Appendix A: Post-Construction Stormwater Management

Post Construction Stormwater Management

Lordstown Energy Center

Village of Lordstown
Trumbull County, Ohio

Prepared By:

Tetra Tech, Inc.

for

Clean Energy Future - Lordstown LLC

February 2015

Lordstown Energy Center
Village of Lordstown
Trumbull County, Ohio

POST CONSTRUCTION STORMWATER MANAGEMENT PLAN

Table of Contents

Attachments

POST CONSTRUCTION STORMWATER MANAGEMENT
PROPOSED LORDSTOWN ENERGY CENTER
VILLAGE OF LORDSTOWN, TRUMBULL COUNTY, OHIO

1.0 PROJECT OVERVIEW

Tetra Tech, Inc. has prepared this preliminary post construction stormwater management (PCSM) evaluation on behalf of Clean Energy Future – Lordstown, LLC to review potential impacts and conceptual mitigation measures associated with the proposed Lordstown Energy Center (LEC) project. The proposed project is construction of an 800 MW natural gas fired combined cycle power plant. The project will be located near the intersection of State Route 45 and Henn Parkway in the Village of Lordstown, Trumbull County, Ohio. The site is situated on the east side of SR 45 approximately 1-mile south of the intersection of Salt Springs Road.

2.0 EXISTING CONDITIONS

The project site exists as a vacant parcel of an area designated for commercial and/or industrial activities. Access to the site is via Henn Parkway from the north and existing driveways from the south and west. The site is gently sloping with elevation ranging from 966' to 952' and drains to the east into an intermittent stream called Mud Creek. The existing surface condition is primarily meadow in good condition with few trees and driveway areas. Existing site soil is predominantly Wadsworth silt loam (hydraulic soil group C). Prior to earth disturbance, a wetland investigation should be performed to identify the presence of any existing wetland areas.

3.0 STORMWATER BEST MANAGEMENT PRACTICE APPROACH

This preliminary PCSM plan provides concepts that can incorporated into the final design of the project site and implemented during and upon completion of construction activities. Each project phase requires a separate approach in regards to the handling of stormwater runoff. During construction, the primary focus of erosion and sediment (E&S) control BMPs is to prevent soil loss and reduce the likelihood of pollution caused by erosion and sedimentation. Upon completion of construction, PCSM BMPs are implemented to mitigate increases in runoff flow rates attributable to development and to promote water quality once the site has become stabilized.

As required by the Ohio Environmental Protection Agency (EPA) General Permit, a Storm Water Pollution Prevention Plan (SWPPP) will be prepared for the proposed project and will remain onsite during each project phase. The SWPPP will provide in-depth detail in regards to pre- vs. post-development site characteristics, site design, E&S control plan and details, PCSM plan and details, and supporting calculations. The SWPPP will be prepared in accordance standards and specifications defined within the Ohio Department of Natural Resources (ODNR) *Rainwater and Land Development Manual*, latest edition, and associated requirements of the Village of Lordstown. A Notice of Intent (NOI) will be submitted to the Ohio EPA for General Permit authorization for discharges associated with construction activities and the SWPPP will be submitted to the Village of Lordstown for review and approval.

<u>During Construction</u>

During construction, the owner and general contractor will be required to comply with planning defined within the approved SWPPP and requirements of the Ohio EPA General Permit. The SWPPP will propose E&S control BMPs to minimize impacts to surface waters caused by erosion and sedimentation. E&S control BMPs will be structural and nonstructural practices that may include, but may not be limited to: a rock construction entrance, compost filter sock barriers, inlet protection, pumped water filter bags, a sediment basin, and temporary/permanent vegetative stabilization.

E&S control BMPs will be designed and maintained in accordance with the *Ohio Rainwater and Land Development Manual*. The SWPPP will define a sequence of construction that minimizes the amount of earth disturbance to that which is necessary to complete the project objective. A rock construction entrance will be installed to prevent the tracking of mud onto public roadways. Filter sock barriers will be installed down slope of disturbed areas to prevent offsite conveyance of sediment caused by sheet flow. Inlet protection will prevent sediment from entering existing storm sewers that discharge into downstream receiving waters. A sediment basin will be installed to allow settling time for runoff collected from disturbed areas prior to offsite discharge. The sediment basin will be converted into a permanent stormwater detention basin once the site has achieved stabilization upon completion of construction and basin outlet structure will be designed for dual purpose use and will be modified as necessary during project phasing. All E&S control BMPs will be maintained during construction by removing accumulated sediment and will be repaired/replaced when necessary. Upon completion of construction, all previously disturbed areas not otherwise stabilized with pavement or aggregate will be stabilized using permanent vegetation.

<u>Post Construction</u>

Upon completion of construction, the owner and general contractor will still be required to comply with planning defined within the approved SWPPP and requirements of the Ohio EPA General Permit. The SWPPP will propose PCSM BMPs that mitigate flow rate increases attributable to site development and to promote water quality. PCSM BMPs will be structural practices that may include, but may not be limited to a detention basin and vegetated bio-swales.

A hydrologic model has been prepared based on the preliminary site layout plan to develop PCSM BMP concepts that will be most suitable for the project site. The hydrologic model provides a pre- vs. post-development comparison of anticipated runoff flow rates. The flow rate comparison is used to approximate basin capacity and configuration of an outlet structure for a detention basin that will reduce post-development flow rates to rates that are less than or equal to the pre-development site condition. Conceptual sizing and location of a detention basin has been determined and identified on Figure 1; the basin has also been implemented within the hydrologic model. The model demonstrates that the detention basin will achieve its intended purpose of flow rate reduction. Performance characteristics are summarized Table 1.

Table 1

Pre- vs Post-Development Peak Discharge			
Storm Event	**Pre-Dev**	**Post-Dev**	**Difference**
year	cfs	cfs	cfs
2	7.01	5.04	-1.97
10	18.40	17.24	-1.16
25	26.63	21.17	-5.46
50	33.95	24.22	-9.73
100	41.98	27.30	-14.68

In addition to flow rate reduction, the detention basin also includes capacity for water quality volume (WQv). WQv is a post-construction stormwater control requirement of the Ohio EPA General Permit and is a volume of water collected via stormwater runoff that must be retained on site and treated through the use of methods such as infiltration, evaporation, vegetative uptake, or a combination thereof. WQv is calculated using an equation defined in the ODNR and for the purpose of this evaluation has been determined as summarized in Table 2.

Table 2

WQv = C x P x A / 12	
C = Runoff Coefficient	0.8
P = precipitation (in)	0.75
A = BMP drainage area (ac)	12
WQv (ac-ft)	0.60

Table 3

Runoff Coefficient per Land Use	
Industrial / Commercial	0.8
High Density Residential	0.5
Medium Density Residential	0.4
Low Density Residential	0.3
Open Space	0.2

Additional PCSM BMPs can be implemented in conjunction with the detention basin based on completion of the final design. Areas where vegetated bioswales would likely be installed have been identified on Figure 1. For the purpose of this evaluation, sizing and capacity of bioswales has not been determined since the detention basin alone is sufficient to achieve the required stormwater management objectives.

4.0 SUMMARY

The purpose of this evaluation is to develop conceptual ideas in relation to post construction stormwater management planning for the proposed Lordstown Energy Center project. The material contained herein is subject to change based on final site design. Upon completion of the final design, a SWPPP will be prepared for approval by the Village of Lordstown and an NOI for issuance of an Ohio EPA General Permit. The SWPPP will specify E&S control BMPs and PCSM BMPs that will be implemented during various phases of construction. This evaluation demonstrates that BMPs can be developed of sufficient size and capacity in locations that will achieve the required stormwater management objectives.

Attachment A

Post Construction Stormwater Management Plan (Preliminary)

NOTES:

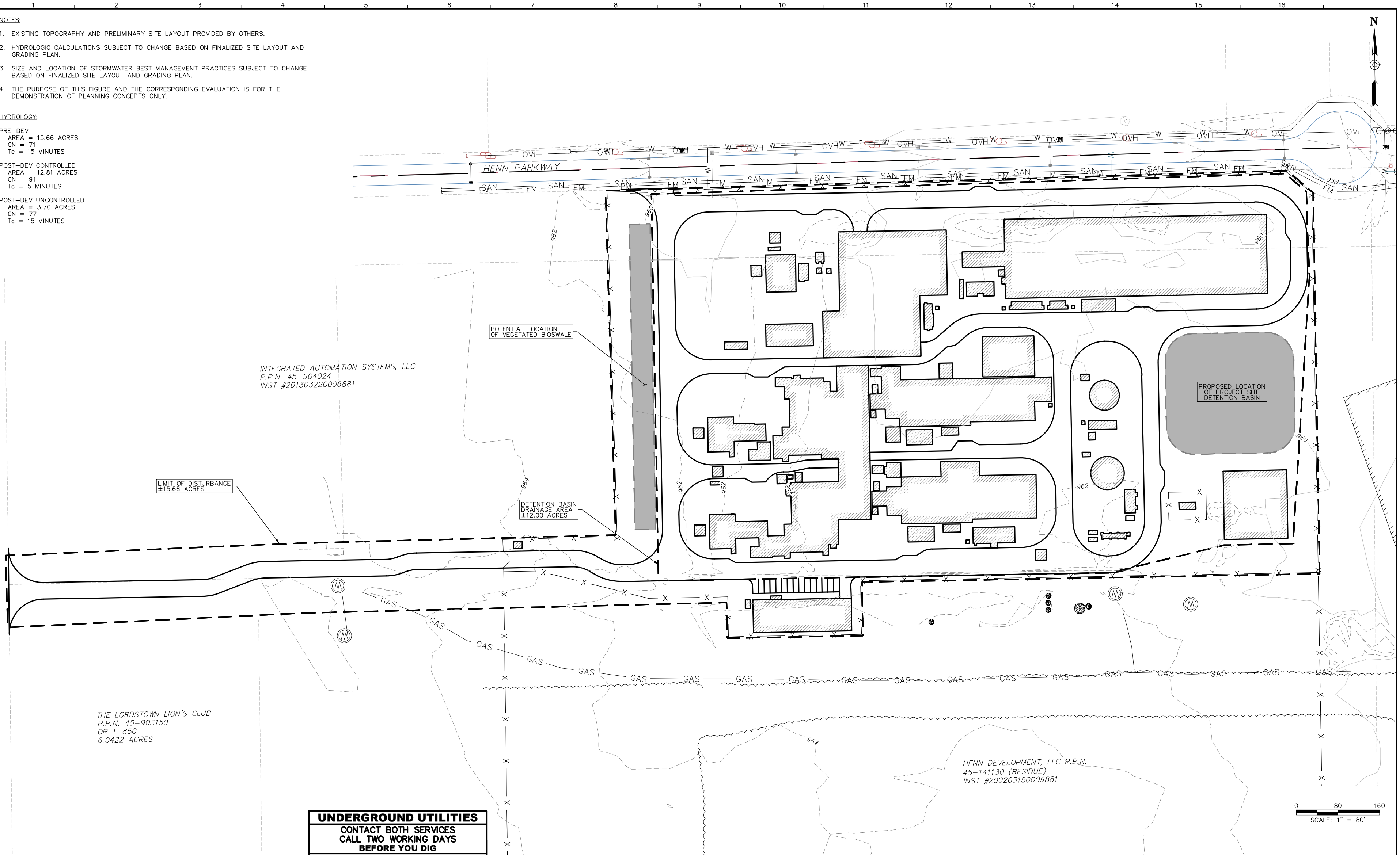
1. EXISTING TOPOGRAPHY AND PRELIMINARY SITE LAYOUT PROVIDED BY OTHERS.
2. HYDROLOGIC CALCULATIONS SUBJECT TO CHANGE BASED ON FINALIZED SITE LAYOUT AND GRADING PLAN.
3. SIZE AND LOCATION OF STORMWATER BEST MANAGEMENT PRACTICES SUBJECT TO CHANGE BASED ON FINALIZED SITE LAYOUT AND GRADING PLAN.
4. THE PURPOSE OF THIS FIGURE AND THE CORRESPONDING EVALUATION IS FOR THE DEMONSTRATION OF PLANNING CONCEPTS ONLY.

HYDROLOGY:

PRE-DEV
AREA = 15.66 ACRES
CN = 71
Tc = 15 MINUTES

POST-DEV CONTROLLED
AREA = 12.81 ACRES
CN = 91
Tc = 5 MINUTES

POST-DEV UNCONTROLLED
AREA = 3.70 ACRES
CN = 77
Tc = 15 MINUTES



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MARK	DATE	DESCRIPTION	BY

CLEAN ENERGY FUTURE-LORDSTOWN, LLC

POST CONSTRUCTION STORMWATER MANAGEMENT
PROPOSED LORDSTOWN ENERGY CENTER
TRUMBULL COUNTY, OHIO

DATE:	02/11/15
PROJECT NO.:	194-5090
DESIGNED BY:	BMC
DRAWN BY:	MAB
CHECKED BY:	BMC
SHEET:	1 OF 1

FIGURE-1

Attachment B

Custom Soil Resource Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Trumbull County, Ohio

February 4, 2015

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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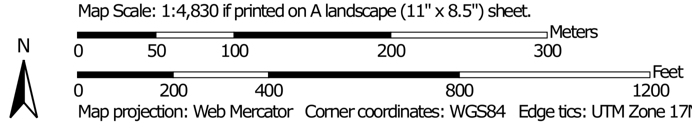
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:4,830 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N 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: http://websoilsurvey.nrcs.usda.gov
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: Trumbull County, Ohio
Survey Area Data: Version 12, Sep 19, 2014

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

Date(s) aerial images were photographed: Oct 7, 2011—Mar 14, 2012

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

Trumbull County, Ohio (OH155)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Ho	Holly silt loam, frequently flooded	5.0	6.8%
RsB	Rittman silt loam, 2 to 6 percent slopes	8.4	11.3%
RsC	Rittman silt loam, 6 to 12 percent slopes	0.8	1.1%
Sc	Sebring silt loam, till substratum	4.9	6.6%
W	Water	1.4	1.9%
WbA	Wadsworth silt loam, 0 to 2 percent slopes	51.1	68.8%
WbB	Wadsworth silt loam, 2 to 6 percent slopes	2.7	3.6%
Totals for Area of Interest		**74.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Trumbull County, Ohio

Ho—Holly silt loam, frequently flooded

Map Unit Setting

National map unit symbol: 9mq3
Elevation: 800 to 840 feet
Mean annual precipitation: 30 to 42 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 133 to 195 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Holly and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Holly

Setting

Landform: Flood plains
Parent material: Loamy alluvium

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 33 inches: silt loam
H3 - 33 to 45 inches: sandy loam
H4 - 45 to 68 inches: stratified gravelly sand to silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water storage in profile: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Other vegetative classification: Unnamed (G139XYC-3OH)

Minor Components

Orrville

Percent of map unit: 8 percent
Landform: Flood plains

Soils subject to ponding

Percent of map unit: 7 percent
Landform: Flood plains

RsB—Rittman silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 9msk
Mean annual precipitation: 32 to 42 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 140 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Rittman and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rittman

Setting

Landform: Knolls on till plains
Landform position (three-dimensional): Side slope
Parent material: Till

Typical profile

H1 - 0 to 16 inches: silt loam
H2 - 16 to 28 inches: clay loam
H3 - 28 to 46 inches: clay loam
H4 - 46 to 72 inches: silty clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 18 to 36 inches to fragipan
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 8 percent
Available water storage in profile: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Other vegetative classification: Unnamed (G139XYF-3OH)

Minor Components

Wadsworth

Percent of map unit: 15 percent
Landform: Till plains

RsC—Rittman silt loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: 9msl
Mean annual precipitation: 32 to 42 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 140 to 195 days
Farmland classification: Farmland of local importance

Map Unit Composition

Rittman and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rittman

Setting

Landform: Ridges on till plains, drainageways on till plains
Landform position (three-dimensional): Side slope
Parent material: Till

Typical profile

H1 - 0 to 16 inches: silt loam
H2 - 16 to 28 inches: clay loam
H3 - 28 to 46 inches: clay loam
H4 - 46 to 72 inches: silty clay loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 18 to 36 inches to fragipan
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 8 percent
Available water storage in profile: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Other vegetative classification: Unnamed (G139XYF-3OH)

Minor Components

Wadsworth

Percent of map unit: 10 percent
Landform: Till plains

Sc—Sebring silt loam, till substratum

Map Unit Setting

National map unit symbol: 9mss
Elevation: 810 to 1,220 feet
Mean annual precipitation: 31 to 42 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 133 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Sebring and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sebring

Setting

Landform: Flats on till plains
Parent material: Lacustrine deposits

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 49 inches: silt loam
H3 - 49 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water storage in profile: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D

Minor Components

Wadsworth

Percent of map unit: 5 percent
Landform: Till plains

Ravenna

Percent of map unit: 5 percent
Landform: Till plains

Lorain

Percent of map unit: 5 percent
Landform: Till plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

WbA—Wadsworth silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 9mm2
Elevation: 1,000 to 1,210 feet
Mean annual precipitation: 32 to 42 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 133 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Wadsworth and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wadsworth

Setting

Landform: Flats on till plains
Landform position (three-dimensional): Side slope
Parent material: Till

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 25 inches: silty clay loam
H3 - 25 to 48 inches: clay loam
H4 - 48 to 80 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 18 to 30 inches to fragipan
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)

Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D

Minor Components

Sebring

Percent of map unit: 8 percent
Landform: Depressions

Rittman

Percent of map unit: 7 percent
Landform: Till plains

WbB—Wadsworth silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 9mm3
Elevation: 1,000 to 1,210 feet
Mean annual precipitation: 32 to 42 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 133 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Wadsworth and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wadsworth

Setting

Landform: Knolls on till plains
Landform position (three-dimensional): Side slope
Parent material: Till

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 25 inches: silty clay loam
H3 - 25 to 48 inches: clay loam
H4 - 48 to 80 inches: clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 18 to 30 inches to fragipan

Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D

Minor Components

Sebring

Percent of map unit: 8 percent
Landform: Depressions

Rittman

Percent of map unit: 7 percent
Landform: Till plains

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

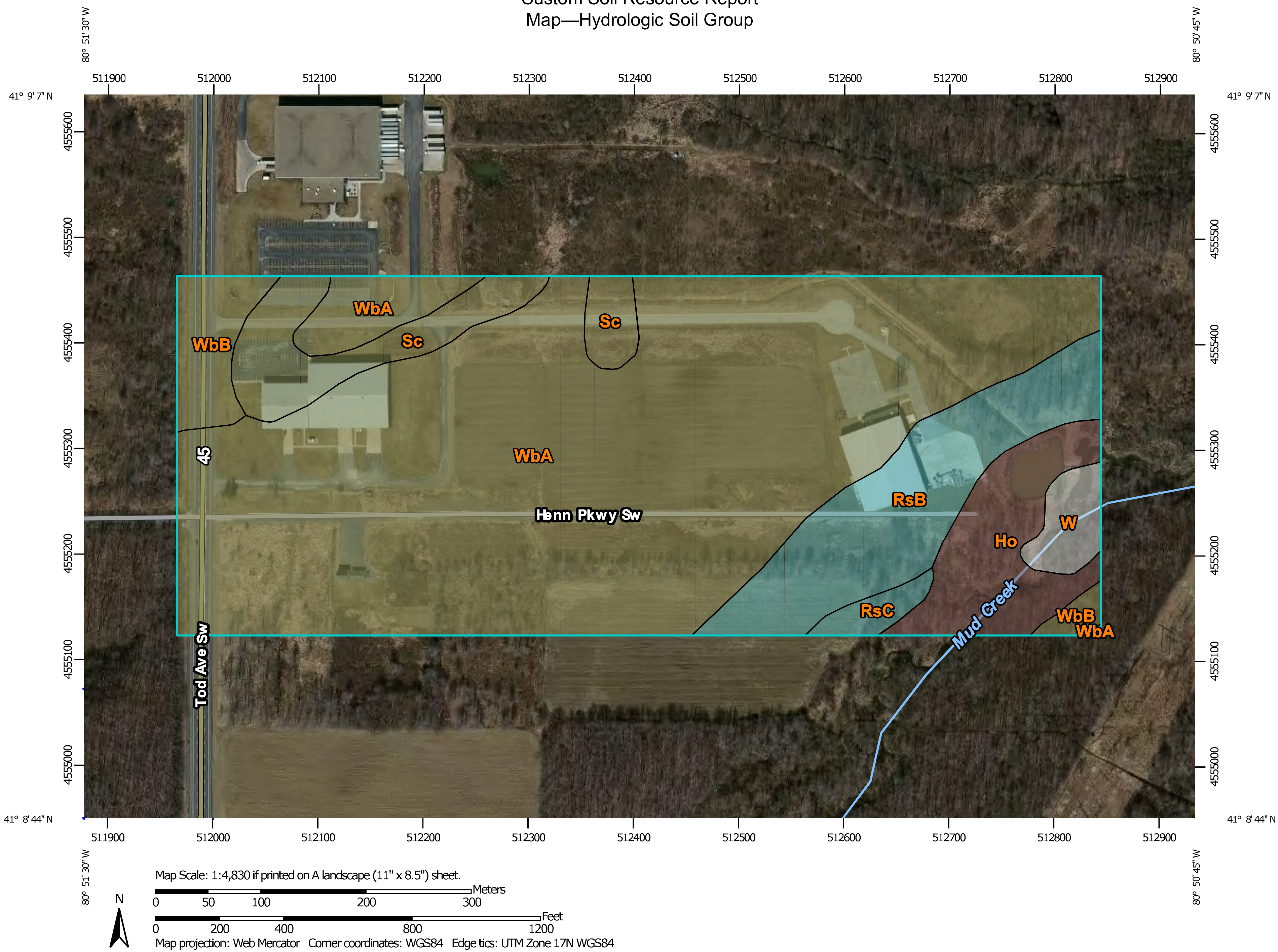
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map—Hydrologic Soil Group



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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: http://websoilsurvey.nrcs.usda.gov
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: Trumbull County, Ohio
Survey Area Data: Version 12, Sep 19, 2014

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

Date(s) aerial images were photographed: Oct 7, 2011—Mar 14, 2012

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.

Table—Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Trumbull County, Ohio (OH155)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Ho	Holly silt loam, frequently flooded	B/D	5.0	6.8%
RsB	Rittman silt loam, 2 to 6 percent slopes	C	8.4	11.3%
RsC	Rittman silt loam, 6 to 12 percent slopes	C	0.8	1.1%
Sc	Sebring silt loam, till substratum	C/D	4.9	6.6%
W	Water		1.4	1.9%
WbA	Wadsworth silt loam, 0 to 2 percent slopes	C/D	51.1	68.8%
WbB	Wadsworth silt loam, 2 to 6 percent slopes	C/D	2.7	3.6%
Totals for Area of Interest			**74.2**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Attachment C

NOAA Point Precipitation Frequency Estimates

NOAA Atlas 14, Volume 2, Version 3
Location name: Warren, Ohio, US*
Latitude: 41.1493°, Longitude: -80.8517°
Elevation: 959ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.313 (0.282-0.348)	0.373 (0.336-0.416)	0.452 (0.406-0.504)	0.513 (0.459-0.569)	0.590 (0.526-0.655)	0.648 (0.576-0.718)	0.705 (0.625-0.780)	0.763 (0.674-0.843)	0.839 (0.738-0.926)	0.895 (0.782-0.987)
10-min	0.487 (0.438-0.541)	0.583 (0.524-0.650)	0.703 (0.631-0.783)	0.792 (0.709-0.879)	0.902 (0.804-1.00)	0.983 (0.873-1.09)	1.06 (0.941-1.17)	1.14 (1.01-1.26)	1.23 (1.08-1.36)	1.30 (1.14-1.44)
15-min	0.597 (0.537-0.664)	0.713 (0.641-0.795)	0.863 (0.775-0.961)	0.974 (0.872-1.08)	1.11 (0.994-1.24)	1.22 (1.08-1.35)	1.32 (1.17-1.46)	1.42 (1.25-1.57)	1.54 (1.35-1.70)	1.63 (1.42-1.80)
30-min	0.790 (0.710-0.878)	0.954 (0.858-1.06)	1.18 (1.06-1.32)	1.35 (1.21-1.50)	1.57 (1.40-1.75)	1.74 (1.55-1.93)	1.90 (1.69-2.11)	2.07 (1.83-2.28)	2.28 (2.01-2.52)	2.44 (2.13-2.69)
60-min	0.964 (0.867-1.07)	1.17 (1.05-1.31)	1.48 (1.33-1.65)	1.72 (1.54-1.91)	2.04 (1.82-2.27)	2.29 (2.04-2.54)	2.55 (2.26-2.82)	2.81 (2.48-3.10)	3.16 (2.77-3.48)	3.43 (3.00-3.78)
2-hr	1.12 (1.01-1.24)	1.35 (1.22-1.50)	1.72 (1.55-1.90)	2.00 (1.80-2.20)	2.38 (2.14-2.62)	2.69 (2.40-2.95)	3.00 (2.67-3.29)	3.33 (2.95-3.64)	3.77 (3.32-4.12)	4.11 (3.59-4.48)
3-hr	1.18 (1.07-1.31)	1.43 (1.30-1.58)	1.81 (1.64-2.00)	2.11 (1.91-2.32)	2.52 (2.27-2.76)	2.85 (2.56-3.12)	3.19 (2.85-3.49)	3.55 (3.15-3.86)	4.04 (3.55-4.39)	4.43 (3.87-4.80)
6-hr	1.42 (1.29-1.56)	1.71 (1.56-1.88)	2.14 (1.95-2.35)	2.49 (2.26-2.72)	2.98 (2.70-3.25)	3.38 (3.05-3.67)	3.80 (3.40-4.11)	4.23 (3.78-4.57)	4.85 (4.29-5.22)	5.34 (4.68-5.74)
12-hr	1.67 (1.52-1.85)	2.00 (1.82-2.22)	2.48 (2.25-2.74)	2.87 (2.60-3.17)	3.44 (3.09-3.78)	3.90 (3.49-4.28)	4.39 (3.91-4.80)	4.90 (4.33-5.34)	5.63 (4.93-6.12)	6.22 (5.41-6.74)
24-hr	2.00 (1.86-2.15)	2.39 (2.23-2.58)	2.94 (2.73-3.17)	3.38 (3.14-3.64)	4.00 (3.69-4.30)	4.51 (4.14-4.83)	5.04 (4.61-5.40)	5.59 (5.08-5.98)	6.35 (5.72-6.82)	6.97 (6.23-7.48)
2-day	2.31 (2.16-2.48)	2.76 (2.58-2.96)	3.35 (3.13-3.60)	3.83 (3.56-4.11)	4.49 (4.16-4.81)	5.02 (4.63-5.38)	5.56 (5.11-5.96)	6.12 (5.60-6.57)	6.89 (6.24-7.41)	7.49 (6.73-8.07)
3-day	2.47 (2.31-2.64)	2.94 (2.76-3.15)	3.56 (3.34-3.81)	4.05 (3.79-4.33)	4.73 (4.40-5.05)	5.27 (4.88-5.63)	5.82 (5.37-6.22)	6.38 (5.86-6.83)	7.14 (6.50-7.66)	7.73 (6.99-8.31)
4-day	2.62 (2.47-2.80)	3.12 (2.94-3.33)	3.77 (3.54-4.02)	4.28 (4.01-4.56)	4.97 (4.64-5.29)	5.51 (5.14-5.88)	6.07 (5.63-6.47)	6.64 (6.12-7.08)	7.39 (6.77-7.91)	7.98 (7.25-8.56)
7-day	3.10 (2.92-3.28)	3.68 (3.48-3.90)	4.41 (4.16-4.68)	5.00 (4.71-5.29)	5.79 (5.44-6.13)	6.42 (6.00-6.80)	7.05 (6.56-7.47)	7.68 (7.12-8.15)	8.54 (7.85-9.09)	9.20 (8.41-9.83)
10-day	3.56 (3.37-3.77)	4.22 (4.00-4.47)	5.02 (4.75-5.31)	5.65 (5.34-5.97)	6.48 (6.11-6.85)	7.14 (6.71-7.55)	7.79 (7.30-8.24)	8.43 (7.87-8.94)	9.29 (8.62-9.86)	9.94 (9.17-10.6)
20-day	4.98 (4.73-5.26)	5.88 (5.57-6.21)	6.90 (6.53-7.28)	7.67 (7.26-8.10)	8.69 (8.20-9.17)	9.46 (8.91-9.99)	10.2 (9.59-10.8)	10.9 (10.2-11.6)	11.9 (11.1-12.6)	12.6 (11.7-13.4)
30-day	6.25 (5.95-6.58)	7.35 (6.99-7.74)	8.52 (8.11-8.96)	9.43 (8.96-9.91)	10.6 (10.1-11.2)	11.5 (10.9-12.1)	12.4 (11.7-13.0)	13.2 (12.4-13.9)	14.3 (13.4-15.1)	15.1 (14.1-16.0)
45-day	7.97 (7.61-8.36)	9.34 (8.91-9.78)	10.7 (10.2-11.2)	11.7 (11.2-12.3)	13.0 (12.4-13.6)	14.0 (13.3-14.7)	14.9 (14.2-15.7)	15.8 (15.0-16.6)	16.9 (16.0-17.8)	17.7 (16.6-18.7)
60-day	9.64 (9.24-10.1)	11.3 (10.8-11.8)	12.8 (12.2-13.4)	13.9 (13.3-14.6)	15.3 (14.7-16.1)	16.4 (15.6-17.1)	17.3 (16.5-18.1)	18.2 (17.3-19.1)	19.3 (18.3-20.2)	20.0 (18.9-21.1)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

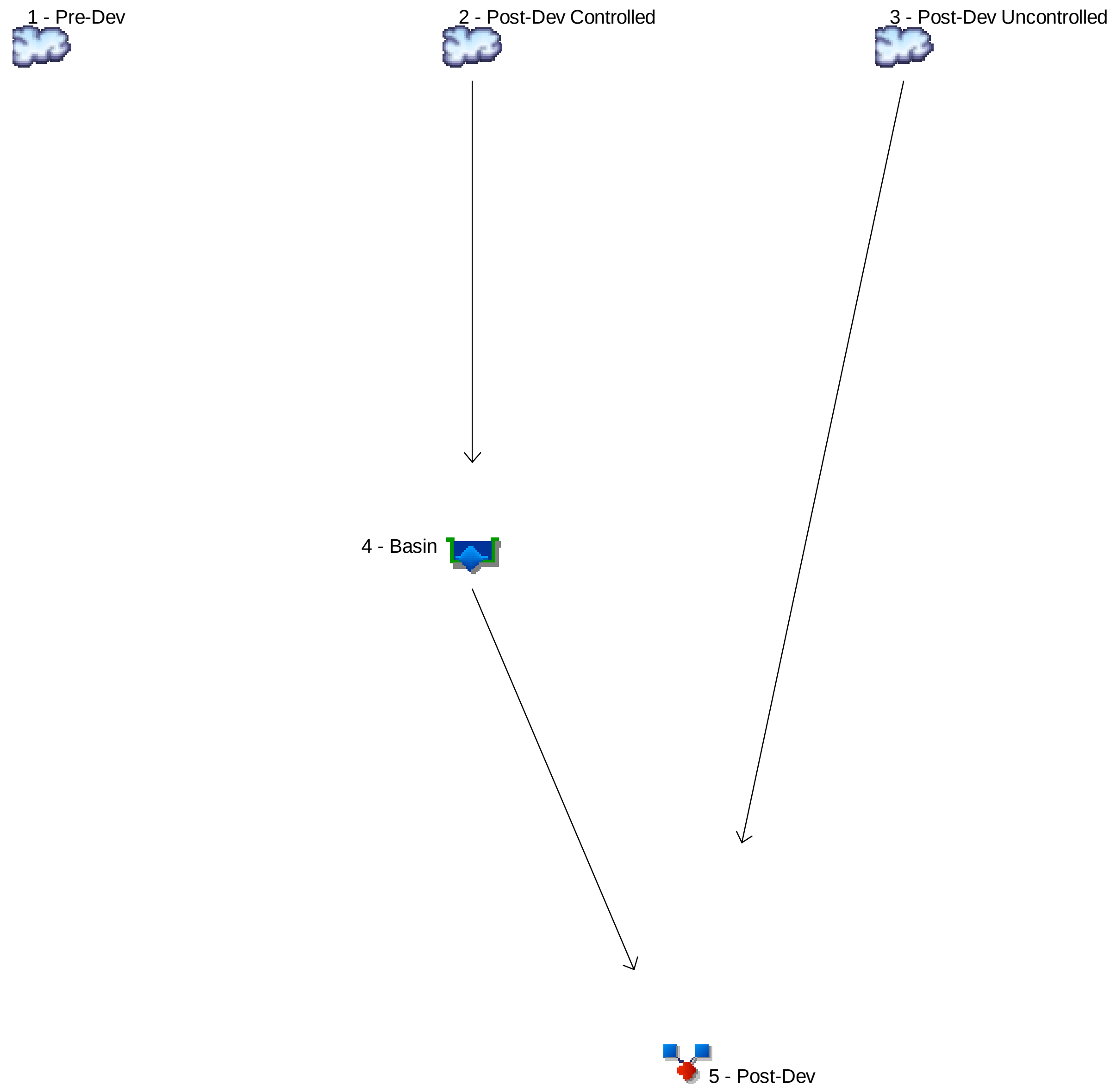
PF graphical

Attachment D

Hydrologic Calculations

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3



Project: lordstown.gpw	Wednesday, 02 / 11 / 2015

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	7.006	-------	-------	18.40	26.63	33.95	41.98	Pre-Dev
2	SCS Runoff	------	-------	32.07	-------	-------	50.38	61.82	71.20	80.91	Post-Dev Controlled
3	SCS Runoff	------	-------	2.936	-------	-------	6.155	8.413	10.35	12.41	Post-Dev Uncontrolled
4	Reservoir	2	-------	3.249	-------	-------	11.11	12.85	14.02	15.08	Basin
5	Combine	3, 4	-------	5.042	-------	-------	17.24	21.17	24.22	27.30	Post-Dev

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

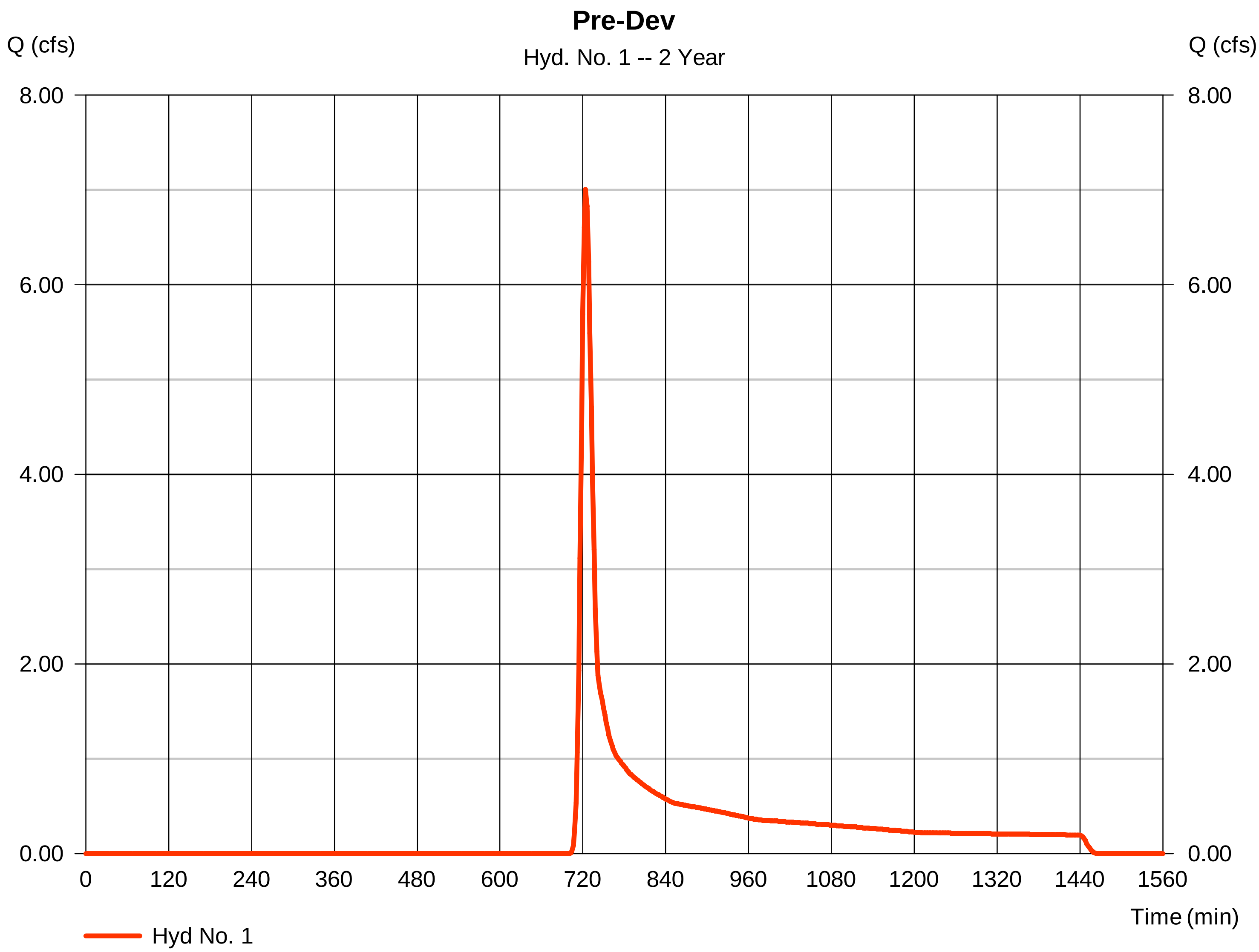
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	7.006	2	724	24,240	------	------	------	Pre-Dev
2	SCS Runoff	32.07	2	716	65,856	------	------	------	Post-Dev Controlled
3	SCS Runoff	2.936	2	724	8,804	------	------	------	Post-Dev Uncontrolled
4	Reservoir	3.249	2	742	38,485	2	958.68	36,414	Basin
5	Combine	5.042	2	728	47,289	3, 4	------	------	Post-Dev

Hydrograph Report

Hyd. No. 1

Pre-Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 7.006 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 24,240 cuft
Drainage area	= 15.660 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.39 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



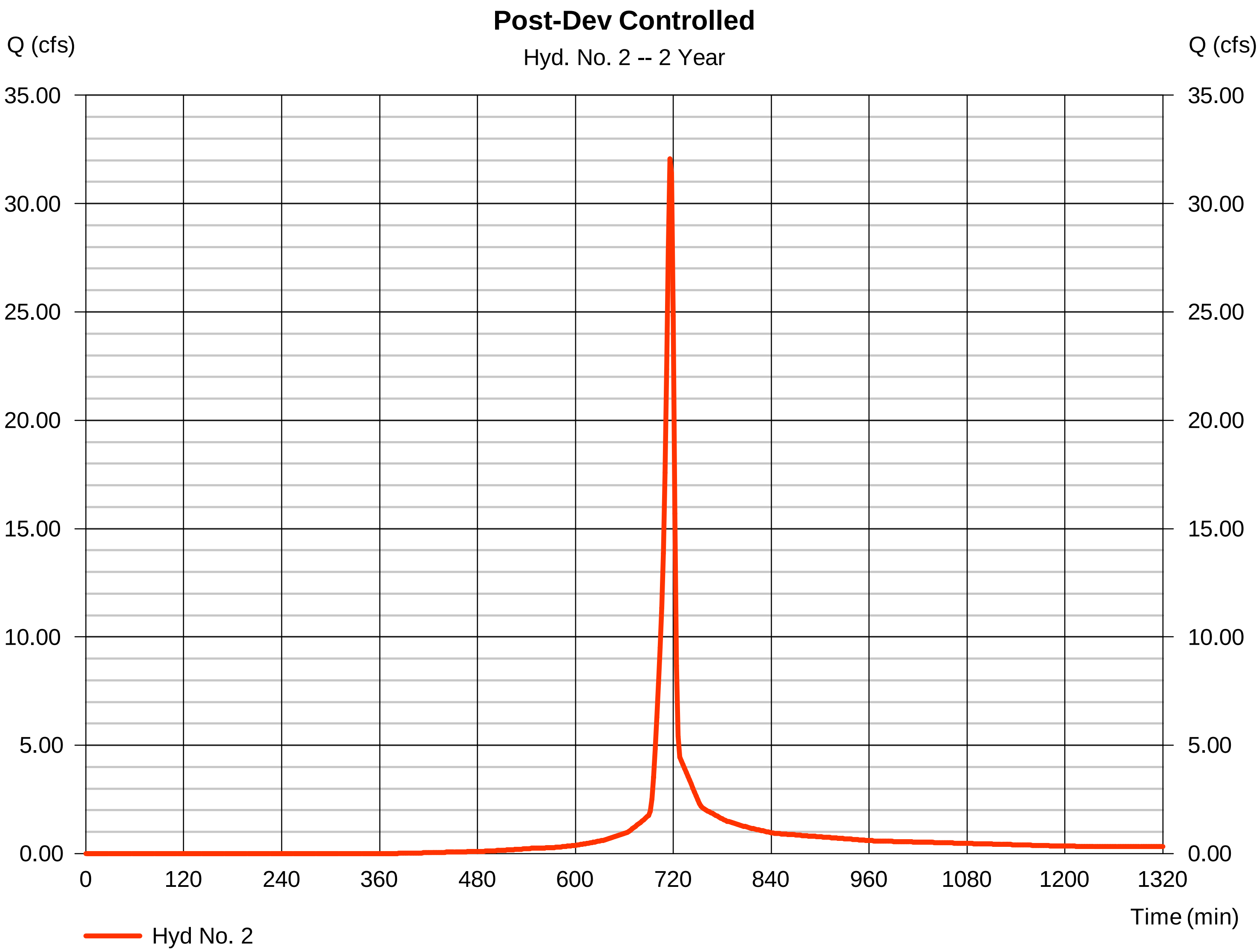
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 02 / 11 / 2015

Hyd. No. 2

Post-Dev Controlled

Hydrograph type	= SCS Runoff	Peak discharge	= 32.07 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 65,856 cuft
Drainage area	= 12.810 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.39 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

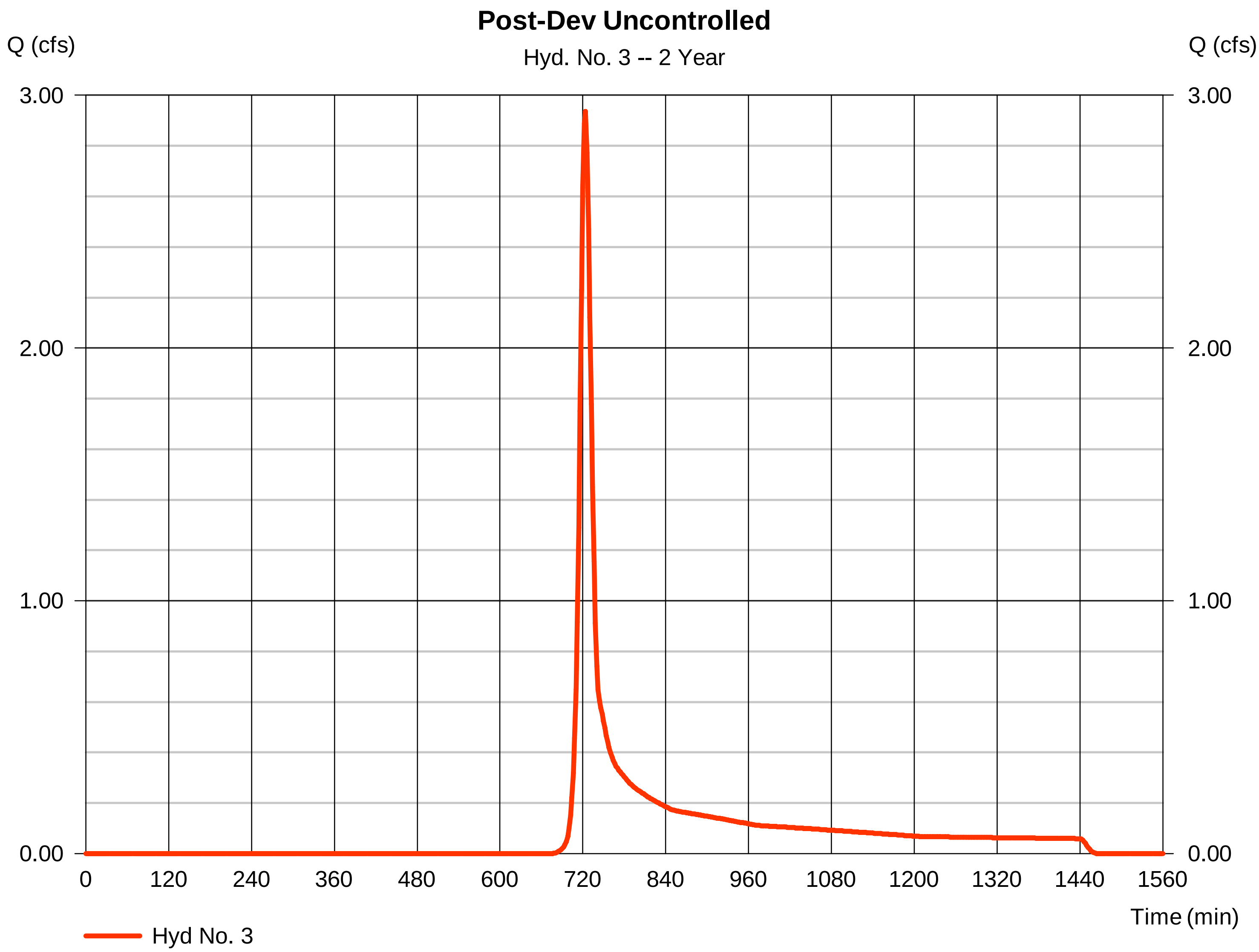


Hydrograph Report

Hyd. No. 3

Post-Dev Uncontrolled

Hydrograph type	= SCS Runoff	Peak discharge	= 2.936 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 8,804 cuft
Drainage area	= 3.700 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.39 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

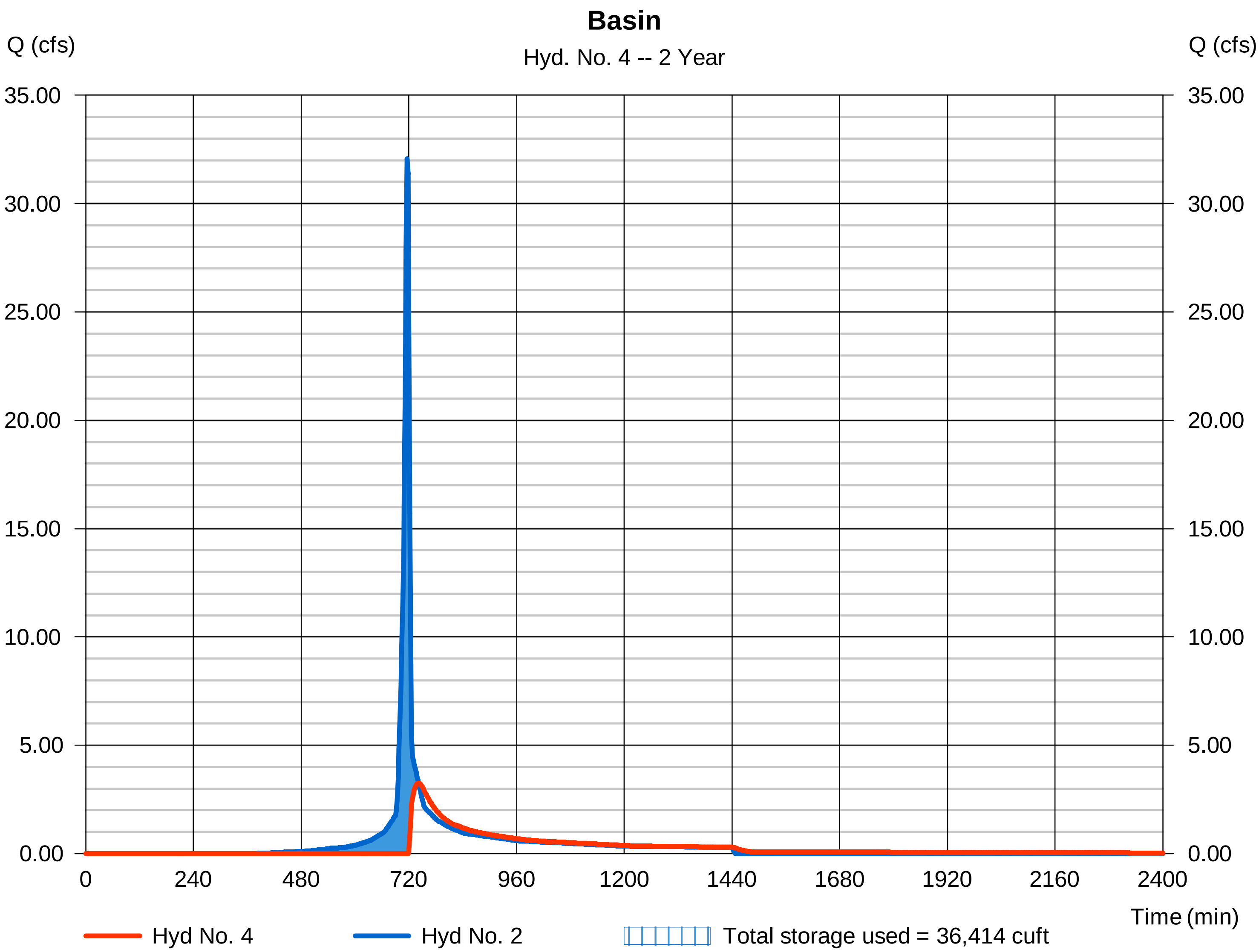
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 02 / 11 / 2015

Hyd. No. 4

Basin

Hydrograph type	= Reservoir	Peak discharge	= 3.249 cfs
Storm frequency	= 2 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 38,485 cuft
Inflow hyd. No.	= 2 - Post-Dev Controlled	Max. Elevation	= 958.68 ft
Reservoir name	= Basin	Max. Storage	= 36,414 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Basin

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 957.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	957.00	20,183	0	0
1.00	958.00	21,821	20,995	20,995
2.00	959.00	23,516	22,661	43,656
3.00	960.00	25,268	24,384	68,040
4.00	961.00	27,076	26,164	94,204
5.00	962.00	28,941	28,000	122,205

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	3.00	0.00	0.00
Span (in)	= 18.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 957.00	958.25	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	0.00	0.00
Crest El. (ft)	= 958.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

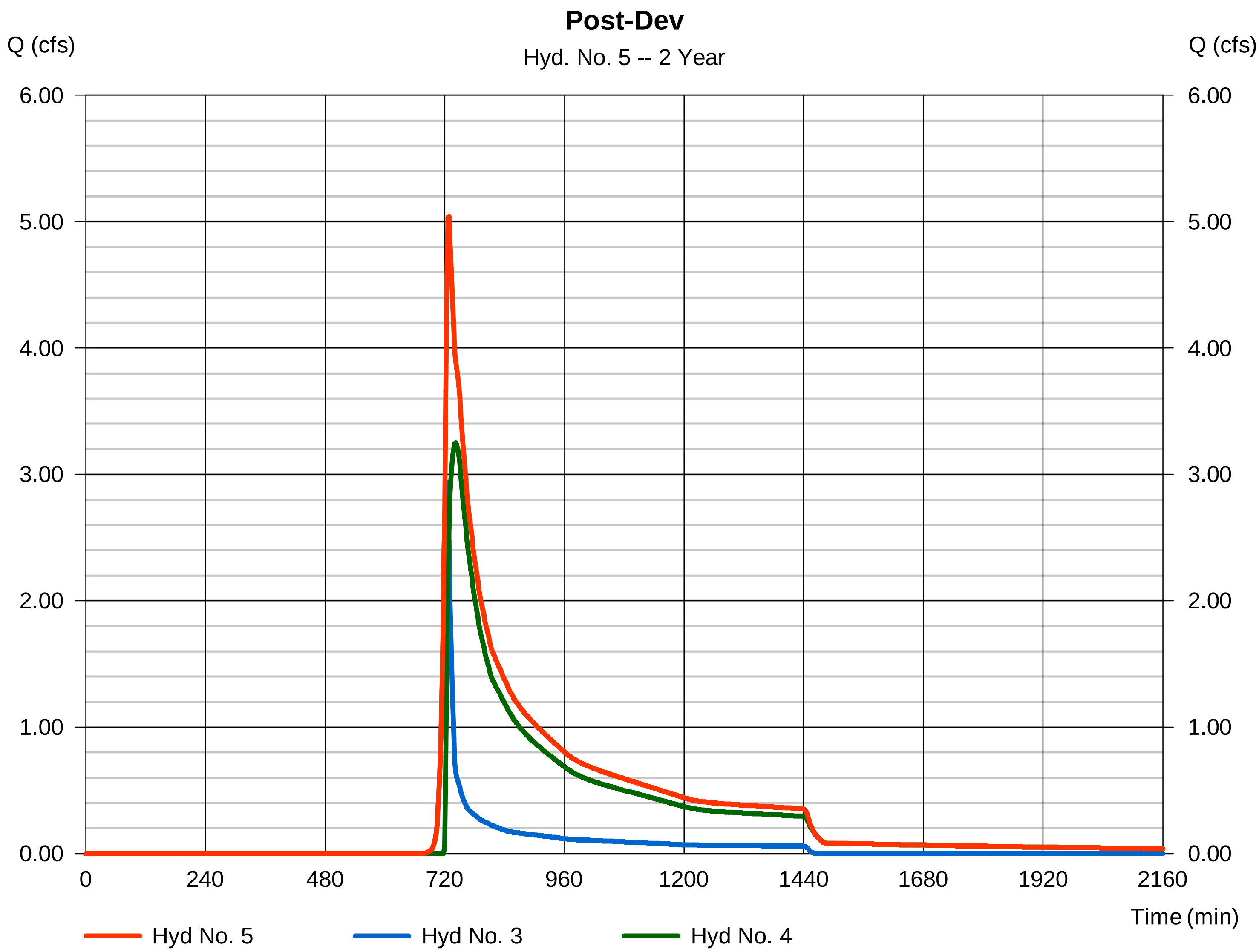
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	957.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.00	20,995	958.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.00	43,656	959.00	9.08 ic	0.19 ic	---	---	9.07 s	---	---	---	---	---	9.262
3.00	68,040	960.00	12.73 ic	0.30 ic	---	---	12.72 s	---	---	---	---	---	13.02
4.00	94,204	961.00	15.33 ic	0.38 ic	---	---	15.27 s	---	---	---	---	---	15.65
5.00	122,205	962.00	17.53 ic	0.45 ic	---	---	17.41 s	---	---	---	---	---	17.86

Hydrograph Report

Hyd. No. 5

Post-Dev

Hydrograph type	= Combine	Peak discharge	= 5.042 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 47,289 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 3.700 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	18.40	2	724	54,773	------	------	------	Pre-Dev
2	SCS Runoff	50.38	2	716	105,833	------	------	------	Post-Dev Controlled
3	SCS Runoff	6.155	2	722	17,574	------	------	------	Post-Dev Uncontrolled
4	Reservoir	11.11	2	724	78,459	2	959.42	53,756	Basin
5	Combine	17.24	2	724	96,032	3, 4	------	------	Post-Dev

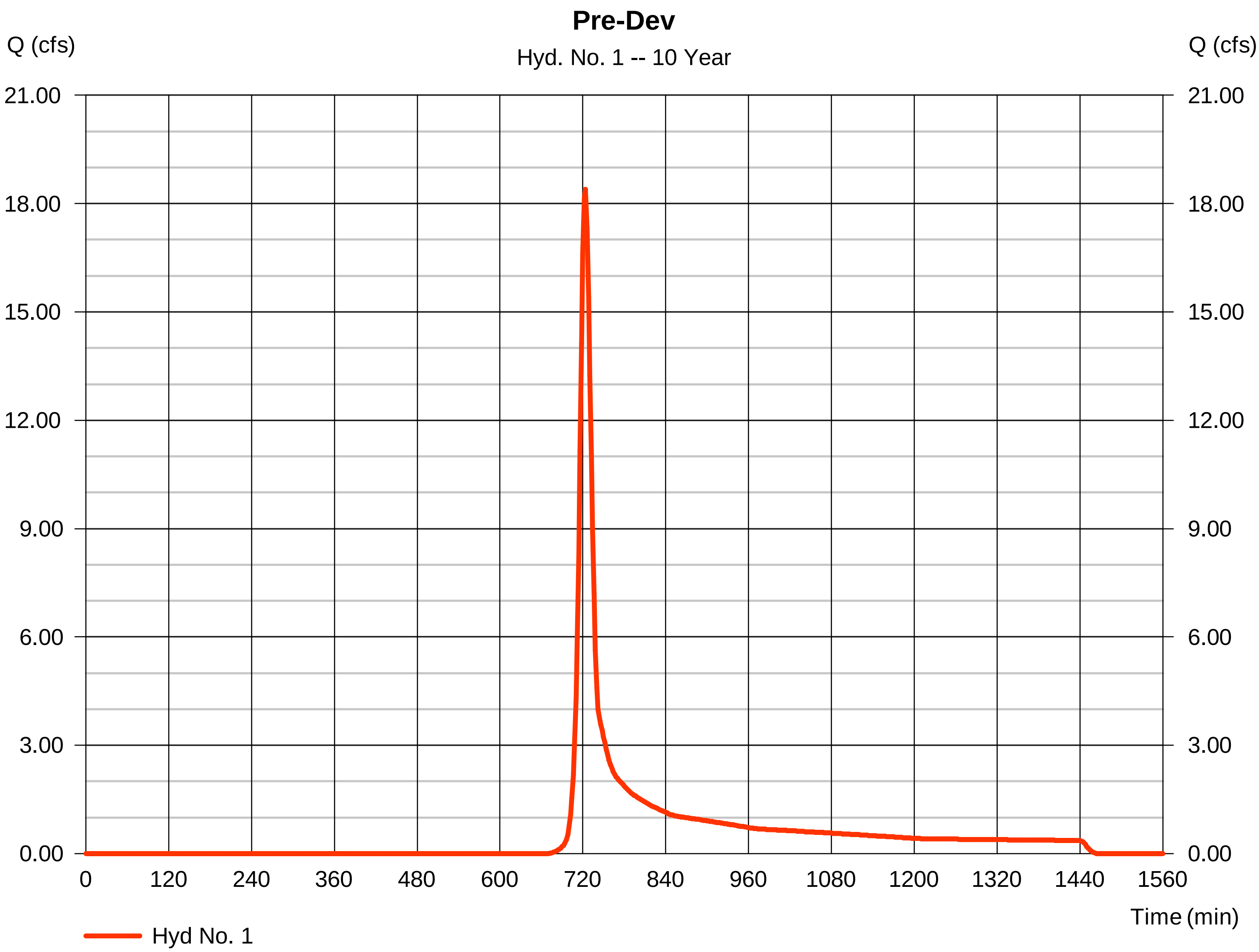
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 02 / 11 / 2015

Hyd. No. 1

Pre-Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 18.40 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 54,773 cuft
Drainage area	= 15.660 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.38 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



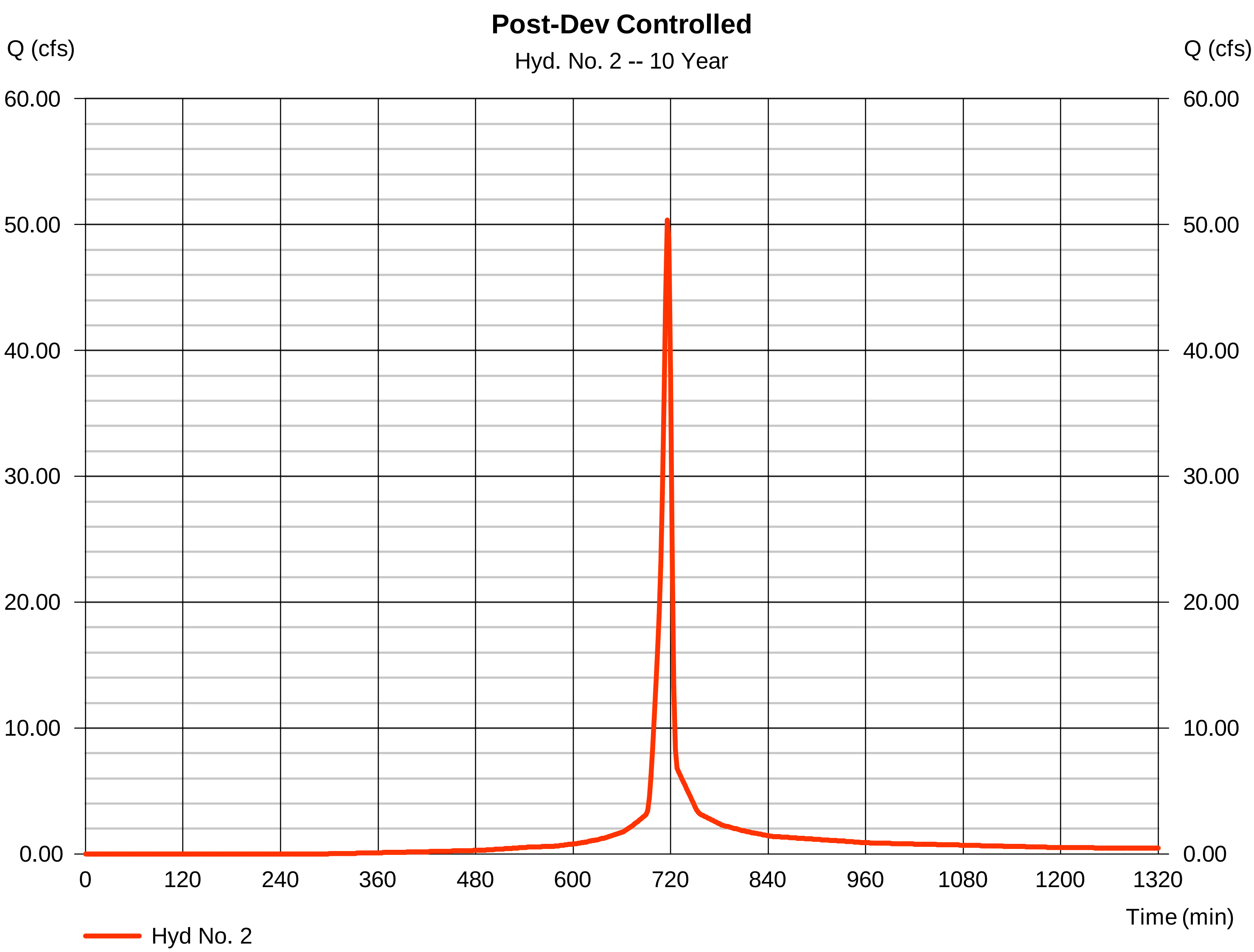
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 02 / 11 / 2015

Hyd. No. 2

Post-Dev Controlled

Hydrograph type	= SCS Runoff	Peak discharge	= 50.38 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 105,833 cuft
Drainage area	= 12.810 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.38 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

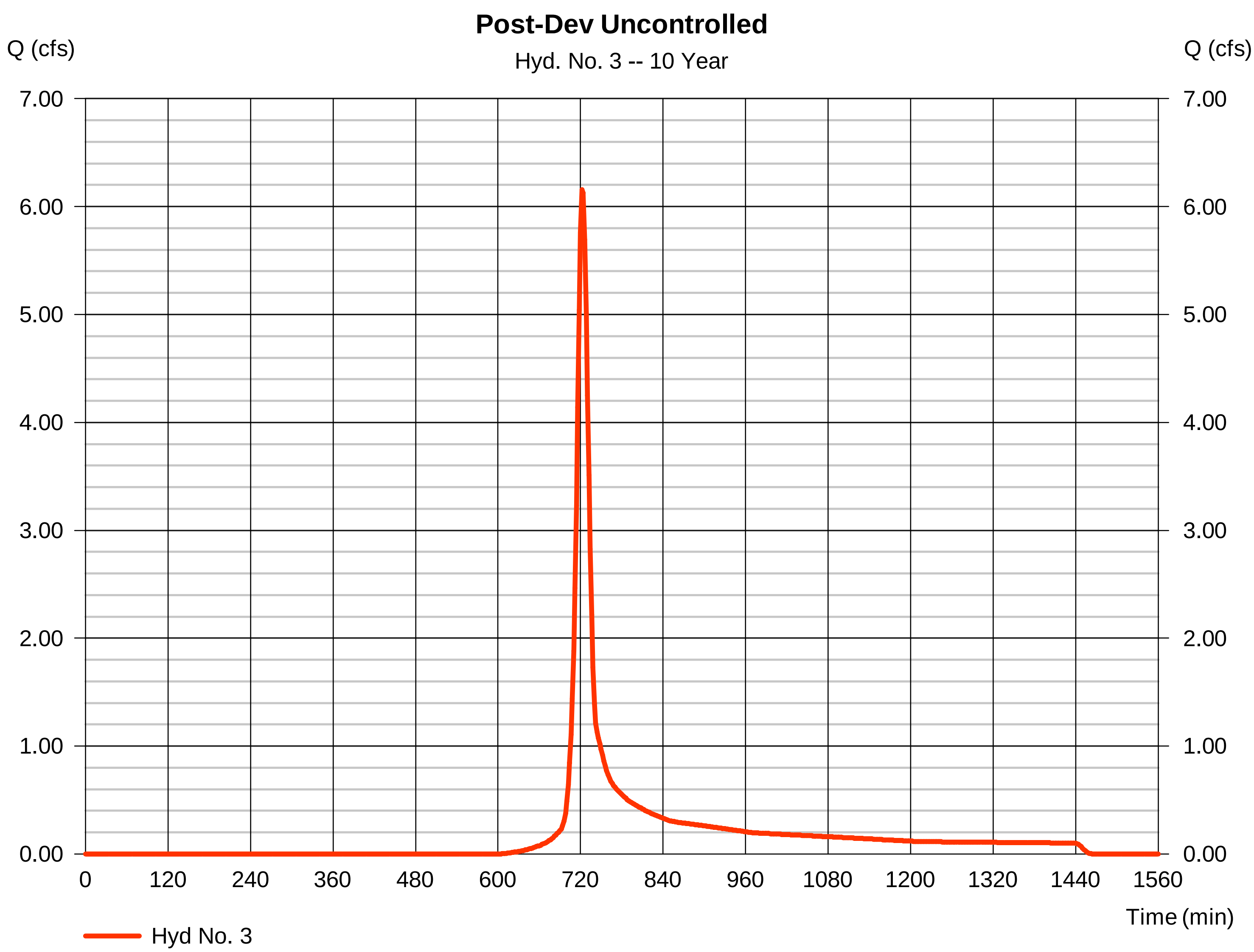


Hydrograph Report

Hyd. No. 3

Post-Dev Uncontrolled

Hydrograph type	= SCS Runoff	Peak discharge	= 6.155 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 17,574 cuft
Drainage area	= 3.700 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.38 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

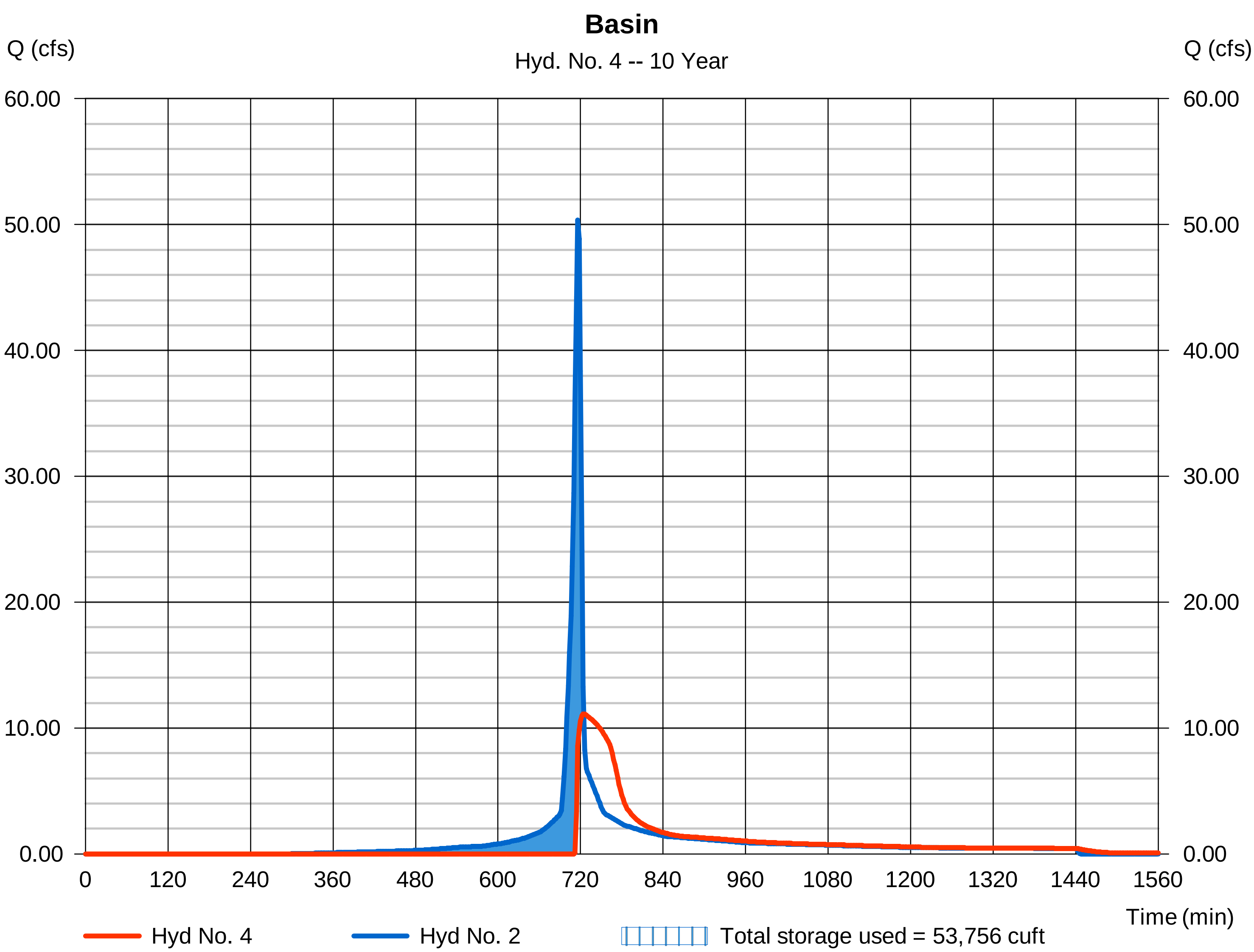
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 | Wednesday, 02 / 11 / 2015

Hyd. No. 4

Basin

Hydrograph type	= Reservoir	Peak discharge	= 11.11 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 78,459 cuft
Inflow hyd. No.	= 2 - Post-Dev Controlled	Max. Elevation	= 959.42 ft
Reservoir name	= Basin	Max. Storage	= 53,756 cuft

Storage Indication method used.



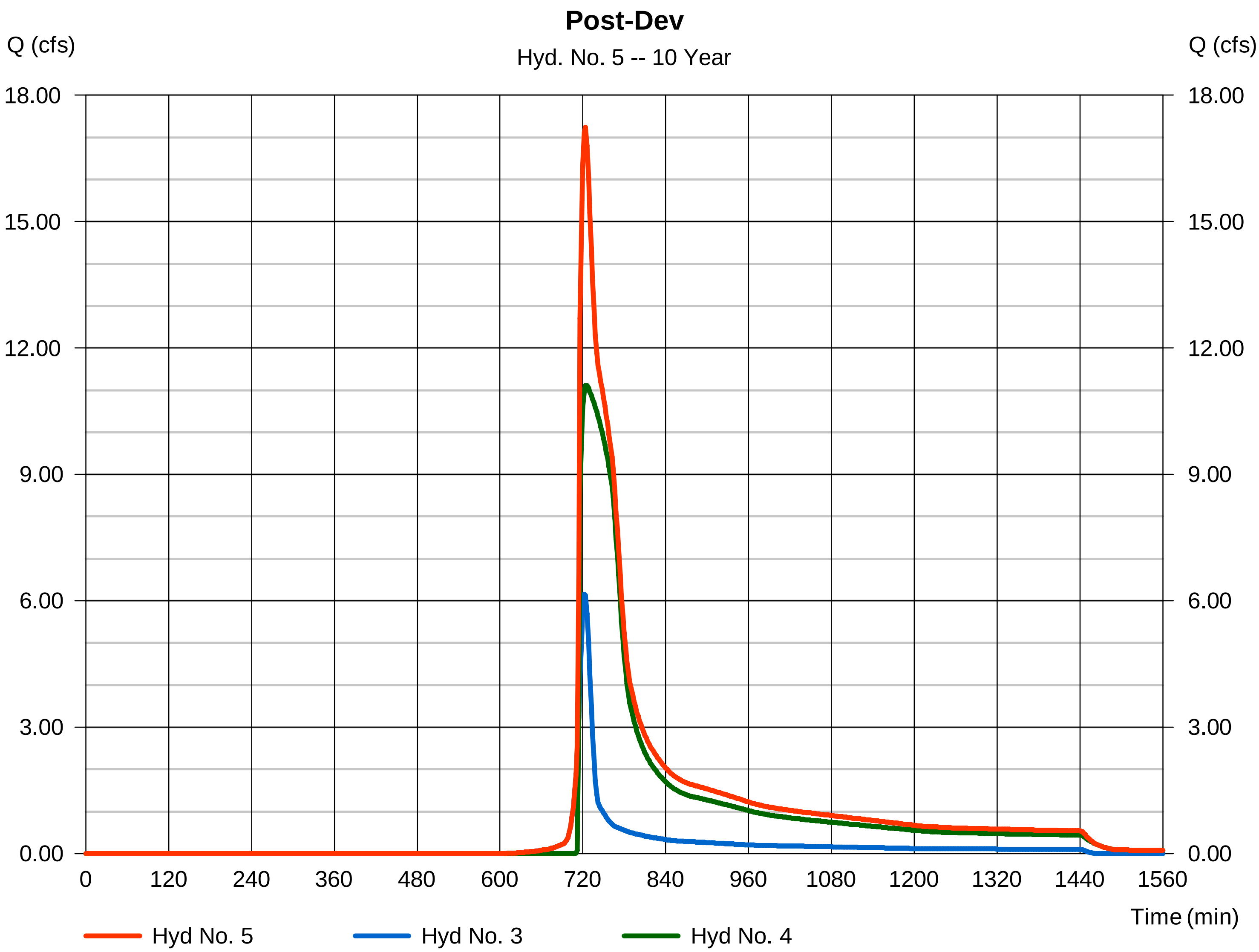
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 02 / 11 / 2015

Hyd. No. 5

Post-Dev

Hydrograph type	= Combine	Peak discharge	= 17.24 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 96,032 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 3.700 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

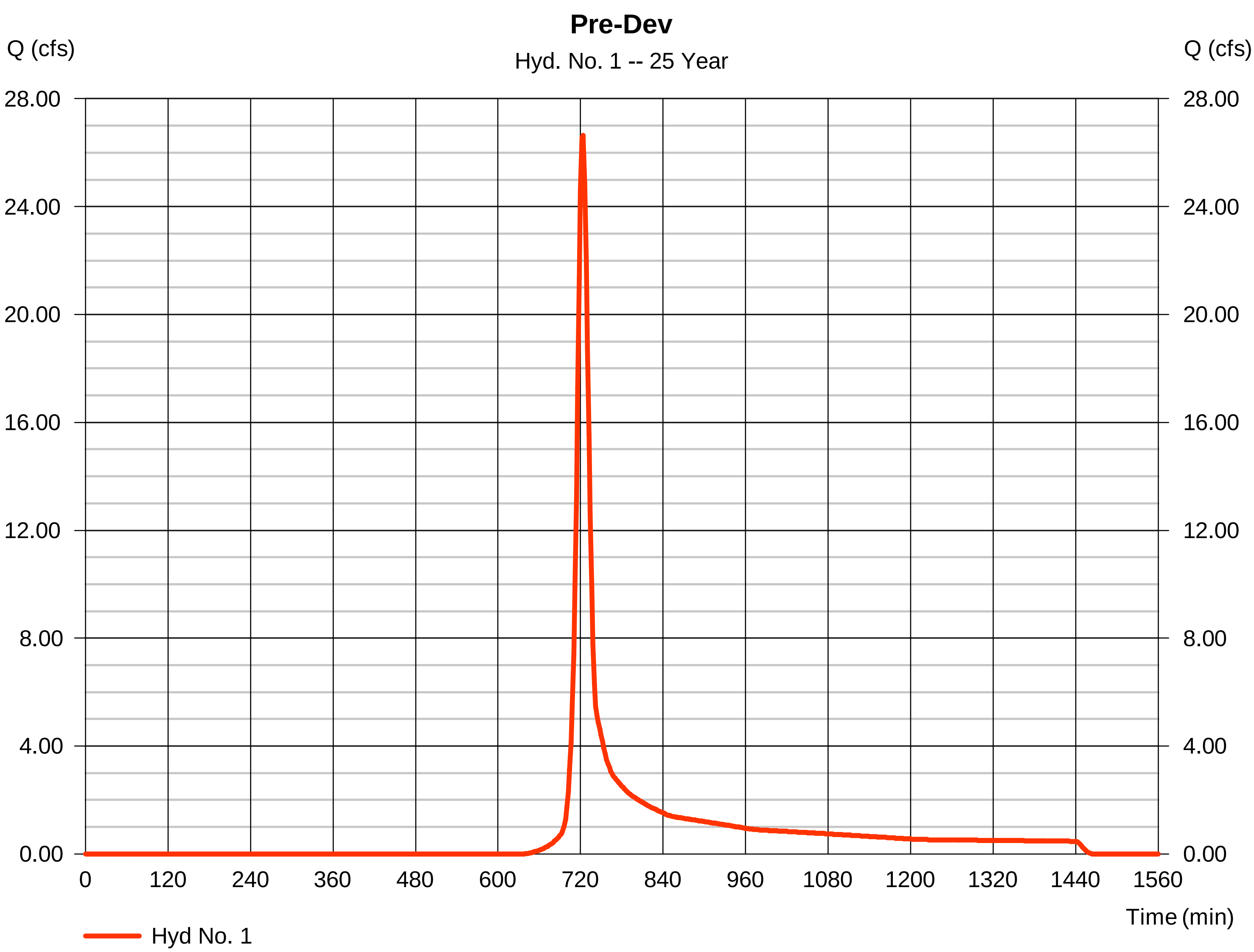
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	26.63	2	724	77,270	------	------	------	Pre-Dev
2	SCS Runoff	61.82	2	716	131,538	------	------	------	Post-Dev Controlled
3	SCS Runoff	8.413	2	722	23,728	------	------	------	Post-Dev Uncontrolled
4	Reservoir	12.85	2	726	104,163	2	959.95	66,716	Basin
5	Combine	21.17	2	724	127,891	3, 4	------	------	Post-Dev

Hydrograph Report

Hyd. No. 1

Pre-Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 26.63 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 77,270 cuft
Drainage area	= 15.660 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

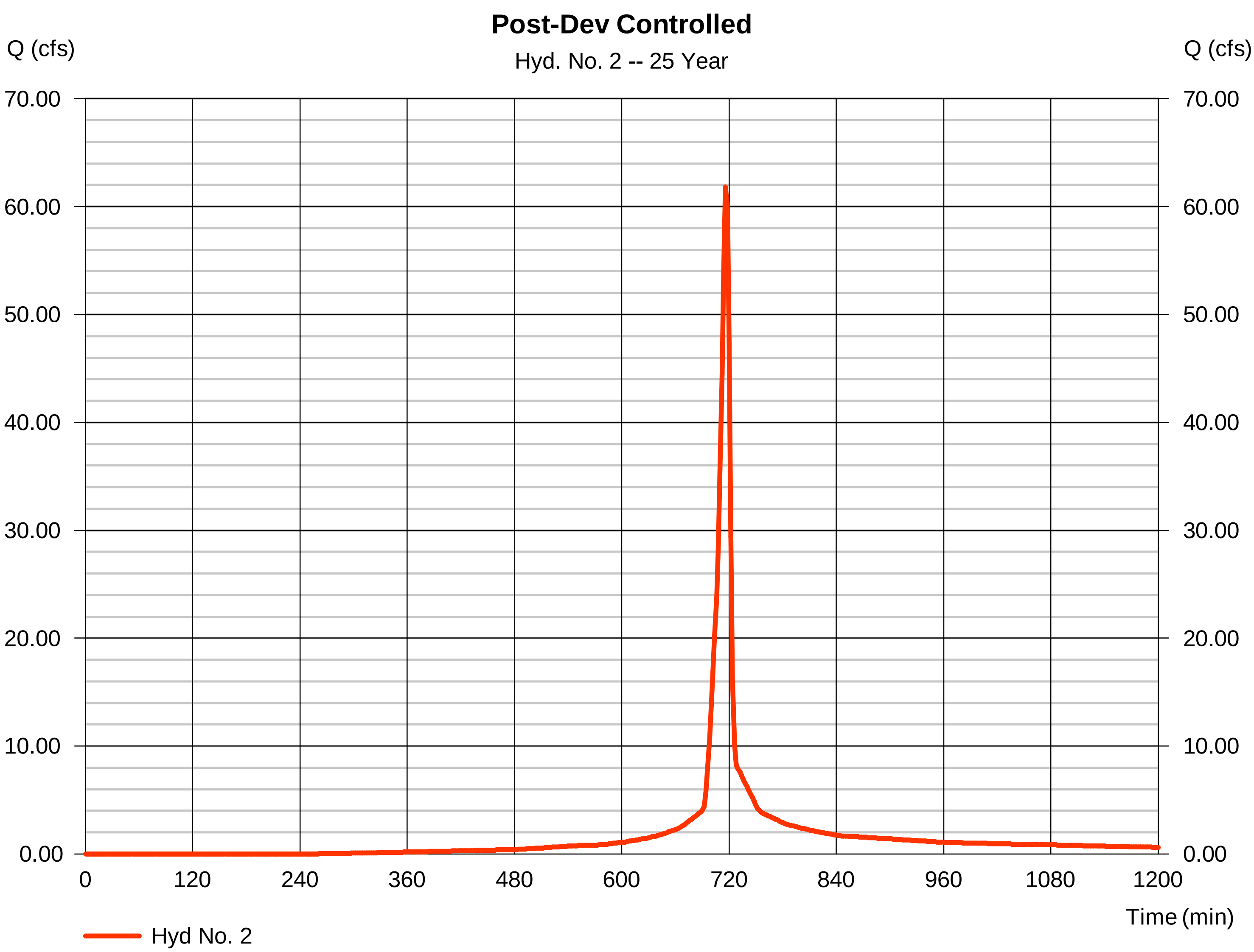


Hydrograph Report

Hyd. No. 2

Post-Dev Controlled

Hydrograph type	= SCS Runoff	Peak discharge	= 61.82 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 131,538 cuft
Drainage area	= 12.810 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

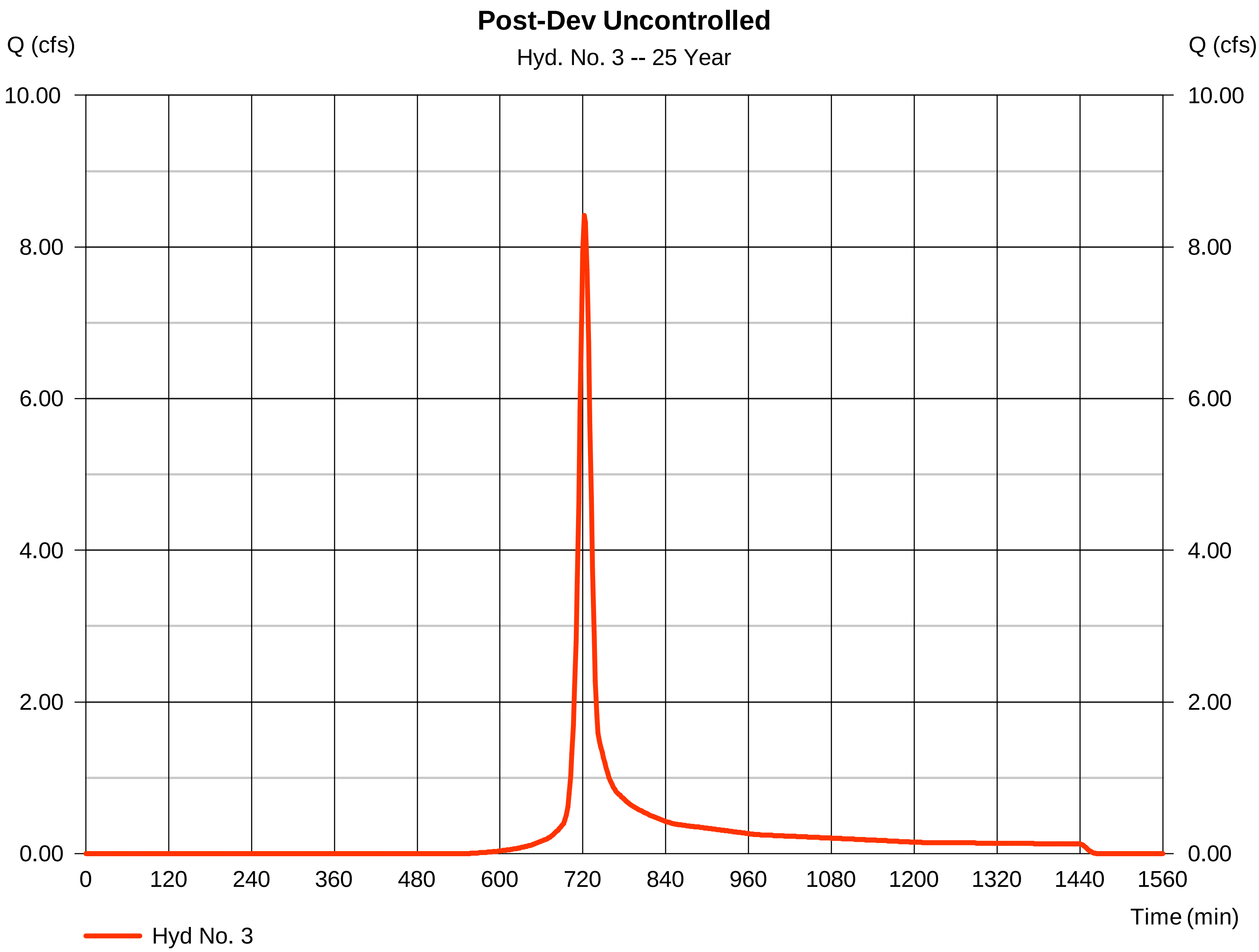


Hydrograph Report

Hyd. No. 3

Post-Dev Uncontrolled

Hydrograph type	= SCS Runoff	Peak discharge	= 8.413 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 23,728 cuft
Drainage area	= 3.700 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

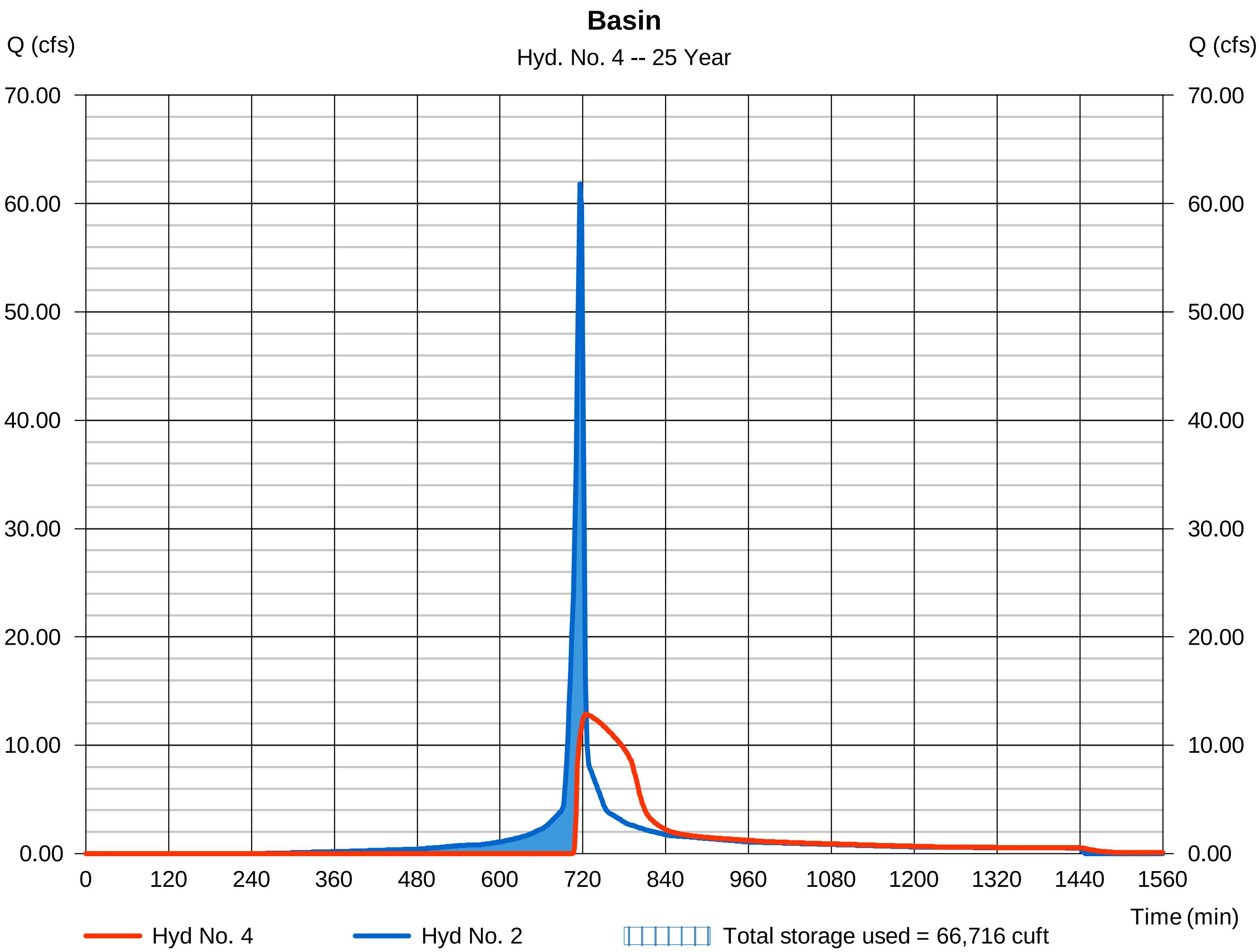
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 02 / 11 / 2015

Hyd. No. 4

Basin

Hydrograph type	= Reservoir	Peak discharge	= 12.85 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 104,163 cuft
Inflow hyd. No.	= 2 - Post-Dev Controlled	Max. Elevation	= 959.95 ft
Reservoir name	= Basin	Max. Storage	= 66,716 cuft

Storage Indication method used.



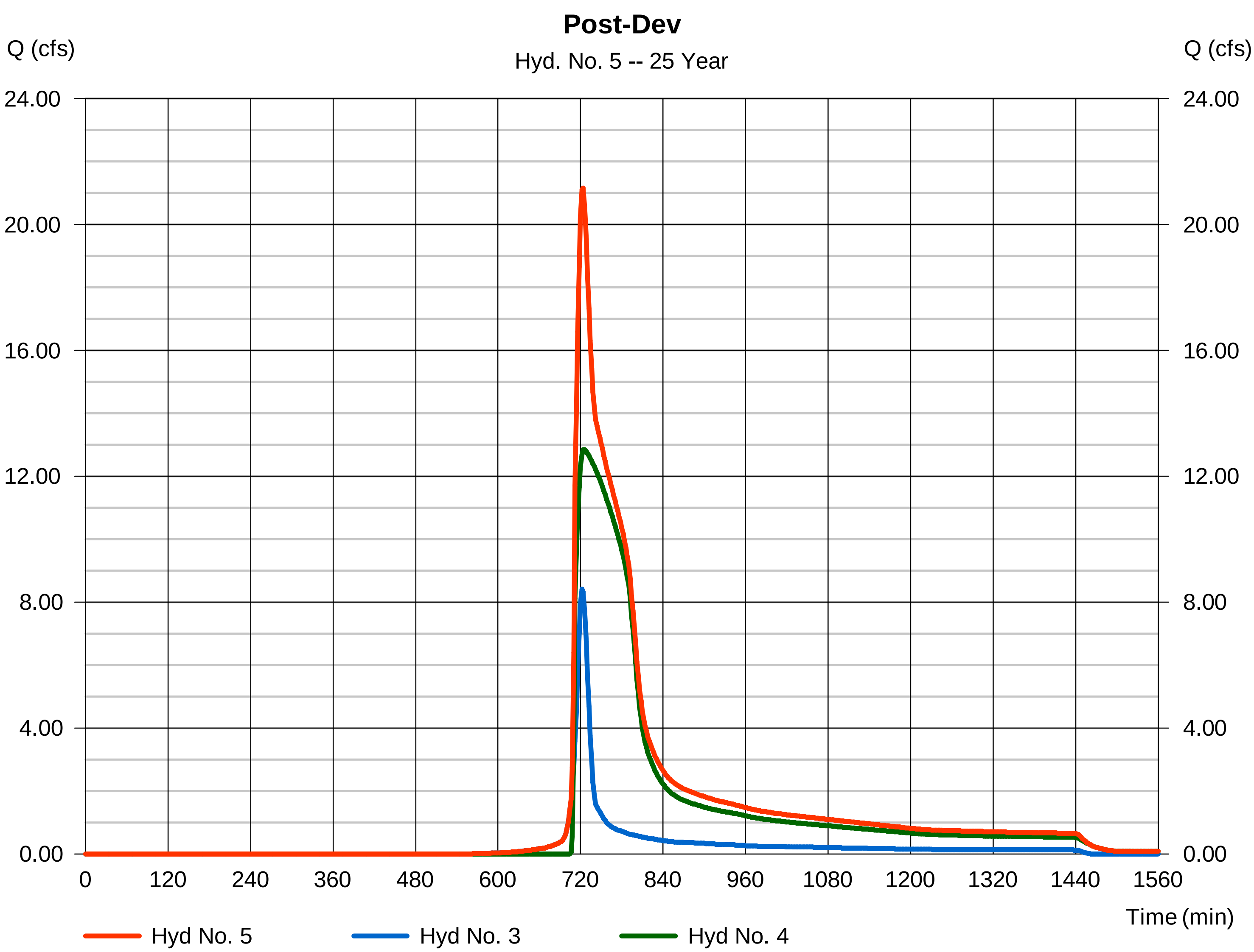
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 02 / 11 / 2015

Hyd. No. 5

Post-Dev

Hydrograph type	= Combine	Peak discharge	= 21.17 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 127,891 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 3.700 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	33.95	2	722	97,194	------	------	------	Pre-Dev
2	SCS Runoff	71.20	2	716	152,915	------	------	------	Post-Dev Controlled
3	SCS Runoff	10.35	2	722	29,055	------	------	------	Post-Dev Uncontrolled
4	Reservoir	14.02	2	726	125,539	2	960.37	77,476	Basin
5	Combine	24.22	2	722	154,593	3, 4	------	------	Post-Dev

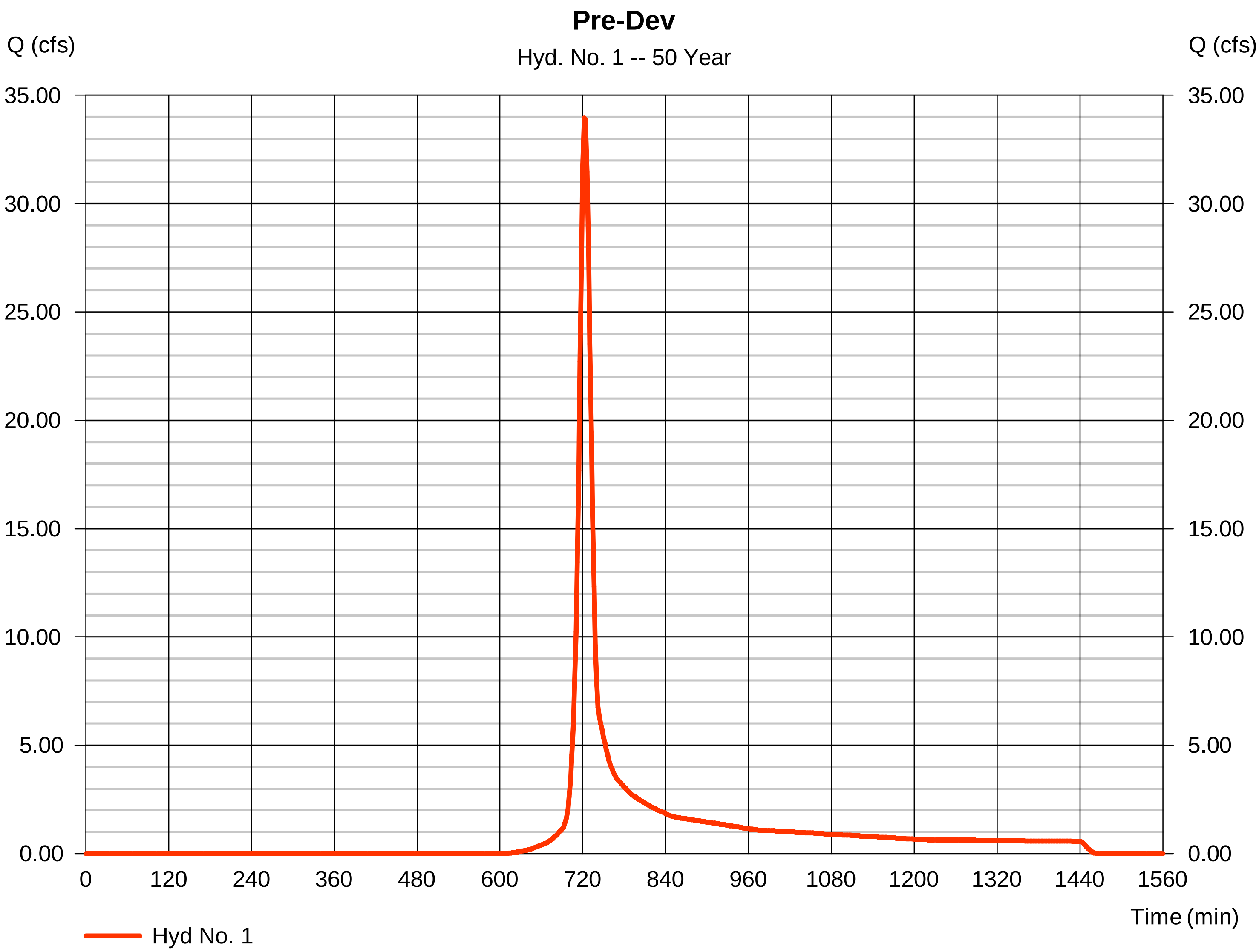
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 02 / 11 / 2015

Hyd. No. 1

Pre-Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 33.95 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 97,194 cuft
Drainage area	= 15.660 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.51 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



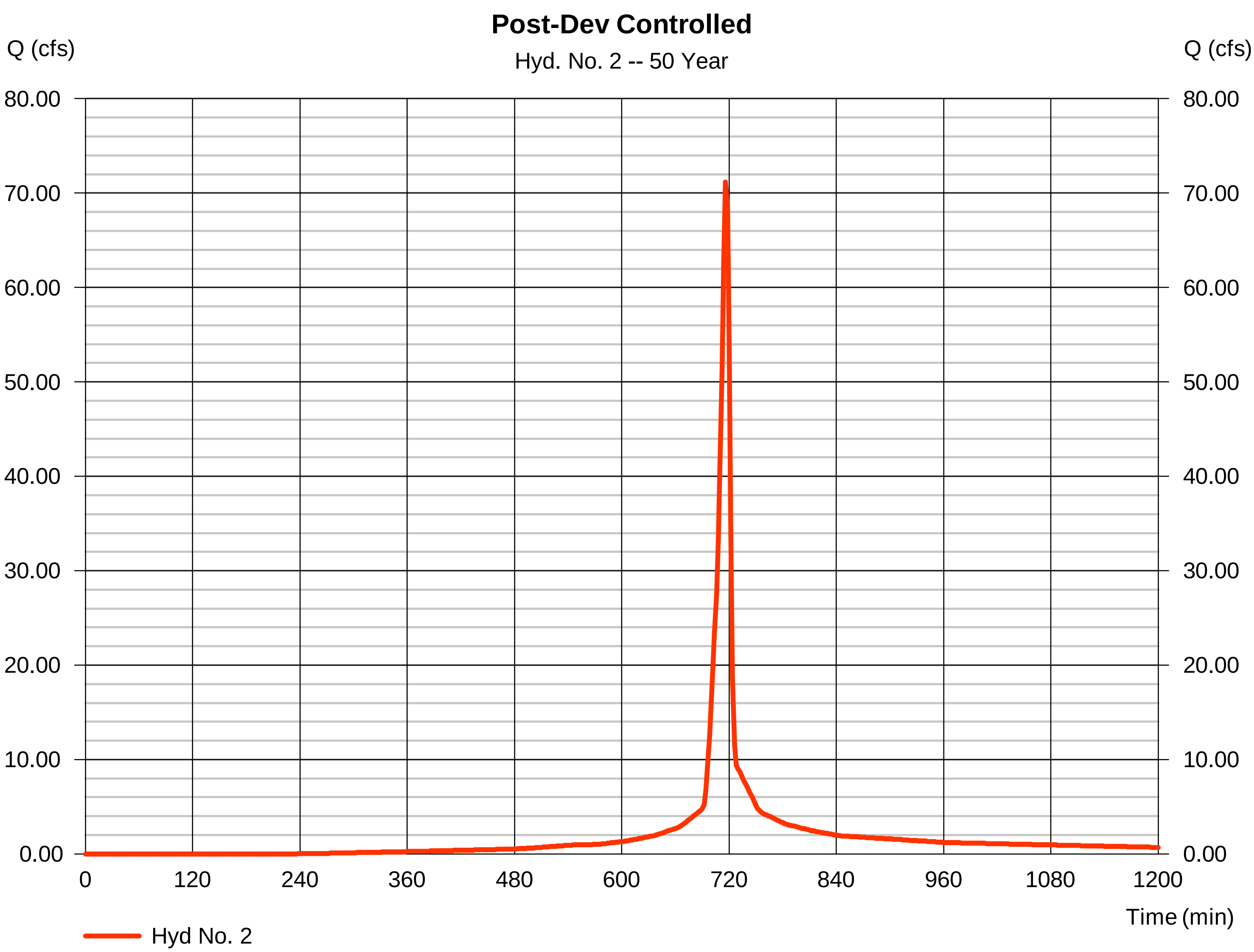
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 02 / 11 / 2015

Hyd. No. 2

Post-Dev Controlled

Hydrograph type	= SCS Runoff	Peak discharge	= 71.20 cfs
Storm frequency	= 50 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 152,915 cuft
Drainage area	= 12.810 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.51 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

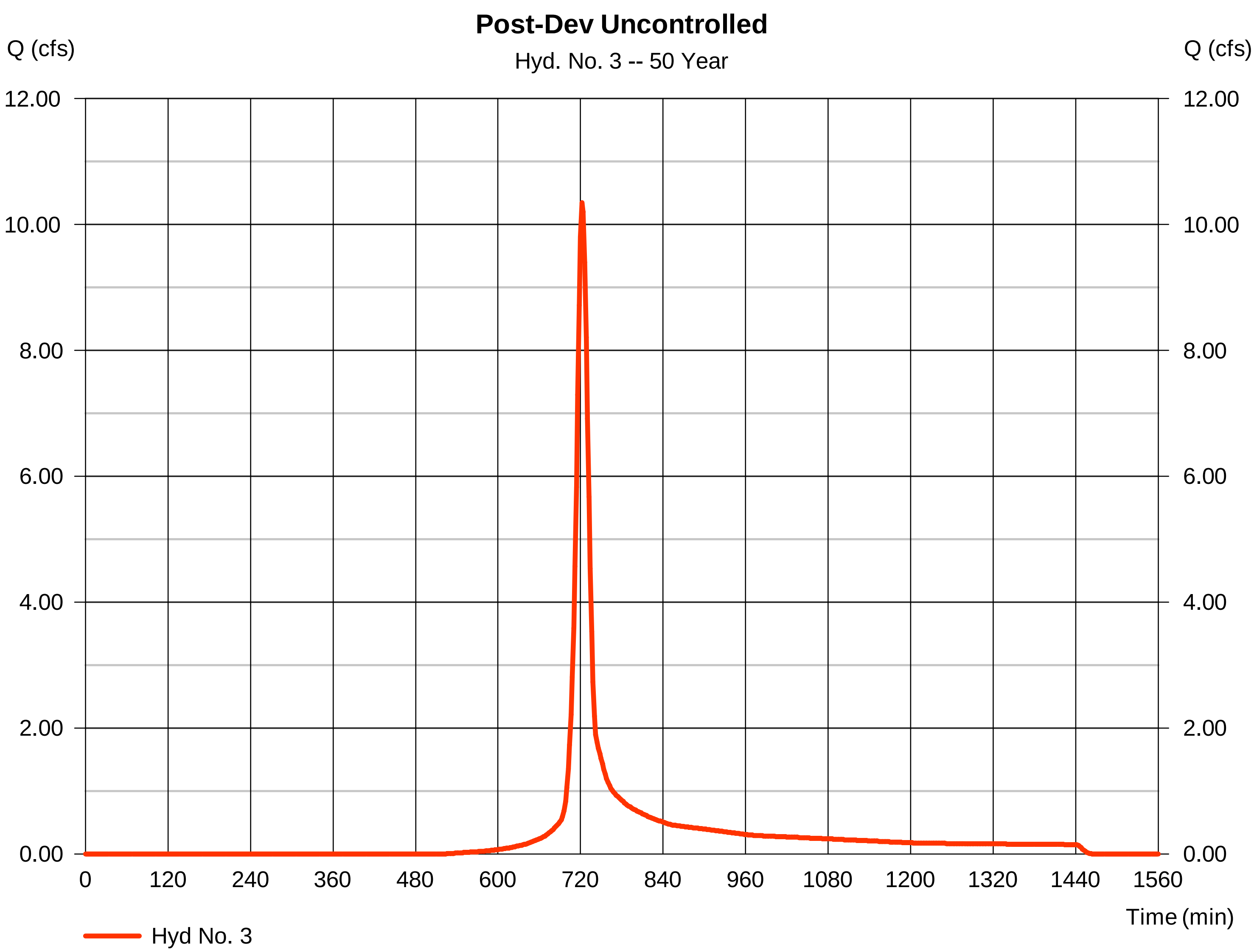


Hydrograph Report

Hyd. No. 3

Post-Dev Uncontrolled

Hydrograph type	= SCS Runoff	Peak discharge	= 10.35 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 29,055 cuft
Drainage area	= 3.700 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.51 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

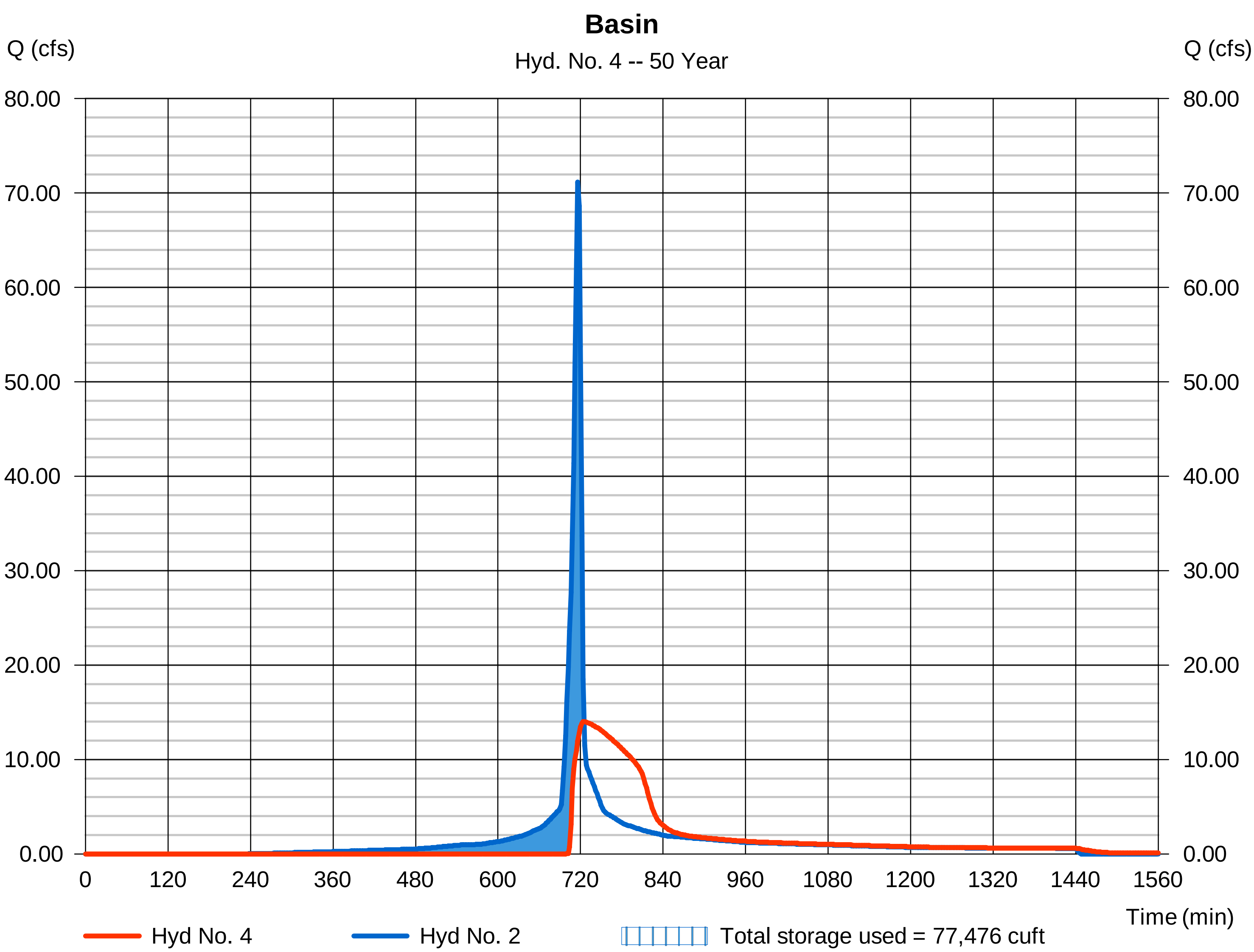
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 02 / 11 / 2015

Hyd. No. 4

Basin

Hydrograph type	= Reservoir	Peak discharge	= 14.02 cfs
Storm frequency	= 50 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 125,539 cuft
Inflow hyd. No.	= 2 - Post-Dev Controlled	Max. Elevation	= 960.37 ft
Reservoir name	= Basin	Max. Storage	= 77,476 cuft

Storage Indication method used.

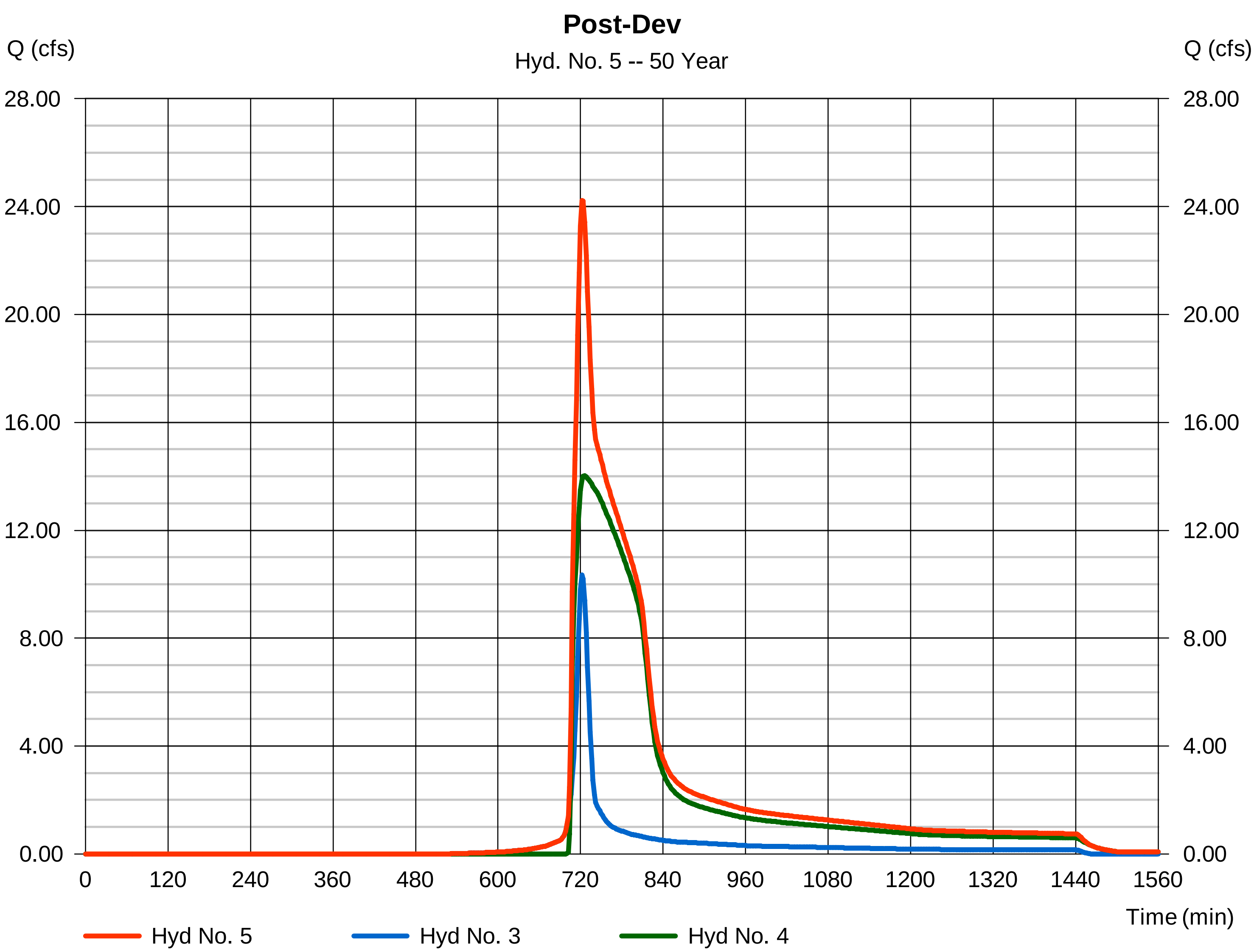


Hydrograph Report

Hyd. No. 5

Post-Dev

Hydrograph type	= Combine	Peak discharge	= 24.22 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 154,593 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 3.700 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	41.98	2	722	118,984	------	------	------	Pre-Dev
2	SCS Runoff	80.91	2	716	175,289	------	------	------	Post-Dev Controlled
3	SCS Runoff	12.41	2	722	34,787	------	------	------	Post-Dev Uncontrolled
4	Reservoir	15.08	2	726	147,912	2	960.79	88,616	Basin
5	Combine	27.30	2	722	182,699	3, 4	------	------	Post-Dev

lordstown.gpw	Return Period: 100 Year	Wednesday, 02 / 11 / 2015

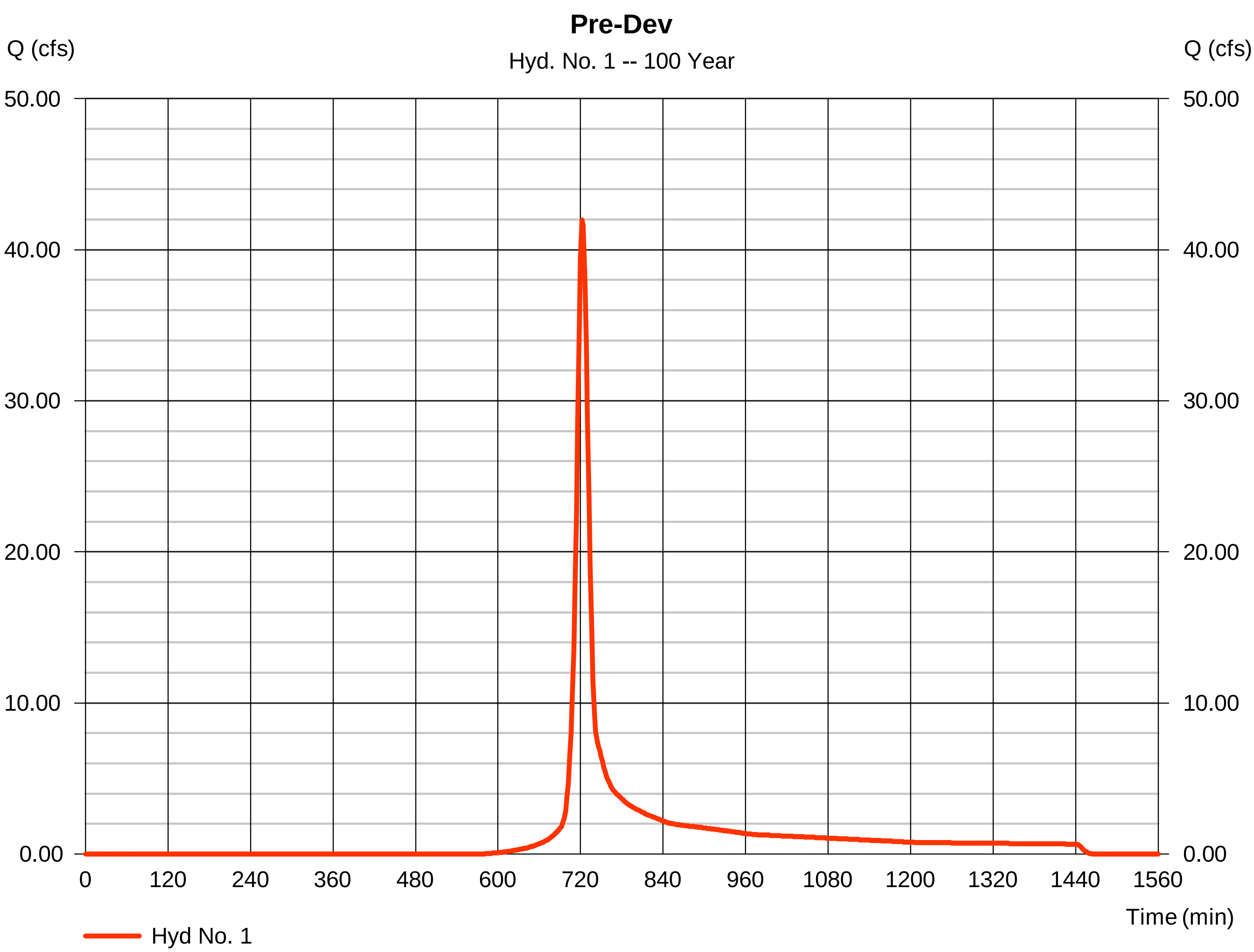
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 02 / 11 / 2015

Hyd. No. 1

Pre-Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 41.98 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 118,984 cuft
Drainage area	= 15.660 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.04 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



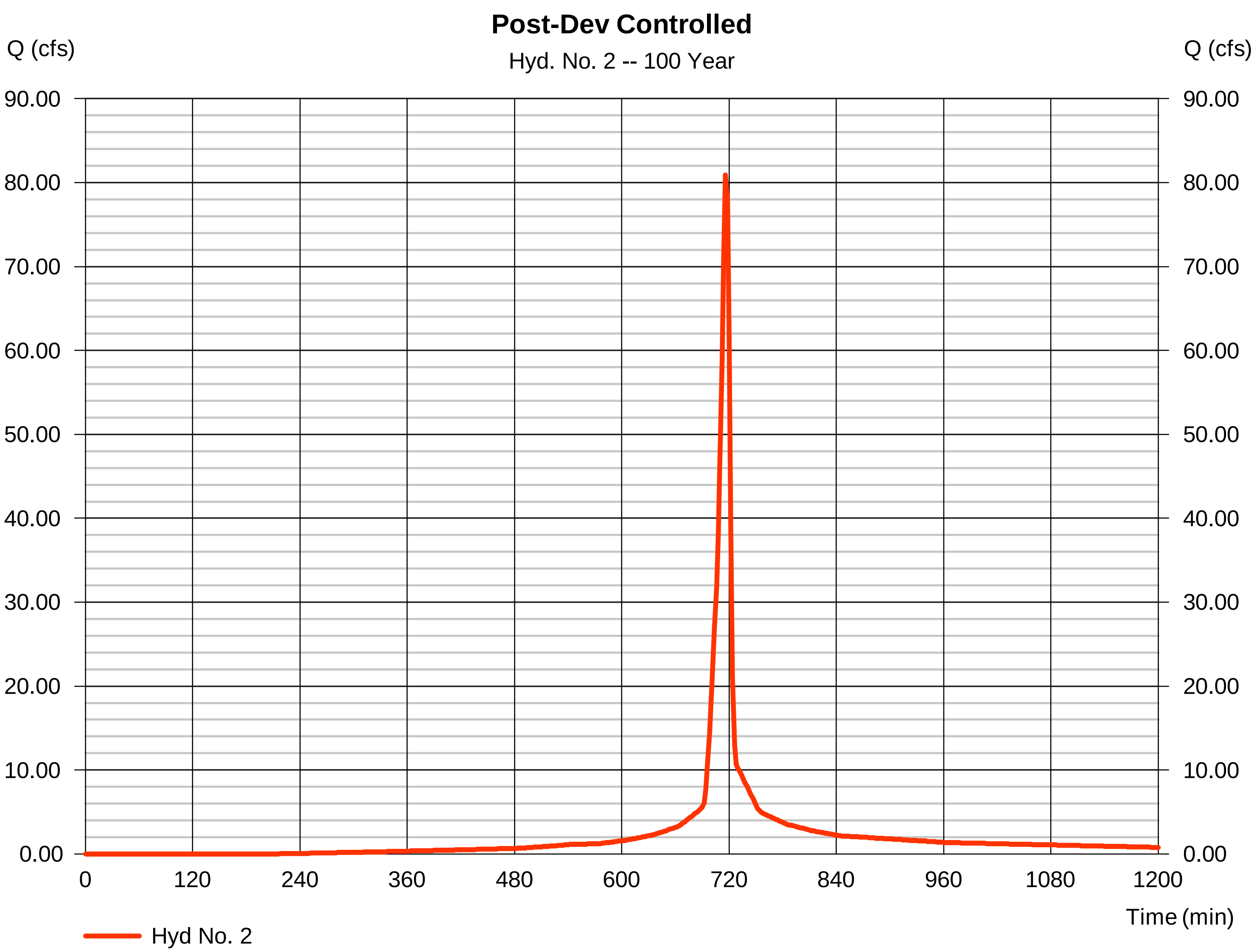
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 02 / 11 / 2015

Hyd. No. 2

Post-Dev Controlled

Hydrograph type	= SCS Runoff	Peak discharge	= 80.91 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 175,289 cuft
Drainage area	= 12.810 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.04 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

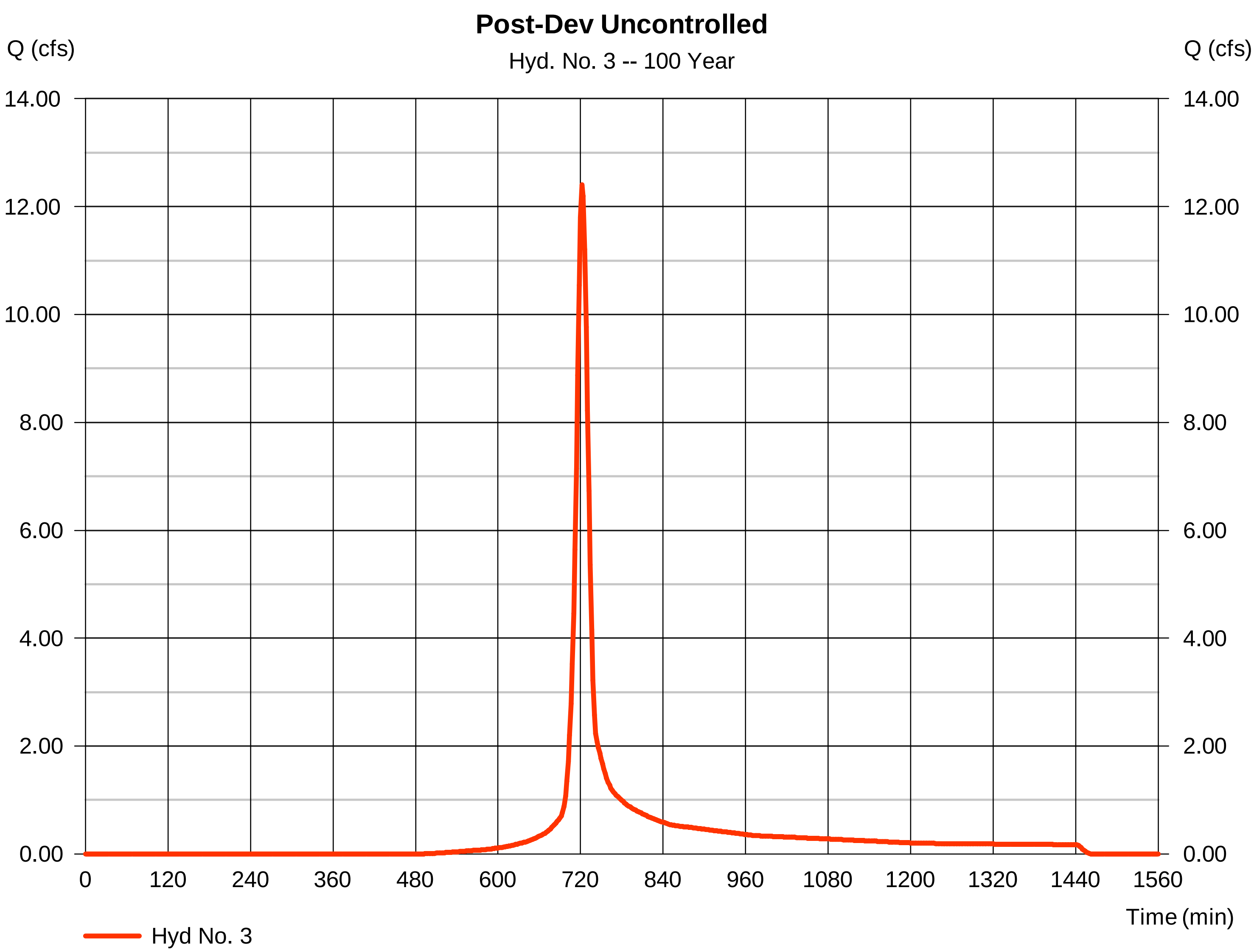


Hydrograph Report

Hyd. No. 3

Post-Dev Uncontrolled

Hydrograph type	= SCS Runoff	Peak discharge	= 12.41 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 34,787 cuft
Drainage area	= 3.700 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.04 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

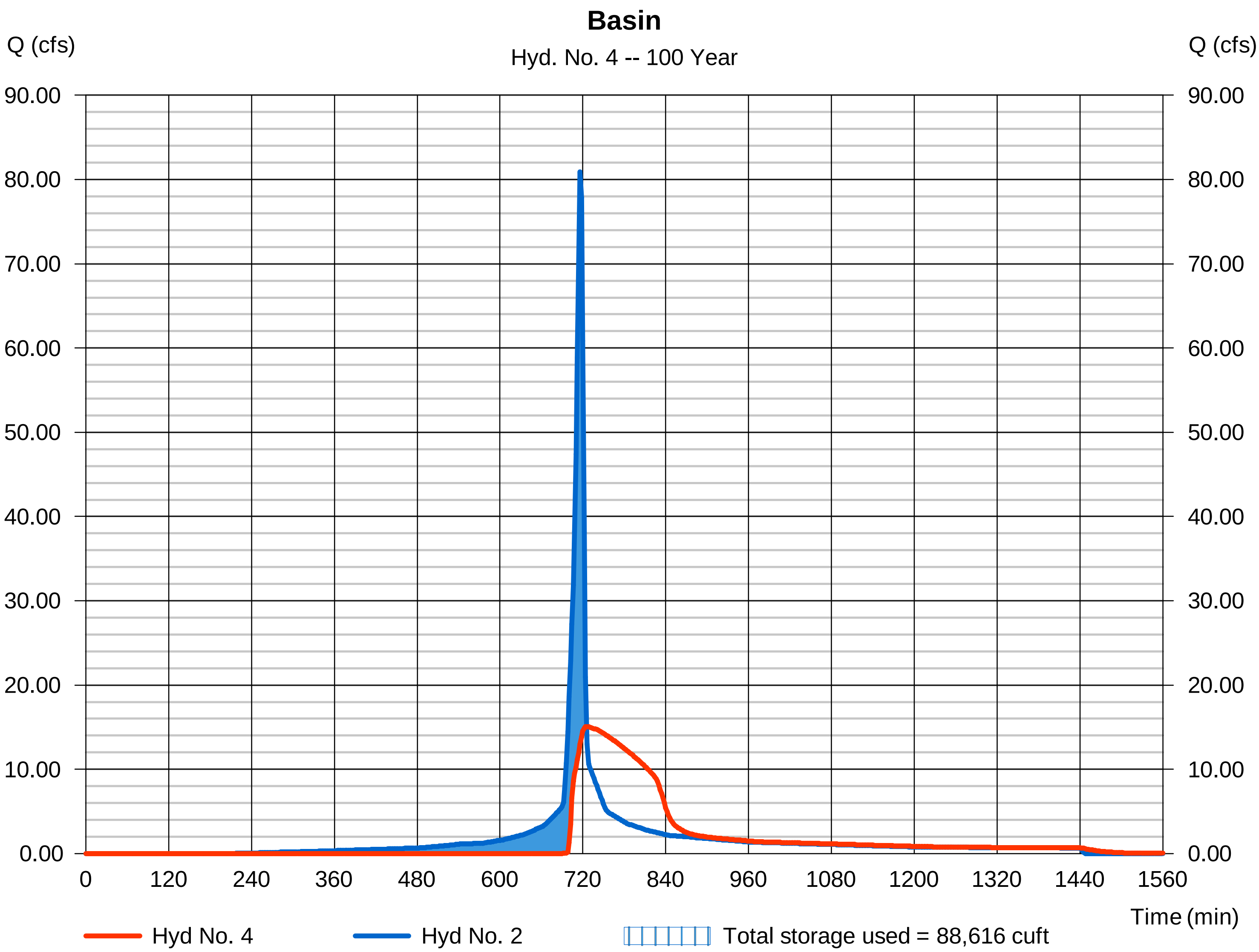
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Wednesday, 02 / 11 / 2015

Hyd. No. 4

Basin

Hydrograph type	= Reservoir	Peak discharge	= 15.08 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 147,912 cuft
Inflow hyd. No.	= 2 - Post-Dev Controlled	Max. Elevation	= 960.79 ft
Reservoir name	= Basin	Max. Storage	= 88,616 cuft

Storage Indication method used.



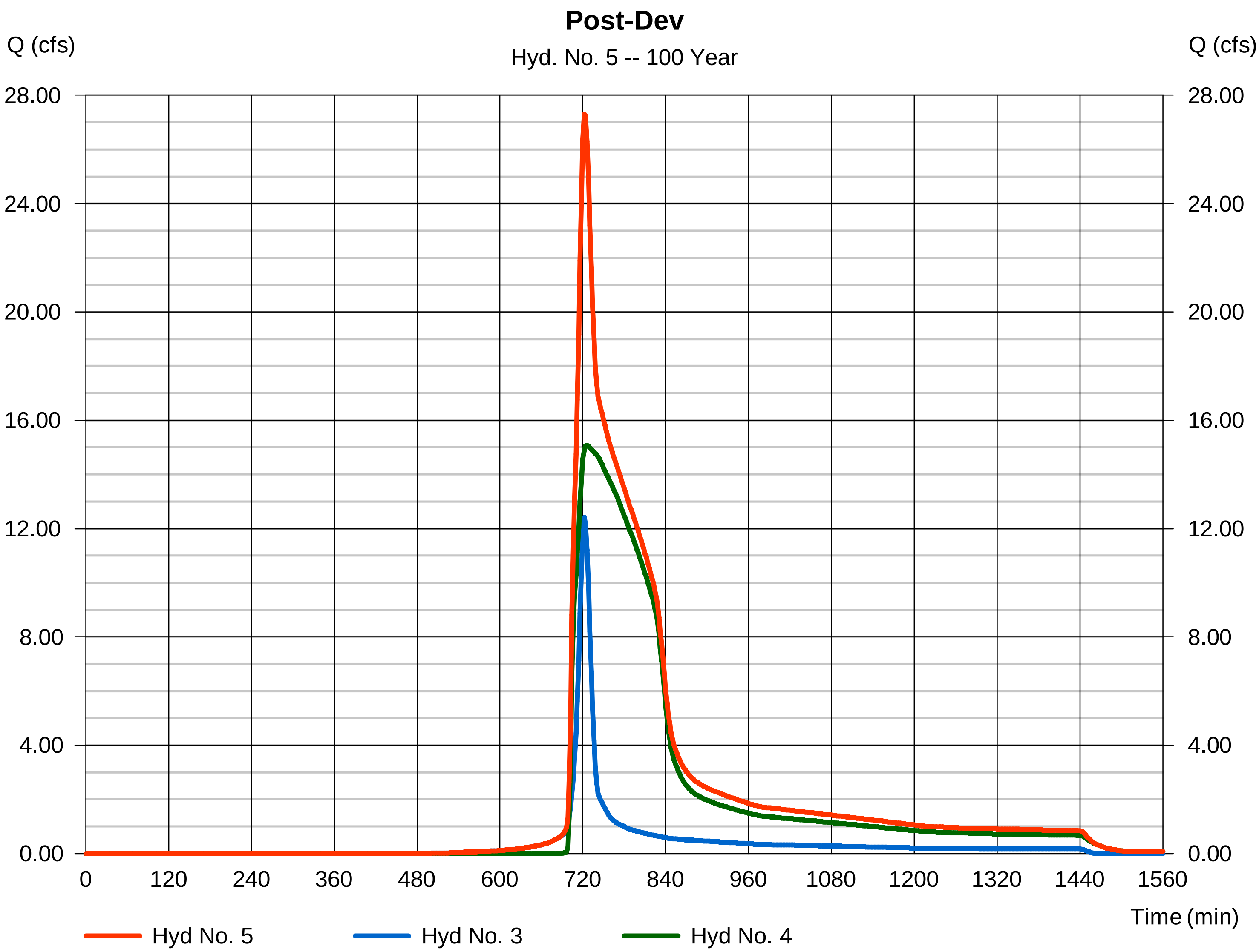
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Wednesday, 02 / 11 / 2015

Hyd. No. 5

Post-Dev

Hydrograph type	= Combine	Peak discharge	= 27.30 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 182,699 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 3.700 ac



Appendix B: PJM Feasibility Study

#Z2-028 – Highland – Sammis 345kV and Highland - Mansfield 345kV Generation Interconnection

General

The Interconnection Customer (IC) is proposing to install an 800 MW natural gas facility to be located in Trumbell County, OH and has requested to be studied as an 800 MW Energy (800MW Capacity) resource interconnecting into the ATSI area. The IC has proposed in-service date is for April 29, 2019. **Impacts on the MISO member transmission systems will be done as a part of the Facilities Study phase, which may reveal new upgrades required for this project to be put in service.**

This Generation Interconnection Feasibility Study provides analysis results to aid the IC in assessing the practicality and cost of incorporating the facility into the PJM system. This study was limited to load flow analyses of probable contingencies. If the IC elects to pursue a System Impact Study, a more comprehensive analysis will be performed.

Point(s) of Interconnection

Z2-028 will interconnect with the ATSI transmission system at one of two options: Option 1 is to connect to two lines simultaneously at Highland – Sammis 345kV and Highland – Mansfield 345kV. For Option 1, it is expected to take a minimum of 48 months from the date of a fully executed Interconnection Construction Service Agreement to complete all ATSI upgrades for project Z2-028. Option 2 is to connect to two lines simultaneously at Highland – Mansfield 345kV and Highland – Hannah 345kV. Please note that all costs below associated with Attachment Facilities, Direct and Non-Direct Connection Facilities being referenced are provided for Option 1 only. Should Option 2 be chosen, Attachment Facilities, Direct and Non-Direct Connection Facilities costs will be provided as a part of the System Impact Study report.

Note: Any ATSI cost estimates throughout this report were produced without a detailed engineering review and are subject to error. More accurate estimates will be determined as a part of the System Impact Study.

The following assumptions were made when making these cost/time estimates:

- Interconnection Customer to provide all right-of-way, permits, easements, etc.
- No environmental issues
- No delays in acquiring necessary permits
- All system outages will be allowed when requested.

Option 1 Attachment Facilities

To accommodate this interconnection, loops to both Highland – Mansfield and Highland – Sammis 345kV lines from proposed ring bus listed in Option 1 Direct Connection section is required. This loop tie-in will cost approximately **$3,033,600** (add **$732,700** tax if applicable for a total of **$3,766,300**). The single line is shown below in **Figure 1**.

The IC is required to construct all connection facilities in accordance with the ATSI published standards.

Option 1 Direct Connection

To accommodate this interconnection, the installation of a five-breaker ring bus will be required. The total preliminary cost estimate for Direct Connection work is given in the following tables below.

For ATSI building Direct Connection cost estimates:

Table 1. Direct Connect Cost Estimate			
Description	**Total Cost**	**Tax**	**Total with Tax**
Install new 345kV five-breaker ring bus substation to interconnect Z2-028	$10,413,000	$2,514,800	$12,927,800
Engineering Oversight and Commissioning	$141,900	$33,200	$175,100
Total	**$10,54,900**	**$2,548,000**	**$13,102,900**

Option 1 Non-Direct Connection

To accommodate this interconnection, installation of fiber from project Z2-028 to Highland substation must be installed and line relaying at Highland substation to new Z2-028 interconnection bus. The total preliminary cost estimate for Non-Direct Connection work is given in the following tables below:

For ATSI building Non-Direct Connection cost estimates:

Table 2. Non-Direct Connect Cost Estimate			
Description	**Total Cost**	**Tax**	**Total with Tax**
Upgrade Highland substation line relaying to new Z2-028 interconnection bus	$236,000	$57,000	$293,000
Install fiber from Z2-028 Interconnection substation to Highland substation	$121,900	$28,500	$150,400
Total	**$357,900**	**$85,500**	**$443,400**

The following protection requirements are required by ATSI for this project:

Z2-028 345kV Interconnecting Ring Bus Substation

345kV Transmission Line Protection

- Highland #1 line exit
  - Primary relay: SEL-411L relay with line current differential protection over fiber
  - Backup relay: SEL-411L relay with line current differential protection over fiber
  - Fiber-optic cable path with dedicated fibers for use with the SEL-411L primary and backup relaying

- Planning to determine if dual, independent paths necessary for stability purposes

- Highland #2 line exit
  - Primary relay: SEL-411L relay with line current differential protection over fiber
  - Backup relay: SEL-411L relay with line current differential protection over fiber
  - Fiber-optic cable path with dedicated fibers for use with the SEL-411L primary and backup relaying
    - Planning to determine if dual, independent paths necessary for stability purposes

- Mansfield line exit
  - Primary relay: SEL-421-5 directional comparison blocking line relaying operating over power line carrier (PLC) communications
    - Ametek/Pulsar UPLC on/off carrier set for use with directional comparison blocking line relaying.
    - CCVTs with carrier accessories in one phase and at least two secondary windings, line tuner, and wavetrap for use with PLC relaying
  - Backup relay: SEL-421-5 non-pilot direct tripping backup relay
    - Planning to determine if dual pilot protection is necessary for stability purposes

- Sammis line exit
  - Primary relay: SEL-421-5 directional comparison blocking line relaying operating over power line carrier (PLC) communications
    - Ametek/Pulsar UPLC on/off carrier set for use with directional comparison blocking line relaying.
    - CCVTs with carrier accessories in one phase and at least two secondary windings, line tuner, and wavetrap for use with PLC relaying
  - Backup relay: SEL-421-5 non-pilot direct tripping backup relay
    - Planning to determine if dual pilot protection is necessary for stability purposes

- Z2-028 Generating Station line exit
  - Primary relay: SEL-411L relay with line current differential protection over fiber
  - Backup relay: SEL-411L relay with line current differential protection over fiber
  - Dual, independent fiber-optic cable paths with dedicated fibers for use with the SEL-411L primary and backup relaying

345kV Breaker Failure to Trip Protection

- 345kV Breaker Failure to Trip Relaying
  - SEL-501 breaker failure to trip relaying (1 on each 345kV breakers). The breaker failure to trip relaying on the Z2-028, Highland #1, and Highland #2 line exit breakers shall initiate direct transfer trip via the SEL-411L relays (fiber).

<u>Z2-028 345kV Generating Station</u>

345kV Transmission Line Protection

- Z2-028 Interconnecting Station line exit
  - Primary relay: SEL-411L relay with line current differential protection over fiber
  - Backup relay: SEL-411L relay with line current differential protection over fiber

345kV Breaker Failure to Trip Protection

- 345kV Breaker Failure to Trip Relaying
  - SEL-352-2 breaker failure to trip relaying on each of four 345kV breakers (one line and three Unit). The breaker failure to trip relaying on the Z2-028 Interconnecting Station line exit breaker shall initiate direct transfer trip via the SEL-411L primary and backup line relays (fiber).

345kV Bus & GSU Transformer Protection @ Z2-028 Generating Station (minimum protection to meet FE requirements)

- To be determined in a later study phase.

FE System Modifications

<u>Highland 345kV Substation</u>

345kV Transmission Line Protection

- Z2-028 Interconnecting Station line exit
  - Primary relay: SEL-411L relay with line current differential protection over fiber
  - Backup relay: SEL-411L relay with line current differential protection over fiber

- Z2-028 Interconnecting Station line exit
  - Primary relay: SEL-411L relay with line current differential protection over fiber
  - Backup relay: SEL-411L relay with line current differential protection over fiber

<u>Mansfield 345kV Substation</u>

345kV Circuit Breaker Adequacy

- (14) 345kV circuit breakers have been identified by PJM as overdutied with the addition of Z2-028. This would necessitate replacing the existing 72kA breakers with 80kA breakers.

Revenue Metering and SCADA Requirements

For PJM: IC will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

For ATSI: The Interconnection Customer will be required to comply with all FE Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "FirstEnergy Requirements for Transmission Connected Facilities" document located at the following links:

http://www.firstenergycorp.com/feconnect
http://www.pjm.com/planning/design-engineering/to-tech-standards.aspx

Option 1: Highland – Sammis 345kV and Highland – Mansfield 345kV

Network Impacts

The Queue Project Z2-028 was studied as an 800.0 MW (800.0 MW Capacity) injection simultaneously into Highland – Sammis and Highland – Mansfield 345kV lines in the ATSI area. Project Z2-028 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project Z2-028 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

No violations were identified.

Multiple Facility Contingency

(Double Circuit Tower Line(DCTL), Line with Failed Breaker(LFFB) and Bus Fault(Bus) contingencies for the full energy output.)

No violations were identified.

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue.)

No violations were identified.

Short Circuit

(Summary of impacted circuit breakers)

PJM has completed the short circuit analysis of the Z2-028 queue project Highland – Sammis 345kV and Highland – Mansfield 345kV. One option was considered during this study: the primary option was a double tap of the Highland – Sammis 345kV and Highland – Mansfield 345kV lines. PJM analysis found **14 breakers** to be over duty in the ATSI transmission area. The breakers are listed below:

Bus_NO	BUS	BREAKER	Duty % with Z2-028	Duty % without Z2-028	Duty % Difference	Duty Amps With Z2-028	Duty Amps Without Z2-028	Notes
9728	B.MNSFLD 345 345.kV	BVLY1-HOYT :	102.80%	98.93%	3.87%	74014.9	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	BVLY1-S. BUS	102.80%	98.93%	3.87%	74014.9	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	BVLY2-GEN1 :	102.80%	98.93%	3.87%	74014.9	71231.2	New Overduty

9728	B.MNSFLD 345 345.kV	BVLY2-S. BUS	102.80%	98.93%	3.87%	74014.9	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	CHAMB-S. BUS	102.80%	98.93%	3.87%	74014.9	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	CRESENT-S. B	102.80%	98.93%	3.87%	74014.9	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	GEN NO 1-N.	102.80%	98.93%	3.87%	74014.9	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	GEN NO 2-N.	102.80%	98.93%	3.87%	74014.9	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	GEN NO 3-N.	102.80%	98.93%	3.87%	74014.9	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	GEN2-CHAMB :	102.80%	98.93%	3.87%	74014.9	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	GEN3-S. BUS	102.80%	98.93%	3.87%	74014.9	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	HIGH-CRESCEN	102.80%	98.93%	3.87%	74014.9	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	HIGH-N. BUS	102.80%	98.93%	3.87%	74014.9	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	HOYT-N. BUS	102.80%	98.93%	3.87%	74014.9	71231.2	New Overduty

PJM analysis also found **1 new breakers** to be over-duty in the AEP transmission area. **This is originally an ATSI project but an AEP bus is 3 or more buses away.** The new over-duty breakers are listed below:

Bus_NO	BUS	BREAKER	Duty % with Z2-028	Duty % without Z2-028	Duty % Difference	Duty Amps With Z2-028	Duty Amps Without Z2-028	Notes
0	05CORRID 138.kV	106N	100.00%	100.0%	0.0%	65000.6	64999.2	New Overduty

It will take approximately **18 months** to complete replacement of this breaker. See **Table 4** below for cost estimate details.

The following upgrades listed in **Table 3** will mitigate the ATSI overdutied breakers listed above:

Table 3. ATSI Breaker Replacement Cost Estimate			
Description	**Total Cost**	**Taxes**	**Total with Tax**
Replace three overdutied 345kV circuit breakers at Bruce Mansfield substation.	$2,909,100	$702,600	$3,611,700
Replace three overdutied 345kV circuit breakers at Bruce Mansfield substation.	$2,909,100	$702,600	$3,611,700
Replace three overdutied 345kV circuit breakers at Bruce Mansfield substation.	$2,909,100	$702,600	$3,611,700
Replace three overdutied 345kV circuit breakers at Bruce Mansfield substation.	$2,909,100	$702,600	$3,611,700

Replace two overdutied 345kV circuit breakers at Bruce Mansfield substation.	$1,944,400	$469,600	$2,414,000
Total	**$13,580,800**	**$3,280,000**	**$16,860,800**

The following upgrades listed in **Table 4** will mitigate the AEP overdutied breakers listed above:

Table 4. AEP Breaker Replacement Cost Estimate	
Description	**Total Cost**
Replace overdutied 138kV circuit breaker 106N at Corridor substation.	$500,000
Total	**$500,000**

Light Load Analysis - 2018

Not required.

System Reinforcements

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. "Network Impacts", initially caused by the addition of this project generation)

None.

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

None.

Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of the surrounding generation. Any potential problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which analyzes all overload conditions associated with the overloaded element(s) identified. As a result of the aggregate energy resources in the area, the following violations were identified.

As a result of the aggregate energy resources in the area, no violations were identified.

Option 2: Highland – Mansfield 345kV and Highland – Hannah 345kV

Network Impacts

The Queue Project Z2-028 was studied as an 800.0 MW (800.0 MW Capacity) injection simultaneously into Highland – Mansfield and Highland – Hannah 345kV lines in the ATSI area. Project Z2-028 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project Z2-028 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

No violations were identified.

Multiple Facility Contingency

(Double Circuit Tower Line(DCTL), Line with Failed Breaker(LFFB) and Bus Fault(Bus) contingencies for the full energy output.)

Item 1a. (FE - FE) The Z2-028 TAP-02HANNA 345 kV line (from bus 917140 to bus 238781 ckt 1) loads from 82.91% to 102.51% (**DC power flow**) of its emergency rating (1554 MVA) for the tower line contingency outage of 'C5-TWL-CR31B'. This project contributes approximately 304.62 MW to the thermal violation.

```
CONTINGENCY 'C5-TWL-CR31B'                    /* HANNA-MAN, HANNA-BEAV VAL 345
  DISCONNECT BRANCH FROM BUS 238781 TO BUS 238941 CKT 1      /* 02HANNA 345.00 02MANSFD 345.00
  DISCONNECT BRANCH FROM BUS 238781 TO BUS 253902 CKT 1      /* 02HANNA 345.00 15BVRVAL 345.00
  END
```

Please refer to Appendix 1 for a table containing the generators having contribution to this flowgate.

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue.)

No violations were identified.

Short Circuit

(Summary of impacted circuit breakers)

PJM has completed the short circuit analysis of the Z2-028 queue project Highland – Mansfield 345kV and Highland – Hannah 345kV. One option was considered during this study: the secondary option was a double tap of the Highland – Mansfield 345kV and Highland – Hanna 345kV lines. PJM analysis found **16 breakers** to be over duty in the ATSI transmission area. The breakers are listed below:

Bus_NO	BUS	BREAKER	Duty % with Z2-028	Duty % without Z2-028	Duty % Difference	Duty Amps With Z2-028	Duty Amps Without Z2-028	Notes
9728	B.MNSFLD 345 345.kV	BVLY1-HOYT :	102.80%	98.93%	3.87%	74058.2	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	BVLY1-S. BUS	102.80%	98.93%	3.87%	74058.2	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	BVLY2-GEN1 :	102.80%	98.93%	3.87%	74058.2	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	BVLY2-S. BUS	102.80%	98.93%	3.87%	74058.2	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	CHAMB-S. BUS	102.80%	98.93%	3.87%	74058.2	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	CRESENT-S. B	102.80%	98.93%	3.87%	74058.2	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	GEN NO 1-N.	102.80%	98.93%	3.87%	74058.2	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	GEN NO 2-N.	102.80%	98.93%	3.87%	74058.2	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	GEN NO 3-N.	102.80%	98.93%	3.87%	74058.2	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	GEN2-CHAMB :	102.80%	98.93%	3.87%	74058.2	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	GEN3-S. BUS	102.80%	98.93%	3.87%	74058.2	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	HIGH-CRESCEN	102.80%	98.93%	3.87%	74058.2	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	HIGH-N. BUS	102.80%	98.93%	3.87%	74058.2	71231.2	New Overduty
9728	B.MNSFLD 345 345.kV	HOYT-N. BUS	102.80%	98.93%	3.87%	74058.2	71231.2	New Overduty
9200	HANNA 345 345.kV	HIGHLD-TR1 :	101.32%	90.85%	10.47%	39335.9	35272.5	New Overduty
9200	HANNA 345 345.kV	JUNIPER-TR2	101.32%	90.85%	10.47%	39335.9	35272.5	New Overduty

PJM analysis also found **1 new breakers** to be over-duty in the AEP transmission area. **This is originally an ATSI project but an AEP bus is 3 or more buses away.** The new over-duty breakers are listed below:

Bus_NO	BUS	BREAKER	Duty % with Z2-028	Duty % without Z2-028	Duty % Difference	Duty Amps With Z2-028	Duty Amps Without Z2-028	Notes
0	05CORRID 138.kV	106N	100.00%	100.0%	0.0%	65000.6	64999.2	New Overduty

Should Option 2 be chosen, mitigations and cost estimates for any over-duty breakers will be provided with the System Impact Study report.

Light Load Analysis - 2018

Not required.

System Reinforcements

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. "Network Impacts", initially caused by the addition of this project generation)

If this option is chosen, cost estimates and mitigation will be provided as a part of the System Impact Study.

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

None.

Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of the surrounding generation. Any potential problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which analyzes all overload conditions associated with the overloaded element(s) identified. As a result of the aggregate energy resources in the area, the following violations were identified.

As a result of the aggregate energy resources in the area, no violations were identified.

Appendix C: EMF Evaluation

Electrical Engineering and Computer Sciences Practice

Assessment of Electric and Magnetic Fields, Audible Noise, and Radio Noise

Lordstown Energy Center Ringbus Interconnection

Assessment of Electric and Magnetic Fields, Audible Noise, and Radio Noise

Lordstown Energy Center Ringbus Interconnection

Prepared for

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29 Bartlett Street
Marlborough, MA 01752

Prepared by

Exponent
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Bowie, MD 20715

March 19, 2015

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Contents

List of Figures

List of Tables

Acronyms and Abbreviations

AN	Audible noise
BPA	Bonneville Power Administration
dB	Decibel
dBA	Decibel on the A-weighted scale
dBμV/m	Decibels relative to microvolts per meter
EMF	Electric and magnetic fields
FCC	Federal Communications Commission
Hz	Hertz
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ICES	International Committee on Electromagnetic Safety
IEEE	Institute of Electrical and Electronics Engineers
ISM	Industrial, Scientific and Medical
kHz	Kilohertz
kV	Kilovolt
kV/m	Kilovolts per meter
mG	Milligauss
MHz	Megahertz
RF	Radio Frequency
RN	Radio noise
ROW	Right of way
V/m	Volts per meter

Limitations

At the request of Clean Energy Future – Lordstown, LLC (CEF-L) and Energy Initiatives Group, LLC, Exponent conducted specific modeling and evaluations of the electrical environment for the 345 kilovolt Ringbus Interconnection of the Lordstown Energy Center in the Village of Lordstown, Ohio. This report summarizes work performed to date and presents the findings resulting from that work. In the analysis, we have relied on transmission line design geometry, usage, specifications, and various other types of information provided by the client. We cannot verify the correctness of this input data, and rely on the client for the data's accuracy. Although Exponent has exercised usual and customary care in the conduct of this analysis, the responsibility for the design and operation of the project remains fully with the client.

The findings presented herein are made to a reasonable degree of engineering and scientific certainty. Exponent reserves the right to supplement this report and to expand or modify opinions based on review of additional material as it becomes available through any additional work or review of additional work performed by others.

The scope of services performed during this investigation may not adequately address the needs of other users of this report, and any re-use of this report or its findings, conclusions, or recommendations presented herein are at the sole risk of the user. The opinions and comments formulated during this assessment are based on the observations and information available at the time of the investigation. No guarantee or warranty as to the future life or performance of any reviewed condition is expressed or implied.

Executive Summary

Exponent calculated the electric fields, magnetic fields, audible noise (AN), and radio noise (RN) associated with the proposed Ringbus Interconnection of the Lordstown Energy Center. Based on these modeled parameters, the Ringbus Interconnection complies with environmental assessment standards and guidelines for AC transmission lines.

The highest calculated magnetic field on the ROW (273 mG) is beneath the lowest phase conductor of the proposed structure, and was calculated at maximum net power output of the proposed generation facility. Calculated magnetic field levels at all locations are far below the reference levels recommended by ICES and ICNIRP (9,040 mG and 2,000 mG, respectively).

The highest calculated electric field on the ROW (5.6 kV/m) is below the reference levels recommended by ICES within transmission-line rights-of-way. Calculated electric-field levels beyond the ROW edges are less than 1.9 kV/m, below the reference levels recommended for the general public by ICES and ICNIRP (5.0 kV/m and 4.2 kV/m, respectively).

Calculated RN levels at 50 feet from the conductors of the proposed circuit are 48 dBμV/m in fair weather, and are likewise below the reference levels recommended in the Institute of Electrical and Electronics Engineers (IEEE) Radio Noise Design Guide (61 dBμV/m at 50 feet from the outermost conductor).

The Ringbus Interconnection will be nearly inaudible under fair-weather conditions, with noise levels comparable to those in a quiet bedroom (24 dBA). In foul weather conditions, the highest calculated AN value is 51 dBA, comparable to the noise levels in an office environment. In foul weather, transmission-line AN would be further masked by other noise sources associated with foul weather, e.g., rain and wind noise.

These AN and RN levels are unlikely to be objectionable, especially since the proposed Ringbus Interconnection is located hundreds of feet from existing residences and near to existing 345-kV transmission-line corridors.

Introduction

Clean Energy Future – Lordstown, LLC (CEF-L) proposes construction of the Lordstown Energy Center (the Facility) in the Village of Lordstown, Ohio. CEF-L also proposes construction of a 5-breaker ringbus at a Ringbus Site in Lordstown between two First Energy 345-kilovolt (kV) transmission-line corridors. This report evaluates the electrical environment of the proposed 345 kV electrical interconnection (Ringbus Interconnection) between the Facility Site and the Ringbus Site.

A representative structure of the Ringbus Interconnection is shown in Figure 1. The proposed circuit is located in the center of a proposed 100-foot right-of-way (ROW), with circuit conductors supported on delta monopole structures between 90 and 100 feet in height. Phases of the proposed Ringbus Interconnection are twin-bundled 954 kcmil 45/7 ACSR (Rail) conductors, 1.165 inches in diameter, with two 3/8" EHS Galvanized Class B Steel Wires. Accounting for conductor sag, the height of the lowest phase conductor is 30 feet above ground at mid-span. Based on conditions provided by Energy Initiatives Group, LLC, Exponent modeled the Ringbus Interconnect at the maximum net power output of the Facility (940 MW) and 85% power factor. This modeling condition corresponds to 1106 MVA, or 1851 amperes per phase at 345 kV. Using an electrical model of the proposed circuit, Exponent calculated electric fields, magnetic fields, audible noise (AN), and radio noise (RN) for the Ringbus Interconnection.

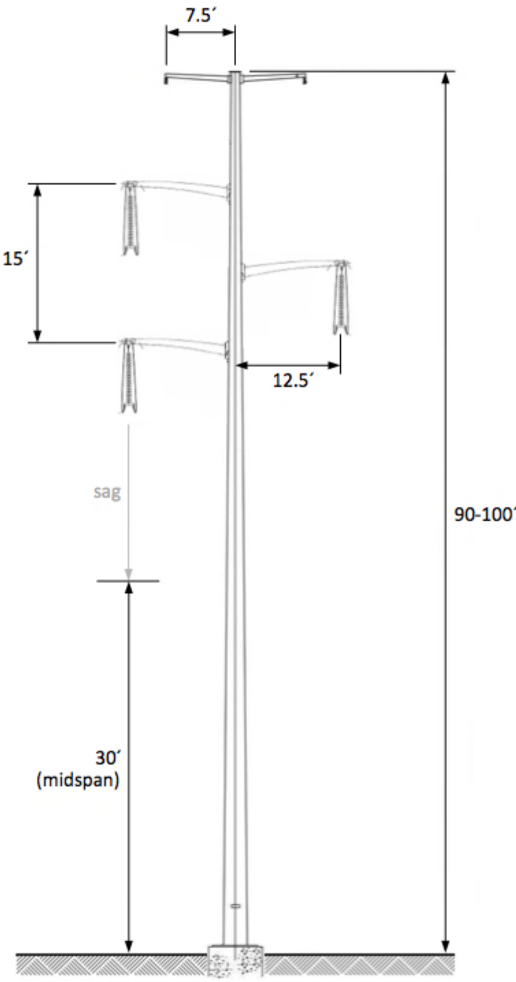

Figure 1. Proposed 345 kV delta structure for the Ringbus Interconnection.

Electric Fields

Electric fields are produced by the voltage applied to electrical conductors, and electric-field levels increase as the voltage increases. In the modeling results below, electric-field levels are reported in units of kilovolts per meter (kV/m), where 1 kV/m is equal to 1,000 volts per meter.

Since conducting objects such as buildings, fences, and trees easily block electric fields, the major sources of exposure to electric fields indoors are appliances, equipment, and machines within homes, office, and factories. Transmission lines, distribution lines, and other power-related infrastructure are the major source of electric fields outdoors.

Magnetic Fields

Magnetic fields are produced by the electric currents that flow through conductors. The strength of a magnetic field is expressed as magnetic flux density in units of milligauss (mG), where 1 Gauss = 1,000 mG.[1] In general, the strength of a magnetic field increases as current increases, but also depends on characteristics of the source, including the arrangement of and separation of conductors. Unlike electric fields, magnetic fields are not easily blocked by conducting objects at power-line frequencies (60 cycles per second).

The intensity of both electric fields and magnetic fields diminishes with increasing distance from the source. In the case of transmission lines, electric and magnetic fields generally decrease with distance from the conductors in proportion to the square of the distance. Since line voltage is quite stable and does not change much over time, electric-field levels are stable in time. Magnetic-field levels, however, can in general vary depending on load conditions.

Corona

At the surface of high-voltage power-line conductors, the electric field may become concentrated on surface irregularities to cause an electrical breakdown of the insulating properties of air, resulting in power loss at the site of breakdown (a phenomenon called corona).

Corona activity depends on a number of factors: altitude, line voltage, conductor size, conductor geometry, and weather conditions. Corona activity is most likely near transmission lines at higher altitudes and is most pronounced during foul weather. A transmission line is designed so that the electric field at the conductor surface does not exceed the breakdown potential. Nevertheless, any irregularities on the conductor surface (e.g., nicks, water droplets, or debris) will create points where the electric field is intensified sufficiently to produce corona. In foul weather, raindrops or snowflakes accumulating on the conductor surface will also act as points for corona inception.

[1] Scientists also refer to magnetic flux density at these levels in units of microtesla (μT). Magnetic flux density in milligauss (mG) units can be converted to μT by dividing by 10, i.e., 1 mG = 0.1 μT.

The difference in corona rate between fair weather and foul weather is marked enough that corona-related effects such as AN and RN are typically 10 times more intense during foul weather conditions.

Audible noise

Corona can result in AN, the intensity of which is most pronounced directly underneath the transmission-line conductors and decreases with distance. The frequency spectrum of AN for an AC transmission line is primarily broad-band with some discrete pure tones at multiples of the power frequency. AN is thus typically perceived as a hissing, crackling sound that may be accompanied by a 120-Hz hum.

AN levels increase with the "loudness" or "volume" of a particular sound. AN is measured in decibels (dB) referenced to 20 micropascals, which is approximately the pressure threshold of human hearing at 1 kilohertz (kHz). The range of audible frequencies for the human ear is from approximately 20 Hz to 20 kHz, with peak sensitivity between 1 kHz and 4 kHz. This change in sensitivity of the human ear with frequency is addressed by weighting the contribution of sound at different frequencies in measurements and calculations. Frequencies where the ear is less sensitive (20 Hz or 20 kHz) are given much less weight than frequencies near 1-4 kHz, where the ear is most sensitive. The weighting of sound over the frequency spectrum to account for the sensitivity of the human ear is called the A-weighted sound level (ANSI S1.4, 1971).

When the A-weighting scale is applied to a sound-pressure measurement, the level is reported as dBA, referenced to the audible pressure threshold of 20 micropascals. The sound level of typical human speech is approximately 60 dBA, and background levels of noise in rural and urban environments are about 30 to 40 dBA. Specific identifiable noises such as birdcalls, neighborhood activity, and traffic can produce AN levels of 50 to 75 dBA. Table 1 lists the sound intensities of common acoustic sources.

Table 1. Commonly encountered acoustic sources and audible noise levels

Noise Source	A-weighted sound level (dBA)
Pain Threshold	128
Auto horn	110
Inside subway	95
Traffic	75
Conversation	65
Office	55
Living Room	45
Library	35
Bedroom, at night	24
Hearing Threshold	0

Adapted from EPRI Red Book, 1982.

Corona-generated AN varies in time. In order to account for fluctuating sound levels, statistical descriptors are used to describe environmental noise. Exceedence levels (L levels) refer to the A-weighted sound level that is exceeded for a specified percentage of the time. Thus, the L_5 level refers to the sound level that is exceeded only 5 percent of the time. L_{50} refers to the sound level exceeded 50 percent of the time. Sound-level measurements in this report are expressed in the L_{50} level (median level) in fair conditions.

Radio noise

Overhead transmission lines can generate RN in the bands used for the reception of radio signals. Corona activity, described above, induces impulsive currents along a transmission line. These induced currents result in broadband radio-frequency (RF) noise that can affect the reception of RF signals.

As in the case with AN, the magnitude of the RN is an important factor in determining the potential for interference. However, the frequency and modulation of the RF signal are just as important. The frequency of the RF signal is of primary importance because the magnitude of RN from a transmission line decreases rapidly with increasing frequency. For instance, the power level of typical corona-generated RN at a frequency of 1 megahertz (MHz) is approximately 50 times higher than at a frequency of 10 MHz, and more than 200 times higher than at a frequency of 100 MHz (Comber and Nigbor, 1982). Therefore, while RN from a transmission line may exist at any frequency between 1 MHz and 1,000 MHz, it more strongly affects devices operating at lower frequencies. For example, RN can produce interference with broadcast AM radio signals (520-1,720 kHz), but broadcast FM stations (approximately 88-108 MHz) are typically not affected by RN.

In addition, the modulation of an RF signal is an important factor in determining the potential for interference. AM signals are amplitude-modulated, and this is type of modulation is more susceptible to interference from transmission-line RN than frequency-modulated signals, such as those from broadcast FM stations. In the past, RN was also a concern for the video portion of analog television signals, since it also uses amplitude modulation; however, this is no longer a concern in the United States because commercial broadcast television stations have switched to digital broadcasting and no longer transmit amplitude-modulated video signals.

RN levels in this report are expressed as dB referenced to 1 microvolt per meter (dBµV/m). These units describe the electric field intensity incident upon a reference antenna at 500 kHz, as recommended by the IEEE (1971). As with AN, corona-generated RN also varies in time. In order to account for fluctuating noise levels, statistical descriptors are used to describe RN. RN levels in this report are expressed as 50 percent exceedance values (median or L_{50} values). RN, like AN, is also more pronounced at higher altitudes and during foul weather.

Methods

Electric and magnetic fields (EMF), AN, and RN levels for the proposed Ringbus Interconnection were calculated using computer algorithms developed by the Bonneville Power Administration (BPA, 1991), an agency of the U.S. Department of Energy. The inputs to the program are data provided by Energy Initiatives Group, LLC for the proposed circuit, and include voltage, load flow, and conductor configurations.

Based on these data, Exponent calculated levels of EMF, AN, and RN at the point of lowest sag between structures along a transect perpendicular to the centerline of the proposed Ringbus Interconnection. EMF levels were calculated at 1 meter (3.28 feet) above ground as the root mean square value of the field in accordance with IEEE Std. C95.3.1-2010 and IEEE Std. 644-1994.[2] The conductors were assumed to be located on flat terrain and at maximum sag for the entire distance between structures. Balanced currents were modeled on all three phase conductors, with a subconductor spacing of 18 inches.

For calculation of the electric field, AN, and RN, a 5% overvoltage condition was assumed to ensure that the calculated values represent the maximum expected values for each of the parameters.

AN levels are reported in decibels on the A-weighted scale (dBA) as L_{50} values (i.e., the sound-pressure levels exceeded 50 percent of the time) for fair and foul weather conditions. As recommended by BPA, fair-weather AN levels are calculated by the subtraction of 25 dBA from the calculated foul-weather AN values. AN was calculated at a sound-receiver height of 5 feet above ground, which was assumed to be at an altitude of 300 feet above mean sea level.

Exponent calculated the RN levels for foul-weather conditions at a frequency of 500 kHz; the results are expressed in decibels relative to 1 microvolt per meter (dBμV/m). Fair-weather levels are calculated by subtracting 17 dBμV/m from the calculated foul-weather values, as

[2] The resultant magnetic field is the Euclidian norm (square root of the sum of the squares) of the component magnetic-field vectors calculated along vertical, transverse, and longitudinal axes.

recommended by BPA. RN was calculated at an antenna height of 1 meter (3.28 feet) above ground, which was assumed to be at an altitude of 300 feet above mean sea level.

Results and Discussion

Magnetic Fields

The calculated magnetic-field levels for the proposed Ringbus Interconnection at maximum net power output of the Facility (940 MW) and 85% power factor are summarized in Table 2 and depicted graphically in Figure 2. The highest calculated magnetic field on the ROW (273 mG) is beneath the lowest phase conductor on the south side of the proposed structure, as shown in Figure 2. At the south ROW edge, 50 feet from the structure centerline, the magnetic-field level is below 114 mG, and is somewhat lower (<94 mG) at the north ROW edge. The calculated magnetic field level decreases rapidly with distance, and falls below 18 mG at a distance of 100 feet from either ROW edge.

Electric Fields

The calculated electric-field for the proposed Ringbus Interconnection is summarized in Table 3 and depicted graphically in Figure 3. Similar to the magnetic field, the highest calculated electric field on the ROW (5.60 kV/m) is beneath the lowest phase conductor on the south side of the proposed structure, as shown in Figure 3. At the south ROW edge, 50 feet from the structure centerline, the electric-field level is below 1.7 kV/m. On the north ROW edge, the calculated electric field is somewhat higher (<1.9 kV/m). At this location, the mutual cancellation of electric fields from the phases on the opposite side of the structure is somewhat less than on the south ROW edge. The calculated electric field level decreases rapidly with distance, and falls below 0.2 kV/m at a distance of 100 feet from either ROW edge.

Audible Noise

The calculated audible-noise levels for the proposed Ringbus Interconnection are summarized in Table 4 and depicted graphically in Figure 4. The calculated AN profile is nearly symmetric around the conductors on the south side of the proposed structure, with a maximum foul-weather AN value of 51 dBA as shown in Figure 4. At the ROW edges, the highest calculated foul-weather AN level is 48 dBA, falling below 44 dBA 100 feet from the ROW edges.[3] In fair weather conditions, the highest calculated AN level at the ROW edges is 23 dBA, below a typical noise level in a bedroom at night (24 dBA).

Radio Noise

The calculated radio-noise levels for the proposed Ringbus Interconnection are summarized in Table 5 and depicted graphically in Figure 5. The calculated RN profile is nearly symmetric around the conductors on the south side of the proposed structure, as shown in Figure 5. The maximum foul-weather RN level at 50 feet beyond the outside conductor is 65 dBμV/m. In fair weather (the condition for the IEEE standard, discussed in the following section), the highest calculated RN level is 48 dBμV/m at this distance.

[3] The noise associated with foul weather itself would likely mask the noise from the Ringbus Interconnect during these conditions.

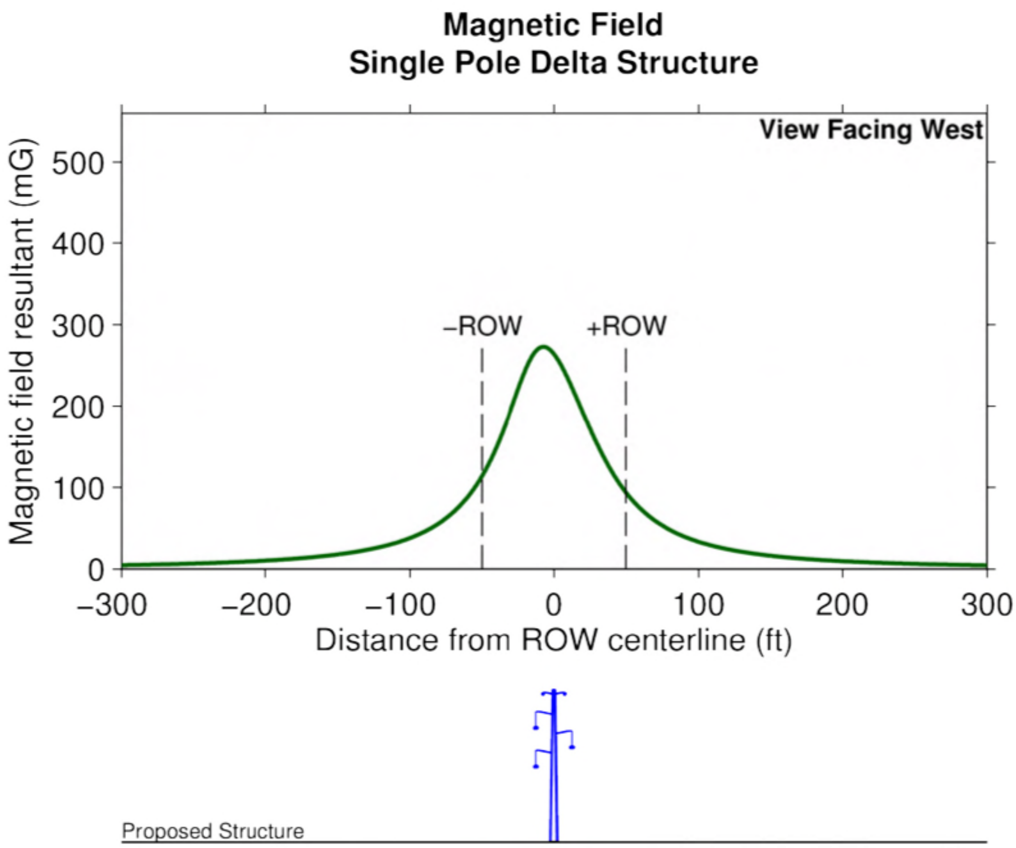

Figure 2. Calculated magnetic-field levels for proposed Ringbus Interconnection at maximum net power output of the Facility (940 MW) and 85% power factor.

Table 2. Calculated magnetic-field levels (mG) for proposed Ringbus Interconnection at maximum net power output of the Facility (940 MW) and 85% power factor

	Location				
Configuration	100 ft beyond –ROW edge	−ROW edge	Max on ROW	+ROW edge	100 ft beyond +ROW edge
Proposed	17.6	114	273	93	16.1

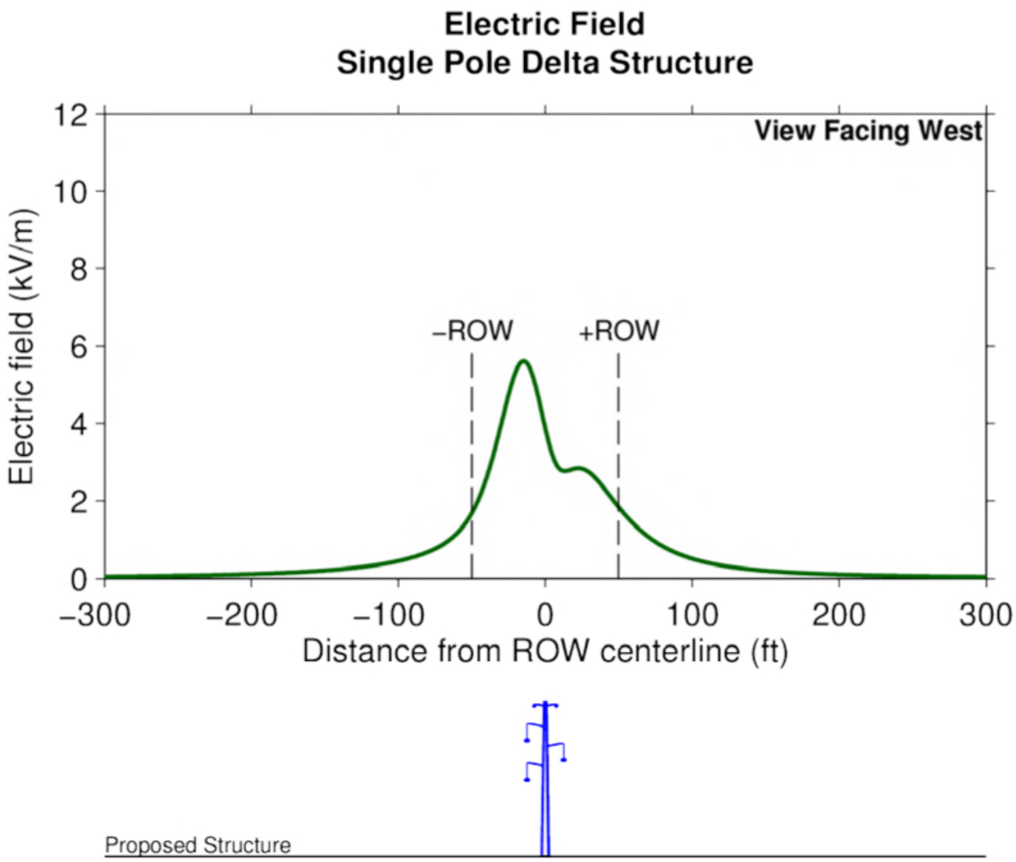

Figure 3. Calculated electric-field levels for proposed Ringbus Interconnection

Table 3. Calculated electric-field levels (kV/m) for proposed Ringbus Interconnection

	Location				
Configuration	100 ft beyond –ROW edge	−ROW edge	Max on ROW	+ROW edge	100 ft beyond +ROW edge
Proposed	0.2	1.7	5.6	1.8	0.2

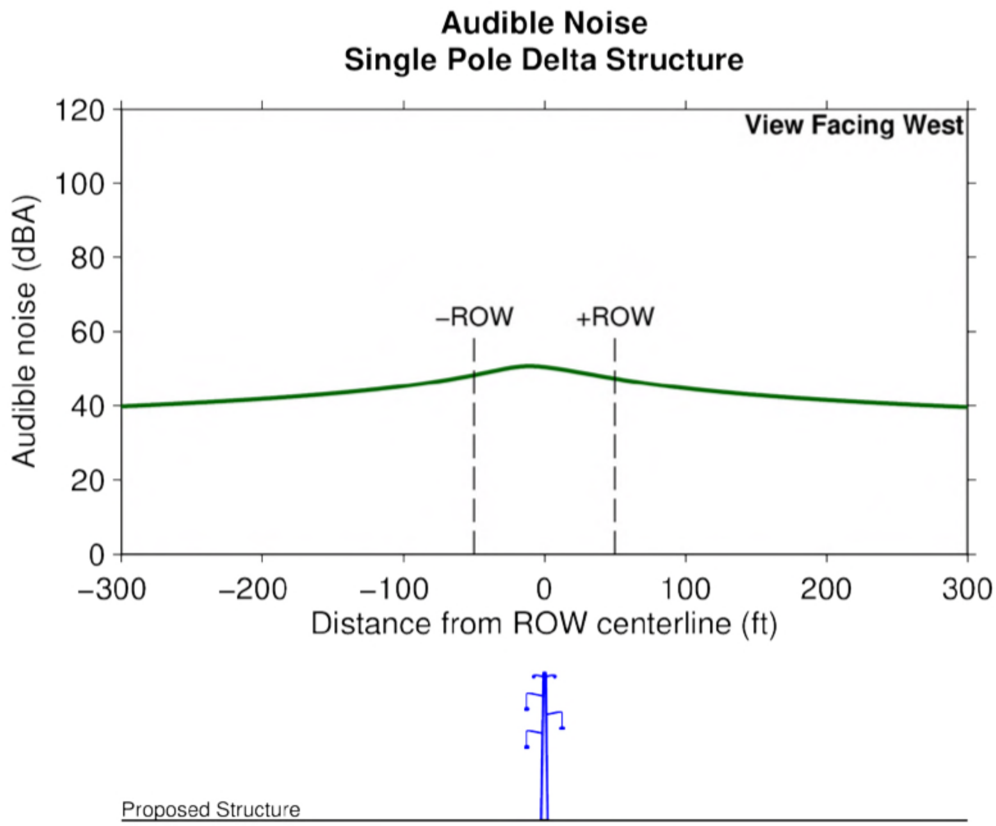

Figure 4. Calculated audible-noise levels for proposed Ringbus Interconnection, foul weather.

Table 4. Calculated audible-noise levels (dBA) for proposed Ringbus Interconnection

	Location				
Configuration	100 ft beyond –ROW edge	−ROW edge	Max on ROW	+ROW edge	100 ft beyond +ROW edge
Proposed, foul weather	43	48	51	47	43
Proposed, fair weather	18	23	26	22	18

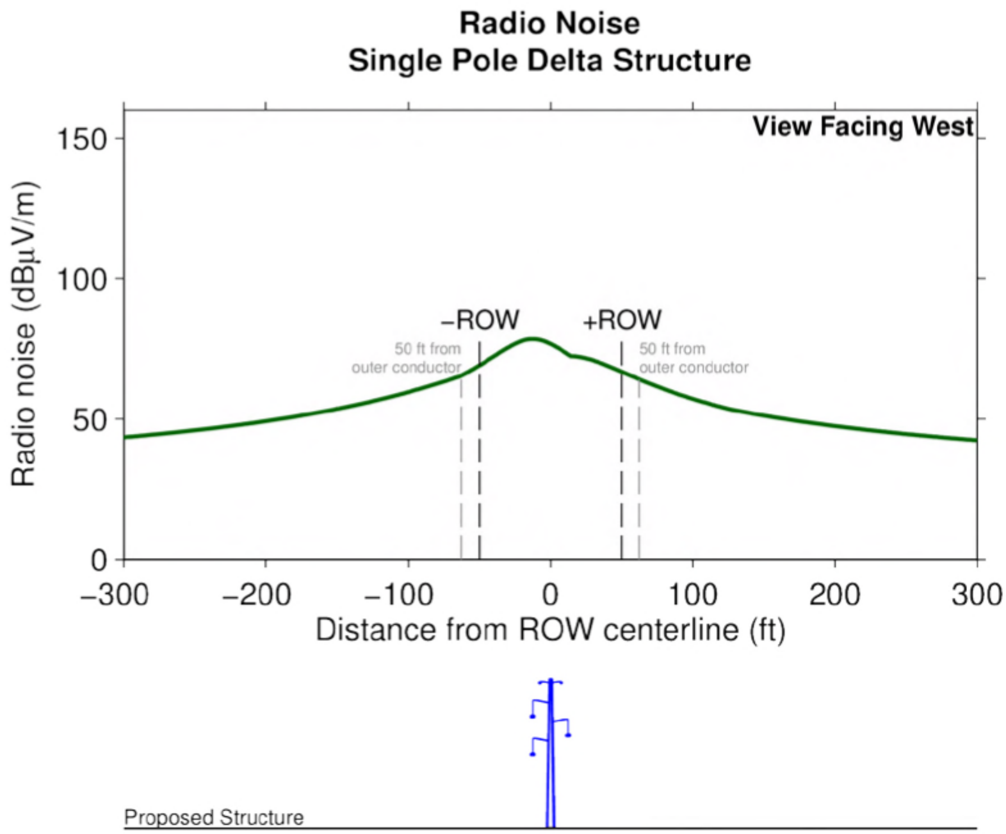

Figure 5. Calculated radio-noise levels for proposed Ringbus Interconnection

Table 5. Calculated radio-noise levels (dBµV/m) for proposed Ringbus Interconnection

	Location				
Configuration	–50 ft beyond outermost conductor	−ROW edge	Max on ROW	+ROW edge	+50 ft beyond outermost conductor
Proposed, foul weather	65	69	78	67	64
Proposed, fair weather	48	52	61	50	47

Standards and Guidelines

Electric and Magnetic Fields

Neither the state of Ohio nor the federal government has enacted standards for magnetic fields or electric fields from transmission lines or other sources at power frequencies. Some other states have statutes or guidelines that apply to fields produced by new transmission lines, but these are not health-based guidelines. For example, New York and Florida have limits on EMF that were designed to limit fields from new transmission lines to levels produced by existing transmission lines (i.e., to maintain the *status quo*) (FDER 1989; FDEP 1996; NYPSC 1978; NYPSC 1990).

More relevant than the various state-enacted guidelines are exposure limits recommended by scientific organizations that were developed to protect health and safety. These exposure limits are based on extensive weight-of-evidence reviews and evaluations of relevant health research and are designed to prevent acute, short-term biological responses such as perception, annoyance, and the stimulation of nerves and tissue that can occur at very high exposure levels to which most people are not exposed.

The International Committed on Electromagnetic Safety (ICES) and the International Commission on Non-ionizing Radiation Protection (ICNIRP) have published guidelines limiting exposure to very high levels of EMF based on the avoidance of established acute effects.

Table 6 summarizes the environmental assessment standards and guidelines for AC transmission lines, including reference levels below which exposures are ensured to not exceed limits on electric fields in the body (ICES, 2002; ICNIRP, 2010), as well as other guidelines for RN.

Table 6. Environmental assessment standards and guidelines for AC transmission lines

Electrical Parameter	Limit	Agency providing guideline (year)	Comment
AC electric field	4.2 kV/m	ICNIRP (2010)	General public exposure
	5 kV/m*	ICES (2002)	General public exposure
AC magnetic field	2 G	ICNIRP (2010)	General public exposure
	9.04 G	ICES (2002)	
Radio noise	61 (dBµV/m)**	IEEE (1971)	Measured at 15 meters (50 feet) horizontally from the conductor in fair weather

* There is an exception within transmission line ROWs, where the limit is 10 kV/m, because people do not spend a substantial amount of time in ROWs and very specific conditions are needed before a response is likely to occur (i.e., a person must be well insulated from ground and must contact a grounded conductor) (ICES, 2002, p. 27).

** The 1 MHz measurement frequency in IEEE (1971) was changed to 500 kHz by IEEE Radio Noise Measurement Standard 430-1986. The guideline has therefore been adjusted for frequency (calculations performed at 500 kHz) and receiver (-2 dB for 9 kHz bandwidth receiver) to update the guideline to present methods of measurement and calculation (500 kHz with CISPR receiver).

The highest calculated electric field on the ROW (5.6 kV/m) is beneath the lowest phase conductor on the south side of the proposed structure. This electric-field level is below the reference level recommended by ICES within transmission-line ROWs. Calculated electric-field levels beyond the ROW edges are less than 1.9 kV/m, below the reference levels recommended by ICES and ICNIRP for the general public

The highest calculated magnetic field on the ROW (273 mG) is beneath the lowest phase conductor on the south side of the proposed structure. This magnetic-field level is likewise below the reference levels recommended by ICES and ICNIRP for the general public.

Audible Noise

Section 1161.04 of the Codified Ordinances of Lordstown states:

> *No land or building in any district shall be used or occupied in any manner creating dangerous, injurious, noxious, or otherwise objectionable conditions which could*

> *adversely affect the surrounding areas or adjoining premises, except that any use permitted by this Zoning Ordinance may be undertaken and maintained if acceptable measures and safeguards to reduce dangerous and objectionable conditions to acceptable limits as established by the performance requirements in the following subsections.*
>
> *(h) Noise. Objectionable noise as determined by the Board of Zoning Appeals which is due to volume, frequency, or beat shall be muffled or otherwise controlled. Air-raid sirens and related apparatus used solely for public purposes are exempt from this requirement.*

In fair weather conditions, the highest calculated AN level at the ROW edges is 23 dBA, below typical noise levels in a quiet bedroom (24 dBA). In foul weather conditions, the highest calculated AN value is 51 dBA, comparable to the noise levels in an office environment; the noise associated with foul weather itself (e.g., wind and rain) are likely to generate levels of AN (41-63 dB-A) that are similar to or exceed the levels of AN from the transmission line and would likely mask the noise from the Ringbus Interconnect during these conditions (Miller, 1978). Given these AN levels, noise complaints would be unlikely, especially since the proposed Ringbus Interconnection is located hundreds of feet from existing residences and near to other existing 345-kV transmission-line ROWs.

Radio Noise

The state of Ohio has not enacted a limit for RN. Likewise, the Federal Communication Commission (FCC) Rules and Regulations (2008) contain no guideline regarding the RN levels for high-voltage transmission lines. Power transmission lines fall into the FCC category of "incidental radiator," which is defined as "a device that generates radio frequency energy during the course of its operation although the device is not intentionally designed to generate or emit radio frequency energy." Operation of an incidental radiator "is subject to the conditions that no harmful interference is caused and that interference must be accepted that may be caused by the operation of an authorized radio station, by another intentional or unintentional radiator, by industrial, scientific and medical (ISM) equipment, or by an incidental radiator." Section

15.1(m) of the FCC regulations defines "harmful interference" as "any emission, radiation or induction that endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radio communications service operating in accordance with this Chapter."

Historically, transmission-line operators have not had difficulty operating under the present FCC rules, since most sources of "harmful interference" from power lines in fair weather are due to gap-type discharges that can be identified and repaired (USDOE, 1980). Amplitude-modulated radio reception at residences very near transmission lines, however, may be affected by RN generated by corona on transmission conductors in foul-weather. For this reason, the IEEE Radio Noise Design Guide identifies an acceptable level of average *fair-weather* RN of 61 dBµV/m at 50 feet from the outside conductor, as shown in Table 6.

In fair weather the highest calculated RN level is 48 dBµV/m at a distance of 50 feet beyond the outermost conductor, and falls below the acceptable levels identified in the IEEE Radio Noise Design Guide.

Conclusions

The modeling of proposed conditions shows that the proposed Ringbus Interconnection complies with environmental assessment standards and guidelines for AC transmission lines.

The calculated magnetic-field levels for the proposed Ringbus Interconnection at maximum net power output of the Facility are far below the reference levels recommended by ICES and ICNIRP (9,040 mG and 2,000 mG, respectively). The highest calculated electric field on the ROW (5.6 kV/m) is below the reference levels recommended by ICES within transmission-line rights-of-way. Calculated electric-field levels beyond the ROW edges are less than 1.9 kV/m, below the reference levels recommended for the general public by ICES and ICNIRP (5.0 kV/m and 4.2 kV/m, respectively). Calculated radio noise levels at 50 feet from the conductors of the proposed circuit are likewise below the recommended IEEE reference levels.

The Ringbus Interconnection will be nearly inaudible under fair-weather conditions, with noise levels comparable to an office environment during foul weather. Calculated AN levels are unlikely to be objectionable, especially since the proposed Ringbus Interconnection is located hundreds of feet from existing residences and near to existing 345-kV transmission-line corridors.

References

Bonneville Power Administration (BPA). Corona and Field Effects Computer Program. Portland, OR: Bonneville Power Administration, 1991.

Comber MG and Nigbor RJ. Field effects of overhead transmission lines and stations. Chap. 5, pp., 205-266. In: Transmission Line Reference Book: 345 KV and Above. Second ed. (Ed: LaForest JJ). Palo Alto, CA: Electric Power Research Institute, Palo Alto, CA, 1982.

Electric Power Research Institute. *EPRI Transmission Line Reference Book 345 kV and Above, Second Edition*. (Palo Alto, CA: Electric Power Research Institute, 1982);

Federal Communications Commission (FCC). Code of Federal Regulations, Title 47, §15.5, 15.13, 15.15, 2008.

Florida Department of Environmental Regulation (FDER). Electric and Magnetic Fields. Chapter 17-274. Department of Environmental Regulation Rules, March, 1989.

Florida Department of Environmental Protection (FDEP). Chapter 62-814 Electric and Magnetic Fields, 1996.

Institute of Electrical and Electronics Engineers (IEEE). Radio Noise Design Guide for High-Voltage Transmission Lines, IEEE Radio Noise Subcommittee Report. IEEE Transactions on Power Apparatus and Systems PAS-90, 1971.

Institute of Electrical and Electronics Engineers (IEEE). IEEE Recommended Practice for Measurements and Computations of Electric, Magnetic, and Electromagnetic fields with respect to Human Exposure to Such Fields, 0 Hz to 100 kHz. New York: IEEE. IEEE Std. C95.3.1-2010.

Institute of Electrical and Electronics Engineers (IEEE). Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines (ANSI/IEEE Std. 644-1994). New York:IEEE, 1994.

International Committee on Electromagnetic Safety (ICES). IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields 0 to 3 kHz C95.6-2002. Piscataway, NJ: IEEE, 2002.

International Commission on Non-Ionizing Radiation Protection (ICNIRP). Guidelines for limiting exposure to time-varying electric and magnetic fields (1 Hz – 100 kHz). Health Physics 99:818-826, 2010.

Miller MW, Carstensen EL, Kaufman GE, Robertson D. 60-Hz electric field parameters associated with the perturbation of eukaryotic system. In: Biological effects of extremely low frequency electromagnetic fields. Proceedings of the Eighteenth Annual Hanford Life Sciences

Symposium at Richland Washington, October 16-18, 1978; pp. 109-116, 1979.

New York Public Service Commission (NYPSC). Opinion No. 78-13. Opinion and Order Determining Health and Safety Issues, Imposing Operating Conditions, and Authorizing, in Case 26529, Operation Pursuant to Those Conditions. Issued June 19, 1978.

New York Public Service Commission (NYPSC). Statement of Interim Policy on Magnetic Fields of Major Transmission Facilities. Cases 26529 and 26559 Proceeding on Motion of the Commission. Issued and Effective: September 11, 1990.

USDOE, Bonneville Power Administration. A Practical Handbook for the Correction of Radio Interference from Overhead Powerlines and Facilities. Portland, OR: Bonneville Power Administration, 1980.

U.S. Environmental Protection Agency (USEPA). Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Office of Noise Abatement and Control, March 19

Appendix D: Geotechnical Report

GEOTECHNICAL INVESTIGATION

PROPOSED LORDSTOWN ENERGY CENTER
LORDSTOWN, OHIO

JANUARY 2015

PREPARED FOR:
CLEAN ENERGY FUTURE – LORDSTOWN LLC
24 PROCTOR STREET
MANCHESTER, MASSACHUSETTS 01944

PREPARED BY:
THE MANNIK & SMITH GROUP, INC.
1800 INDIAN WOOD CIRCLE
MAUMEE, OHIO 43537

GEOTECHNICAL INVESTIGATION

PROPOSED LORDSTOWN ENERGY CENTER
LORDSTOWN, OHIO

PREPARED BY: ______________________
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PROJECT ENGINEER

STATE OF OHIO
GREGORY A. BUHOVECKEY
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REGISTERED
PROFESSIONAL ENGINEER

REVIEWED &
APPROVED BY: ______________________
JEFFREY L. SNYDER, PE
PROJECT ENGINEER

STATE OF OHIO
JEFFREY LYNN SNYDER
E-72271
REGISTERED
PROFESSIONAL ENGINEER

Mannik Smith GROUP

TABLE OF CONTENTS

SECTION: **PAGE NO.:**

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION AND PROJECT DESCRIPTION

The Mannik & Smith Group, Inc. (MSG) was retained by Clean Energy Future – Lordstown LLC (Clean Energy) to perform a geotechnical subsurface exploration at the proposed Lordstown Energy Center site located in Lordstown, Ohio. The project location is depicted in Figure 1 *Site Location Map*. Several buildings and structures are proposed at the site including buildings, gas turbines, heat recovery steam generators, cooling towers, water storage tanks, transformers, parking lots and access drives. This report describes the investigation and presents MSG's geotechnical findings.

Structural loading conditions were provided at the time of preparation of this report. It is our understanding that shallow spread footings are preferred for structures to support loads. However, if loading and subsurface conditions are not favorable for conventional shallow foundation designs, deep foundation designs will be considered.

The purpose of this geotechnical investigation is to evaluate subsurface conditions for the proposed structures and pavement. This investigation included the advancement of six (6) geotechnical borings (totaling approximately 108 linear feet of drilling including approximately 98 feet of soil sampling and 10 feet of bedrock coring). The boring locations are shown on Figure 2 *Soil Boring Locations Map*. Representative soil samples were tested to establish the subsurface soil and groundwater conditions present at the site during the investigation.

This report describes the geotechnical investigative and testing procedures, presents the subsurface conditions encountered and provides evaluations and recommendations relative to construction considerations.

2.0 BACKGROUND

The Site is located in a rural area within a partially developed industrial complex within The Village of Lordstown, Trumbull County, Ohio. The Site is located south of Henn Parkway and is currently vacant with current land use for agricultural purposes. Main access to and from the Site is provided off of Henn Parkway. A Site Location Map is presented as Figure 1.

The Site lies entirely within the Glaciated Allegheny Plateaus Physiographic Region, and can be further subdivided into the Killbuck-Glaciated Pittsburgh Plateau. Generally, geologic deposits within the region consist of glacial sediments, including materials deposited from advancing and retreating ice sheets. Local on-site soils and soil structure appear not to have been significantly influenced by development at the site.

The current use of the property is vacant and site history indicates that naturally deposited sequence and structure of the soils at the site are most likely preserved. A somewhat stratified column of the naturally deposited soils was observed at the site. There was no indication of underground mining, sinkhole activity or excessive settlement at the site at the time of this exploration.

The investigation was performed in accordance with the scope of work included in the MSG Agreement for Profession Services dated December 12, 2014. Geotechnical borings were marked for Ohio Utilities Protection Service (OUPS) notification purposes. Geotechnical drilling activities were performed by MSG on January 7 and 8, 2015. The split-spoon samples were delivered to MSG's soil testing laboratory located in Canton, Michigan immediately after collection in the field.

3.0 INVESTIGATION PROCEDURES

Soil borings were advanced on site and samples were collected at various intervals to analyze soil properties by both visual and laboratory methods. Split spoon samples, or "disturbed" samples, were recovered to obtain representative samples suitable for visual determination of texture and fabric. These samples were also used for laboratory index property testing which included measurements of grain-size distribution, and moisture content. A Shelby Tube sample, or "relatively undisturbed" sample was recovered for laboratory soil permeability testing.

3.1 Field Exploration

Six (6) soil borings, identified as B-01 to B-06 were marked on the site. The borings were advanced for geotechnical investigation purposes on January 7 and 8, 2015. Bedrock cores were obtained on January 7, 2015 from boring locations B-01 and B-02 as a part of this project. The borings performed for this investigation were advanced with a Geoprobe model 7822DT soil probing unit by hydraulically pushing 3.25-inch inner diameter steel casings into the soil in general conformance with ASTM D1452. An NQ sized air rotary NWD4 conventional core barrel was used to core the underlying bedrock. Bedrock coring activities were performed in general accordance with ASTM D 2113.

Soil sampling was conducted using the Standard Penetration Test (SPT) in general accordance with ASTM D1586. A standard 2-inch outer diameter split-spoon sampler was driven 18 inches into the soil with blows of a 140-pound hammer falling 30 inches. The sum of the number of hammer blows required to drive the sampler the second and third six-inch intervals was recorded and designated the "standard penetration resistance", or blow count (N value), in units of blows per foot (bpf). The SPT N value, when properly evaluated, is an index of the soil's strength and density. Split-spoon samples were generally collected at a 2.5-foot interval beneath the surface to casing refusal. Average refusal depth was approximately 16 feet below ground surface (bgs).

Bedrock core samples were collected from the 2 boring locations listed above. Rock Quality Designation (RQD) was calculated and recorded for each core sample in the field by a representative of MSG. The results of the field investigations have been summarized on the field boring logs provided in Appendix A.

A representative of MSG visually classified the split-spoon soil samples in the field (ASTM D2488), conducted pocket penetrometer tests and logged the borings. Prior to backfilling, the open bore holes were observed for groundwater. The borings were backfilled primarily with bentonite and drilling cuttings upon the completion of drilling. Soil and rock samples were delivered to MSG's soils laboratory for further examination and the assignment of laboratory testing on selected samples.

Soil boring logs, indicating soil descriptions and standard penetration resistance, are included in Appendix A, Soil Boring Logs. The type of sampler utilized to collect each soil sample was the split spoon sampler and a Shelby tube and is designated as "SS" or "ST", respectively, on the boring logs.

3.2 Laboratory Testing

Each split-spoon sample recovered from the borings was examined and visually classified. This examination was performed to select samples for further laboratory evaluation, to verify conditions identified within field boring logs, and to perform visual-manual classification of samples not subjected to further laboratory testing. During the examination process, the geotechnical engineer finalized the soil boring logs.

Laboratory index testing consisted of moisture content, gradation, and plasticity. Moisture contents were determined for select samples in accordance with ASTM D2216. Soil gradation analyses, including sieve and hydrometer analyses, were performed on select split-spoon samples in accordance with ASTM D422.

Atterberg limit tests to determine the plasticity characteristics of clayey soils were performed in accordance with ASTM D4318. A flexible wall permeability test to determine the in-situ permeability of the native material was performed in accordance with ASTM D5084 on the Shelby tube sample.

Geotechnical testing (in addition to moisture content) was conducted in accordance with the test schedule and standard methods as summarized in Table 3.1. Results of the laboratory testing are included in Appendix B. Test results are generally discussed in the following sections.

Table 3.1 Geotechnical Testing Schedule

Boring/ Sample	ASTM D422 (Grain Size Distribution)	ASTM D4318 (Atterberg Limits)	ASTM D2166 (Unconfined Compression)	ASTM D5084 (Permeability)
B-01/SS-2	●	●		
B-01/SS-3			●	
B-04/SS-2	●	●		
B-05/SS-5	●	●		
B-06/SS-4	●	●	●	
B-01/ST-1				●

4.0 SUBSURFACE CONDITIONS

The subsurface soils encountered in the bore holes drilled at the site are shown in detail on the boring logs contained in Appendix A. The subsurface profile has been simplified in the following sections to provide a basis for geotechnical design. The soil boundaries indicated are inferred based on non-continuous sampling, drilling observations and/or sampling resistance. The subsurface conditions discussed in the following paragraphs and those shown on the boring logs represent an interpretation of the subsurface conditions based on field and laboratory data using geotechnical engineering judgment. The subsurface conditions described herein may vary between and beyond the borings.

Based on reviews of the boring logs and laboratory test results, MSG has identified three soil units in the soil profile. Soil Unit 1 is at the surface and consists primarily of topsoil material to an average depth of approximately 10 inches bgs. Soil Unit 2, is located below Soil Unit 1 and was encountered to an average depth of 9 feet bgs. Soil Unit 2 is a fine grained glacial material consisting primarily of silt and clay sized particles, with varying amounts of sand and gravel. Soil Unit 3 is located below Soil 2 and was encountered until refusal, which was at an average depth of 16 feet bgs. Soil Unit 3 is a fine grained residual soil material consisting primarily of silt and sand sized particles.

4.1 Soil Units

4.1.1 Soil Unit 1 – Top Soil

A deposit of organic mix of clay, silt and sand material was encountered in all of the borings at the surface to an average depth of approximately 10 inches bgs.

No split spoon samples were taken of this unit and no pocket penetrometer readings or laboratory analyses were performed.

4.1.2 Soil Unit 2 – Fine Grained Glacial (Silty Clay)

A deposit of brown and brown mottled with gray silty clay with varying amounts of sand and gravel was encountered in the soil borings from a depth of approximately 10 inches bgs to an average depth of 9 feet bgs.

Typical "N" values obtained within this layer were variable and ranged from 9 to 23 blows per foot, averaging 17, indicative of a very stiff material. Pocket penetrometer readings ranged from 2.0 to greater than 4.5 tsf. Laboratory analysis of soil samples taken from this layer indicated an average liquid limit of 29% and a plastic limit of 17%. Average moisture content of this layer was 18.0%. Laboratory permeability testing on a Shelby tube sample taken from this unit indicate an in-situ permeability of 7.97×10^{-8} cm/sec.

4.1.3 Soil Unit 3 – Residual Soil

A deposit of dark gray silty clay with varying amounts of sand and gravel was encountered in the soil borings from a depth of approximately 9 feet bgs to the average maximum depth of the borings - 16 feet bgs.

Typical "N" values obtained within this layer were variable and ranged from 32 to 49 blows per foot, averaging 40, indicative of a hard material. Pocket penetrometer readings ranged from 2.0 to greater than 4.5 tsf. Laboratory analysis of soil samples taken from this layer indicated a liquid limit of 30% and a plastic limit of 20%. Average moisture content of this layer was 12.0%.

4.1.4 Bedrock Unit 1 – Highly Weathered Shale

The bedrock encountered in the borings completed for this investigation consists of gray shale. The rock mass observed is highly weathered. The bedding in Ohio shale is generally horizontally oriented. However, no bedding orientation or bedding thickness is discernable in the limited amount of core observed, but remnants would suggest it to be generally thinly bedded. The rock mass appears to be highly fractured and exhibits a tendency to part along bedding planes as a result of the coring process, as is typical of most bedded sedimentary rocks. Bedrock was encountered at an average depth of approximately 16 feet bgs. The Rock Quality Designation (RQD) was 0%.

4.2 Soil Parameters

This section presents a summary of soil parameters for design considerations. These parameters have been developed from boring data and laboratory testing results and are consistent with similar soils encountered in the area. Soil design parameters for the major stratigraphic units are summarized in the following table:

Table 4.1 Soil Parameters

Stratigraphy	Average Atterberg Limits			Estimated Undrained Shear Strength (psf)	Estimated Depth (ft. bgs)	Estimated In-Situ Permeability (cm/sec)
	LL	PL	PI			
Soil Unit 2 - Fine Grained Glacial Layer	29	17	12	3,000-4,500[1]	0.8-9	7.97×10^{-8}
Soil Unit 3 - Residual Soil	30	20	10	4,000-7,500[2]	9-16	-

1. Estimated from blow counts, field and laboratory data, average estimated undrained shear strength was 3,800 psf.
2. Estimated from blow counts and field data, average estimated undrained shear strength was 5,600 psf.

The soil design parameters generally represent the lower bound of test results for conservative analyses. Parameters were developed from field data and SPT N values.

4.3 Groundwater

As the borings were advanced, the drill crew checked the drilling rods and sampling equipment for indications of groundwater or seepage. Each borehole was checked again for groundwater immediately after completion of drilling and the groundwater level was observed at 5 to 5.5 feet bgs in the borings. Changes in soil color, from brown to gray, are generally indicative of the median water table. The depth to the change in soil color from brown to gray soils was approximately 9 feet bgs. Also, wet (saturated) soils (excluding topsoil) were encountered at the boring location B-01 at the time of drilling at a depth of approximately 14 feet bgs. The groundwater elevation fluctuates and is naturally at a seasonal high during the winter and spring and is usually lower in the summer and early fall.

4.4 Site Seismic Classification

According to the International Building Code (IBC) Chapter 16, Tables 1613.5.2 and 1613.5.3, the proposed site is designated as “Site Class D” based on the average Standard Penetration Test for the upper 16 feet of soil. The seismic related design factors and coefficients are shown in Tables 1613.5.2 and 1613.5.3 presented in Appendix C, International Building Code Site Seismic Classifications.

5.0 EVALUATION

5.1 General

The following evaluations and conclusions are based on interpretations of field and laboratory data obtained during the geotechnical investigation and MSG's experience with similar soils and subsurface conditions. Where comments are made on construction or regarding the proposed development, they are provided in order to highlight aspects of construction that could potentially affect the design of the project. Contractors bidding on or undertaking the work should make their own interpretations of the factual results of the investigation as it affects their construction methods, equipment capabilities, costs, schedule, sequencing and similar issues.

This report and evaluation reflects only the geotechnical aspects of the subsurface conditions at the site. Review and evaluation of environmental aspects of subsurface conditions is beyond the scope of this report.

5.2 Site Preparation

Before proceeding with construction, topsoil, vegetation, root systems, and other deleterious materials should be stripped from the proposed construction areas.

Areas exposed by stripping operations, on which subgrade preparations are to be performed, should be scarified to a minimum depth of 8 inches and compacted in place to 98% maximum dry density based on the Standard Proctor reference (ASTM D698).

It is also recommended that the prepared subgrade be proof-rolled to detect any unstable, soft or loose areas. Proof-rolling should be accomplished by making a minimum of two complete passes with a fully-loaded tandem-axle dump truck, or other approved pneumatic-tired vehicle, with a minimum weight of 20 tons in each of two perpendicular directions. If proof-rolling reveals the presence of soft, loose or poorly performing material within the subgrade, some remedial measures will be required to stabilize the subgrade soils. **Conditions promoting poorly performing subgrade material should be anticipated in isolated areas during construction.**

Depending on the severity of distress encountered during proof-rolling, compaction of the subgrade surface with a vibratory sheep's foot roller, vibratory smooth drum roller or undercutting to an acceptable subgrade surface and backfilling with compacted lifts of drier materials, may prove to be adequate. If these activities fail to stabilize the subgrade, the use of granular backfill with a geotextile separation layer and/or geogrid may be required**. Analysis of the soil conditions present at the time of the exploration at the subgrade elevation (assuming minimal cut/fill) indicate that a 12-inch undercut may be necessary for subgrade stabilization in some of the pavement areas.**

Frost heaving soils (Silt) are common in the area but were not observed on-site in the borings. It is recommended that the subgrade surfaces be inspected by a geotechnical engineer for the presence of soils that are susceptible to frost heave. If these soils are identified at the subgrade surface, they should be completely removed or undercut to a depth of 36-inches below subgrade and replaced with suitable structural fill material. Structural fill material should be placed and compacted as discussed in Section 5.3.

High plasticity clay (CH) was not encountered within the top 5 feet in the borings performed at the site. However, high plasticity clay is common in the area and may be present on site. High plasticity clays are not suitable for use as fill and should be undercut, where encountered, a minimum of 24 inches below the bearing surface in foundation areas and 24 inches below the top of subgrade in pavement and slab areas. The undercut areas should be backfilled with engineered fill in accordance with Section 5.3.

Existing abandoned utilities within the proposed development area were not identified. However, if such utilities are encountered during construction activities (field tiles); they should be removed or properly abandoned in place. If abandoned in place, it is recommended that the utility pipe be filled with cement grout to avoid potential collapse in the future. Should the utility lines be removed from the site, the resultant trench excavations should be backfilled with well-compacted granular material, placed and compacted in accordance with the recommendations of Section 5.3.

5.3 Fill Placement

Grading plans were not provided at the time of report preparation. However, MSG assumes that the proposed construction will include placement of some fill. Fill should be compacted to 98% of Standard Proctor maximum dry density (ASTM D698).

Fill material intended to support building/structure footings should be compacted to 100% of the material's maximum density as determined by the Standard Proctor test. Clay should be compacted to $\pm 2\%$ of optimum moisture content. High plasticity (CH) and SILT soils are not suitable for use as fill due to high shrink swell potential and potential frost heave, respectively.

On-site soils should be placed with an 8-inch maximum loose lift thickness, assuming appropriately weighted and ballasted equipment is utilized for compaction. The actual thickness suitable for placement is dependent upon the soil type, compaction equipment, and the compaction specification. The geotechnical engineer, as part of the construction monitoring, should review the equipment utilized for compaction to confirm suitability relative to the specified loose lift thickness. If necessary, the geotechnical engineer will recommend a revised lift thickness suitable to the equipment performing compaction.

Coarse crushed granular material is recommended as fill for replacement of undercut areas, if necessary. For undercut areas, the coarse crushed granular material may consist of natural aggregate materials or geotechnical engineer approved equivalent. Typical lift thickness utilized for this material is 8 inches. As an alternative, in very soft or loose subgrade areas, the use of a geotextile for separation and/or a geogrid in addition to the coarse crushed granular material should be considered.

As a working platform for the new structures construction, and prior to footing excavation, it is recommended that at least 6 inches of granular base material meeting the gradation requirements of ODOT Item 304 stabilized crushed aggregate be placed and compacted to 100% of Standard Proctor maximum dry density.

Trench excavations associated with abandonment of existing utilities or installation of new utilities should be no wider than what is required to safely place and compact the backfill material on either side of the pipe depending on the backfill material, equipment, compaction method, and the pipe diameter. Typical trench width for pipe 10 to 24 inches in diameter is twice the outside diameter of the pipe. Typical trench width for 30 and 36 inch pipe is usually the outside diameter plus two feet. For pipe 42 inches in diameter and larger, a width equal to the outside diameter plus three feet is typical. Pipe bedding should be sufficient to provide uniform firm support for the pipe and maintain pipe grade. Granular backfill around the pipe should be well compacted and meet the gradation requirements of ODOT Item 304 extending from the pipe haunches to at least two pipe diameters above the top of the pipe.

Excavated soil material, compacted to 98% of Standard Proctor, can be placed for backfilling abandoned existing utilities and for installation of new utilities. Typical lift thickness utilized for this material is 8 inches.

Compaction equipment and methods used should be appropriate for the types of fill materials being placed. Granular materials should be compacted using vibratory or non-vibratory smooth-drum rollers. Fine-grained soils should be compacted using a segmental peel or "sheepsfoot" compactor. For restricted access areas, such as utility trenches, fill should be compacted utilizing portable compaction equipment in 3 to 6 inch loose lifts.

All fills should be placed in horizontal lifts and adequately keyed into stripped and scarified subgrade soils and adjacent fill. Proper drainage should be maintained during and after fill placement to prevent water from impacting compaction efforts or long-term fill integrity.

A qualified geotechnical consultant should be retained to monitor fill placement in order to assure compaction requirements are achieved and that suitable fill materials are being used. Soil density testing should be performed during fill placement activities to assure proper fill compaction. Areas that do not achieve compaction requirements after initial placement should be recompacted to meet project requirements.

5.4 Excavation

Activities at the site, such as utilities, may require excavations at significant depth below the ground surface. Slope height, slope inclination, and excavation depth (including utility trench excavations) should in no case exceed those specified in local, state, or federal safety (OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926 Subpart P) regulations. Such regulations are strictly enforced and, if not followed, the owner, contractor, or earthwork or utility subcontractors could be liable for substantial penalties.

Maximum allowable slopes for excavations less than 20 feet based on soil type and angle to horizontal are as follows:

Table 5.1 Maximum Allowable Slopes

Soil Type	Height/Depth Ratio	Slope Angle
Stable Rock	Vertical	90°
Type A	¾:1	53°
Type B	**1:1**	**45°**
Type C	1 ½:1	34°
Type A (Short-Term)	½:1	63°
(For a maximum excavation depth of 12 ft.)		

The overburden soils encountered during the investigation were generally a mixture of silt and clay with varying amounts of sand and gravel. Based upon the data obtained, we anticipate OSHA will classify these as Type B soil. Flatter slopes may be required if adverse seepage conditions are encountered during construction. For permanent excavations and slopes, the grades should be no steeper than 4H:1V without further geotechnical review of the finalized grading plan.

If any excavation, including a utility trench, is extended to a depth of more than 20 feet, OSHA requires that a Professional Engineer design the side slopes of such excavations.

5.5 Foundations

MSG has developed preliminary foundation recommendations presented herein based on the subsurface conditions at the assumed footing depth of 42 inches in the fine grained glacial till layer. The evaluation was based on footing elevations with regard to existing site elevations and assuming a finish floor elevation approximately at the current existing grade.

Based upon our review of the existing soil conditions, a recommended allowable bearing capacity for footings bearing within the fine grained glacial till layer or well compacted engineered fill is 4,500 psf. The recommended value takes into account variation in shear strength of the underlying soil likely to be encountered within portions of the site, and should provide economical shallow footing sizes for the type of structures proposed with an adequate factor of safety.

Column and strip footings should be sized based on the anticipated maximum structural loads and the aforementioned recommended allowable bearing capacity. However, column footings should be at least 3 foot square and strip footings should be at least 2 feet wide, regardless of the resulting contact pressure. Exterior footing bottoms and footings in unheated areas should be no less than 42 inches below final exterior grade for protection against possible frost damage. Interior footings, which should not be subject to frost action, may bear at shallower depths, provided they are supported on native soil or engineered fill capable of supporting the design load. MSG recommends the interior shallow foundations bear no less than 24 inches below final floor subgrade.

A qualified geotechnical consultant, prior to the placement of reinforcing steel and concrete, should evaluate foundation excavations to verify that an adequate bearing material is present and that all debris, mud, and loose, frozen or water-softened soils are removed. MSG recommends that subgrade strength testing be performed by the inspector prior to foundation placement to ensure a suitable bearing capacity.

Foundations should be constructed as soon as practical after they are excavated. Water should not be allowed to pond in any excavation. If an excavation is left open for an extended period, a thin mat of lean concrete should be placed over the bottom to minimize damage to the bearing surface from weather or construction activities. Foundation concrete should not be placed on frozen or flooded subgrade.

5.6 Settlement

Settlement generally consists of three separate components, immediate settlement, consolidation, and secondary compression (or creep). In general, all soils will exhibit settlement as a result of a load applied to the soil. The magnitude of soil settlement depends on several factors, including soil type, structure, past loading history of the soil deposit, and moisture content/saturation.

It is assumed that the footings will bear in the fine grained glacial material layer and that the approximate layer thickness beneath the foundations may be about 5.5-feet. No laboratory consolidation testing was performed to determine the compression and recompression indices of the underlying bearing strata as a part of this exploration. Therefore, empirical relationships were used to estimate the compression index C_c and the recompression index C_r for settlement analysis of the underlying cohesive layers.

For saturated cohesive soils, consolidation settlement is the predominant mechanism of settlement. Consolidation is the process of pore water expulsion associated with application of load to a fine-grained soil. Consolidation settlement of foundations bearing on saturated clay is of greater concern than immediate settlement due to the potential magnitude and time dependent nature of consolidation. Settlement analyses indicate an estimated consolidation settlement will be on the order of approximately 3/4 to 1 inch for footings loaded to the allowable bearing capacity of 4,500 psf, bearing at 3.5 feet bgs. Proposed finished floor elevations above the existing surface elevation are anticipated to generate an additional 1/12 to 1/10 inch of total settlement per 1 foot of fill (building pad) added.

The effects of differential settlement between foundation elements could be minimized by pre-loading the building pad area prior to installing foundation elements (employing a waiting time), adjusting the footing sizes to reduce contact pressures, adjusting the building pad thickness to reduce loading or adjusting the bearing elevation of the footings in the soil. The proper combination of any of the above listed measures could keep differential settlement between elements within a tolerable limit. Settlement and differential settlement of the strip and spread footings loaded to the preliminary design loads in conjunction with the proposed building pad thickness should be analyzed by a geotechnical engineer in more detail prior to final design to more accurately define the total and differential settlement amounts that should be anticipated.

In order to minimize the potential impacts caused by differential settlement, any slab-on-grade construction should be kept structurally separate from walls and columns and saw cut control joints should be provided at suitable intervals.

5.7 Slab-on-Grade

As indicated previously, the subgrade soils anticipated at the site will consist of stiff material. Based on the existing materials and a subgrade prepared as outlined in Sections 5.2 and 5.3, for slab-on-grade design, an estimated modulus for subgrade reaction on top of the existing subgrade of 175 pounds per cubic inch (pci) may be used.

It is recognized that the use of stabilized base increases the modulus of subgrade reaction appreciably. The final construction of slabs-on-grade should consist of at least 6 inches of stabilized aggregate base/subbase compacted to 100% of the materials Standard Proctor maximum dry density.

5.8 Pavement Recommendations

Subgrade soils should be prepared for pavements as recommended in previous discussions in this report. The use of pavement subdrains, in conjunction with free draining backfill, will also improve pavement performance. Such measures should include consultation of a geotechnical engineer to ensure soil improvement techniques result in pavement construction with an acceptable service life. Subgrade stability should be verified through proof rolling in accordance with Section 5.2 of this report.

Based on the soil characteristics and blow counts during the geotechnical investigation, a California Bearing Ratio (CBR) value of 7 was estimated for the design of the pavement. MSG recommends that underdrains be utilized around catch basins and in other low areas of the proposed pavements to limit the accumulation of water below the pavement structures which will improve pavement performance. Surface edge drains should also be used at curbs.

Based on a design CBR value of 7, the following pavement sections are recommended:

1. Standard Duty Asphalt Concrete Pavement – 8-inches of ODOT Item 304 Aggregate Base overlain by 2-inches of ODOT 441.02-1 Type 2 Asphalt Intermediate Course which in turn is overlain by 2-inches of ODOT 441.02-1 Type 1 Asphalt Surface Course .
2. Heavy Duty Asphalt Concrete Pavement – 10-inches of ODOT Item 304 Aggregate Base overlain by 2-inches of ODOT 441.02-1 Type 2 Asphalt Intermediate Course which in turn is overlain by 2-inches of ODOT 441.02-1 Type 1 Asphalt Surface Course.
3. Heavy Duty Concrete Pavement – 6-inches of ODOT Item 304 Aggregate Base overlain by 6-inches of non-reinforced Portland Cement Concrete Pavement.

It should be noted that actual traffic loading estimates for pavement section design were not provided at the time of this investigation. The above recommended pavement sections are based upon estimated auto and truck traffic associated with the proposed site use. Pavement design based on actual anticipated auto and truck volumes and loading should be performed. Final detailed design pavement sections may vary from those listed above.

Typically subgrades can deteriorate when directly exposed to construction equipment loads during unfavorable conditions which can increase the soil moisture content – i.e. cold and wet weather. Therefore, construction should take place during favorable times of the year or special considerations should be taken during construction to protect the pavement/pavement subgrade areas from deterioration, which may require further undercutting in some areas.

5.9 Water Control

In this investigation, either perched groundwater or the permanent groundwater table was observed during drilling activities. Perched water may be present at other locations on the Subject Property. Typically, the groundwater elevation fluctuates and is higher during the winter and spring and lower in summer and early fall.

The amount and type of dewatering required during construction, if any, will depend on the weather, groundwater levels at the time of construction, and the effectiveness of the contractor's techniques in preventing surface water runoff from entering open excavations. Initial excavations could allow the release of encountered groundwater into open excavations. Seepage water that does accumulate can be removed by pumping from prepared sumps.

The design and installation of a permanent underdrain system, in conjunction with free draining backfill, should be considered for the development area due to the high water table and low permeability of the natural soils. Design of an underdrain system should include consultation of a geotechnical engineer to ensure proper drainage from the development area.

6.0 CLOSURE

The evaluations, conclusions and recommendations in this report are based on our interpretation of the field and laboratory data obtained during the geotechnical investigation, our understanding of the project and our experience with similar sites and subsurface conditions. Data used during this investigation included:

- Six (6) exploratory borings performed during this study;
- Observations of the project site by MSG staff;
- Results of laboratory soil testing completed to date; and,
- Published soil and geologic data for the area.

The subsurface conditions discussed in this report and those shown on the boring logs represent an estimate of the subsurface conditions based on interpretation of the boring data using normally accepted geotechnical engineering judgments. Although individual test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times. As variations in the soil profile are encountered, additional subsurface sampling and testing may be necessary to provide data required to reevaluate the recommendations of this report. MSG is not responsible for independent conclusions, opinions, or recommendations made by others based upon information presented in this report.

The project plans and specifications should be reviewed by the geotechnical engineer to confirm that the geotechnical aspects are generally consistent with the recommendations of this report. In addition, site subgrade preparation and structural fill compaction activities should be monitored by the geotechnical engineer.

FIGURES

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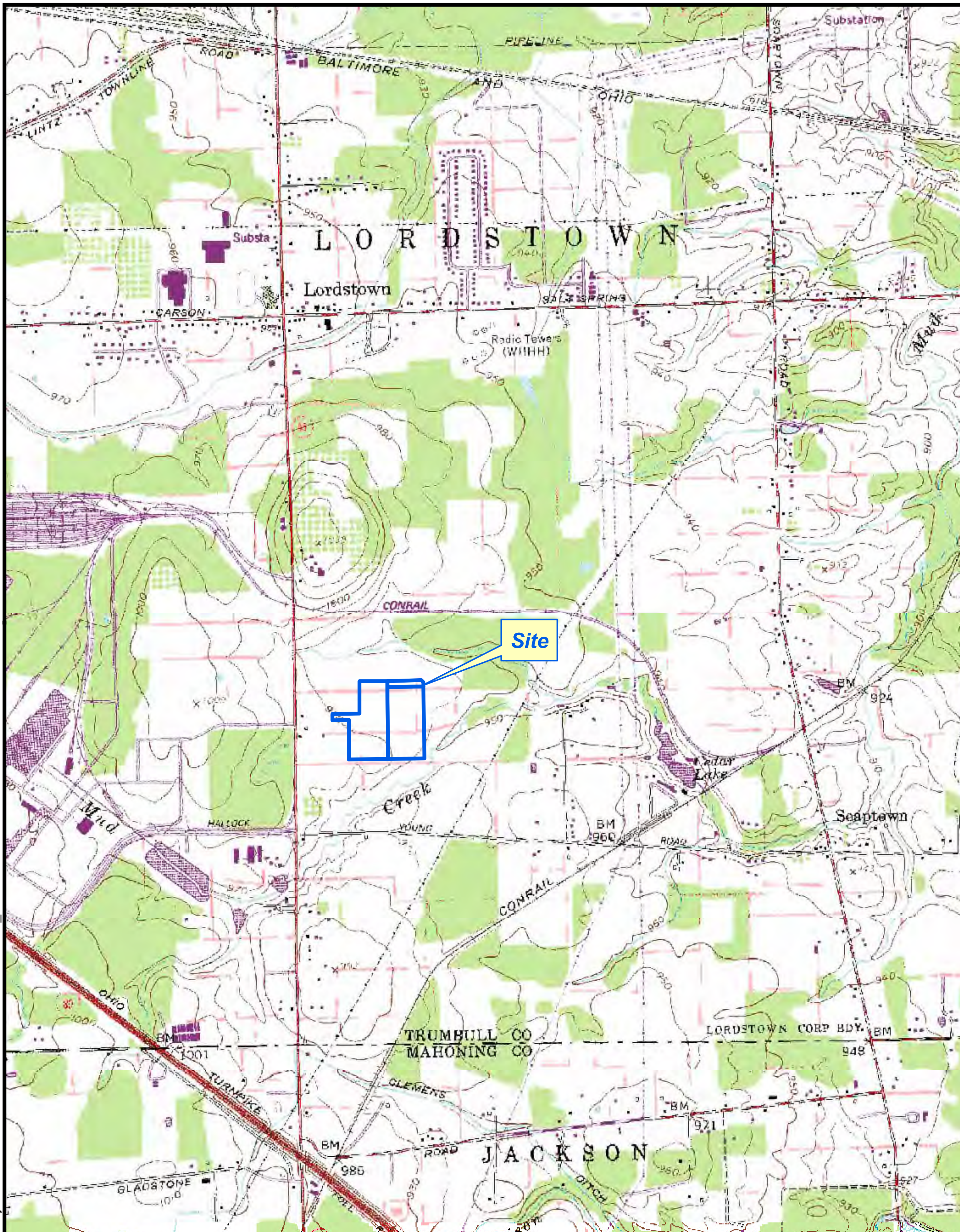

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Figure 1: Site Location Map
Lordstown Energy Center
Lordstown, Ohio

Notes

USGS Quadrangle, 7.5' Series Topographic
Warren, OH 1959 Revised 1984

Feet
0 1,000 2,000

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Figure 2: Soil Boring Locations
Lordstown Energy Center
Lordstown, Ohio

Notes
The Trumbull County photography, dated April 2011, is provided by OGRIP as part of the Ohio Statewide Imagery Program.

Feet
0 200 400

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APPENDIX A
SOIL BORING LOGS

EXHIBIT A -
GENERAL SOIL SAMPLE NOTES

Unless noted, all terms utilized herein refer to the Standard Definitions presented in ASTM D 653.

Standard Penetration Test (ASTM D 1586) - A 2.0" outside-diameter, 1-3/8" inside-diameter split barrel sampler is driven into undisturbed soil by means of a 140-pound weight falling freely through a vertical distance of 30 inches. The sampler is normally driven three successive 6-inch increments. The total number of blows required for the final 12 inches of penetration is the Standard Penetration Resistance (N).

COHESIVE SOILS / **COHESIONLESS SOILS**

Consistency	Approximate Range of (N)	Unconfined Compressive Strength (psf)	Density Classification	Approximate Range of (N)
Very Soft	0-2	Below 500	Very Loose	0-4
Soft	3-4	500-1,000	Loose	5-10
Medium Stiff	5-8	1,000-2,000	Medium Dense	11-30
Stiff	9-15	2,000-4,000	Dense	31-50
Very Stiff	16-30	4,000-8,000	Very Dense	Over 50
Hard	31-50	8,000-16,000		
Very Hard	Over 50	Over 16,000		

*If Clay content is sufficient so that clay dominates soil properties, clay becomes the principal noun with the other major soil constituent as modifier: i.e., silty clay. Other minor soil constituents may be included in accordance with the classification breakdown for cohesionless soils: i.e., silty clay, trace of Sand, little gravel.

CLASSIFICATION

The major soil constituent is the principal noun, i.e. sand, silt, gravel. The second major soil constituent and other minor constituents are reported as follows:

Second Major Constituent (percent by weight)	Minor constituents (percent by weight)
Trace - 1% to 11%	Trace - 1% to 11%
Adjective - 12% to 35% (clayey, silty, etc.)	Little - 12% to 22%
	Some - 23% to 33%
And - Over 35%	

PARTICLE SIZES

Boulders		- Greater than 12 inches (305 mm)
Cobbles		- 3 inches (76.2 mm) to 12 inches (305 mm)
Gravel:	Coarse	- ¾ inches (19.05 mm) to 3 inches (76.2
	Fine	- No. 4 - 3/16 inches (4.75 mm) to ¾ inches (19.05 mm)
Sand:	Coarse	- No. 10 (2.00 mm) to No. 4 (4.75 mm)
	Medium	- No. 40 (0.425 mm) to No. 10 (2.00 mm)
	Fine	- No. 200 (0.074 mm) to No. 40 (0.425 mm)
Silt		- 0.005 mm to 0.074 mm
Clay		- Less than 0.005 mm

If sand particle size is greater than 11% by weight of the total sample weight, the adjective (i.e. fine, medium or coarse) is added to the soil description for the sand portion of the sample, provided sand is the major or second major constituent.

SAMPLE DESIGNATIONS

AS	Auger Sample - Directly from auger flight	ST	Shelby Tube Sample - 3 inch diameter unless otherwise
BS	Miscellaneous Samples - Bottle or Bag	PS	Piston Sample - 3 inch diameter unless otherwise noted
MC	Macro-Core Sample - 2.25-inch O.D., 1.75-inch I.D. polyethylene liner; 5-feet long	RC	Rock Core - NX core unless otherwise noted
LB	Large-Bore (micro-core) Sample - with 1 inch diameter, 2 foot long polyethylene liner	CS	CME Continuous Sampler – 5 feet long, 3 inch diameter unless
SS	Split Spoon Sample, 1-inch or 2-inch outer-	HA	Hand Auger
LS	Split Spoon Sample (SS) with 3-inch long liner	DP	Drive Point
NR	No Recovery	CM	Coring Machine

EXHIBIT B -
GENERAL ROCK SAMPLE NOTES

Rock core barrels are either single- or double-tubed type. The most common barrel type is the N-series including the NX and NQ barrels. The rock cores for NX and NQ barrels are typically 2-1/8 inches and 1-7/8 inches in diameter, respectively.

The Rock Quality Designation (RQD) is an index of the frequency of fractures in the bedrock. The RQD value is determined by summing the total length of all core pieces which are at least 4 inches long and dividing by the total length of the core run or total thickness of the rock unit. The literature suggests there is a reasonable relationship between the quality of the rock and the RQD value for engineering purposes. Rock quality is classified as follows:

RQD (%)	General Quality
0 - 25	Very Poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 – 100	Excellent

STRENGTH OF BEDROCK

Description	Field or Lab Evaluation	Range of Unconfined Compressive Strength Values (psi)
Extremely Strong	Rock cannot be scratch by a knife or sharp pick. Chipping of hand specimens requires repeated hard blows from a geologist hammer.	>30,000
Very Strong	Rock cannot be scratched by a knife or sharp pick. Breaking of hand specimens requires repeated hard blows from a geologist hammer.	15,000 to 30,000
Strong	Rock can be scratched with a knife or pick only with difficulty. Requires hard hammer blows to detach a hand specimen. Sharp and resistant edges are present on hand specimens.	7,500 to 15,000
Moderately Strong	Rock can be scratched with a knife or pick. Grooves or gouges to 0.25 inches deep can be excavated by hard blows from a geologist's pick. Requires moderate hammer blows to detach a hand specimen.	3,600 to 7,500
Slightly Strong	Rock can be grooved or gouged 0.05 inches deep by firm pressure of a knife or pick point and can be excavated in small chips to about 1-inch maximum size pieces by hard blows from the point of a geologist's pick.	1,500 to 3,600
Weak	Rock can be grooved or gouged readily by a knife or pick, and can be excavated in small fragments by moderate blows from a pick point. Small, thin pieces can broken by finger pressure.	750 to 1,500
Very Weak	Rock can be carved with a knife or can be excavated readily with a point of a pick. Pieces 1 inch or more in thickness can broken by finger pressure. Rock can be scratched by a fingernail.	40 to 750

DEGREE OF FRACTURING IN BEDROCK

Description	Average Spacing Between Natural Fractures
Unfractured	>10 ft.
Intact	3 ft. to 10 ft.
Slightly Fractured	1 ft. to 3 ft.
Moderately	4 in. to 12 in.
Fractured	2 in. to 4 in.
Highly Fractured	< 2 in.

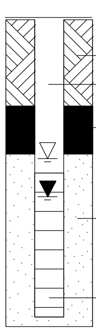
MAJOR DIVISIONS				TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LESS THAN 15% FINES	GW	WELL-GRADED GRAVELS WITH OR WITHOUT SAND
			GP	POORLY-GRADED GRAVELS WITH OR WITHOUT SAND
		GRAVELS WITH 15% OR MORE FINES	GM	SILTY GRAVELS WITH OR WITHOUT SAND
			GC	CLAYEY GRAVELS WITH OR WITHOUT SAND
	SANDS MORE THAN HALF COARSE FRACTION IS FINER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 15% FINES	SW	WELL-GRADED SANDS WITH OR WITHOUT GRAVEL
			SP	POORLY-GRADED SANDS WITH OR WITHOUT GRAVEL
		SANDS WITH 15% OR MORE FINES	SM	SILTY SANDS WITH OR WITHOUT GRAVEL
			SC	CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML	INORGANIC SILTS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			OL	ORGANIC SILTS OR CLAYS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH	INORGANIC SILTS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			CH	INORGANIC CLAYS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			OH	ORGANIC SILTS OR CLAYS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
HIGHLY ORGANIC SOILS			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

SYMBOLS KEY

SAMPLE TYPES

Split Spoon sample, 1 inch or 2 inch outer-diameter.

WELL SYMBOLS



OTHER MATERIAL SYMBOLS

- Topsoil
- Poorly Graded Sand with Clay
- Clayey Sand
- Sandy Silt
- Gravelly Silt
- Poorly Graded Gravelly Sand
- Well Graded Gravel with Clay
- Well Graded Gravel with Silt
- Well Graded Gravelly Sand
- Shale
- Shaly Dolomite
- Limestone

CANTON
DETROIT
MONROE
LANSING

MAUMEE
COLUMBUS
CLEVELAND
TRAVERSE CITY

BORING / WELL LOG KEY

The Mannik & Smith Group, Inc.
2365 Haggerty Road South, Canton, MI 48188
ph: 734-397-3100 fax: 734-397-3131

BORING NUMBER B-01

CANTON DETROIT MONROE LANSING MAUMEE COLUMBUS CLEVELAND TRAVERSE CITY

The Mannik & Smith Group, Inc.
2365 S Haggerty Road, Canton, MI 48188
ph: 734-397-3100 fax: 734-397-3131

CLIENT Clean Energy Future-Lordstown, LLC
PROJECT NAME Phase I, Wetland, Det. & Boundary Survey
PROJECT NUMBER C4580001
PROJECT LOCATION Lordstown, OH
DATE STARTED 1/7/15 **COMPLETED** 1/7/15
GROUND ELEVATION 960.682 FEET **BORING DIAMETER:** 3.25"
DRILLING CONTRACTOR MSG - 7822 DT - drilled by RJS
WELL SURVEY INFORMATION: 544205.24 Northing; 2422216.79 Easting
DRILLING METHOD Direct push with Split Spoon, NWD4 Core - Air Rotary
AT TIME OF DRILLING: N/A
LOGGED BY JDF **CHECKED BY** JLS
AT END OF DRILLING: 5 FEET
NOTES ST-1 in offset bore from 5-7 feet depth, Rec= 87.5%, PP = 4.5+
AFTER DRILLING: N/A

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0	TOPSOIL										
	(CL) Stiff, brown silty CLAY with little sand; moist	SS 1	61	3-5-6 (11)	3.5		17				
5	(CL) Very stiff, brown silty CLAY with little sand and trace gravel; damp	SS 2	67	5-7-10 (17)	4.5+		14	28	17	11	72
							15				
		SS 3	67	7-10-12 (22)	4.5+	117	16				
10	(SC) Dense, dark gray clayey SAND with some silt and little shale fragments; damp (Residual Soil)	SS 4	45	4-17-32 (49)			12				
15	Becomes wet	SS 5	39	6-20-20 (40)							
20	Gray SHALE, weak, highly weathered; damp	SS 6	56	40-50							
		RC 1	46 (0)								

Refusal at 19.3 feet.
Bottom of borehole at 24.3 feet.

BORING NUMBER B-02

CANTON DETROIT MONROE LANSING MAUMEE COLUMBUS CLEVELAND TRAVERSE CITY

The Mannik & Smith Group, Inc.
2365 S Haggerty Road, Canton, MI 48188
ph: 734-397-3100 fax: 734-397-3131

CLIENT Clean Energy Future-Lordstown, LLC
PROJECT NAME Phase I, Wetland, Det. & Boundary Survey
PROJECT NUMBER C4580001
PROJECT LOCATION Lordstown, OH
DATE STARTED 1/7/15 **COMPLETED** 1/7/15
GROUND ELEVATION 960.238 FEET **BORING DIAMETER:** 3.25"
DRILLING CONTRACTOR MSG - 7822 DT - drilled by RJS
WELL SURVEY INFORMATION: 544497.47 Northing; 2422208.95 Easting
DRILLING METHOD Direct push with Split Spoon, NWD4 Core - Air Rotary
AT TIME OF DRILLING: N/A
LOGGED BY JDF **CHECKED BY** JLS
AT END OF DRILLING: 5.5 FEET
NOTES
AFTER DRILLING: N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		TOPSOIL										
		(CL) Stiff, brown silty CLAY with trace sand and gravel; moist	SS 1	45	3-4-5 (9)	3.5		18				
5			SS 2	55	4-6-9 (15)	4.5+		14				
		Becomes very stiff	SS 3	67	6-10-10 (20)	4.5+						
10		(SC) Dense, dark gray clayey SAND with little shale fragments and trace clay; damp (Residual Soil)	SS 4	33	5-15-30 (45)							
15		Becomes moist	SS 5	33	8-13-23 (36)							
20		Gray SHALE, weak, highly weathered; moist	SS 6		38-50							
			RC 1	20 (0)								

Refusal at 19.3 feet.
Bottom of borehole at 24.3 feet.

BORING NUMBER B-03

CANTON DETROIT MONROE LANSING MAUMEE COLUMBUS CLEVELAND TRAVERSE CITY

The Mannik & Smith Group, Inc.
2365 S Haggerty Road, Canton, MI 48188
ph: 734-397-3100 fax: 734-397-3131

CLIENT Clean Energy Future-Lordstown, LLC
PROJECT NAME Phase I, Wetland, Det. & Boundary Survey
PROJECT NUMBER C4580001
PROJECT LOCATION Lordstown, OH
DATE STARTED 1/8/15 **COMPLETED** 1/8/15
GROUND ELEVATION 961.02 FEET **BORING DIAMETER:** 3.25"
DRILLING CONTRACTOR MSG - 7822 DT - drilled by RJS
WELL SURVEY INFORMATION: 544339.03 Northing; 2422154.41 Easting
DRILLING METHOD Direct push with Split Spoon
AT TIME OF DRILLING: N/A
LOGGED BY JDF **CHECKED BY** JLS
AT END OF DRILLING: 5 FEET
NOTES
AFTER DRILLING: N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		TOPSOIL										
		(CL) Stiff, brown mottled with gray silty CLAY with trace sand and gravel; moist	SS 1	55	2-4-5 (9)	2.0		32				
		Becomes very stiff	SS 2	67	5-8-10 (18)	3.5		14				
5												
			SS 3	55	6-8-12 (20)	4.5+						
10		(SC) Dense, dark gray clayey SAND with some silt and little shale fragments; damp (Residual Soil)	SS 4	39	5-20-22 (42)			12				
			SS 5	33	8-12-20 (32)							
15			SS 6	33	9-15-24 (39)							

Bottom of borehole at 15.0 feet.

BORING NUMBER B-04

PAGE 1 OF 1

CANTON, DETROIT, MONROE, LANSING, MAUMEE, COLUMBUS, CLEVELAND, TRAVERSE CITY

The Mannik & Smith Group, Inc.
2365 S Haggerty Road, Canton, MI 48188
ph: 734-397-3100 fax: 734-397-3131

CLIENT Clean Energy Future-Lordstown, LLC
PROJECT NAME Phase I, Wetland, Det. & Boundary Survey
PROJECT NUMBER C4580001
PROJECT LOCATION Lordstown, OH
DATE STARTED 1/8/15 **COMPLETED** 1/8/15
GROUND ELEVATION 960.518 FEET **BORING DIAMETER:** 3.25"
DRILLING CONTRACTOR MSG - 7822 DT - drilled by RJS
WELL SURVEY INFORMATION: 544305.26 Northing; 2422376.75 Easting
DRILLING METHOD Direct push with Split Spoon
AT TIME OF DRILLING: N/A
LOGGED BY JDF **CHECKED BY** JLS
AT END OF DRILLING: 5 FEET
NOTES
AFTER DRILLING: N/A

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0	TOPSOIL										
	(CL) Stiff, brown silty CLAY with some sand and trace gravel; moist	SS 1	45	3-6-5 (11)	2.0		30				
5	Becomes very stiff and damp	SS 2	61	4-7-10 (17)	4.5+		16	30	17	13	71
		SS 3	45	5-10-13 (23)	4.5+		20				
10	(SC) Dense, dark gray clayey SAND with some silt and little shale fragments; damp (Residual Soil)	SS 4	33	4-17-25 (42)							
		SS 5	33	6-15-24 (39)							
15	Dark gray SHALE, weak, highly weathered; damp	SS 6	45	6-13-22 (35)							

Bottom of borehole at 15.0 feet.

BORING NUMBER B-05

CANTON DETROIT MONROE LANSING MAUMEE COLUMBUS CLEVELAND TRAVERSE CITY

The Mannik & Smith Group, Inc.
2365 S Haggerty Road, Canton, MI 48188
ph: 734-397-3100 fax: 734-397-3131

CLIENT Clean Energy Future-Lordstown, LLC
PROJECT NAME Phase I, Wetland, Det. & Boundary Survey
PROJECT NUMBER C4580001
PROJECT LOCATION Lordstown, OH
DATE STARTED 1/8/15 **COMPLETED** 1/8/15
GROUND ELEVATION 961.306 FEET **BORING DIAMETER:** 3.25"
DRILLING CONTRACTOR MSG - 7822 DT - drilled by RJS
WELL SURVEY INFORMATION: 544309.48 Northing; 2422564.30 Easting
DRILLING METHOD Direct push with Split Spoon
AT TIME OF DRILLING: N/A
LOGGED BY JDF **CHECKED BY** JLS
AT END OF DRILLING: 5 FEET
NOTES
AFTER DRILLING: N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0		TOPSOIL										
		(CL) Stiff, brown silty CLAY with trace sand and gravel; damp	SS 1	55	4-6-6 (12)	2.5						
		Becomes very stiff	SS 2	67	4-9-9 (18)	4.5+		16				
5			SS 3	67	5-9-8 (17)	4.5+						
		Becomes damp	SS 4	67	5-10-10 (20)	4.5+		16				
10		(SC) Dense, dark gray clayey SAND with some silt and little shale fragments; damp (Residual Soil)	SS 5	33	5-12-20 (32)			11	30	20	10	31
15		Black SHALE, weak, highly weathered; damp	SS 6	55	8-18-20 (38)							

Bottom of borehole at 15.0 feet.

BORING NUMBER B-06

Mannik Smith GROUP

CANTON DETROIT MONROE LANSING MAUMEE COLUMBUS CLEVELAND TRAVERSE CITY

The Mannik & Smith Group, Inc.
2365 S Haggerty Road, Canton, MI 48188
ph: 734-397-3100 fax: 734-397-3131

CLIENT Clean Energy Future-Lordstown, LLC
PROJECT NAME Phase I, Wetland, Det. & Boundary Survey
PROJECT NUMBER C4580001
PROJECT LOCATION Lordstown, OH
DATE STARTED 1/8/15 **COMPLETED** 1/8/15
GROUND ELEVATION 959.398 FEET **BORING DIAMETER:** 3.25"
DRILLING CONTRACTOR MSG - 7822 DT - drilled by RJS
WELL SURVEY INFORMATION: 544576.80 Northing; 2422592.76 Easting
DRILLING METHOD Direct push with Split Spoon
AT TIME OF DRILLING: N/A
LOGGED BY JDF **CHECKED BY** JLS
AT END OF DRILLING: 5 FEET
NOTES
AFTER DRILLING: N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		TOPSOIL										
		(CL) Stiff, brown silty CLAY with some sand and trace gravel; damp	SS 1	45	3-5-7 (12)	2.5						
5		Becomes dry	SS 2	50	6-7-8 (15)	4.5+		15				
		Becomes very stiff	SS 3	50	6-10-10 (20)	4.5+						
10		Becomes damp	SS 4	67	5-8-12 (20)	4.5+	117	15	30	18	12	73
		(SC) Dense, dark gray clayey SAND with some silt and little shale fragments; damp (Residual Soil)	SS 5	39	5-18-22 (40)							
		Black SHALE, weak, highly weathered; damp	SS 6	33	10-50							
		Refusal at 14.3 feet. Bottom of borehole at 14.3 feet.										

APPENDIX B
GEOTECHNICAL LABORATORY TEST DATA

CANTON
DETROIT
MONROE
LANSING

MAUMEE
COLUMBUS
CLEVELAND
TRAVERSE CITY

SUMMARY OF LABORATORY RESULTS

The Mannik & Smith Group, Inc.
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ph: 734-397-3100 fax: 734-397-3131

CLIENT Clean Energy Future-Lordstown, LLC

PROJECT NAME Phase I, Wetland, Det. & Boundary Survey

PROJECT NUMBER C4580001

PROJECT LOCATION Lordstown, OH

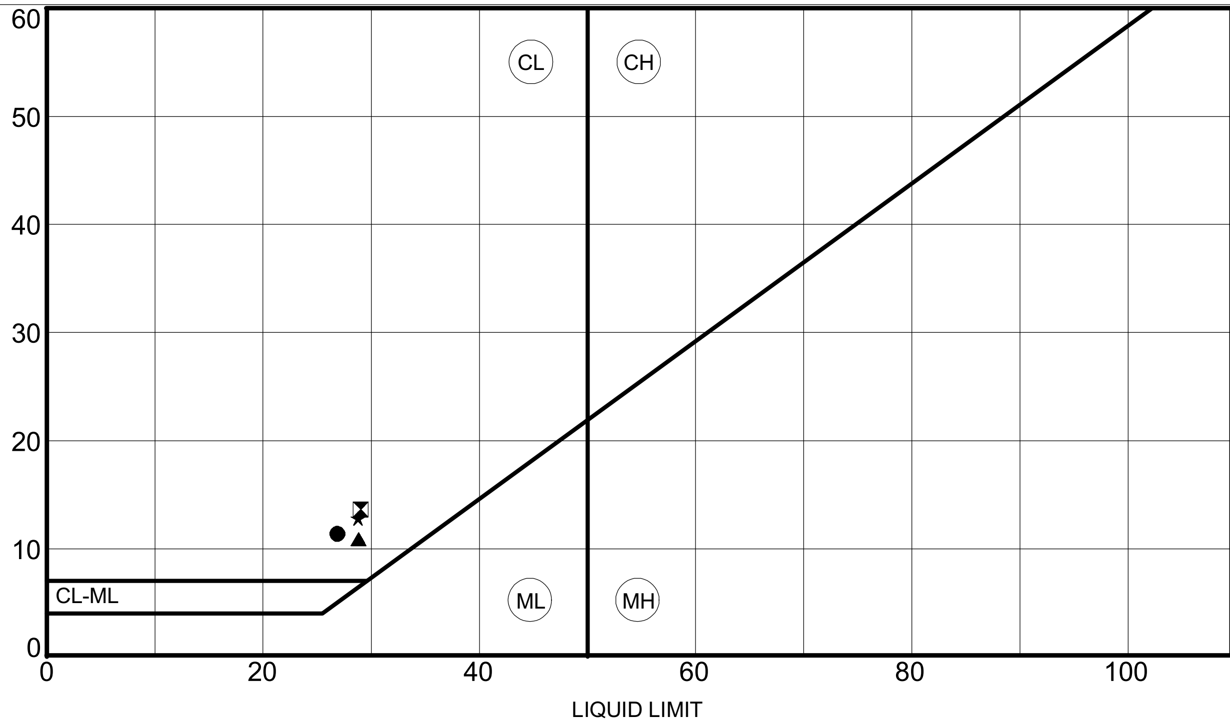
Sample No.	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Bulk Density (pcf)	Satur-ation (%)	Specific Gravity
B-01	1.0							17.1			
B-01	3.5	28	17	11	19	72	CL	13.9			
B-01	5.0							15.5			
B-01	6.0							15.5	135.4		
B-01	8.5							12.1			
B-02	1.0							17.6			
B-02	3.5							14.1			
B-03	1.0							32.0			
B-03	3.5							14.4			
B-03	8.5							12.5			
B-04	1.0							29.6			
B-04	3.5	30	17	13	19	71	CL	15.7			
B-04	6.0							19.7			
B-05	3.5							15.8			
B-05	8.5							16.4			
B-05	11.0	30	20	10	37.5	31	SC	10.6			
B-06	3.5							15.4			
B-06	8.5	30	18	12	19	73	CL	15.0	134.1		

CANTON DETROIT MONROE LANSING
MAUMEE COLUMBUS CLEVELAND TRAVERSE CITY

ATTERBERG LIMITS' RESULTS

The Mannik & Smith Group, Inc.
2365 Haggerty Rd S, Canton, MI 48188
ph: 734-397-3100 fax: 734-397-3131

CLIENT Clean Energy Future-Lordstown, LLC
PROJECT NAME Phase I, Wetland, Det. & Boundary Survey
PROJECT NUMBER C4580001
PROJECT LOCATION Lordstown, OH



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**B-01**	**3.5**	**28**	**17**	**11**	**72**	**LEAN CLAY with SAND(CL)**
⧗	**B-04**	**3.5**	**30**	**17**	**13**	**71**	**LEAN CLAY with SAND(CL)**
▲	**B-05**	**11.0**	**30**	**20**	**10**	**31**	**CLAYEY SAND with GRAVEL(SC)**
★	**B-06**	**8.5**	**30**	**18**	**12**	**73**	**LEAN CLAY with SAND(CL)**

GRAIN SIZE DISTRIBUTION

Mannik Smith GROUP
CANTON DETROIT MONROE LANSING MAUMEE COLUMBUS CLEVELAND TRAVERSE CITY

The Mannik & Smith Group, Inc.
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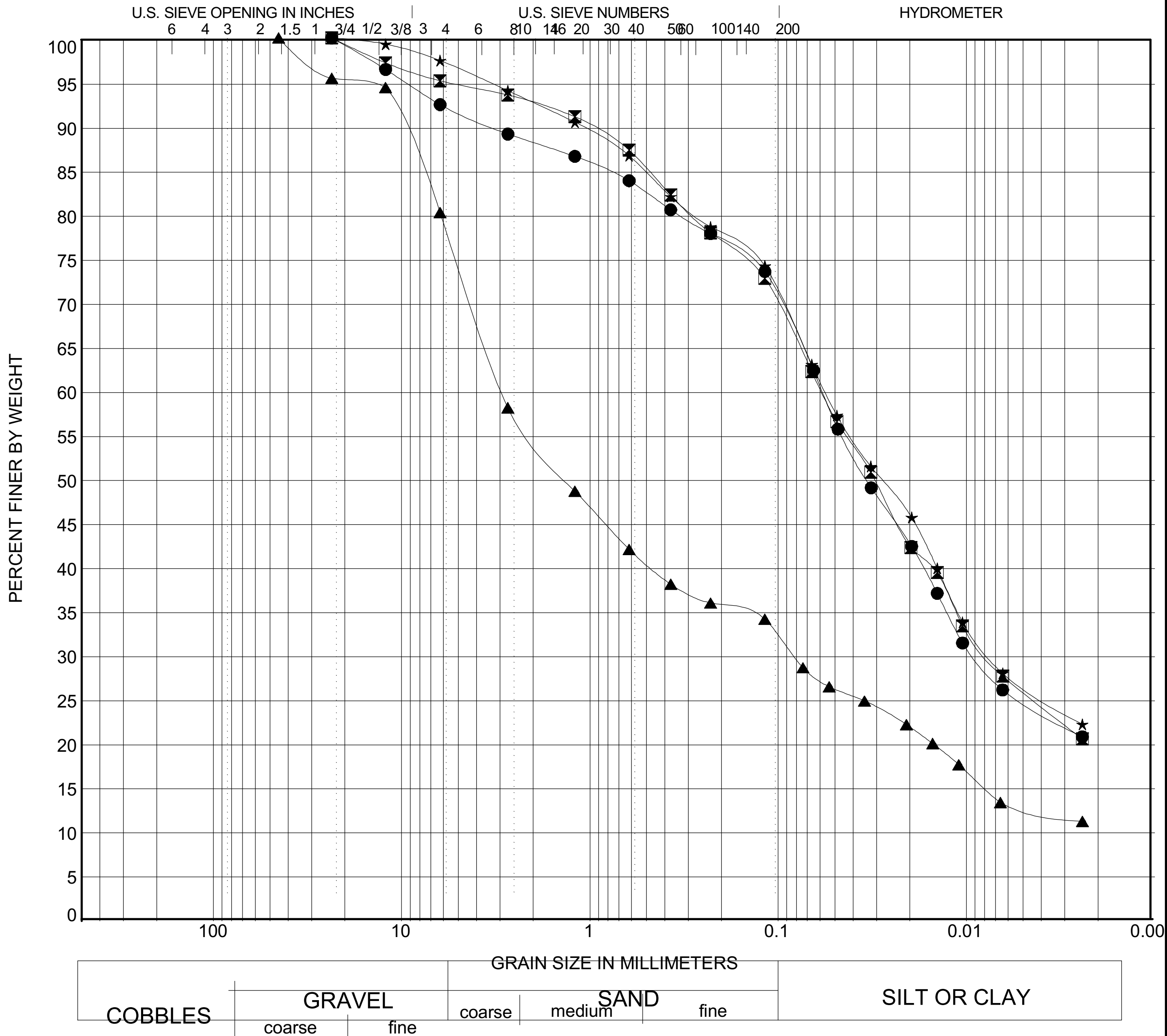
CLIENT Clean Energy Future-Lordstown, LLC
PROJECT NAME Phase I, Wetland, Det. & Boundary Survey
PROJECT NUMBER C4580001
PROJECT LOCATION Lordstown, OH



	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	B-01	3.5	LEAN CLAY with SAND(CL)	28	17	11		
⧗	B-04	3.5	LEAN CLAY with SAND(CL)	30	17	13		
▲	B-05	11.0	CLAYEY SAND with GRAVEL(SC)	30	20	10	0.51	576.87
★	B-06	8.5	LEAN CLAY with SAND(CL)	30	18	12		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-01	3.5	19	0.039	0.007		7.9	19.8	52.8	19.5
⧗	B-04	3.5	19	0.04	0.006		5.1	23.4	51.5	20.0
▲	B-05	11.0	37.5	2.31	0.069	0.004	20.7	48.2	23.1	8.0
★	B-06	8.5	19	0.039	0.006		2.7	24.3	51.8	21.2

Mannik Smith GROUP

CANTON
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LANSING

MAUMEE
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CLEVELAND
TRAVERSE CITY

UNCONFINED COMPRESSION TEST

The Mannik & Smith Group, Inc.
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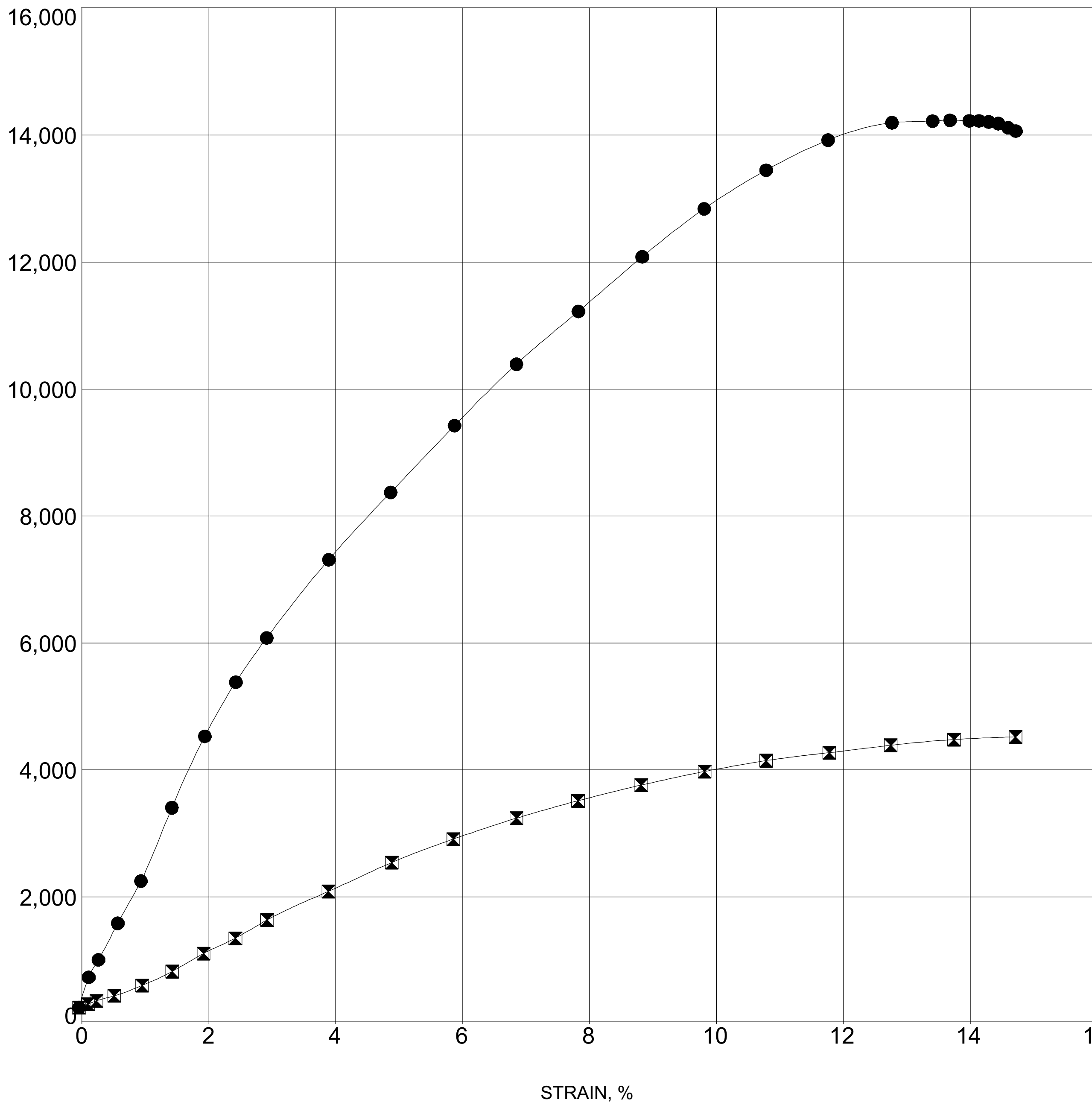
ph: 734-397-3100 fax: 734-397-3131

CLIENT Clean Energy Future-Lordstown, LLC

PROJECT NAME Phase I, Wetland, Det. & Boundary Survey

PROJECT NUMBER C4580001

PROJECT LOCATION Lordstown, OH



	Specimen Identification		Classification	γ_d	MC%
●	**B-01**	**6.0**		**117**	**16**
⧗	**B-06**	**8.5**	**LEAN CLAY with SAND(CL)**	**117**	**15**

Mannik Smith Group — Civil Engineering, Surveying and Environmental Consulting TOLEDO CANTON LANSING DETROIT MONROE CLEVELAND COLUMBUS	AAP AASHTO R18	Flexible Wall Permeability Test ASTM D5084

Project Name:	Lordstown Energy	Project No:	C4580001
Client's Sample No.	B-01 ST-1	Date:	1/6/15
Visual Description:	Lean Clay with Sand	Depth:	5.0-7.0'
		Recovery:	21.0"

Permeant: [X] De-aired tap water [ ] 0.01 N $CaSO_4$

Sample Preparation:

[X] Sample was removed from a 3" Shelby tube and trimmed to length in a trimming jig. Any pebbles found on outer surface were removed and resulting voids were filled with material trimmed from the sample.

[ ] Material was adjusted to required moisture content and remolded at the required density.

[ ] Other: ________________

Soil Properties:

Before Saturation			After Saturation		
Initial Moisture Content (%)	Initial Wet Density (pcf)	Initial Dry Density (pcf)	Final Moisture Content (%)	Final Wet Density (pcf)	Final Dry Density (pcf)
15.49	140.00	121.22	14.71	141.15	123.05

Formula:

$$K = \frac{aL}{2At}\left(\ln\frac{P_B+h(t_1)}{P_B+h(t_2)}\right)*R_T$$

K= Corrected Coefficient of Permeability (cm/sec)

a= Cross-sectional area of burette (cm^2) = 0.906

L= Length of sample (cm) = 9.21

A= Cross-sectional area of sample (cm^2) = 41.282491

t= Elapsed time (sec)

$h(t_1) = \frac{V_U(t_1) - V_L(t_1)}{a}$

$h(t_2) = \frac{V_U(t_2) - V_L(t_2)}{a}$

R_T= Correction factor for viscosity of water at various temperatures

P_B= Bias Pressure (cm) = psi x 70.37 cm/psi 140.74

Degree of Saturation:

Date	Time	Cell Pressure (psi)	Back Pressure (psi)	Confining Pressure Increase (psi) = a	Pore Pressure Increase (psi) = b	Skempton's Parameter (B) = (b/a)
1/22/2015	12:00pm	40.0	34.0	5.0	5.0	1.0

Permeability Measurement:

Test No.	Date	t (sec)	Upper Volume Reading (V_U)	Lower Volume Reading (V_L)	$h(t_1)$	$h(t_2)$	Water Temp. T (°C)	R_T (from table)	K (cm/sec)	$K_{corrected}$ (cm/sec)
1	1/23/2015	17,760	23.00	1.00	24.28		20	1.000	8.05E-08	8.05E-08
			21.90	2.00		21.96	20	1.000		
2	1/24/2015	86,700	21.90	2.00	21.96		20	1.000	8.10E-08	8.10E-08
			17.00	7.00		11.04	20	1.000		
3	1/26/2015	153,060	17.00	7.00	11.04		20	1.000	7.79E-08	7.79E-08
			9.40	14.70		-5.85	20	1.000		
4	1/27/2015	86,040	9.40	14.70	-5.85		20	1.000	7.95E-08	7.95E-08
			5.40	18.70		-14.68	20	1.000		
5										
6										

AVERAGE CORRECTED COEFFICIENT OF PERMEABILITY (K): 7.97E-08 cm/sec

Tested By: MJG Reviewed By: TEJ R. Date: 1/28/2015

APPENDIX C
INTERNATIONAL BUILDING CODE SITE SEISMIC CLASSIFICATIONS

TABLE 1613.5.3(1)
VALUES OF SITE COEFFICIENT F_a [a]

SITE CLASS	MAPPED SPECTRAL RESPONSE ACCELERATION AT SHORT PERIOD				
	$S_s \le 0.25$	$S_s = 0.50$	$S_s = 0.75$	$S_s = 1.00$	$S_s \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	Note b	Note b	Note b	Note b	Note b

a. Use straight-line interpolation for intermediate values of mapped spectral response acceleration at short period, S_s.
b. Values shall be determined in accordance with Section 11.4.7 of ASCE 7.

TABLE 1613.5.3(2)
VALUES OF SITE COEFFICIENT F_V [a]

SITE CLASS	MAPPED SPECTRAL RESPONSE ACCELERATION AT 1-SECOND PERIOD				
	$S_1 \le 0.1$	$S_1 = 0.2$	$S_1 = 0.3$	$S_1 = 0.4$	$S_1 \ge 0.5$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	Note b	Note b	Note b	Note b	Note b

a. Use straight-line interpolation for intermediate values of mapped spectral response acceleration at 1-second period, S_1.
b. Values shall be determined in accordance with Section 11.4.7 of ASCE 7.

TABLE 1613.5.2
SITE CLASS DEFINITIONS

SITE CLASS	SOIL PROFILE NAME	AVERAGE PROPERTIES IN TOP 100 feet, SEE SECTION 1613.5.5		
		Soil shear wave velocity, $\bar{v}_s$, (ft/s)	Standard penetration resistance, $\bar{N}$	Soil undrained shear strength, $\bar{s}_u$, (psf)
A	Hard rock	$\bar{v}_s > 5{,}000$	N/A	N/A
B	Rock	$2{,}500 < \bar{v}_s \leq 5{,}000$	N/A	N/A
C	Very dense soil and soft rock	$1{,}200 < \bar{v}_s \leq 2{,}500$	$\bar{N} > 50$	$\bar{s}_u \geq 2{,}000$
D	Stiff soil profile	$600 \leq \bar{v}_s \leq 1{,}200$	$15 \leq \bar{N} \leq 50$	$1{,}000 \leq \bar{s}_u \leq 2{,}000$
E	Soft soil profile	$\bar{v}_s < 600$	$\bar{N} < 15$	$\bar{s}_u < 1{,}000$
E	—	Any profile with more than 10 feet of soil having the following characteristics: 1. Plasticity index $PI > 20$, 2. Moisture content $w \geq 40\%$, and 3. Undrained shear strength $\bar{s}_u < 500$ psf		
F	—	Any profile containing soils having one or more of the following characteristics: 1. Soils vulnerable to potential failure or collapse under seismic loading such as liquefiable soils, quick and highly sensitive clays, collapsible weakly cemented soils. 2. Peats and/or highly organic clays ($H >$ 10 feet of peat and/or highly organic clay where H = thickness of soil) 3. Very high plasticity clays ($H >$25 feet with plasticity index $PI >$75) 4. Very thick soft/medium stiff clays ($H >$120 feet)		

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 pound per square foot = 0.0479 kPa. N/A = Not applicable

Appendix E: Wetland Documentation

- Surface Water Delineation Report (January 2015)
- Wetland and Stream Mitigation Plan (December 2011)
- USACE Permit 2005-1448

SURFACE WATER DELINEATION REPORT

HENN PARKWAY AND STATE ROUTE 45
LORDSTOWN, TRUMBULL COUNTY, OHIO 44881

JANUARY 2015
REVISED: MARCH 2015

PREPARED FOR:
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PREPARED BY:
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LORDSTOWN, TRUMBULL COUNTY, OHIO 44881

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TABLE OF CONTENTS

1.0 INTRODUCTION

On November 6, 7 & 11, 2014, the Mannik & Smith Group, Inc. (MSG) performed a surface water delineation for the Lordstown Energy Center (LEC), Parcels: 45-903150, 45-016701, and 45-033360, Lordstown, Trumbull County, Ohio (Site) (Figure 1). The purpose of a surface water delineation is to identify any areas on the Site that could be considered a jurisdictional wetland or surface water.

Affiliated with this site are parcels 45-190801, 45-904025, 45-141130, 45-904110 and surrounding areas where wetlands were previously delineated in June 2006. These wetland boundaries consisted of 15 separate wetland areas totaling 30.048 acres. The United States Army Corps of Engineers (USACE) issued a letter on July 7, 2006 agreeing with the wetland boundaries. Following this correspondence Henn Development was issued Department of the Army Permit No. 2005-1448 on January 15, 2013 to fill a total of 1.76 acres of wetlands. A condition of this permit was to build a wetland mitigation area (Mitigation Area) that is at least 2.64 acres in size. This Mitigation Area was designed by ms consultants, inc. (ms consultants) on behalf of Henn Development in accordance with ms consultants' *Wetland and Stream Mitigation Plan – Revised, Henn Development*, dated December 2011 (Mitigation Plan) on parcel number 45-016701 (Figure 3). According to the Mitigation Plan and associated construction plans, the constructed Mitigation Area totals 2.77 acres in size, which exceeds the minimum wetland creation requirement.

Code of Federal Regulations 33 Part 328 defines a wetland as an area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. The USACE Corps of Engineers Wetland Delineation Manual further defines a wetland as having the following characteristics: (1) hydric soils, (2) evidence of inundated or saturated conditions (hydrology), and (3) a predominance of hydrophytic vegetation. When all three of these criteria are met, a wetland is present and is subject to Federal and/or State regulations and permitting.

When conducting a wetland delineation, data are collected concerning the vegetation, soils and hydrology present in various plant communities to determine if the criteria for a jurisdictional wetland are met, and the wetland/non-wetland boundaries are then flagged. The wetland/non-wetland boundaries and the sample locations are surveyed and placed on the Site map. From the wetland map, the acreage of each wetland is calculated. A preliminary determination is also made as to whether each wetland is isolated and thus under the jurisdiction of the State of Ohio Isolated Wetland Permit Program, or non-isolated, and thus under federal Clean Water Act (CWA) jurisdiction. This determination is based on the hydrological connection (if any) to "waters of the United States".

2.0 METHODS

MSG performed the surface water delineation in accordance with the *2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, Version 2.0 (the Manual). The Manual* defines a wetland as any area on the Site that contains a predominance of wetland vegetation, hydric soils and positive indicators of wetland hydrology. Sample points for vegetation, soils and hydrology were documented on either side of the wetland boundary. The wetland/upland boundary was surveyed using a Trimble Geo XH GPS receiver. The wetland and upland data sheets that describe each plot are included in Appendix A. Digital images of each wetland are included in Appendix B. After the wetland was delineated, MSG described the hydrological connection (if any) to "waters of the United States" and the probable jurisdictional status of the wetland. To finalize this wetland delineation, USACE will need to issue a Jurisdictional Determination (JD) confirming the wetland boundaries and jurisdictional status of surface waters on the Site.

MSG also characterized the quality of the wetland using the Ohio Rapid Assessment Method (ORAM), version 5.0 (Appendix C). The Ohio Environmental Protection Agency (Ohio EPA) has established three primary and three intermediate categories of wetland quality which are based on a wetland's size, its hydrologic function, the types of plant communities present, the physical structure of the wetland plant community and the wetland's level of disturbance (OAC 3745-1-54). The relationship between the various wetland categories and their respective ORAM scores is presented in Table 2.1.

Table 2.1 Ohio Rapid Assessment Categories

Category Number	Range of ORAM Scores
Category 1	0–29.9
Category 1 or 2 (Gray Zone)	30–34.9
Modified Category 2	35–44.9
Category 2	45–59.9
Category 2 or 3	60–64.9
Category 3	65–100

Category 3 wetlands have the highest quality, and are generally characterized by a high level of biological diversity and topographical variation, large numbers of native species, or a high level of functional importance to its surroundings. Category 2 wetlands have the capability to support a moderate wildlife community or maintain mid-level hydrological functions. Category 2 also includes wetlands that may be of lower quality or degraded but have reasonable potential to be restored (Modified Category 2). Category 1 wetlands are of the lowest quality, and are generally characterized by hydrological isolation, lack of plant species diversity, insufficient habitat availability, and limited potential to perform major wetland functions (OAC 3745-1-54).

Streams were identified as linear waterways with a distinct bed, bank and ordinary high watermark. Streams were measured using one of two Ohio EPA methods. Any stream that had a pool over 40 centimeters (cm) deep or with a watershed of greater than one square mile would be measured using the Qualitative Habitat Evaluation Index (QHEI). Smaller streams without a pool over 40 cm deep or a watershed less than one square mile would be measured using the Primary Headwater Habitat Evaluation Form (HHEI).

3.0 RESULTS

3.1 Agency Resource Information

The United States Geological Survey (USGS) Quadrangle map for the Warren, OH (1959, Revised 1984) indicates that the Site has nearby elevations varying from 950 to 970 feet (Figure 1). One USGS blue line stream (Mud Creek) traverses the Site. A review of the National Wetland Inventory (MWI) map did not indicate the presence of any wetlands on the Site; however, there was one pond identified on the southern half of parcel 45-016701 (Figure 2). Seven soil types have been mapped on the Site by the National Resource Conservation Service (NRCS). The soil types are included in Table 3.1 and mapped on Figure 2. Two soil types, Holly silt loam and Sebring silt loam were listed as hydric or having hydric inclusions.

Table 3.1 Soil Types at Project Site

Soil Type	Map Unit	Hydric?	With Hydric Inclusions?
Holly silt loam, frequently flooded	Ho	Yes	No
Mahoning silt loam, 0 to 2 percent slope	MgA	No	No
Mahoning silt loam, 2 to 6 percent slope	MgB	No	No
Orrville silt loam, frequently flooded	Or	No	No
Sebring silt loam, till substratum	Sc	Yes	No
Wadsworth silt loam, 0 to 2 percent slope	WbA	No	No
Wadsworth silt loam, 2 to 6 percent slope	WbB	No	No

3.2 Wetland Delineation

Ten wetlands (Wetlands A-J) totaling 3.648 acres were identified on the Site (Figure 3). To define the wetland boundaries, sixteen sample points were collected (SP-1 through SP-16). Wetland delineation data forms are included in Appendix A and Site photographs are included in Appendix B. MSG has reviewed the Site conditions to determine the hydrological connection (if any) to "waters of the United States" and the probable jurisdictional status of the wetlands based on current USACE guidance and policy. Due to the location and hydrologic connection to a USGS blue line stream, it appears that Wetlands A, E, F, and G will be considered jurisdictional (non-isolated) by the USACE, and therefore regulated under the Section 404 program. A hydrological connection is based on if the wetland is contributing to the physical, chemical, and biological integrity of the downstream traditional navigable waterway (TNW).

Table 3.2 Summary of Wetlands

Wetland	Sample Point	Delineated Acreage within Study Area	Wetland Type[1]	ORAM Score	Wetland Category	Potential Jurisdiction[2]
Wetland A	SP-1	0.12	PEM	24	Category 1	USACE
Wetland B	SP-3	0.62	PFO	41	Modified Category 2	OEPA
Wetland C	SP-4	0.158	PEM	21	Category 1	OEPA
Wetland D	SP-5	0.277	PEM	21	Category 1	OEPA
Wetland E	SP-6	0.632	PEM	39	Modified Category 2	USACE
Wetland F	SP-8 & SP-10	0.116	PEM	30	1 or 2 Gray Zone	USACE
Wetland G	SP-11	0.784	PEM	29	Category 1	USACE
Wetland H	SP-12	0.295	PEM	16	Category 1	OEPA

Wetland	Sample Point	Delineated Acreage within Study Area	Wetland Type[1]	ORAM Score	Wetland Category	Potential Jurisdiction[2]
Wetland I	SP-13	0.214	PEM	25	Category 1	OEPA
Wetland J	SP-15	0.432	PEM	14	Category 1	OEPA
Total		3.648				

1 wetland community type: PEM=palustrine emergent; PSS= palustrine scrub/shrub; PFO=palustrine forested and POW=palustrine open water
2 potential jurisdiction based on current USACE guidance and policy

Wetland A
Wetland A was delineated as 0.12 acres and is located in the western portion of parcel number 45-033360 (Figure 3). The soil profile consisted of a twelve inch layer of 10YR 3/2 clay loam soil with 10% yellow (10YR 5/8) redox features.

Positive indicators of wetland hydrology included saturation and the FAC-neutral test. Dominant vegetation consisted of hydrophytic vegetation such as: reed canary grass (*Phalaris arundinacea*: FACW). This wetland is within the floodplain of Mud Creek a "waters of the U.S," and therefore will likely be under the jurisdiction of the USACE. Using ORAM, version 5.0, MSG determined that the wetland scored a 24, which correlates to a Category 1 wetland.

Wetland B
Wetland B was delineated as 0.62 acres and is located in the northeast portion of parcel number 45-033360 (Figure 3). The soil profile consisted of a four inch layer of 10YR 4/1 clay loam soil. This was underlain by eight inch layer of 10YR 6/1 clay sandy clay loam with 40% yellow 10YR 6/8 redox feature.

Positive indicators of wetland hydrology included saturation and the FAC-neutral test. Dominant vegetation consisted of hydrophytic vegetation such as: Pin Oak (*Quercus palustris:* FACW), American Elm (*Ulmus americana*: FACW.), and Swamp White Oak (*Quercus bicolor*: FACW). This wetland appears to have no connection to a "waters of the U.S." and therefore will likely be under the jurisdiction of the OEPA. Using ORAM, version 5.0, Wetland B obtained a score of 41, which correlates to a Category modified 2 wetland.

Wetland C
Wetland C was delineated as 0.158 acres and is located in the northeast portion of parcel number 45-033360 (Figure 3). The soil profile consisted of a twelve inch layer of 10YR 4/1 sandy clay loam soil.

Positive indicators of wetland hydrology included saturation and the FAC-neutral test. Dominant vegetation consisted of hydrophytic vegetation such as: reed canary grass (*Phalaris arundinacea*: FACW), Sensitive fern (*Onoclea sensibilis*: FACW), cattails (*Typha latifolia*: OBL), and longhair sedge (*Carex comosa*: OBL). This wetland appears to have no connection to a "waters of the U.S." and therefore will likely be under the jurisdiction of the OEPA. Using ORAM version 5.0, Wetland C obtained a score of 21, which correlates to a Category 1 wetland.

Wetland D
Wetland D was delineated as 0.277 acres and is located in the northeast portion of parcel number 45-03336 (Figure 3). The soil profile consisted of a four inch layer of 10YR 4/1 sandy clay loam soil, this was underlain by eight inch layer of 10YR 5/2 with 20% brownish orange (10YR 5/8) redox features.

Saturation was observed as the positive indicator of wetland hydrology. Dominant vegetation consisted of hydrophytic vegetation such as: reed canary grass (*Phalaris arundinacea*: FACW), drooping bulrush (*Scirpus lineatus*: FACW), and blunt spikerush (*Eleocharis obtusa*.: OBL). This wetland appears to have no connection to a "waters of the U.S." and therefore will likely be under the jurisdiction of the OEPA. Using ORAM, version 5.0, Wetland D obtained a score of 21, which correlates to a Category 1 wetland.

Wetland E

Wetland E was delineated as 0.632 acres and is located in the eastern portion of parcel number 45-033360 (Figure 3). The soil profile consisted of a twelve inch layer of 10YR 4/1 sandy clay loam soil with 5% brownish yellow (10YR 5/8) redox features.

Positive indicators of wetland hydrology included surface water, saturation, and the FAC-neutral test. Dominant vegetation consisted of hydrophytic vegetation: reed canary grass (*Phalaris arundinacea*). This wetland is within the floodplain of Mud Creek a "waters of the U.S." and therefore will likely be under the jurisdiction of the USACE. Using ORAM version 5.0, Wetland E obtained a score of 39, which correlates to a Modified Category 2 wetland.

Wetland F

Wetland F was delineated as 0.116 acres and is located in the southeast portion of parcel number 45-033360 (Figure 3). The soil profile consisted of a twelve inch layer of 10YR 3/1 sandy clay loam soil.

Positive indicators of wetland hydrology included surface water, saturation, and the FAC-neutral test. Dominant vegetation consisted of hydrophytic vegetation such as: reed canary grass (*Phalaris arundinacea*: FACW). This wetland is within the riparian corridor of a unnamed tributary to Mud Creek a "waters of the U.S." and therefore will likely be under the jurisdiction of the USACE. Using ORAM version 5.0, Wetland F obtained a score of 30, which correlates to a Category 1 or 2 gray zone wetland.

Wetland G

Wetland G was delineated as 0.784 acres and is located in the southwest portion of parcel number 45-016701 (Figure 3). The soil profile consisted of a twelve inch layer of 10YR 4/2 clay loam soil with 20% brownish yellow (10YR 5/8) redox features.

Positive indicators of wetland hydrology included saturation and the FAC-neutral test. Dominant vegetation consisted of hydrophytic vegetation such as: reed canary grass (*Phalaris arundinacea*: FACW), green bulrush (*Scirpus atrovirens*:OBL), fox sedge (*Carex vulpinoidea*: OBL) and poverty rush (*Juncus tenuis*.: FAC). This wetland appears to be hydraulically connected to the floodplain of an unnamed tributary of Mud Creek a "waters of the U.S." and therefore will likely be under the jurisdiction of the USACE. Using ORAM version 5.0, Wetland G obtained a score of 29, which correlates to a Category 1 wetland.

Wetland H

Wetland H was delineated as 0.295 acres and is located in the northern portion of parcel number 45-016701 (Figure 3). The soil profile consisted of a twelve inch layer of 10YR 4/2 clay loam soil with 30% brownish orange (5YR 4/6) redox features.

Positive indicators of wetland hydrology included saturation and the FAC-neutral test. Dominant vegetation consisted of hydrophytic vegetation such as: reed canary grass (*Phalaris arundinacea*: FACW). This wetland appears to have no connection to a "waters of the U.S." and therefore will likely be under the jurisdiction of the OEPA. Using ORAM version 5.0, Wetland H obtained a score of 16, which correlates to a Category 1 wetland.

Wetland I

Wetland I was delineated as 0.214 acres and is located in the eastern portion of parcel number 45-016701 (Figure 3). The soil profile consisted of a twelve inch layer of 10YR 4/2 clay loam soil with 20% brownish yellow (10YR 5/8) redox features.

Positive indicators of wetland hydrology included saturation and the FAC-neutral test. Dominant vegetation consisted of hydrophytic vegetation such as: reed canary grass (*Phalaris arundinacea*: FACW), switchgrass (*Panicum virgatum*: FAC). This wetland appears to have no connection to a "waters of the U.S." and therefore will likely be under the jurisdiction of the OEPA. Using ORAM version 5.0, Wetland I obtained a score of 25, which correlates to a Category 1 wetland.

Wetland J

Wetland J was delineated as 0.432 acres and is located in the western portion of parcel number 45-903150 (Figure 3). The soil profile consisted of a twelve inch layer of 10YR 4/1 clay loam soil with 30% brownish yellow (10YR 5/8) redox features.

Positive indicators of wetland hydrology included saturation and the FAC-neutral test. Dominant vegetation consisted of hydrophytic vegetation such as: reed canary grass (*Phalaris arundinacea*: FACW). This wetland appears to have no connection to a "waters of the U.S." and therefore will likely be under the jurisdiction of the OEPA. Using ORAM version 5.0, Wetland J obtained a score of 14, which correlates to a Category 1 wetland.

Mitigation Area

The wetland mitigation area was not delineated as a part of this report, but data was collected on the soils, hydrology and plant community. The soil profile consisted of a twelve inch layer of 10YR 4/2 clay loam soil with 20% brownish yellow (10YR 5/8) redox features.

Positive indicators of wetland hydrology included saturation and the FAC-neutral test. Dominant vegetation consisted of hydrophytic vegetation such as: blunt spikerush (*Eleocharis obtusa:* OBL), green rush (*Juncus alpinoarticulatus:* OBL) and broadleaf cattail (*Typha latifolia:* OBL). Complete details of this mitigation site will be available in the "First Year Mitigation Monitoring Report", which will be submitted to the Pittsburgh USACE Office in the very near future.

3.3 Uplands

Five sample points were taken in upland areas (SP-2, SP-6, SP-9, SP-14 and SP-16).

SP-2 was dominated with pin oak (*Quercus palustris*: FACW), garlic mustard (*Alliaria petiolata :* FACU) and grass (*Poaceae spp.*: FACU). The soil profile consisted of a twelve inch layer of 10YR 4/2 clay loam soil. No signs of hydrology were observed.

SP-6 was dominated with fescue sedge (*Carex festucacea:* FAC) and red clover (*Trifolium pratense*: FACU). The soil profile consisted of a twelve inch layer of 10YR 4/2 sandy clay loam soil with 10% 10YR 4/6 redox features. No signs of hydrology were observed.

SP-9 was dominated with black cherry (*Prunus serotina*: FACU), yellow birch (*Betula alleghaniensis*: FAC) and multiflora rose (*Rosa multiflora*: FACU). The soil profile consisted of a six inch layer of 10YR 3/2 sandy clay loam soil, underlain soils were fill soil. No signs of hydrology were observed.

SP-14 was dominated with fescue sedge (*Carex festucacea*: FAC), grass (*Poaceae spp*: FACU), poverty rush (*Juncus tenuis*: FAC), Kentucky bluegrass (*Poa pratensis*: FACU) and Queen Anne's Lace (*Daucus carota*: UPL). The soil profile consisted of a twelve inch layer of 10YR 4/3 silty clay loam soil. No signs of hydrology were observed.

SP-16 was dominated with fescue sedge (*Carex festucacea*: FAC) and white clover (*Trifolium repens*: FACU). The soil profile consisted of a twelve inch layer of 10YR 4/3 silty clay loam soil. No signs of hydrology were observed.

3.4 Stream Assessment

One stream, designated Stream 1 (Mud Creek) was identified during the desktop review, and two additional streams designated Stream 2 and Stream 3 were identified in the field. Stream 1 (Mud Creek) was the only USGS blue line stream identified on the Site (Figure 3). The streams were evaluated using the HHEI and the QHEI. Wetlands A and E are adjacent to Stream 1 (Mud Creek). Wetland F is adjacent to Stream 2 and Wetland G is adjacent to Stream 3.

Table 3.3 Summary of Streams

Stream	Length within Study Area (ft.)	QHEI/HHEI* Score	PHWH* Stream Class
Stream 1 (Mu d Creek)	2,318	78	Warmwater Habitat
Stream 2	667	47	Class II PHWH
Stream 3	665	27	Class I PHWH
Total	3,650		

*PHWH-Primary Head Water Habitat

** Qualitative Habitat Evaluation Index/ Headwater Habitat Evaluation Index

3.5 Threatened and Endangered Species

The Site was visually surveyed for threatened and endangered species on November 6, 7 & 11, 2014. Several potential Indiana Bat Trees were identified on the Site. No other state or federally-listed species or their habitats were identified. These trees exhibit habitat that is preferred by the Indiana Bat for summer roosting such as loose bark and crevices on dead or dying trees. Requests regarding the occurrence of state and federally-listed plants and animals, plant communities and breeding/non-breeding animal concentrations within the Site were submitted to the U.S. Fish and Wildlife Service (USFWS) and Ohio Department of Natural Resources (ODNR). USFWS correspondence dated February 25, 2015 Indicated the project is within the range of the Indiana bat (*Myotis sodalis*), a federally listed species; northern long-eared bat (*Myotis septentrionalis*), currently proposed for listing as federally endangered; and eastern massasauga (*Sistrurus catenatus*), a Federal candidate species. The USFWS further concluded that due to the type, size and location of the project it is not anticipated to have any adverse effects to other federally endangered, threatened, proposed or candidate species. A copy of our correspondence can be found in Appendix C.

4.0 SUMMARY

A surface water delineation was completed on November 6, 7 & 11, 2014 and identified ten wetlands (Wetlands A-J), totaling 3.648 acres, and three streams (Stream 1 (Mud Creek), Stream 2, and Stream 3) having a total length of 3,650 linear feet. Due to the location and hydrologic connection to a USGS blue line stream, it appears that Wetlands A, E, F, and G will be considered jurisdictional (non-isolated) by the USACE, and therefore regulated under the Section 404 program. Wetlands B, C, D, H, I, and J appear to have no direct connection to a jurisdictional stream, and will likely be considered isolated. These wetlands will likely be regulated by Ohio EPA under the State of Ohio Isolated Wetland Law. The mitigation area was observed to have indicators of hydric soils, hydrophytic vegetation and hydrology. Complete details of this mitigation site will be available in the "First Year Mitigation Monitoring Report", which will be submitted to the Pittsburgh USACE Office in the very near future.

All wetlands were evaluated using the ORAM scoring system. Wetland A, C, D, G, H, I, and J were determined to be Category 1 wetlands. Wetland F was determined to be a Category 1 or 2 Gray Zone wetland. Wetlands B and E were determined to be Modified Category 2 wetlands. A JD from USACE and an ORAM evaluation by the Ohio EPA will be necessary to confirm these findings.

FIGURES

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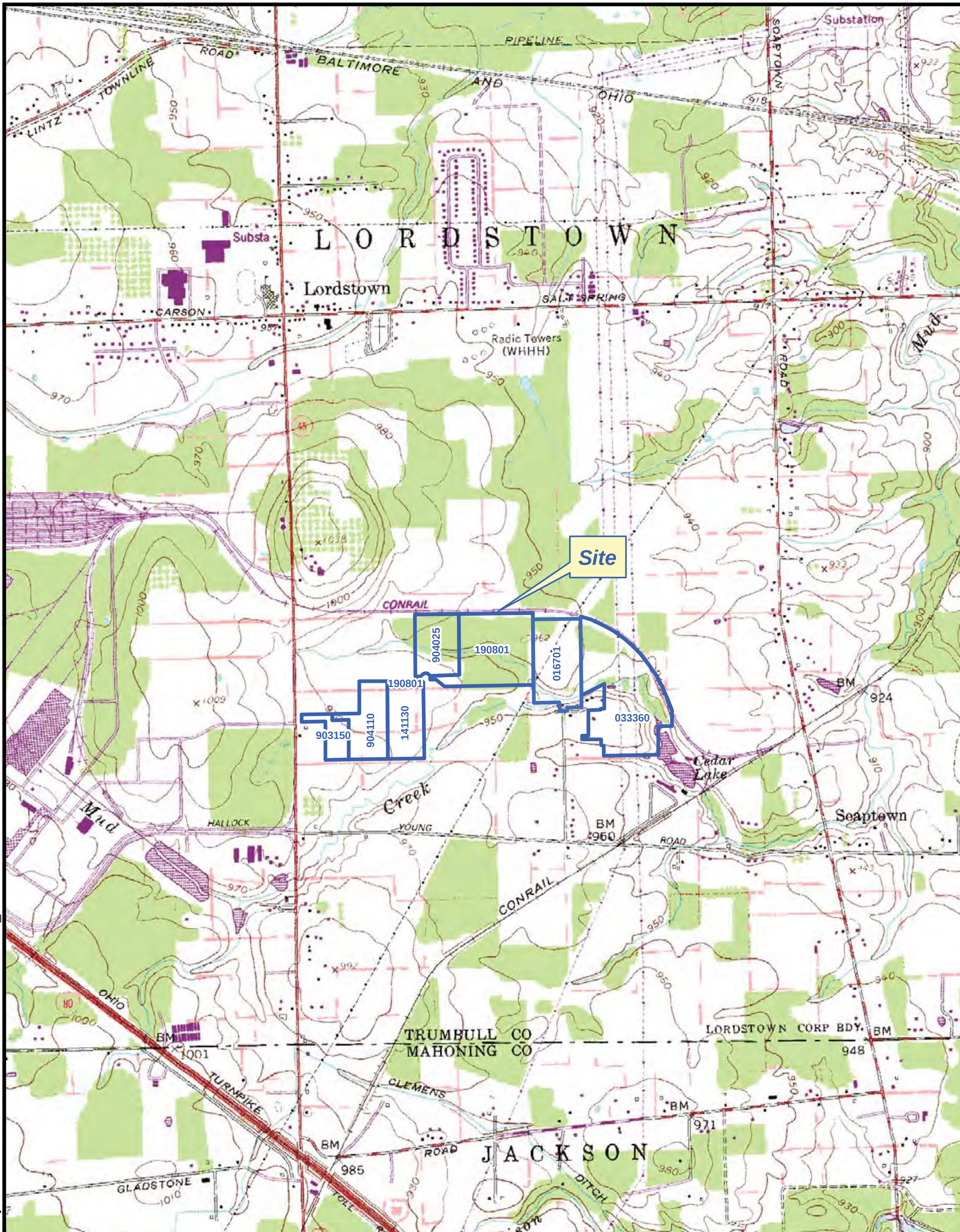

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Figure 1: Site Location Map
Lordstown Energy Center
Lordstown, Ohio

Notes

USGS Quadrangle, 7.5' Series Topographic
Warren, OH 1959 Revised 1984

Feet
0 1,000 2,000

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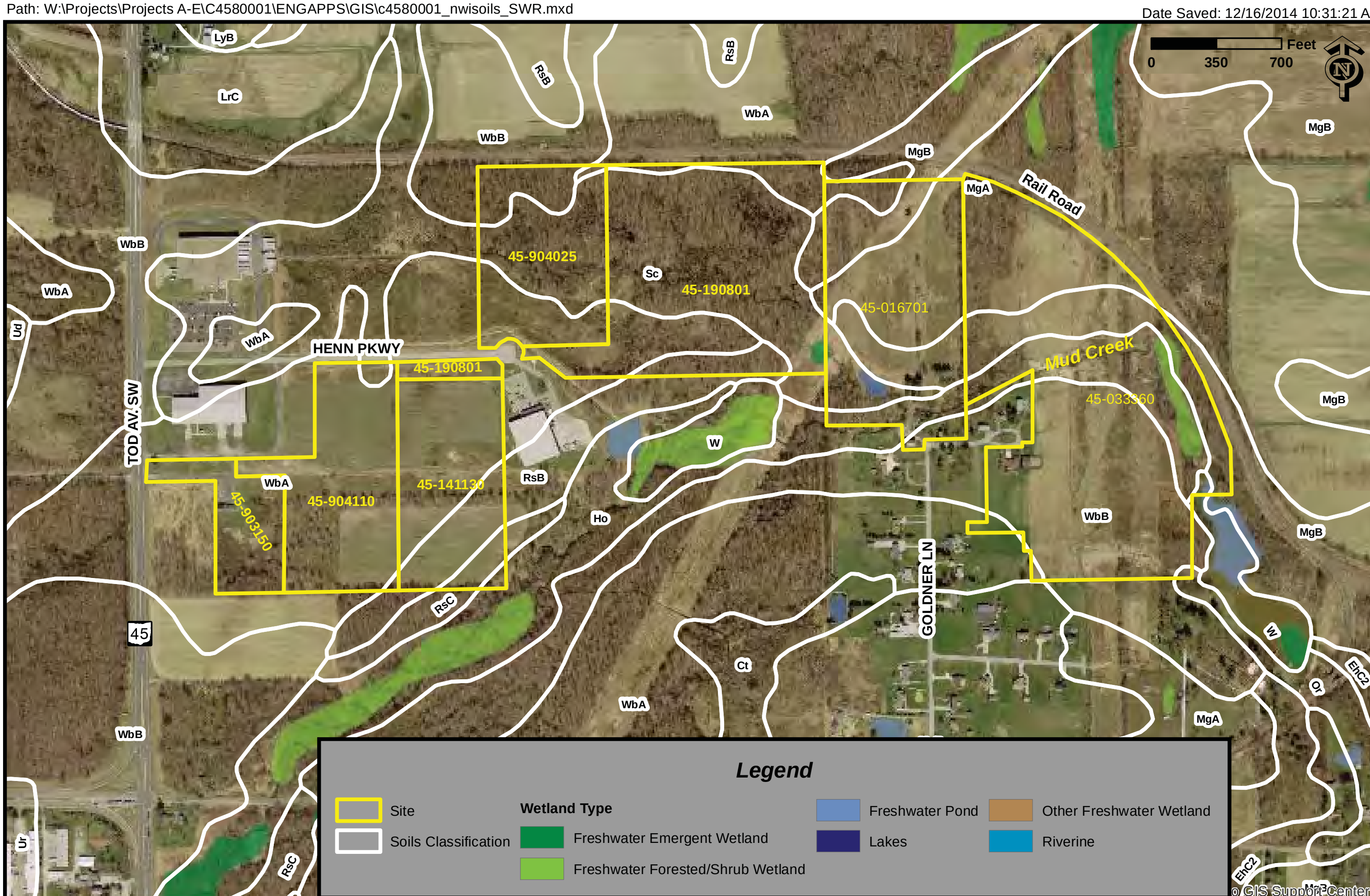

Figure 2: NWI/Soils Classification
Lordstown Energy Center
Lordstown, Ohio

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Notes: The Trumbull County photography, dated April 2011, is provided by OGRIP as part of the Ohio Statewide Imagery Program.
The soils data is provided by the U.S. Department of Agriculture, Natural Resources Conservation Service.
The NWI data is provided by the U.S. Department of the Interior, Fish and Wildlife Service.

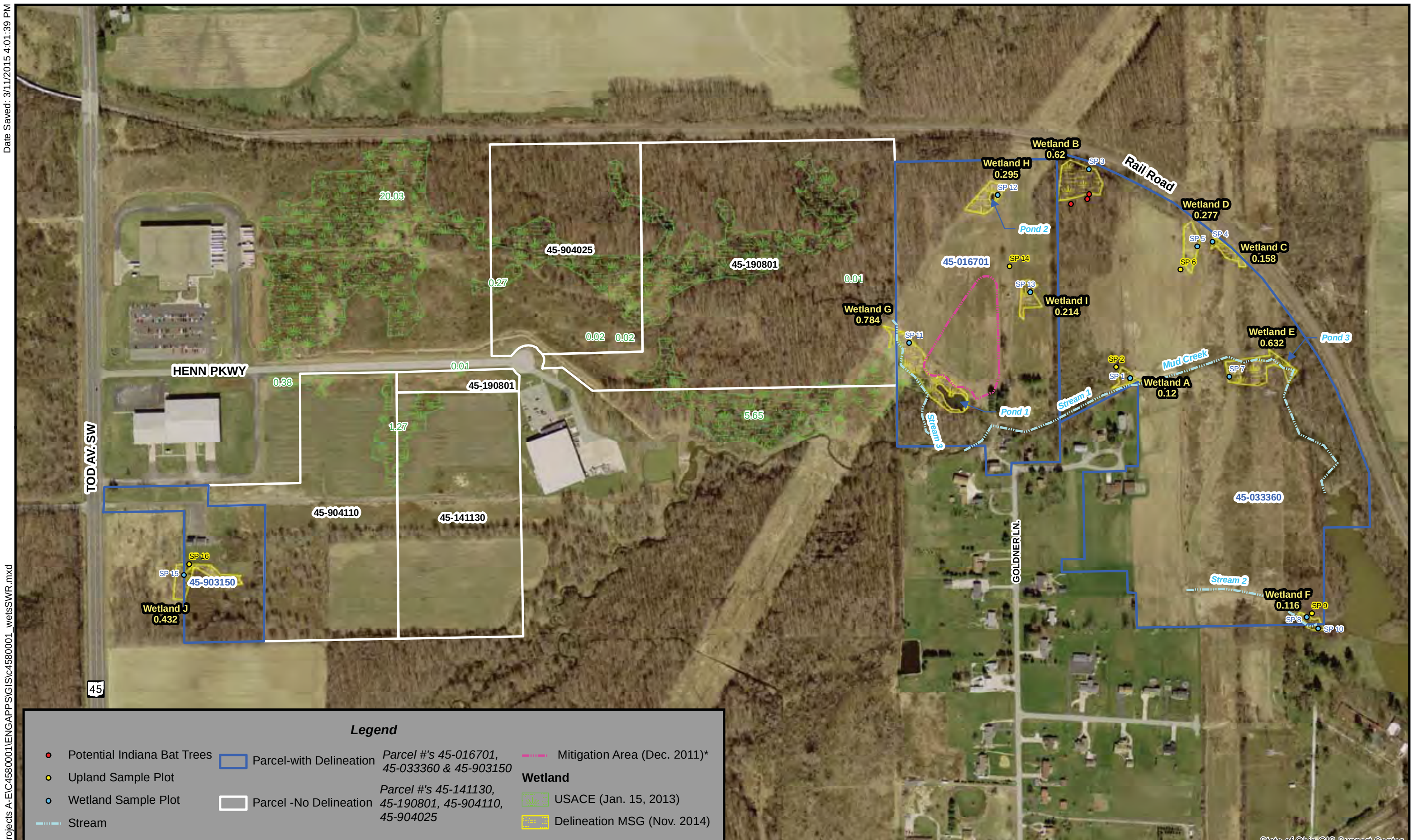

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Figure 3: Wetland Delineation
Lordstown Energy Center
Lordstown, Ohio

Notes

* Mitigation Area drawn as designed by ms consultants (Wetland Mitigation Project, Henn Development).

The Trumbull County photography, dated April 2011, is provided by OGRIP as part of the Ohio Statewide Imagery Program.

APPENDIX A
WETLAND DELINEATION DATA SHEETS

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/6/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-1

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): ______

Subregion (LRR or MLRA): LLR Lat: 41.149782 Long: -80.839937 Datum: DD

Soil Map Unit Name: Holly silt loam, frequently Floods NWI classification: None

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

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X	No ______	**Is the Sampled Area within a Wetland?** **Yes** X **No** ______
Hydric Soil Present?	Yes X	No ______	
Wetland Hydrology Present?	Yes X	No ______	If yes, optional Wetland Site ID: Wetland A

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

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X 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 on 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 two 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 X	No ______	Depth (inches): 12
Water Table Present?	Yes ______	No X	Depth (inches): ______
Saturation Present? (includes capillary fringe)	Yes X	No ______	Depth (inches): 12

Wetland Hydrology Present? Yes X **No** ______

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

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP-1

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Phalaris arundinacea*	100	X	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	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 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

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

SOIL

Sampling Point: SP-1

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

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-12	10 YR 3/2	90	10 YR 5/8	10		M	Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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**)
- ___ 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:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/6/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-2

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): none Slope (%): ______

Subregion (LRR or MLRA): LLR Lat: 41.149782 Long: -80.839937 Datum: DD

Soil Map Unit Name: Holly silt loam, Frequently Floods NWI classification: None

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

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X
Hydric Soil Present?	Yes ______	No X
Wetland Hydrology Present?	Yes ______	No X

Is the Sampled Area within a Wetland? **Yes** ______ **No** X

If yes, optional Wetland Site ID: ______

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

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is 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 on 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 two 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 X	Depth (inches): ______
Water Table Present?	Yes ______	No X	Depth (inches): ______
Saturation Present? (includes capillary fringe)	Yes ______	No X	Depth (inches): ______

Wetland Hydrology Present? Yes ______ **No** X

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

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: SP-2

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Quercus palustris*	100	X	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	100 = Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size:)			
1. *Alliaria petiolata*	30	X	FACU
2. *Poaceae*	20	X	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	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 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

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

SOIL

Sampling Point: SP-2

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10 YR 4/2	100					Clay Loam	No Redox Features

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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**)
___ 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:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/6/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-3

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): ________ Local relief (concave, convex, none): none Slope (%): ____

Subregion (LRR or MLRA): LRR Lat: 41.152606 Long: -80.839861 Datum: DD

Soil Map Unit Name: Mahoning silt loam 0 to 2 percent slope (MgA) NWI classification: None

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X No ____	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ____
Hydric Soil Present?	Yes X No ____		
Wetland Hydrology Present?	Yes X No ____	If yes, optional Wetland Site ID:	Wetland B

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

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- X 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 X No ____	Depth (inches): 3	
Water Table Present?	Yes ____ No X	Depth (inches): ____	
Saturation Present? (includes capillary fringe)	Yes X No ____	Depth (inches): 12	**Wetland Hydrology Present? Yes** X **No** ____

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

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP-3

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Quercus palustris*	70	X	FACW
2. *Ulmus americana*	20	X	FACW
3. *Quercus bicolor*	10		FACW
4.			
5.			
6.			
7.			
	100	= Total Cover	

Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	

Herb Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0	= Total Cover	

Woody Vine Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
	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 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

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

SOIL

Sampling Point: SP-3

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/1	100					Clay Loam	No Redox Features
4-12	10YR 6/1	60	10YR 6/8	40	RM	M	Sandy Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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**)
- ___ 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:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/6/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-4

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): ____

Subregion (LRR or MLRA): LLR Lat: 41.151334 Long: -80.838315 Datum: DD

Soil Map Unit Name: Mahoning silt loam 0 to 2 percent slope (MgA) NWI classification: None

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

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	If yes, optional Wetland Site ID: Wetland C

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

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two 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 X Depth (inches): ____

Water Table Present? Yes ___ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 12 in.

Wetland Hydrology Present? Yes X **No** ___

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

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP-4

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Phalaris arundinacea*	30	X	FACW
2. *Onoclea sensibilis*	20	X	FACW
3. *Typha latifolia*	20	X	OBL
4. *Carex comosa Boott*	20	X	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90	= Total Cover	

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

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

SOIL

Sampling Point: SP-4

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/1	100					Sandy Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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)
- X 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**)
- ___ 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 X **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/6/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-5

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): ____

Subregion (LRR or MLRA): LRR Lat: 41.151359 Long: -80.838303 Datum: DD

Soil Map Unit Name: Mahoning silt loam 0 to 2 percent slope (MgA) NWI classification: none

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

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	If yes, optional Wetland Site ID: Wetland D

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

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X 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 on 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 two 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 X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 12

Wetland Hydrology Present? Yes X **No** ___

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

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP-5

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	

Herb Stratum (Plot size:)			
1. *Scirpus lineatus*	20	X	FACW
2. *Phalaris arundinacea*	20	X	FACW
3. *Eleocharis obtusa*	20	X	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60	= Total Cover	

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	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 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

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

SOIL

Sampling Point: SP-5

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/1	100					Sandy Clay Loam	
4-12	10YR 5/2	80	10YR 5/8	20	RM	M	Sandy Clay Loam	Saturated

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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**)
- ___ 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:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/6/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-6

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): ____

Subregion (LRR or MLRA): LRR Lat: 41.151202 Long: -80.838582 Datum: DD

Soil Map Unit Name: Mahoning silt loam 0 to 2 percent slope (MgA) NWI classification: ____

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X 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.

	Yes	No
Hydrophytic Vegetation Present?		X
Hydric Soil Present?		X
Wetland Hydrology Present?		X

Is the Sampled Area within a Wetland? **Yes** ____ **No** X

If yes, optional Wetland Site ID: ____

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

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is 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 on 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 two 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:

	Yes	No	Depth (inches)
Surface Water Present?		X	
Water Table Present?		X	
Saturation Present? (includes capillary fringe)		X	

Wetland Hydrology Present? Yes ____ **No** X

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

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP-6

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Carex festucacea*	70	X	FAC
2. *Trifolium pratense*	20	X	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90 = Total Cover		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 = 0
FACW species		x 2 = 0
FAC species	70	x 3 = 210
FACU species	20	x 4 = 80
UPL species		x 5 = 0
Column Totals:	90 (A)	290 (B)

Prevalence Index = B/A = 3.22

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

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

SOIL

Sampling Point: SP-6

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/2	90	10YR 4/6	10	RM	M	Sandy Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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**)
___ 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 X

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/6/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-7

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): ____

Subregion (LRR or MLRA): LRR Lat: 41.151202 Long: -80.838582 Datum: DD

Soil Map Unit Name: Mahoning silt loam 0 to 2 percent slope (MgA) NWI classification: Freshwater Forested/Sh

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

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	If yes, optional Wetland Site ID: Wetland E

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

HYDROLOGY

Wetland Hydrology Indicators:

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

X Surface Water (A1)
___ High Water Table (A2)
X Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
X 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 on 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 two 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 X No ___	Depth (inches): 3	
Water Table Present?	Yes ___ No X	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes X No ___	Depth (inches): 12	**Wetland Hydrology Present? Yes** X **No** ___

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

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: SP-7

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	

Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	60	X	FACW
2. *Carex spp.*	20		FACW
3. *Eleocharis obtusa*	20		OBL
4. *Juncus effusus*	10		OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	110	= Total Cover	

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	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 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

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

SOIL

Sampling Point: SP-7

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/1	95	10YR 5/8	5	RM	M	Sandy Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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)
- X 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**)
- ___ 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** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/7/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-8

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): ____

Subregion (LRR or MLRA): LRR Lat: 41.146681 Long: -80.836875 Datum: DD

Soil Map Unit Name: Orrville silt loam, Frequently Floods NWI classification: None

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

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X	No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X	No ___	
Wetland Hydrology Present?	Yes X	No ___	If yes, optional Wetland Site ID: Wetland F

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

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two 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 X	No ___	Depth (inches): 6
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 12

Wetland Hydrology Present? Yes X **No** ___

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

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP-8

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		

Herb Stratum (Plot size: ____)			
1. *Phalaris arundinacea*	100	X	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
	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 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

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

SOIL

Sampling Point: SP-8

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/1	100					Sandy Clay Loam	No Redox Features

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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)
- _X_ 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**)
- ___ 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 _X_ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/7/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-9

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): Convex Slope (%): ______

Subregion (LRR or MLRA): LRR Lat: 41.146812 Long: -80.836848 Datum: DD

Soil Map Unit Name: Orrville silt loam Frequently Floods NWI classification: None

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

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X	**Is the Sampled Area within a Wetland?** **Yes** ______ **No** X
Hydric Soil Present?	Yes ______	No X	
Wetland Hydrology Present?	Yes ______	No X	If yes, optional Wetland Site ID: ______

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

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is 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 on 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 two 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 X Depth (inches): ______

Water Table Present? Yes ______ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ______ No X Depth (inches): ______

Wetland Hydrology Present? Yes ______ **No** X

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

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP-9

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Prunus serotina*	60	X	FACU
2. *Betula alleghaniensis*	40	X	FAC
3.			
4.			
5.			
6.			
7.			
	100 = Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1. *Rosa multiflora*	10	X	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	10 = Total Cover		
Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	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 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

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

SOIL Sampling Point: SP-9

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	100					Sandy Clay Loam	No Redox Features, Hit Fill Soil

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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**)
- ___ 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 X

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/7/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-10

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): ______

Subregion (LRR or MLRA): ______ Lat: 41.146501 Long: -80.836654 Datum: DD

Soil Map Unit Name: Orrvile silt loam, Frequently Floods NWI classification: none

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

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X
Hydric Soil Present?	Yes ___	No X
Wetland Hydrology Present?	Yes ___	No X

Is the Sampled Area within a Wetland? **Yes** ___ **No** X

If yes, optional Wetland Site ID: ______

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

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is 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 on 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 two 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 X	Depth (inches): ______
Water Table Present?	Yes ___	No X	Depth (inches): ______
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ______

Wetland Hydrology Present? **Yes** ___ **No** X

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

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP-10

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Prunus serotina*	60	X	FACU
2. *Betula nigra*	40	X	FACW
3.			
4.			
5.			
6.			
7.			
	100	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. *Rosa multiflora*	10	X	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	10	= Total Cover	
Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	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 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ______ **No** X

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

SOIL

Sampling Point: SP-10

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	100					Sandy Clay Loam	No Redox Features, Hit Fill Soil

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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**)
- ___ 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** X

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/11/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-11

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): ____

Subregion (LRR or MLRA): ____ Lat: 41.150389 Long: -80.843221 Datum: DD

Soil Map Unit Name: Sebring silt loam, till substratum (Sc) NWI classification: Freshwater Emergent

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X	No ____
Hydric Soil Present?	Yes X	No ____
Wetland Hydrology Present?	Yes X	No ____

Is the Sampled Area within a Wetland? **Yes** X **No** ____

If yes, optional Wetland Site ID: Wetland G

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

HYDROLOGY

Wetland Hydrology Indicators:

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

- X Surface Water (A1)
- ___ High Water Table (A2)
- X 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 on 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 two 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 X	No ____	Depth (inches): 4
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 12

Wetland Hydrology Present? Yes X **No** ____

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

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP-11

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	

Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	60	X	FACW
2. *Scirpus atrovirens*	30	X	OBL
3. *Carex vulpinoidea*	10		OBL
4. *Juncus tenuis*	5		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	105	= Total Cover	

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	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 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

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

SOIL

Sampling Point: SP-11

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/2	80	10YR 5/8	20	RM	M	Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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**)
- ___ 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:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/11/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-12

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): ____

Subregion (LRR or MLRA): ____ Lat: 41.152420 Long: -80.841729 Datum: DD

Soil Map Unit Name: Mahoning silt loam 2 to 6 percent slope (MgB) NWI classification: NONE

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	If yes, optional Wetland Site ID: Wetland H

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

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two 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 X	No ____	Depth (inches): 4
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 12

Wetland Hydrology Present? Yes X **No** ____

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

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP-12

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	100	X	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	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 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

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

SOIL

Sampling Point: SP-12

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/2	70	5YR 4/6	30	RM	M	Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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)
- _X_ 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**)
- ___ 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** _X_ **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/11/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-13

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): concave Slope (%): ____

Subregion (LRR or MLRA): ____ Lat: 41.151637 Long: -80.841938 Datum: DD

Soil Map Unit Name: Mahoning silt loam 0 to 2 percent slope (MgA) NWI classification: NONE

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

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X	No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X	No ___	
Wetland Hydrology Present?	Yes X	No ___	If yes, optional Wetland Site ID: Wetland I

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

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (minimum of two 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 X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 12

Wetland Hydrology Present? Yes X **No** ___

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

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP-13

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Phalaris arundinacea*	80	X	FACW
2. *Panicum virgatum*	10		FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90 = Total Cover		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	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 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

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

SOIL

Sampling Point: SP-13

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/2	80	10YR 5/8	20	RM	M	Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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)
- _X_ 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**)
- ___ 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 _X_ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/11/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-14

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): convex Slope (%): ______

Subregion (LRR or MLRA): ______ Lat: 41.151198 Long: -80.841747 Datum: DD

Soil Map Unit Name: Mahoning silt loam 0 to 2 percent slope (MgA) NWI classification: none

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

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X
Hydric Soil Present?	Yes ___	No X
Wetland Hydrology Present?	Yes ___	No X

Is the Sampled Area within a Wetland? **Yes** ___ **No** X

If yes, optional Wetland Site ID: ______

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

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is 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 on 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 two 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 X Depth (inches): ______

Water Table Present? Yes ___ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes ___ **No** X

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

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP-14

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Carex festucacea*	50	X	FAC
2. *Aster canadensis*	20		FACU
3. *Poaceae*	10		FACU
4. *Juncus tenuis*	10		FAC
5. *Poa pratensis*	10		FACU
6. *Daucus carota*	5		UPL
7.			
8.			
9.			
10.			
11.			
12.			
	105	= Total Cover	

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species	60	x 3 =	180
FACU species	30	x 4 =	120
UPL species		x 5 =	0
Column Totals:	90 (A)		300 (B)

Prevalence Index = B/A = 3.33

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ______ **No** X

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

SOIL

Sampling Point: SP-14

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
12	10YR 4/3	80	10YR4/6	20		M	Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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**)
- ___ 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:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/11/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-15

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR or MLRA): ______ Lat: 41.147423 Long: -80.855587 Datum: DD

Soil Map Unit Name: Wadsworth silt loam 0 to 2 percent slope (WbA) NWI classification: NONE

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

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X	No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X	No ___	
Wetland Hydrology Present?	Yes X	No ___	If yes, optional Wetland Site ID: Wetland J

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

HYDROLOGY

Wetland Hydrology Indicators:

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

___ Surface Water (A1)
X High Water Table (A2)
X 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 on 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 two 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 X	Depth (inches): ___
Water Table Present?	Yes X	No ___	Depth (inches): 2
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 0

Wetland Hydrology Present? Yes X **No** ___

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

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP-15

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
Herb Stratum (Plot size:)			
1. *Phalaris arundinacea*	100	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	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 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

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

SOIL Sampling Point: SP-15

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/1	70	10YR 5/8	30	RM	M	Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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)
- _X_ 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**)
- ___ 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 _X_ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lordstown City/County: Lordstown/ Trumbull Sampling Date: 11/11/2014

Applicant/Owner: Henn State: OH Sampling Point: SP-16

Investigator(s): Jessica Stratigakos, Jamie Berardinelli Section, Township, Range: T3N R4W

Landform (hillslope, terrace, etc.): ____ Local relief (concave, convex, none): ____ Slope (%): ____

Subregion (LRR or MLRA): ____ Lat: 41.147496 Long: -80.855690 Datum: DD

Soil Map Unit Name: Wadsworth silt loam 0 to 2 percent slope (WbA) NWI classification: none

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X 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 X	**Is the Sampled Area within a Wetland?**	**Yes** ____ **No** X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____	

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

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is 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 on 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 two 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 X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? Yes ____ **No** X

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

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP-16

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Carex festucacea*	80	X	FAC
2. *Trifolium repens*	20	X	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 = 0
FACW species		x 2 = 0
FAC species	80	x 3 = 240
FACU species	20	x 4 = 80
UPL species		x 5 = 0
Column Totals:	100 (A)	320 (B)

Prevalence Index = B/A = 3.20

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - 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 or equal to 3.28 ft (1 m) tall.

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

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ______ **No** X

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

SOIL

Sampling Point: SP-16

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
12	10YR 4/3	100				M	Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 Mucky 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**)
___ 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** X

Remarks:

<table>
<tr><td rowspan="2">Version 5.0</td><td colspan="2">Ohio Rapid Assessment Method for Wetlands
10 Page Form for Wetland Categorization</td></tr>
<tr><td>Background Information
Scoring Boundary Worksheet
Narrative Rating
Field Form Quantitative Rating
ORAM Summary Worksheet
Wetland Categorization Worksheet</td><td>Ohio EPA, Division of Surface Water
Final: February 1, 2001</td></tr>
</table>

Instructions

The investigator is *STRONGLY URGED* to read the Manual for Using the Ohio Rapid Assessment Method for Wetlands for further elaboration and discussion of the questions below prior to using the rating forms.

The Narrative Rating is designed to categorize a wetland or to provide alerts to the Rater based on the presence or possible presence of threatened or endangered species. The presence or proximity of such species is often an indicator of the quality and lack of disturbance of the wetland being evaluated. In addition, it is designed to categorize certain wetlands as very low quality (Category 1) or very high quality (Category 3) regardless of the wetland's score on the Quantitative Rating. In addition, the Narrative Rating also alerts the investigator that a particular wetland *may* be a Category 3 wetland, again, regardless of the wetland's score on the Quantitative Rating.

It is *VERY IMPORTANT* to properly and thoroughly answer each of the questions in the ORAM in order to properly categorize a wetland. To *properly* answer all the questions, the boundaries of the wetland being assessed must be correctly identified. Refer to Scoring Boundary worksheet and the User's Manual for a discussion of how to determine the "scoring boundaries." In some instances, the scoring boundaries may differ from the "jurisdictional boundaries."

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories. The most recent version of this document is posted on Ohio EPA's Division of Surface Water web page at: http://www.epa.ohio.gov/dsw/wetlands/WetlandEcologySection.aspx

Background Information

Name:	Jessica Stratigakos
Date:	11/12/2014
Affiliation:	The Mannik & Smith Group
Address:	23225 Mercantile Road, Beachwood Ohio 44122
Phone Number:	216-378-1490
e-mail address:	jstratigakos@manniksmithgroup.com
Name of Wetland:	Wetland A
Vegetation Communit(ies):	Forested
HGM Class(es):	Depressional

Location of Wetland: include map, address, north arrow, landmarks, distances, roads, etc.

See Attached Map

Lat/Long or UTM Coordinate	41.149782, -80.839937
USGS Quad Name	Warren
County	Trumbull
Township	Montgomery
Section and Subsection	S22 T22N R16W
Hydrologic Unit Code	050400020605
Site Visit	11/12/2014
National Wetland Inventory Map	None
Ohio Wetland Inventory Map	None
Soil Survey	Holly silt loam
Delineation report/map	See Fig. 3

Name of Wetland:
Wetland A

Wetland Size (acres, hectares):	0.12

Sketch: Include north arrow, relationship with other surface waters, vegetation zones, etc.

See Fig 3

Comments, Narrative Discussion, Justification of Category Changes:

None

Final score : 24	**Category:**	1

Scoring Boundary Worksheet

INSTRUCTIONS. The initial step in completing the ORAM is to identify the "scoring boundaries" of the wetland being rated. In many instances this determination will be relatively easy and the scoring boundaries will coincide with the "jurisdictional boundaries." For example, the scoring boundary of an isolated cattail marsh located in the middle of a farm field will likely be the same as that wetland's jurisdictional boundaries. In other instances, however, the scoring boundary will not be as easily determined. Wetlands that are small or isolated from other surface waters often form large contiguous areas or heterogeneous complexes of wetland and upland. In separating wetlands for scoring purposes, the hydrologic regime of the wetland is the main criterion that should be used. Boundaries between contiguous or connected wetlands should be established where the volume, flow, or velocity of water moving through the wetland changes significantly. *Areas with a high degree of hydrologic interaction should be scored as a single wetland*. In determining a wetland's scoring boundaries, use the guidelines in the ORAM Manual Section 5.0. In certain instances, it may be difficult to establish the scoring boundary for the wetland being rated. These problem situations include wetlands that form a patchwork on the landscape, wetlands divided by artificial boundaries like property fences, roads, or railroad embankments, wetlands that are contiguous with streams, lakes, or rivers, and estuarine or coastal wetlands. These situations are discussed below, however, it is recommended that Rater contact Ohio EPA, Division of Surface Water, 401/Wetlands Section if there are additional questions or a need for further clarification of the appropriate scoring boundaries of a particular wetland.

#	Steps in properly establishing scoring boundaries	done?	not applicable
Step 1	Identify the wetland area of interest. This may be the site of a proposed impact, a reference site, conservation site, etc.	✓	
Step 2	Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both natural and human-induced changes including, constrictions caused by berms or dikes, points where the water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic interaction between the wetlands or parts of a single wetland.	✓	
Step 3	Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within the areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction are included within the scoring boundary.	✓	
Step 4	Determine if artificial boundaries, such as property lines, state lines, roads, railroad embankments, etc., are present. These should not be used to establish scoring boundaries unless they coincide with areas where the hydrologic regime changes.	✓	
Step 5	In all instances, the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.	✓	
Step 6	Consult ORAM Manual Section 5.0 for how to establish scoring boundaries for wetlands that form a patchwork on the landscape, divided by artificial boundaries, contiguous to streams, lakes or rivers, or for dual classifications.	✓	

End of Scoring Boundary Determination. Begin Narrative Rating on next page.

Narrative Rating

INSTRUCTIONS. Answer each of the following questions. Questions 1, 2, 3 and 4 should be answered based on information obtained from the site visit or the literature *and* by submitting a Data Services Request to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Data Services, 1889 Fountain Square Court, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/dnap . The remaining questions are designed to be answered primarily by the results of the site visit. Refer to the User's Manual for descriptions of these wetland types. Note: "Critical habitat" is legally defined in the Endangered Species Act and is the geographic area containing physical or biological features essential to the conservation of a listed species or as an area that may require special management considerations or protection. The Rater should contact the Region 3 Headquarters or the Columbus Ecological Services Office for updates as to whether critical habitat has been designated for other federally listed threatened or endangered species. "Documented" means the wetland is listed in the appropriate State of Ohio database.

#	Question	Circle one	
1	**Critical Habitat.** Is the wetland in a township, section, or subsection of a United States Geological Survey 7.5 minute Quadrangle that has been designated by the U.S. Fish and Wildlife Service as "critical habitat" for any threatened or endangered plant or animal species? Note: as of January 1, 2001, of the federally listed endangered or threatened species which can be found in Ohio, the Indiana Bat has had critical habitat designated (50 CFR 17.95(a)) and the piping plover has had critical habitat proposed (65 FR 41812 July 6, 2000).	YES Wetland should be evaluated for possible Category 3 status Go to Question 2	NO Go to Question 2
2	**Threatened or Endangered Species.** Is the wetland known to contain an individual of, or documented occurrences of federal or state-listed threatened or endangered plant or animal species?	YES Wetland is a Category 3 wetland. Go to Question 3	NO Go to Question 3
3	**Documented High Quality Wetland.** Is the wetland on record in Natural Heritage Database as a high quality wetland?	YES Wetland is a Category 3 wetland Go to Question 4	NO Go to Question 4
4	**Significant Breeding or Concentration Area.** Does the wetland contain documented regionally significant breeding or nonbreeding waterfowl, neotropical songbird, or shorebird concentration areas?	YES Wetland is a Category 3 wetland Go to Question 5	NO Go to Question 5
5	**Category 1 Wetlands.** Is the wetland less than 0.5 hectares (1 acre) in size and **hydrologically isolated** and either 1) comprised of vegetation that is dominated (greater than eighty per cent areal cover) by *Phalaris arundinacea, Lythrum salicaria,* or *Phragmites australis*, or 2) an acidic pond created or excavated on mined lands that has little or no vegetation?	YES Wetland is a Category 1 wetland Go to Question 6	NO Go to Question 6
6	**Bogs.** Is the wetland a peat-accumulating wetland that 1) has no significant inflows or outflows, 2) supports acidophilic mosses, particularly *Sphagnum* spp., 3) the acidophilic mosses have >30% cover, 4) at least one species from Table 1 is present, and 5) the cover of invasive species (see Table 1) is <25%?	YES Wetland is a Category 3 wetland Go to Question 7	NO Go to Question 7
7	**Fens.** Is the wetland a carbon accumulating (peat, muck) wetland that is saturated during most of the year, primarily by a discharge of free flowing, mineral rich, ground water with a circumneutral ph (5.5-9.0) and with one or more plant species listed in Table 1 and the cover of invasive species listed in Table 1 is <25%?	YES Wetland is a Category 3 wetland Go to Question 8a	NO Go to Question 8a
8a	**"Old Growth Forest."** Is the wetland a forested wetland and is the forest characterized by, but not limited to, the following characteristics: overstory canopy trees of great age (exceeding at least 50% of a projected maximum attainable age for a species); little or no evidence of human-caused understory disturbance during the past 80 to 100 years; an all-aged structure and multilayered canopies; aggregations of canopy trees interspersed with canopy gaps; and significant numbers of standing dead snags and downed logs?	YES Wetland is a Category 3 wetland. Go to Question 8b	NO Go to Question 8b

8b	**Mature forested wetlands**. Is the wetland a forested wetland with 50% or more of the cover of upper forest canopy consisting of deciduous trees with large diameters at breast height (dbh), generally diameters greater than 45cm (17.7in) dbh?	YES Wetland should be evaluated for possible Category 3 status. Go to Question 9a	NO Go to Question 9a
9a	**Lake Erie coastal and tributary wetlands**. Is the wetland located at an elevation less than 575 feet on the USGS map, adjacent to this elevation, or along a tributary to Lake Erie that is accessible to fish?	YES Go to Question 9b	NO Go to Question 10
9b	Does the wetland's hydrology result from measures designed to prevent erosion and the loss of aquatic plants, i.e. the wetland is partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 9c
9c	Are Lake Erie water levels the wetland's primary hydrological influence, i.e. the wetland is hydrologically unrestricted (no lakeward or upland border alterations), or the wetland can be characterized as an "estuarine" wetland with lake and river influenced hydrology. These include sandbar deposition wetlands, estuarine wetlands, river mouth wetlands, or those dominated by submersed aquatic vegetation.	YES Go to Question 9d	NO Go to Question 10
9d	Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant native species can also be present?	YES Wetland is a Category 3 wetland Go to Question 10	NO Go to Question 9e
9e	Does the wetland have a predominance of non-native or disturbance tolerant native plant species within its vegetation communities?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 10
10	**Lake Plain Sand Prairies (Oak Openings)** Is the wetland located in Lucas, Fulton, Henry, or Wood Counties and can the wetland be characterized by the following description: the wetland has a sandy substrate with interspersed organic matter, a water table often within several inches of the surface, and often with a dominance of the gramineous vegetation listed in Table 1 (woody species may also be present). The Ohio Department of Natural Resources Division of Natural Areas and Preserves can provide assistance in confirming this type of wetland and its quality.	YES Wetland is a Category 3 wetland. Go to Question 11	NO Go to Question 11
11	**Relict Wet Prairies**. Is the wetland a relict wet prairie community dominated by some or all of the species in Table 1. Extensive prairies were formerly located in the Darby Plains (Madison and Union Counties), Sandusky Plains (Wyandot, Crawford, and Marion Counties), northwest Ohio (e.g. Erie, Huron, Lucas, Wood Counties), and portions of western Ohio Counties (e.g. Darke, Mercer, Miami, Montgomery, Van Wert etc.).	YES Wetland should be evaluated for possible Category 3 status Complete Quantitative Rating	NO Complete Quantitative Rating

Table 1. Characteristic plant species.

invasive/exotic spp	fen species	bog species	0ak Opening species	wet prairie species
Lythrum salicaria	*Zygadenus elegans var. glaucus*	*Calla palustris*	*Carex cryptolepis*	*Calamagrostis canadensis*
Myriophyllum spicatum	*Cacalia plantaginea*	*Carex atlantica var. capillacea*	*Carex lasiocarpa*	*Calamogrostis stricta*
Najas minor	*Carex flava*	*Carex echinata*	*Carex stricta*	*Carex atherodes*
Phalaris arundinacea	*Carex sterilis*	*Carex oligosperma*	*Cladium mariscoides*	*Carex buxbaumii*
Phragmites australis	*Carex stricta*	*Carex trisperma*	*Calamagrostis stricta*	*Carex pellita*
Potamogeton crispus	*Deschampsia caespitosa*	*Chamaedaphne calyculata*	*Calamagrostis canadensis*	*Carex sartwellii*
Ranunculus ficaria	*Eleocharis rostellata*	*Decodon verticillatus*	*Quercus palustris*	*Gentiana andrewsii*
Rhamnus frangula	*Eriophorum viridicarinatum*	*Eriophorum virginicum*		*Helianthus grosseserratus*
Typha angustifolia	*Gentianopsis spp.*	*Larix laricina*		*Liatris spicata*
Typha xglauca	*Lobelia kalmii*	*Nemopanthus mucronatus*		*Lysimachia quadriflora*
	Parnassia glauca	*Schechzeria palustris*		*Lythrum alatum*
	Potentilla fruticosa	*Sphagnum spp.*		*Pycnanthemum virginianum*
	Rhamnus alnifolia	*Vaccinium macrocarpon*		*Silphium terebinthinaceum*
	Rhynchospora capillacea	*Vaccinium corymbosum*		*Sorghastrum nutans*
	Salix candida	*Vaccinium oxycoccos*		*Spartina pectinata*
	Salix myricoides	*Woodwardia virginica*		*Solidago riddellii*
	Salix serissima	*Xyris difformis*		
	Solidago ohioensis			
	Tofieldia glutinosa			
	Triglochin maritimum			
	Triglochin palustre			

End of Narrative Rating. Begin Quantitative Rating on next page.

Site: Lordstown	Rater(s): J.Stratigakos	Date: 11/12/2014

Metric 1. Wetland Area (size).

max 6 pts.	subtotal
1.0	1.0

Select one size class and assign score.

1.0

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [ ] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [x] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

Metric 2. Upland buffers and surrounding land use.

max 14 pts.	subtotal
7.0	8.0

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

4.0

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [x] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [ ] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

3.0

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [x] LOW. Old field (>10 years), shrub land, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [x] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

Metric 3. Hydrology.

max 30 pts.	subtotal
9.0	17.0

3a. Sources of Water. Score all that apply.

6.0

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [x] Precipitation (1)
- [ ] Seasonal/Intermittent surface water (3)
- [x] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

1.0

- [x] 100 year floodplain (1)
- [ ] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

1.0

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [x] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

1.0

- [ ] Semi- to permanently inundated/saturated (4)
- [ ] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [x] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

3.0

- [ ] None or none apparent (12)
- [ ] Recovered (7)
- [x] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [ ] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [ ] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [ ] other____________________

Metric 4. Habitat Alteration and Development.

max 20 pts.	subtotal
6.0	23.0

4a. Substrate disturbance. Score one or double check and average.

2.0

- [ ] None or none apparent (4)
- [ ] Recovered (3)
- [x] Recovering (2)
- [ ] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

1.0

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [ ] Fair (3)
- [ ] Poor to fair (2)
- [x] Poor (1)

4c. Habitat alteration. Score one or double check and average.

3.0

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [x] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [x] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [ ] farming
- [ ] nutrient enrichment

23.0
subtotal this page

Site: Lordstown	Rater(s): J.Stratigakos	Date: 11/12/2014

23.0
subtotal first page

0.0	23.0
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

0

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Prairies (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

1.0	24.0
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

3

- 0 Aquatic bed
- 2 Emergent
- 0 Shrub
- 1 Forest
- 0 Mudflats
- 0 Open water
- Other___________________

6b. horizontal (plan view) Interspersion.
Select only one.

1

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [ ] Moderately low (2)
- [x] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

-5

- -5 Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- 0 Nearly absent <5% cover (0)
- Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

2

- Vegetated hummucks/tussucks
- 1 Coarse woody debris >15cm (6in)
- 1 Standing dead >25cm (10in) dbh
- Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

24.0

End of Quantitative Rating. Complete Categorization Worksheets.

ORAM Summary Worksheet

		circle answer or insert score	Result
Narrative Rating	Question 1 Critical Habitat	YES NO	If yes, Category 3.
	Question 2. Threatened or Endangered Species	YES NO	If yes, Category 3.
	Question 3. High Quality Natural Wetland	YES NO	If yes, Category 3.
	Question 4. Significant bird habitat	YES NO	If yes, Category 3.
	Question 5. Category 1 Wetlands	YES NO	If yes, Category 1.
	Question 6. Bogs	YES NO	If yes, Category 3.
	Question 7. Fens	YES NO	If yes, Category 3.
	Question 8a. Old Growth Forest	YES NO	If yes, Category 3.
	Question 8b. Mature Forested Wetland	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9b. Lake Erie Wetlands - Restricted	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9d. Lake Erie Wetlands – Unrestricted with native plants	YES NO	If yes, Category 3
	Question 9e. Lake Erie Wetlands - Unrestricted with invasive plants	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 10. Oak Openings	YES NO	If yes, Category 3
	Question 11. Relict Wet Prairies	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
Quantitative Rating	Metric 1. Size	1.00	
	Metric 2. Buffers and surrounding land use	7.00	
	Metric 3. Hydrology	9.00	
	Metric 4. Habitat	6.00	
	Metric 5. Special Wetland Communities	0.00	
	Metric 6. Plant communities, interspersion, microtopography	1.00	
	TOTAL SCORE	24.00	Category based on score breakpoints 1

Complete Wetland Categorization Worksheet.

Wetland Categorization Worksheet

Choices	Circle one		Evaluation of Categorization Result of ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 2, 3, 4, 6, 7, 8a, 9d, 10	YES Wetland is categorized as a Category 3 wetland	NO	Is quantitative rating score *less* than the Category 2 scoring threshold (*excluding* gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been over-categorized by the ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 1, 8b, 9b, 9e, 11	YES Wetland should be evaluated for possible Category 3 status	NO	Evaluate the wetland using the 1) narrative criteria in OAC Rule 3745-1-54(C) and 2) the quantitative rating score. If the wetland is determined to be a Category 3 wetland using either of these, it should be categorized as a Category 3 wetland. Detailed biological and/or functional assessments may also be used to determine the wetland's category.
Did you answer "Yes" to Narrative Rating No. 5	YES Wetland is categorized as a Category 1 wetland	NO	Is quantitative rating score *greater* than the Category 2 scoring threshold *(including* any gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been under-categorized by the ORAM
Does the quantitative score fall within the scoring range of a Category 1, 2, or 3 wetland?	YES Wetland is assigned to the appropriate category based on the scoring range	NO	If the score of the wetland is located within the scoring range for a particular category, the wetland should be assigned to that category. In all instances however, the narrative criteria described in OAC Rule 3745-1-54(C) can be used to clarify or change a categorization based on a quantitative score.
Does the quantitative score fall with the *"gray zone"* for Category 1 or 2 or Category 2 or 3 wetlands?	YES Wetland is assigned to the higher of the two categories or assigned to a category based on detailed assessments and the narrative criteria	NO	Rater has the option of assigning the wetland to the higher of the two categories or to assign a category based on the results of a nonrapid wetland assessment method, e.g. functional assessment, biological assessment, etc, and a consideration of the narrative criteria in OAC rule 3745-1-54(C).
Does the wetland otherwise exhibit *moderate OR superior* hydrologic OR habitat, OR recreational functions AND the wetland was *not* categorized as a Category 2 wetland (in the case of moderate functions) or a Category 3 wetland (in the case of superior functions) by this method?	YES Wetland was undercategorized by this method. A written justification for recategorization should be provided on Background Information Form	NO Wetland is assigned to category as determined by the ORAM.	A wetland may be undercategorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54(C)(2) and (3) are controlling, and the under-categorization should be corrected. A written justification with supporting reasons or information for this determination should be provided.

Final Category

Choose one	Category 1	Category 2	Category 3

End of Ohio Rapid Assessment Method for Wetlands.

<table>
<tr><td rowspan="2">Version 5.0</td><td colspan="2">Ohio Rapid Assessment Method for Wetlands
10 Page Form for Wetland Categorization</td></tr>
<tr><td>Background Information
Scoring Boundary Worksheet
Narrative Rating
Field Form Quantitative Rating
ORAM Summary Worksheet
Wetland Categorization Worksheet</td><td>Ohio EPA, Division of Surface Water
Final: February 1, 2001</td></tr>
</table>

Instructions

The investigator is *STRONGLY URGED* to read the Manual for Using the Ohio Rapid Assessment Method for Wetlands for further elaboration and discussion of the questions below prior to using the rating forms.

The Narrative Rating is designed to categorize a wetland or to provide alerts to the Rater based on the presence or possible presence of threatened or endangered species. The presence or proximity of such species is often an indicator of the quality and lack of disturbance of the wetland being evaluated. In addition, it is designed to categorize certain wetlands as very low quality (Category 1) or very high quality (Category 3) regardless of the wetland's score on the Quantitative Rating. In addition, the Narrative Rating also alerts the investigator that a particular wetland *may* be a Category 3 wetland, again, regardless of the wetland's score on the Quantitative Rating.

It is *VERY IMPORTANT* to properly and thoroughly answer each of the questions in the ORAM in order to properly categorize a wetland. To *properly* answer all the questions, the boundaries of the wetland being assessed must be correctly identified. Refer to Scoring Boundary worksheet and the User's Manual for a discussion of how to determine the "scoring boundaries." In some instances, the scoring boundaries may differ from the "jurisdictional boundaries."

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories. The most recent version of this document is posted on Ohio EPA's Division of Surface Water web page at: http://www.epa.ohio.gov/dsw/wetlands/WetlandEcologySection.aspx

Background Information

Name:	Jessica Stratigakos
Date:	11/12/2014
Affiliation:	The Mannik & Smith Group
Address:	23225 Mercantile Road, Beachwood Ohio 44122
Phone Number:	216-378-1490
e-mail address:	jstratigakos@manniksmithgroup.com
Name of Wetland:	Wetland B
Vegetation Communit(ies):	Forested
HGM Class(es):	Depressional

Location of Wetland: include map, address, north arrow, landmarks, distances, roads, etc.

See Attached Map

Lat/Long or UTM Coordinate	41.152606, -80.839861
USGS Quad Name	Warren
County	Trumbull
Township	Montgomery
Section and Subsection	S22 T22N R16W
Hydrologic Unit Code	050400020605
Site Visit	11/12/2014
National Wetland Inventory Map	None
Ohio Wetland Inventory Map	None
Soil Survey	Mahoning silt loam
Delineation report/map	See Fig. 3

Name of Wetland: Wetland B	
Wetland Size (acres, hectares):	0.62
Sketch: Include north arrow, relationship with other surface waters, vegetation zones, etc.	
Comments, Narrative Discussion, Justification of Category Changes: None	
Final score : 46 **Category:**	2

Scoring Boundary Worksheet

INSTRUCTIONS. The initial step in completing the ORAM is to identify the "scoring boundaries" of the wetland being rated. In many instances this determination will be relatively easy and the scoring boundaries will coincide with the "jurisdictional boundaries." For example, the scoring boundary of an isolated cattail marsh located in the middle of a farm field will likely be the same as that wetland's jurisdictional boundaries. In other instances, however, the scoring boundary will not be as easily determined. Wetlands that are small or isolated from other surface waters often form large contiguous areas or heterogeneous complexes of wetland and upland. In separating wetlands for scoring purposes, the hydrologic regime of the wetland is the main criterion that should be used. Boundaries between contiguous or connected wetlands should be established where the volume, flow, or velocity of water moving through the wetland changes significantly. *Areas with a high degree of hydrologic interaction should be scored as a single wetland*. In determining a wetland's scoring boundaries, use the guidelines in the ORAM Manual Section 5.0. In certain instances, it may be difficult to establish the scoring boundary for the wetland being rated. These problem situations include wetlands that form a patchwork on the landscape, wetlands divided by artificial boundaries like property fences, roads, or railroad embankments, wetlands that are contiguous with streams, lakes, or rivers, and estuarine or coastal wetlands. These situations are discussed below, however, it is recommended that Rater contact Ohio EPA, Division of Surface Water, 401/Wetlands Section if there are additional questions or a need for further clarification of the appropriate scoring boundaries of a particular wetland.

#	Steps in properly establishing scoring boundaries	done?	not applicable
Step 1	Identify the wetland area of interest. This may be the site of a proposed impact, a reference site, conservation site, etc.	✓	
Step 2	Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both natural and human-induced changes including, constrictions caused by berms or dikes, points where the water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic interaction between the wetlands or parts of a single wetland.	✓	
Step 3	Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within the areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction are included within the scoring boundary.	✓	
Step 4	Determine if artificial boundaries, such as property lines, state lines, roads, railroad embankments, etc., are present. These should not be used to establish scoring boundaries unless they coincide with areas where the hydrologic regime changes.	✓	
Step 5	In all instances, the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.	✓	
Step 6	Consult ORAM Manual Section 5.0 for how to establish scoring boundaries for wetlands that form a patchwork on the landscape, divided by artificial boundaries, contiguous to streams, lakes or rivers, or for dual classifications.	✓	

End of Scoring Boundary Determination. Begin Narrative Rating on next page.

Narrative Rating

INSTRUCTIONS. Answer each of the following questions. Questions 1, 2, 3 and 4 should be answered based on information obtained from the site visit or the literature *and* by submitting a Data Services Request to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Data Services, 1889 Fountain Square Court, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/dnap . The remaining questions are designed to be answered primarily by the results of the site visit. Refer to the User's Manual for descriptions of these wetland types. Note: "Critical habitat" is legally defined in the Endangered Species Act and is the geographic area containing physical or biological features essential to the conservation of a listed species or as an area that may require special management considerations or protection. The Rater should contact the Region 3 Headquarters or the Columbus Ecological Services Office for updates as to whether critical habitat has been designated for other federally listed threatened or endangered species. "Documented" means the wetland is listed in the appropriate State of Ohio database.

#	Question	Circle one	
1	**Critical Habitat.** Is the wetland in a township, section, or subsection of a United States Geological Survey 7.5 minute Quadrangle that has been designated by the U.S. Fish and Wildlife Service as "critical habitat" for any threatened or endangered plant or animal species? Note: as of January 1, 2001, of the federally listed endangered or threatened species which can be found in Ohio, the Indiana Bat has had critical habitat designated (50 CFR 17.95(a)) and the piping plover has had critical habitat proposed (65 FR 41812 July 6, 2000).	YES Wetland should be evaluated for possible Category 3 status Go to Question 2	NO Go to Question 2
2	**Threatened or Endangered Species.** Is the wetland known to contain an individual of, or documented occurrences of federal or state-listed threatened or endangered plant or animal species?	YES Wetland is a Category 3 wetland. Go to Question 3	NO Go to Question 3
3	**Documented High Quality Wetland.** Is the wetland on record in Natural Heritage Database as a high quality wetland?	YES Wetland is a Category 3 wetland Go to Question 4	NO Go to Question 4
4	**Significant Breeding or Concentration Area.** Does the wetland contain documented regionally significant breeding or nonbreeding waterfowl, neotropical songbird, or shorebird concentration areas?	YES Wetland is a Category 3 wetland Go to Question 5	NO Go to Question 5
5	**Category 1 Wetlands.** Is the wetland less than 0.5 hectares (1 acre) in size and **hydrologically isolated** and either 1) comprised of vegetation that is dominated (greater than eighty per cent areal cover) by *Phalaris arundinacea, Lythrum salicaria,* or *Phragmites australis*, or 2) an acidic pond created or excavated on mined lands that has little or no vegetation?	YES Wetland is a Category 1 wetland Go to Question 6	NO Go to Question 6
6	**Bogs.** Is the wetland a peat-accumulating wetland that 1) has no significant inflows or outflows, 2) supports acidophilic mosses, particularly *Sphagnum* spp., 3) the acidophilic mosses have >30% cover, 4) at least one species from Table 1 is present, and 5) the cover of invasive species (see Table 1) is <25%?	YES Wetland is a Category 3 wetland Go to Question 7	NO Go to Question 7
7	**Fens.** Is the wetland a carbon accumulating (peat, muck) wetland that is saturated during most of the year, primarily by a discharge of free flowing, mineral rich, ground water with a circumneutral ph (5.5-9.0) and with one or more plant species listed in Table 1 and the cover of invasive species listed in Table 1 is <25%?	YES Wetland is a Category 3 wetland Go to Question 8a	NO Go to Question 8a
8a	**"Old Growth Forest."** Is the wetland a forested wetland and is the forest characterized by, but not limited to, the following characteristics: overstory canopy trees of great age (exceeding at least 50% of a projected maximum attainable age for a species); little or no evidence of human-caused understory disturbance during the past 80 to 100 years; an all-aged structure and multilayered canopies; aggregations of canopy trees interspersed with canopy gaps; and significant numbers of standing dead snags and downed logs?	YES Wetland is a Category 3 wetland. Go to Question 8b	NO Go to Question 8b

8b	**Mature forested wetlands**. Is the wetland a forested wetland with 50% or more of the cover of upper forest canopy consisting of deciduous trees with large diameters at breast height (dbh), generally diameters greater than 45cm (17.7in) dbh?	YES Wetland should be evaluated for possible Category 3 status. Go to Question 9a	NO Go to Question 9a
9a	**Lake Erie coastal and tributary wetlands**. Is the wetland located at an elevation less than 575 feet on the USGS map, adjacent to this elevation, or along a tributary to Lake Erie that is accessible to fish?	YES Go to Question 9b	NO Go to Question 10
9b	Does the wetland's hydrology result from measures designed to prevent erosion and the loss of aquatic plants, i.e. the wetland is partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 9c
9c	Are Lake Erie water levels the wetland's primary hydrological influence, i.e. the wetland is hydrologically unrestricted (no lakeward or upland border alterations), or the wetland can be characterized as an "estuarine" wetland with lake and river influenced hydrology. These include sandbar deposition wetlands, estuarine wetlands, river mouth wetlands, or those dominated by submersed aquatic vegetation.	YES Go to Question 9d	NO Go to Question 10
9d	Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant native species can also be present?	YES Wetland is a Category 3 wetland Go to Question 10	NO Go to Question 9e
9e	Does the wetland have a predominance of non-native or disturbance tolerant native plant species within its vegetation communities?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 10
10	**Lake Plain Sand Prairies (Oak Openings)** Is the wetland located in Lucas, Fulton, Henry, or Wood Counties and can the wetland be characterized by the following description: the wetland has a sandy substrate with interspersed organic matter, a water table often within several inches of the surface, and often with a dominance of the gramineous vegetation listed in Table 1 (woody species may also be present). The Ohio Department of Natural Resources Division of Natural Areas and Preserves can provide assistance in confirming this type of wetland and its quality.	YES Wetland is a Category 3 wetland. Go to Question 11	NO Go to Question 11
11	**Relict Wet Prairies**. Is the wetland a relict wet prairie community dominated by some or all of the species in Table 1. Extensive prairies were formerly located in the Darby Plains (Madison and Union Counties), Sandusky Plains (Wyandot, Crawford, and Marion Counties), northwest Ohio (e.g. Erie, Huron, Lucas, Wood Counties), and portions of western Ohio Counties (e.g. Darke, Mercer, Miami, Montgomery, Van Wert etc.).	YES Wetland should be evaluated for possible Category 3 status Complete Quantitative Rating	NO Complete Quantitative Rating

Table 1. Characteristic plant species.

invasive/exotic spp	fen species	bog species	0ak Opening species	wet prairie species
Lythrum salicaria	*Zygadenus elegans var. glaucus*	*Calla palustris*	*Carex cryptolepis*	*Calamagrostis canadensis*
Myriophyllum spicatum	*Cacalia plantaginea*	*Carex atlantica var. capillacea*	*Carex lasiocarpa*	*Calamogrostis stricta*
Najas minor	*Carex flava*	*Carex echinata*	*Carex stricta*	*Carex atherodes*
Phalaris arundinacea	*Carex sterilis*	*Carex oligosperma*	*Cladium mariscoides*	*Carex buxbaumii*
Phragmites australis	*Carex stricta*	*Carex trisperma*	*Calamagrostis stricta*	*Carex pellita*
Potamogeton crispus	*Deschampsia caespitosa*	*Chamaedaphne calyculata*	*Calamagrostis canadensis*	*Carex sartwellii*
Ranunculus ficaria	*Eleocharis rostellata*	*Decodon verticillatus*	*Quercus palustris*	*Gentiana andrewsii*
Rhamnus frangula	*Eriophorum viridicarinatum*	*Eriophorum virginicum*		*Helianthus grosseserratus*
Typha angustifolia	*Gentianopsis spp.*	*Larix laricina*		*Liatris spicata*
Typha xglauca	*Lobelia kalmii*	*Nemopanthus mucronatus*		*Lysimachia quadriflora*
	Parnassia glauca	*Schechzeria palustris*		*Lythrum alatum*
	Potentilla fruticosa	*Sphagnum spp.*		*Pycnanthemum virginianum*
	Rhamnus alnifolia	*Vaccinium macrocarpon*		*Silphium terebinthinaceum*
	Rhynchospora capillacea	*Vaccinium corymbosum*		*Sorghastrum nutans*
	Salix candida	*Vaccinium oxycoccos*		*Spartina pectinata*
	Salix myricoides	*Woodwardia virginica*		*Solidago riddellii*
	Salix serissima	*Xyris difformis*		
	Solidago ohioensis			
	Tofieldia glutinosa			
	Triglochin maritimum			
	Triglochin palustre			

End of Narrative Rating. Begin Quantitative Rating on next page.

Site: Lordstown	Rater(s): J. Stratigakos	Date: 11/12/2014

2.0	2.0
max 6 pts.	subtotal

Metric 1. Wetland Area (size).

Select one size class and assign score.

2.0

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [x] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [x] <0.1 acres (0.04ha) (0 pts)

6.0	8.0
max 14 pts.	subtotal

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

2.0

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [x] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [ ] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [x] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

4.0

- [x] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrub land, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [x] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

4.0	12.0
max 30 pts.	subtotal

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

1.0

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [x] Precipitation (1)
- [ ] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

0.0

- [ ] 100 year floodplain (1)
- [ ] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

1.0

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [x] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

2.0

- [ ] Semi- to permanently inundated/saturated (4)
- [ ] Regularly inundated/saturated (3)
- [x] Seasonally inundated (2)
- [ ] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

7.0

- [ ] None or none apparent (12)
- [x] Recovered (7)
- [ ] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [ ] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [ ] filling/grading
- [x] road bed/RR track
- [ ] dredging
- [ ] other_____________________

14.0	26.0
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

3.0

- [ ] None or none apparent (4)
- [x] Recovered (3)
- [ ] Recovering (2)
- [ ] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

5.0

- [ ] Excellent (7)
- [ ] Very good (6)
- [x] Good (5)
- [ ] Moderately good (4)
- [ ] Fair (3)
- [ ] Poor to fair (2)
- [ ] Poor (1)

4c. Habitat alteration. Score one or double check and average.

6.0

- [ ] None or none apparent (9)
- [x] Recovered (6)
- [ ] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [ ] farming
- [ ] nutrient enrichment

26.0
subtotal this page

last revised 1 February 2001 jjm

Site: Lordstown	**Rater(s):** J. Stratigakos	**Date:** 11/12/2014

26.0
subtotal first page

5.0 | 31.0
max 10 pts. | subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

5.0

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [x] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Prairies (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

10.0 | 41.0
max 20 pts. | subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

3

- 0 Aquatic bed
- 0 Emergent
- 0 Shrub
- 3 Forest
- 0 Mudflats
- 0 Open water
- Other___________________

6b. horizontal (plan view) Interspersion.
Select only one.

3

- [ ] High (5)
- [ ] Moderately high(4)
- [x] Moderate (3)
- [ ] Moderately low (2)
- [ ] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

1

- [ ] Extensive >75% cover (-5)
- [ ] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- 1 Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

3

- Vegetated hummucks/tussucks
- 2 Coarse woody debris >15cm (6in)
- 1 Standing dead >25cm (10in) dbh
- Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

41.0

End of Quantitative Rating. Complete Categorization Worksheets.

ORAM Summary Worksheet

		circle answer or insert score	Result
Narrative Rating	Question 1 Critical Habitat	YES NO	If yes, Category 3.
	Question 2. Threatened or Endangered Species	YES NO	If yes, Category 3.
	Question 3. High Quality Natural Wetland	YES NO	If yes, Category 3.
	Question 4. Significant bird habitat	YES NO	If yes, Category 3.
	Question 5. Category 1 Wetlands	YES NO	If yes, Category 1.
	Question 6. Bogs	YES NO	If yes, Category 3.
	Question 7. Fens	YES NO	If yes, Category 3.
	Question 8a. Old Growth Forest	YES NO	If yes, Category 3.
	Question 8b. Mature Forested Wetland	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9b. Lake Erie Wetlands - Restricted	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9d. Lake Erie Wetlands – Unrestricted with native plants	YES NO	If yes, Category 3
	Question 9e. Lake Erie Wetlands - Unrestricted with invasive plants	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 10. Oak Openings	YES NO	If yes, Category 3
	Question 11. Relict Wet Prairies	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
Quantitative Rating	Metric 1. Size	2.00	
	Metric 2. Buffers and surrounding land use	6.00	
	Metric 3. Hydrology	4.00	
	Metric 4. Habitat	14.00	
	Metric 5. Special Wetland Communities	5.00	
	Metric 6. Plant communities, interspersion, microtopography	10.00	
	TOTAL SCORE	41.00	Category based on score breakpoints modified 2

Complete Wetland Categorization Worksheet.

Wetland Categorization Worksheet

Choices	Circle one		Evaluation of Categorization Result of ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 2, 3, 4, 6, 7, 8a, 9d, 10	YES Wetland is categorized as a Category 3 wetland	NO	Is quantitative rating score *less* than the Category 2 scoring threshold (*excluding* gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been over-categorized by the ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 1, 8b, 9b, 9e, 11	YES Wetland should be evaluated for possible Category 3 status	NO	Evaluate the wetland using the 1) narrative criteria in OAC Rule 3745-1-54(C) and 2) the quantitative rating score. If the wetland is determined to be a Category 3 wetland using either of these, it should be categorized as a Category 3 wetland. Detailed biological and/or functional assessments may also be used to determine the wetland's category.
Did you answer "Yes" to Narrative Rating No. 5	YES Wetland is categorized as a Category 1 wetland	NO	Is quantitative rating score *greater* than the Category 2 scoring threshold *(including* any gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been under-categorized by the ORAM
Does the quantitative score fall within the scoring range of a Category 1, 2, or 3 wetland?	YES Wetland is assigned to the appropriate category based on the scoring range	NO	If the score of the wetland is located within the scoring range for a particular category, the wetland should be assigned to that category. In all instances however, the narrative criteria described in OAC Rule 3745-1-54(C) can be used to clarify or change a categorization based on a quantitative score.
Does the quantitative score fall with the *"gray zone"* for Category 1 or 2 or Category 2 or 3 wetlands?	YES Wetland is assigned to the higher of the two categories or assigned to a category based on detailed assessments and the narrative criteria	NO	Rater has the option of assigning the wetland to the higher of the two categories or to assign a category based on the results of a nonrapid wetland assessment method, e.g. functional assessment, biological assessment, etc, and a consideration of the narrative criteria in OAC rule 3745-1-54(C).
Does the wetland otherwise exhibit *moderate OR superior* hydrologic OR habitat, OR recreational functions AND the wetland was *not* categorized as a Category 2 wetland (in the case of moderate functions) or a Category 3 wetland (in the case of superior functions) by this method?	YES Wetland was undercategorized by this method. A written justification for recategorization should be provided on Background Information Form	NO Wetland is assigned to category as determined by the ORAM.	A wetland may be undercategorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54(C)(2) and (3) are controlling, and the under-categorization should be corrected. A written justification with supporting reasons or information for this determination should be provided.

Final Category

Choose one	Category 1	Category 2	Category 3

End of Ohio Rapid Assessment Method for Wetlands.

<table>
<tr><td rowspan="2">Version 5.0</td><td colspan="2">Ohio Rapid Assessment Method for Wetlands
10 Page Form for Wetland Categorization</td></tr>
<tr><td>Background Information
Scoring Boundary Worksheet
Narrative Rating
Field Form Quantitative Rating
ORAM Summary Worksheet
Wetland Categorization Worksheet</td><td>Ohio EPA, Division of Surface Water
Final: February 1, 2001</td></tr>
</table>

Instructions

The investigator is *STRONGLY URGED* to read the Manual for Using the Ohio Rapid Assessment Method for Wetlands for further elaboration and discussion of the questions below prior to using the rating forms.

The Narrative Rating is designed to categorize a wetland or to provide alerts to the Rater based on the presence or possible presence of threatened or endangered species. The presence or proximity of such species is often an indicator of the quality and lack of disturbance of the wetland being evaluated. In addition, it is designed to categorize certain wetlands as very low quality (Category 1) or very high quality (Category 3) regardless of the wetland's score on the Quantitative Rating. In addition, the Narrative Rating also alerts the investigator that a particular wetland *may* be a Category 3 wetland, again, regardless of the wetland's score on the Quantitative Rating.

It is *VERY IMPORTANT* to properly and thoroughly answer each of the questions in the ORAM in order to properly categorize a wetland. To *properly* answer all the questions, the boundaries of the wetland being assessed must be correctly identified. Refer to Scoring Boundary worksheet and the User's Manual for a discussion of how to determine the "scoring boundaries." In some instances, the scoring boundaries may differ from the "jurisdictional boundaries."

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories. The most recent version of this document is posted on Ohio EPA's Division of Surface Water web page at: http://www.epa.ohio.gov/dsw/wetlands/WetlandEcologySection.aspx

Background Information

Name:	Jessica Stratigakos
Date:	11/6/2014
Affiliation:	The Mannik & Smith Group
Address:	23225 Mercantile Road, Beachwood Ohio 44122
Phone Number:	216-378-1490
e-mail address:	jstratigakos@manniksmithgroup.com
Name of Wetland:	Wetland C and Wetland D
Vegetation Communit(ies):	Shrub
HGM Class(es):	Depressional

Location of Wetland: include map, address, north arrow, landmarks, distances, roads, etc.

See Attached Map

Lat/Long or UTM Coordinate	41.151359, -80.838303
USGS Quad Name	Warren
County	Trumbull
Township	Montgomery
Section and Subsection	S22 T22N R16W
Hydrologic Unit Code	050400020605
Site Visit	11/12/2014
National Wetland Inventory Map	None
Ohio Wetland Inventory Map	None
Soil Survey	Mahoning silt loam
Delineation report/map	See Fig. 3

Name of Wetland: Wetland C and Wetland D	
Wetland Size (acres, hectares):	0.435
Sketch: Include north arrow, relationship with other surface waters, vegetation zones, etc.	
Comments, Narrative Discussion, Justification of Category Changes: None	
Final score : 21 **Category:**	1

Scoring Boundary Worksheet

INSTRUCTIONS. The initial step in completing the ORAM is to identify the "scoring boundaries" of the wetland being rated. In many instances this determination will be relatively easy and the scoring boundaries will coincide with the "jurisdictional boundaries." For example, the scoring boundary of an isolated cattail marsh located in the middle of a farm field will likely be the same as that wetland's jurisdictional boundaries. In other instances, however, the scoring boundary will not be as easily determined. Wetlands that are small or isolated from other surface waters often form large contiguous areas or heterogeneous complexes of wetland and upland. In separating wetlands for scoring purposes, the hydrologic regime of the wetland is the main criterion that should be used. Boundaries between contiguous or connected wetlands should be established where the volume, flow, or velocity of water moving through the wetland changes significantly. *Areas with a high degree of hydrologic interaction should be scored as a single wetland*. In determining a wetland's scoring boundaries, use the guidelines in the ORAM Manual Section 5.0. In certain instances, it may be difficult to establish the scoring boundary for the wetland being rated. These problem situations include wetlands that form a patchwork on the landscape, wetlands divided by artificial boundaries like property fences, roads, or railroad embankments, wetlands that are contiguous with streams, lakes, or rivers, and estuarine or coastal wetlands. These situations are discussed below, however, it is recommended that Rater contact Ohio EPA, Division of Surface Water, 401/Wetlands Section if there are additional questions or a need for further clarification of the appropriate scoring boundaries of a particular wetland.

#	Steps in properly establishing scoring boundaries	done?	not applicable
Step 1	Identify the wetland area of interest. This may be the site of a proposed impact, a reference site, conservation site, etc.	✓	
Step 2	Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both natural and human-induced changes including, constrictions caused by berms or dikes, points where the water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic interaction between the wetlands or parts of a single wetland.	✓	
Step 3	Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within the areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction are included within the scoring boundary.	✓	
Step 4	Determine if artificial boundaries, such as property lines, state lines, roads, railroad embankments, etc., are present. These should not be used to establish scoring boundaries unless they coincide with areas where the hydrologic regime changes.	✓	
Step 5	In all instances, the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.	✓	
Step 6	Consult ORAM Manual Section 5.0 for how to establish scoring boundaries for wetlands that form a patchwork on the landscape, divided by artificial boundaries, contiguous to streams, lakes or rivers, or for dual classifications.	✓	

End of Scoring Boundary Determination. Begin Narrative Rating on next page.

Narrative Rating

INSTRUCTIONS. Answer each of the following questions. Questions 1, 2, 3 and 4 should be answered based on information obtained from the site visit or the literature *and* by submitting a Data Services Request to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Data Services, 1889 Fountain Square Court, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/dnap . The remaining questions are designed to be answered primarily by the results of the site visit. Refer to the User's Manual for descriptions of these wetland types. Note: "Critical habitat" is legally defined in the Endangered Species Act and is the geographic area containing physical or biological features essential to the conservation of a listed species or as an area that may require special management considerations or protection. The Rater should contact the Region 3 Headquarters or the Columbus Ecological Services Office for updates as to whether critical habitat has been designated for other federally listed threatened or endangered species. "Documented" means the wetland is listed in the appropriate State of Ohio database.

#	Question	Circle one	
1	**Critical Habitat.** Is the wetland in a township, section, or subsection of a United States Geological Survey 7.5 minute Quadrangle that has been designated by the U.S. Fish and Wildlife Service as "critical habitat" for any threatened or endangered plant or animal species? Note: as of January 1, 2001, of the federally listed endangered or threatened species which can be found in Ohio, the Indiana Bat has had critical habitat designated (50 CFR 17.95(a)) and the piping plover has had critical habitat proposed (65 FR 41812 July 6, 2000).	YES Wetland should be evaluated for possible Category 3 status Go to Question 2	NO Go to Question 2
2	**Threatened or Endangered Species.** Is the wetland known to contain an individual of, or documented occurrences of federal or state-listed threatened or endangered plant or animal species?	YES Wetland is a Category 3 wetland. Go to Question 3	NO Go to Question 3
3	**Documented High Quality Wetland.** Is the wetland on record in Natural Heritage Database as a high quality wetland?	YES Wetland is a Category 3 wetland Go to Question 4	NO Go to Question 4
4	**Significant Breeding or Concentration Area.** Does the wetland contain documented regionally significant breeding or nonbreeding waterfowl, neotropical songbird, or shorebird concentration areas?	YES Wetland is a Category 3 wetland Go to Question 5	NO Go to Question 5
5	**Category 1 Wetlands.** Is the wetland less than 0.5 hectares (1 acre) in size and **hydrologically isolated** and either 1) comprised of vegetation that is dominated (greater than eighty per cent areal cover) by *Phalaris arundinacea, Lythrum salicaria,* or *Phragmites australis*, or 2) an acidic pond created or excavated on mined lands that has little or no vegetation?	YES Wetland is a Category 1 wetland Go to Question 6	NO Go to Question 6
6	**Bogs.** Is the wetland a peat-accumulating wetland that 1) has no significant inflows or outflows, 2) supports acidophilic mosses, particularly *Sphagnum* spp., 3) the acidophilic mosses have >30% cover, 4) at least one species from Table 1 is present, and 5) the cover of invasive species (see Table 1) is <25%?	YES Wetland is a Category 3 wetland Go to Question 7	NO Go to Question 7
7	**Fens.** Is the wetland a carbon accumulating (peat, muck) wetland that is saturated during most of the year, primarily by a discharge of free flowing, mineral rich, ground water with a circumneutral ph (5.5-9.0) and with one or more plant species listed in Table 1 and the cover of invasive species listed in Table 1 is <25%?	YES Wetland is a Category 3 wetland Go to Question 8a	NO Go to Question 8a
8a	**"Old Growth Forest."** Is the wetland a forested wetland and is the forest characterized by, but not limited to, the following characteristics: overstory canopy trees of great age (exceeding at least 50% of a projected maximum attainable age for a species); little or no evidence of human-caused understory disturbance during the past 80 to 100 years; an all-aged structure and multilayered canopies; aggregations of canopy trees interspersed with canopy gaps; and significant numbers of standing dead snags and downed logs?	YES Wetland is a Category 3 wetland. Go to Question 8b	NO Go to Question 8b

8b	**Mature forested wetlands**. Is the wetland a forested wetland with 50% or more of the cover of upper forest canopy consisting of deciduous trees with large diameters at breast height (dbh), generally diameters greater than 45cm (17.7in) dbh?	YES Wetland should be evaluated for possible Category 3 status. Go to Question 9a	NO Go to Question 9a
9a	**Lake Erie coastal and tributary wetlands**. Is the wetland located at an elevation less than 575 feet on the USGS map, adjacent to this elevation, or along a tributary to Lake Erie that is accessible to fish?	YES Go to Question 9b	NO Go to Question 10
9b	Does the wetland's hydrology result from measures designed to prevent erosion and the loss of aquatic plants, i.e. the wetland is partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 9c
9c	Are Lake Erie water levels the wetland's primary hydrological influence, i.e. the wetland is hydrologically unrestricted (no lakeward or upland border alterations), or the wetland can be characterized as an "estuarine" wetland with lake and river influenced hydrology. These include sandbar deposition wetlands, estuarine wetlands, river mouth wetlands, or those dominated by submersed aquatic vegetation.	YES Go to Question 9d	NO Go to Question 10
9d	Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant native species can also be present?	YES Wetland is a Category 3 wetland Go to Question 10	NO Go to Question 9e
9e	Does the wetland have a predominance of non-native or disturbance tolerant native plant species within its vegetation communities?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 10
10	**Lake Plain Sand Prairies (Oak Openings)** Is the wetland located in Lucas, Fulton, Henry, or Wood Counties and can the wetland be characterized by the following description: the wetland has a sandy substrate with interspersed organic matter, a water table often within several inches of the surface, and often with a dominance of the gramineous vegetation listed in Table 1 (woody species may also be present). The Ohio Department of Natural Resources Division of Natural Areas and Preserves can provide assistance in confirming this type of wetland and its quality.	YES Wetland is a Category 3 wetland. Go to Question 11	NO Go to Question 11
11	**Relict Wet Prairies**. Is the wetland a relict wet prairie community dominated by some or all of the species in Table 1. Extensive prairies were formerly located in the Darby Plains (Madison and Union Counties), Sandusky Plains (Wyandot, Crawford, and Marion Counties), northwest Ohio (e.g. Erie, Huron, Lucas, Wood Counties), and portions of western Ohio Counties (e.g. Darke, Mercer, Miami, Montgomery, Van Wert etc.).	YES Wetland should be evaluated for possible Category 3 status Complete Quantitative Rating	NO Complete Quantitative Rating

Table 1. Characteristic plant species.

invasive/exotic spp	fen species	bog species	0ak Opening species	wet prairie species
Lythrum salicaria	*Zygadenus elegans var. glaucus*	*Calla palustris*	*Carex cryptolepis*	*Calamagrostis canadensis*
Myriophyllum spicatum	*Cacalia plantaginea*	*Carex atlantica var. capillacea*	*Carex lasiocarpa*	*Calamogrostis stricta*
Najas minor	*Carex flava*	*Carex echinata*	*Carex stricta*	*Carex atherodes*
Phalaris arundinacea	*Carex sterilis*	*Carex oligosperma*	*Cladium mariscoides*	*Carex buxbaumii*
Phragmites australis	*Carex stricta*	*Carex trisperma*	*Calamagrostis stricta*	*Carex pellita*
Potamogeton crispus	*Deschampsia caespitosa*	*Chamaedaphne calyculata*	*Calamagrostis canadensis*	*Carex sartwellii*
Ranunculus ficaria	*Eleocharis rostellata*	*Decodon verticillatus*	*Quercus palustris*	*Gentiana andrewsii*
Rhamnus frangula	*Eriophorum viridicarinatum*	*Eriophorum virginicum*		*Helianthus grosseserratus*
Typha angustifolia	*Gentianopsis spp.*	*Larix laricina*		*Liatris spicata*
Typha xglauca	*Lobelia kalmii*	*Nemopanthus mucronatus*		*Lysimachia quadriflora*
	Parnassia glauca	*Schechzeria palustris*		*Lythrum alatum*
	Potentilla fruticosa	*Sphagnum spp.*		*Pycnanthemum virginianum*
	Rhamnus alnifolia	*Vaccinium macrocarpon*		*Silphium terebinthinaceum*
	Rhynchospora capillacea	*Vaccinium corymbosum*		*Sorghastrum nutans*
	Salix candida	*Vaccinium oxycoccos*		*Spartina pectinata*
	Salix myricoides	*Woodwardia virginica*		*Solidago riddellii*
	Salix serissima	*Xyris difformis*		
	Solidago ohioensis			
	Tofieldia glutinosa			
	Triglochin maritimum			
	Triglochin palustre			

End of Narrative Rating. Begin Quantitative Rating on next page.

Site: Lordstown	**Rater(s):** J. Stratigakos	**Date:** 11/6/2014

2.0	2.0
max 6 pts.	subtotal

Metric 1. Wetland Area (size).

Select one size class and assign score.

2.0

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [x] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

4.0	6.0
max 14 pts.	subtotal

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

1.0

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [ ] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [x] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

3.0

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrub land, young second growth forest. (5)
- [x] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [ ] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

3.0	9.0
max 30 pts.	subtotal

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

1.0

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [x] Precipitation (1)
- [ ] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

0.0

- [ ] 100 year floodplain (1)
- [ ] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

1.0

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [x] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

1.0

- [ ] Semi- to permanently inundated/saturated (4)
- [ ] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [x] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

3.0

- [ ] None or none apparent (12)
- [ ] Recovered (7)
- [x] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [ ] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [ ] filling/grading
- [x] road bed/RR track
- [ ] dredging
- [ ] other____________________

8.0	17.0
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

2.0

- [ ] None or none apparent (4)
- [ ] Recovered (3)
- [x] Recovering (2)
- [ ] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

3.0

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [x] Fair (3)
- [ ] Poor to fair (2)
- [ ] Poor (1)

4c. Habitat alteration. Score one or double check and average.

3.0

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [x] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [ ] farming
- [ ] nutrient enrichment

17.0
subtotal this page

last revised 1 February 2001 jjm

Site: Lordstown	Rater(s): J. Stratigakos	Date: 11/6/2014

17.0
subtotal first page

0.0	17.0
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

0.0

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Prairies (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

4.0	21.0
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

3

- 0 Aquatic bed
- 2 Emergent
- 1 Shrub
- 0 Forest
- 0 Mudflats
- 0 Open water
- 0 Other___________________

6b. horizontal (plan view) Interspersion.
Select only one.

2

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [x] Moderately low (2)
- [ ] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

-1

- [ ] Extensive >75% cover (-5)
- [ ] Moderate 25-75% cover (-3)
- 1 Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [ ] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

0

- 0 Vegetated hummucks/tussucks
- 0 Coarse woody debris >15cm (6in)
- 0 Standing dead >25cm (10in) dbh
- 0 Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

21.0

End of Quantitative Rating. Complete Categorization Worksheets.

ORAM Summary Worksheet

		circle answer or insert score	Result
Narrative Rating	Question 1 Critical Habitat	YES NO	If yes, Category 3.
	Question 2. Threatened or Endangered Species	YES NO	If yes, Category 3.
	Question 3. High Quality Natural Wetland	YES NO	If yes, Category 3.
	Question 4. Significant bird habitat	YES NO	If yes, Category 3.
	Question 5. Category 1 Wetlands	YES NO	If yes, Category 1.
	Question 6. Bogs	YES NO	If yes, Category 3.
	Question 7. Fens	YES NO	If yes, Category 3.
	Question 8a. Old Growth Forest	YES NO	If yes, Category 3.
	Question 8b. Mature Forested Wetland	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9b. Lake Erie Wetlands - Restricted	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9d. Lake Erie Wetlands – Unrestricted with native plants	YES NO	If yes, Category 3
	Question 9e. Lake Erie Wetlands - Unrestricted with invasive plants	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 10. Oak Openings	YES NO	If yes, Category 3
	Question 11. Relict Wet Prairies	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
Quantitative Rating	Metric 1. Size	2.00	
	Metric 2. Buffers and surrounding land use	4.00	
	Metric 3. Hydrology	3.00	
	Metric 4. Habitat	8.00	
	Metric 5. Special Wetland Communities	0.00	
	Metric 6. Plant communities, interspersion, microtopography	4.00	
	TOTAL SCORE	21.00	Category based on score breakpoints 1

Complete Wetland Categorization Worksheet.

Wetland Categorization Worksheet

Choices	Circle one		Evaluation of Categorization Result of ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 2, 3, 4, 6, 7, 8a, 9d, 10	YES Wetland is categorized as a Category 3 wetland	NO	Is quantitative rating score *less* than the Category 2 scoring threshold (*excluding* gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been over-categorized by the ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 1, 8b, 9b, 9e, 11	YES Wetland should be evaluated for possible Category 3 status	NO	Evaluate the wetland using the 1) narrative criteria in OAC Rule 3745-1-54(C) and 2) the quantitative rating score. If the wetland is determined to be a Category 3 wetland using either of these, it should be categorized as a Category 3 wetland. Detailed biological and/or functional assessments may also be used to determine the wetland's category.
Did you answer "Yes" to Narrative Rating No. 5	YES Wetland is categorized as a Category 1 wetland	NO	Is quantitative rating score *greater* than the Category 2 scoring threshold *(including* any gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been under-categorized by the ORAM
Does the quantitative score fall within the scoring range of a Category 1, 2, or 3 wetland?	YES Wetland is assigned to the appropriate category based on the scoring range	NO	If the score of the wetland is located within the scoring range for a particular category, the wetland should be assigned to that category. In all instances however, the narrative criteria described in OAC Rule 3745-1-54(C) can be used to clarify or change a categorization based on a quantitative score.
Does the quantitative score fall with the *"gray zone"* for Category 1 or 2 or Category 2 or 3 wetlands?	YES Wetland is assigned to the higher of the two categories or assigned to a category based on detailed assessments and the narrative criteria	NO	Rater has the option of assigning the wetland to the higher of the two categories or to assign a category based on the results of a nonrapid wetland assessment method, e.g. functional assessment, biological assessment, etc, and a consideration of the narrative criteria in OAC rule 3745-1-54(C).
Does the wetland otherwise exhibit *moderate OR superior* hydrologic OR habitat, OR recreational functions AND the wetland was *not* categorized as a Category 2 wetland (in the case of moderate functions) or a Category 3 wetland (in the case of superior functions) by this method?	YES Wetland was undercategorized by this method. A written justification for recategorization should be provided on Background Information Form	NO Wetland is assigned to category as determined by the ORAM.	A wetland may be undercategorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54(C)(2) and (3) are controlling, and the under-categorization should be corrected. A written justification with supporting reasons or information for this determination should be provided.

Final Category

Choose one	Category 1	Category 2	Category 3

End of Ohio Rapid Assessment Method for Wetlands.

<table>
<tr><td rowspan="2">Version 5.0</td><td colspan="2">Ohio Rapid Assessment Method for Wetlands
10 Page Form for Wetland Categorization</td></tr>
<tr><td>Background Information
Scoring Boundary Worksheet
Narrative Rating
Field Form Quantitative Rating
ORAM Summary Worksheet
Wetland Categorization Worksheet</td><td>Ohio EPA, Division of Surface Water
Final: February 1, 2001</td></tr>
</table>

Instructions

The investigator is *STRONGLY URGED* to read the Manual for Using the Ohio Rapid Assessment Method for Wetlands for further elaboration and discussion of the questions below prior to using the rating forms.

The Narrative Rating is designed to categorize a wetland or to provide alerts to the Rater based on the presence or possible presence of threatened or endangered species. The presence or proximity of such species is often an indicator of the quality and lack of disturbance of the wetland being evaluated. In addition, it is designed to categorize certain wetlands as very low quality (Category 1) or very high quality (Category 3) regardless of the wetland's score on the Quantitative Rating. In addition, the Narrative Rating also alerts the investigator that a particular wetland *may* be a Category 3 wetland, again, regardless of the wetland's score on the Quantitative Rating.

It is *VERY IMPORTANT* to properly and thoroughly answer each of the questions in the ORAM in order to properly categorize a wetland. To *properly* answer all the questions, the boundaries of the wetland being assessed must be correctly identified. Refer to Scoring Boundary worksheet and the User's Manual for a discussion of how to determine the "scoring boundaries." In some instances, the scoring boundaries may differ from the "jurisdictional boundaries."

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories. The most recent version of this document is posted on Ohio EPA's Division of Surface Water web page at: http://www.epa.ohio.gov/dsw/wetlands/WetlandEcologySection.aspx

Background Information

Name:	Jessica Stratigakos
Date:	11/7/2014
Affiliation:	The Mannik & Smith Group
Address:	23225 Mercantile Road, Beachwood Ohio 44122
Phone Number:	216-378-1490
e-mail address:	jstratigakos@manniksmithgroup.com
Name of Wetland:	Wetland E
Vegetation Communit(ies):	Emergent
HGM Class(es):	Depressional

Location of Wetland: include map, address, north arrow, landmarks, distances, roads, etc.

See Attached Map

Lat/Long or UTM Coordinate	41.151202, -80.838582
USGS Quad Name	Warren
County	Trumbull
Township	Montgomery
Section and Subsection	S22 T22N R16W
Hydrologic Unit Code	050400020605
Site Visit	11/7/2014
National Wetland Inventory Map	None
Ohio Wetland Inventory Map	None
Soil Survey	Holly silt loam
Delineation report/map	See Fig. 3

Name of Wetland: Wetland E	
Wetland Size (acres, hectares):	0.632
Sketch: Include north arrow, relationship with other surface waters, vegetation zones, etc. See attached Figure 3	
Comments, Narrative Discussion, Justification of Category Changes: None	
Final score : 39 **Category:**	modified 2

Scoring Boundary Worksheet

INSTRUCTIONS. The initial step in completing the ORAM is to identify the "scoring boundaries" of the wetland being rated. In many instances this determination will be relatively easy and the scoring boundaries will coincide with the "jurisdictional boundaries." For example, the scoring boundary of an isolated cattail marsh located in the middle of a farm field will likely be the same as that wetland's jurisdictional boundaries. In other instances, however, the scoring boundary will not be as easily determined. Wetlands that are small or isolated from other surface waters often form large contiguous areas or heterogeneous complexes of wetland and upland. In separating wetlands for scoring purposes, the hydrologic regime of the wetland is the main criterion that should be used. Boundaries between contiguous or connected wetlands should be established where the volume, flow, or velocity of water moving through the wetland changes significantly. *Areas with a high degree of hydrologic interaction should be scored as a single wetland*. In determining a wetland's scoring boundaries, use the guidelines in the ORAM Manual Section 5.0. In certain instances, it may be difficult to establish the scoring boundary for the wetland being rated. These problem situations include wetlands that form a patchwork on the landscape, wetlands divided by artificial boundaries like property fences, roads, or railroad embankments, wetlands that are contiguous with streams, lakes, or rivers, and estuarine or coastal wetlands. These situations are discussed below, however, it is recommended that Rater contact Ohio EPA, Division of Surface Water, 401/Wetlands Section if there are additional questions or a need for further clarification of the appropriate scoring boundaries of a particular wetland.

#	Steps in properly establishing scoring boundaries	done?	not applicable
Step 1	Identify the wetland area of interest. This may be the site of a proposed impact, a reference site, conservation site, etc.	✓	
Step 2	Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both natural and human-induced changes including, constrictions caused by berms or dikes, points where the water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic interaction between the wetlands or parts of a single wetland.	✓	
Step 3	Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within the areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction are included within the scoring boundary.	✓	
Step 4	Determine if artificial boundaries, such as property lines, state lines, roads, railroad embankments, etc., are present. These should not be used to establish scoring boundaries unless they coincide with areas where the hydrologic regime changes.	✓	
Step 5	In all instances, the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.	✓	
Step 6	Consult ORAM Manual Section 5.0 for how to establish scoring boundaries for wetlands that form a patchwork on the landscape, divided by artificial boundaries, contiguous to streams, lakes or rivers, or for dual classifications.	✓	

End of Scoring Boundary Determination. Begin Narrative Rating on next page.

Narrative Rating

INSTRUCTIONS. Answer each of the following questions. Questions 1, 2, 3 and 4 should be answered based on information obtained from the site visit or the literature *and* by submitting a Data Services Request to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Data Services, 1889 Fountain Square Court, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/dnap . The remaining questions are designed to be answered primarily by the results of the site visit. Refer to the User's Manual for descriptions of these wetland types. Note: "Critical habitat" is legally defined in the Endangered Species Act and is the geographic area containing physical or biological features essential to the conservation of a listed species or as an area that may require special management considerations or protection. The Rater should contact the Region 3 Headquarters or the Columbus Ecological Services Office for updates as to whether critical habitat has been designated for other federally listed threatened or endangered species. "Documented" means the wetland is listed in the appropriate State of Ohio database.

#	Question	Circle one	
1	**Critical Habitat.** Is the wetland in a township, section, or subsection of a United States Geological Survey 7.5 minute Quadrangle that has been designated by the U.S. Fish and Wildlife Service as "critical habitat" for any threatened or endangered plant or animal species? Note: as of January 1, 2001, of the federally listed endangered or threatened species which can be found in Ohio, the Indiana Bat has had critical habitat designated (50 CFR 17.95(a)) and the piping plover has had critical habitat proposed (65 FR 41812 July 6, 2000).	YES Wetland should be evaluated for possible Category 3 status Go to Question 2	NO Go to Question 2
2	**Threatened or Endangered Species.** Is the wetland known to contain an individual of, or documented occurrences of federal or state-listed threatened or endangered plant or animal species?	YES Wetland is a Category 3 wetland. Go to Question 3	NO Go to Question 3
3	**Documented High Quality Wetland.** Is the wetland on record in Natural Heritage Database as a high quality wetland?	YES Wetland is a Category 3 wetland Go to Question 4	NO Go to Question 4
4	**Significant Breeding or Concentration Area.** Does the wetland contain documented regionally significant breeding or nonbreeding waterfowl, neotropical songbird, or shorebird concentration areas?	YES Wetland is a Category 3 wetland Go to Question 5	NO Go to Question 5
5	**Category 1 Wetlands.** Is the wetland less than 0.5 hectares (1 acre) in size and **hydrologically isolated** and either 1) comprised of vegetation that is dominated (greater than eighty per cent areal cover) by *Phalaris arundinacea, Lythrum salicaria,* or *Phragmites australis*, or 2) an acidic pond created or excavated on mined lands that has little or no vegetation?	YES Wetland is a Category 1 wetland Go to Question 6	NO Go to Question 6
6	**Bogs.** Is the wetland a peat-accumulating wetland that 1) has no significant inflows or outflows, 2) supports acidophilic mosses, particularly *Sphagnum* spp., 3) the acidophilic mosses have >30% cover, 4) at least one species from Table 1 is present, and 5) the cover of invasive species (see Table 1) is <25%?	YES Wetland is a Category 3 wetland Go to Question 7	NO Go to Question 7
7	**Fens.** Is the wetland a carbon accumulating (peat, muck) wetland that is saturated during most of the year, primarily by a discharge of free flowing, mineral rich, ground water with a circumneutral ph (5.5-9.0) and with one or more plant species listed in Table 1 and the cover of invasive species listed in Table 1 is <25%?	YES Wetland is a Category 3 wetland Go to Question 8a	NO Go to Question 8a
8a	**"Old Growth Forest."** Is the wetland a forested wetland and is the forest characterized by, but not limited to, the following characteristics: overstory canopy trees of great age (exceeding at least 50% of a projected maximum attainable age for a species); little or no evidence of human-caused understory disturbance during the past 80 to 100 years; an all-aged structure and multilayered canopies; aggregations of canopy trees interspersed with canopy gaps; and significant numbers of standing dead snags and downed logs?	YES Wetland is a Category 3 wetland. Go to Question 8b	NO Go to Question 8b

8b	**Mature forested wetlands**. Is the wetland a forested wetland with 50% or more of the cover of upper forest canopy consisting of deciduous trees with large diameters at breast height (dbh), generally diameters greater than 45cm (17.7in) dbh?	YES Wetland should be evaluated for possible Category 3 status. Go to Question 9a	NO Go to Question 9a
9a	**Lake Erie coastal and tributary wetlands**. Is the wetland located at an elevation less than 575 feet on the USGS map, adjacent to this elevation, or along a tributary to Lake Erie that is accessible to fish?	YES Go to Question 9b	NO Go to Question 10
9b	Does the wetland's hydrology result from measures designed to prevent erosion and the loss of aquatic plants, i.e. the wetland is partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 9c
9c	Are Lake Erie water levels the wetland's primary hydrological influence, i.e. the wetland is hydrologically unrestricted (no lakeward or upland border alterations), or the wetland can be characterized as an "estuarine" wetland with lake and river influenced hydrology. These include sandbar deposition wetlands, estuarine wetlands, river mouth wetlands, or those dominated by submersed aquatic vegetation.	YES Go to Question 9d	NO Go to Question 10
9d	Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant native species can also be present?	YES Wetland is a Category 3 wetland Go to Question 10	NO Go to Question 9e
9e	Does the wetland have a predominance of non-native or disturbance tolerant native plant species within its vegetation communities?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 10
10	**Lake Plain Sand Prairies (Oak Openings)** Is the wetland located in Lucas, Fulton, Henry, or Wood Counties and can the wetland be characterized by the following description: the wetland has a sandy substrate with interspersed organic matter, a water table often within several inches of the surface, and often with a dominance of the gramineous vegetation listed in Table 1 (woody species may also be present). The Ohio Department of Natural Resources Division of Natural Areas and Preserves can provide assistance in confirming this type of wetland and its quality.	YES Wetland is a Category 3 wetland. Go to Question 11	NO Go to Question 11
11	**Relict Wet Prairies**. Is the wetland a relict wet prairie community dominated by some or all of the species in Table 1. Extensive prairies were formerly located in the Darby Plains (Madison and Union Counties), Sandusky Plains (Wyandot, Crawford, and Marion Counties), northwest Ohio (e.g. Erie, Huron, Lucas, Wood Counties), and portions of western Ohio Counties (e.g. Darke, Mercer, Miami, Montgomery, Van Wert etc.).	YES Wetland should be evaluated for possible Category 3 status Complete Quantitative Rating	NO Complete Quantitative Rating

Table 1. Characteristic plant species.

invasive/exotic spp	fen species	bog species	0ak Opening species	wet prairie species
Lythrum salicaria	*Zygadenus elegans var. glaucus*	*Calla palustris*	*Carex cryptolepis*	*Calamagrostis canadensis*
Myriophyllum spicatum	*Cacalia plantaginea*	*Carex atlantica var. capillacea*	*Carex lasiocarpa*	*Calamogrostis stricta*
Najas minor	*Carex flava*	*Carex echinata*	*Carex stricta*	*Carex atherodes*
Phalaris arundinacea	*Carex sterilis*	*Carex oligosperma*	*Cladium mariscoides*	*Carex buxbaumii*
Phragmites australis	*Carex stricta*	*Carex trisperma*	*Calamagrostis stricta*	*Carex pellita*
Potamogeton crispus	*Deschampsia caespitosa*	*Chamaedaphne calyculata*	*Calamagrostis canadensis*	*Carex sartwellii*
Ranunculus ficaria	*Eleocharis rostellata*	*Decodon verticillatus*	*Quercus palustris*	*Gentiana andrewsii*
Rhamnus frangula	*Eriophorum viridicarinatum*	*Eriophorum virginicum*		*Helianthus grosseserratus*
Typha angustifolia	*Gentianopsis spp.*	*Larix laricina*		*Liatris spicata*
Typha xglauca	*Lobelia kalmii*	*Nemopanthus mucronatus*		*Lysimachia quadriflora*
	Parnassia glauca	*Schechzeria palustris*		*Lythrum alatum*
	Potentilla fruticosa	*Sphagnum spp.*		*Pycnanthemum virginianum*
	Rhamnus alnifolia	*Vaccinium macrocarpon*		*Silphium terebinthinaceum*
	Rhynchospora capillacea	*Vaccinium corymbosum*		*Sorghastrum nutans*
	Salix candida	*Vaccinium oxycoccos*		*Spartina pectinata*
	Salix myricoides	*Woodwardia virginica*		*Solidago riddellii*
	Salix serissima	*Xyris difformis*		
	Solidago ohioensis			
	Tofieldia glutinosa			
	Triglochin maritimum			
	Triglochin palustre			

End of Narrative Rating. Begin Quantitative Rating on next page.

Site: Lordstown	**Rater(s):** J. Stratigakos	**Date:** 11/7/2014

2.0	2.0
max 6 pts.	subtotal

Metric 1. Wetland Area (size).

Select one size class and assign score.

2.0

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [x] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

9.0	11.0
max 14 pts.	subtotal

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

4.0

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [x] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [ ] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

5.0

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [x] LOW. Old field (>10 years), shrub land, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [ ] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

11.0	22.0
max 30 pts.	subtotal

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

6.0

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [x] Precipitation (1)
- [ ] Seasonal/Intermittent surface water (3)
- [x] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

1.0

- [x] 100 year floodplain (1)
- [x] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

1.0

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [x] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

3.0

- [ ] Semi- to permanently inundated/saturated (4)
- [x] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [ ] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

3.0

- [ ] None or none apparent (12)
- [ ] Recovered (7)
- [x] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [ ] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [ ] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [ ] other____________________

10.0	32.0
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

2.0

- [ ] None or none apparent (4)
- [ ] Recovered (3)
- [x] Recovering (2)
- [ ] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

5.0

- [ ] Excellent (7)
- [ ] Very good (6)
- [x] Good (5)
- [ ] Moderately good (4)
- [ ] Fair (3)
- [ ] Poor to fair (2)
- [ ] Poor (1)

4c. Habitat alteration. Score one or double check and average.

3.0

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [x] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [x] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [ ] farming
- [ ] nutrient enrichment

32.0
subtotal this page

last revised 1 February 2001 jjm

Site: Lordstown	Rater(s): J. Stratigakos	Date: 11/7/2014

32.0
subtotal first page

0.0	32.0
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

0.0

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Prairies (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

7.0	39.0
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

5

- 0 Aquatic bed
- 2 Emergent
- 1 Shrub
- 0 Forest
- 0 Mudflats
- 2 Open water
- 0 Other___________________

6b. horizontal (plan view) Interspersion.
Select only one.

2

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [x] Moderately low (2)
- [ ] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

-3

- [ ] Extensive >75% cover (-5)
- -3 Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [ ] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

3

- 0 Vegetated hummucks/tussucks
- 2 Coarse woody debris >15cm (6in)
- 1 Standing dead >25cm (10in) dbh
- 0 Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

39.0

End of Quantitative Rating. Complete Categorization Worksheets.

ORAM Summary Worksheet

		circle answer or insert score	Result
Narrative Rating	Question 1 Critical Habitat	YES NO	If yes, Category 3.
	Question 2. Threatened or Endangered Species	YES NO	If yes, Category 3.
	Question 3. High Quality Natural Wetland	YES NO	If yes, Category 3.
	Question 4. Significant bird habitat	YES NO	If yes, Category 3.
	Question 5. Category 1 Wetlands	YES NO	If yes, Category 1.
	Question 6. Bogs	YES NO	If yes, Category 3.
	Question 7. Fens	YES NO	If yes, Category 3.
	Question 8a. Old Growth Forest	YES NO	If yes, Category 3.
	Question 8b. Mature Forested Wetland	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9b. Lake Erie Wetlands - Restricted	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9d. Lake Erie Wetlands – Unrestricted with native plants	YES NO	If yes, Category 3
	Question 9e. Lake Erie Wetlands - Unrestricted with invasive plants	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 10. Oak Openings	YES NO	If yes, Category 3
	Question 11. Relict Wet Prairies	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
Quantitative Rating	Metric 1. Size	2.00	
	Metric 2. Buffers and surrounding land use	9.00	
	Metric 3. Hydrology	11.00	
	Metric 4. Habitat	10.00	
	Metric 5. Special Wetland Communities	0.00	
	Metric 6. Plant communities, interspersion, microtopography	7.00	
	TOTAL SCORE	39.00	Category based on score breakpoints modified 2

Complete Wetland Categorization Worksheet.

Wetland Categorization Worksheet

Choices	Circle one		Evaluation of Categorization Result of ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 2, 3, 4, 6, 7, 8a, 9d, 10	YES Wetland is categorized as a Category 3 wetland	NO	Is quantitative rating score *less* than the Category 2 scoring threshold (*excluding* gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been over-categorized by the ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 1, 8b, 9b, 9e, 11	YES Wetland should be evaluated for possible Category 3 status	NO	Evaluate the wetland using the 1) narrative criteria in OAC Rule 3745-1-54(C) and 2) the quantitative rating score. If the wetland is determined to be a Category 3 wetland using either of these, it should be categorized as a Category 3 wetland. Detailed biological and/or functional assessments may also be used to determine the wetland's category.
Did you answer "Yes" to Narrative Rating No. 5	YES Wetland is categorized as a Category 1 wetland	NO	Is quantitative rating score *greater* than the Category 2 scoring threshold *(including* any gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been under-categorized by the ORAM
Does the quantitative score fall within the scoring range of a Category 1, 2, or 3 wetland?	YES Wetland is assigned to the appropriate category based on the scoring range	NO	If the score of the wetland is located within the scoring range for a particular category, the wetland should be assigned to that category. In all instances however, the narrative criteria described in OAC Rule 3745-1-54(C) can be used to clarify or change a categorization based on a quantitative score.
Does the quantitative score fall with the *"gray zone"* for Category 1 or 2 or Category 2 or 3 wetlands?	YES Wetland is assigned to the higher of the two categories or assigned to a category based on detailed assessments and the narrative criteria	NO	Rater has the option of assigning the wetland to the higher of the two categories or to assign a category based on the results of a nonrapid wetland assessment method, e.g. functional assessment, biological assessment, etc, and a consideration of the narrative criteria in OAC rule 3745-1-54(C).
Does the wetland otherwise exhibit *moderate OR superior* hydrologic OR habitat, OR recreational functions AND the wetland was *not* categorized as a Category 2 wetland (in the case of moderate functions) or a Category 3 wetland (in the case of superior functions) by this method?	YES Wetland was undercategorized by this method. A written justification for recategorization should be provided on Background Information Form	NO Wetland is assigned to category as determined by the ORAM.	A wetland may be undercategorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54(C)(2) and (3) are controlling, and the under-categorization should be corrected. A written justification with supporting reasons or information for this determination should be provided.

Final Category

Choose one	Category 1	Category 2	Category 3

39

End of Ohio Rapid Assessment Method for Wetlands.

Version 5.0	**Ohio Rapid Assessment Method for Wetlands** **10 Page Form for Wetland Categorization**	
	Background Information **Scoring Boundary Worksheet** **Narrative Rating** **Field Form Quantitative Rating** **ORAM Summary Worksheet** **Wetland Categorization Worksheet**	Ohio EPA, Division of Surface Water Final: February 1, 2001

Instructions

The investigator is *STRONGLY URGED* to read the Manual for Using the Ohio Rapid Assessment Method for Wetlands for further elaboration and discussion of the questions below prior to using the rating forms.

The Narrative Rating is designed to categorize a wetland or to provide alerts to the Rater based on the presence or possible presence of threatened or endangered species. The presence or proximity of such species is often an indicator of the quality and lack of disturbance of the wetland being evaluated. In addition, it is designed to categorize certain wetlands as very low quality (Category 1) or very high quality (Category 3) regardless of the wetland's score on the Quantitative Rating. In addition, the Narrative Rating also alerts the investigator that a particular wetland *may* be a Category 3 wetland, again, regardless of the wetland's score on the Quantitative Rating.

It is *VERY IMPORTANT* to properly and thoroughly answer each of the questions in the ORAM in order to properly categorize a wetland. To *properly* answer all the questions, the boundaries of the wetland being assessed must be correctly identified. Refer to Scoring Boundary worksheet and the User's Manual for a discussion of how to determine the "scoring boundaries." In some instances, the scoring boundaries may differ from the "jurisdictional boundaries."

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories. The most recent version of this document is posted on Ohio EPA's Division of Surface Water web page at: http://www.epa.ohio.gov/dsw/wetlands/WetlandEcologySection.aspx

Background Information

Name:	Jessica Stratigakos
Date:	11/7/2014
Affiliation:	The Mannik & Smith Group
Address:	23225 Mercantile Road, Beachwood Ohio 44122
Phone Number:	216-378-1490
e-mail address:	jstratigakos@manniksmithgroup.com
Name of Wetland:	Wetland F
Vegetation Communit(ies):	Emergent
HGM Class(es):	Depressional

Location of Wetland: include map, address, north arrow, landmarks, distances, roads, etc.

See Attached Map

Lat/Long or UTM Coordinate	41.146681 -80.836875
USGS Quad Name	Warren
County	Trumbull
Township	Montgomery
Section and Subsection	S22 T22N R16W
Hydrologic Unit Code	050400020605
Site Visit	11/7/2014
National Wetland Inventory Map	None
Ohio Wetland Inventory Map	None
Soil Survey	Orrville silt loam
Delineation report/map	See Fig. 3

Name of Wetland: Wetland F	
Wetland Size (acres, hectares):	0.095
Sketch: Include north arrow, relationship with other surface waters, vegetation zones, etc. See Attached Figure 3.	
Comments, Narrative Discussion, Justification of Category Changes: None	
Final score : 30 **Category:**	1 or 2 gray zone

Scoring Boundary Worksheet

INSTRUCTIONS. The initial step in completing the ORAM is to identify the "scoring boundaries" of the wetland being rated. In many instances this determination will be relatively easy and the scoring boundaries will coincide with the "jurisdictional boundaries." For example, the scoring boundary of an isolated cattail marsh located in the middle of a farm field will likely be the same as that wetland's jurisdictional boundaries. In other instances, however, the scoring boundary will not be as easily determined. Wetlands that are small or isolated from other surface waters often form large contiguous areas or heterogeneous complexes of wetland and upland. In separating wetlands for scoring purposes, the hydrologic regime of the wetland is the main criterion that should be used. Boundaries between contiguous or connected wetlands should be established where the volume, flow, or velocity of water moving through the wetland changes significantly. *Areas with a high degree of hydrologic interaction should be scored as a single wetland*. In determining a wetland's scoring boundaries, use the guidelines in the ORAM Manual Section 5.0. In certain instances, it may be difficult to establish the scoring boundary for the wetland being rated. These problem situations include wetlands that form a patchwork on the landscape, wetlands divided by artificial boundaries like property fences, roads, or railroad embankments, wetlands that are contiguous with streams, lakes, or rivers, and estuarine or coastal wetlands. These situations are discussed below, however, it is recommended that Rater contact Ohio EPA, Division of Surface Water, 401/Wetlands Section if there are additional questions or a need for further clarification of the appropriate scoring boundaries of a particular wetland.

#	Steps in properly establishing scoring boundaries	done?	not applicable
Step 1	Identify the wetland area of interest. This may be the site of a proposed impact, a reference site, conservation site, etc.	✓	
Step 2	Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both natural and human-induced changes including, constrictions caused by berms or dikes, points where the water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic interaction between the wetlands or parts of a single wetland.	✓	
Step 3	Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within the areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction are included within the scoring boundary.	✓	
Step 4	Determine if artificial boundaries, such as property lines, state lines, roads, railroad embankments, etc., are present. These should not be used to establish scoring boundaries unless they coincide with areas where the hydrologic regime changes.	✓	
Step 5	In all instances, the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.	✓	
Step 6	Consult ORAM Manual Section 5.0 for how to establish scoring boundaries for wetlands that form a patchwork on the landscape, divided by artificial boundaries, contiguous to streams, lakes or rivers, or for dual classifications.	✓	

End of Scoring Boundary Determination. Begin Narrative Rating on next page.

Narrative Rating

INSTRUCTIONS. Answer each of the following questions. Questions 1, 2, 3 and 4 should be answered based on information obtained from the site visit or the literature *and* by submitting a Data Services Request to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Data Services, 1889 Fountain Square Court, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/dnap . The remaining questions are designed to be answered primarily by the results of the site visit. Refer to the User's Manual for descriptions of these wetland types. Note: "Critical habitat" is legally defined in the Endangered Species Act and is the geographic area containing physical or biological features essential to the conservation of a listed species or as an area that may require special management considerations or protection. The Rater should contact the Region 3 Headquarters or the Columbus Ecological Services Office for updates as to whether critical habitat has been designated for other federally listed threatened or endangered species. "Documented" means the wetland is listed in the appropriate State of Ohio database.

#	Question	Circle one	
1	**Critical Habitat.** Is the wetland in a township, section, or subsection of a United States Geological Survey 7.5 minute Quadrangle that has been designated by the U.S. Fish and Wildlife Service as "critical habitat" for any threatened or endangered plant or animal species? Note: as of January 1, 2001, of the federally listed endangered or threatened species which can be found in Ohio, the Indiana Bat has had critical habitat designated (50 CFR 17.95(a)) and the piping plover has had critical habitat proposed (65 FR 41812 July 6, 2000).	YES Wetland should be evaluated for possible Category 3 status Go to Question 2	NO Go to Question 2
2	**Threatened or Endangered Species.** Is the wetland known to contain an individual of, or documented occurrences of federal or state-listed threatened or endangered plant or animal species?	YES Wetland is a Category 3 wetland. Go to Question 3	NO Go to Question 3
3	**Documented High Quality Wetland.** Is the wetland on record in Natural Heritage Database as a high quality wetland?	YES Wetland is a Category 3 wetland Go to Question 4	NO Go to Question 4
4	**Significant Breeding or Concentration Area.** Does the wetland contain documented regionally significant breeding or nonbreeding waterfowl, neotropical songbird, or shorebird concentration areas?	YES Wetland is a Category 3 wetland Go to Question 5	NO Go to Question 5
5	**Category 1 Wetlands.** Is the wetland less than 0.5 hectares (1 acre) in size and **hydrologically isolated** and either 1) comprised of vegetation that is dominated (greater than eighty per cent areal cover) by *Phalaris arundinacea, Lythrum salicaria,* or *Phragmites australis*, or 2) an acidic pond created or excavated on mined lands that has little or no vegetation?	YES Wetland is a Category 1 wetland Go to Question 6	NO Go to Question 6
6	**Bogs.** Is the wetland a peat-accumulating wetland that 1) has no significant inflows or outflows, 2) supports acidophilic mosses, particularly *Sphagnum* spp., 3) the acidophilic mosses have >30% cover, 4) at least one species from Table 1 is present, and 5) the cover of invasive species (see Table 1) is <25%?	YES Wetland is a Category 3 wetland Go to Question 7	NO Go to Question 7
7	**Fens.** Is the wetland a carbon accumulating (peat, muck) wetland that is saturated during most of the year, primarily by a discharge of free flowing, mineral rich, ground water with a circumneutral ph (5.5-9.0) and with one or more plant species listed in Table 1 and the cover of invasive species listed in Table 1 is <25%?	YES Wetland is a Category 3 wetland Go to Question 8a	NO Go to Question 8a
8a	**"Old Growth Forest."** Is the wetland a forested wetland and is the forest characterized by, but not limited to, the following characteristics: overstory canopy trees of great age (exceeding at least 50% of a projected maximum attainable age for a species); little or no evidence of human-caused understory disturbance during the past 80 to 100 years; an all-aged structure and multilayered canopies; aggregations of canopy trees interspersed with canopy gaps; and significant numbers of standing dead snags and downed logs?	YES Wetland is a Category 3 wetland. Go to Question 8b	NO Go to Question 8b

8b	**Mature forested wetlands**. Is the wetland a forested wetland with 50% or more of the cover of upper forest canopy consisting of deciduous trees with large diameters at breast height (dbh), generally diameters greater than 45cm (17.7in) dbh?	YES Wetland should be evaluated for possible Category 3 status. Go to Question 9a	NO Go to Question 9a
9a	**Lake Erie coastal and tributary wetlands**. Is the wetland located at an elevation less than 575 feet on the USGS map, adjacent to this elevation, or along a tributary to Lake Erie that is accessible to fish?	YES Go to Question 9b	NO Go to Question 10
9b	Does the wetland's hydrology result from measures designed to prevent erosion and the loss of aquatic plants, i.e. the wetland is partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 9c
9c	Are Lake Erie water levels the wetland's primary hydrological influence, i.e. the wetland is hydrologically unrestricted (no lakeward or upland border alterations), or the wetland can be characterized as an "estuarine" wetland with lake and river influenced hydrology. These include sandbar deposition wetlands, estuarine wetlands, river mouth wetlands, or those dominated by submersed aquatic vegetation.	YES Go to Question 9d	NO Go to Question 10
9d	Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant native species can also be present?	YES Wetland is a Category 3 wetland Go to Question 10	NO Go to Question 9e
9e	Does the wetland have a predominance of non-native or disturbance tolerant native plant species within its vegetation communities?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 10
10	**Lake Plain Sand Prairies (Oak Openings)** Is the wetland located in Lucas, Fulton, Henry, or Wood Counties and can the wetland be characterized by the following description: the wetland has a sandy substrate with interspersed organic matter, a water table often within several inches of the surface, and often with a dominance of the gramineous vegetation listed in Table 1 (woody species may also be present). The Ohio Department of Natural Resources Division of Natural Areas and Preserves can provide assistance in confirming this type of wetland and its quality.	YES Wetland is a Category 3 wetland. Go to Question 11	NO Go to Question 11
11	**Relict Wet Prairies**. Is the wetland a relict wet prairie community dominated by some or all of the species in Table 1. Extensive prairies were formerly located in the Darby Plains (Madison and Union Counties), Sandusky Plains (Wyandot, Crawford, and Marion Counties), northwest Ohio (e.g. Erie, Huron, Lucas, Wood Counties), and portions of western Ohio Counties (e.g. Darke, Mercer, Miami, Montgomery, Van Wert etc.).	YES Wetland should be evaluated for possible Category 3 status Complete Quantitative Rating	NO Complete Quantitative Rating

Table 1. Characteristic plant species.

invasive/exotic spp	fen species	bog species	0ak Opening species	wet prairie species
Lythrum salicaria	*Zygadenus elegans var. glaucus*	*Calla palustris*	*Carex cryptolepis*	*Calamagrostis canadensis*
Myriophyllum spicatum	*Cacalia plantaginea*	*Carex atlantica var. capillacea*	*Carex lasiocarpa*	*Calamogrostis stricta*
Najas minor	*Carex flava*	*Carex echinata*	*Carex stricta*	*Carex atherodes*
Phalaris arundinacea	*Carex sterilis*	*Carex oligosperma*	*Cladium mariscoides*	*Carex buxbaumii*
Phragmites australis	*Carex stricta*	*Carex trisperma*	*Calamagrostis stricta*	*Carex pellita*
Potamogeton crispus	*Deschampsia caespitosa*	*Chamaedaphne calyculata*	*Calamagrostis canadensis*	*Carex sartwellii*
Ranunculus ficaria	*Eleocharis rostellata*	*Decodon verticillatus*	*Quercus palustris*	*Gentiana andrewsii*
Rhamnus frangula	*Eriophorum viridicarinatum*	*Eriophorum virginicum*		*Helianthus grosseserratus*
Typha angustifolia	*Gentianopsis spp.*	*Larix laricina*		*Liatris spicata*
Typha xglauca	*Lobelia kalmii*	*Nemopanthus mucronatus*		*Lysimachia quadriflora*
	Parnassia glauca	*Schechzeria palustris*		*Lythrum alatum*
	Potentilla fruticosa	*Sphagnum spp.*		*Pycnanthemum virginianum*
	Rhamnus alnifolia	*Vaccinium macrocarpon*		*Silphium terebinthinaceum*
	Rhynchospora capillacea	*Vaccinium corymbosum*		*Sorghastrum nutans*
	Salix candida	*Vaccinium oxycoccos*		*Spartina pectinata*
	Salix myricoides	*Woodwardia virginica*		*Solidago riddellii*
	Salix serissima	*Xyris difformis*		
	Solidago ohioensis			
	Tofieldia glutinosa			
	Triglochin maritimum			
	Triglochin palustre			

End of Narrative Rating. Begin Quantitative Rating on next page.

Site: Lordstown	Rater(s): J. Stratigakos	Date: 11/7/2014

1.0	1.0
max 6 pts.	subtotal

Metric 1. Wetland Area (size).

Select one size class and assign score.

1.0

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [ ] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [x] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

8.0	9.0
max 14 pts.	subtotal

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

4.0

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [x] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [ ] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

4.0

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [x] LOW. Old field (>10 years), shrub land, young second growth forest. (5)
- [x] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [ ] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

11.0	20.0
max 30 pts.	subtotal

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

6.0

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [✓] Precipitation (1)
- [ ] Seasonal/Intermittent surface water (3)
- [✓] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

1.0

- [ ] 100 year floodplain (1)
- [✓] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

1.0

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [✓] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

3.0

- [ ] Semi- to permanently inundated/saturated (4)
- [✓] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [ ] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

3.0

- [ ] None or none apparent (12)
- [ ] Recovered (7)
- [✓] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [ ] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [ ] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [ ] other_____________________

8.0	28.0
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

2.0

- [ ] None or none apparent (4)
- [ ] Recovered (3)
- [x] Recovering (2)
- [ ] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

3.0

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [x] Moderately good (4)
- [x] Fair (3)
- [ ] Poor to fair (2)
- [ ] Poor (1)

4c. Habitat alteration. Score one or double check and average.

3.0

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [x] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [ ] farming
- [ ] nutrient enrichment

28.0
subtotal this page

last revised 1 February 2001 jjm

Site: Lordstown	Rater(s): J. Stratigakos	Date: 11/7/2014

28.0
subtotal first page

0.0	28.0
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

0.0

	Bog (10)
	Fen (10)
	Old growth forest (10)
	Mature forested wetland (5)
	Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
	Lake Erie coastal/tributary wetland-restricted hydrology (5)
	Lake Plain Sand Prairies (Oak Openings) (10)
	Relict Wet Prairies (10)
	Known occurrence state/federal threatened or endangered species (10)
	Significant migratory songbird/water fowl habitat or usage (10)
	Category 1 Wetland. See Question 1 Qualitative Rating (-10)

2.0	30.0
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

5

0	Aquatic bed
1	Emergent
1	Shrub
1	Forest
0	Mudflats
2	Open water
0	Other___________________

6b. horizontal (plan view) Interspersion.
Select only one.

2

	High (5)
	Moderately high(4)
	Moderate (3)
×	Moderately low (2)
	Low (1)
	None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

-5

-5	Extensive >75% cover (-5)
	Moderate 25-75% cover (-3)
	Sparse 5-25% cover (-1)
	Nearly absent <5% cover (0)
	Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

0

0	Vegetated hummucks/tussucks
0	Coarse woody debris >15cm (6in)
0	Standing dead >25cm (10in) dbh
0	Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

30.0

End of Quantitative Rating. Complete Categorization Worksheets.

ORAM Summary Worksheet

		circle answer or insert score	Result
Narrative Rating	Question 1 Critical Habitat	YES NO	If yes, Category 3.
	Question 2. Threatened or Endangered Species	YES NO	If yes, Category 3.
	Question 3. High Quality Natural Wetland	YES NO	If yes, Category 3.
	Question 4. Significant bird habitat	YES NO	If yes, Category 3.
	Question 5. Category 1 Wetlands	YES NO	If yes, Category 1.
	Question 6. Bogs	YES NO	If yes, Category 3.
	Question 7. Fens	YES NO	If yes, Category 3.
	Question 8a. Old Growth Forest	YES NO	If yes, Category 3.
	Question 8b. Mature Forested Wetland	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9b. Lake Erie Wetlands - Restricted	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9d. Lake Erie Wetlands – Unrestricted with native plants	YES NO	If yes, Category 3
	Question 9e. Lake Erie Wetlands - Unrestricted with invasive plants	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 10. Oak Openings	YES NO	If yes, Category 3
	Question 11. Relict Wet Prairies	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
Quantitative Rating	Metric 1. Size	1.00	
	Metric 2. Buffers and surrounding land use	8.00	
	Metric 3. Hydrology	11.00	
	Metric 4. Habitat	8.00	
	Metric 5. Special Wetland Communities	0.00	
	Metric 6. Plant communities, interspersion, microtopography	2.00	
	TOTAL SCORE	30.00	Category based on score breakpoints 1 or 2 gray zone

Complete Wetland Categorization Worksheet.

Wetland Categorization Worksheet

Choices	Circle one		Evaluation of Categorization Result of ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 2, 3, 4, 6, 7, 8a, 9d, 10	YES Wetland is categorized as a Category 3 wetland	NO	Is quantitative rating score *less* than the Category 2 scoring threshold (*excluding* gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been over-categorized by the ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 1, 8b, 9b, 9e, 11	YES Wetland should be evaluated for possible Category 3 status	NO	Evaluate the wetland using the 1) narrative criteria in OAC Rule 3745-1-54(C) and 2) the quantitative rating score. If the wetland is determined to be a Category 3 wetland using either of these, it should be categorized as a Category 3 wetland. Detailed biological and/or functional assessments may also be used to determine the wetland's category.
Did you answer "Yes" to Narrative Rating No. 5	YES Wetland is categorized as a Category 1 wetland	NO	Is quantitative rating score *greater* than the Category 2 scoring threshold (*including* any gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been under-categorized by the ORAM
Does the quantitative score fall within the scoring range of a Category 1, 2, or 3 wetland?	YES Wetland is assigned to the appropriate category based on the scoring range	NO	If the score of the wetland is located within the scoring range for a particular category, the wetland should be assigned to that category. In all instances however, the narrative criteria described in OAC Rule 3745-1-54(C) can be used to clarify or change a categorization based on a quantitative score.
Does the quantitative score fall with the *"gray zone"* for Category 1 or 2 or Category 2 or 3 wetlands?	YES Wetland is assigned to the higher of the two categories or assigned to a category based on detailed assessments and the narrative criteria	NO	Rater has the option of assigning the wetland to the higher of the two categories or to assign a category based on the results of a nonrapid wetland assessment method, e.g. functional assessment, biological assessment, etc, and a consideration of the narrative criteria in OAC rule 3745-1-54(C).
Does the wetland otherwise exhibit *moderate OR superior* hydrologic OR habitat, OR recreational functions AND the wetland was *not* categorized as a Category 2 wetland (in the case of moderate functions) or a Category 3 wetland (in the case of superior functions) by this method?	YES Wetland was undercategorized by this method. A written justification for recategorization should be provided on Background Information Form	NO Wetland is assigned to category as determined by the ORAM.	A wetland may be undercategorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54(C)(2) and (3) are controlling, and the under-categorization should be corrected. A written justification with supporting reasons or information for this determination should be provided.

Final Category

Choose one	Category 1	Category 2	Category 3

End of Ohio Rapid Assessment Method for Wetlands.

Version 5.0	**Ohio Rapid Assessment Method for Wetlands** **10 Page Form for Wetland Categorization**	
	Background Information **Scoring Boundary Worksheet** **Narrative Rating** **Field Form Quantitative Rating** **ORAM Summary Worksheet** **Wetland Categorization Worksheet**	Ohio EPA, Division of Surface Water Final: February 1, 2001

Instructions

The investigator is *STRONGLY URGED* to read the Manual for Using the Ohio Rapid Assessment Method for Wetlands for further elaboration and discussion of the questions below prior to using the rating forms.

The Narrative Rating is designed to categorize a wetland or to provide alerts to the Rater based on the presence or possible presence of threatened or endangered species. The presence or proximity of such species is often an indicator of the quality and lack of disturbance of the wetland being evaluated. In addition, it is designed to categorize certain wetlands as very low quality (Category 1) or very high quality (Category 3) regardless of the wetland's score on the Quantitative Rating. In addition, the Narrative Rating also alerts the investigator that a particular wetland *may* be a Category 3 wetland, again, regardless of the wetland's score on the Quantitative Rating.

It is *VERY IMPORTANT* to properly and thoroughly answer each of the questions in the ORAM in order to properly categorize a wetland. To *properly* answer all the questions, the boundaries of the wetland being assessed must be correctly identified. Refer to Scoring Boundary worksheet and the User's Manual for a discussion of how to determine the "scoring boundaries." In some instances, the scoring boundaries may differ from the "jurisdictional boundaries."

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories. The most recent version of this document is posted on Ohio EPA's Division of Surface Water web page at: http://www.epa.ohio.gov/dsw/wetlands/WetlandEcologySection.aspx

Background Information

Name:	Jessica Stratigakos
Date:	11/11/2014
Affiliation:	The Mannik & Smith Group
Address:	23225 Mercantile Road, Beachwood Ohio 44122
Phone Number:	216-378-1490
e-mail address:	jstratigakos@manniksmithgroup.com
Name of Wetland:	Wetland G
Vegetation Communit(ies):	Emergent
HGM Class(es):	Depressional

Location of Wetland: include map, address, north arrow, landmarks, distances, roads, etc.

See Attached Figure 3.

Lat/Long or UTM Coordinate	41.150389, -80.843221
USGS Quad Name	Warren
County	Trumbull
Township	Montgomery
Section and Subsection	S22 T22N R16W
Hydrologic Unit Code	050400020605
Site Visit	11/11/2014
National Wetland Inventory Map	None
Ohio Wetland Inventory Map	None
Soil Survey	Sebring silt loam
Delineation report/map	See Fig. 3

Name of Wetland: Wetland G	
Wetland Size (acres, hectares):	0.784
Sketch: Include north arrow, relationship with other surface waters, vegetation zones, etc. See Attached Figure 3.	
Comments, Narrative Discussion, Justification of Category Changes: None	
Final score : 29 **Category:**	1

Scoring Boundary Worksheet

INSTRUCTIONS. The initial step in completing the ORAM is to identify the "scoring boundaries" of the wetland being rated. In many instances this determination will be relatively easy and the scoring boundaries will coincide with the "jurisdictional boundaries." For example, the scoring boundary of an isolated cattail marsh located in the middle of a farm field will likely be the same as that wetland's jurisdictional boundaries. In other instances, however, the scoring boundary will not be as easily determined. Wetlands that are small or isolated from other surface waters often form large contiguous areas or heterogeneous complexes of wetland and upland. In separating wetlands for scoring purposes, the hydrologic regime of the wetland is the main criterion that should be used. Boundaries between contiguous or connected wetlands should be established where the volume, flow, or velocity of water moving through the wetland changes significantly. *Areas with a high degree of hydrologic interaction should be scored as a single wetland*. In determining a wetland's scoring boundaries, use the guidelines in the ORAM Manual Section 5.0. In certain instances, it may be difficult to establish the scoring boundary for the wetland being rated. These problem situations include wetlands that form a patchwork on the landscape, wetlands divided by artificial boundaries like property fences, roads, or railroad embankments, wetlands that are contiguous with streams, lakes, or rivers, and estuarine or coastal wetlands. These situations are discussed below, however, it is recommended that Rater contact Ohio EPA, Division of Surface Water, 401/Wetlands Section if there are additional questions or a need for further clarification of the appropriate scoring boundaries of a particular wetland.

#	Steps in properly establishing scoring boundaries	done?	not applicable
Step 1	Identify the wetland area of interest. This may be the site of a proposed impact, a reference site, conservation site, etc.	✓	
Step 2	Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both natural and human-induced changes including, constrictions caused by berms or dikes, points where the water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic interaction between the wetlands or parts of a single wetland.	✓	
Step 3	Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within the areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction are included within the scoring boundary.	✓	
Step 4	Determine if artificial boundaries, such as property lines, state lines, roads, railroad embankments, etc., are present. These should not be used to establish scoring boundaries unless they coincide with areas where the hydrologic regime changes.	✓	
Step 5	In all instances, the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.	✓	
Step 6	Consult ORAM Manual Section 5.0 for how to establish scoring boundaries for wetlands that form a patchwork on the landscape, divided by artificial boundaries, contiguous to streams, lakes or rivers, or for dual classifications.	✓	

End of Scoring Boundary Determination. Begin Narrative Rating on next page.

Narrative Rating

INSTRUCTIONS. Answer each of the following questions. Questions 1, 2, 3 and 4 should be answered based on information obtained from the site visit or the literature *and* by submitting a Data Services Request to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Data Services, 1889 Fountain Square Court, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/dnap . The remaining questions are designed to be answered primarily by the results of the site visit. Refer to the User's Manual for descriptions of these wetland types. Note: "Critical habitat" is legally defined in the Endangered Species Act and is the geographic area containing physical or biological features essential to the conservation of a listed species or as an area that may require special management considerations or protection. The Rater should contact the Region 3 Headquarters or the Columbus Ecological Services Office for updates as to whether critical habitat has been designated for other federally listed threatened or endangered species. "Documented" means the wetland is listed in the appropriate State of Ohio database.

#	Question	Circle one	
1	**Critical Habitat.** Is the wetland in a township, section, or subsection of a United States Geological Survey 7.5 minute Quadrangle that has been designated by the U.S. Fish and Wildlife Service as "critical habitat" for any threatened or endangered plant or animal species? Note: as of January 1, 2001, of the federally listed endangered or threatened species which can be found in Ohio, the Indiana Bat has had critical habitat designated (50 CFR 17.95(a)) and the piping plover has had critical habitat proposed (65 FR 41812 July 6, 2000).	YES Wetland should be evaluated for possible Category 3 status Go to Question 2	NO Go to Question 2
2	**Threatened or Endangered Species.** Is the wetland known to contain an individual of, or documented occurrences of federal or state-listed threatened or endangered plant or animal species?	YES Wetland is a Category 3 wetland. Go to Question 3	NO Go to Question 3
3	**Documented High Quality Wetland.** Is the wetland on record in Natural Heritage Database as a high quality wetland?	YES Wetland is a Category 3 wetland Go to Question 4	NO Go to Question 4
4	**Significant Breeding or Concentration Area.** Does the wetland contain documented regionally significant breeding or nonbreeding waterfowl, neotropical songbird, or shorebird concentration areas?	YES Wetland is a Category 3 wetland Go to Question 5	NO Go to Question 5
5	**Category 1 Wetlands.** Is the wetland less than 0.5 hectares (1 acre) in size and **hydrologically isolated** and either 1) comprised of vegetation that is dominated (greater than eighty per cent areal cover) by *Phalaris arundinacea, Lythrum salicaria,* or *Phragmites australis*, or 2) an acidic pond created or excavated on mined lands that has little or no vegetation?	YES Wetland is a Category 1 wetland Go to Question 6	NO Go to Question 6
6	**Bogs.** Is the wetland a peat-accumulating wetland that 1) has no significant inflows or outflows, 2) supports acidophilic mosses, particularly *Sphagnum* spp., 3) the acidophilic mosses have >30% cover, 4) at least one species from Table 1 is present, and 5) the cover of invasive species (see Table 1) is <25%?	YES Wetland is a Category 3 wetland Go to Question 7	NO Go to Question 7
7	**Fens.** Is the wetland a carbon accumulating (peat, muck) wetland that is saturated during most of the year, primarily by a discharge of free flowing, mineral rich, ground water with a circumneutral ph (5.5-9.0) and with one or more plant species listed in Table 1 and the cover of invasive species listed in Table 1 is <25%?	YES Wetland is a Category 3 wetland Go to Question 8a	NO Go to Question 8a
8a	**"Old Growth Forest."** Is the wetland a forested wetland and is the forest characterized by, but not limited to, the following characteristics: overstory canopy trees of great age (exceeding at least 50% of a projected maximum attainable age for a species); little or no evidence of human-caused understory disturbance during the past 80 to 100 years; an all-aged structure and multilayered canopies; aggregations of canopy trees interspersed with canopy gaps; and significant numbers of standing dead snags and downed logs?	YES Wetland is a Category 3 wetland. Go to Question 8b	NO Go to Question 8b

8b	**Mature forested wetlands**. Is the wetland a forested wetland with 50% or more of the cover of upper forest canopy consisting of deciduous trees with large diameters at breast height (dbh), generally diameters greater than 45cm (17.7in) dbh?	YES Wetland should be evaluated for possible Category 3 status. Go to Question 9a	NO Go to Question 9a
9a	**Lake Erie coastal and tributary wetlands**. Is the wetland located at an elevation less than 575 feet on the USGS map, adjacent to this elevation, or along a tributary to Lake Erie that is accessible to fish?	YES Go to Question 9b	NO Go to Question 10
9b	Does the wetland's hydrology result from measures designed to prevent erosion and the loss of aquatic plants, i.e. the wetland is partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 9c
9c	Are Lake Erie water levels the wetland's primary hydrological influence, i.e. the wetland is hydrologically unrestricted (no lakeward or upland border alterations), or the wetland can be characterized as an "estuarine" wetland with lake and river influenced hydrology. These include sandbar deposition wetlands, estuarine wetlands, river mouth wetlands, or those dominated by submersed aquatic vegetation.	YES Go to Question 9d	NO Go to Question 10
9d	Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant native species can also be present?	YES Wetland is a Category 3 wetland Go to Question 10	NO Go to Question 9e
9e	Does the wetland have a predominance of non-native or disturbance tolerant native plant species within its vegetation communities?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 10
10	**Lake Plain Sand Prairies (Oak Openings)** Is the wetland located in Lucas, Fulton, Henry, or Wood Counties and can the wetland be characterized by the following description: the wetland has a sandy substrate with interspersed organic matter, a water table often within several inches of the surface, and often with a dominance of the gramineous vegetation listed in Table 1 (woody species may also be present). The Ohio Department of Natural Resources Division of Natural Areas and Preserves can provide assistance in confirming this type of wetland and its quality.	YES Wetland is a Category 3 wetland. Go to Question 11	NO Go to Question 11
11	**Relict Wet Prairies**. Is the wetland a relict wet prairie community dominated by some or all of the species in Table 1. Extensive prairies were formerly located in the Darby Plains (Madison and Union Counties), Sandusky Plains (Wyandot, Crawford, and Marion Counties), northwest Ohio (e.g. Erie, Huron, Lucas, Wood Counties), and portions of western Ohio Counties (e.g. Darke, Mercer, Miami, Montgomery, Van Wert etc.).	YES Wetland should be evaluated for possible Category 3 status Complete Quantitative Rating	NO Complete Quantitative Rating

Table 1. Characteristic plant species.

invasive/exotic spp	fen species	bog species	0ak Opening species	wet prairie species
Lythrum salicaria	*Zygadenus elegans var. glaucus*	*Calla palustris*	*Carex cryptolepis*	*Calamagrostis canadensis*
Myriophyllum spicatum	*Cacalia plantaginea*	*Carex atlantica var. capillacea*	*Carex lasiocarpa*	*Calamogrostis stricta*
Najas minor	*Carex flava*	*Carex echinata*	*Carex stricta*	*Carex atherodes*
Phalaris arundinacea	*Carex sterilis*	*Carex oligosperma*	*Cladium mariscoides*	*Carex buxbaumii*
Phragmites australis	*Carex stricta*	*Carex trisperma*	*Calamagrostis stricta*	*Carex pellita*
Potamogeton crispus	*Deschampsia caespitosa*	*Chamaedaphne calyculata*	*Calamagrostis canadensis*	*Carex sartwellii*
Ranunculus ficaria	*Eleocharis rostellata*	*Decodon verticillatus*	*Quercus palustris*	*Gentiana andrewsii*
Rhamnus frangula	*Eriophorum viridicarinatum*	*Eriophorum virginicum*		*Helianthus grosseserratus*
Typha angustifolia	*Gentianopsis spp.*	*Larix laricina*		*Liatris spicata*
Typha xglauca	*Lobelia kalmii*	*Nemopanthus mucronatus*		*Lysimachia quadriflora*
	Parnassia glauca	*Schechzeria palustris*		*Lythrum alatum*
	Potentilla fruticosa	*Sphagnum spp.*		*Pycnanthemum virginianum*
	Rhamnus alnifolia	*Vaccinium macrocarpon*		*Silphium terebinthinaceum*
	Rhynchospora capillacea	*Vaccinium corymbosum*		*Sorghastrum nutans*
	Salix candida	*Vaccinium oxycoccos*		*Spartina pectinata*
	Salix myricoides	*Woodwardia virginica*		*Solidago riddellii*
	Salix serissima	*Xyris difformis*		
	Solidago ohioensis			
	Tofieldia glutinosa			
	Triglochin maritimum			
	Triglochin palustre			

End of Narrative Rating. Begin Quantitative Rating on next page.

End of Narrative Rating. Begin Quantitative Rating on next page.

Site: Lordstown	Rater(s): J. Stratigakos	Date: 11/11/2014

Metric 1. Wetland Area (size).

2.0 (max 6 pts.) | 2.0 (subtotal)

Select one size class and assign score.

2.0

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [x] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

Metric 2. Upland buffers and surrounding land use.

5.0 (max 14 pts.) | 7.0 (subtotal)

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

1.0

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [ ] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [x] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

4.0

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [x] LOW. Old field (>10 years), shrub land, young second growth forest. (5)
- [x] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [ ] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

Metric 3. Hydrology.

11.0 (max 30 pts.) | 18.0 (subtotal)

3a. Sources of Water. Score all that apply.

6.0

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [x] Precipitation (1)
- [ ] Seasonal/Intermittent surface water (3)
- [x] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

0.0

- [ ] 100 year floodplain (1)
- [ ] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

1.0

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [x] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

4.0

- [x] Semi- to permanently inundated/saturated (4)
- [ ] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [ ] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

7.0

- [ ] None or none apparent (12)
- [x] Recovered (7)
- [ ] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [ ] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [ ] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [ ] other_____________________

Metric 4. Habitat Alteration and Development.

6.0 (max 20 pts.) | 24.0 (subtotal)

4a. Substrate disturbance. Score one or double check and average.

3.0

- [ ] None or none apparent (4)
- [x] Recovered (3)
- [ ] Recovering (2)
- [ ] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

2.0

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [ ] Fair (3)
- [x] Poor to fair (2)
- [ ] Poor (1)

4c. Habitat alteration. Score one or double check and average.

1.0

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [ ] Recovering (3)
- [x] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [ ] farming
- [ ] nutrient enrichment

24.0 (subtotal this page)

Site: Lordstown	**Rater(s):** J. Stratigakos	**Date:** 11/11/2014

24.0
subtotal first page

0.0	24.0
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

0.0

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Prairies (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

5.0	29.0
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

4

0	Aquatic bed
2	Emergent
0	Shrub
0	Forest
0	Mudflats
2	Open water
0	Other___________________

6b. horizontal (plan view) Interspersion.
Select only one.

2

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [x] Moderately low (2)
- [ ] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

-3

	Extensive >75% cover (-5)
-3	Moderate 25-75% cover (-3)
	Sparse 5-25% cover (-1)
	Nearly absent <5% cover (0)
	Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

2

0	Vegetated hummucks/tussucks
2	Coarse woody debris >15cm (6in)
0	Standing dead >25cm (10in) dbh
0	Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

29.0

End of Quantitative Rating. Complete Categorization Worksheets.

ORAM Summary Worksheet

		circle answer or insert score	Result
Narrative Rating	Question 1 Critical Habitat	YES NO	If yes, Category 3.
	Question 2. Threatened or Endangered Species	YES NO	If yes, Category 3.
	Question 3. High Quality Natural Wetland	YES NO	If yes, Category 3.
	Question 4. Significant bird habitat	YES NO	If yes, Category 3.
	Question 5. Category 1 Wetlands	YES NO	If yes, Category 1.
	Question 6. Bogs	YES NO	If yes, Category 3.
	Question 7. Fens	YES NO	If yes, Category 3.
	Question 8a. Old Growth Forest	YES NO	If yes, Category 3.
	Question 8b. Mature Forested Wetland	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9b. Lake Erie Wetlands - Restricted	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9d. Lake Erie Wetlands – Unrestricted with native plants	YES NO	If yes, Category 3
	Question 9e. Lake Erie Wetlands - Unrestricted with invasive plants	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 10. Oak Openings	YES NO	If yes, Category 3
	Question 11. Relict Wet Prairies	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
Quantitative Rating	Metric 1. Size	2.00	
	Metric 2. Buffers and surrounding land use	5.00	
	Metric 3. Hydrology	11.00	
	Metric 4. Habitat	6.00	
	Metric 5. Special Wetland Communities	0.00	
	Metric 6. Plant communities, interspersion, microtopography	5.00	
	TOTAL SCORE	29.00	Category based on score breakpoints 1

Complete Wetland Categorization Worksheet.

Wetland Categorization Worksheet

Choices	Circle one		Evaluation of Categorization Result of ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 2, 3, 4, 6, 7, 8a, 9d, 10	YES Wetland is categorized as a Category 3 wetland	NO	Is quantitative rating score *less* than the Category 2 scoring threshold (*excluding* gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been over-categorized by the ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 1, 8b, 9b, 9e, 11	YES Wetland should be evaluated for possible Category 3 status	NO	Evaluate the wetland using the 1) narrative criteria in OAC Rule 3745-1-54(C) and 2) the quantitative rating score. If the wetland is determined to be a Category 3 wetland using either of these, it should be categorized as a Category 3 wetland. Detailed biological and/or functional assessments may also be used to determine the wetland's category.
Did you answer "Yes" to Narrative Rating No. 5	YES Wetland is categorized as a Category 1 wetland	NO	Is quantitative rating score *greater* than the Category 2 scoring threshold (*including* any gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been under-categorized by the ORAM
Does the quantitative score fall within the scoring range of a Category 1, 2, or 3 wetland?	YES Wetland is assigned to the appropriate category based on the scoring range	NO	If the score of the wetland is located within the scoring range for a particular category, the wetland should be assigned to that category. In all instances however, the narrative criteria described in OAC Rule 3745-1-54(C) can be used to clarify or change a categorization based on a quantitative score.
Does the quantitative score fall with the *"gray zone"* for Category 1 or 2 or Category 2 or 3 wetlands?	YES Wetland is assigned to the higher of the two categories or assigned to a category based on detailed assessments and the narrative criteria	NO	Rater has the option of assigning the wetland to the higher of the two categories or to assign a category based on the results of a nonrapid wetland assessment method, e.g. functional assessment, biological assessment, etc, and a consideration of the narrative criteria in OAC rule 3745-1-54(C).
Does the wetland otherwise exhibit *moderate OR superior* hydrologic OR habitat, OR recreational functions AND the wetland was *not* categorized as a Category 2 wetland (in the case of moderate functions) or a Category 3 wetland (in the case of superior functions) by this method?	YES Wetland was undercategorized by this method. A written justification for recategorization should be provided on Background Information Form	NO Wetland is assigned to category as determined by the ORAM.	A wetland may be undercategorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54(C)(2) and (3) are controlling, and the under-categorization should be corrected. A written justification with supporting reasons or information for this determination should be provided.

Final Category

Choose one	Category 1	Category 2	Category 3

29

End of Ohio Rapid Assessment Method for Wetlands.

<table>
<tr><td rowspan="2">Version 5.0</td><td colspan="2">Ohio Rapid Assessment Method for Wetlands
10 Page Form for Wetland Categorization</td></tr>
<tr><td>Background Information
Scoring Boundary Worksheet
Narrative Rating
Field Form Quantitative Rating
ORAM Summary Worksheet
Wetland Categorization Worksheet</td><td>Ohio EPA, Division of Surface Water
Final: February 1, 2001</td></tr>
</table>

Instructions

The investigator is *STRONGLY URGED* to read the Manual for Using the Ohio Rapid Assessment Method for Wetlands for further elaboration and discussion of the questions below prior to using the rating forms.

The Narrative Rating is designed to categorize a wetland or to provide alerts to the Rater based on the presence or possible presence of threatened or endangered species. The presence or proximity of such species is often an indicator of the quality and lack of disturbance of the wetland being evaluated. In addition, it is designed to categorize certain wetlands as very low quality (Category 1) or very high quality (Category 3) regardless of the wetland's score on the Quantitative Rating. In addition, the Narrative Rating also alerts the investigator that a particular wetland *may* be a Category 3 wetland, again, regardless of the wetland's score on the Quantitative Rating.

It is *VERY IMPORTANT* to properly and thoroughly answer each of the questions in the ORAM in order to properly categorize a wetland. To *properly* answer all the questions, the boundaries of the wetland being assessed must be correctly identified. Refer to Scoring Boundary worksheet and the User's Manual for a discussion of how to determine the "scoring boundaries." In some instances, the scoring boundaries may differ from the "jurisdictional boundaries."

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories. The most recent version of this document is posted on Ohio EPA's Division of Surface Water web page at: http://www.epa.ohio.gov/dsw/wetlands/WetlandEcologySection.aspx

Background Information

Name:	Jessica Stratigakos
Date:	11/11/2014
Affiliation:	The Mannik & Smith Group
Address:	23225 Mercantile Road, Beachwood Ohio 44122
Phone Number:	216-378-1490
e-mail address:	jstratigakos@manniksmithgroup.com
Name of Wetland:	Wetland H
Vegetation Communit(ies):	Shrub
HGM Class(es):	Depressional

Location of Wetland: include map, address, north arrow, landmarks, distances, roads, etc.

See Attached Map

Lat/Long or UTM Coordinate	41.151637, -80.841938
USGS Quad Name	Warren
County	Trumbull
Township	Montgomery
Section and Subsection	S22 T22N R16W
Hydrologic Unit Code	050400020605
Site Visit	11/11/2014
National Wetland Inventory Map	None
Ohio Wetland Inventory Map	None
Soil Survey	Mahoning silt loam
Delineation report/map	See Fig. 3

Name of Wetland:
Wetland H

Wetland Size (acres, hectares):	0.295

Sketch: Include north arrow, relationship with other surface waters, vegetation zones, etc.

See Attached Figure 3.

Comments, Narrative Discussion, Justification of Category Changes:

None

Final score : 16	**Category:**	1

Scoring Boundary Worksheet

INSTRUCTIONS. The initial step in completing the ORAM is to identify the "scoring boundaries" of the wetland being rated. In many instances this determination will be relatively easy and the scoring boundaries will coincide with the "jurisdictional boundaries." For example, the scoring boundary of an isolated cattail marsh located in the middle of a farm field will likely be the same as that wetland's jurisdictional boundaries. In other instances, however, the scoring boundary will not be as easily determined. Wetlands that are small or isolated from other surface waters often form large contiguous areas or heterogeneous complexes of wetland and upland. In separating wetlands for scoring purposes, the hydrologic regime of the wetland is the main criterion that should be used. Boundaries between contiguous or connected wetlands should be established where the volume, flow, or velocity of water moving through the wetland changes significantly. *Areas with a high degree of hydrologic interaction should be scored as a single wetland*. In determining a wetland's scoring boundaries, use the guidelines in the ORAM Manual Section 5.0. In certain instances, it may be difficult to establish the scoring boundary for the wetland being rated. These problem situations include wetlands that form a patchwork on the landscape, wetlands divided by artificial boundaries like property fences, roads, or railroad embankments, wetlands that are contiguous with streams, lakes, or rivers, and estuarine or coastal wetlands. These situations are discussed below, however, it is recommended that Rater contact Ohio EPA, Division of Surface Water, 401/Wetlands Section if there are additional questions or a need for further clarification of the appropriate scoring boundaries of a particular wetland.

#	Steps in properly establishing scoring boundaries	done?	not applicable
Step 1	Identify the wetland area of interest. This may be the site of a proposed impact, a reference site, conservation site, etc.	✓	
Step 2	Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both natural and human-induced changes including, constrictions caused by berms or dikes, points where the water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic interaction between the wetlands or parts of a single wetland.	✓	
Step 3	Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within the areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction are included within the scoring boundary.	✓	
Step 4	Determine if artificial boundaries, such as property lines, state lines, roads, railroad embankments, etc., are present. These should not be used to establish scoring boundaries unless they coincide with areas where the hydrologic regime changes.	✓	
Step 5	In all instances, the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.	✓	
Step 6	Consult ORAM Manual Section 5.0 for how to establish scoring boundaries for wetlands that form a patchwork on the landscape, divided by artificial boundaries, contiguous to streams, lakes or rivers, or for dual classifications.	✓	

End of Scoring Boundary Determination. Begin Narrative Rating on next page.

Narrative Rating

INSTRUCTIONS. Answer each of the following questions. Questions 1, 2, 3 and 4 should be answered based on information obtained from the site visit or the literature *and* by submitting a Data Services Request to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Data Services, 1889 Fountain Square Court, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/dnap . The remaining questions are designed to be answered primarily by the results of the site visit. Refer to the User's Manual for descriptions of these wetland types. Note: "Critical habitat" is legally defined in the Endangered Species Act and is the geographic area containing physical or biological features essential to the conservation of a listed species or as an area that may require special management considerations or protection. The Rater should contact the Region 3 Headquarters or the Columbus Ecological Services Office for updates as to whether critical habitat has been designated for other federally listed threatened or endangered species. "Documented" means the wetland is listed in the appropriate State of Ohio database.

#	Question	Circle one	
1	**Critical Habitat.** Is the wetland in a township, section, or subsection of a United States Geological Survey 7.5 minute Quadrangle that has been designated by the U.S. Fish and Wildlife Service as "critical habitat" for any threatened or endangered plant or animal species? Note: as of January 1, 2001, of the federally listed endangered or threatened species which can be found in Ohio, the Indiana Bat has had critical habitat designated (50 CFR 17.95(a)) and the piping plover has had critical habitat proposed (65 FR 41812 July 6, 2000).	YES Wetland should be evaluated for possible Category 3 status Go to Question 2	NO Go to Question 2
2	**Threatened or Endangered Species.** Is the wetland known to contain an individual of, or documented occurrences of federal or state-listed threatened or endangered plant or animal species?	YES Wetland is a Category 3 wetland. Go to Question 3	NO Go to Question 3
3	**Documented High Quality Wetland.** Is the wetland on record in Natural Heritage Database as a high quality wetland?	YES Wetland is a Category 3 wetland Go to Question 4	NO Go to Question 4
4	**Significant Breeding or Concentration Area.** Does the wetland contain documented regionally significant breeding or nonbreeding waterfowl, neotropical songbird, or shorebird concentration areas?	YES Wetland is a Category 3 wetland Go to Question 5	NO Go to Question 5
5	**Category 1 Wetlands.** Is the wetland less than 0.5 hectares (1 acre) in size and **hydrologically isolated** and either 1) comprised of vegetation that is dominated (greater than eighty per cent areal cover) by *Phalaris arundinacea, Lythrum salicaria,* or *Phragmites australis*, or 2) an acidic pond created or excavated on mined lands that has little or no vegetation?	YES Wetland is a Category 1 wetland Go to Question 6	NO Go to Question 6
6	**Bogs.** Is the wetland a peat-accumulating wetland that 1) has no significant inflows or outflows, 2) supports acidophilic mosses, particularly *Sphagnum* spp., 3) the acidophilic mosses have >30% cover, 4) at least one species from Table 1 is present, and 5) the cover of invasive species (see Table 1) is <25%?	YES Wetland is a Category 3 wetland Go to Question 7	NO Go to Question 7
7	**Fens.** Is the wetland a carbon accumulating (peat, muck) wetland that is saturated during most of the year, primarily by a discharge of free flowing, mineral rich, ground water with a circumneutral ph (5.5-9.0) and with one or more plant species listed in Table 1 and the cover of invasive species listed in Table 1 is <25%?	YES Wetland is a Category 3 wetland Go to Question 8a	NO Go to Question 8a
8a	**"Old Growth Forest."** Is the wetland a forested wetland and is the forest characterized by, but not limited to, the following characteristics: overstory canopy trees of great age (exceeding at least 50% of a projected maximum attainable age for a species); little or no evidence of human-caused understory disturbance during the past 80 to 100 years; an all-aged structure and multilayered canopies; aggregations of canopy trees interspersed with canopy gaps; and significant numbers of standing dead snags and downed logs?	YES Wetland is a Category 3 wetland. Go to Question 8b	NO Go to Question 8b

8b	**Mature forested wetlands**. Is the wetland a forested wetland with 50% or more of the cover of upper forest canopy consisting of deciduous trees with large diameters at breast height (dbh), generally diameters greater than 45cm (17.7in) dbh?	YES Wetland should be evaluated for possible Category 3 status. Go to Question 9a	NO Go to Question 9a
9a	**Lake Erie coastal and tributary wetlands**. Is the wetland located at an elevation less than 575 feet on the USGS map, adjacent to this elevation, or along a tributary to Lake Erie that is accessible to fish?	YES Go to Question 9b	NO Go to Question 10
9b	Does the wetland's hydrology result from measures designed to prevent erosion and the loss of aquatic plants, i.e. the wetland is partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 9c
9c	Are Lake Erie water levels the wetland's primary hydrological influence, i.e. the wetland is hydrologically unrestricted (no lakeward or upland border alterations), or the wetland can be characterized as an "estuarine" wetland with lake and river influenced hydrology. These include sandbar deposition wetlands, estuarine wetlands, river mouth wetlands, or those dominated by submersed aquatic vegetation.	YES Go to Question 9d	NO Go to Question 10
9d	Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant native species can also be present?	YES Wetland is a Category 3 wetland Go to Question 10	NO Go to Question 9e
9e	Does the wetland have a predominance of non-native or disturbance tolerant native plant species within its vegetation communities?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 10
10	**Lake Plain Sand Prairies (Oak Openings)** Is the wetland located in Lucas, Fulton, Henry, or Wood Counties and can the wetland be characterized by the following description: the wetland has a sandy substrate with interspersed organic matter, a water table often within several inches of the surface, and often with a dominance of the gramineous vegetation listed in Table 1 (woody species may also be present). The Ohio Department of Natural Resources Division of Natural Areas and Preserves can provide assistance in confirming this type of wetland and its quality.	YES Wetland is a Category 3 wetland. Go to Question 11	NO Go to Question 11
11	**Relict Wet Prairies**. Is the wetland a relict wet prairie community dominated by some or all of the species in Table 1. Extensive prairies were formerly located in the Darby Plains (Madison and Union Counties), Sandusky Plains (Wyandot, Crawford, and Marion Counties), northwest Ohio (e.g. Erie, Huron, Lucas, Wood Counties), and portions of western Ohio Counties (e.g. Darke, Mercer, Miami, Montgomery, Van Wert etc.).	YES Wetland should be evaluated for possible Category 3 status Complete Quantitative Rating	NO Complete Quantitative Rating

Table 1. Characteristic plant species.

invasive/exotic spp	fen species	bog species	0ak Opening species	wet prairie species
Lythrum salicaria	*Zygadenus elegans var. glaucus*	*Calla palustris*	*Carex cryptolepis*	*Calamagrostis canadensis*
Myriophyllum spicatum	*Cacalia plantaginea*	*Carex atlantica var. capillacea*	*Carex lasiocarpa*	*Calamogrostis stricta*
Najas minor	*Carex flava*	*Carex echinata*	*Carex stricta*	*Carex atherodes*
Phalaris arundinacea	*Carex sterilis*	*Carex oligosperma*	*Cladium mariscoides*	*Carex buxbaumii*
Phragmites australis	*Carex stricta*	*Carex trisperma*	*Calamagrostis stricta*	*Carex pellita*
Potamogeton crispus	*Deschampsia caespitosa*	*Chamaedaphne calyculata*	*Calamagrostis canadensis*	*Carex sartwellii*
Ranunculus ficaria	*Eleocharis rostellata*	*Decodon verticillatus*	*Quercus palustris*	*Gentiana andrewsii*
Rhamnus frangula	*Eriophorum viridicarinatum*	*Eriophorum virginicum*		*Helianthus grosseserratus*
Typha angustifolia	*Gentianopsis spp.*	*Larix laricina*		*Liatris spicata*
Typha xglauca	*Lobelia kalmii*	*Nemopanthus mucronatus*		*Lysimachia quadriflora*
	Parnassia glauca	*Schechzeria palustris*		*Lythrum alatum*
	Potentilla fruticosa	*Sphagnum spp.*		*Pycnanthemum virginianum*
	Rhamnus alnifolia	*Vaccinium macrocarpon*		*Silphium terebinthinaceum*
	Rhynchospora capillacea	*Vaccinium corymbosum*		*Sorghastrum nutans*
	Salix candida	*Vaccinium oxycoccos*		*Spartina pectinata*
	Salix myricoides	*Woodwardia virginica*		*Solidago riddellii*
	Salix serissima	*Xyris difformis*		
	Solidago ohioensis			
	Tofieldia glutinosa			
	Triglochin maritimum			
	Triglochin palustre			

End of Narrative Rating. Begin Quantitative Rating on next page.

Site: Lordstown	**Rater(s):** J. Stratigakos	**Date:** 11/11/2014

2.0	2.0
max 6 pts.	subtotal

Metric 1. Wetland Area (size).

Select one size class and assign score.

2.0

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [x] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

2.0	4.0
max 14 pts.	subtotal

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

1.0

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [ ] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [x] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

1.0

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrub land, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [x] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

5.0	9.0
max 30 pts.	subtotal

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

1.0

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [x] Precipitation (1)
- [ ] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

0.0

- [ ] 100 year floodplain (1)
- [ ] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

1.0

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [x] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

3.0

- [ ] Semi- to permanently inundated/saturated (4)
- [x] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [ ] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

1.0

- [ ] None or none apparent (12)
- [ ] Recovered (7)
- [ ] Recovering (3)
- [x] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [ ] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [ ] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [ ] other_____________________

4.0	13.0
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

2.0

- [ ] None or none apparent (4)
- [ ] Recovered (3)
- [x] Recovering (2)
- [ ] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

1.0

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [x] Moderately good (4)
- [ ] Fair (3)
- [ ] Poor to fair (2)
- [x] Poor (1)

4c. Habitat alteration. Score one or double check and average.

1.0

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [ ] Recovering (3)
- [x] Recent or no recovery (1)

Check all disturbances observed

- [x] mowing
- [ ] grazing
- [x] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [ ] farming
- [ ] nutrient enrichment

13.0
subtotal this page

last revised 1 February 2001 jjm

Site: Lordstown	**Rater(s):** J. Stratigakos	**Date:** 11/11/2014

13.0
subtotal first page

0.0	13.0
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

0.0

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Prairies (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

3.0	16.0
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

4

0	Aquatic bed
2	Emergent
0	Shrub
0	Forest
0	Mudflats
2	Open water
0	Other___________________

6b. horizontal (plan view) Interspersion.
Select only one.

2

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [x] Moderately low (2)
- [ ] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

-3

	Extensive >75% cover (-5)
-3	Moderate 25-75% cover (-3)
	Sparse 5-25% cover (-1)
	Nearly absent <5% cover (0)
	Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

0

0	Vegetated hummucks/tussucks
0	Coarse woody debris >15cm (6in)
0	Standing dead >25cm (10in) dbh
0	Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

16.0

End of Quantitative Rating. Complete Categorization Worksheets.

ORAM Summary Worksheet

		circle answer or insert score	Result
Narrative Rating	Question 1 Critical Habitat	YES NO	If yes, Category 3.
	Question 2. Threatened or Endangered Species	YES NO	If yes, Category 3.
	Question 3. High Quality Natural Wetland	YES NO	If yes, Category 3.
	Question 4. Significant bird habitat	YES NO	If yes, Category 3.
	Question 5. Category 1 Wetlands	YES NO	If yes, Category 1.
	Question 6. Bogs	YES NO	If yes, Category 3.
	Question 7. Fens	YES NO	If yes, Category 3.
	Question 8a. Old Growth Forest	YES NO	If yes, Category 3.
	Question 8b. Mature Forested Wetland	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9b. Lake Erie Wetlands - Restricted	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9d. Lake Erie Wetlands – Unrestricted with native plants	YES NO	If yes, Category 3
	Question 9e. Lake Erie Wetlands - Unrestricted with invasive plants	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 10. Oak Openings	YES NO	If yes, Category 3
	Question 11. Relict Wet Prairies	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
Quantitative Rating	Metric 1. Size	2.00	
	Metric 2. Buffers and surrounding land use	2.00	
	Metric 3. Hydrology	5.00	
	Metric 4. Habitat	4.00	
	Metric 5. Special Wetland Communities	0.00	
	Metric 6. Plant communities, interspersion, microtopography	3.00	
	TOTAL SCORE	16.00	Category based on score breakpoints 1

Complete Wetland Categorization Worksheet.

Wetland Categorization Worksheet

Choices	**Circle one**		**Evaluation of Categorization Result of ORAM**
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 2, 3, 4, 6, 7, 8a, 9d, 10	YES Wetland is categorized as a Category 3 wetland	NO	Is quantitative rating score *less* than the Category 2 scoring threshold (*excluding* gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been over-categorized by the ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 1, 8b, 9b, 9e, 11	YES Wetland should be evaluated for possible Category 3 status	NO	Evaluate the wetland using the 1) narrative criteria in OAC Rule 3745-1-54(C) and 2) the quantitative rating score. If the wetland is determined to be a Category 3 wetland using either of these, it should be categorized as a Category 3 wetland. Detailed biological and/or functional assessments may also be used to determine the wetland's category.
Did you answer "Yes" to Narrative Rating No. 5	YES Wetland is categorized as a Category 1 wetland	NO	Is quantitative rating score *greater* than the Category 2 scoring threshold *(including* any gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been under-categorized by the ORAM
Does the quantitative score fall within the scoring range of a Category 1, 2, or 3 wetland?	YES Wetland is assigned to the appropriate category based on the scoring range	NO	If the score of the wetland is located within the scoring range for a particular category, the wetland should be assigned to that category. In all instances however, the narrative criteria described in OAC Rule 3745-1-54(C) can be used to clarify or change a categorization based on a quantitative score.
Does the quantitative score fall with the *"gray zone"* for Category 1 or 2 or Category 2 or 3 wetlands?	YES Wetland is assigned to the higher of the two categories or assigned to a category based on detailed assessments and the narrative criteria	NO	Rater has the option of assigning the wetland to the higher of the two categories or to assign a category based on the results of a nonrapid wetland assessment method, e.g. functional assessment, biological assessment, etc, and a consideration of the narrative criteria in OAC rule 3745-1-54(C).
Does the wetland otherwise exhibit *moderate OR superior* hydrologic OR habitat, OR recreational functions AND the wetland was *not* categorized as a Category 2 wetland (in the case of moderate functions) or a Category 3 wetland (in the case of superior functions) by this method?	YES Wetland was undercategorized by this method. A written justification for recategorization should be provided on Background Information Form	NO Wetland is assigned to category as determined by the ORAM.	A wetland may be undercategorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54(C)(2) and (3) are controlling, and the under-categorization should be corrected. A written justification with supporting reasons or information for this determination should be provided.

Final Category

Choose one	**Category 1**	**Category 2**	**Category 3**

End of Ohio Rapid Assessment Method for Wetlands.

Version 5.0	**Ohio Rapid Assessment Method for Wetlands 10 Page Form for Wetland Categorization**	
	Background Information Scoring Boundary Worksheet Narrative Rating Field Form Quantitative Rating ORAM Summary Worksheet Wetland Categorization Worksheet	Ohio EPA, Division of Surface Water Final: February 1, 2001

Instructions

The investigator is *STRONGLY URGED* to read the Manual for Using the Ohio Rapid Assessment Method for Wetlands for further elaboration and discussion of the questions below prior to using the rating forms.

The Narrative Rating is designed to categorize a wetland or to provide alerts to the Rater based on the presence or possible presence of threatened or endangered species. The presence or proximity of such species is often an indicator of the quality and lack of disturbance of the wetland being evaluated. In addition, it is designed to categorize certain wetlands as very low quality (Category 1) or very high quality (Category 3) regardless of the wetland's score on the Quantitative Rating. In addition, the Narrative Rating also alerts the investigator that a particular wetland *may* be a Category 3 wetland, again, regardless of the wetland's score on the Quantitative Rating.

It is *VERY IMPORTANT* to properly and thoroughly answer each of the questions in the ORAM in order to properly categorize a wetland. To *properly* answer all the questions, the boundaries of the wetland being assessed must be correctly identified. Refer to Scoring Boundary worksheet and the User's Manual for a discussion of how to determine the "scoring boundaries." In some instances, the scoring boundaries may differ from the "jurisdictional boundaries."

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories. The most recent version of this document is posted on Ohio EPA's Division of Surface Water web page at: http://www.epa.ohio.gov/dsw/wetlands/WetlandEcologySection.aspx

Background Information

Name:	Jessica Stratigakos
Date:	11/11/2014
Affiliation:	The Mannik & Smith Group
Address:	23225 Mercantile Road, Beachwood Ohio 44122
Phone Number:	216-378-1490
e-mail address:	jstratigakos@manniksmithgroup.com
Name of Wetland:	Wetland I
Vegetation Communit(ies):	Emergent
HGM Class(es):	Depressional

Location of Wetland: include map, address, north arrow, landmarks, distances, roads, etc.

See Attached Figure 3

Lat/Long or UTM Coordinate	41.149872, -80.842373
USGS Quad Name	Warren
County	Trumbull
Township	Montgomery
Section and Subsection	S22 T22N R16W
Hydrologic Unit Code	050400020605
Site Visit	11/7/2014
National Wetland Inventory Map	None
Ohio Wetland Inventory Map	None
Soil Survey	Mahoning silt loam
Delineation report/map	See Fig. 3

Name of Wetland: Wetland I	
Wetland Size (acres, hectares):	0.214
Sketch: Include north arrow, relationship with other surface waters, vegetation zones, etc. See Attached Figure 3	
Comments, Narrative Discussion, Justification of Category Changes: None	
Final score : 25 **Category:**	1

Scoring Boundary Worksheet

INSTRUCTIONS. The initial step in completing the ORAM is to identify the "scoring boundaries" of the wetland being rated. In many instances this determination will be relatively easy and the scoring boundaries will coincide with the "jurisdictional boundaries." For example, the scoring boundary of an isolated cattail marsh located in the middle of a farm field will likely be the same as that wetland's jurisdictional boundaries. In other instances, however, the scoring boundary will not be as easily determined. Wetlands that are small or isolated from other surface waters often form large contiguous areas or heterogeneous complexes of wetland and upland. In separating wetlands for scoring purposes, the hydrologic regime of the wetland is the main criterion that should be used. Boundaries between contiguous or connected wetlands should be established where the volume, flow, or velocity of water moving through the wetland changes significantly. *Areas with a high degree of hydrologic interaction should be scored as a single wetland*. In determining a wetland's scoring boundaries, use the guidelines in the ORAM Manual Section 5.0. In certain instances, it may be difficult to establish the scoring boundary for the wetland being rated. These problem situations include wetlands that form a patchwork on the landscape, wetlands divided by artificial boundaries like property fences, roads, or railroad embankments, wetlands that are contiguous with streams, lakes, or rivers, and estuarine or coastal wetlands. These situations are discussed below, however, it is recommended that Rater contact Ohio EPA, Division of Surface Water, 401/Wetlands Section if there are additional questions or a need for further clarification of the appropriate scoring boundaries of a particular wetland.

#	Steps in properly establishing scoring boundaries	done?	not applicable
Step 1	Identify the wetland area of interest. This may be the site of a proposed impact, a reference site, conservation site, etc.	✓	
Step 2	Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both natural and human-induced changes including, constrictions caused by berms or dikes, points where the water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic interaction between the wetlands or parts of a single wetland.	✓	
Step 3	Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within the areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction are included within the scoring boundary.	✓	
Step 4	Determine if artificial boundaries, such as property lines, state lines, roads, railroad embankments, etc., are present. These should not be used to establish scoring boundaries unless they coincide with areas where the hydrologic regime changes.	✓	
Step 5	In all instances, the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.	✓	
Step 6	Consult ORAM Manual Section 5.0 for how to establish scoring boundaries for wetlands that form a patchwork on the landscape, divided by artificial boundaries, contiguous to streams, lakes or rivers, or for dual classifications.	✓	

End of Scoring Boundary Determination. Begin Narrative Rating on next page.

Narrative Rating

INSTRUCTIONS. Answer each of the following questions. Questions 1, 2, 3 and 4 should be answered based on information obtained from the site visit or the literature *and* by submitting a Data Services Request to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Data Services, 1889 Fountain Square Court, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/dnap . The remaining questions are designed to be answered primarily by the results of the site visit. Refer to the User's Manual for descriptions of these wetland types. Note: "Critical habitat" is legally defined in the Endangered Species Act and is the geographic area containing physical or biological features essential to the conservation of a listed species or as an area that may require special management considerations or protection. The Rater should contact the Region 3 Headquarters or the Columbus Ecological Services Office for updates as to whether critical habitat has been designated for other federally listed threatened or endangered species. "Documented" means the wetland is listed in the appropriate State of Ohio database.

#	Question	Circle one	
1	**Critical Habitat.** Is the wetland in a township, section, or subsection of a United States Geological Survey 7.5 minute Quadrangle that has been designated by the U.S. Fish and Wildlife Service as "critical habitat" for any threatened or endangered plant or animal species? Note: as of January 1, 2001, of the federally listed endangered or threatened species which can be found in Ohio, the Indiana Bat has had critical habitat designated (50 CFR 17.95(a)) and the piping plover has had critical habitat proposed (65 FR 41812 July 6, 2000).	YES Wetland should be evaluated for possible Category 3 status Go to Question 2	NO Go to Question 2
2	**Threatened or Endangered Species.** Is the wetland known to contain an individual of, or documented occurrences of federal or state-listed threatened or endangered plant or animal species?	YES Wetland is a Category 3 wetland. Go to Question 3	NO Go to Question 3
3	**Documented High Quality Wetland.** Is the wetland on record in Natural Heritage Database as a high quality wetland?	YES Wetland is a Category 3 wetland Go to Question 4	NO Go to Question 4
4	**Significant Breeding or Concentration Area.** Does the wetland contain documented regionally significant breeding or nonbreeding waterfowl, neotropical songbird, or shorebird concentration areas?	YES Wetland is a Category 3 wetland Go to Question 5	NO Go to Question 5
5	**Category 1 Wetlands.** Is the wetland less than 0.5 hectares (1 acre) in size and **hydrologically isolated** and either 1) comprised of vegetation that is dominated (greater than eighty per cent areal cover) by *Phalaris arundinacea, Lythrum salicaria,* or *Phragmites australis*, or 2) an acidic pond created or excavated on mined lands that has little or no vegetation?	YES Wetland is a Category 1 wetland Go to Question 6	NO Go to Question 6
6	**Bogs.** Is the wetland a peat-accumulating wetland that 1) has no significant inflows or outflows, 2) supports acidophilic mosses, particularly *Sphagnum* spp., 3) the acidophilic mosses have >30% cover, 4) at least one species from Table 1 is present, and 5) the cover of invasive species (see Table 1) is <25%?	YES Wetland is a Category 3 wetland Go to Question 7	NO Go to Question 7
7	**Fens.** Is the wetland a carbon accumulating (peat, muck) wetland that is saturated during most of the year, primarily by a discharge of free flowing, mineral rich, ground water with a circumneutral ph (5.5-9.0) and with one or more plant species listed in Table 1 and the cover of invasive species listed in Table 1 is <25%?	YES Wetland is a Category 3 wetland Go to Question 8a	NO Go to Question 8a
8a	**"Old Growth Forest."** Is the wetland a forested wetland and is the forest characterized by, but not limited to, the following characteristics: overstory canopy trees of great age (exceeding at least 50% of a projected maximum attainable age for a species); little or no evidence of human-caused understory disturbance during the past 80 to 100 years; an all-aged structure and multilayered canopies; aggregations of canopy trees interspersed with canopy gaps; and significant numbers of standing dead snags and downed logs?	YES Wetland is a Category 3 wetland. Go to Question 8b	NO Go to Question 8b

8b	**Mature forested wetlands**. Is the wetland a forested wetland with 50% or more of the cover of upper forest canopy consisting of deciduous trees with large diameters at breast height (dbh), generally diameters greater than 45cm (17.7in) dbh?	YES Wetland should be evaluated for possible Category 3 status. Go to Question 9a	NO Go to Question 9a
9a	**Lake Erie coastal and tributary wetlands**. Is the wetland located at an elevation less than 575 feet on the USGS map, adjacent to this elevation, or along a tributary to Lake Erie that is accessible to fish?	YES Go to Question 9b	NO Go to Question 10
9b	Does the wetland's hydrology result from measures designed to prevent erosion and the loss of aquatic plants, i.e. the wetland is partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 9c
9c	Are Lake Erie water levels the wetland's primary hydrological influence, i.e. the wetland is hydrologically unrestricted (no lakeward or upland border alterations), or the wetland can be characterized as an "estuarine" wetland with lake and river influenced hydrology. These include sandbar deposition wetlands, estuarine wetlands, river mouth wetlands, or those dominated by submersed aquatic vegetation.	YES Go to Question 9d	NO Go to Question 10
9d	Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant native species can also be present?	YES Wetland is a Category 3 wetland Go to Question 10	NO Go to Question 9e
9e	Does the wetland have a predominance of non-native or disturbance tolerant native plant species within its vegetation communities?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 10
10	**Lake Plain Sand Prairies (Oak Openings)** Is the wetland located in Lucas, Fulton, Henry, or Wood Counties and can the wetland be characterized by the following description: the wetland has a sandy substrate with interspersed organic matter, a water table often within several inches of the surface, and often with a dominance of the gramineous vegetation listed in Table 1 (woody species may also be present). The Ohio Department of Natural Resources Division of Natural Areas and Preserves can provide assistance in confirming this type of wetland and its quality.	YES Wetland is a Category 3 wetland. Go to Question 11	NO Go to Question 11
11	**Relict Wet Prairies**. Is the wetland a relict wet prairie community dominated by some or all of the species in Table 1. Extensive prairies were formerly located in the Darby Plains (Madison and Union Counties), Sandusky Plains (Wyandot, Crawford, and Marion Counties), northwest Ohio (e.g. Erie, Huron, Lucas, Wood Counties), and portions of western Ohio Counties (e.g. Darke, Mercer, Miami, Montgomery, Van Wert etc.).	YES Wetland should be evaluated for possible Category 3 status Complete Quantitative Rating	NO Complete Quantitative Rating

Table 1. Characteristic plant species.

invasive/exotic spp	fen species	bog species	0ak Opening species	wet prairie species
Lythrum salicaria	*Zygadenus elegans var. glaucus*	*Calla palustris*	*Carex cryptolepis*	*Calamagrostis canadensis*
Myriophyllum spicatum	*Cacalia plantaginea*	*Carex atlantica var. capillacea*	*Carex lasiocarpa*	*Calamogrostis stricta*
Najas minor	*Carex flava*	*Carex echinata*	*Carex stricta*	*Carex atherodes*
Phalaris arundinacea	*Carex sterilis*	*Carex oligosperma*	*Cladium mariscoides*	*Carex buxbaumii*
Phragmites australis	*Carex stricta*	*Carex trisperma*	*Calamagrostis stricta*	*Carex pellita*
Potamogeton crispus	*Deschampsia caespitosa*	*Chamaedaphne calyculata*	*Calamagrostis canadensis*	*Carex sartwellii*
Ranunculus ficaria	*Eleocharis rostellata*	*Decodon verticillatus*	*Quercus palustris*	*Gentiana andrewsii*
Rhamnus frangula	*Eriophorum viridicarinatum*	*Eriophorum virginicum*		*Helianthus grosseserratus*
Typha angustifolia	*Gentianopsis spp.*	*Larix laricina*		*Liatris spicata*
Typha xglauca	*Lobelia kalmii*	*Nemopanthus mucronatus*		*Lysimachia quadriflora*
	Parnassia glauca	*Schechzeria palustris*		*Lythrum alatum*
	Potentilla fruticosa	*Sphagnum spp.*		*Pycnanthemum virginianum*
	Rhamnus alnifolia	*Vaccinium macrocarpon*		*Silphium terebinthinaceum*
	Rhynchospora capillacea	*Vaccinium corymbosum*		*Sorghastrum nutans*
	Salix candida	*Vaccinium oxycoccos*		*Spartina pectinata*
	Salix myricoides	*Woodwardia virginica*		*Solidago riddellii*
	Salix serissima	*Xyris difformis*		
	Solidago ohioensis			
	Tofieldia glutinosa			
	Triglochin maritimum			
	Triglochin palustre			

End of Narrative Rating. Begin Quantitative Rating on next page.

Site: Lordstown	**Rater(s):** J. Stratigakos	**Date:** 11/11/2014

2.0	2.0
max 6 pts.	subtotal

Metric 1. Wetland Area (size).

Select one size class and assign score.

2.0

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [x] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [ ] <0.1 acres (0.04ha) (0 pts)

5.0	7.0
max 14 pts.	subtotal

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

4.0

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [x] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [ ] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

1.0

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrub land, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [x] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

6.0	13.0
max 30 pts.	subtotal

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

1.0

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [✓] Precipitation (1)
- [ ] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

1.0

- [ ] 100 year floodplain (1)
- [✓] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

1.0

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [✓] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

3.0

- [ ] Semi- to permanently inundated/saturated (4)
- [✓] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [ ] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

3.0

- [ ] None or none apparent (12)
- [ ] Recovered (7)
- [✓] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [ ] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [ ] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [ ] other______________________

9.0	22.0
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

2.0

- [ ] None or none apparent (4)
- [ ] Recovered (3)
- [x] Recovering (2)
- [ ] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

4.0

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [x] Moderately good (4)
- [ ] Fair (3)
- [ ] Poor to fair (2)
- [ ] Poor (1)

4c. Habitat alteration. Score one or double check and average.

3.0

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [x] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [ ] farming
- [ ] nutrient enrichment

22.0
subtotal this page

last revised 1 February 2001 jjm

Site: Lordstown	**Rater(s):** J. Stratigakos	**Date:** 11/11/2014

22.0
subtotal first page

0.0 (max 10 pts.) | 22.0 (subtotal)

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

0.0

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Prairies (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

3.0 (max 20 pts.) | 25.0 (subtotal)

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

4

- 0 Aquatic bed
- 2 Emergent
- 0 Shrub
- 0 Forest
- 0 Mudflats
- 2 Open water
- 0 Other___________________

6b. horizontal (plan view) Interspersion.
Select only one.

2

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [x] Moderately low (2)
- [ ] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

-3

- [ ] Extensive >75% cover (-5)
- -3 Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [ ] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

0

- 0 Vegetated hummucks/tussucks
- 0 Coarse woody debris >15cm (6in)
- 0 Standing dead >25cm (10in) dbh
- 0 Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

25.0

End of Quantitative Rating. Complete Categorization Worksheets.

ORAM Summary Worksheet

		circle answer or insert score	Result
Narrative Rating	Question 1 Critical Habitat	YES NO	If yes, Category 3.
	Question 2. Threatened or Endangered Species	YES NO	If yes, Category 3.
	Question 3. High Quality Natural Wetland	YES NO	If yes, Category 3.
	Question 4. Significant bird habitat	YES NO	If yes, Category 3.
	Question 5. Category 1 Wetlands	YES NO	If yes, Category 1.
	Question 6. Bogs	YES NO	If yes, Category 3.
	Question 7. Fens	YES NO	If yes, Category 3.
	Question 8a. Old Growth Forest	YES NO	If yes, Category 3.
	Question 8b. Mature Forested Wetland	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9b. Lake Erie Wetlands - Restricted	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9d. Lake Erie Wetlands – Unrestricted with native plants	YES NO	If yes, Category 3
	Question 9e. Lake Erie Wetlands - Unrestricted with invasive plants	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 10. Oak Openings	YES NO	If yes, Category 3
	Question 11. Relict Wet Prairies	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
Quantitative Rating	Metric 1. Size	2.00	
	Metric 2. Buffers and surrounding land use	5.00	
	Metric 3. Hydrology	6.00	
	Metric 4. Habitat	9.00	
	Metric 5. Special Wetland Communities	0.00	
	Metric 6. Plant communities, interspersion, microtopography	3.00	
	TOTAL SCORE	25.00	Category based on score breakpoints 1

Complete Wetland Categorization Worksheet.

Wetland Categorization Worksheet

Choices	Circle one		Evaluation of Categorization Result of ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 2, 3, 4, 6, 7, 8a, 9d, 10	YES Wetland is categorized as a Category 3 wetland	NO	Is quantitative rating score *less* than the Category 2 scoring threshold (*excluding* gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been over-categorized by the ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 1, 8b, 9b, 9e, 11	YES Wetland should be evaluated for possible Category 3 status	NO	Evaluate the wetland using the 1) narrative criteria in OAC Rule 3745-1-54(C) and 2) the quantitative rating score. If the wetland is determined to be a Category 3 wetland using either of these, it should be categorized as a Category 3 wetland. Detailed biological and/or functional assessments may also be used to determine the wetland's category.
Did you answer "Yes" to Narrative Rating No. 5	YES Wetland is categorized as a Category 1 wetland	NO	Is quantitative rating score *greater* than the Category 2 scoring threshold *(including* any gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been under-categorized by the ORAM
Does the quantitative score fall within the scoring range of a Category 1, 2, or 3 wetland?	YES Wetland is assigned to the appropriate category based on the scoring range	NO	If the score of the wetland is located within the scoring range for a particular category, the wetland should be assigned to that category. In all instances however, the narrative criteria described in OAC Rule 3745-1-54(C) can be used to clarify or change a categorization based on a quantitative score.
Does the quantitative score fall with the *"gray zone"* for Category 1 or 2 or Category 2 or 3 wetlands?	YES Wetland is assigned to the higher of the two categories or assigned to a category based on detailed assessments and the narrative criteria	NO	Rater has the option of assigning the wetland to the higher of the two categories or to assign a category based on the results of a nonrapid wetland assessment method, e.g. functional assessment, biological assessment, etc, and a consideration of the narrative criteria in OAC rule 3745-1-54(C).
Does the wetland otherwise exhibit *moderate OR superior* hydrologic OR habitat, OR recreational functions AND the wetland was *not* categorized as a Category 2 wetland (in the case of moderate functions) or a Category 3 wetland (in the case of superior functions) by this method?	YES Wetland was undercategorized by this method. A written justification for recategorization should be provided on Background Information Form	NO Wetland is assigned to category as determined by the ORAM.	A wetland may be undercategorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54(C)(2) and (3) are controlling, and the under-categorization should be corrected. A written justification with supporting reasons or information for this determination should be provided.

Final Category

Choose one	Category 1	Category 2	Category 3

25

End of Ohio Rapid Assessment Method for Wetlands.

Version 5.0	**Ohio Rapid Assessment Method for Wetlands** **10 Page Form for Wetland Categorization**	
	Background Information **Scoring Boundary Worksheet** **Narrative Rating** **Field Form Quantitative Rating** **ORAM Summary Worksheet** **Wetland Categorization Worksheet**	Ohio EPA, Division of Surface Water Final: February 1, 2001

Instructions

The investigator is *STRONGLY URGED* to read the Manual for Using the Ohio Rapid Assessment Method for Wetlands for further elaboration and discussion of the questions below prior to using the rating forms.

The Narrative Rating is designed to categorize a wetland or to provide alerts to the Rater based on the presence or possible presence of threatened or endangered species. The presence or proximity of such species is often an indicator of the quality and lack of disturbance of the wetland being evaluated. In addition, it is designed to categorize certain wetlands as very low quality (Category 1) or very high quality (Category 3) regardless of the wetland's score on the Quantitative Rating. In addition, the Narrative Rating also alerts the investigator that a particular wetland *may* be a Category 3 wetland, again, regardless of the wetland's score on the Quantitative Rating.

It is *VERY IMPORTANT* to properly and thoroughly answer each of the questions in the ORAM in order to properly categorize a wetland. To *properly* answer all the questions, the boundaries of the wetland being assessed must be correctly identified. Refer to Scoring Boundary worksheet and the User's Manual for a discussion of how to determine the "scoring boundaries." In some instances, the scoring boundaries may differ from the "jurisdictional boundaries."

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories. The most recent version of this document is posted on Ohio EPA's Division of Surface Water web page at: http://www.epa.ohio.gov/dsw/wetlands/WetlandEcologySection.aspx

Background Information

Name:	Jessica Stratigakos
Date:	11/12/2014
Affiliation:	The Mannik & Smith Group
Address:	23225 Mercantile Road, Beachwood Ohio 44122
Phone Number:	216-378-1490
e-mail address:	jstratigakos@manniksmithgroup.com
Name of Wetland:	Wetland J
Vegetation Communit(ies):	Forested
HGM Class(es):	Depressional

Location of Wetland: include map, address, north arrow, landmarks, distances, roads, etc.

See Attached Map

Lat/Long or UTM Coordinate	41.147423, -80.855587
USGS Quad Name	Warren
County	Trumbull
Township	Montgomery
Section and Subsection	S22 T22N R16W
Hydrologic Unit Code	050400020605
Site Visit	11/12/2014
National Wetland Inventory Map	None
Ohio Wetland Inventory Map	None
Soil Survey	Wadsworth silt loam
Delineation report/map	See Fig. 3

Name of Wetland: Wetland J	
Wetland Size (acres, hectares):	0.432
Sketch: Include north arrow, relationship with other surface waters, vegetation zones, etc. See Attached Figure 3.	
Comments, Narrative Discussion, Justification of Category Changes: None	
Final score : 14 **Category:**	1

Scoring Boundary Worksheet

INSTRUCTIONS. The initial step in completing the ORAM is to identify the "scoring boundaries" of the wetland being rated. In many instances this determination will be relatively easy and the scoring boundaries will coincide with the "jurisdictional boundaries." For example, the scoring boundary of an isolated cattail marsh located in the middle of a farm field will likely be the same as that wetland's jurisdictional boundaries. In other instances, however, the scoring boundary will not be as easily determined. Wetlands that are small or isolated from other surface waters often form large contiguous areas or heterogeneous complexes of wetland and upland. In separating wetlands for scoring purposes, the hydrologic regime of the wetland is the main criterion that should be used. Boundaries between contiguous or connected wetlands should be established where the volume, flow, or velocity of water moving through the wetland changes significantly. *Areas with a high degree of hydrologic interaction should be scored as a single wetland*. In determining a wetland's scoring boundaries, use the guidelines in the ORAM Manual Section 5.0. In certain instances, it may be difficult to establish the scoring boundary for the wetland being rated. These problem situations include wetlands that form a patchwork on the landscape, wetlands divided by artificial boundaries like property fences, roads, or railroad embankments, wetlands that are contiguous with streams, lakes, or rivers, and estuarine or coastal wetlands. These situations are discussed below, however, it is recommended that Rater contact Ohio EPA, Division of Surface Water, 401/Wetlands Section if there are additional questions or a need for further clarification of the appropriate scoring boundaries of a particular wetland.

#	Steps in properly establishing scoring boundaries	done?	not applicable
Step 1	Identify the wetland area of interest. This may be the site of a proposed impact, a reference site, conservation site, etc.	✓	
Step 2	Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both natural and human-induced changes including, constrictions caused by berms or dikes, points where the water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic interaction between the wetlands or parts of a single wetland.	✓	
Step 3	Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within the areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction are included within the scoring boundary.	✓	
Step 4	Determine if artificial boundaries, such as property lines, state lines, roads, railroad embankments, etc., are present. These should not be used to establish scoring boundaries unless they coincide with areas where the hydrologic regime changes.	✓	
Step 5	In all instances, the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.	✓	
Step 6	Consult ORAM Manual Section 5.0 for how to establish scoring boundaries for wetlands that form a patchwork on the landscape, divided by artificial boundaries, contiguous to streams, lakes or rivers, or for dual classifications.	✓	

End of Scoring Boundary Determination. Begin Narrative Rating on next page.

Narrative Rating

INSTRUCTIONS. Answer each of the following questions. Questions 1, 2, 3 and 4 should be answered based on information obtained from the site visit or the literature *and* by submitting a Data Services Request to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Data Services, 1889 Fountain Square Court, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/dnap . The remaining questions are designed to be answered primarily by the results of the site visit. Refer to the User's Manual for descriptions of these wetland types. Note: "Critical habitat" is legally defined in the Endangered Species Act and is the geographic area containing physical or biological features essential to the conservation of a listed species or as an area that may require special management considerations or protection. The Rater should contact the Region 3 Headquarters or the Columbus Ecological Services Office for updates as to whether critical habitat has been designated for other federally listed threatened or endangered species. "Documented" means the wetland is listed in the appropriate State of Ohio database.

#	Question	Circle one	
1	**Critical Habitat.** Is the wetland in a township, section, or subsection of a United States Geological Survey 7.5 minute Quadrangle that has been designated by the U.S. Fish and Wildlife Service as "critical habitat" for any threatened or endangered plant or animal species? Note: as of January 1, 2001, of the federally listed endangered or threatened species which can be found in Ohio, the Indiana Bat has had critical habitat designated (50 CFR 17.95(a)) and the piping plover has had critical habitat proposed (65 FR 41812 July 6, 2000).	YES Wetland should be evaluated for possible Category 3 status Go to Question 2	NO Go to Question 2
2	**Threatened or Endangered Species.** Is the wetland known to contain an individual of, or documented occurrences of federal or state-listed threatened or endangered plant or animal species?	YES Wetland is a Category 3 wetland. Go to Question 3	NO Go to Question 3
3	**Documented High Quality Wetland.** Is the wetland on record in Natural Heritage Database as a high quality wetland?	YES Wetland is a Category 3 wetland Go to Question 4	NO Go to Question 4
4	**Significant Breeding or Concentration Area.** Does the wetland contain documented regionally significant breeding or nonbreeding waterfowl, neotropical songbird, or shorebird concentration areas?	YES Wetland is a Category 3 wetland Go to Question 5	NO Go to Question 5
5	**Category 1 Wetlands.** Is the wetland less than 0.5 hectares (1 acre) in size and **hydrologically isolated** and either 1) comprised of vegetation that is dominated (greater than eighty per cent areal cover) by *Phalaris arundinacea, Lythrum salicaria,* or *Phragmites australis*, or 2) an acidic pond created or excavated on mined lands that has little or no vegetation?	YES Wetland is a Category 1 wetland Go to Question 6	NO Go to Question 6
6	**Bogs.** Is the wetland a peat-accumulating wetland that 1) has no significant inflows or outflows, 2) supports acidophilic mosses, particularly *Sphagnum* spp., 3) the acidophilic mosses have >30% cover, 4) at least one species from Table 1 is present, and 5) the cover of invasive species (see Table 1) is <25%?	YES Wetland is a Category 3 wetland Go to Question 7	NO Go to Question 7
7	**Fens.** Is the wetland a carbon accumulating (peat, muck) wetland that is saturated during most of the year, primarily by a discharge of free flowing, mineral rich, ground water with a circumneutral ph (5.5-9.0) and with one or more plant species listed in Table 1 and the cover of invasive species listed in Table 1 is <25%?	YES Wetland is a Category 3 wetland Go to Question 8a	NO Go to Question 8a
8a	**"Old Growth Forest."** Is the wetland a forested wetland and is the forest characterized by, but not limited to, the following characteristics: overstory canopy trees of great age (exceeding at least 50% of a projected maximum attainable age for a species); little or no evidence of human-caused understory disturbance during the past 80 to 100 years; an all-aged structure and multilayered canopies; aggregations of canopy trees interspersed with canopy gaps; and significant numbers of standing dead snags and downed logs?	YES Wetland is a Category 3 wetland. Go to Question 8b	NO Go to Question 8b

8b	**Mature forested wetlands**. Is the wetland a forested wetland with 50% or more of the cover of upper forest canopy consisting of deciduous trees with large diameters at breast height (dbh), generally diameters greater than 45cm (17.7in) dbh?	YES Wetland should be evaluated for possible Category 3 status. Go to Question 9a	NO Go to Question 9a
9a	**Lake Erie coastal and tributary wetlands**. Is the wetland located at an elevation less than 575 feet on the USGS map, adjacent to this elevation, or along a tributary to Lake Erie that is accessible to fish?	YES Go to Question 9b	NO Go to Question 10
9b	Does the wetland's hydrology result from measures designed to prevent erosion and the loss of aquatic plants, i.e. the wetland is partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 9c
9c	Are Lake Erie water levels the wetland's primary hydrological influence, i.e. the wetland is hydrologically unrestricted (no lakeward or upland border alterations), or the wetland can be characterized as an "estuarine" wetland with lake and river influenced hydrology. These include sandbar deposition wetlands, estuarine wetlands, river mouth wetlands, or those dominated by submersed aquatic vegetation.	YES Go to Question 9d	NO Go to Question 10
9d	Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant native species can also be present?	YES Wetland is a Category 3 wetland Go to Question 10	NO Go to Question 9e
9e	Does the wetland have a predominance of non-native or disturbance tolerant native plant species within its vegetation communities?	YES Wetland should be evaluated for possible Category 3 status Go to Question 10	NO Go to Question 10
10	**Lake Plain Sand Prairies (Oak Openings)** Is the wetland located in Lucas, Fulton, Henry, or Wood Counties and can the wetland be characterized by the following description: the wetland has a sandy substrate with interspersed organic matter, a water table often within several inches of the surface, and often with a dominance of the gramineous vegetation listed in Table 1 (woody species may also be present). The Ohio Department of Natural Resources Division of Natural Areas and Preserves can provide assistance in confirming this type of wetland and its quality.	YES Wetland is a Category 3 wetland. Go to Question 11	NO Go to Question 11
11	**Relict Wet Prairies**. Is the wetland a relict wet prairie community dominated by some or all of the species in Table 1. Extensive prairies were formerly located in the Darby Plains (Madison and Union Counties), Sandusky Plains (Wyandot, Crawford, and Marion Counties), northwest Ohio (e.g. Erie, Huron, Lucas, Wood Counties), and portions of western Ohio Counties (e.g. Darke, Mercer, Miami, Montgomery, Van Wert etc.).	YES Wetland should be evaluated for possible Category 3 status Complete Quantitative Rating	NO Complete Quantitative Rating

Table 1. Characteristic plant species.

invasive/exotic spp	fen species	bog species	0ak Opening species	wet prairie species
Lythrum salicaria	*Zygadenus elegans var. glaucus*	*Calla palustris*	*Carex cryptolepis*	*Calamagrostis canadensis*
Myriophyllum spicatum	*Cacalia plantaginea*	*Carex atlantica var. capillacea*	*Carex lasiocarpa*	*Calamogrostis stricta*
Najas minor	*Carex flava*	*Carex echinata*	*Carex stricta*	*Carex atherodes*
Phalaris arundinacea	*Carex sterilis*	*Carex oligosperma*	*Cladium mariscoides*	*Carex buxbaumii*
Phragmites australis	*Carex stricta*	*Carex trisperma*	*Calamagrostis stricta*	*Carex pellita*
Potamogeton crispus	*Deschampsia caespitosa*	*Chamaedaphne calyculata*	*Calamagrostis canadensis*	*Carex sartwellii*
Ranunculus ficaria	*Eleocharis rostellata*	*Decodon verticillatus*	*Quercus palustris*	*Gentiana andrewsii*
Rhamnus frangula	*Eriophorum viridicarinatum*	*Eriophorum virginicum*		*Helianthus grosseserratus*
Typha angustifolia	*Gentianopsis spp.*	*Larix laricina*		*Liatris spicata*
Typha xglauca	*Lobelia kalmii*	*Nemopanthus mucronatus*		*Lysimachia quadriflora*
	Parnassia glauca	*Schechzeria palustris*		*Lythrum alatum*
	Potentilla fruticosa	*Sphagnum spp.*		*Pycnanthemum virginianum*
	Rhamnus alnifolia	*Vaccinium macrocarpon*		*Silphium terebinthinaceum*
	Rhynchospora capillacea	*Vaccinium corymbosum*		*Sorghastrum nutans*
	Salix candida	*Vaccinium oxycoccos*		*Spartina pectinata*
	Salix myricoides	*Woodwardia virginica*		*Solidago riddellii*
	Salix serissima	*Xyris difformis*		
	Solidago ohioensis			
	Tofieldia glutinosa			
	Triglochin maritimum			
	Triglochin palustre			

End of Narrative Rating. Begin Quantitative Rating on next page.

Site: Lordstown	**Rater(s):** J.Stratigakos	**Date:** 11/12/2014

0.0	0.0
max 6 pts.	subtotal

Metric 1. Wetland Area (size).

Select one size class and assign score.

0.0

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [ ] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [x] <0.1 acres (0.04ha) (0 pts)

4.0	4.0
max 14 pts.	subtotal

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

1.0

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [ ] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [x] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

3.0

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [ ] LOW. Old field (>10 years), shrub land, young second growth forest. (5)
- [x] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [ ] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

3.0	7.0
max 30 pts.	subtotal

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

1.0

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [✓] Precipitation (1)
- [ ] Seasonal/Intermittent surface water (3)
- [ ] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

0.0

- [ ] 100 year floodplain (1)
- [ ] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [ ] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

1.0

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [✓] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

1.0

- [ ] Semi- to permanently inundated/saturated (4)
- [ ] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [✓] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

3.0

- [ ] None or none apparent (12)
- [ ] Recovered (7)
- [✓] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [ ] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [ ] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [ ] other______________________

7.0	14.0
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

2.0

- [ ] None or none apparent (4)
- [ ] Recovered (3)
- [x] Recovering (2)
- [ ] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

2.0

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [ ] Fair (3)
- [x] Poor to fair (2)
- [ ] Poor (1)

4c. Habitat alteration. Score one or double check and average.

3.0

- [ ] None or none apparent (9)
- [ ] Recovered (6)
- [x] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [ ] farming
- [ ] nutrient enrichment

14.0
subtotal this page

last revised 1 February 2001 jjm

Site: Lordstown	**Rater(s):** J.Stratigakos	**Date:** 11/12/2014

14.0
subtotal first page

0.0 | 14.0
max 10 pts. | subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

0

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Prairies (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

0.0 | 14.0
max 20 pts. | subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

3

- 0 Aquatic bed
- 2 Emergent
- 0 Shrub
- 1 Forest
- 0 Mudflats
- 0 Open water
- Other____________________

6b. horizontal (plan view) Interspersion.
Select only one.

2

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [x] Moderately low (2)
- [ ] Low (1)
- [ ] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

-5

- -5 Extensive >75% cover (-5)
- [ ] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [ ] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

0

- [ ] Vegetated hummucks/tussucks
- [ ] Coarse woody debris >15cm (6in)
- [ ] Standing dead >25cm (10in) dbh
- [ ] Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

14.0

End of Quantitative Rating. Complete Categorization Worksheets.

ORAM Summary Worksheet

		circle answer or insert score	Result
Narrative Rating	Question 1 Critical Habitat	YES NO	If yes, Category 3.
	Question 2. Threatened or Endangered Species	YES NO	If yes, Category 3.
	Question 3. High Quality Natural Wetland	YES NO	If yes, Category 3.
	Question 4. Significant bird habitat	YES NO	If yes, Category 3.
	Question 5. Category 1 Wetlands	YES NO	If yes, Category 1.
	Question 6. Bogs	YES NO	If yes, Category 3.
	Question 7. Fens	YES NO	If yes, Category 3.
	Question 8a. Old Growth Forest	YES NO	If yes, Category 3.
	Question 8b. Mature Forested Wetland	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9b. Lake Erie Wetlands - Restricted	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9d. Lake Erie Wetlands – Unrestricted with native plants	YES NO	If yes, Category 3
	Question 9e. Lake Erie Wetlands - Unrestricted with invasive plants	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 10. Oak Openings	YES NO	If yes, Category 3
	Question 11. Relict Wet Prairies	YES NO	If yes, evaluate for Category 3; may also be 1 or 2.
Quantitative Rating	Metric 1. Size	0.00	
	Metric 2. Buffers and surrounding land use	4.00	
	Metric 3. Hydrology	3.00	
	Metric 4. Habitat	7.00	
	Metric 5. Special Wetland Communities	0.00	
	Metric 6. Plant communities, interspersion, microtopography	0.00	
	TOTAL SCORE	14.00	Category based on score breakpoints 1

Complete Wetland Categorization Worksheet.

Wetland Categorization Worksheet

Choices	Circle one		Evaluation of Categorization Result of ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 2, 3, 4, 6, 7, 8a, 9d, 10	YES Wetland is categorized as a Category 3 wetland	NO	Is quantitative rating score *less* than the Category 2 scoring threshold (*excluding* gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been over-categorized by the ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 1, 8b, 9b, 9e, 11	YES Wetland should be evaluated for possible Category 3 status	NO	Evaluate the wetland using the 1) narrative criteria in OAC Rule 3745-1-54(C) and 2) the quantitative rating score. If the wetland is determined to be a Category 3 wetland using either of these, it should be categorized as a Category 3 wetland. Detailed biological and/or functional assessments may also be used to determine the wetland's category.
Did you answer "Yes" to Narrative Rating No. 5	YES Wetland is categorized as a Category 1 wetland	NO	Is quantitative rating score *greater* than the Category 2 scoring threshold (*including* any gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been under-categorized by the ORAM
Does the quantitative score fall within the scoring range of a Category 1, 2, or 3 wetland?	YES Wetland is assigned to the appropriate category based on the scoring range	NO	If the score of the wetland is located within the scoring range for a particular category, the wetland should be assigned to that category. In all instances however, the narrative criteria described in OAC Rule 3745-1-54(C) can be used to clarify or change a categorization based on a quantitative score.
Does the quantitative score fall with the *"gray zone"* for Category 1 or 2 or Category 2 or 3 wetlands?	YES Wetland is assigned to the higher of the two categories or assigned to a category based on detailed assessments and the narrative criteria	NO	Rater has the option of assigning the wetland to the higher of the two categories or to assign a category based on the results of a nonrapid wetland assessment method, e.g. functional assessment, biological assessment, etc, and a consideration of the narrative criteria in OAC rule 3745-1-54(C).
Does the wetland otherwise exhibit *moderate OR superior* hydrologic OR habitat, OR recreational functions AND the wetland was *not* categorized as a Category 2 wetland (in the case of moderate functions) or a Category 3 wetland (in the case of superior functions) by this method?	YES Wetland was undercategorized by this method. A written justification for recategorization should be provided on Background Information Form	NO Wetland is assigned to category as determined by the ORAM.	A wetland may be undercategorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54(C)(2) and (3) are controlling, and the under-categorization should be corrected. A written justification with supporting reasons or information for this determination should be provided.

Final Category

Choose one	Category 1	Category 2	Category 3

14

End of Ohio Rapid Assessment Method for Wetlands.

Ohio EPA — Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 47

Stream & Location: Stream 1 (Mud Creek) **RM:** 5.75 **Date:** 11/06/14

Scorers Full Name & Affiliation: Jessica Stratigakos/The Mannik & Smith G

River Code: ___ **STORET #:** ___ **Lat./ Long.:** (NAD 83 - decimal °) 41.15 /8 0.84 Office verified location ☐

1] SUBSTRATE
Check *ONLY* Two substrate *TYPE BOXES*; estimate % or note every type present

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☒ ☐ GRAVEL [7]	30	70	☐ ☒ SILT [2]	70	30
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Comments

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☒ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☒ HEAVY [-2]
- ☐ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ NONE [1]

Substrate 7 — *Maximum 20*

2] INSTREAM COVER
Indicate presence 0 to 3: **0**-Absent; **1**-Very small amounts or if more common of marginal quality; **2**-Moderate amounts, but not of highest quality or in small amounts of highest quality; **3**-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

- 0 UNDERCUT BANKS [1]
- 0 OVERHANGING VEGETATION [1]
- 0 SHALLOWS (IN SLOW WATER) [1]
- 0 ROOTMATS [1]
- 2 POOLS > 70cm [2]
- 0 ROOTWADS [1]
- 0 BOULDERS [1]
- 0 OXBOWS, BACKWATERS [1]
- 0 AQUATIC MACROPHYTES [1]
- 0 LOGS OR WOODY DEBRIS [1]

AMOUNT — Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☒ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 9 — *Maximum 20*

3] CHANNEL MORPHOLOGY
Check ONE in each category (*Or 2 & average*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☒ LOW [2]	☒ FAIR [3]	☒ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel 11 — *Maximum 20*

4] BANK EROSION AND RIPARIAN ZONE
Check **ONE** in each category for ***EACH BANK*** (*Or 2 per bank & average*)

River right looking downstream

EROSION (L R)
- ☒ ☒ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☒ ☒ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☐ FOREST, SWAMP [3]
- ☐ ☐ SHRUB OR OLD FIELD [2]
- ☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ FENCED PASTURE [1]
- ☒ ☒ OPEN PASTURE, ROWCROP [0]
- ☐ ☐ CONSERVATION TILLAGE [1]
- ☐ ☐ URBAN OR INDUSTRIAL [0]
- ☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 4 — *Maximum 10*

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH — Check **ONE** (*ONLY!*)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH — Check ONE (*Or 2 & average*)
- ☒ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY — Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☒ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☐ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 9 — *Maximum 12*

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (*Or 2 & average*). ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH
- ☐ BEST AREAS > 10cm [2]
- ☒ BEST AREAS 5-10cm [1]
- ☐ BEST AREAS < 5cm [metric=0]

RUN DEPTH
- ☐ MAXIMUM > 50cm [2]
- ☒ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE
- ☐ STABLE (e.g., Cobble, Boulder) [2]
- ☒ MOD. STABLE (e.g., Large Gravel) [1]
- ☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ NONE [2]
- ☒ LOW [1]
- ☐ MODERATE [0]
- ☐ EXTENSIVE [-1]

Comments

Riffle / Run 4 — *Maximum 8*

6] GRADIENT (ft/mi)
DRAINAGE AREA (2.97 mi²)

- ☒ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 10 %GLIDE: 10
%RUN: 70 %RIFFLE: 10

Gradient 3 — *Maximum 10*

A] SAMPLED REACH Check ALL that apply

Comment RE: Reach consistency/ Is reach typical of steam?, *Recreation/* Observed - Inferred, *Other/* Sampling observations, Concerns, Access directions, etc.

METHOD
- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☐ OTHER

STAGE 1st -sample pass- 2nd
- ☐ HIGH ☐
- ☐ UP ☐
- ☐ NORMAL ☐
- ☐ LOW ☐
- ☐ DRY ☐

DISTANCE
- ☐ 0.5 Km
- ☐ 0.2 Km
- ☐ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_______ meters

CLARITY 1st --sample pass-- 2nd
- ☐ < 20 cm ☐
- ☐ 20-<40 cm ☐
- ☐ 40-70 cm ☐
- ☐ > 70 cm/ CTB ☐
- ☐ SECCHI DEPTH ☐

CANOPY
- ☐ > 85%- OPEN
- ☐ 55%-<85%
- ☐ 30%-<55%
- ☐ 10%-<30%
- ☐ <10%- CLOSED

1st pass _________ cm
2nd _________ cm

C] RECREATION AREA DEPTH
POOL: ☐>100ft² ☐>3ft

B] AESTHETICS
- ☐ NUISANCE ALGAE
- ☐ INVASIVE MACROPHYTES
- ☐ EXCESS TURBIDITY
- ☐ DISCOLORATION
- ☐ FOAM / SCUM
- ☐ OIL SHEEN
- ☐ TRASH / LITTER
- ☐ NUISANCE ODOR
- ☐ SLUDGE DEPOSITS
- ☐ CSOs/SSOs/OUTFALLS

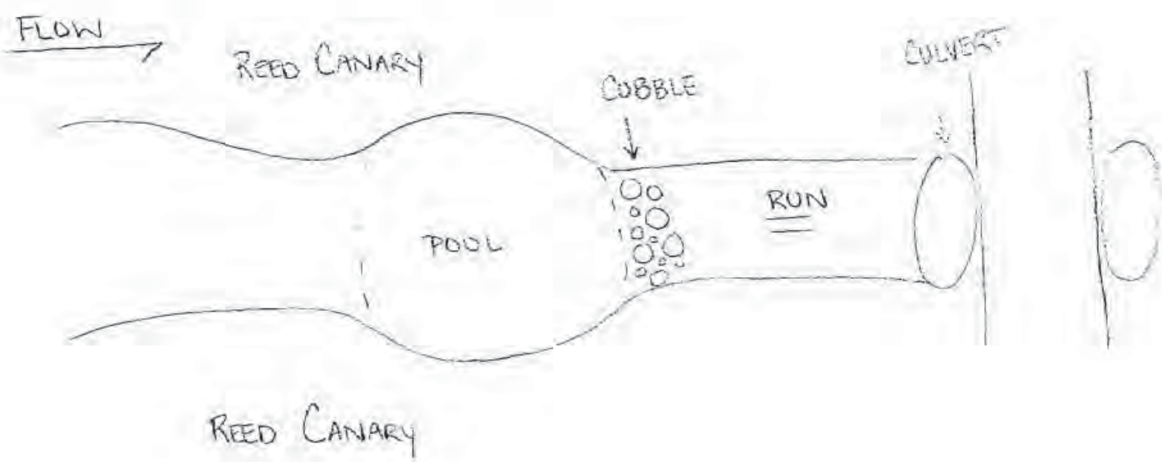
D] MAINTENANCE
PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

Circle some & *COMMENT*

E] ISSUES
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_2O / TILE / H_2O TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENTS
$\bar{x}$ width
$\bar{x}$ depth
max. depth
$\bar{x}$ bankfull width
bankfull $\bar{x}$ depth
W/D ratio
bankfull max. depth
floodprone x^2 width
entrench. ratio
Legacy Tree:

Stream Drawing:



Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 47

SITE NAME/LOCATION: Stream 2 (Unnamed Tributarty to Mud Creek)

SITE NUMBER: C4580001 RIVER BASIN: DRAINAGE AREA (mi^2): 0.04

LENGTH OF STREAM REACH (ft): LAT. 41.14700 LONG. -80.83700 RIVER CODE: NA RIVER MILE: NA

DATE: 11/07/14 SCORER: J.Stratigak COMMENTS:

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL MODIFICATIONS: ☐ NONE / NATURAL CHANNEL ☐ RECOVERED ☑ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type of substrate present. Check *ONLY* two predominant substrate *TYPE* boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	Substrate	PERCENT	TYPE	Substrate	PERCENT
☐☐	BLDR SLABS [16 pts]	0%	☑☑	SILT [3 pt]	100%
☐☐	BOULDER (>256 mm) [16 pts]	0%	☐☐	LEAF PACK/WOODY DEBRIS [3 pts]	0%
☐☐	BEDROCK [16 pt]	0%	☐☐	FINE DETRITUS [3 pts]	0%
☐☐	COBBLE (65-256 mm) [12 pts]	0%	☐☐	CLAY or HARDPAN [0 pt]	0%
☐☐	GRAVEL (2-64 mm) [9 pts]	0%	☐☐	MUCK [0 pts]	0%
☐☐	SAND (<2 mm) [6 pts]	0%	☐☐	ARTIFICIAL [3 pts]	0%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock: 0.00%

Substrate Percentage Check: 100%

(A) SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 6

(B) TOTAL NUMBER OF SUBSTRATE TYPES: 1

HHEI Metric Points — Substrate Max = 40: **7** (A + B)

2. Maximum Pool Depth *(Measure the maximum pool depth within the 61 meter (200 ft)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☑ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☐ > 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5 pts]
- ☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS **MAXIMUM POOL DEPTH (centimeters):**

Pool Depth Max = 30: **20**

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) **(Check *ONLY* one box):**

- ☐ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☑ > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☐ ≤ 1.0 m (<=3' 3") [5 pts]

COMMENTS **AVERAGE BANKFULL WIDTH (meters):**

Bankfull Width Max=30: **20**

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH L R	(Per Bank)	FLOODPLAIN QUALITY L R	(Most Predominant per Bank)	L R	
☐☐	Wide >10m	☐☐	Mature Forest, Wetland	☐☐	Conservation Tillage
☐☐	Moderate 5-10m	☐☐	Immature Forest, Shrub or Old Field	☐☐	Urban or Industrial
☑☑	Narrow <5m	☑☑	Residential, Park, New Field	☐☐	Open Pasture, Row Crop
☐☐	None	☐☐	Fenced Pasture	☐☐	Mining or Construction

COMMENTS

FLOW REGIME *(At Time of Evaluation)* (Check *ONLY* one box):

- ☑ Stream Flowing
- ☐ Subsurface flow with isolated pools (Interstitial)
- ☐ Moist Channel, isolated pools, no flow (Intermittent)
- ☐ Dry channel, no water (Ephemeral)

COMMENTS

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check *ONLY* one box):

☐ None ☐ 0.5 ☑ 1.0 ☐ 1.5 ☐ 2.0 ☐ 2.5 ☐ 3.0 ☐ >3

STREAM GRADIENT ESTIMATE

☑ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? ☐ Yes ☒ No QHEI Score ______ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☐ WWH Name: ______ Distance from Evaluated Stream ______
☐ CWH Name: ______ Distance from Evaluated Stream ______
☐ EWH Name: ______ Distance from Evaluated Stream ______

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: ______ NRCS Soil Map Page: ______ NRCS Soil Map Stream Order ______

County: Wyandot Township / City: ______

MISCELLANEOUS

Base Flow Conditions? (Y/N): Y Date of last precipitation: 11/6 Quantity: 0.00

Photograph Information: ______

Elevated Turbidity? (Y/N): Y Canopy (% open): 0%

Were samples collected for water chemistry? (Y/N): Y (Note lab sample no. or id. and attach results) Lab Number: ______

Field Measures: Temp (°C) ______ Dissolved Oxygen (mg/l) ______ pH (S.U.) ______ Conductivity (µmhos/cm) ______

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: ______

Additional comments/description of pollution impacts: ______

BIOTIC EVALUATION

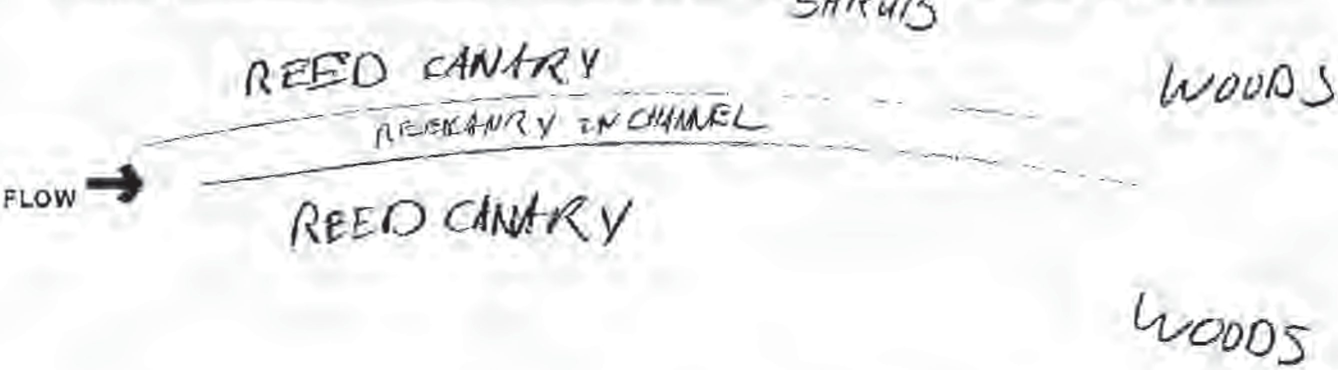
Performed? (Y/N): Y (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) Y Voucher? (Y/N) Y Salamanders Observed? (Y/N) Y Voucher? (Y/N) Y
Frogs or Tadpoles Observed? (Y/N) Y Voucher? (Y/N) Y Aquatic Macroinvertebrates Observed? (Y/N) Y Voucher? (Y/N) Y

Comments Regarding Biology:
DEAD SMALL FISH FOUND

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 27

SITE NAME/LOCATION: Stream 3 (Unnamed Tributarty to Mud Creek)

SITE NUMBER: C4580001 RIVER BASIN: DRAINAGE AREA (mi²): 0.04

LENGTH OF STREAM REACH (ft): 200 LAT. 41.14900 LONG. -80.84300 RIVER CODE: NA RIVER MILE: NA

DATE: 11/07/14 SCORER: J.Stratigak COMMENTS:

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL MODIFICATIONS: ☐ NONE / NATURAL CHANNEL ☐ RECOVERED ☑ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type of substrate present. Check *ONLY* two predominant substrate *TYPE* boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE		PERCENT	TYPE		PERCENT
☐☐	BLDR SLABS [16 pts]	0%	☐☑	SILT [3 pt]	100%
☐☐	BOULDER (>256 mm) [16 pts]	0%	☑☐	LEAF PACK/WOODY DEBRIS [3 pts]	0%
☐☐	BEDROCK [16 pt]	0%	☐☐	FINE DETRITUS [3 pts]	0%
☐☐	COBBLE (65-256 mm) [12 pts]	0%	☐☐	CLAY or HARDPAN [0 pt]	0%
☐☐	GRAVEL (2-64 mm) [9 pts]	0%	☐☐	MUCK [0 pts]	0%
☐☐	SAND (<2 mm) [6 pts]	0%	☐☐	ARTIFICIAL [3 pts]	0%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock: 0.00%

Substrate Percentage Check: 100%

(A) **SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES:** 6

(B) **TOTAL NUMBER OF SUBSTRATE TYPES:** 1

HHEI Metric Points

Substrate Max = 40: **7** (A + B)

2. Maximum Pool Depth *(Measure the maximum pool depth within the 61 meter (200 ft)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☐ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☑ > 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5 pts]
- ☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS **MAXIMUM POOL DEPTH (centimeters):**

Pool Depth Max = 30: **15**

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) **(Check *ONLY* one box):**

- ☐ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☐ > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☑ ≤ 1.0 m (<=3' 3") [5 pts]

COMMENTS **AVERAGE BANKFULL WIDTH (meters):** 1.00

Bankfull Width Max=30: **5**

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH L R	(Per Bank)	FLOODPLAIN QUALITY L R	(Most Predominant per Bank)	L R	
☐☐	Wide >10m	☐☐	Mature Forest, Wetland	☐☐	Conservation Tillage
☐☐	Moderate 5-10m	☐☐	Immature Forest, Shrub or Old Field	☐☐	Urban or Industrial
☑☑	Narrow <5m	☑☑	Residential, Park, New Field	☐☐	Open Pasture, Row Crop
☐☐	None	☐☐	Fenced Pasture	☐☐	Mining or Construction

COMMENTS

FLOW REGIME *(At Time of Evaluation)* (Check *ONLY* one box):

- ☑ Stream Flowing
- ☐ Subsurface flow with isolated pools (Interstitial)
- ☐ Moist Channel, isolated pools, no flow (Intermittent)
- ☐ Dry channel, no water (Ephemeral)

COMMENTS

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check *ONLY* one box):

- ☑ None
- ☐ 0.5
- ☐ 1.0
- ☐ 1.5
- ☐ 2.0
- ☐ 2.5
- ☐ 3.0
- ☐ >3

STREAM GRADIENT ESTIMATE

☑ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? - ☐ Yes ☑ No QHEI Score ____ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☐ WWH Name: ____ Distance from Evaluated Stream ____
☐ CWH Name: ____ Distance from Evaluated Stream ____
☐ EWH Name: ____ Distance from Evaluated Stream ____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: ____ NRCS Soil Map Page: ____ NRCS Soil Map Stream Order ____

County: Wyandot Township / City: ____

MISCELLANEOUS

Base Flow Conditions? (Y/N): Y Date of last precipitation: 11/06/14 Quantity: 0.00

Photograph Information: ____

Elevated Turbidity? (Y/N): N Canopy (% open): 0%

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number ____

Field Measures: Temp (°C) ____ Dissolved Oxygen (mg/l) ____ pH (S.U.) ____ Conductivity (µmhos/cm) ____

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: ____

Additional comments/description of pollution impacts: ____

BIOTIC EVALUATION

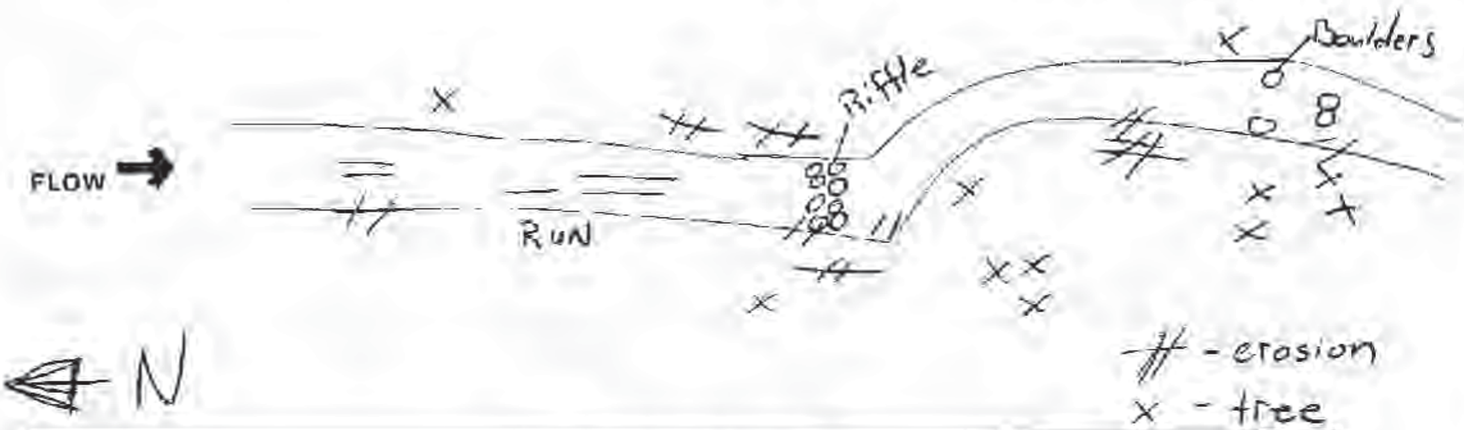
Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) N Voucher? (Y/N) N Salamanders Observed? (Y/N) N Voucher? (Y/N) N
Frogs or Tadpoles Observed? (Y/N) N Voucher? (Y/N) Y Aquatic Macroinvertebrates Observed? (Y/N) N Voucher? (Y/N) N

Comments Regarding Biology: ____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



[redacted] [redacted]

APPENDIX B
SITE PHOTOGRAPHS

Photo 1: SP-1 Wetland A.

Photo 2: Wetland A looking south.

Photo 3: Upland SP-2 looking south.

Photo 4: SP-3 Wetland B looking northwest.

Photo 5: Wetland B looking west.

Photo 6: SP-4 Wetland C looking west.

Photo 7: Wetland C looking north.

Photo 8: SP-5 Wetland D looking east.

Photo 9: Upland SP-6 area looking west.

Photo 10: SP-7Wetland E.

Photo 11: Wetland E looking east.

Photo 12: SP-8 Wetland F looking south.

Photo 13: Upland SP-9 looking west.

Photo 14: SP-11 Wetland G looking southwest.

Photo 15: SP-12 Wetland H looking east.

Photo 16: SP-13 Wetland I looking southwest

.

Photo 17: SP-15 Wetland J looking south.

Photo 18: Upland SP-16 looking east.

Photo 19: Pond 1 looking west

Photo 20: Pond 2 located by Wetland H looking southwest

Photo 21: Pond 3 Beaver pond looking west.

Photo 22: Beaver dam looking northeast.

Photo 23: Stream 1(Mud Creek) looking upstream.

Photo 24: Stream 1 (Mud Creek) looking downstream

Photo 25: Stream 2 looking upstream.

Photo 26: Stream 2 looking downstream.

Photo 27: Stream 3 looking upstream.

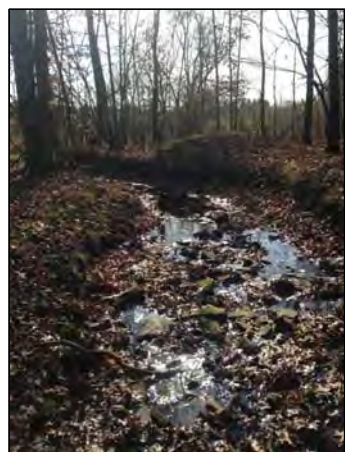


Photo 28: Stream 3 looking downstream.

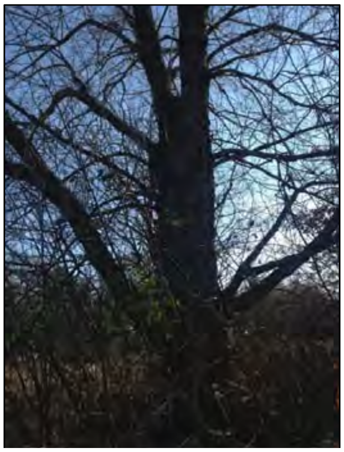


Photo 29: Potential Indiana Bat trees, located near Wetland B.

1800 Indian Wood Circle, Maumee, Ohio 43537
Tel: 419.891.2222 Fax: 419.891.1595

APPENDIX C
RESOURCE AGENCY CORRESPONDENCE

Mannik Smith GROUP

January 23, 2015

Dr. Mary Knapp
U.S. Fish and Wildlife Services
4625 Morse Road Site 104
Columbus, Ohio 43230-8355

Re: Request for Information for proposed Clean Energy Future-Lordstown LLC., Lordstown, Trumbull County, Ohio

Dear Dr. Knapp:

I am submitting this letter as a request for information regarding any federally-listed species that may occur within the site as depicted on the enclosed figure (Figure 1). We are currently gathering ecological information for inclusion in Clean Water Act permit applications for the proposed Clean Energy Future-Lordstown LLC., Henn Parkway and State Route 45 in Lordstown, Trumbull County, Ohio. The project area lies on the Warren, Trumbull County, Ohio, Ohio Quadrangle maps. Attached is a copy of this map with the study areas indicated to assist you in your search.

The project site is approximately 77 acres of relative flat terrain with a variety of habitats that are still being qualified. Clearing of the project area and construction for this project is proposed to begin after April 1, 2015.

We are requesting any information that your agency may have regarding the occurrence of federally listed plants and animals, plant communities and breeding/non-breeding animal concentrations within the project area. Please contact me with any questions pertaining to this matter at 216.378.1490 or jstratigakos@manniksmithgroup.com.

Thank you for your assistance in this matter.

Sincerely,

Jessica Stratigakos
Environmental Scientist

Enclosure

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. Fish and Wildlife Service
Ecological Services Office
4625 Morse Road, Suite 104
Columbus, Ohio 43230
(614) 416-8993 / Fax (614) 416-8994

February 25, 2015

Mannik Smith Group
Attn: Jessica Stratigakos
23225 Mercantile Road
Beachwood, OH 44122

TAILS# 03E15000-2015-TA-0799

Reference: Mannik Smith Group, Clean Energy Future-Lordstown, Trumbull County, Ohio

Dear Ms. Stratigakos,

We have received your recent correspondence requesting information about the subject proposal. The proposed project involving Clean Energy Future consists of a project area of 77 acres. There are no federal wilderness areas, wildlife refuges or designated critical habitat within the vicinity of the project area. The following comments and recommendations will assist you in fulfilling the requirements for consultation under section 7 of the Endangered Species Act of 1973, as amended (ESA).

The Service recommends that proposed developments avoid and minimize water quality impacts and impacts to high quality fish and wildlife habitat (e.g., forests, streams, wetlands). Additionally, natural buffers around streams and wetlands should be preserved to enhance beneficial functions. If streams or wetlands will be impacted, the Corps of Engineers should be contacted to determine whether a Clean Water Act section 404 permit is required. Best management practices should be used to minimize erosion, especially on slopes. All disturbed areas should be mulched and revegetated with native plant species. Prevention of non-native, invasive plant establishment is critical in maintaining high quality habitats.

LISTED SPECIES COMMENTS: All projects in the State of Ohio lie within the range of the **Indiana bat** (*Myotis sodalis*), a federally listed endangered species. Since first listed as endangered in 1967, their population has declined by nearly 60%. Several factors have contributed to the decline of the Indiana bat, including the loss and degradation of suitable hibernacula, human disturbance during hibernation, pesticides, and the loss and degradation of forested habitat, particularly stands of large, mature trees. Fragmentation of forest habitat may also contribute to declines. During winter, Indiana bats hibernate in caves and abandoned mines. Summer habitat requirements for the species are not well defined but the following are considered important:

(1) dead or live trees and snags with peeling or exfoliating bark, split tree trunk and/or branches, or cavities, which may be used as maternity roost areas;
(2) live trees (such as shagbark hickory and oaks) which have exfoliating bark;
(3) stream corridors, riparian areas, and upland woodlots which provide forage sites.

Should the proposed site contain trees or associated habitats exhibiting any of the characteristics listed above and/or the site contains any caves or abandoned mines, we recommend that the habitat and surrounding trees be saved wherever possible. If any caves or abandoned mines may be disturbed, further coordination with this office is requested to determine if surveys are warranted. Any survey should be designed and conducted in coordination with the Endangered Species Coordinator for this office. If no caves or abandoned mines are present and tree removal is unavoidable, any tree removal should only occur between October 1 and March 31.

If there is a federal nexus for the project (e.g., federal funding provided, federal permits required to construct), no tree clearing on any portion of the parcel should occur until consultation under section 7 of the ESA, between the Service and the federal action agency, is completed. We recommend that the federal action agency submit a determination of effects to this office, relative to the Indiana bat, for our review and concurrence.

PROPOSED SPECIES COMMENTS: The proposed project lies within the range of the **northern long-eared bat** (*Myotis septentrionalis*), a species that is currently proposed for listing as federally endangered under the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*). The final listing decision for the northern long-eared bat will occur no later than April 2, 2015. No critical habitat has been proposed at this time. Recently white-nose syndrome (WNS), a novel fungal pathogen, has caused serious declines in the northern long-eared bat population in the northeastern U.S. WNS has also been documented in Ohio, but the full extent of the impacts from WNS in Ohio is not yet known.

During winter, northern long-eared bats hibernate in caves and abandoned mines. Summer habitat requirements for the species are not well defined but the following are considered important:

(1) Roosting habitat in dead or live trees and snags with cavities, peeling or exfoliating bark, split tree trunk and/or branches, which may be used as maternity roost areas;
(2) Foraging habitat in upland and lowland woodlots and tree lined corridors;
(3) Occasionally they may roost in structures like barns and sheds.

Pursuant to section 7(a)(4) of the ESA, federal action agencies are required to confer with the Service if their proposed action is likely to jeopardize the continued existence of the northern long-eared bat (50 CFR 402.10(a)). Federal action agencies may also voluntarily confer with the Service if the proposed action may affect a proposed species. Nevertheless, species proposed for listing are not afforded protection under the ESA; however as soon as a listing becomes effective, the prohibition against jeopardizing its continued existence and "take" applies regardless of an action's stage of completion. If the federal agency retains any discretionary involvement or control over on-the-ground actions that may affect the species after listing, section 7 applies.

The proposed project is in the vicinity of one or more confirmed records of northern long-eared bats. Therefore, we recommend that trees exhibiting any of the characteristics listed above, as well as any wooded areas or tree lined corridors be saved wherever possible. If any caves or abandoned mines may be disturbed, further coordination with this office is requested to determine if fall or spring surveys are warranted. If no caves or abandoned mines are present and trees must be cut, we recommend that any tree removal occur between October 1 and March 31 to avoid impacts to northern long-eared bats. Incorporating these conservation measures into your project at this time may avoid significant future project delays should the listing become official.

CANDIDATE SPECIES COMMENTS: The project lies within the range of the **eastern massasauga** (*Sistrurus catenatus*), a small, docile rattlesnake that is currently a Federal candidate species. Since designated as a candidate species in 1999, it has declined significantly throughout its range and populations in Ohio that were once throughout glaciated portions of the state, are now small and isolated. The species has been listed by the State of Ohio as endangered since 1996. Several factors have contributed to the decline of the species including habitat loss and fragmentation, indiscriminate killing, collection, gene pool contamination and incompatible land use practices.

Eastern massasaugas use both upland and wetland habitat and these habitats differ by season. During the winter, massasaugas hibernate in low wet areas, primarily in crayfish burrows, but may use other structures. Presence of a water table near the surface is important for a suitable hibernaculum. In the summer, massasaugas use drier, open areas that contain a mix of grasses and forbs such as goldenrods and other prairie plants that may be intermixed with trees or shrubs. Adjoining lowland and upland habitat with variable elevations between are critical for the species to travel back and forth seasonally. Should the proposed project area contain any of the habitat types or features described above, we recommend that a habitat assessment be conducted to determine if suitable habitat for the species exists within the vicinity of the proposed site. Please note that habitat assessments should only be conducted by approved eastern massasauga surveyors due to variable habitat types and cryptic nature of the species. Any habitat assessments or surveys should be coordinated with this office.

Due to the project type, size, and location, we do not anticipate adverse effects to any other federally endangered, threatened, proposed, or candidate species. Should the project design change, or during the term of this action, additional information on listed or proposed species or their critical habitat become available, or if new information reveals effects of the action that were not previously considered, consultation with the Service should be initiated to assess any potential impacts.

These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Endangered Species Act of 1973 (ESA), as amended, and are consistent with the intent of the National Environmental Policy Act of 1969 and the U. S. Fish and Wildlife Service's Mitigation Policy. This letter provides technical assistance only and does not serve as a completed section 7 consultation document.

We recommend that the project be coordinated with the Ohio Department of Natural Resources due to the potential for the project to affect state listed species. Contact John Kessler, Environmental Services Administrator, at (614) 265-6621 or at john.kessler@dnr.state.oh.us

If you have any questions, or we may be of further assistance in this matter, please contact Charlie Allen at charles_allen@fws.gov or extension 29 in this office.

Sincerely,

Dan Everson
Field Supervisor

Enclosure: Eastern Massasauga Surveyors List

cc: Nathan Reardon, ODNR-DOW
Jennifer Norris, ODNR-DOW

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
4625 Morse Road, Suite 104
Columbus, Ohio 43230
(614) 416-8993 / FAX (614) 416-8994

January 23, 2015

Qualified Eastern Massasauga Surveyors for Ohio

Doug Wynn 241 Chase Street Apt. A1 Russells Point, OH 43348 (614) 306-0313 sistrurus@aol.com	Jeffery G. Davis 625 Crescent Road Hamilton, OH 45013 (513) 868-3154 anura@fuse.net
Gregory Lipps, LLC 1473 County Road 5 2 Delta, OH 43515 (419) 376-3441 GregLipps@gmail.com	Tim Matson 5696 Matson Road Geneva, OH 44041 (216) 231-4600 ext.3247 (440) 466-5067 tmatson@cmnh.org

[redacted] [redacted]

WETLAND AND STREAM MITIGATION PLAN - REVISED
Henn Development

Prepared for:
Henn Development
Lordstown, Ohio

Prepared by:
ms consultants, inc.
engineers, architects, and planners
1 South Main Street
Akron, Ohio 44308-1864

Original Mitigation Plan - June 2009
Revised Plan – May 2011
Revised Narrative – December 2011

WETLAND AND STREAM MITIGATION PLAN
TABLE OF CONTENTS

WETLAND AND STREAM MITIGATION PLAN
Henn Development

I. Overall Mitigation Goals and Objectives

The goal of the mitigation effort will be to result in:

- No loss of wetland function as a result of the project;
- Provide additional protection to the local watershed;
- Eliminate the redirection of stream flow that occurred on an adjacent property during previous site development activities.

II. Baseline Information of Proposed Impact Site and Proposed Mitigation Site

Location – The proposed project is the development of parcels 45-019-00300, 45-019-00400 and 45-020-00600 in Trumbull County, Ohio east of S.R. 45. The project is northeast of the General Motors Lordstown Plant. Additional location information is as follows:

Latitude/longitude:	80º51’22”W, 41º10’27”N
Village:	Lordstown Village
Hydrologic Unit:	05030103

Impact Site – The project has previously impacted or will impact the following wetland areas:

- Wetland A – Wetland A is a very large system comprised of emergent, shrub/scrub and forested components. Wetland A scored a 70 on the ORAM (Category 3 wetland). It is likely that Wetland A was much larger prior to construction of the GM Lordstown spur of the Conrail railroad. The 0.31 acre of impacts to Wetland A (from prior activities) were limited to lesser quality wetland habitats that included open field grassy habitat. The impacted area of Wetland A will be excavated to the grade of the surrounding wetland areas and planted with wetland species. The higher quality wooded and scrub/shrub wetlands are located in the northeast corner of the property. These high quality areas are proposed to be protected by a conservation easement.
- Wetland B – Wetland B is 0.38 acre in size. Wetland B has emergent grassy and scrub/shrub wetland components. The wetland has been impacted by agricultural use and a ditched roadway that created a barrier to the former hydrologic connection that connected it with Wetland A to the north. Surrounding upland areas are fallow field habitat. Based on the ORAM score of 42, Wetland B was classed as a Modified Category 2 wetland. Wetland B will be eliminated by the Preferred Alternative.
- Wetland C – Wetland C is 1.27 acre in size, and is an emergent grassy wetland. The wetland has been impacted by agricultural use. Surrounding upland areas are fallow field habitat. Based on the ORAM score of 25, Wetland C was classed as a Category 1 wetland. Wetland C will be eliminated by the Preferred Alternative.
- Wetland M – Wetland M (0.02 acre) will be a total take for the preferred alternative. Wetland M is a small pocket of emergent vegetation in a

depression in the open field. Wetland M scored 28 on the ORAM (Category 1 wetland).

- Wetland N – Wetland N (0.02 acre) would be a total take by the preferred alternative. Wetland N is a small pocket of emergent vegetation in a depression in the open field. The ORAM score for Wetland N is 32, which places it in the Category 1 or 2 gray zone (Category 2 for mitigation purposes).
- Wetland P – Wetland P includes 0.01 acre of impacts by prior fill activities associated with the construction of the Henn Parkway. Wetland P was not scored on the ORAM but would probably have scored as Category 2.
- Wetland S – Wetland S was a prior impact associated with the construction of a retention pond. 0.06 acre was filled by the prior work. Wetland S was not scored on the ORAM but would probably have scored as a Category 2.
- Wetland T – Wetland T is a 0.27-acre non-isolated emergent wetland. Wetland T is dominated by invasive *Phalaris arundinacea* (reed-canary grass). The ORAM score for Wetland T is 29 and falls into the Category 1 wetland status.

Wetland	Cover Type	Category	Total Acreage	Impact – Minimal Degradation	Mitigation Ratio	Mitigation Required
A	PEM	3	20.03	0.00	2.0	0.00
B	PEM/PSS	Mod. 2	0.38	0.38	1.5	0.57
C	PEM	1	1.27	1.27	1.5	1.91
K	PEM	2	5.63	0.00	1.5	0.00
M	PEM	1	0.02	0.02	1.5	0.03
N	PEM	2	0.02	0.02	1.5	0.03
P	PEM	2	0.01	0.01	1.5	0.01
S	PEM	2	0.06	0.06	1.5	0.09
T	PEM	1	0.27	0.00	1.5	0.00
			Total	**1.76**		**2.64**

Based on this calculation, the total mitigation required will be 2.64 acres.

Overall Watershed Improvements - The Mahoning River Watershed (05030103) has no existing Mitigation Bank Review Team (MBRT) approved mitigation banks or currently operating shared mitigation areas. The lack of MRBT approved wetland mitigation banks has pushed the developer to investigate on-site mitigation.

Active watershed conservation groups in the Mahoning watershed include:

- The Alliance for Watershed Action and Riparian Easements (AWARE) is a wetland and stream conservation group based in Mahoning County. AWARE is heavily invested in the Mahoning River Cleanup. AWARE has no known plans to develop a wetland mitigation bank in Trumbull County.
- Trumbull County MetroParks has no plans to develop a wetland mitigation bank in the area of the proposed project, but has expressed interest in conservation easement agreements.

- The Trumbull County Soil and Water District is has no current plans to develop a wetland bank in the Mahoning watershed, but has expressed interest in conservation easement agreements.

Proposed Mitigation Site – The original mitigation plan proposed in 2008 involved the expansion of wetland areas adjacent to existing Wetland A. However, during the design phase, it was determined that the expansion of this wetland was not feasible. In particular, it was determined that it would be extremely difficult to obtain vehicle access to construct the northern portion of the wetland. Additionally, the high percentage of invasive species in this portion of Wetland A would make it very difficult to create a good quality mitigation area. For this reason, it was determined to consider other sites in the immediate vicinity.

The new proposed site is immediately adjacent (east) to the Henn Property. The parcel number is 45-016701, and the total acreage is 23.73 acres. It is proposed that the required mitigation acreage will be provided by excavating a site immediately east of the existing power lines. The detailed layout of the mitigation site is shown on the site plans. The proposed acreage (2.77 acres) exceeds the minimum wetland creation requirement (2.64 acres).

III. Mitigation Site Selection and Justification

Existing Conditions - For the reasons discussed above, it was determined that wetland mitigation would be provided by creating a new wetland area on the property adjacent to the Henn property. This site was selected for the following reasons.

- The proposed site is readily available to Henn Development.
- The existing power line easement on the west creates a permanent buffer from any future development. Because of the isolation from developed areas, this area is more likely to develop into an acceptable quality wetland.
- The topography and hydrology of the area is conducive to wetland development.

Physical Attributes of Mitigation Site – The Sebring soil type found in the project area is generally noted for poor drainage quality and ponding after heavy storms and spring snowmelt. The poor drainage in the area is conducive to wetland development.

Future Sustainability – The wetland creation site will be controlled by Henn Development. The created wetland will be monitored by ms consultants for the duration of the 5-year monitoring period. For the wetland conservation easement, sustainability issues will be addressed upon selection of a local conservation group to provide the controlling interest.

IV. Mitigation Work Plan

Site Preparation - Henn Development is responsible for the site development plan and would be responsible for contractor selection for the wetland mitigation construction. A Storm Water Pollution Prevention Plan will be completed for the project.

Timing – Wetland mitigation construction will begin and be completed in 2011.

Wetland Design Specifications and Characteristics - It is proposed that 2.77 acres of wetland creation will be provided as shown in the detailed design plans. The wetland would be created by lowering the current topography by excavating soils from the site. Vegetation in the wetland creation area will be enhanced using a broadcast seed mix that includes native species.

Vegetation Plan - A vigorous planting scheme and seeding method will be incorporated to ensure the continued development of the wetland habitat.

The herbaceous seed mix for the wetland area will be applied at 15 pounds per acre and will be comprised of a combination of the suggested dominants listed below:

- Fox sedge (*Carex vulpinoidea*)
- Virginia wild rye (*Elymus virginicus*)
- Eastern bur reed (*Sparganium americanum*)
- Swamp dock (*Rumex verticillatus*)
- Sensitive fern (*Onoclea sensibilis*)
- Cosmos sedge (*Carex comosa*)
- Lurid sedge (*Carex lurida*)
- Many-leaved bulrush (*Scirpus polyphyllus*)
- Blue flag (*Iris versicolor*)
- Nodding sedge (*Carex gynandra*)
- Green bulrush (*Scirpus atrovirens*)
- Squarrose sedge (*Carex squarrosa*)
- Arrowhead (*Sagittaria latifolia*)
- Umbrella aster (*Aster umbellatus*)
- Bailey's sedge (*Carex baileyi*)
- Hop sedge (*Carex lupulina*)
- Wood reedgrass (*Cinna arundinacea*)
- Three-way sedge (*Dulichium arundinaceum*)

Suitable replacements of the above species may be identified. The seeding mix can also be found on the wetland plan sheet.

Areas shown on the plan for "live stake" planting will be planted with the following species:

- Red osier dogwood (*Cornus stolonifera*)
- Black willow (*Salix nigra*)

- Silky dogwood (*Cornus amomum*, naturalized or local native species)

Stream Replacement – An OEPA letter of November 14, 2008, indicated that a stream previously existed on the property north of Henn Parkway and east of S.R. 45, now developed as an industrial site and owned by Copeland Properties (Intier). During the development of the Intier property, this stream was eliminated and redirected by storm sewer to the drainage ditch that runs adjacent to Henn Parkway, eventually flowing to the sediment pond developed on the Henn site. Because of this redirection of flow, additional water from the drainage area west of S.R. 45 was directed to the sediment pond. Henn Development has redirected the flow from the storm sewer to Wetland A, using an open channel. The Corps of Engineers and the Ohio EPA has reviewed this work.

V. Conservation Easement

Remaining wetlands on the Henn site will be placed in a conservation easement to be controlled by a local conservation group. The conservation easement area has a very large and diverse Palustrine Forested (PFO) wetland component. The forested area is comprised of pin oak, red maple and green ash stands with evidence of standing water deeper than 15.7 inches. The upland buffer includes red maple, woodfern, spring beauty and a diverse and large component of fungi, mushrooms and smuts. The area was most likely logged in the early part of the 20th century, but since then, there is no evidence of additional logging. The area is considered mature forested wetland based on the large "diameter at breast height" (dbh) of the trees currently populating the wetland. The wetland also includes micro-topographic elements that heighten the productivity of the wetland. These include vegetated hummocks, coarse woody debris, standing dead trees and amphibian breeding pools.

A braided section of Mud Creek flows through this area. The long-term preservation of this wooded wetland habitat will be of substantial benefit in protecting water quality and reducing downstream flooding conditions.

VI. Performance Standards

During the annual monitoring visits, the mitigation wetland will be evaluated for Vegetation Index of Biotic Integrity (VIBI), success of vegetation growth, and development of wetland habitat. Invasive vegetation will not be permitted to exceed 10% of wetland vegetation cover. Soil chemistry and color (pH, temperature and Munsell color analysis) will be evaluated. The condition of the wetland will be compared to the “natural” wetlands in the area.

VII. Site Protection and Maintenance

Responsible Parties - The wetland creation site will be owned and managed by Henn Development. The conservation easement will be turned over to a qualified local conservation group.

Legal Protection – As discussed above, the conservation easement portion will be protected in perpetuity as a conservation easement maintained by a qualified local conservation group.

Maintenance Plan and Schedule - During the monitoring period, if signs of vegetation die-off and/or loss are noted for the mitigation wetland, the Henn Development, using company forces, conservation group resources or a qualified contractor, will address and replant areas with vegetation loss.

VIII. Monitoring Plan

Monitoring Report Content - Wetland monitoring of the creation area will be the responsibility of the qualified consultant and will be completed in conformance with the provisions stated in the Section 404 Permit. Color photographs will be taken during each monitoring year from established photograph stations.

Timing - The first wetland mitigation monitoring report will be provided at the end of the first full growing season following project construction, and will continue for five years.

Notification of Completion - Representatives of Henn Development and the monitoring consultant will accompany Corps staff on a final field visit to confirm completion of the wetland mitigation effort.

IX. Adaptive Management Plan

The major concern regarding the success of the wetland mitigation effort is the potential for significant vegetation loss and invasive colonization. If vegetation is lost due to die-off, it will be replaced. If appropriate, consideration will be given to incorporating different, hardier plant species.

X. Financial Assurances

All construction, maintenance, monitoring, and remedial measures associated with the wetland creation area will be the responsibility of Henn Development.

DEPARTMENT OF THE ARMY PERMIT

PERMITTEE: Henn Development, Inc.

PERMIT NUMBER: 2005-1448

NOTE: The term you and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

PROJECT DESCRIPTION: Henn Development, Inc., 101 Country Way, Warren, Ohio 44481, IS HEREBY AUTHORIZED BY THE SECRETARY OF THE ARMY TO: FILL A TOTAL OF 1.76 ACRES OF WETLAND ADJACENT TO AN UNNAMED TRIBUTARY TO MUD CREEK IN ORDER TO FACILITATE THE COMMERCIAL DEVELOPMENT ALONG HENN PARKWAY. IN AN EFFORT TO RECTIFY THE 0.38 ACRE PREVIOUSLY UNPERMITTED PERMANENT FILL AND 0.48 ACRE TEMPORARY IMPACT ASSOCIATED WITH THIS PROJECT, THE APPLICANT WILL BE REMOVING 0.31 ACRE OF UNPERMITTED FILL FROM WETLAND A AND CONSTRUCTING A MITIGATION WETLAND THAT IS AT LEAST 2.64 ACRES IN SIZE ON AN ADJACENT PARCEL IN ACCORDANCE WITH THE GENERAL AND SPECIAL CONDITIONS, AND THE PLANS AND DRAWINGS AND ANY ADDITIONAL SPECIAL CONDITIONS ATTACHED HERETO WHICH ARE INCORPORATED IN AND MADE A PART OF THIS PERMIT.

PROJECT LOCATION: THE PROJECT IS LOCATED IN WETLANDS ADJACENT TO AN UNNAMED TRIBUTARY TO MUD CREEK IN THE VILLAGE OF LORDSTOWN, TRUMBULL COUNTY, OHIO.

PERMIT CONDITIONS

GENERAL CONDITIONS:

1. The time limit for completing the work authorized ends on **December 31, 2015.** If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you must make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity, or should you desire to abandon it without a good faith transfer, you may obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archaeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

7. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

8. A copy of this permit must be kept at the work site at all times and made available to all contractors and subcontractors.

SPECIAL CONDITIONS:

1. Anticipated Development: Lot #1B and 2 does not have a tenant currently and therefore FILL MAY NOT BE PLACED IN JURISDICTIONAL RESOURCES ON THIS LOT UNTIL TENANTS ARE SECURED AND DEVELOPMENT PLANS HAVE BEEN SUBMITTED TO THE CORPS FOR APPROVAL. A revised alternatives analysis will be required with these development plans to enable the Corps to ensure compliance with the 404(b)(1) analysis. Where possible, impacts to jurisdictional resources should be avoided and minimized to the furthest extent practical. Minimization beyond what was PROVISIONALLY permitted by this permit on this lot is encouraged. The permittee shall not place any fill in jurisdictional resources until the Corps approves the development plans on these anticipated lots.

2. Wetland mitigation must be constructed in accordance with the December 2011 Revised Wetland Mitigation Plan resulting in at least 2.64 acres of Palustrine Emergent (PEM) and Palustrine Scrub Shrub (PSS) wetland. No more than 10% of the total constructed wetland may exist as Palustrine Open Water (POW) at a depth no greater than 16 inches. Mitigation work must begin prior to or during the same growing season as impacts are incurred.

3. Wetland and stream mitigation will be monitored during the growing season for at least 5 years with the first report being received in this office by December 31st after the first full growing season. Monitoring will include a minimum of two inspections for the first two years and one inspection per year for the remaining years during the growing season. The report will contain a discussion of success to date, an analysis of the functions being provided, and a discussion of any problems that have been or are currently being encountered as well as possible remedies. The PEM mitigation component must obtain 85% vegetative coverage, dominated by hydrophytic species with no single species comprising greater than 50% by completion of the third growing season or corrective actions will be required. Copies of the monitoring reports, as built plans, and final design of the wetland mitigation area must be provided to the U.S. Army Corps of Engineers. Once the Corps of Engineers determines the functions and values of the impacted and failed wetlands have been replaced the monitoring will no longer be required.

4. A conservation instrument protecting the mitigation area and the remaining unimpacted wetlands (that are not currently in an easement) in perpetuity must be recorded and executed. A copy of this signed conservation instrument must be submitted to this office within 30 days of permit issuance protecting no less than 25.87 acres.

FURTHER INFORMATION:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

Section 404 of the Clean Water Act.

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (see 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as this specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

____
(PERMITTEE)

____
(DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

____
WILLIAM H. GRAHAM
Colonel, Corps of Engineers
District Engineer

____
(DATE)

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

____
(TRANSFEREE)

____
(DATE)

DATE: May 1, 2012

FILE NO: 2005-1448

NOTIFICATION OF APPLICANT OPTIONS (NAO) FOR PARTIES ISSUED A DEPARTMENT OF THE ARMY INDIVIDUAL PERMIT

You are hereby advised that the following options are available to you in your evaluation of the enclosed permit:

(1) You may sign the permit and return to the District Engineer for final authorization. Your signature on the permit means that you accept the permit in its entirety, and waive all rights to appeal the permit or its terms and conditions.

(2) You may decline to sign the permit because you object to certain terms and conditions therein, and you may request that the permit be modified accordingly. You must outline your objections to the terms and conditions of the permit in a letter to the District Engineer. Your objections must be received by the District Engineer within 60 days of the date of this NAO, or you will forfeit your right to request changes to the terms and conditions of the permit. Upon receipt of your letter, the District Engineer will evaluate your objections, and may: (a) modify the permit to address all of your concerns, or (b) modify the permit to address some of your objections, or (c) not modify the permit, having determined that the permit should be issued as previously written. In any of these three cases, the District Engineer will send you a final permit for your reconsideration, as well as a Notification of Appeal (NAP) form and a Request for Appeal (RFA) form. Should you decline the final proffered permit, you can appeal the declined permit under the Corps of Engineers Administrative Appeal Process by submitting the completed RFA form to the Division Engineer. The RFA must be received by the Division Engineer within 60 days of the date of the NAP that was transmitted with the second proffered permit.

CONSTRUCTION NOTIFICATION

FILE NO: 2005-1448

APPLICANT: Henn Development, Inc.

PROJECT LOCATION: Wetlands adjacent to an unnamed tributary to Mud Creek in the Village of Lordstown, Trumbull County, Ohio.

Construction will start on ________________ and will be completed on ______________.
(date) (date)

Signature: ____________________________

Title: ______________________________

NOTE: You must return this form to the following address 10 days prior to commencement of the work.

U. S. Army Corps of Engineers, Pittsburgh District
ATTN: CELRP-OP-F
2200 William S. Moorhead Federal Bldg.
1000 Liberty Avenue
Pittsburgh, PA 15222-4186

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Henn Development, Inc.		File Number: 2005-1448	Date: May 1, 2012
Attached is:			See Section below
X	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
	PROFFERED PERMIT (Standard Permit or Letter of permission)		B
	PERMIT DENIAL		C
	APPROVED JURISDICTIONAL DETERMINATION		D
	PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/CECW/Pages/reg_materials.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

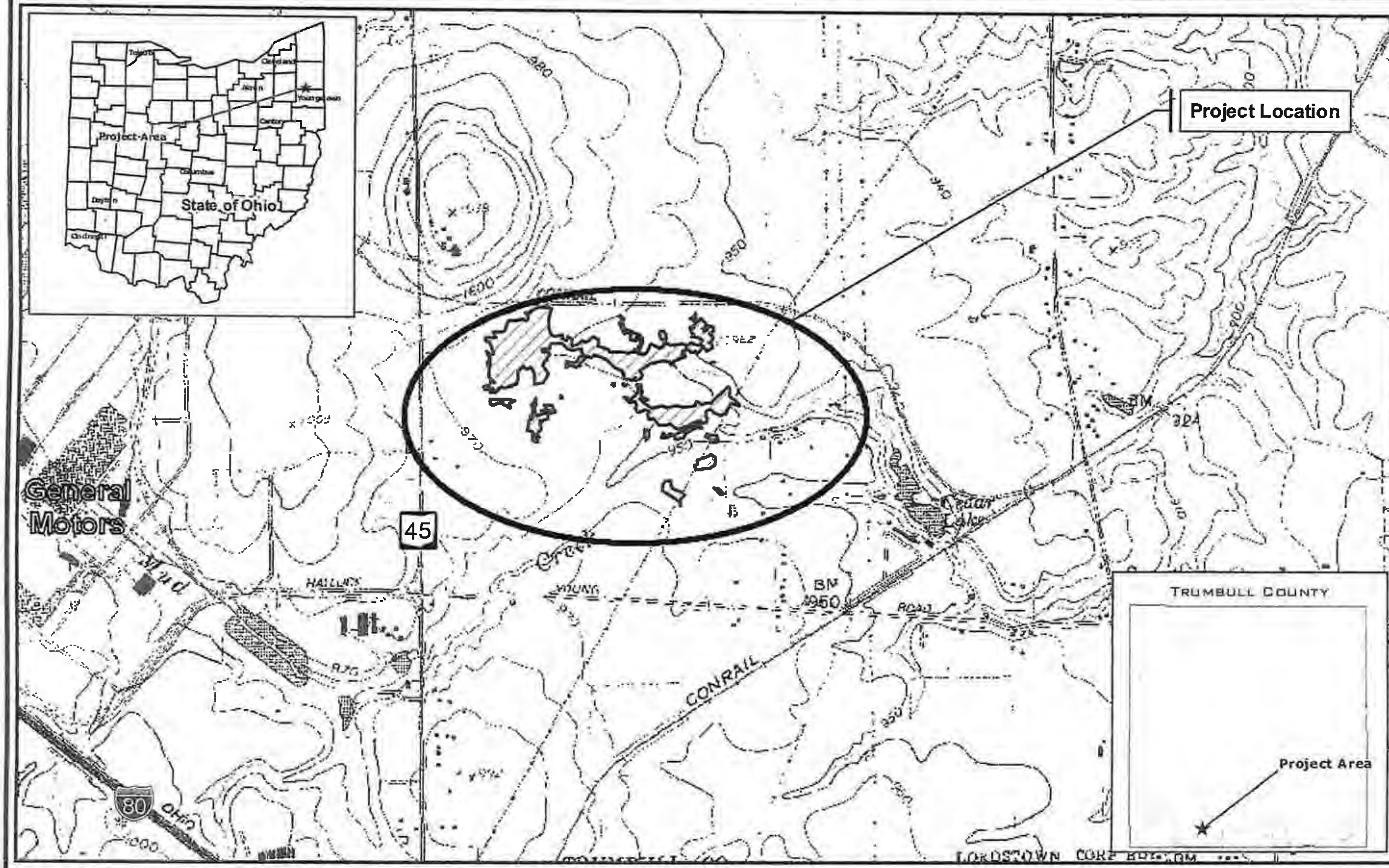
If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact: Appeals Officer U.S. Army Corps of Engineers Great Lakes and Ohio River Division 550 Main Street, Room 10032 Cincinnati, OH 45202-3222 TEL (513) 684-6212; FAX (513) 684-2460

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_______________________ Signature of appellant or agent.	Date:	Telephone number:

Project Location Map

Figure 1



Henn Parkway Site

0 800 1,600 3,200 Feet

Map Document (T:\DATA\arcdata\06\06561\102\apr\Project_Loc.mxd)
11/5/2004 – 12:00:00 PM

ms consultants, inc.
engineers, architects, planners