Republic Wind Project

APPENDIX H

WETLAND AND STREAM DELINEATION REPORT AND FORMS

Surface Water Delineation Report

Republic Wind Project
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REPUBLIC WIND

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Shaping the Future

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Acronyms

CFR	Code of Federal Regulations
CR	County Road
CWA	Clean Water Act
CWH	cold water habitat
DBH	Diameter at Breast Height
DOH	ditches
EW	Exceptional Warm Water Habitat
FAC	Facultative Plants
FACU	Facultative Upland Plants
FACW	Facultative Wetland Plants
GPS	Global Positioning System
HDD	horizontal directional drilling
HHEI	Headwater Habitat Evaluation Index
MBTA	Migratory Bird Treaty Act
MW	megawatt
MWH	Modified Warmwater Habitat
NHD	National Hydrography Dataset
NLCD	National Land Cover Database
NRCS	National Resource Conservation Service
NWI	National Wetland Inventory
NWPL	National Wetland Plant List
OBL	Obligate Wetland Plants
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
OHWM	Ordinary High Water Mark
ORAM	Ohio Rapid Assessment Methodology
OWI	Ohio Wetland Inventory
PEM	Palustrine Emergent Wetlands
PFO	Palustrine Forested Wetlands
PHWH	Primary Headwater Stream
POH	ponds
Project	Republic Wind Project
PSS	Palustrine Scrub/Shrub Wetlands
QHEI	Qualitative Habitat Evaluation Index
RTE	rare, threatened and endangered
SOH	streams
SR	State Route
SWANCC	Solid Waste Agency of Northern Cook County
TNW	traditionally navigable waterway
TOB	Top-of-Bank
TR	Township Road

UPL	Obligate Upland Plants
USACE	U.S. Army Corp of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Service
UTV	utility terrain vehicle
WOH	wetlands
WOTUS	Waters of the U.S.
WWH	warm water habitat

1 Introduction

Republic Wind, LLC is developing the Republic Wind Project (Project) in northern Seneca County and southeast Sandusky County, Ohio. The Project is proposed as a 200-megawatt (MW) wind project with up to 50 wind turbines. In support of Project planning, Cardno completed a field delineation survey of 314 parcels (approximately 20,265 acres) to identify surface waters within the parcels of land planned for ground disturbance (Survey Area; Figure 1-1). Surface waters are regulated under the jurisdiction of either the state or federal government. Cardno identified potentially jurisdictional Waters of the U.S. (WOTUS), including Traditionally Navigable Waters (TNW), their tributaries, and non-isolated wetlands, which are regulated under the jurisdiction of the State of Ohio and the U.S. Army Corps of Engineers (USACE) in accordance with Sections 401/404 of the Clean Water Act (CWA). Cardno also identified isolated waterbodies and wetlands that do not have a significant nexus to TNW, which are considered waters of Ohio (as defined under OAC Rule 3745-1-02 (b)(77)[1]) and are regulated by the Ohio Environmental Protection Agency (OEPA)'s Isolated Wetlands Permitting Program.

Prior to the field survey, Cardno completed a desktop review of publicly-available data sources to review site-specific conditions and to identify potential surface water features. Between the fall of 2016 and fall of 2017, Cardno completed field delineation surveys within all areas of proposed ground disturbance associated with installation of the Project.

[1] OEPA 2017.

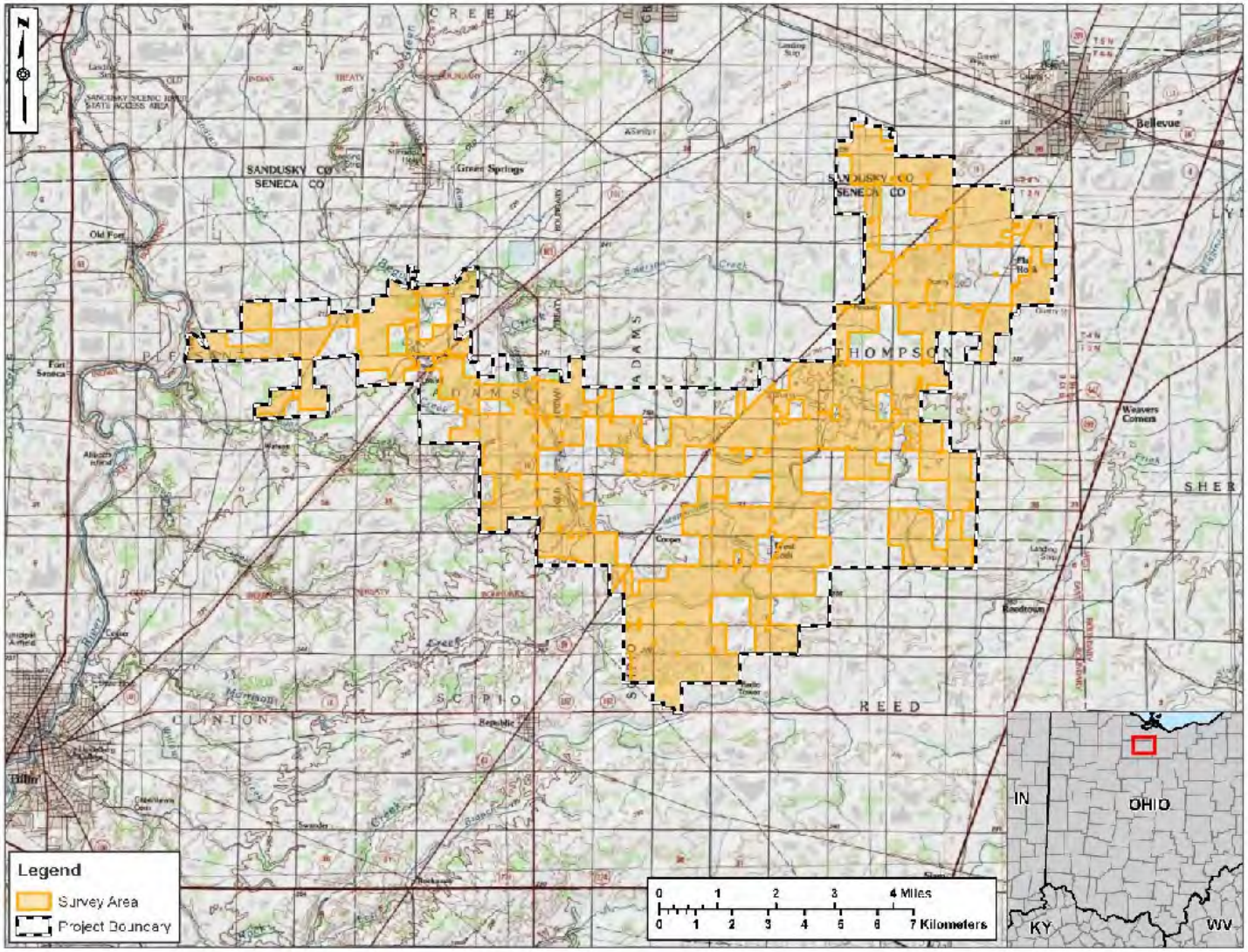

Figure 1-1 Project Overview of Republic Wind Project in Seneca and Sandusky Counties, Ohio

2 Desktop Assessment

Prior to field surveys, Cardno completed a desktop review of the Survey Area using publicly-available data to identify and classify potential surface water features and create field maps for use during surveys. Sources of this reference material included, but was not limited to: the National Land Cover Database (NLCD); the U.S. Department of Agriculture (USDA) National Resource Conservation Service (NRCS) Soil Survey for Seneca and Sandusky Counties; historic aerial photographs; U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps; U.S. Geologic Service (USGS) topographic maps; USGS National Hydrography Dataset (NHD); and Ohio Wetland Inventory (OWI).

2.1 National Land Cover Database Review

Review of the 2011 NLCD (Homer et al. 2015) shows that the most prominent land use type within the Survey Area was cultivated crops and accounted for approximately 87 percent of the total Survey Area acreage. The second most prominent land use type within the Survey Area was identified as "Deciduous Forest" at approximately 6 percent, followed by "Developed, Open Space" for approximately 5 percent. The classification of "Developed, Open Space" refers to "areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses" (Homer et al. 2015). Pasture/Hay was the only other land use type to account for at least 1 percent. All other land use activities accounted for less than 1 percent of the total acreage in the Survey Area. A summary is provided in Table 2-1 below.

Table 2-1 Land Use within the Survey Area

Type	Acreage	Percentage of Total Acreage
Cultivated Crops	17,633	87%
Deciduous Forest	1,195	6%
Developed, Open Space	925	5%
Pasture/Hay	390	2%
Developed, Low Intensity	68	<1%
Grassland/Herbaceous	25	<1%
Open Water	8	<1%
Barren Land (Rock/Sand/Clay)	7	<1%
Developed, Medium Intensity	5	<1%
Woody Wetlands	4	<1%
Emergent Herbaceous Wetlands	3	<1%
Evergreen Forest	1	<1%
Developed, High Intensity	<1	<1%
TOTAL	**20,265**	**100%**

Compiled from NLCD 2011.

2.2 Geography

The Project is located within the Central Lowland Physiographic Province of Ohio, which covers the central and western portions of the state south of Lake Erie. The Central Lowland is characterized by

glacial till plains with gently rolling hills. Most hills are a series of moraines, which are glacier-created mounds of rock and soil that are up to 100 feet high and 6 miles wide (ODNR 1998). Elevations in the Central Lowlands range from 700 to 1,150 feet above mean sea level with moderate topographic relief (ODNR 1998[2]).

2.3 Hydric Soils

Project soil information was obtained from the Web Soil Survey, an application of the NRCS (USDA-NRCS 2017). As shown in Table 2-2, approximately 1.3 percent (265 acres) of the Survey Area was determined to be located in fully hydric soils. The poor draining qualities of hydric soils combined with local flat or bowl-shaped topography make these locations predisposed to containing wetland areas. Three different soil types in the Survey Area were considered fully hydric (i.e., soils contain 100 percent hydric components). The most common type of hydric soil was the Lenawee silty clay loam. The Lenawee series consists of very deep, poorly drained and very poorly drained soils formed in lacustrine deposits. These soils are on lake plains and in depressions on moraines, outwash plains, and glacial drainage ways. The Bono series consists of deep, very poorly drained soils formed in lacustrine sediments in flat or depressional areas of tilled plains. The Sebring series consists of deep, poorly drained, moderately slowly permeable soils formed on uplands in water laid deposits along drainageways. All soils occur along minor slopes ranging from 0 to 2 percent.

The remaining Survey Area is located in areas of non-hydric or predominantly non-hydric soils.

Table 2-2 Fully Hydric Soils within the Survey Area (USDA-NRCS 2017)

Type	Map Unit Description	Hydric Rating	Acreage	Percentage of Delineated Acreage
Le	Lenawee silty clay loam	100	117	0.6%
Bp	Bono silty clay, loamy substratum	100	93	0.5%
Sb	Sebring silt loam	100	55	0.3%
	TOTAL		**265**	**1.3%**

2.4 Navigable Waters

The Survey Area is located entirely within the Sandusky River drainage basin, which drains northward toward Sandusky Bay and ultimately Lake Erie. No traditional navigable waterways are located within the Survey Area. However, tributaries of the Sandusky River include several streams that cross into the Project Area including Beaver Creek, Indian Creek, Morrison Creek, Noel Ditch, Owl Creek, Westerhouse Ditch, Pickerel Creek, and Royer Ditch. Other tributaries located nearby, but which do not cross into the Survey Area, include Emerson Creek, Hayward Ditch, Albright Ditch, Green Creek, and Raccoon Creek. All of the tributaries identified in the Study Area are designated as warm water habitat (WWH) in the Water Quality Standards, except for a portion of Beaver Creek/Green Creek which is listed as cold water habitat (CWH).[3]

The Survey Area can be categorized into 10 main drainage areas (12-Digit Hydrologic Unit Code), as shown in Table 2-3:

[2] ODNR 1998.

[3] OEPA 2007.

Table 2-3 Drainage Areas Within the Project Area

Spicer Creek-Sandusky River	Westerhouse Ditch
Indian Creek-Sandusky River	Beaver Creek
Morrison Creek	Rock Creek
Raccoon Creek-Frontal Sandusky Bay	Frink Run
Pickerel Creek-Frontal Sandusky Bay	Flag Run-Green Creek

2.5 Remote Wetland and Waterbody Identification

Prior to site investigations, the Survey Area was screened using the NRCS, ODNR OWI, USFWS NWI, and USGS NHD (2017) remote data for potential wetlands and waterbodies. The NWI and OWI data shows remotely identified wetlands, which may be based on previous aerial imagery interpretation and soils surveys, while the NHD uses digital stream information to identify potential waterways.

Multiple wetlands and waterbodies were identified within the Survey Area, with some additional streams and wetlands occurring in the vicinity of the Survey Area. The majority of the waterbodies remotely identified appeared to be manipulated agricultural ditches. Additionally, the Cardno team identified several NHD features that ran directly through active agricultural areas but were not visible in any aerial imagery. These relic NHD features may have been rerouted by previous land use manipulation or even tiled which would route them under crop areas. Most of the wetlands identified by ODNR occurred in isolated woodlots, with moderate overlap with NWI features.

2.6 Desktop Review Summary

The desktop review indicated potential for wetlands to be located in multiple woodlots in the Survey Area. The Survey Area also had a high number of ditches and streams that ran between crop areas which may or may not still be present. It is Cardno's experience that the NHD set can sometimes indicate features which are no longer present or have been moved underground via tiles by landowners. Much of the Survey Area was cultivated crops which limit the likelihood of wetlands in that land use.

3 Field Delineation Surveys

Between the fall of 2016 and fall of 2017, Cardno surveyed 20,265 acres which covered 314 parcels. The acreage surveyed for wetlands and waterbodies is considered the Survey Area, and it contains all areas of proposed facility infrastructure (e.g., turbines, collection lines, transmission lines, access roads, substation, and laydown yards).

3.1 Methodologies

Surface water delineation surveys were conducted in the Survey Area to determine the extent of wetlands and waterbodies during field surveys in accordance with applicable federal and state regulations and guidelines. A Trimble ® Global Positioning System (GPS) with sub-meter accuracy was used to collect data points for mapping. As wetland and waterbody point features were collected, they were assigned a FEATURE_ID with the format of FFF-XXX-YY, where:

FFF = Feature Type

- DOH – Ditches
- SOH – Streams
- POH – Ponds
- WOH – Wetlands

XXX = Three-digit number as the unique identifier

YY = Flag number per each unique feature identified

The information collected in the field was post-processed using ArcGIS and verified by the field team for accuracy. If a feature continued out of the Survey Area, it was noted. Appendix A contains representative photo documentation of the delineated wetland and waterbody features. Appendix B contains maps depicting the delineated surface water features. Appendix C contains the completed routine wetland data and Ohio Rapid Assessment Methodology (ORAM) assessment forms from the field efforts. Appendix D contains the completed Headwater Habitat Evaluation Index (HHEI) and relevant Qualitative Habitat Evaluation Index (QHEI) forms.

3.1.1 Wetland Delineations

Wetland delineations were conducted according to the 1987 USACE *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0)* (USACE 2011) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0)* (USACE 2010). These documents are cumulatively referred to as the Manual. The methodology outlined in the Manual requires the area being evaluated to meet the three wetland criteria in order for a wetland to be present; 1) dominance of hydrophytic vegetation, 2) hydric soils, and 3) sufficient hydrology.

Sampling points were taken at each suspected wetland, within the wetland and outside in the upland area. At each sampling point, Cardno:

- Recorded location using GPS equipment;
- Completed routine wetland determination forms in the wetland and upland area, including:
    - Evaluating sampling points for dominance of hydrophytic vegetation;
    - Evaluating soils for evidence of hydric conditions;
    - Evaluating presence of indicators of wetland hydrology;

- Recorded habitat notes for narrative descriptions and use in ORAM; and
- Documented the feature's current conditions with photos.

The boundaries of each wetland were recorded by GPS at intervals to accurately capture changes in profile. Physical flagging was hung along the wetland boundary in areas that would not interfere with farming and livestock operations or disturb private landowners.

3.1.1.1 Hydrophytic Vegetation Criterion

The hydrophytic vegetation criterion is met when more than 50 percent of the dominant plant community is hydrophytic, as determined by species dominance and the assigned species-specific indicator status of the identified species. The National Wetland Plant List (NWPL) is a list of wetland plants and their assigned indicator statuses. An indicator status reflects the likelihood that a particular plant occurs in a wetland or nonwetland. Table 3-1 shows the indicator status categories for plants.

Table 3-1 Plant Indicator Categories

Indicator Category	Indicator Symbol	Definition
Obligate Wetland Plants	OBL	Plants that occur almost always (estimated probability >99 percent) in wetlands under natural conditions, but which may also occur rarely (estimated probability <1 percent) in nonwetlands.
Facultative Wetland Plants	FACW	Plants that occur usually (estimated probability >67 percent to 99 percent) in wetlands, but also occur (estimated probability 1 percent to 33 percent) in nonwetlands.
Facultative Plants	FAC	Plants with a similar likelihood (estimated probability 33 percent to 67 percent) of occurring in both wetlands and nonwetlands.
Facultative Upland Plants	FACU	Plants that occur sometimes (estimated probability 1 percent to <33 percent) in wetlands, but occur more often (estimated probability >67 percent to 99 percent) in nonwetlands.
Obligate Upland Plants	UPL	Plants that occur rarely (estimated probability <1 percent) in wetlands, but occur almost always (estimated probability >99 percent) in nonwetlands under natural conditions.

Both the Northcentral/Northeast and the Midwest regional supplements evaluate vegetation in four different stratums, including tree, sapling/shrub, herb, or woody vine. The tree stratum includes all woody plants with a diameter at breast height (DBH) of more than 3 inches. The sapling/shrub stratum includes all woody vegetation with a DBH less than 3 inches and greater than 1 meter tall. The herb stratum includes all herbaceous/non-woody plants and woody plants less than 1 meter tall. The woody vine stratum includes all the woody vines greater than 1 meter in height. Typically the vegetation in each stratum is evaluated within a uniform plot size at each sampling point. The plots are often nested, so that all trees and vines within a 30-foot radius are evaluated, then all sapling/shrubs within a 15-foot radius, and then all herbaceous plants within a 5-foot radius of the sampling point. The plot size and dimensions can be altered as needed. For example, if a wetland is identified as rectangular, the plots can be rectangular as well and of varying sizes for each of the stratum.

Dominant vegetation is assessed for hydrophytic preference. After identifying the plant species present within the sampling point of a potential wetland, the dominance and indicator status for each identified unique species was determined. Based on the results, the vegetation community being evaluated was determined to be indicative of either a wetland or nonwetland.

If the site is dominated by hydrophytic vegetation (OBL or FACW) only, then the site meets the criteria for the rapid test for hydrophytic vegetation. However, if the dominant vegetation is a mix of species and indicators, then a more detailed analysis of the dominance can be completed on the wetland determination data form. The dominance test is simply the number of dominant species that are rated as OBL, FACW, or FAC divided by the total number of dominant species. If the dominance test result is greater than 50 percent, then the hydrophytic vegetation criteria is met.

Additional methods can be used on the wetland determination form for areas where a suspected wetland has hydric soils and hydrology but fails the dominance test. Cardno utilized one such evaluation method that involves calculating a prevalence index which weights the coverage of a particular class of species (using its wetland indicator status) against the total coverage within the sampling area. If a sampling area passes this test (which requires the value to be less than or equal to 3), it can be considered a wetland. Cardno also noted the presence of morphological adaptations, which can include root buttressing, shallow roots, or multi-stemmed trunks. The presence of such adaptations is considered evidence that the plants (even FACU species) have adapted to survive in prolonged inundation or root saturation.

In rare instances, another method for identifying hydrophytic vegetation is to report "Problematic Hydrophytic Vegetation." This method is used sparingly, and reflects the delineator's opinion that conditions outside of those considered normal may be present, such as vegetation being bent or damaged to such a degree that identification to species level is impracticable. Damage to vegetation may be the result of recent severe weather, unseasonably cold conditions, or habitat destruction. Under this method, the vegetation present would be treated as consistent with a wetland, but the vegetation could not be reliably identified. This method was utilized by Cardno for one wetland that was recently cleared within the Survey Area.

3.1.1.2 Hydric Soils Criterion

The hydric soils criterion is met when the soils identified are officially listed as hydric soils or the soils demonstrate characteristics representative of soils in reducing (hydric) conditions. The latter is determined in the field by teams digging small test pits to evaluate the upper 12 to 16 inches of soil (or to a depth until refusal, bedrock, or large debris preventing further digging). Cardno evaluates if the soils fall within the hydric ranges on the Munsell Color Chart, examine soil profiles for other evidence of reducing conditions, and/or observe other indicators of anaerobic activity per the Manual. Under certain conditions, hydric soils can be assumed to be present without testing, including when a sampling point is dominated by hydrophytic vegetation (i.e., vegetation rated OBL or FACW) and obvious wetland hydrology is present such as direct observation of surface water or saturated soils.

3.1.1.3 Hydrology Criterion

The hydrology criterion is met when sufficient hydrologic indicators are present. The indicators must be representative of sufficient saturation or inundation occurring over the growing season sufficient to support a hydrophytic plant-dominated vegetative community. The Manual categorizes the wetland hydrology indicators into four groups which document different types of hydrologic observations:

- Group A indicators are based on direct observation of surface or ground water;
- Group B indicators identify the site as having evidence of potential flooding or ponding despite a lack of inundation at the time of a site visit;
- Group C indicators document evidence of soil saturation, either recent or current; and
- Group D indicators consist of landscape, soil, and vegetation features identifying contemporary wet conditions.

Each of the groups is further identified as either a primary or a secondary indicator for each group. Identification as primary or secondary is based on estimated reliability of an indicator to accurately identify

wetland conditions, and can vary by region. In all regions, a single primary indicator is needed to identify the presence of wetland hydrology, or at least two secondary indicators.

Regional indicators and their status as primary or secondary are identified in Table 3-2. If an indicator does not have an 'X' for a region, then it is not applicable to that area.

Table 3-2 Hydrology Indicators and Regional Manual Status

	Midwest[a]		Northcentral/Northeast[b]	
Type of Indicator	Primary	Secondary	Primary	Secondary
Group A - Observation of Surface Water or Saturate Soils				
A1 - Surface Water	X		X	
A2 - High Water Table	X		X	
A3 - Saturation	X		X	
Group B - Evidence of Recent Inundation				
B1 - Water Marks	X		X	
B2 - Sediment Deposits	X		X	
B3 - Drift Deposits	X		X	
B4 - Algal Mat or Crust	X		X	
B5 - Iron Deposits	X		X	
B6 - Surface Soil Cracks		X		X
B7 - Inundation Visible on Aerial Imagery	X		X	
B8 - Sparsely Vegetated Concave Surface	X		X	
B9 - Water-stained Leaves	X		X	
B10 - Drainage Patterns		X		X
B13 - Aquatic Fauna	X		X	
B14 - True Aquatic Plants	X			
B15 - Marl Deposits			X	
B16 - Moss Trim Lines				X
Group C - Evidence of Current or Recent Soil Saturation				
C1 - Hydrogen Sulfide Odor	X		X	
C2 - Dry-season Water Table		X		X
C3 - Oxidized Rhizospheres Along Living Roots	X		X	
C4 - Presence of Reduced Iron	X		X	
C6 - Recent Iron Reduction in Tilled Soils	X		X	
C7 - Think Much Surface	X		X	
C8 - Crayfish Burrows		X		X
C9 - Saturation Visible on Aerial Imagery		X		X
Group D - Evidence from Other Site Conditions or Data				
D1 - Stunted or Stressed Plants		X		X
D2 - Geomorphic Position		X		X

Table 3-2 Hydrology Indicators and Regional Manual Status

	Midwest[a]		Northcentral/Northeast[b]	
Type of Indicator	Primary	Secondary	Primary	Secondary
D3 - Shallow Aquitard				X
D4 - Microtopographic Relief				
D5 - FAC-neutral Test		X		X
D9 - Gauge or Well Data	X			

Notes:

[a] *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0)* (USACE 2010)

[b] *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0)* (USACE 2011)

3.1.2 Ohio Environmental Protection Agency - Ohio Rapid Assessment Methodology

After the field delineations were complete, the identified wetlands were scored using the OEPA's ORAM. The ORAM wetland functional assessment was developed to determine the ecological "quality" and level of function of a particular wetland in order to meet requirements under Section 401 of the CWA. Wetlands are scored on the basis of hydrology, upland buffer, habitat alteration, special wetland communities, and vegetation communities. Each of these subject areas is further divided into sub-categories under ORAM v5.0, resulting in a score that describes the wetland using a range from 0 (low quality and high disturbance) to 100 (high quality and low disturbance).

Wetlands that receive a score from between 0 to 29.9 are grouped into "Category 1," 30 to 59.9 are "Category 2" and 60 to 100 are "Category 3." Transitional zones exist between "Categories 1 and 2" from 30 to 34.9 and between "Categories 2 and 3" from 60 to 64.9. However, wetland scores that fall into one of these transitional ranges should be assigned to the higher Category unless collected data suggests the wetland should be placed in the lower category.

Category 1 consist of wetlands that are often isolated emergent marshes dominated by invasive species (such as cattails), with little or no upland buffers, and which are located in and around active agricultural fields. Category 2 consists of wetlands for which rare, threatened, or endangered species (RTE) and their habitat are absent, but may have well-developed habitat for other more common species. Category 2 wetlands constitute the broad middle category of "good" quality wetlands. A "Modified Category 2" wetland appears to have some signs of degradation but also has the potential to restore some of the lost functionality. Category 3 wetlands are typified by high levels of diversity, a high proportion of native species, and/or high functional values. Category 3 wetlands include wetlands that may contain or provide habitat for threatened or endangered species, are high quality mature forested wetlands, vernal pools, bogs, fens, or which are scarce regionally and/or statewide.

3.1.3 Waterbody Delineations

During field delineations, waterbodies were characterized into three categories including ditches (DOH), streams (SOH), and ponds (POH), defined as follows:

1. Ditches were identified as man-made or modified channels, which were manipulated by landowners or communities to improve drainage amongst farm fields. Modification to channels could include the mowing of bank vegetation, altering of channel morphology, or removal of debris to maintain flow conditions. Many ditches were identified as having ephemeral or intermittent flows and heavily vegetated channels. Most ditches also had trapezoidal cross sections, with a small bankfull width/channel at the bottom and a wider crossing distance at the

TOB. If a ditch crossed under a road, the deepest pools of water were normally located at the edges of the culvert which was a result of eddies and currents of stormwater flow creating erosion. Most ditches lacked flowing water throughout and were primarily either moist channels or had limited isolated pools along the reaches surveyed.

2. Streams were more often considered natural channels which had indications of significant recovery since any historic modification had occurred. Streams often had perennial or intermittent flows (with isolated pools and moist channel areas). Streams were more likely to have vegetated riparian buffers along the banks and pools of water which might support wildlife.
3. Ponds were features that appeared to hold water throughout the year. Many of the ponds observed in the vicinity of the Survey Area were man-made impoundments which may be used for holding water for irrigation or recreational fishing and aesthetics.

Waterbodies were delineated by taking GPS points along the Ordinary High Water Mark (OHWM) along the course of the channel. The OHWM is defined as the lateral extents over which agencies have regulation, and is defined in the CWA and the Code of Federal Regulations (CFR) as "*The term ordinary high water mark means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas*" (33 CFR 328.3(e)). The USACE has issued additional regulatory guidance, as a Regulatory Guidance Letter, which identifies physical characteristics which can be used to identify the OHWM in the field, including: shelving, changes in soil character, bed and bank, wracking, or natural line impressed on the bank (USACE 2005).

Measurements including bankfull width (OWHM to OWHM) and Top-of-Bank (TOB) to TOB were also recorded. Photos were taken along the waterbodies to capture the typical conditions. Observational notes about the characteristics of the waterbody (such as flow regime and substrate) were recorded by the field team for use in evaluating the stream quality. Table 3-3 identifies the definitions used in assigning flow categories.

Table 3-3 Flow Categories

Flow Category	Definition
Perennial	Flow is continuous and likely permanent across the seasons (though it may vary). Such flow can be surface based or occur as interstitial flow, which would include the flow driving underground for a portion of the channel.
Intermittent	Flow is present during extended periods of time during some seasons, but gradually returns to a state of isolated pools in the channel or a dry channel. There may be indications of subsurface flow (interstitial).
Ephemeral	Flow is often not present during the majority of the year, and only occurs after a precipitation event. Channels of ephemeral streams will be dry with no evidence of isolated pools of water.

3.1.4 Headwater Habitat Evaluation Index Assessments

All flowing streams and ditches, but not ponds delineated in the Survey Area were assessed using the OEPA's HHEI. The HHEI allows for uniform scoring of various waterbodies using a standard methodology that identifies pertinent information about the waterbody including substrates, pool depths, and bankfull width.

Substrate is taken as an estimate of the types and abundance of substrate available in the sampled stream reach. The two dominant substrates are then used to calculate the score for the substrate metric.

Each substrate type is scored according to potential use by biota; an example being cobble is scored as 12 points while clay or hardpan scores 0 points. Evaluation is restricted to areas of substrate in wetted areas where water is present, or along the entire course of the channel for dry stream channels. Once the dominant substrates are scored, the number of substrates recorded is added for a final substrate metric score. The substrates cannot score more than 40 points.

Maximum pool depth is also evaluated to identify whether a stream reach can support a significant fish community. Identifying pool depth can also help in determining the flow type of the stream. Maximum pool depth avoids the measurements of plunge pools since they are not characteristic of overall stream morphology. Maximum pool depth cannot score more than 30 points.

The final metric evaluated by the HHEI is the average bankfull width. Bankfull width is defined in the HHEI Manual as "…*the elevation on the stream banks where the flow is at bankfull discharge. The bankfull discharge is defined as follows '…the discharge at which channel maintenance is the most effective, that is, the discharge at which moving sediment, forming or removing bars, forming or changing bends and meanders, and generally doing work that results in the average morphological characteristics of channels.' Dunne and Leopold (1978)*." (OEPA 2009). The use of bankfull width is analogous to the OHWM which was previously defined in Section 3.1.3. Bankfull width can score up to 30 points.

Once all components are evaluated, a final score is tabulated. Typical score ranges and waterbody characterizations are found in Table 3-4. Additional information is recorded on the HHEI worksheet (Appendix D) including information on surrounding land use and riparian width, flow regime at time of evaluation, sinuosity, and gradient of the stream reach, and other current conditions such as turbidity and time since last rainfall.

Table 3-4 Headwater Habitat Evaluation Index Scoring

Final HHEI Score	Definition
<30	Class I PHWH (ephemeral streams, normally dry channel, little to no aquatic life)
30 - 50	Class II PHWH (intermittent flow, summery-dry, warm water streams)
>50	Class II or III PHWH (depending on conditions)
>75	Class III (perennial flow, cool-cold water streams)

PHWH – Primary Headwater Stream

3.1.5 Qualitative Habitat Evaluation Index Assessments

Larger features were evaluated using the OEPA's QHEI. The QHEI form is used to describe similar aspects of waterbodies, but is focused on larger (often higher quality) waterbodies. Typically, QHEI forms are completed only for those perennial features that meet two criteria: drainage areas greater than 1 square mile *and* pools deeper than 40 centimeters (approximately 16 inches). The maximum possible QHEI score is 100; waterbodies with a total score of 75 or more are characterized as potential exceptional WWH. In cases where a feature scored highly on the HHEI forms but failed to meet the QHEI criteria, it was still evaluated with the QHEI to better record the conditions present. Six principal metrics are used to score a feature.

1. Where the HHEI looks to identify the dominant substrates and overall amount, the QHEI identifies the types of substrates as well as their origin and quality as the first metric. The QHEI also identifies the type of cover as a percent of cover for both pools and riffles within the sampling reach. Similar to the HHEI, different types of substrate are scored differently; for example cobble is scored for 8 points where as silt bottoms are scored for 2 points. The QHEI attributes a maximum of 20 points for substrate.

2. Instream cover is the second metric evaluated under the QHEI, and identifies the presence or absence as well as amount of particular types of cover that could be used by aquatic fauna. Each cover type that is present is scored on a scale of 0 (absent) to 3 (highest quality in moderate or great amounts) which help to describe the cover available in the stream reach. A final category for amount determines the overall extent of all types of cover, such as sparse between 5 and 25 percent or extensive at greater than 75 percent. Instream cover can score a maximum of 20 points.
3. Channel morphology is evaluated in the QHEI by scoring the sinuosity, development, channelization, and stability of the stream reach. The sum of the components cannot exceed 20 points for channel morphology.
4. Bank erosion and riparian zone is the fourth category evaluated by the QHEI. The erosion is identified and scored by degree, for each bank. Riparian width and flood plain quality are also scored as part of this metric, and are tabulated on a per bank basis. Flood plain land use is identified as the area approximately 100 meters beyond the riparian boundary. This metric can score a maximum of 10 points.
5. Pool/glide and riffle/run quality is the next metric evaluated by QHEI. A variety of components are evaluated under this metric, including the maximum depth of pools or glides present, type/speed of current, morphology of channel, riffle depth, run depth, and substrate and embeddedness in riffle/run areas of the waterbody. The pool/glide and riffle/run quality cannot score more than 20 points.
6. The sixth and final metric evaluated under the QHEI is the gradient of the waterbody. The gradient is estimated as change in elevation as feet per mile. Low gradients can score between 2 and 4 points where as high gradient streams can score between 6 and 10 points. This metric can score a maximum of 10 points.

Table 3-5 provides an overview of the typical score ranges and waterbody classification under QHEI.

Table 3-5 Qualitative Habitat Evaluation Index Scoring

Final QHEI Score	Definition
<32	Limited Resource Water
32 - 60	Modified Warm Water Habitat (MWH)
60 - 75	Warm Water Habitat (WWH)
>75	Possible Exceptional Warm Water Habitat (EW)

3.1.6 Potential Jurisdictional Determinations

Cardno has identified features it considers potentially jurisdictional based on USACE/U.S. Environmental Protection Agency (USEPA) guidance material and makes a recommendation on the potential jurisdictional status of each feature. Guidance used for these determinations include documentation from the USEPA “Current Implementation of Waters of the United States”[4] which refers to the original 1986/1988 promulgation and subsequent Supreme Court cases which further defined the term.

[4] 40 CFR 230.3

The Supreme Court cases include those known as the Solid Waste Agency of Northern Cook County (SWANCC) case[5] and the Rapanos Guidance[6]. In the 2001 SWANCC decision it was determined that the USACE could not extend CWA Section 404 jurisdiction over physically isolated wetlands using the Migratory Bird Treaty Act (MBTA). In the case, SWANCC had sought to fill isolated and non-navigable wetlands, but the USACE had extended CWA jurisdiction due to their use as habitat by migratory birds. Since the wetlands were non-navigable waters and isolated from any true navigable WOTUS, it was determined that the use of the MBTA to assert jurisdiction was improper. The Rapanos Guidance actually refers to two court cases which were consolidated, Rapanos v. United States and Carabell v United States. The combined guidance document developed after the rulings from USEPA and USACE identified several key points regarding jurisdiction and when it would be exercised:

- Agencies would always assert jurisdiction over traditionally navigable waterways (TNWs), wetlands adjacent to TNWs, non-navigable tributaries of TNWs with relatively permanent flow (flow year round or have continuous flow at least seasonally), and wetlands abutting such tributaries;
- Agencies will evaluate the following waters for a significant nexus to a TNW before deciding jurisdiction: non-navigable tributaries that are not relatively permanent, wetlands adjacent to non-navigable tributaries that are not relatively permanent, or wetlands adjacent to but do not directly abut a relatively permanent non-navigable tributary; and
- Agencies will not assert jurisdiction over swales, erosional features, or those ditches excavated wholly in and draining only uplands that do not carry a relatively permanent flow of water.

Critical to the Rapanos Guidance was the definition of a *significant nexus*, which would be determined by assessing the flow characteristics of a tributary and functions performed by any adjacent wetlands. The function of a wetland or waterbody was the potential ability to alter the chemical, physical, or biological integrity of a down-stream TNW.

The Code of Federal Regulations (33 CFR 328.3), defines WOTUS as:

1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
2. All interstate waters including interstate wetlands;
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
    a. Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
    b. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
    c. Which are used or could be used for industrial purposes by industries in interstate commerce;
4. All impoundments of waters otherwise defined as WOTUS under this definition;
5. Tributaries of waters identified in paragraphs (s)(1) through (4) of this section;

[5] 68 FR 10 (January 15, 2003) https://www.gpo.gov/fdsys/pkg/FR-2003-01-15/pdf/03-960.pdf

[6] USEPA 2008.

6. The territorial sea;

7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (s)(1) through (6) of this section; waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not WOTUS.

4 Delineation Results

The following is a discussion of the results of field surveys completed within the Survey Area. Seasonal conditions in the Survey Area were typical for the area during both the fall 2016 and fall 2017 surveys; field teams experienced several rainy days during the surveys. Appendix A contains representative photo documentation of the delineated surface water features. Appendix B contains maps depicting the delineated surface water features. Appendix C contains the completed routine wetland data forms and ORAM forms from the field efforts. Appendix D contains the completed HHEI and QHEI forms.

4.1 Wetlands

A total of 106 wetlands were delineated during field surveys, for a total of 155.23 acres of wetland within the Survey Area. The majority of wetlands were identified as Palustrine Forested Wetlands (PFO; n=62), followed by Palustrine Emergent Wetlands (PEM; n=32). Only one wetland was identified as Palustrine Scrub/Shrub (PSS). The remaining 11 wetlands were a combination of PEM/PFO, PSS/PFO, or PEM/PSS. Table 4-1 provides a list of the delineated wetland acreages, category, and associated ORAM scoring (see Section 3.1.2 for details on this scoring system). ORAM scores varied widely throughout the Survey Area. The following provides a summary of each Category ranking.

Table 4-1 Wetlands Delineated in the Survey Area

Wetland ID	Latitude of Center Point	Longitude of Center Point	Area (acres) within Survey Area	Wetland Type	ORAM Score	Wetland Category	Jurisdictional Recommendation	Drainage Basin	Cardno Parcel	Mapbook Location
WOH-002	41.201968	-83.034263	0.28	PEM	10	1	Yes	Beaver Creek	157	92
WOH-003	41.190625	-83.012886	0.94	PEM/ PFO	41	Modified 2	No	Sugar Creek	180	132
WOH-004	41.1927	-83.04389	0.84	PFO	47.5	2	No	Beaver Creek, Sugar Creek	173	116
WOH-006	41.204589	-83.020032	0.58	PEM/ PFO	48.5	2	Yes	Westerhouse Ditch	159	93
WOH-007	41.205141	-83.002509	0.83	PEM/ PFO	56	2	No	Westerhouse Ditch	162	94
WOH-008	41.154758	-82.944182	28.97	PEM/ PFO	78	3	Yes	Westerhouse Ditch	271, 279	204 & 205
WOH-009	41.160548	-82.959679	6.07	PFO	51	2	No	Westerhouse Ditch	269	182, 188, 196
WOH-010	41.165705	-82.948423	4.31	PEM/ PFO	49	2	Yes	Westerhouse Ditch	256, 259	179 & 190
WOH-101	41.221805	-83.709945	0.91	PEM	54	1	Yes	Indian Creek - Sandusky River	078, 079	44 & 57
WOH-102	41.209362	-83.090177	1.01	PEM	17	1	No	Indian Creek - Sandusky River	307	78
WOH-105	41.227356	-83.04171	0.24	PFO	38	Modified 2	No	Beaver Creek	083	37
WOH-106	41.216242	-83.041332	0.10	PEM	5	1	No	Beaver Creek	306	61
WOH-107	41.213152	-83.039569	0.42	PEM	28	1	Yes	Beaver Creek	118	73
WOH-108	41.207756	-83.041203	4.20	PFO	55	2	No	Beaver Creek	134, 135	81 & 91
WOH-109	41.205033	-83.040217	0.14	PFO	48	2	No	Beaver Creek	135	91
WOH-110	41.203937	-83.045129	2.73	PFO	67	3	No	Beaver Creek	135	91
WOH-111	41.202879	-83.046153	2.13	PFO	67	3	No	Beaver Creek	135	91

Table 4-1 Wetlands Delineated in the Survey Area

Wetland ID	Latitude of Center Point	Longitude of Center Point	Area (acres) within Survey Area	Wetland Type	ORAM Score	Wetland Category	Jurisdictional Recommendation	Drainage Basin	Cardno Parcel	Mapbook Location
WOH-122	41.195529	-83.018252	4.16	PFO	60	2	No	Beaver Creek, Westerhouse Ditch	177, 178	118
WOH-123	41.186764	-83.026634	1.05	PFO	45	2	No	Sugar Creek	198	144
WOH-124	41.18194	-83.02611	0.15	PFO	43	Modified 2	No	Sugar Creek	215	156
WOH-125	41.180627	-83.027909	3.84	PFO	56	2	No	Sugar Creek	215	156
WOH-126	41.181471	-83.024988	0.84	PFO	48	2	No	Sugar Creek	215	156
WOH-127	41.179755	-83.022584	0.16	PFO	51	2	No	Sugar Creek	216	156
WOH-128	41.176205	-83.018391	0.37	PFO	31	1	No	Sugar Creek	217, 235	164
WOH-129	41.175564	-83.005209	0.28	PEM	10	1	No	Westerhouse Ditch	238	166
WOH-130	41.176763	-83.004862	0.24	PFO	46	2	No	Westerhouse Ditch	220	158
WOH-131	41.162911	-82.990186	6.19	PFO	60	2	No	Westerhouse Ditch	251	187
WOH-132	41.133728	-82.964188	1.52	PFO	65	3	No	Morrison Creek	339, 340	222
WOH-136	41.180942	-82.87664	0.33	PEM/ PFO	42.5	Modified 2	No	Pickerel Creek-Frontal Sandusky Bay	368	162
WOH-137	41.185628	-82.886756	0.86	PEM	30	1	No	Beaver Creek	365	154
WOH-138	41.192356	-82.89176	0.45	PEM	42.5	Modified 2	No	Beaver Creek	362	141
WOH-140	41.199828	-82.922442	1.71	PFO	41	Modified 2	No	Beaver Creek	368	65
WOH-141	41.167043	-82.954935	0.27	PEM	16	1	No	Westerhouse Ditch	365	49
WOH-142	41.167209	-82.957386	0.09	PEM	19	1	No	Westerhouse Ditch	362	70

Table 4-1 Wetlands Delineated in the Survey Area

Wetland ID	Latitude of Center Point	Longitude of Center Point	Area (acres) within Survey Area	Wetland Type	ORAM Score	Wetland Category	Jurisdictional Recommendation	Drainage Basin	Cardno Parcel	Mapbook Location
WOH-143	41.142833	-82.931199	0.41	PFO	41	Modified 2	No	Westerhouse Ditch	169	35
WOH-144	41.163863	-82.95064	0.02	PEM	25.5	1	No	Westerhouse Ditch	255	55
WOH-145	41.19581	-82.898428	0.45	PEM	35	Modified 2	No	Beaver Creek	255	
WOH-200	41.266449	-82.917019	0.59	PFO	19	1	No	Pickerel Creek-Frontal Sandusky Bay, Raccoon Creek-Frontal Sandusky Bay	282	64
WOH-201	41.260036	-82.908767	0.12	PEM	6	1	No	Pickerel Creek-Frontal Sandusky Bay	257	55
WOH-202	41.232944	-82.845721	0.28	PFO	28	1	Yes	Pickerel Creek-Frontal Sandusky Bay	057	34
WOH-203	41.235834	-82.847672	0.01	PSS	17	1	No	Pickerel Creek-Frontal Sandusky Bay	057	34
WOH-204	41.225412	-82.917667	1.03	PFO	23	1	No	Beaver Creek	087	48
WOH-205	41.225558	-82.914889	0.13	PEM	16	1	No	Beaver Creek	087	48
WOH-206	41.220767	-82.874662	0.17	PEM	19	1	No	Pickerel Creek-Frontal Sandusky Bay	094	65
WOH-207	41.219078	-82.87466	0.12	PFO	39	Modified 2	No	Pickerel Creek-Frontal Sandusky Bay	094	65
WOH-208	41.206005	-82.922117	0.03	PFO	55	2	No	Beaver Creek	141	98

Table 4-1 Wetlands Delineated in the Survey Area

Wetland ID	Latitude of Center Point	Longitude of Center Point	Area (acres) within Survey Area	Wetland Type	ORAM Score	Wetland Category	Jurisdictional Recommendation	Drainage Basin	Cardno Parcel	Mapbook Location
WOH-209	41.205893	-82.924472	0.02	PFO	55	2	No	Beaver Creek	141	98
WOH-210	41.203101	-82.917019	5.19	PEM	22	1	Yes	Beaver Creek	171	98 & 112
WOH-211	41.201617	-82.914577	13.31	PEM	28	1	Yes	Beaver Creek	171	99 & 113
WOH-212	41.206968	-82.901503	4.75	PEM	11	1	Yes	Beaver Creek	131	86 & 100
WOH-213	41.191198	-82.905287	0.17	PEM	7	1	Yes	Beaver Creek	196	140
WOH-214	41.208456	-82.890704	0.15	PFO	47	2	No	Pickerel Creek-Frontal Sandusky Bay	147	87
WOH-215	41.186207	-82.904105	0.09	PFO	37	Modified 2	No	Beaver Creek	213, 214	152
WOH-216	41.185239	-82.902825	0.02	PEM	27	1	No	Beaver Creek	214	153
WOH-217	41.184766	-82.903232	0.04	PEM	26	1	No	Beaver Creek	214	153
WOH-218	41.184187	-82.902918	0.09	PEM	24	1	No	Beaver Creek	214	153
WOH-219	41.183859	-82.906944	0.43	PFO	27	1	No	Beaver Creek	214	152
WOH-220	41.183608	-82.908781	0.87	PFO	31	1	No	Beaver Creek	212, 214	152
WOH-221	41.188515	-82.935231	8.29	PEM	20	1	No	Beaver Creek	210	138
WOH-222	41.183686	-82.937197	1.32	PSS/ PFO	52	2	Yes	Beaver Creek	210, 228	151
WOH-223	41.183172	-82.935594	0.04	PFO	48	2	Yes	Beaver Creek	210	151
WOH-224	41.182743	-82.935499	0.01	PFO	48	2	Yes	Beaver Creek	228	151
WOH-225	41.184502	-82.935621	1.09	PEM	53	2	Yes	Beaver Creek	210	151
WOH-226	41.191774	-82.945462	0.01	PFO	42	Modified 2	No	Westerhouse Ditch	190	124
WOH-226A	41.191749	-82.94549	0.16	PFO	42	Modified 2	No	Westerhouse Ditch	190	137

Table 4-1 Wetlands Delineated in the Survey Area

Wetland ID	Latitude of Center Point	Longitude of Center Point	Area (acres) within Survey Area	Wetland Type	ORAM Score	Wetland Category	Jurisdictional Recommendation	Drainage Basin	Cardno Parcel	Mapbook Location
WOH-227	41.189647	-82.967763	2.48	PFO	68	3	No	Westerhouse Ditch	206	135
WOH-228	41.184633	-82.937129	0.05	PEM	31	1	Yes	Beaver Creek	210	151
WOH-229	41.18445	-82.93328	5.58	PFO	70	3	Yes	Beaver Creek	210, 211	151
WOH-230	41.186033	-82.932719	0.84	PFO	52	2	Yes	Beaver Creek	210, 211	151
WOH-231	41.18339	-82.931626	0.19	PFO	43	Modified 2	Yes	Beaver Creek	211	151
WOH-232	41.183836	-82.93145	0.07	PFO	45	2	Yes	Beaver Creek	211	151
WOH-233	41.184964	-82.931828	0.66	PFO	44	Modified 2	Yes	Beaver Creek	211	151
WOH-234	41.184867	-82.931222	0.10	PFO	47	2	Yes	Beaver Creek	211	151
WOH-235	41.185779	-82.931123	0.21	PFO	47	2	Yes	Beaver Creek	211	138
WOH-236	41.182012	-82.932628	5.93	PFO	62	3	Yes	Beaver Creek	210, 228, 232	151 & 160
WOH-237	41.182189	-82.936031	0.19	PEM/ PSS	39	Modified 2	Yes	Beaver Creek	228	151
WOH-238	41.180698	-82.929741	0.04	PEM/ PSS	47	2	Yes	Beaver Creek	232	150 & 160
WOH-239	41.182078	-82.929576	4.39	PFO	80	3	Yes	Beaver Creek	211, 232	150 & 161
WOH-240	41.18406	-82.928561	0.79	PFO	52	2	No	Beaver Creek	211	150
WOH-241	41.179328	-82.928861	0.25	PEM/ PSS	46	2	Yes	Beaver Creek	232	160 & 161
WOH-242	41.178186	-82.928454	2.84	PFO	40	Modified 2	Yes	Beaver Creek	232, 233	160 & 161
WOH-243	41.178971	-82.932631	0.15	PEM	27	1	No	Beaver Creek	232	160
WOH-244	41.174513	-82.960147	0.02	PFO	36	Modified 2	Yes	Westerhouse Ditch	241	167

Table 4-1 Wetlands Delineated in the Survey Area

Wetland ID	Latitude of Center Point	Longitude of Center Point	Area (acres) within Survey Area	Wetland Type	ORAM Score	Wetland Category	Jurisdictional Recommendation	Drainage Basin	Cardno Parcel	Mapbook Location
WOH-245	41.177343	-82.960023	0.12	PFO	59	2	No	Westerhouse Ditch	222	159
WOH-246	41.167633	-82.927007	0.04	PEM	34	Modified 2	Yes	Beaver Creek	325	181
WOH-247	41.164786	-82.926576	0.18	PFO	32	1	No	Beaver Creek	324, 325	191
WOH-248	41.160245	-82.928326	0.03	PFO	25	1	Yes	Beaver Creek	326	199
WOH-249	41.159074	-82.923732	0.11	PFO	32	1	No	Beaver Creek	273	199
WOH-250	41.154426	-82.924118	0.35	PEM	28	1	Yes	Beaver Creek	273	206
WOH-251	41.15388	-82.924975	0.01	PEM	25	1	Yes	Beaver Creek	273	206
WOH-252	41.155938	-82.926091	0.10	PEM	18	1	No	Beaver Creek	273	206
WOH-253	41.158514	-82.926236	0.01	PFO	31	1	No	Beaver Creek	273	199
WOH-254	41.154433	-82.92849	0.15	PFO	33	1	No	Beaver Creek	272	206
WOH-255	41.167565	-82.944848	4.32	PFO	66	3	No	Beaver Creek	259	179
WOH-256	41.167389	-82.946499	0.18	PEM/ PFO	57	2	No	Beaver Creek	259	179
WOH-257	41.16827	-82.94348	0.84	PFO	66	3	No	Beaver Creek	259	179
WOH-259	41.147422	-82.942959	2.69	PEM	38	Modified 2	No	Westerhouse Ditch	279	210
WOH-260	41.154244	-82.954963	0.06	PEM	12	1	No	Morrison Creek	327	204
WOH-262	41.160385	-82.962193	2.29	PFO	67	3	No	Westerhouse Ditch	269	182, 188, 196
WOH-263	41.161735	-82.960222	0.80	PFO	55	2	No	Westerhouse Ditch	252	182 & 188
WOH-264	41.168648	-82.892613	0.98	PFO	65	3	Yes	Beaver Creek	375, 401, 402	183
WOH-265	41.169335	-82.892875	0.12	PFO	51	2	Yes	Beaver Creek	401	183

Table 4-1 Wetlands Delineated in the Survey Area

Wetland ID	Latitude of Center Point	Longitude of Center Point	Area (acres) within Survey Area	Wetland Type	ORAM Score	Wetland Category	Jurisdictional Recommendation	Drainage Basin	Cardno Parcel	Mapbook Location
WOH-266	41.169448	-82.891286	0.09	PFO	53	2	No	Beaver Creek	402	183
WOH-267	41.168639	-82.889729	0.10	PFO	53	2	No	Beaver Creek	402	183
WOH-268	41.168221	-82.890955	0.18	PFO	54	2	No	Beaver Creek	375, 402	183
WOH-269	41.170457	-82.893063	0.08	PFO	52	2	Yes	Beaver Creek	401	183
Total Acreage			**155.23**							

4.1.1 Category 1 Wetlands

Thirty-nine (39) wetlands were scored as Category 1 using the ORAM. Twenty-seven (27) of these wetlands were isolated emergent wetlands without any significant habitat. Another 11 wetlands were identified as forested, but were typically sparsely vegetated concave surfaces within the woodlots. One wetland (WOH-203) was a small scrub/shrub wetland dominated by gray dogwood (*Cornus racemosa*).

4.1.2 Category 2 Wetlands

Fifty-five (55) wetlands were scored as Category 2 or Modified Category 2 according to the ORAM. Nineteen (19) were considered Modified Category 2, which indicates past manipulation of the wetland resulting in decreased habitat viability. Twelve (12) of the Modified Category 2 wetlands were considered forested, with the historic manipulations often related to selective logging or development of utility terrain vehicle (UTV) paths through them. Thirty-six wetlands were identified as Category 2; of which 28 were identified as forested.

4.1.3 Category 3 Wetlands

Twelve (12) wetlands were scored as Category 3 using the ORAM. The majority were relatively large forested wetlands with well-developed habitat and specific descriptions are provided below.

WOH-008 is a relatively large (28.97 acres) forested wetland that was located along a segment of Westerhouse Ditch (DOH-040) at the bottom of a minor valley between cultivated crop areas. The wetland itself contains relic oxbows of the Westerhouse Ditch as well. The wetland had pockets of open emergent areas where it appears the trees had either died from historic storm damage or inundation, as well as forested portions along the relic stream channel that had isolated pools of water. The surrounding landscape sloped into the wetland which meant any runoff naturally flowed into and was retained by the wetland. Wetland WOH-008 extends outside of the Survey Area to the west. The large size, lack of disturbance and development of quality habitat led to the wetland scoring highly on the ORAM. Due to its proximity to Westerhouse Ditch it was considered jurisdictional.

WOH-110 is a 2.73-acre forested wetland located inside of a woodlot. It was characterized by a shallow, sparsely vegetated concave surface which likely retained water for a large portion of the year as evidenced by stained leaves. The vegetation along the perimeter of the wetland was predominately FACU species such as shagbark hickory and basswood (*Tillia americana*) with morphological adaptations (primarily root buttressing). The presence of these adaptations indicated seasonal inundation. The concave nature of the wetland also allowed the wetland to retain runoff. The wide buffers between WOH-110 and surrounding land use, moderate amounts of microtopographic habitat, and a lack of any observable disturbance led to the wetland scoring highly on the ORAM. Due to its location within a woodlot, and lack of connection to a WOTUS, it is not considered jurisdictional.

WOH-111 is a 2.13-acre forested wetland. Wetland WOH-111 was characterized by a shallow, sparsely vegetated concave surface with significant presence of FACU species along the perimeter. Moderate amounts of dead standing wood and woody debris could provide habitat value, but it is likely that the inconsistent water levels would limit development. The wide buffers between WOH-111 and surrounding land use, moderate amounts of microtopographic habitat, and a lack of any observable disturbance led to the wetland scoring highly on the ORAM. Due to the lack of proximity to a WOTUS, wetland WOH-111 is not considered jurisdictional.

WOH-132 is a 1.52-acre forested wetland located along an ephemeral seep that runs the width of an isolated woodlot. Vegetation within the wetland is dominated by marsh marigold (*Caltha palustris*) and OBL species, with FACW species in the shrub/sapling layer such as American beech and spicebush (*Lindera benzoin*). The wide buffers between WOH-132 and surrounding land use, as well as a lack of any observable disturbance, led to the wetland scoring highly on the ORAM. Due to the lack of connection with a WOTUS, wetland WOH-132 is not considered jurisdictional.

WOH-227 is a 2.48-acre forested wetland located in an isolated woodlot surrounded by cultivated crop areas. The wetland was dominated by FACW species such as silver maple and green ash in the tree and sapling stratums, and Muskigum sedge (*Carex muskingumensis*) and sweet wood-reed (*Cinna arundinacea*) dominating the herb stratum. A lack of noticeable habitat alteration and significant habitat development led to a high score on the ORAM. Due to the wetland occurring in an isolated woodlot with no connection to any WOTUS, WOH-227 is not considered jurisdictional.

WOH-229 is a relatively large 5.58-acre forested wetland located in a forested wetland complex just east of the intersection of County Road (CR) 27 and Township Road (TR) 0138. The wetland occurs in a woodlot between two unnamed tributaries to Royer Ditch. The wetland was characterized by a shallow, sparsely vegetated concave surface, which allowed for retention of water for extended periods of time. Vegetation in the wetland included eastern cottonwood (*Populus deltoides*), pin oak, American elm, and creeping-jenny (*Lysimachia nummularia*). The wide buffers, lack of disturbance, and habitat development led to the wetland scoring highly on the ORAM. Due to the location adjacent to Royer Ditch (a WOTUS), it is considered jurisdictional.

WOH-236 is another relatively large forested wetland (5.93 acres). The wetland appeared to be only seasonally inundated, with evidence of seasonal hydrology including water marks and drift deposits along the sparsely vegetated concave surface. The vegetation was dominated by boxelder in the tree and sapling stratum. The large size of the wetland, relative lack of disturbance and development of plant communities and microtopography led to the wetland scoring highly on the ORAM. Wetland WOH-236 is considered jurisdictional due to the connection to Royer Ditch.

WOH-239 is a 4.39-acre forested wetland located on the eastern side of Royer Ditch. The wetland was dominated by silver maple in the tree stratum, with green ash and American elm in sapling stratum. The large size of the wetland, relative lack of disturbance, and development of plant communities and microtopography led to the wetland scoring highly on the ORAM. Wetland WOH-239 is considered jurisdictional due to the connection to Royer Ditch.

WOH-255 is a 4.32-acre forested wetland located in a forest/wetland complex. Vegetation within the wetland was dominated by pin oak and swamp white oak (*Quercus bicolor*). The herb stratum also had significant compositions of OBL species including blunt broom sedge (*Carex tribuloides*) and stiff marsh bedstraw (*Galium tinctorium*). This wetland showed a relative lack of disturbance, includes wide buffers from the surrounding land use, and provides high quality habitat (including large mature trees, moderate quality vernal pools, and coarse woody debris); these contributing factors led to the wetland scoring highly on the ORAM. Due to the wetland lacking a connection to a WOTUS, WOH-255 is not considered jurisdictional.

WOH-257 is 0.84-acre forested wetland. Vegetation was dominated by red maple in the tree stratum and a variety of FACW species in the herb stratum including sweet wood-reed *(Cinna arundinacea*), spotted ladysthumb (*Persicaria maculosa*), and whitegrass (*Leersia virginica*). This wetland showed a relative lack of disturbance, includes wide buffers from the surrounding land use, and provides high quality habitat (including large mature trees, moderate quality vernal pools, and coarse woody debris); these contributing factors led to the wetland scoring highly on the ORAM. Due to the wetland lacking a connection to a WOTUS, it is not considered jurisdictional.

WOH-262 is a 2.29-acre forested wetland. The wetland was dominated by pin oak, red maple, and silver maple with a diverse herbaceous understory. Herbaceous plants included the blunt broom sedge, woodland sedge, and stiff marsh bedstraw. The wetland's recovery from disturbance, wide buffers, and well-developed habitat led to the wetland scoring highly on the ORAM. Due to the location in an isolated woodlot lacking a connection to a WOTUS, it is not considered jurisdictional.

WOH-264 is a 0.98-acre forested wetland. The wetland was dominated by pin oak, Virginia wild rye (*Elymus virginicus*), and lakebank sedge (*Carex lacustris*). The wetland's recovery from disturbance,

wide buffers, and well-developed habitat led to the wetland scoring highly on the ORAM. Due to its proximity to Royer Ditch it is considered jurisdictional.

4.1.4 Potentially Jurisdictional Delineated Wetlands in the Survey Area

Of the 106 wetlands, 37 are considered potentially jurisdictional according to the USACE guidance based on a hydrologic connection to a WOTUS or tributary to a WOTUS. The remaining wetlands are considered non-jurisdictional, isolated wetlands and are classified as Waters of the State.

4.2 Waterbodies

A total of 123 waterbodies were delineated in the Survey Area, see Figure 4-2: 83 ditches, 32 streams, and 8 ponds. The OEPA's HHEI forms were completed for each stream and ditch and serve to record and score a variety of aspects about the feature as detailed in Section 3.1.4, (see Appendix D for forms). Thirty-six (36) of the waterbodies were identified as Class I according to the HHEI scoring matrix, with an additional 61 scoring as Class II. A total of 18 features were considered Class III waterbodies. Five features (all ditches) scored highly on the HHEI score, however, lacked the required cool/cold water habitat to be identified as Class III. The eight (8) ponds were not scored on the HHEI since it is not a flowing linear waterbody. The majority of the waterbodies were considered modified (n=105; see Table 4-2).

Table 4-2 Waterbodies Delineated in Survey Area

Stream ID	County	Linear Feet in Project Corridor	HHEI Score	QHEI Score	PHWH Class Designation	Flow Regime	Drainage Basin	Potentially Jurisdictional	Potential RTE Habitat	Mussels Observed	Water Quality Classification					Mapbook Location
											SRW	SSH	PWS	AWS	BW	
DOH-001	Seneca	2,612	28	NA	I	Ephemeral	UNT to Sandusky River	Yes	Low	No						57 & 70
DOH-002	Seneca	1,831	32	NA	II	Intermittent	UNT to Sandusky River	Yes	Low	No						68
DOH-005	Seneca	1,440	43	NA	II	Perennial	Indian Creek	Yes	Low	No	X		X	X	X	44 & 58
DOH-006	Seneca	1,274	17	NA	I	Ephemeral	UNT to Sandusky River	No	Low	No						57
DOH-008	Seneca	85	17	NA	I	Ephemeral	Owl Creek	No	Low	No						60
DOH-010	Seneca	2,189	43	NA	II	Intermittent	Owl Creek	Yes	Low	No	X		X	X	X	104 & 105
DOH-011	Seneca	393	22	NA	I	Intermittent	UNT to Owl Creek	No	Low	No						105
DOH-016	Seneca	896	17	NA	I	Ephemeral	UNT to Green Creek	No	Low	No						36
DOH-023	Seneca	906	53	NA	II	Perennial	UNT to Sugar Creek	Yes	Low	No						185
DOH-024	Seneca	3,284	32	NA	II	Intermittent	UNT to Westerhouse Ditch	Yes	Low	No						166, 176, 186
DOH-027	Seneca	6,118	43	NA	II	Intermittent	UNT to Sugar Creek	Yes	Low	No						131 & 132
DOH-028	Seneca	1,263	18	NA	I	Ephemeral	UNT to Noel Ditch	Yes	Low	No						136
DOH-035	Seneca	1,482	18	NA	I	Intermittent	Noel Ditch	Yes	Low	No	X		X	X	X	106 & 107
DOH-036	Seneca	729	17	NA	I	Ephemeral	Noel Ditch	No	Low	No						107
DOH-037	Seneca	9,095	33	NA	II	Intermittent	Morrison Creek	Yes	Low	No	X		X	X	X	201, 202, 203, 207, 209
DOH-038	Seneca	4,535	54	NA	II	Intermittent	UNT to Royer Ditch	Yes	Low	No						190, 198, 199
DOH-040	Seneca	7,873	64	NA	III	Perennial	Westerhouse ditch	Yes	Low	No	X		X	X	X	189, 197, 204, 205
DOH-041	Seneca	6,838	58	NA	III	Perennial	Westerhouse ditch	Yes	Low	No	X		X	X	X	167, 168
DOH-042	Seneca	795	44	NA	II	Intermittent	Westerhouse ditch	No	Low	No	X		X	X	X	179
DOH-043	Seneca	904	39	NA	II	Intermittent	UNT to Royer Ditch	Yes	Low	No						180
DOH-044	Seneca	3,704	38	NA	II	Ephemeral	UNT to Royer Ditch	Yes	Low	No						169, 170, 181
DOH-047	Seneca	3,168	48	NA	II	Intermittent	UNT to Royer Ditch	Yes	Low	No						169
DOH-051	Seneca	3,091	27	NA	I	Intermittent	UNT to Royer Ditch	Yes	Low	No						126 & 140
DOH-055	Seneca	4,033	17	NA	I	Intermittent	Noel Ditch	Yes	Low	No	X		X	X	X	109, 123, 136
DOH-057	Seneca	914	18	NA	I	Intermittent	Noel Ditch	Yes	Low	No	X		X	X	X	137
DOH-058	Seneca	3,753	33	NA	II	Ephemeral	Royer Ditch	Yes	Low	No	X		X	X	X	62 & 63
DOH-059	Sandusky	4,369	33	NA	II	Intermittent	Pickerel Creek	Yes	Low	No	X		X	X	X	1,2,3
DOH-100	Seneca	460	52	NA	II	Perennial	UNT to Sandusky River	Yes	Low	No						67
DOH-101	Seneca	2,635	37	NA	II	Intermittent	UNT to Indian Creek	Yes	Low	No						43 & 55

Table 4-2 Waterbodies Delineated in Survey Area

Stream ID	County	Linear Feet in Project Corridor	HHEI Score	QHEI Score	PHWH Class Designation	Flow Regime	Drainage Basin	Potentially Jurisdictional	Potential RTE Habitat	Mussels Observed	Water Quality Classification					Mapbook Location
											SRW	SSH	PWS	AWS	BW	
DOH-102	Seneca	2,791	35	NA	II	Intermittent	UNT to Indian Creek	Yes	Low	No						43 & 56
DOH-104	Seneca	1,355	45	NA	II	Intermittent	UNT to Sandusky River	No	Low	No						70
DOH-105	Seneca	2,119	52	NA	II	Intermittent	UNT to Sugar Creek	Yes	Low	No						91
DOH-106	Seneca	664	22	NA	I	Ephemeral	UNT to Sugar Creek	No	Low	No						102
DOH-107	Seneca	660	22	NA	I	Ephemeral	UNT to Sugar Creek	No	Low	No						102
DOH-108	Seneca	279	47	NA	II	Intermittent	Beaver Creek	No	Low	No						37
DOH-109	Seneca	401	42	NA	II	Intermittent	UNT to Beaver Creek	No	Low	No						29
DOH-110	Seneca	110	21	NA	I	Ephemeral	UNT to Owl Creek	No	Low	No						73
DOH-111	Seneca	929	42	NA	II	Intermittent	UNT to Owl Creek	Yes	Low	No						73
DOH-113	Seneca	3,190	57	NA	II	Intermittent	Noel Ditch	Yes	Low	No	X		X	X	X	95 & 107
DOH-114	Seneca	4,667	42	NA	II	Intermittent	UNT to Noel Ditch	Yes	Low	No						106, 107, 121
DOH-115	Seneca	1,732	58	NA	II	Intermittent	UNT to Westerhouse Ditch	No	Low	No						106
DOH-116	Seneca	6,657	57	NA	III	Perennial	UNT to Sugar Creek	Yes	Low	No						156, 158, 163, 164
DOH-117	Seneca	2,199	42	NA	II	Intermittent	UNT to Sugar Creek	No	Low	No						158, 164, 165
DOH-118	Seneca	834	13	NA	I	Ephemeral	N/A	No	Low	No						194
DOH-119	Seneca	661	59	NA	II	Intermittent	UNT to Morrison Creek	Yes	Low	No						207
DOH-120	Seneca	2,783	55	NA	II	Intermittent	UNT to Morrison Creek	Yes	Low	No						202 & 208
DOH-121	Seneca	543	17	NA	I	Ephemeral	UNT to Morrison Creek	No	Low	No						208
DOH-122	Seneca	410	20	NA	I	Ephemeral	UNT to Morrison Creek	No	Low	No						208
DOH-123	Seneca	4,003	58	NA	II	Intermittent	UNT to Morrison Creek	Yes	Low	No						221 & 222
DOH-124	Seneca	164	17	NA	I	Ephemeral	UNT to Morrison Creek	No	Low	No						222
DOH-125	Seneca	4,861	18	NA	I	Ephemeral	UNT to Westerhouse Ditch	No	Low	No						213, 217, 218, 223
DOH-126	Seneca	5,829	18	NA	I	Ephemeral	UNT to Westerhouse Ditch	No	Low	No						213, 217, 218
DOH-127	Seneca	2,828	30	NA	II	Intermittent	UNT to Westerhouse Ditch	Yes	Low	No						216, 218, 219, 223
DOH-128	Seneca	1,469	54	NA	II	Intermittent	UNT to Westerhouse Ditch	Yes	Low	No						213 & 218
DOH-150	Seneca	285	13	NA	I	Ephemeral	UNT to Westerhouse Ditch	Yes	Low	No						194
DOH-152	Seneca	1,924	17	NA	I	Ephemeral	UNT to Royer Ditch	No	Low	No						171
DOH-153	Seneca	2,284	61	NA	III	Perennial	UNT to Royer Ditch	Yes	Low	No	X		X	X	X	192
DOH-156	Seneca	961	18	NA	I	Intermittent	UNT to Royer Ditch	No	Low	No						184 & 193
DOH-159	Seneca	2,442	38	NA	II	Intermittent	N/A	Yes	Low	No						155

Table 4-2 Waterbodies Delineated in Survey Area

Stream ID	County	Linear Feet in Project Corridor	HHEI Score	QHEI Score	PHWH Class Designation	Flow Regime	Drainage Basin	Potentially Jurisdictional	Potential RTE Habitat	Mussels Observed	Water Quality Classification					Mapbook Location
											SRW	SSH	PWS	AWS	BW	
DOH-160	Seneca	1,314	44	NA	II	Intermittent	N/A	No	Low	No						154
DOH-161	Seneca	617	32	NA	II	Ephemeral	UNT to Royer Ditch	Yes	Low	No	X		X	X	X	141
DOH-165	Seneca	1,468	32	NA	II	Ephemeral	UNT to Morrison Creek	Yes	Low	No						211
DOH-166	Seneca	1,563	52	NA	II	Ephemeral	UNT to Morrison Creek	Yes	Low	No						211 & 216
DOH-168	Seneca	2,679	35	NA	II	Intermittent	UNT to Westerhouse Ditch	Yes	Low	No						215 & 220
DOH-169	Seneca	400	19	NA	I	Ephemeral	N/A	No	Low	No						219
DOH-171	Seneca	507	16	NA	I	Intermittent	UNT to Morrison Creek	Yes	Low	No						204
DOH-204	Sandusky	135	47	NA	II	Ephemeral	N/A	No	Low	No						4
DOH-205	Sandusky	1,323	37	NA	II	Ephemeral	N/A	No	Low	No						4
DOH-206	Seneca	2,914	52	NA	II	Intermittent	UNT to Hayward Ditch	Yes	Low	No						34, 42, 53
DOH-207	Seneca	4,443	42	NA	II	Intermittent	UNT to Royer Ditch	Yes	Low	No						98 & 99
DOH-208	Seneca	281	40	NA	II	Ephemeral	UNT to Royer Ditch	No	Low	No						99
DOH-209	Seneca	2,842	56	NA	II	Intermittent	UNT to Royer Ditch	Yes	Low	No	X		X	X	X	100 & 114
DOH-210	Seneca	1,573	18	NA	I	Ephemeral	UNT to Royer Ditch	Yes	Low	No						141
DOH-211	Seneca	2,791	47	NA	II	Intermittent	UNT to Royer Ditch	Yes	Low	No						151
DOH-212	Seneca	1,148	37	NA	II	Intermittent	UNT to Noel Ditch	Yes	Low	No						123 & 135
DOH-213	Seneca	1,065	27	NA	I	Ephemeral	N/A	No	Low	No						123 & 136
DOH-214	Seneca	1,211	24	NA	I	Ephemeral	UNT to Royer Ditch	No	Low	No						170 & 181
DOH-215	Seneca	60	28	NA	I	Ephemeral	UNT to Royer Ditch	No	Low	No						199
DOH-216	Seneca	394	57	NA	III	Perennial	UNT to Royer Ditch	Yes	Low	No						206
DOH-217	Seneca	1,440	37	NA	II	Ephemeral	UNT to Royer Ditch	No	Low	No						199 & 206
DOH-218	Seneca	954	47	NA	II	Perennial	UNT to Westerhouse Ditch	Yes	Low	No						204
DOH-219	Seneca	2,032	47	NA	II	Perennial	UNT to Westerhouse Ditch	Yes	Low	No						210
DOH-220	Seneca	963	57	NA	III	Perennial	UNT to Westerhouse Ditch	Yes	Low	No	X		X	X	X	210
POH-001	Seneca	NA	NA	NA	NA	Perennial	N/A	Yes	Low	No						67
POH-100	Seneca	NA	NA	NA	NA	Perennial	N/A	No	Low	No						107
POH-101	Seneca	NA	NA	NA	NA	Perennial	N/A	No	Low	No						187
POH-157	Seneca	NA	NA	NA	NA	Perennial	N/A	No	Low	No						184
POH-164	Seneca	NA	NA	NA	NA	Perennial	N/A	No	Low	No						98
POH-170	Seneca	NA	NA	NA	NA	Perennial	N/A	No	Low	No						106
POH-171	Seneca	NA	NA	NA	NA	Perennial	N/A	No	Low	No						128
POH-200	Seneca	NA	NA	NA	NA	Perennial	N/A	No	Low	No						50 & 64
SOH-001	Seneca	1,486	33	NA	II	Intermittent	UNT to Sandusky River	Yes	Low	No						67
SOH-002	Seneca	166	74	60	III	Perennial	Beaver Creek	Yes	Moderate	No		X	X	X	X	36

Table 4-2 Waterbodies Delineated in Survey Area

Stream ID	County	Linear Feet in Project Corridor	HHEI Score	QHEI Score	PHWH Class Designation	Flow Regime	Drainage Basin	Potentially Jurisdictional	Potential RTE Habitat	Mussels Observed	Water Quality Classification				Mapbook Location
											SRW	SSH	PWS	AWS	BW	
SOH-003	Seneca	5,500	76	70	III	Perennial	Beaver Creek	Yes	Moderate	No		X	X	X	X	29 & 37
SOH-004	Seneca	2,529	39	NA	II	Intermittent	UNT to Beaver Creek	Yes	Low	No						47 & 61
SOH-005	Seneca	239	78	NA	III	Intermittent	Owl Creek	Yes	Moderate	No	X		X	X	X	60
SOH-006	Seneca	85	52	38.5	III	Perennial	Owl Creek	Yes	Moderate	No	X		X	X	X	72
SOH-009	Seneca	71	44	NA	II	Intermittent	UNT to Westerhouse Ditch	No	Low	No						186
SOH-010	Seneca	6,114	66	51	III	Perennial	Westerhouse Ditch	Yes	Moderate	No	X		X	X	X	146, 158, 166, 176
SOH-011	Seneca	2,876	71	61.5	III	Perennial	Westerhouse Ditch	Yes	Moderate	No	X		X	X	X	119 & 134
SOH-014	Seneca	4,214	60	63	III	Perennial	Westerhouse Ditch	Yes	Moderate	No	X		X	X	X	93 & 106
SOH-015	Seneca	2,385	60	NA	III	Perennial	Noel Ditch	Yes	Moderate	No	X		X	X	X	107
SOH-016	Seneca	2,643	45	NA	II	Intermittent	Royer Ditch	Yes	Moderate	No	X		X	X	X	86
SOH-017	Seneca	3,094	32	NA	II	Intermittent	Noel Ditch	Yes	Low	No	X		X	X	X	149 & 150
SOH-018	Seneca	5,872	27	NA	I	Intermittent	UNT to Royer Ditch	Yes	Low	No						99 & 100
SOH-019	Seneca	308	61	NA	III	Perennial	Owl Creek	Yes	Moderate	No	X		X	X	X	72
SOH-100	Seneca	117	24	NA	I	Ephemeral	UNT to Sugar Creek	Yes	Low	No						102
SOH-101	Seneca	1,610	43	NA	II	Intermittent	UNT to Beaver Creek	Yes	Low	No						37
SOH-102	Seneca	192	48	NA	II	Intermittent	UNT to Beaver Creek	Yes	Low	No						29
SOH-103	Seneca	733	70	NA	III	Perennial	UNT to Owl Creek	Yes	Moderate	No						73
SOH-104	Seneca	343	34	NA	II	Intermittent	UNT to Owl Creek	No	Low	No						73
SOH-105	Seneca	139	34	NA	II	Intermittent	UNT to Owl Creek	No	Low	No						91
SOH-106	Seneca	458	24	NA	I	Ephemeral	UNT to Owl Creek	No	Low	No						91
SOH-107	Seneca	258	38	NA	II	Intermittent	N/A	No	Low	No						201
SOH-108	Seneca	333	29	NA	I	Ephemeral	N/A	No	Low	No						118
SOH-109	Seneca	327	18	NA	I	Ephemeral	N/A	No	Low	No						156
SOH-154	Seneca	3,781	74	NA	III	Perennial	UNT to Westerhouse Ditch	Yes	Moderate	No	X		X	X	X	172 & 183
SOH-158	Seneca	234	16	NA	I	Ephemeral	N/A	No	Low	No						162
SOH-167	Seneca	1,915	52	NA	II	Intermittent	UNT to Westerhouse Ditch	Yes	Low	No	X		X	X	X	215
SOH-200	Seneca	102	52	NA	II	Intermittent	N/A	No	Moderate	No						66 & 169
SOH-201	Seneca	5,373	59	NA	III	Perennial	UNT to Royer Ditch	Yes	Moderate	No						151 & 160
SOH-202	Seneca	153	26	NA	I	Ephemeral	UNT to Royer Ditch	Yes	Low	No						151
SOH-203	Seneca	255	36	NA	II	Ephemeral	UNT to Royer Ditch	Yes	Low	No						160
	TOTAL	**228,713**														

Table 4-2 Waterbodies Delineated in Survey Area

QHEI – Scoring
< 32: Limited Resource Water (LRW)
32 to 60: Modified Warm Water Habitat (MWH)
60 to 75: Warm Water Habitat (WWH)
> 75: Possible Exceptional Warm Water Habitat (EW)
HHEI – Scoring
< 30: Class I PHWH (typically ephemeral streams)
30 to 50 Class II PHWH (intermittent warm water streams)
> 50: Class II or III PHWH (depending on conditions)
> 75: Class III PHWH (perennial cool water streams)

Notes:
NA – Not Applicable
SRW - State Resource Water
PWS - Public Water Supply
BW - Bathing Waters
UNT – Unnamed Tributary
SSH - Seasonal Salmonid Habitat
AWS - Agricultural Water Supply

4.2.1 Class I Waterbodies

A total of 36 waterbodies were identified as Class I using the HHEI scoring, including 29 ditches and 7 streams. All of the ditches were considered modified, with the majority being identified as ephemeral (n=22) roadside waterbodies. In general, the ditches had a trapezoidal cross section with a narrow bankfull width and wider TOB, with grassy sloped sides. Substrate within ditches is typically fine silt material that is carried in from nearby farm fields by storm events. Any pooling that occurs is shallow and does not occur for extended periods of time.

The Class I streams were primarily ephemeral waterbodies which had more naturalized courses and less evidence of any manipulation. The Class I streams often occurred in proximity to identified wetlands, and either acted to collect overland runoff from nearby fields and transfer to a wetland, or to allow for flooding to be relieved.

4.2.2 Class II Waterbodies

The bulk of waterbodies were identified as Class II (n=61), including 48 ditches and 13 streams. The majority of ditches were considered intermittent (n=34) which is consistent with the HHEI guidance, however five ditches were considered perennial Class II due to the evidence of continuous flow but poor development of habitat along the reaches delineated. Likewise, nine ditches were identified as ephemeral but scored as a Class II waterbody due to the presence of wide channels and varied substrates with moderate pooling. The ephemeral ditches were not expected to flow year round, but instead were considered to have been delineated during ideal conditions after rain events. Five of the Class II ditches scored high enough to be considered a Class III waterbody based solely on their HHEI score. However a lack of available shade means that these ditches would be unlikely to have the required cool/cold habitat typical of Class III waterbodies, and the surrounding upland areas are consistently disturbed limiting the riparian habitat and are therefore considered Class II.

DOH-038 is a modified intermittent ditch that meanders through several active cultivated crop areas before crossing under CR 24. The ditch had moderate pooling along its course, but generally no deeper than 6 inches. The banks of the ditch had a narrow riparian buffer of shrubs and trees which provided shade along a portion of the ditch. The mix of substrates and wider bankfull width (approximately 11 feet wide) led to the ditch scoring well on the HHEI, however no QHEI was conducted since it lacks a predominance of pools at least 16 inches deep. Project related activities will likely rely on horizontal directional drilling (HDD) to install collection lines under the waterbody and thus avoid impacts. Due to DOH-038 being identified as a tributary to an identified WOTUS, the feature is considered jurisdictional.

DOH-113 is a modified intermittent ditch that flows between cultivated crop areas, passing underneath TR 179 just north of TR 148. The banks of the channel were primarily grasses and weedy species which appeared to be seasonally mowed. The ditch had moderately deep pools (up to 9 inches deep) at some of its bends, which led it to scoring highly on the HHEI. No QHEI evaluation was conducted since it lacks a predominance of pools at least 16 inches deep. The surrounding cultivated crop areas and ongoing manipulation of the banks would likely inhibit use by any significant wildlife along much of the waterbody. Due to DOH-113 being identified as a tributary to an identified WOTUS, the feature is identified as jurisdictional.

DOH-115 is a modified intermittent ditch that flows between cultivated crop areas northeast of the intersection of State Route (SR) 19 and TR 148. The banks of the channel were primarily grasses and weedy species which appeared to be seasonally mowed. The ditch had moderately deep pools (up to 6 inches deep) at some of its bends, which combined with a larger bankfull width to scoring highly on the HHEI. No QHEI evaluation was conducted since it lacks a predominance of pools at least 16 inches deep. The surrounding cultivated crop areas and ongoing manipulation of the banks would likely inhibit use by any significant wildlife along much of the waterbody. Due to DOH-115 being identified as an upland intermittent ditch and not a tributary to a WOTUS, it is not identified as jurisdictional.

DOH-119 is a modified intermittent ditch that flows north from Hensinger Road before turning and continuing out of the Survey Area. The ditch has a steep trapezoidal cross section, with the channel occurring approximately 6 feet below the TOB. The sides were covered in weedy species which appeared to be mowed seasonally. The moderate depth (6 inches) and wide bankfull width (6 feet) led to the ditch scoring highly on the HHEI, though the constant manipulation of the banks and surrounding land will likely prevent any significant wildlife occurrence in the ditch. No QHEI evaluation was conducted since it lacks a predominance of pools at least 16 inches deep. Due to DOH-119 lacking a connection to a WOTUS, it is not considered jurisdictional.

DOH-123 is a modified intermittent ditch that flows between two cultivated crop areas just east of TR 77. The ditch has a steep trapezoidal cross section, with the channel occurring approximately 10 feet below the TOB. The sides were covered in grasses which appeared to be mowed regularly. The moderate depth (6 inches) and wide bankfull width (6 feet) led to the ditch scoring highly on the HHEI, though the constant manipulation of the banks and surrounding land will likely prevent any significant wildlife occurrence in the ditch. No QHEI evaluation was conducted since it lacks a predominance of pools at least 16 inches deep. Due to DOH-123 being identified as a tributary to an identified WOTUS, the feature is considered to be jurisdictional.

The Class II streams were primarily modified (n=9) and intermittent (n=12) waterbodies. The majority of the modified streams were considered to be recovering from historic manipulation, but still not fully restored to their natural state. Stream SOH-203 was identified as an ephemeral Class II stream, primarily due to the variety of substrate and development of pooling along its length but were relatively narrow.

4.2.3 Class III Waterbodies

A total of 18 waterbodies were identified as Class III using the HHEI scoring metrics and potential for cool/cold water habitat to be present in summer, including 6 ditches and 12 streams. Due to their higher quality, Cardno recommends Project designs include rerouting or using drilling to avoid impacts these resources. Brief descriptions are provided below.

DOH-040 is a modified perennial ditch that collects water from a woodlot just east of CR 27, before flowing through a forested wetland (WOH-008) and then north. The ditch has deep plunge pools near the culverted crossings of CR 27 and CR 24, but generally holds no more than 10 inches of water in most pools. Once the ditch leaves the woodlot and flows north, it exhibits the typical characteristics of a ditch with trapezoidal cross section and grassy/weedy banks. The variety of substrate and maximum depth of pools led to the ditch scoring highly on the HHEI; however, no QHEI was conducted since it lacks a predominance of pools at least 16 inches deep. Due to DOH-040 being identified as a tributary to an identified WOTUS, the feature is identified as jurisdictional.

DOH-041 is a modified perennial ditch located among cultivated crop areas, with a culverted crossing under TR 183. The channel was flowing at the time of the survey, with the deepest pools having approximately 8 inches of water in them. The banks of the channel were primarily grasses and weedy species which appeared to be seasonally mowed. Along the western edge of the ditch within the Survey Area, the buffer area includes a large woodlot that may have several wetlands inside. The depth of the pools and wider dimensions resulted in DOH-041 scoring higher than other agricultural ditches. The surrounding cultivated crop areas and ongoing manipulation of the banks would likely inhibit use by any significant wildlife along much of the waterbody. No QHEI evaluation was conducted since it lacks a predominance of pools at least 16 inches deep. Project related activities will likely rely on HDD to install collection lines under the waterbody and thus avoid impacts. Due to DOH-041 being identified as a tributary to an identified WOTUS, the feature is identified as jurisdictional.

DOH-116 is a modified perennial ditch that flows between cultivated crop areas between SR 19 and Trail 175, just north of CR 38. Along the northern bank are several woodlots with isolated wetlands, however they do not provide any significant shade along the majority of the ditch. As the ditch nears Trail 175 the

ditch gains a wooded riparian buffer and appears to have a more naturalized channel (including cobble substrates and several pools with small minnow-like fishes). However, the majority of the ditch is an open trapezoidal ditch with banks covered in grasses and weedy species that are seasonally mowed. The ditch had moderately deep pools (up to 6 inches deep) at some of its bends, which combined with a larger bankfull width to scoring highly on the HHEI. No QHEI evaluation was conducted since it lacks a predominance of pools at least 16 inches deep. The surrounding cultivated crop areas and ongoing manipulation of the banks would likely inhibit use by any significant wildlife along much of the waterbody. Due to DOH-116 being identified as a tributary to an identified WOTUS, the feature is identified as jurisdictional.

DOH-153 is a modified perennial ditch that flows north from CR 24 towards a woodlot. The sides were covered in grasses which appeared to be mowed regularly. The moderate depth (8 inches) and wide bankfull width (12 feet) led to the ditch scoring highly on the HHEI, though the constant manipulation of the banks and surrounding land will likely prevent any significant wildlife occurrence in the ditch. The ditch was also seen to have multiple feed tile discharges along its length, which may help create some deeper pooling areas. No QHEI evaluation was conducted since it lacks a predominance of pools at least 16 inches deep. Due to DOH-153 being identified as a tributary to an identified WOTUS, the feature is identified as jurisdictional.

DOH-216 is a modified perennial ditch that flows through a corner of the Survey Area southwest of the intersection of CR 24 and TR 80. Near the northeast end of the ditch, it abuts WOH-250 which may retain some overflow during storm events. The ditch scored highly on the HHEI due to the presence of deep pools (approximately 10 inches) and a wide bankfull width; however, the lack of complex substrate and ongoing manipulation of the surrounding landscape likely reduces the quality of habitat provided by the ditch. No QHEI evaluation was conducted since it lacks a predominance of pools at least 16 inches deep. Due to DOH-216 being identified as a tributary to an identified WOTUS, the feature is considered to be jurisdictional.

DOH-220 is a modified perennial ditch flowing alongside CR 27 just north of the intersection with TR 124. The ditch flows between cultivated crop areas and maintained residential yards before discharging to DOH-219. The ditch scored highly on the HHEI due to the presence of deep pools (approximately 6 inches) and a wide bankfull width; however, the lack of complex substrate and ongoing manipulation of the surrounding landscape likely reduces the quality of habitat provided by the ditch. No QHEI evaluation was conducted since it lacks a predominance of pools at least 16 inches deep. Due to DOH-220 being identified as a tributary to an identified WOTUS, the feature is identified as jurisdictional.

SOH-002 is a perennial naturalized stream with a mix of rocky and fine grain sediments for substrates. The channel varied in width, but averaged 18 feet wide for the majority of the feature. The TOB to TOB distance was slightly wider at 20 feet. Stream SOH-002 scored highly on the HHEI forms (74) due to variety of substrates and dominance of rocky components (such as cobble and gravel). The channel also had multiple deep pools along its course, with the deepest occurring at the bends where water depth was approximately 15 inches. Stream SOH-002 was a portion of Beaver Creek. A few small minnow-like fish were observed during the survey. Due to SOH-002 being identified as a tributary to an identified WOTUS, the feature is considered to be jurisdictional.

SOH-003 is another perennial naturalized reach of Beaver Creek, located east of SOH-002, which meanders through the Survey Area to south of the intersection of Rowe Road and TR 32. The channel was 25 feet wide with moderate pooling along the reach surveyed. The stream had a moderately complex substrate with a variety of materials including cobble, sand and silt along the highly sinuous length. Many of the bends had significantly deep pools over a foot deep. During the delineations, large fish (unidentified due to high turbidity) were observed in the pools. Due to SOH-003 being identified as a tributary to an identified WOTUS, the feature is considered to be jurisdictional.

SOH-005 is an intermittent modified reach of Owl Creek that passes under SR 19, and diagonally crosses the Survey Area. The stream on the eastern side of SR 19 was a moderately wide channel approximately 18 feet wide with isolated pools of water over cobble substrates. The eastern side of the channel also had a developed forest buffer between the channel and surrounding crop area which appeared to be recovering from historic modification. The channel to the west of SR 19 however has mowed banks and a much smaller channel area of 8 feet. The deepest pools are in the area of the SR 19 overpass, and measured approximately 8 inches deep. Due to SOH-005 being identified as a tributary to an identified WOTUS, the feature is considered to be jurisdictional.

SOH-006 is a modified perennial reach of Owl Creek flowing between SR 101 and CR 44, crossing perpendicular to the Survey Area. The stream averaged a typical bankfull width of 2 feet, but widened out significantly by the SR 778 overpass where it approached 10 feet wide. The reach of the stream by the overpass also saw the deepest pools at approximately 10 inches deep. The majority of the channel was shaded by willows and other deciduous trees, but became an open channel as it passed near a VFW hall by the intersection of SR 778 and CR 44. Though the channel lacked significant pooling in excess of 16 inches, the stream was scored on both the HHEI and QHEI forms. The wide bankfull width and presence of pools (6 inches deep) led to the waterbody scoring highly on the HHEI, but the lack of well-developed habitat led to a lower score on the QHEI. Due to SOH-006 being identified as a tributary to an identified WOTUS, the feature is considered to be jurisdictional.

SOH-010 is a perennial modified stream that begins in a mature woodlot and flows north between CR 38 and TR 138. The substrate of the channel was a balanced mix of cobble, gravel, sand, and silt. The southern half of the stream was forested and had several large pieces of woody debris in some of the pools. The widest and deepest parts of the stream were located in the forested portion. As the stream flowed north towards the fields, the canopy cover was reduced and the stream begins to narrow and become much shallower. The northern reach of the stream loses any significant riparian habitat and is an unshaded stream. The complexity of the substrate, wide bankfull width, and depth of pools led the stream to score highly on both the HHEI and QHEI forms. Due to SOH-010 being identified as a tributary to an identified WOTUS, the feature is considered to be jurisdictional.

SOH-011 is a naturalized perennial stream that flows between two crop areas. The stream has a narrow riparian buffer on both sides with a mix of mature trees and weedy herbaceous species which have migrated in from the edge of the nearby crops. The channel was approximately 12 feet wide and had pools approximately 18 inches deep. The substrate in the channel was a well-balanced mix of cobble, gravel, sand, and silt. During the surveys, a handful of minnow-like fishes were observed in the deeper pools. The complexity of the substrate, wide bankfull width, and depth of pools led the stream to score highly on both the HHEI and QHEI forms. Due to SOH-011 being identified as a tributary to an identified WOTUS, the feature is considered to be jurisdictional.

SOH-014 is a perennial naturalized stream that flows along a minor forest valley just west of SR 19. The stream channel was approximately 12 feet wide on average, with moderate pooling up to 18 inches deep in some of the bends. The substrate in the channel was a mix of cobble, gravel, silt, and sand with minor amounts of woody debris from the overhanging trees. During the survey, a handful of minnow-like fishes were observed swimming in the deeper parts of the channel. Due to SOH-014 being identified as a tributary to an identified WOTUS, the feature is considered to be jurisdictional.

SOH-015 is a modified perennial stream with a cobble channel approximately 7.5 feet wide which flows between cultivated crop areas. The majority of the stream has a narrow, forested buffer between it and the surrounding landuse. The wide bankfull width and moderate complexity of the substrate led to the stream scoring highly on the HHEI. Stream SOH-015 lacked a predominance of pools over 16 inches deep and so a QHEI evaluation was not completed. Due to SOH-015 being identified as a tributary to an identified WOTUS, the feature is considered to be jurisdictional.

SOH-019 is a modified perennial stream that flows perpendicular to CR 44 just west of SR 778/19. To the south of CR 44, the narrow stream flows between maintained residential yards and has little shade. The banks of the southern portion of the reach are predominately grasses and weeds, with a few isolated willow saplings. On the north side of CR 44 however, the stream widens out and deepens as it flows through a residential woodlot. The moderate pool depth and complexity of the substrates led to the stream scoring highly on the HHEI. No QHEI evaluation was completed due to the stream lacking a predominance of pools over 16 inches deep. Due to SOH-019 being identified as a reach of an identified WOTUS (Owl Creek), the feature is considered to be jurisdictional.

SOH-103 is a perennial modified stream that flows through a small woodlot just north of SR 19. The stream was relatively shallow overall, with some minor pools up to 6 inches deep, but scored highly on the HHEI due to the complex substrate and wide bankfull width. No QHEI evaluation was completed due to the stream lacking a predominance of pools over 16 inches deep. Due to SOH-103 being identified as a tributary to an identified WOTUS, the feature is considered to be jurisdictional.

SOH-154 is a forested extension of DOH-153, but was identified as having a significant difference in environmental conditions to be identified as another feature. Stream SOH-154 maintained a relatively wide bankfull distance and had several naturalized meanders as it flowed north through a woodlot. A mix of substrates, deep pools, and the wide width led to the feature scoring highly on the HHEI. No QHEI evaluation was completed due to the stream lacking a predominance of pools over 16 inches deep. Due to SOH-154 being identified as a portion of an identified WOTUS, the feature is considered to be jurisdictional.

SOH-201 is a modified perennial stream that flows through a forested wetland complex located northeast of the intersection of CR 27 and TR 136. The substrate was mostly comprised of simple silts and limited cobble which prevented the stream from scoring higher on the HHEI despite the nearby wetland complex. No QHEI evaluation was completed due to the stream lacking a predominance of pools over 16 inches deep. Due to SOH-201 being identified as a tributary to an identified WOTUS, the feature is considered to be jurisdictional.

4.2.4 Potentially Jurisdictional Delineated Waterbodies in the Survey Area

No traditional navigable waterways are located within the Survey Area. However, eight named WOTUS and their tributaries were identified in the Survey Area, including Beaver Creek, Indian Creek, Morrison Creek, Noel Ditch, Owl Creek, Pickerel Creek, Royer Ditch, and Westerhouse Ditch. Tributaries themselves may not be navigable, but have a significant impact on water quality ‘down-stream’ in the WOTUS. Status as a tributary was primarily assessed on the presence or absence of a USGS NHD blue line feature and possibility for flow into a larger WOTUS. Additionally, if the waterbody or wetland abutted a potentially jurisdictional feature and had a permanent or potentially permanent hydrologic connection, then both waterbodies would be considered jurisdictional. However, final determinations of jurisdiction are the responsibility of the USACE.

Seventy-six (76) delineated waterbodies were considered potentially jurisdictional within the Survey Area due to a significant nexus to a WOTUS according to the USACE guidance as outlined in Section 3.1.6. Any delineated WOTUS retained a connection to an NHD blue line feature and were either perennial or intermittent. The jurisdictional features included 52 ditches, 23 streams, and 1 pond. The majority of the jurisdictional features were portions of a WOTUS or identified as a tributary to a WOTUS. The pond, POH-001, was determined to be an impoundment of tributary waters to the Sandusky River, which still maintained hydrologic connection to down-stream features, and thereby potentially a WOTUS.

5 Conclusions

The Republic Wind Project is proposed as a 200-MW wind farm with up to 50 turbines on private lands in northern Seneca County and southeast Sandusky County, Ohio. The Project is proposed in a predominantly agricultural area. The history of land conversion and landscape manipulation for farming has reduced the land available for wetlands to develop.

Between the fall of 2016 and fall of 2017, Cardno completed field surveys of 314 parcels within the Project Area (i.e., Survey Area) that totaled approximately 20,265 acres. The majority of wetlands delineated were located in woodlots, which had remained relatively undisturbed or recovered from previous disturbance. Of the 106 wetlands delineated in the Survey Area, 12 wetlands were considered high quality wetland (Category 3), which was attributed to their larger size, buffer from surrounding landuse, and significant development of habitat within the wetlands. The majority were identified as Category 2 or Modified Category 2 by the ORAM (n=55) which is considered a moderate quality wetland. Of the 106 wetlands, 37 (approximately 84.6 acres) are considered jurisdictional according to the USACE guidance based on a hydrologic connection to a WOTUS or tributary to a WOTUS. The remaining 69 wetlands were considered isolated wetlands (Waters of the State).

Of the 123 waterbody features delineated in the Survey Area, 32 stream reaches were identified in the Survey Area. Eighteen (18) of the delineated waterbodies (including 12 streams and 6 ditches) scored highly enough on the HHEI score to be considered Class III waterbodies. Eighty-three (83) of the waterbodies were identified as ditches. Of the 123 delineated waterbodies, 76 were considered jurisdictional according to the USACE guidance due to connections to potential tributaries to WOTUS features. The remaining 47 waterbodies were considered Waters of the State.

The findings of this investigation represent a delineation survey of the Survey Area for surface waters, including all Waters of the State and federally jurisdictional WOTUS. This report represents a professional estimate of the Survey Area's potential surface waters and is based upon on implementation of applicable field methods and the professional judgment of Cardno. Final verification of their boundaries and jurisdictional status for regulatory purposes can only be completed through a Jurisdictional Determination review by the USACE or their duly appointed representative.

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Republic Wind Project

APPENDIX A

SITE PHOTOS

Apex Republic Wind Project, Seneca and Sandusky County Ohio
Wetland and Waterbody Field Delineation Surveys
Photolog
Fall 2016 Though Fall 2017

Photo: Typical Modified Ephemeral Waterbody

Date: 9/28/16

Description: Photo of ditch DOH-001 which was typical for most ephemeral ditches in the Delineation Area. The channel lacked any standing water which indicated it likely flowed during larger storm events. And due to the constant mowing of the banks and input from field tile, the waterbody was considered modified. The combination of lacking habitat and constant disturbance meant the waterbody was of low biological quality.

Photo: Typical Naturalized Ephemeral Waterbody

Date: 4/25/17

Description: Stream SOH-108 was identified as an ephemeral waterbody due to the presence of a defined bed and bank and indications of flow (as evidenced by sticks and snags). Unlike a modified waterbody, the naturalized ephemeral waterbodies lacked signs of recent man-made disturbance. Although the features laced disturbance, the lack of consistent water meant biological utilization was likely low.

Apex Republic Wind Project, Seneca and Sandusky County Ohio
Wetland and Waterbody Field Delineation Surveys
Photolog
Fall 2016 Though Fall 2017

Photo: Typical Modified Intermittent Waterbody

Date: 10/03/16

Description: Photo of ditch DOH-038 which was typical for most intermittent ditches in the Delineation Area. The channel had pockets of standing water throughout its length. Due to the constant mowing of the banks and input from field tile, the waterbody was considered modified. Modified ditches such as this feature often had limited potential for significant biological utilization due to the constant disturbance of the banks.

Photo: Typical Naturalized Intermittent Waterbody

Date: 9/29/16

Description: Stream SOH-004 was identified as an intermittent waterbody due to the presence of a defined bed and bank and pockets of standing water. This particular waterbody had signs of recovery from historic modification in the form of mature trees growing along straightened channels. Naturalized intermittent streams were considered to have a higher biological utilization than modified features due to the presence of habitat along the banks.

Apex Republic Wind Project, Seneca and Sandusky County Ohio
Wetland and Waterbody Field Delineation Surveys
Photolog
Fall 2016 Though Fall 2017

Photo: Typical Modified Perennial Waterbody

Date: 10/03/16

Description: Photo of ditch DOH-041 which was typical for most perennial ditches in the Delineation Area. The channel had flowing water throughout approximately 6 inches deep. Due to the constant mowing of the banks and input from field tile, the waterbody was considered modified. Modified ditches such as this feature often had limited potential for significant biological utilization due to the constant disturbance of the banks.

Photo: Typical Naturalized Perennial Waterbody

Date: 9/29/16

Description: Stream SOH-011 was typical of the perennial naturalized streams in the Delineation Area. Such waterbodies had significant flowing water, and often had pools over a foot deep. The naturalized waterbodies had mature trees along the banks which in turn deposited woody debris in the channel. The availability of habitat within the channel and lower levels of disturbance from surrounding landuse meant that the naturalized perennial waterbodies could potentially see high biological utilization.

Apex Republic Wind Project, Seneca and Sandusky County Ohio
Wetland and Waterbody Field Delineation Surveys
Photolog
Fall 2016 Though Fall 2017

Photo: Typical Category 1 Wetland

Date: 9/30/16

Description: Typical low quality palustrine emergent wetland found in the Delineation Area. This wetland (WOH-002) was located in a small depressional area along a roadside. The presence of invasive narrow leaf cattail (*Typha angustifolia*), lack of buffers from surrounding landuse, and lack of standing water led to the wetland scoring as a Category 1 wetland on the ORAM forms.

Photo: Typical Modified Category 2 Wetland

Date: 10/01/16

Description: Photo of wetland WOH-003, which was a mix of emergent and forested wetland. Due to the historic modification of the wetland area adjacent to the crop area, the wetland had lost some of its functions. However when scoring on the ORAM form, the forested portion (which extends to the left in the photo) indicated the wetland could increase its score and recover some of its lost functions; which led to it scoring as a Modified Category 2 on the ORAM forms.

Apex Republic Wind Project, Seneca and Sandusky County Ohio
Wetland and Waterbody Field Delineation Surveys
Photolog
Fall 2016 Though Fall 2017

Photo: Typical Category 2 Wetland

Date: 10/02/16

Description: Wetland WOH-005 was identified as high scoring Category 2 wetland. The feature scored highly despite the lack of standing water due to its location inside a woodlot (which acted as a buffer between surrounding landuse) and the amount of woody debris and dead standing trees which could be utilized for habitat.

This wetland was typical of the forested wetlands, which often exhibited sparsely vegetated concave surfaces and root buttressing.

Photo: Typical Category 3 Wetland

Date: 10/02/16

Description: Photo of wetland WOH-008, which was a mix of emergent and forested wetland. The wetland was the largest wetland identified in the Delineation Area. The wetland had a high interspersion of vegetation types, high amount of dead standing and woody debris, and was relatively large which led to it scoring highly on the ORAM.

Apex Republic Wind Project, Seneca and Sandusky County Ohio
Wetland and Waterbody Field Delineation Surveys
Photolog
Fall 2016 Though Fall 2017

Photo: Typical Wetland Soils

Date: 10/02/16

Description: The soils in many of the wetlands exhibited similar characteristics. Often the soils were darky colored with brighter pockets of redox concentrations. The redox concentrations occur when soils are saturated for a significant portion of the season.

Wetland soils often had clay components as well which helped the soils retain water for longer periods.

Photo: Typical Upland Soils

Date: 10/03/16

Description: Upland soils in the Delineation Area were often brightly colored dry loams, with minor amounts of clay in the matrix. This composition allowed for water to pass more easily to deeper depths.

Apex Republic Wind Project, Seneca and Sandusky County Ohio
Wetland and Waterbody Field Delineation Surveys
Photolog
Fall 2016 Though Fall 2017

Photo: Typical Crop Area

Date: 10/02/16

Description: The majority of the Delineation Area consisted of active crop areas. The crops encountered during the surveys included soybeans and corn. The crop areas often had small windrows of trees which served to denote property lines.

Photo: Typical Crop Area

Date: 10/17/17

Description: many of the crop areas also had grassy swales between fields. These swales were designed to convey stormwater runoff from the fields and into nearby ditches or streams. Due to a lack of identifiable ordinary high water mark and upland vegetation, swales are not considered wetlands or waterbodies.

Apex Republic Wind Project, Seneca and Sandusky County Ohio
Wetland and Waterbody Field Delineation Surveys
Photolog
Fall 2016 Though Fall 2017

Photo: Typical Forested Woodlot

Date: 10/17/17

Description: Understory development in woodlots varied between parcel, and likely reflected historic disturbance and land use. Some woodlots had relatively dense understories dominated by blackberry (*Rubus* spp.) and grasses; while others might be relatively sparse and dominated by saplings.

Photo: Typical Forested Woodlot

Date: 10/02/16

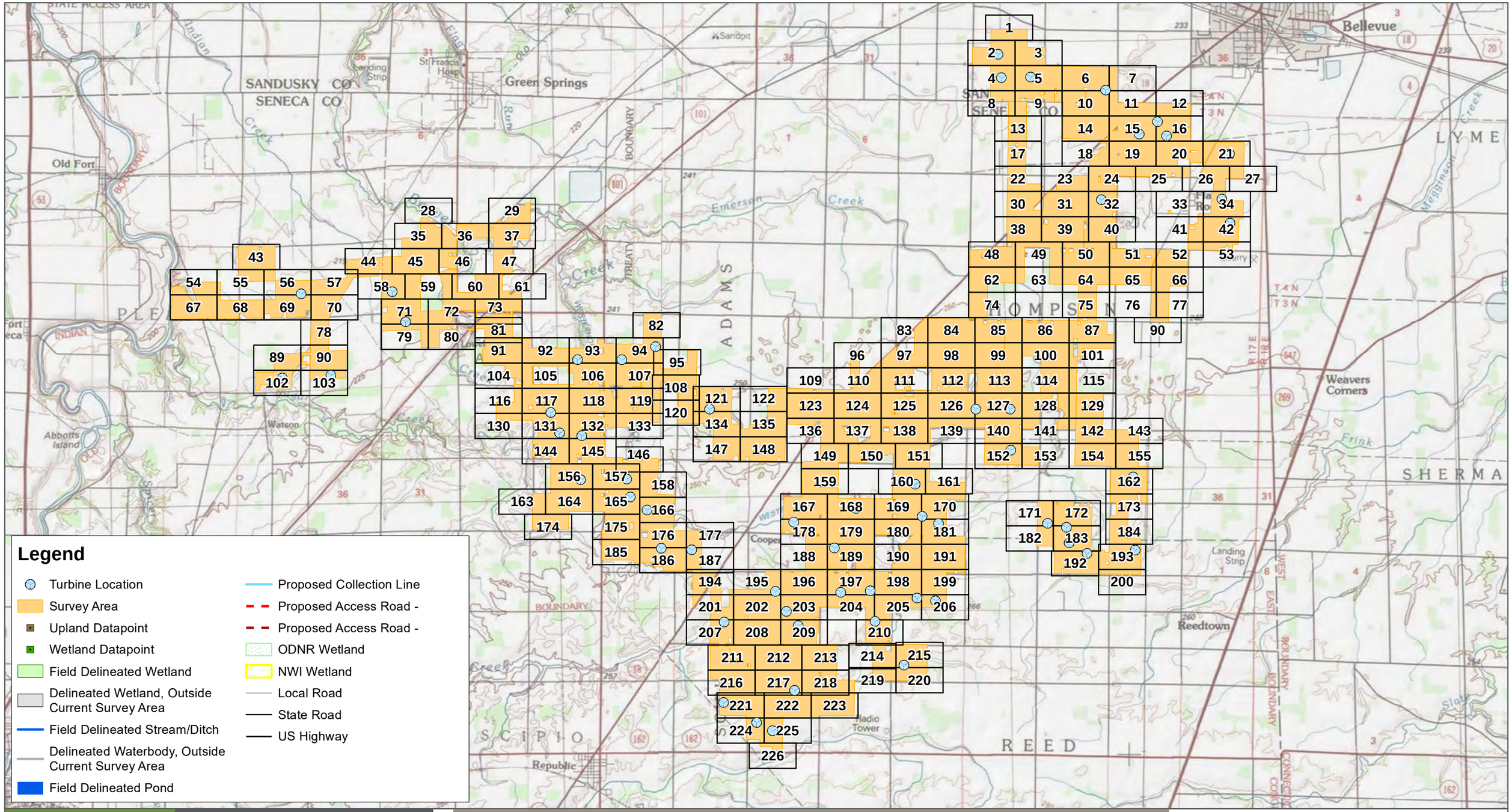
Description: The woodlots in the Delineation Area varied in species variety with some woodlots being dominated by American beech *(Fagus grandifolia*), and others a mix of multiple hickory (*Carya* sp.), maples (*Acer* sp.), and oaks (*Quercus* sp.).

Many of the woodlots had evidence of historic logging due to the presence of flat topped tree stumps and overgrown roads.

Republic Wind Project

APPENDIX B

WETLAND AND WATERBODY MAPS



Legend

- Turbine Location
- Survey Area
- Upland Datapoint
- Wetland Datapoint
- Field Delineated Wetland
- Delineated Wetland, Outside Current Survey Area
- Field Delineated Stream/Ditch
- Delineated Waterbody, Outside Current Survey Area
- Field Delineated Pond
- Proposed Collection Line
- Proposed Access Road -
- Proposed Access Road -
- ODNR Wetland
- NWI Wetland
- Local Road
- State Road
- US Highway

Data Source: ESRI, Apex (2016)

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Wetland and Waterbody Maps
Map Index

Republic Wind Project
Seneca and Sandusky Counties, OH

0 1 2 3 Miles
0 1 2 3 4 5 Kilometers

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GIS Analyst: Peter.Marsey

- Turbine Location
- Survey
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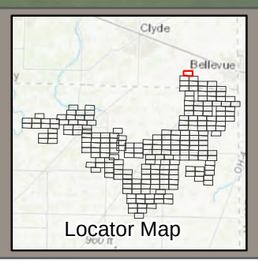

Wetland and Waterbody Maps (Sheet 1 of 226)

Republic Wind Project
Seneca and Sandusky Counties, OH

0 200 400 600 Feet
0 50 100 150 200 Meters

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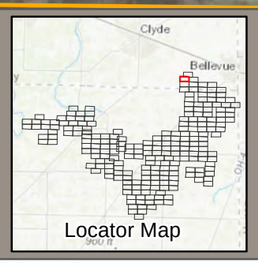

Wetland and Waterbody Maps (Sheet 2 of 226)

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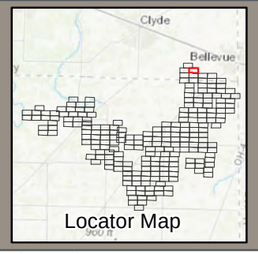

Wetland and Waterbody Maps (Sheet 3 of 226)

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- Local Road
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- US Highway

Locator Map

Wetland and Waterbody Maps (Sheet 4 of 226)

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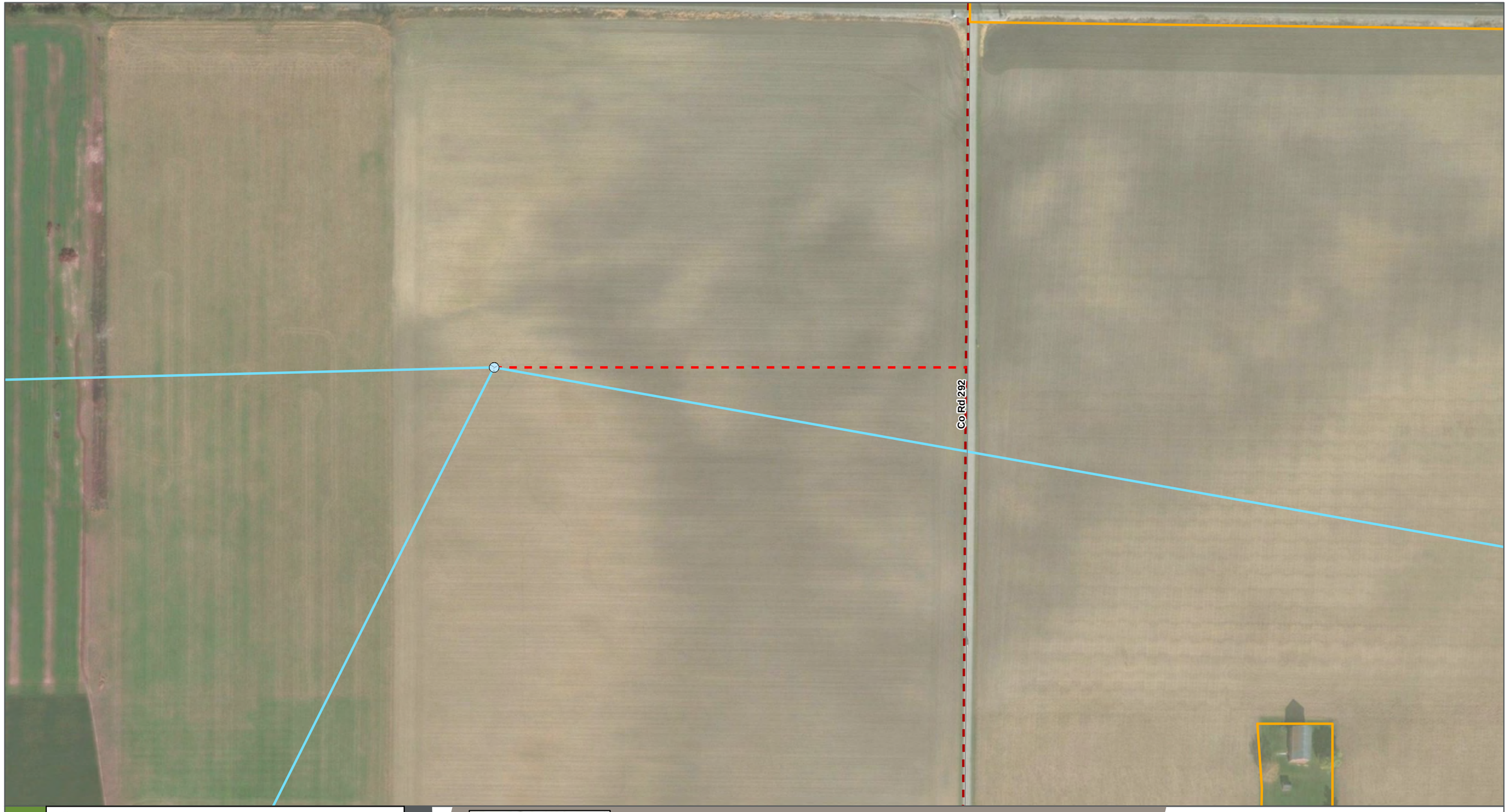

Turbine Location
Survey
Upland Datapoint
Wetland Datapoint
Field Delineated Wetland
Delineated Wetland, Outside Current Survey Area
Field Delineated Stream/Ditch
Delineated Waterbody, Outside Current Survey Area
Field Delineated Pond
Proposed Collection Line
Proposed Access Road -
Proposed Access Road - Public
ODNR Wetland
NWI Wetland
Local Road
State Road
US Highway

Wetland and Waterbody Maps (Sheet 5 of 226)

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- State Road
- US Highway

Wetland and Waterbody Maps (Sheet 6 of 226)

Republic Wind Project
Seneca and Sandusky Counties, OH

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Co Rd 302

- Turbine Location
- Survey
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- State Road
- US Highway

Wetland and Waterbody Maps (Sheet 7 of 226)

Republic Wind Project
Seneca and Sandusky Counties, OH

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Wetland and Waterbody Maps (Sheet 8 of 226)

Republic Wind Project
Seneca and Sandusky Counties, OH

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Co Hwy 62
Co Hwy 113
Co Rd 113
E Co Rd 62
Co Rd 292
Twp Rd 81
N Twp Rd 81

- Turbine Location
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Wetland and Waterbody Maps (Sheet 9 of 226)

Republic Wind Project
Seneca and Sandusky Counties, OH

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Co Hwy 113
Co Hwy 62
E Co Rd 62
Co Rd 113

N

- Turbine Location
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- US Highway

Locator Map

Wetland and Waterbody Maps (Sheet 10 of 226)

Republic Wind Project
Seneca and Sandusky Counties, OH

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Wetland and Waterbody Maps (Sheet 11 of 226)

Republic Wind Project
Seneca and Sandusky Counties, OH

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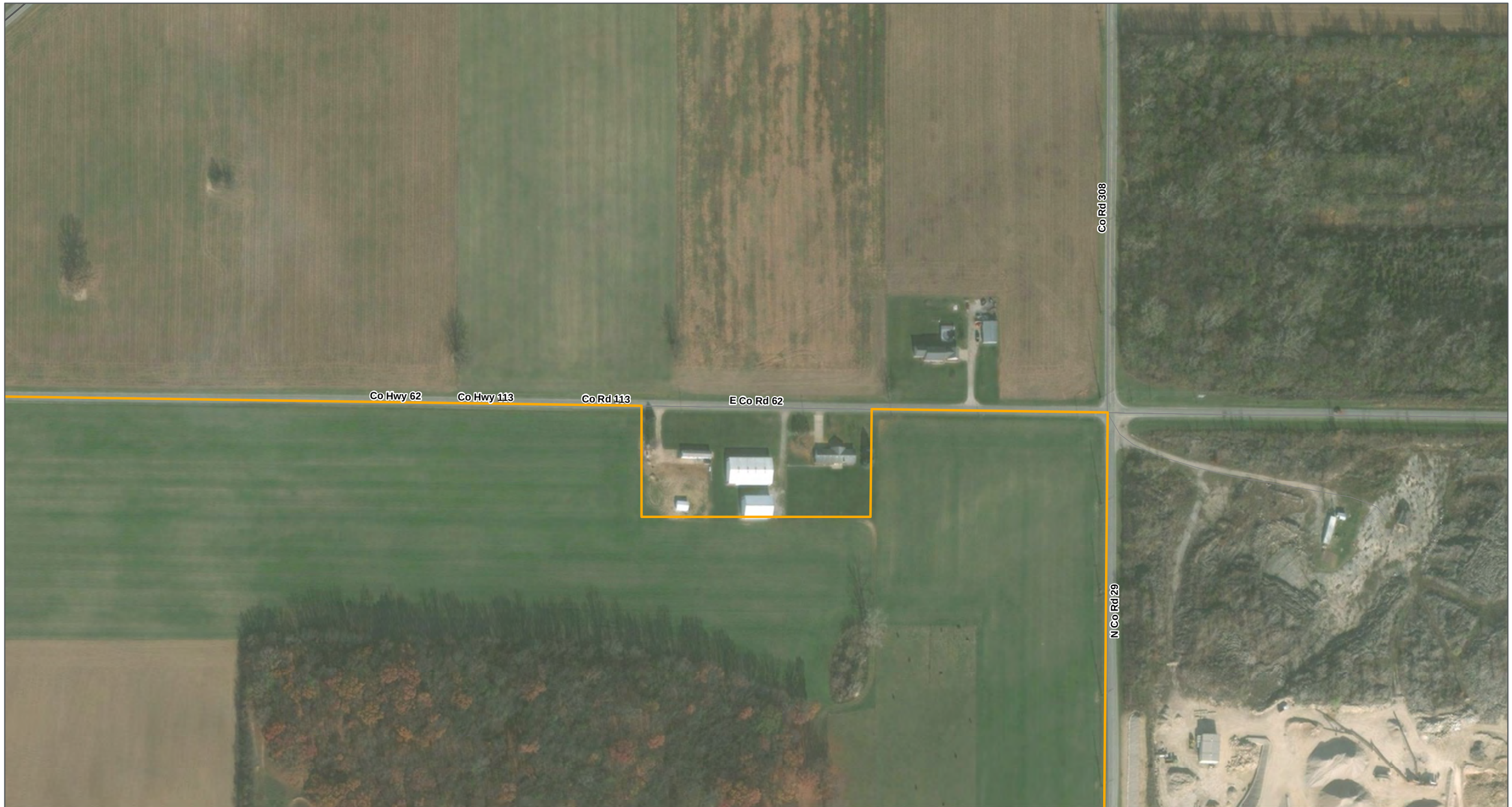

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Wetland and Waterbody Maps (Sheet 12 of 226)

Republic Wind Project
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Wetland and Waterbody Maps (Sheet 13 of 226)

Republic Wind Project
Seneca and Sandusky Counties, OH

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Wetland and Waterbody Maps (Sheet 14 of 226)

Republic Wind Project
Seneca and Sandusky Counties, OH

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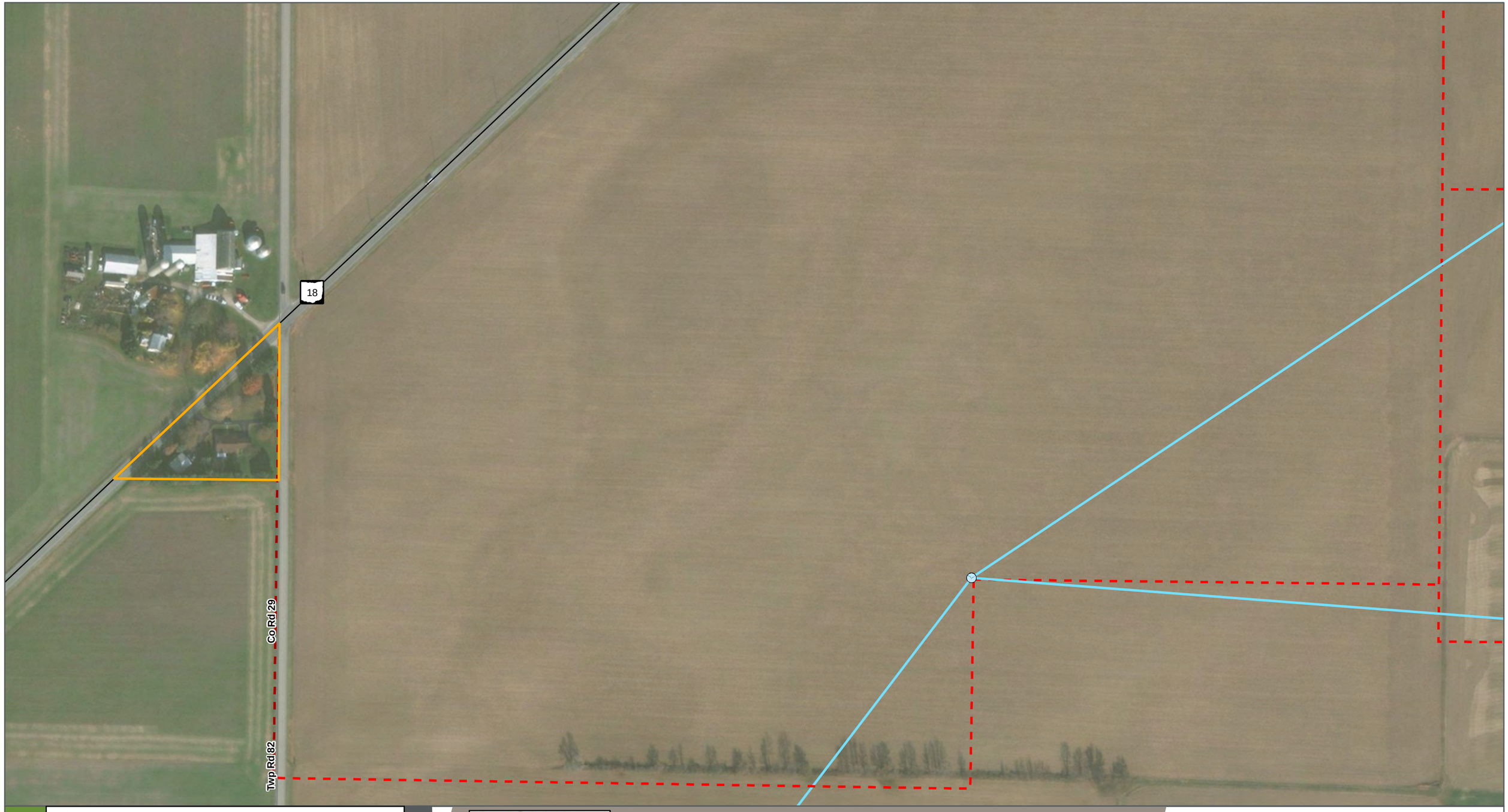

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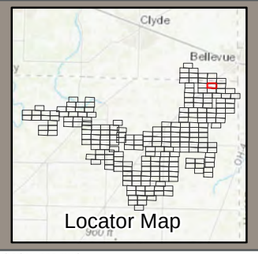

Locator Map

Wetland and Waterbody Maps (Sheet 15 of 226)

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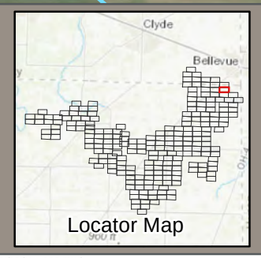

Wetland and Waterbody Maps (Sheet 16 of 226)

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Turbine Location
Survey
Upland Datapoint
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Field Delineated Pond
Proposed Collection Line
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Proposed Access Road - Public
ODNR Wetland
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Local Road
State Road
US Highway

Wetland and Waterbody Maps (Sheet 17 of 226)

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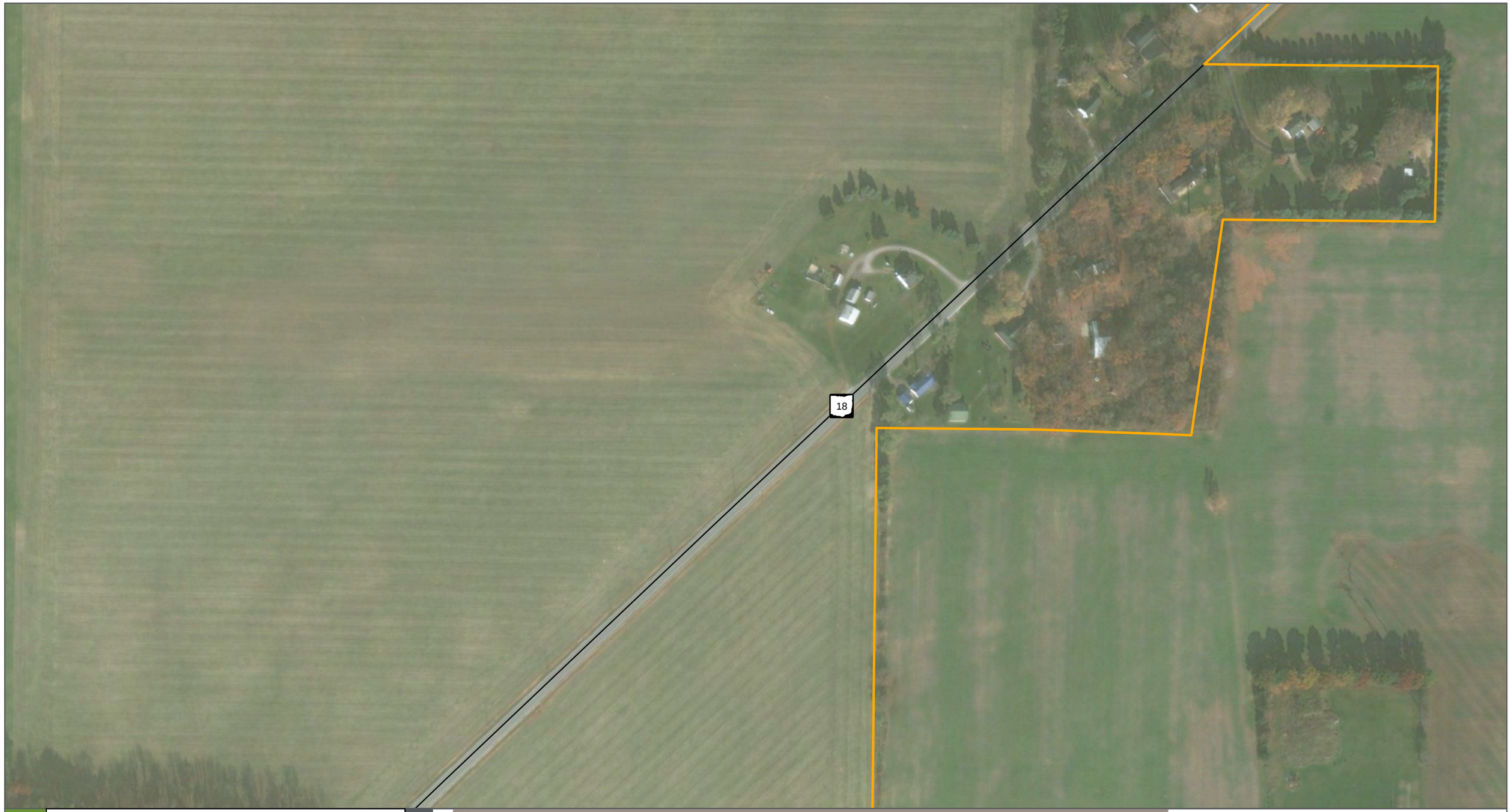

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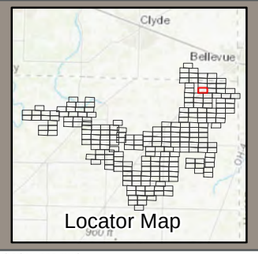

Wetland and Waterbody Maps (Sheet 18 of 226)

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Wetland and Waterbody Maps (Sheet 19 of 226)

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