4906-5-08 ECOLOGICAL INFORMATION AND COMPLIANCE WITH PERMITTING REQUIREMENTS

This section of the Application provides a summary of the studies conducted to assess the potential effects of the Project on the ecology of the area. A map and literature search was conducted for a corridor 1,000 feet either side of the centerline of both the Preferred and Alternate Routes. A field survey of ecological habitat and features was performed within a 280-foot wide corridor (100 feet on either side of the planned 80-foot wide disturbance corridor) for both the Preferred and Alternate Routes with one exception discussed in Section (B) below. Information in the following subsections is provided separately for the Preferred and Alternate Routes.

(A) ECOLOGICAL MAP

Maps at a scale of 1:24,000 (1 inch = 2,000 feet) including the corridor 1,000 feet either side of the centerlines (referred to as the 2,000-foot corridor) of the Preferred and Alternate Routes are presented as Figures 7-1A through 7-1F. These maps depict the proposed pipeline alignments and land use classifications, including vegetative cover. Additionally, lakes, ponds, and/or reservoirs, highly erodible soils and slopes of 12 percent or greater, abandoned or undeveloped land, wildlife areas, nature preserves, and conservation areas within the 2,000-foot corridor are identified on these maps. Figures 7-1A through 7-1F also show the proposed regulation station and valve station locations and station expansion areas. Features within 1,000 feet of the proposed Routes were identified from published data and verified by the pedestrian ecological field survey. An ecological overview map is provided as Figure 8-1. More detailed maps at 1:7,000 scale depicting field-delineated water features are provided as Figures 8-2A through 8-2H (Preferred Route) and Figures 8-3A through 8-3J (Alternate Route).

In the discussion below, the term “survey corridor” refers to the corridor encompassing 100 feet either side of the planned disturbance area (*i.e.*, an estimated 80-foot wide construction work area or right-of-way [ROW]), which equates to a survey corridor of 280 feet in width. This survey corridor was evaluated by CH2M’s field biologists through pedestrian field observations. The term “construction work area (CWA)” refers to the planned 80-foot corridor that will be used during the construction process (temporary equipment access, soil piles, etc.). The planned 80-foot wide CWA along the pipeline is preliminary and conceptual as of this Application

submittal. The CWA will be refined once the final route is approved and detailed engineering design and construction plans commence. The use of the 80-foot CWA for purposes of this Application allows for a comparison of the various types of land use settings and sensitive ecological features that are present and the approximate extent of areas that may be disturbed during construction of either the Preferred or Alternate Route.

(B) FIELD SURVEY REPORT FOR VEGETATION AND SURFACE WATERS

The ecological field surveys along the Preferred and Alternate Routes, which included a 280-foot wide survey corridor centered along the Preferred and Alternate Route centerlines, were conducted between April 11, 2016, and ~~July 21~~December 22, 2016, by CH2M's field biologists. The results of the field surveys are presented in the following sections. Duke Energy Ohio has completed all field surveys for the Preferred and Alternate Route corridor. ~~with the exception of 1.2 miles of the Alternate Route. This remaining section of Alternate Route, representing less than 9 percent of the overall length of the Alternate Route, will be surveyed and the results submitted as a supplemental filing to the OPSB by October 17, 2016. The field survey of this 1.2-mile section (from Ronald Reagan Cross County Highway south to Losantiville Avenue) was suspended at the request of the Hamilton County Commissioners during the July 27th symposium with community representatives where Duke Energy Ohio participated in a question and answer forum to discuss the Project.~~ The extent of one stream and three wetlands (formed in a railroad corridor swale) on the Norfolk Southern Railroad corridor could not be fully evaluated (refer to footnotes of Tables 8-2 and 8-3). These features will be delineated once Norfolk Southern provides approval for safe access to this active railroad, if deemed necessary by OPSB in the event that the Alternate Route is to be certificated versus the Preferred Route. A parcel owned by the Cincinnati Port Authority, adjacent to the railroad, could not be directly field reviewed because of the site undergoing active soil grading work in preparation for construction of a building. Additionally, the residential backyards adjacent to the Preferred Route alignment along the eastern and southern perimeter of the Kenwood Country Club property were observed for streams and wetlands from the common property boundary between the golf course property and residential properties. The construction workspace would not be located on these residential properties.

The field survey work was preceded by review of published mapping, aerial photography, protected federal-listed and state-listed species, and ecological information for at least a 1,000-foot area on either side of the Preferred and Alternate Route centerlines. Map sources included USGS 7.5-minute quadrangle topographic maps, U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps, and U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil survey maps.

Published information regarding existing flora and fauna was also requested from the ODNR Department of Wildlife (DOW) Ohio Natural Heritage Program. This request included available GIS shapefiles of the location records of state-listed species within one mile of the proposed Project routes. The information provided by the ODNR-DOW on May 11, 2016, and August 8, 2016, indicated no records of federal and/or state threatened or endangered species, or species of special concern, within 1,000 feet of the Preferred and Alternate Routes (ODNR, 2016a). Copies of any future agency consultation correspondence, including from the USFWS and ODNR-DOW, regarding the Project will be provided to the OPSB case docket.

(1) Vegetative Communities, Wetlands, and Streams in Study Area

(a) Vegetative Communities

Vegetative communities include wetlands, upland forest, riparian forest, fallow areas/old-field, and maintained lawns. The vegetative communities occur within various types of land uses including: commercial, industrial, institutional, residential, and recreation lands, as well as transportation corridors (public county and state roads and interstate highways). Habitat descriptions are provided in more detail below. Details on the anticipated impacts on these habitats from construction of the proposed Project are provided in Section 4906-05-08(B)(3)(a) below and in Table 8-5.

Commercial/Industrial/Institutional: Commercial-use, industrial-use, and institutional-use properties exist within the study corridors for the Preferred and Alternate Routes. Commercial, industrial, and institutional areas all include lands having significant amounts of built infrastructure (buildings, parking lots, utility service, etc.). Vegetation identified within the commercial/industrial/institutional areas of the Routes contain areas of grasses and herbaceous plants that are typically maintained through mowing.

Residential/Recreation Areas: Several residential areas and recreation areas (parks, golf courses) exist within the study corridors for the Preferred and Alternate Routes. Vegetation identified on residential and recreational land include areas of grasses and other herbaceous species, such as tall fescue (*Festuca arundinacea*), common dandelion (*Taraxacum officinale*), white clover (*Trifolium repens*), red clover (*Trifolium pretense*), Kentucky bluegrass (*Poa pratensis*), ground ivy (*Glechoma hederacea*), purple dead nettle (*Lamium purpureum*), narrowleaf plantain (*Plantago lanceolate*) and wild onion (*Allium canadense*).

Wetlands: Several wetlands were observed and delineated within the survey corridors for the Preferred and Alternate Routes. Dominant plant species within palustrine forested wetlands include American sycamore (*Platanus occidentalis*), ash-leaf maple (*Acer negundo*), creeping jenny (*Lysimachia nummularia*), common hackberry (*Celtis occidentalis*), Eastern cottonwood (*Populus deltoides*), green ash (*Fraxinus pennsylvanica*), pin oak (*Quercus palustris*), poison ivy (*Toxicodendron radicans*), red maple (*Acer rubrum*), and swamp white oak (*Quercus bicolor*). Dominant plant species within palustrine scrub-shrub wetlands include black willow (*Salix nigra*), southern arrow-wood (*Viburnum dentatum*), Eastern cottonwood, ash-leaf maple, jewelweed (*Impatiens capensis*), and pin oak (*Quercus palustris*). Dominant plant species observed within palustrine emergent wetlands include the following:

- Broadleaf cattail (*Typha latifolia*)
- Chufa (*Cyperus esculentus*)
- Common spike-rush (*Eleocharis palustris*)
- Creeping jenny
- Jewelweed
- Kentucky bluegrass
- Narrowleaf cattail (*Typha angustifolia*)
- Rice cut grass (*Leersia oryzoides*)
- Reed canary grass (*Phalaris arundinacea*)
- Wingsteam (*Verbesina alternifolia*)

Upland Forest: Upland early successional/second growth forest is present across most of the steep land slopes and along streams, in addition to other scattered patches of forest within both the Preferred and Alternate route survey corridors to varying degrees. Dominant canopy species include the following:

- American beech (*Fagus grandifolia)*
- American sycamore
- Amur honeysuckle (*Lonicera maackii*)
- Black cherry (*Prunus serotina*)
- Common hackberry
- Pin oak
- Red maple
- Red oak (*Quercus rubra)*
- Shagbark hickory (*Carya ovata*)
- Sugar maple (*Acer saccharum*)

- White ash (*Fraxinus americana)*

The understory includes species found in the canopy, as well as dwarf larkspur (*Delphinium tricorne*), garlic mustard (*Alliaria petiolata)*, mayapple (*Podophyllum peltatum*), spring beauty (*Claytonia virginica*), jack-in-the-pulpit (*Arisaema triphyllum*), ground ivy, poison ivy, lesser celandine (*Ficaria verna*), and woodland stonecrop (*Sedum ternatum*). The understory of the upland forest within the Project area ranges from open to moderately dense.

Fallow areas/ Old-Field: Fallow areas exist within the survey corridors for the Preferred and Alternate Routes. Fallow areas include fencerows and areas on the side of public roads with road ROWs. Vegetation identified within the fallow areas of the Routes contain areas of grasses and herbaceous plants such as Kentucky blue grass, fescue, Fuller's teasel (*Dipsacus fullonum*), Queen Anne's lace (*Daucus carota*), daisy fleabane (*Erigeron annuus*), and thistle (*Carduus arvensis)*.

Riparian Forest: These successional forests occur in floodplains and as narrow zones along waterways that cross the Preferred and Alternate Routes. They are most developed along major watercourses, notably the Mill Creek and Rossmoyne Creek. Common canopy species include:

- Cottonwood (*Populus deltoides*)
- American sycamore
- Black walnut (*Juglans nigra*)
- Common hackberry (*Celtis occidentalis*)
- Box elder (*Acer negundo*)
- Red elm (*Ulmus rubra*)
- Red maple
- Silver maple (*Acer saccharinum*)
- Green ash (*Fraxinus pennsylvanica)*

The understory of the riparian forest within the Project area ranges from open to moderately dense. It includes canopy species, but is dominated by dense growth of Amur honeysuckle (*Lonicera maackii*) in some areas. Other shrub and ground layer vegetation includes gray dogwood (*Cornus racemosa*), trumpet creeper (*Campsis radicans*), Virginia creeper (*Parthenocissus quinquefolia*), garlic mustard, ground ivy, moneywort (*Lysimmachia nummularia*), and poison ivy.

(b) Wetlands

According to the U.S. Army Corps of Engineers (USACE), a wetland is defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to

support, and that under normal circumstances do support, a prevalence of vegetation (hydrophytic) typically adapted for life in saturated (hydric) soil conditions (USACE, 1987).

CH2M's team of field biologists used the methodology described in the 1987 Technical Report Y-87-1, U.S. Army Corps of Engineers (USACE) Wetlands Delineation Manual and subsequent guidance documents including the 2012 Regional Supplement to the USACE Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0) (USACE, 2012) and the 2010 USACE Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0) (USACE, 2010). Additionally, each field identified wetland was evaluated in accordance with the Ohio Rapid Assessment Method (ORAM) developed by OEPA (OEPA, 2001). Wetland categorizations were conducted in accordance with the latest quantitative score calibration procedure (Mack, 2001). Scores for "Category 1" wetlands range from 0 to 29.9.; scores for "1 or 2 gray zone" range from 30 to 34.9; scores for "modified 2" range from 35-44.9; scores for "Category 2" range from 45-59.9; scores for "Category 2 or 3" range from 60 to 64.9; and scores for "Category 3" range from 65 to 100. Increasing ORAM categories correspond to higher quality wetland areas. To assist in identifying whether potential wetlands exist along the Preferred and Alternate Routes, a desktop study of available resources was also performed prior to the field wetland delineations. Additionally, USFWS NWI maps and the NRCS soil survey and hydric soil list for Hamilton County were reviewed for areas within 1,000 feet of the Preferred and Alternate Routes.

(i) Summary of National Wetland Inventory Data

The USFWS NWI data, including freshwater wetlands and riverine areas, was mapped within 1,000 feet of the Preferred and Alternate Routes and reviewed to help guide the field ecological survey in terms of potential wetland habitat locations (USFWS, 2015). The NWI mapped areas are shown on Figures 8-2A through 8-2H and Figures 8-3A through 8-3J and represent desktop evaluations from aerial photographs conducted by the USFWS which may or may not correlate with field data. Table 8-1 summarizes the NWI data by wetland classification and habitat type. The actual extent and type of field-delineated wetlands along the routes are discussed in the next section.

TABLE 8-1
NWI Wetlands Within 1,000 feet of the Preferred and Alternate Routes

Wetland Type	NWI Code	NWI Habitat Type *	Total Number of Each Habitat Type Preferred/ Alternate
Freshwater Pond	PUBFx	Palustrine Unconsolidated Bottom Semi-Permanently Flooded Excavated	1 - Alternate
Freshwater Pond	PUBGx	Palustrine Unconsolidated Bottom Excavated	~~13~~ 14 - Preferred 11 - Alternate
Freshwater Pond	PUBGh	Palustrine Unconsolidated Bottom Intermittently Exposed Diked/Impounded	~~1~~ 2 - Preferred 2 - Alternate
Riverine	R2UBH	Lower Perennial, Unconsolidated Bottom, Permanently Flooded.	1 - Alternate
Freshwater Emergent Wetland	PEM1Fx	Palustrine Emergent Persistent Semi-Permanently Flooded Excavated	1 - Preferred ~~1 - Alternate~~
Freshwater Emergent Wetland	PEM1C	Palustrine Emergent Persistent Seasonally Flooded	1 - Preferred 1 - Alternate
Total Number of Preferred Route NWI Wetlands:			**~~16~~18**
Total Number of Alternate Route NWI Wetlands:			**16**

Total number of PAB= 0, PEM = 3, PFO= 0, PUB = ~~32~~30, R = ~~0~~1

* USFWS, 2010

(ii) Field-Delineated Wetlands

~~Forty-one~~Fifty-one (~~41~~51) wetlands totaling approximately ~~7.62~~6.13 acres were delineated within the survey corridors (280 feet width) of the Preferred and Alternate Routes. Of this total, ~~three~~ seven wetlands (totaling ~~1.75~~1.12 acres) are crossed by a common segment of the two routes at the north near WW Feed Station. All field-delineated wetlands are mapped on Figures 8-2A through 8-2H and Figures 8-3A through 8-3J. Detailed information on each wetland is provided in Table 8-2. The anticipated maximum construction impacts, where unavoidable, on these wetlands would range from estimated totals of ~~1.07~~1.39 acres (Alternate Route) to ~~1.54~~1.61 acres (Preferred Route) and are summarized in Table 8-2. Three additional potential wetlands were noted within the survey corridor of the Alternate Route along the Norfolk Southern Railroad corridor south of the city of Reading. These small wetlands were not delineated because of restricted land access and therefore have not been included in the wetland count and impact totals. These wetlands are included in Table 8-2. The impacts to wetlands are further discussed in Section 4906-05-08(B)(3)(b).

Duke Energy Ohio is committed to further minimizing these possible wetland impacts through the use of location specific construction methodologies that will be detailed further as the engineering design proceeds. No wetlands were identified as Category 3 (i.e., high quality) wetlands and no single wetland impact is currently planned to exceed the 0.5-acre limit for ~~the~~ utilizing the USACE general nationwide permit process.

TABLE 8-2
Delineated Wetlands within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Wetland Identifier	Route	Figure	Cowardin Wetland Type[a]	ORAM Score	ORAM Category	Length Crossed by Centerline (feet)[e]	Acreage within Survey Corridor[b]	Acreage within Construction Work Area[c,d]
PREFERRED ROUTE WETLANDS								
P-W001	Preferred	Sheet 8-2A and 8-3A	PFO	54.5	2	0	~~0.50~~0.52	~~0.03~~0.52
O-W005	Preferred	Sheet 8-2A and 8-3A	PFO	54.5	2	0	~~0.23~~0.22	~~0.01~~0.1
O-W006	Preferred	Sheet 8-2A and 8-3A	PFO	54.5	2	~~211~~0	~~1.68~~0.02	~~0.53~~0
P-W002	Preferred	Sheet 8-2A and 8-3A	PEM	54.5	2	0	0.27	0
P-W003	Preferred	Sheet 8-2A and 8-3A	PEM	54.5	2	0	0.06	0.01
P-WRH02	Preferred	Sheet 8-2A and 8-3A	PEM	26	1	0	0.02	0
O-W002	Preferred	Sheet 8-2A and 8-3A	PEM/PFO	54.5	2	0	0.01	0
O-W-RH004	Preferred	Sheet 8-2A	PEM/PSS	18	1	12	0.04	0.02
O-W-RH005	Preferred	Sheet 8-2A	PEM	19	1	0	0.01	0
O-W009	Preferred	Sheet 8-2A	PFO	33	1 or 2 gray zone	0	≤0.01	0
O-W008	Preferred	Sheet 8-2A	PEM	26.5	1	0	0.02	≤0.01

TABLE 8-2

Delineated Wetlands within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Wetland Identifier	Route	Figure	Cowardin Wetland Type[a]	ORAM Score	ORAM Category	Length Crossed by Centerline (feet)[e]	Acreage within Survey Corridor[b]	Acreage within Construction Work Area[c,d]
O-W010	Preferred	Sheet 8-2A	PFO	57.5	2	0	0.07	0
O-W010	Preferred	Sheet 8-2A	PEM	57.5	2	0	0.04	0
O-W011	Preferred	Sheet 8-2B	PFO	57.5	2	291	1.32	~~0.65~~0.62
0-W032	Preferred	Sheet 8-2B	PEM	27	1	0	<0.01	0
O-W012	Preferred	Sheet 8-2B	PEM	22	1	0	<0.01	<0.01
O-W302	Preferred	Sheet 8-2B	PEM	10	1	0	~~0~~<0.01	0
O-W014	Preferred	Sheet 8-2B	PEM	20	1	0	0.04	0
O-W015	Preferred	Sheet 8-2B	PEM	18	1	0	0.01	0
O-W016	Preferred	Sheet 8-2C	PEM	17.5	1	0	0.03	0
O-W017	Preferred	Sheet 8-2C	PEM/PSS	39	modified 2	0	~~0~~<0.01	0
O-W301	Preferred	Sheet 8-2C	PFO	28	1	~~18~~0	0.73	0.18
O-W024	Preferred	Sheet 8-2C	PEM	16	1	0	0.1	0.01
O-W025	Preferred	Sheet 8-2C	PEM/PSS	26	1	0	0.03	0
O-W026	Preferred	Sheet 8-2C	PEM/PSS	33	1 or 2 gray zone	~~175~~0	0.08	~~0.08~~0.05
O-W027	Preferred	Sheet 8-2C	PEM	33	1 or 2 gray zone	0	0.01	0
~~O-W028~~	~~Preferred~~	~~Sheet 8-2F~~	~~PEM~~	~~26~~	~~1~~	~~0~~	~~0.01~~	~~0~~
O-W029	Preferred	Sheet 8-2F	PEM	16	1	35	0.05	0.05

TABLE 8-2

Delineated Wetlands within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Wetland Identifier	Route	Figure	Cowardin Wetland Type[a]	ORAM Score	ORAM Category	Length Crossed by Centerline (feet)[e]	Acreage within Survey Corridor[b]	Acreage within Construction Work Area[c,d]
O-W030	Preferred	Sheet 8-2F	PEM	17	1	0	0.04	0.02
BO-W100	Preferred	Sheet 8-2G	PEM	29.5	1	0	0.02	0
O-W300	Preferred	Sheet 8-2G	PEM	29	1	~~2~~0	0.06	0.01
O-W100	Preferred	Sheet 8-2H	PEM	20	1	0	0.02	0
TOTAL FOR PREFERRED ROUTE						**~~709~~338 feet**	**~~5.02~~3.89 acres**	**~~1.54~~1.61 acres**
ALTERNATE ROUTE WETLANDS								
P-W001	Alternate	Sheet 8-2A and 8-3A	PFO	54.5	2	0	0.52	~~0.03~~0.52
O-W005	Alternate	Sheet 8-2A and 8-3A	PFO	54.5	2	~~111~~0	~~0.25~~0.22	~~0.16~~0.1
O-W006	Alternate	Sheet 8-2A and 8-3A	PFO	54.5	2	~~253~~0	~~0.99~~0.02	~~0.28~~0
P-W002	Alternate	Sheet 8-2A and 8-3A	PEM	54.5	2	0	0.27	0
P-W003	Alternate	Sheet 8-2A and 8-3A	PEM	54.5	2	~~48~~0	0.06	~~0.06~~0.01
P-WRH02	Alternate	Sheet 8-2A and 8-3A	PEM	26	1	0	0.02	0
O-W002	Alternate	Sheet 8-2A and 8-3A	PEM/PFO	54.5	2	0	0.01	0
P-W004	Alternate	Sheet 8-3A	PEM	29	1 or 2 gray zone	0	0.03	0.01
P-W100	Alternate	Sheet 8-3A	PEM	22	1	0	0.1	~~0.05~~0.06

TABLE 8-2

Delineated Wetlands within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Wetland Identifier	Route	Figure	Cowardin Wetland Type[a]	ORAM Score	ORAM Category	Length Crossed by Centerline (feet)[e]	Acreage within Survey Corridor[b]	Acreage within Construction Work Area[c,d]
P-WRH06	Alternate	Sheet 8-3A	PEM/PSS	39	2	0	0.29	0
P-W017	Alternate	Sheet 8-3B	PSS	30	1 or 2 gray zone	0	0.02	~~0~~<0.01
P-W018	Alternate	Sheet 8-3B	PFO	37	modified 2	~~33~~15	0.14	0.06
P-W019	Alternate	Sheet 8-3B	PFO	42	modified 2	~~180~~138	0.66	0.21
P-W020	Alternate	Sheet 8-3B	PFO	40.5	modified 2	0	0.21	0.02
P-W014	Alternate	Sheet 8-3B	PEM	25	1	~~130~~135	0.11	0.11
P-W015	Alternate	Sheet 8-3B	PEM	32.5	1 or 2 gray zone	~~40~~57	0.04	0.04
P-W016	Alternate	Sheet 8-3B	PSS	33	1 or 2 gray zone	~~20~~15	<0.01	<0.01
~~P-W400~~	~~Alternate~~	~~Sheet 8-3C~~	~~PEM~~	~~34~~	~~1 or 2 gray zone~~	~~0~~	~~0.46~~	~~0.01~~
P-WRH09	Alternate	Sheet 8-3C	PFO	19.5	1	0	0.01	0
P-WRH08	Alternate	Sheet 8-3C	PEM	18	1	14	0.13	0.02
G-WRH02	Alternate	Sheet 8-3F	PEM	17	1	~~0~~1	0.01	~~0~~<0.01
G-WRH03	Alternate	Sheet 8-3F	PEM	22	1	1	0.01	~~0~~<0.01
G-WRH04	Alternate	Sheet 8-3F	PEM	20	1	0	<0.01	~~0~~<0.01
G-W600	Alternate	Sheet 8-3I	PEM	16	1	0	0.1	0
G-W601	Alternate	Sheet 8-3I	PEM	16	1	0	0.05	0
G-W400a	Alternate	Sheet 8-3I	PEM	33.5	1 or 2 gray zone	0	0.02	0.02
G-W400b	Alternate	Sheet 8-3I	PSS	33.5	1 or 2 gray zone	2	0.09	0.09

TABLE 8-2
Delineated Wetlands within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Wetland Identifier	Route	Figure	Cowardin Wetland Type[a]	ORAM Score	ORAM Category	Length Crossed by Centerline (feet)[e]	Acreage within Survey Corridor[b]	Acreage within Construction Work Area[c,d]
G-W400c	Alternate	Sheet 8-3I	PFO	33.5	1 or 2 gray zone	0	0.03	0.03
G-W401	Alternate	Sheet 8-3I	PEM	27.5	1	0	0.1	0.03
G-W401a	Alternate	Sheet 8-3I	PEM	27.5	1	0	0.04	0
G-W401b	Alternate	Sheet 8-3I	PSS	27.5	1	0	0.03	0.01
G-W603[f]	Alternate	Sheet 8-3I	-	-	-	0	-	-
G-W604[f]	Alternate	Sheet 8-3I	-	-	-	0	-	-
G-W605[f]	Alternate	Sheet 8-3I	-	-	-	0	-	-
TOTAL FOR ALTERNATE ROUTE						**~~830~~378 feet**	**~~4.35~~3.36 acres**	**~~1.07~~1.39 acres**

a Wetland Type: PEM = palustrine emergent, PSS = palustrine scrub/shrub, PFO = palustrine forested.

b The width of the survey corridor = 280 feet wide.

c The width of the planned CWA = 80 feet wide.

d All measurements listed as <0.01 were assumed to be 0.01 for calculations.

e All wetlands will be crossed by open cut methods, primarily due to space limitations for boring equipment.

f Wetland G-W603, G-W604, and G-W605 are linear wetlands observed at the base of a railroad berm from an adjacent property line; a detailed wetland delineation will be performed in the future, as required. These wetlands would not likely be crossed by the pipeline route centerline.

(c) Waterbodies

(i) Field-Delineated Streams

Streams and drainage channels were delineated and evaluated during the ecological surveys of the Preferred and Alternate Route corridors. Streams with drainage areas greater than one square mile or maximum pool depths greater than 40 centimeters (cm) were assessed using the OEPA Qualitative Habitat Evaluation Index (QHEI) with a few exceptions. Mill Creek, Duck Creek and Rossmoyne Creek have been assessed by the OEPA and have assigned aquatic life use (ALU) designations to these larger streams (>1 square mile drainage area). The QHEI is one measure

that is utilized by OEPA, in association with biotic sampling, to determine a stream's ALU designation in accordance with the Ohio water quality standards (OEPA, 2006). QHEI-classified streams then receive a narrative rating based upon their score:

- Score less than 30 for both headwaters and larger streams = Very Poor
- Score between 30 and 42 for headwaters, and 30 and 44 for larger streams = Poor
- Score between 43 and 54 for headwaters, and 45 and 59 for larger streams = Fair
- Score between 55 and 69 for headwaters, and 60 and 74 for larger streams= Good
- Score greater than or equal to 70 for headwaters, and 75 for larger streams = Excellent

Three streams~~,~~ located along the Preferred Route and one stream located along the Alternate Route, were evaluated using the Ohio QHEI method. Field personnel completed the QHEI near the proposed centerline of the pipeline crossing when possible. Streams with an existing ALU as determined by the OEPA were not scored using the QHEI due to the fact that the OEPA has performed a more detailed biological assessment and thereby assigned the appropriate ALU. These streams are Duck Creek (ALU of Limited Resource Water), Mill Creek (Warmwater Habitat), and Rossmoyne Creek (Warmwater Habitat).

The OEPA's Headwater Habitat Evaluation Index (HHEI) is used to evaluate streams with a drainage area less than or equal to one square mile, and maximum pools depths less than or equal to 40 cm (OEPA, 2012). The HHEI is generally used to assess Primary Headwater Habitat (PHWH) streams that typically fall under the classification of first or second-order streams. The HHEI rates a stream based on its physical habitat and uses that information to determine the biological potential of the stream. The physical habitats scored for the HHEI are substrate type, pool depth, and bankfull width. Scores for "Class I PHWH Streams" range from 0 to 29.9; scores for "Class II PHWH Streams" range from 30 to 69.9; and scores for "Class III PHWH Streams" range from 70 to 100. A "Modified" qualifier may be added as a prefix to any of these classes if evidence of anthropogenic alterations, such as channelization and bank stabilization, are observed. A higher PHWH class corresponds with a more continuous flow regime. The flow regime determines the physical habitat of the stream, and is therefore indicative of the biological communities it can support.

One hundred and two (~~100~~102) streams were evaluated using the HHEI method. Seventy-five (75) of these streams were identified within the Preferred Route survey corridor and ~~25~~ 27 within the Alternate Route survey corridor. The HHEI evaluations were completed at the proposed pipeline crossing points, if crossed by the proposed alignment. One additional potential stream was noted within the survey corridor of the Alternate Route. This stream was not delineated because of restricted land access and therefore has not been included in the stream count and impact totals. This stream is included in Table 8-3.

Streams identified during the ecological surveys on the Preferred Route and Alternate Route are shown on Figures 8-2A through 8-2H and Figures 8-3A through 8-3J, respectively. Detailed information on each delineated stream is included in Table 8-3. ALU designations within the Little Miami drainage basin obtained from OAC 3745-1-09 are also provided. The Ohio River, located approximately 4.5 miles south of the Project area, is a traditionally navigable waterway (TNW) as defined by the USACE, as well as the Little Miami River located approximately 2 miles southeast of the Project area.

The Preferred Route centerline would cross ~~20~~25 streams. The length of streams located within the Preferred Route survey corridor is approximately ~~20,181~~22,289 linear feet. The Alternate Route centerline would cross ~~12~~ 11 streams. The total length of streams located within the survey corridor of the Alternate Route is approximately ~~5,850~~5,964 linear feet.

Approximately ~~5,487~~5,129 linear feet of stream are located within the planned Preferred Route CWA, while approximately ~~1,863~~1,634 linear feet are located within the planned Alternate Route CWA. The length of streams within the Preferred and Alternate Routes CWA takes into account streams that will be avoided during construction as a result of planned HDDs. The linear feet of each stream within the CWA is included in Table 8-3 and anticipated temporary impacts to waterbodies is further discussed in Section 4906-05-08(B)(3)(c).

TABLE 8-3

Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
PREFERRED ROUTE												
P-S001 UNT Sharon Creek	Preferred	Sheet 8-2A and 8-3A	Perennial	8	16	HHEI	51	N/A	Modified Class II PHWH	Yes	883	91
P-S002 UNT Sharon Creek	Preferred	Sheet 8-2A and 8-3A	Intermittent	3.5	6	HHEI	53	N/A	Modified Class II PHWH	No (HDD)	899	3890
P-S003 UNT Sharon Creek	Preferred	Sheet 8-2A and 8-3A	Ephemeral	2.5	2	HHEI	29	N/A	Class I PHWH	No (HDD)	95	30
~~O-S003 UNT Sharon Creek~~	~~Preferred~~	~~Sheet 8-2A~~	~~Intermittent~~	~~4~~	~~8~~	~~HHEI~~	~~44~~	~~N/A~~	~~Class II PHWH~~	~~No~~	~~24~~	~~0~~
~~O-S004 UNT Sharon Creek~~	~~Preferred~~	~~Sheet 8-2A and 8-3A~~	~~Intermittent~~	~~3~~	~~8~~	~~HHEI~~	~~42~~	~~N/A~~	~~Class II PHWH~~	~~No~~	~~182~~	~~0~~
P-S004 UNT Sharon Creek	Preferred	Sheet 8-2A and 8-3A	Ephemeral	1	0	HHEI	13	N/A	Class I PHWH	No (HDD)	94	00
P-S005 UNT Sharon Creek	Preferred	Sheet 8-2A and 8-3A	Perennial	8	6	HHEI	62	N/A	Modified Class II PHWH	~~Yes~~ No (HDD)	218	850
O-S007 UNT Sharon Creek	Preferred	Sheet 8-2A and 8-3A	Perennial	12	8	HHEI	69	N/A	Modified Class II PHWH	No (HDD)	98	00

TABLE 8-3

Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
O-SRH05 UNT Sharon Creek	Preferred	Sheet 8-2A	Ephemeral	3	0	HHEI	12	N/A	Modified Class I PHWH	No	75	3
O-S008 UNT Sharon Creek	Preferred	Sheet 8-2A	Intermittent	4	4	HHEI	51	N/A	Modified Class II PHWH	Yes	296	80
O-S010 UNT Sharon Creek	Preferred	Sheet 8-2A	Intermittent	3	2	HHEI	30	N/A	Modified Class II PHWH	No	76	0
O-S009 UNT Sharon Creek	Preferred	Sheet 8-2B	Intermittent	3	5	HHEI	39	N/A	Modified Class II PHWH	No	545	545
O-S011 UNT Sharon Creek	Preferred	Sheet 8-2B	Intermittent	7	6	HHEI	56	N/A	Modified Class II PHWH	No	229	0
O-S013 UNT Sharon Creek	Preferred	Sheet 8-2B	Intermittent	10	3	HHEI	44	N/A	Modified Class II PHWH	No	31	7
O-S012 UNT Sharon Creek	Preferred	Sheet 8-2B	Perennial	12	16	HHEI	51	N/A	Modified Class II PHWH	Yes	707	470
O-S014 UNT Sharon Creek	Preferred	Sheet 8-2B	Ephemeral	3	2	HHEI	21	N/A	Modified Class I PHWH	No	49	29
O-S015 UNT Sharon Creek	Preferred	Sheet 8-2B	Ephemeral	3	1	HHEI	22	N/A	Modified Class I PHWH	No	225	51

TABLE 8-3

Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
O-S016 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Ephemeral	3	0	HHEI	17	N/A	Modified Class I PHWH	No	80	0
O-S017 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Ephemeral	4	0	HHEI	15	N/A	Modified Class I PHWH	Yes	246	78
O-S018 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Ephemeral	3	0	HHEI	17	N/A	Modified Class I PHWH	No	41	41
O-S019 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Intermittent	3	2	HHEI	19	N/A	Modified Class I PHWH	No	105	31
O-S020 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Intermittent	5	5	HHEI	52	N/A	Modified Class II PHWH	No	535	~~262~~469
O-S021 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Intermittent	3	2	HHEI	31	N/A	Modified Class II PHWH	Yes	82	82

TABLE 8-3

Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
O-S022 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Ephemeral	3	0	HHEI	16	N/A	Modified Class I PHWH	No	125	25
O-S023 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Intermittent	3	1	HHEI	22	N/A	Modified Class I PHWH	Yes	110	~~85~~83
O-S024 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Ephemeral	4	0	HHEI	23	N/A	Modified Class I PHWH	No	170	0
O-S025 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Ephemeral	2	0	HHEI	18	N/A	Modified Class I PHWH	No	162	0
O-S026 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Intermittent	5	6	HHEI	49	N/A	Modified Class II PHWH	No	67	0
O-S028 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Ephemeral	1	0	HHEI	16	N/A	Modified Class I PHWH	Yes	85	56

TABLE 8-3
Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
O-S029 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Intermittent	4	20	HHEI	51	N/A	Modified Class II PHWH	No	270	264
O-S030 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Ephemeral	1	0	HHEI	16	N/A	Modified Class I PHWH	Yes	94	81
O-S035 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Perennial	5	9	HHEI	62	N/A	Modified Class II PHWH	Yes	779	509
O-S034 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Intermittent	4	0	HHEI	28	N/A	Modified Class I PHWH	No	500	0
O-S036 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Intermittent	3	3	HHEI	33	N/A	Modified Class II PHWH	No	41	6
O-S037 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Intermittent	1	1.5	HHEI	22	N/A	Modified Class I PHWH	No	40	0

TABLE 8-3
Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
O-S038 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Intermittent	2	2	HHEI	33	N/A	Modified Class II PHWH	No	363	0
O-S039 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2B	Ephemeral	1	0	HHEI	16	N/A	Modified Class I PHWH	No	48	0
O-S041 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Ephemeral	4	0	HHEI	16	N/A	Modified Class I PHWH	No (HDD)	109	~~100~~0
O-S042 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Perennial	5	6	HHEI	42	N/A	Modified Class II PHWH	No (HDD)	153	~~30~~0
O-S043 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Ephemeral	2	0	HHEI	16	N/A	Modified Class I PHWH	No (HDD)	56	0
O-S044 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Ephemeral	5	0	HHEI	26	N/A	Modified Class I PHWH	No (HDD)	~~136~~134	0

TABLE 8-3

Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
O-S045 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Intermittent	5	2	HHEI	32	N/A	Modified Class II PHWH	No (HDD)	89	0
BO-S004 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Perennial	15	5	QHEI	62	N/A	Good	Yes	664	~~199~~80
BO-S005 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Intermittent	4	0	HHEI	39	N/A	Modified Class II PHWH	~~Yes~~No (HDD)	134	~~81~~0
BO-S006 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Intermittent	2	2	HHEI	32	N/A	Modified Class II PHWH	No (HDD)	36	~~16~~0
BO-S007 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Ephemeral	2	0	HHEI	17	N/A	Class I PHWH	No (HDD)	28	~~28~~0
BO-S008 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Perennial	8	11	HHEI	61	N/A	Modified Class II PHWH	No	99	0

TABLE 8-3
Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
O-S047 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Ephemeral	3	0	HHEI	18	N/A	Modified Class I PHWH	No	36	0
O-S048 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Intermittent	4	4	HHEI	51	N/A	Modified Class II PHWH	No	53	~~16~~11
O-S311 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Perennial	8	6	HHEI	63	N/A	Modified Class II PHWH	Yes	280	80
O-S310 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Perennial	4	3	HHEI	48	N/A	Modified Class II PHWH	No	125	125
O-S308 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Perennial	5	3	HHEI	53	N/A	Modified Class II PHWH	Yes	~~884~~865	~~115~~94
O-S060 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Intermittent	3	4	HHEI	32	N/A	Modified Class II PHWH	No	778	333

TABLE 8-3

Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
O-S059 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Intermittent	3	6	HHEI	38	N/A	Modified Class II PHWH	Yes	55	55
O-S061 UNT N. Branch Sycamore Creek	Preferred	Sheet 8-2C	Ephemeral	2	0	HHEI	18	N/A	Modified Class I PHWH	No	46	~~0~~32
O-S063 UNT Sycamore Creek	Preferred	Sheet 8-2D	Intermittent	3	4	HHEI	38	N/A	Modified Class II PHWH	No (HDD)	602	~~602~~0
O-S064 UNT Sycamore Creek	Preferred	Sheet 8-2D	Intermittent	2	4	HHEI	32	N/A	Modified Class II PHWH	No (HDD)	31	~~31~~0
O-S062 UNT Sycamore Creek	Preferred	Sheet 8-2D	Perennial	4	14	HHEI	42	N/A	Modified Class II PHWH	~~Yes~~ No (HDD)	161	~~75~~0
O-S065 UNT Sycamore Creek	Preferred	Sheet 8-2D	Intermittent	4	4	HHEI	32	N/A	Modified Class II PHWH	No	249	249

TABLE 8-3

Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
~~O-S067 UNT East Fork Duck Creek~~	~~Preferred~~	~~Sheet 8-2F~~	~~Perennial~~	~~6~~	~~4~~	~~HHEI~~	~~54~~	~~N/A~~	~~Class II PHWH~~	~~No~~	~~266~~	~~0~~
~~O-S068 UNT East Fork Duck Creek~~	~~Preferred~~	~~Sheet 8-2F~~	~~Intermittent~~	~~3~~	~~3~~	~~HHEI~~	~~32~~	~~N/A~~	~~Class II PHWH~~	~~No~~	~~218~~	~~5~~
~~O-S069 UNT East Fork Duck Creek~~	~~Preferred~~	~~Sheet 8-2F~~	~~Ephemeral~~	~~2~~	~~1~~	~~HHEI~~	~~22~~	~~N/A~~	~~Class I PHWH~~	~~No~~	~~44~~	~~0~~
~~O-S070 UNT East Fork Duck Creek~~	~~Preferred~~	~~Sheet 8-2F~~	~~Ephemeral~~	~~2~~	~~0~~	~~HHEI~~	~~17~~	~~N/A~~	~~Class I PHWH~~	~~No~~	~~49~~	~~0~~
~~O-S071 UNT East Fork Duck Creek~~	~~Preferred~~	~~Sheet 8-2F~~	~~Perennial~~	~~8~~	~~4~~	~~HHEI~~	~~57~~	~~N/A~~	~~Class II PHWH~~	~~Yes~~	~~285~~	~~84~~
~~O-S072 UNT East Fork Duck Creek~~	~~Preferred~~	~~Sheet 8-2F~~	~~Intermittent~~	~~3~~	~~5~~	~~HHEI~~	~~42~~	~~N/A~~	~~Class II PHWH~~	~~No~~	~~132~~	~~0~~
~~O-S073 UNT East Fork Duck Creek~~	~~Preferred~~	~~Sheet 8-2F~~	~~Intermittent~~	~~4~~	~~2~~	~~HHEI~~	~~32~~	~~N/A~~	~~Class II PHWH~~	~~No~~	~~30~~	~~0~~

TABLE 8-3

Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
~~O-S074 UNT East Fork Duck Creek~~	~~Preferred~~	~~Sheet 8-2F~~	~~Intermittent~~	~~4~~	~~2~~	~~HHEI~~	~~32~~	~~N/A~~	~~Class II PHWH~~	~~No~~	~~282~~	~~86~~
~~O-S075 UNT East Fork Duck Creek~~	~~Preferred~~	~~Sheet 8-2F~~	~~Ephemeral~~	~~3~~	~~0~~	~~HHEI~~	~~26~~	~~N/A~~	~~Class I PHWH~~	~~No~~	~~56~~	~~17~~
~~O-S076 UNT East Fork Duck Creek~~	~~Preferred~~	~~Sheet 8-2F~~	~~Ephemeral~~	~~3~~	~~0~~	~~HHEI~~	~~16~~	~~N/A~~	~~Class I PHWH~~	~~No~~	~~34~~	~~21~~
~~O-S077 UNT East Fork Duck Creek~~	~~Preferred~~	~~Sheet 8-2F~~	~~Intermittent~~	~~4~~	~~4~~	~~HHEI~~	~~40~~	~~N/A~~	~~Class II PHWH~~	~~No~~	~~199~~	~~25~~
~~O-S078 UNT East Fork Duck Creek~~	~~Preferred~~	~~Sheet 8-2F~~	~~Ephemeral~~	~~3~~	~~0~~	~~HHEI~~	~~17~~	~~N/A~~	~~Class I PHWH~~	~~No~~	~~104~~	~~0~~
~~O-S079 UNT East Fork Duck Creek~~	~~Preferred~~	~~Sheet 8-2F~~	~~Ephemeral~~	~~2~~	~~2~~	~~HHEI~~	~~29~~	~~N/A~~	~~Class I PHWH~~	~~No~~	~~162~~	~~31~~
~~O-S080 UNT East Fork Duck Creek~~	~~Preferred~~	~~Sheet 8-2F~~	~~Ephemeral~~	~~2~~	~~0~~	~~HHEI~~	~~17~~	~~N/A~~	~~Class I PHWH~~	~~No~~	~~160~~	~~44~~

TABLE 8-3

Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
~~O-S081 UNT East Fork Duck Creek~~	~~Preferred~~	~~Sheet 8-2F~~	~~Intermittent~~	~~4~~	~~2~~	~~HHEI~~	~~28~~	~~N/A~~	~~Class I PHWH~~	~~Yes~~	~~156~~	~~48~~
O-S083 UNT Duck Creek	Preferred	Sheet 8-2F	Ephemeral	4	0	HHEI	17	N/A	Modified Class I PHWH	No	442	0
O-S085 UNT Duck Creek	Preferred	Sheet 8-2F	Ephemeral	4	0	HHEI	26	N/A	Class I PHWH	No	27	0
O-S082 UNT East Fork Duck Creek	Preferred	Sheet 8-2F	Perennial	20	16	HHEI	69	N/A	Class II PHWH	Yes	~~354~~1,066	~~94~~92
O-S088 UNT Duck Creek	Preferred	Sheet 8-2F	Intermittent	5	1.5	HHEI	43	N/A	Class II PHWH	Yes	154	112
O-S087 UNT Duck Creek	Preferred	Sheet 8-2F	Ephemeral	3	0	HHEI	26	N/A	Class I PHWH	Yes	276	95
O-S086 UNT Duck Creek	Preferred	Sheet 8-2F	Ephemeral	3	0	HHEI	26	N/A	Class I PHWH	Yes	246	91
O-S090 UNT Duck Creek	Preferred	Sheet 8-2F	Ephemeral	2	0	HHEI	17	N/A	Class I PHWH	No	41	1

TABLE 8-3

Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
O-S089 UNT Duck Creek	Preferred	Sheet 8-2F	Ephemeral	3	0	HHEI	27	N/A	Class I PHWH	No	67	39
O-S108 Duck Creek	Preferred	Sheet 8-2G	Perennial	Up to 100	12	None/ OEPA Assmt.	N/A	Limited Resource Water	N/A	No	~~3124~~2,568	192
O-S303 UNT Duck Creek	Preferred	Sheet 8-2G	Intermittent	4	0	QHEI	47	N/A	Fair	No	27	0
O-S304 UNT Duck Creek	Preferred	Sheet 8-2G	Ephemeral	2	1	HHEI	34	N/A	Modified Class II PHWH	No	66	0
O-S305 UNT Duck Creek	Preferred	Sheet 8-2G	Intermittent	3	1	HHEI	35	N/A	Modified Class II PHWH	No	12	0
O-S306 UNT Duck Creek	Preferred	Sheet 8-2G	Intermittent	4	4	HHEI	61	N/A	Modified Class II PHWH	No	17	0
O-S307 UNT Duck Creek	Preferred	Sheet 8-2G	Intermittent	7	2	HHEI	43	N/A	Modified Class II PHWH	No	31	0
BO-S100 UNT Duck Creek	Preferred	Sheet 8-2G	Ephemeral	1	0	HHEI	33	N/A	Modified Class II PHWH	Yes	175	75
BO-S101 UNT Duck Creek	Preferred	Sheet 8-2G	Ephemeral	8	2	HHEI	36	N/A	Modified Class II PHWH	Yes	284	84

TABLE 8-3

Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
BO-S102 UNT Duck Creek	Preferred	Sheet 8-2G	Ephemeral	3	0	HHEI	23	N/A	Modified Class I PHWH	No	474	0
BO-S103 UNT Duck Creek	Preferred	Sheet 8-2G	Ephemeral	10	4	HHEI	52	N/A	Modified Class II PHWH	Yes	458	92
BO-S104 Duck Creek	Preferred	Sheet 8-2G	Perennial	50+	12	None/ OEPA Assmt.	N/A	Limited Resource Water	N/A	No	1,774	0
O-S301 UNT Duck Creek	Preferred	Sheet 8-2G	Ephemeral	2	2	HHEI	29	N/A	Modified Class I PHWH	Yes	281	88
O-S302 UNT Duck Creek	Preferred	Sheet 8-2G	Ephemeral	2	1	HHEI	17	N/A	Modified Class I PHWH	No	36	0
BO-S105 UNT Duck Creek	Preferred	Sheet 8-2G	Ephemeral	10	2	HHEI	52	N/A	Modified Class II PHWH	No	94	~~15~~23
BO-S106 UNT to Duck Creek	Preferred	Sheet 8-2G	Intermittent	25	6	QHEI	38	N/A	Poor	No	42	0
O-S300 Duck Creek	Preferred	Sheet 8-2H	Intermittent	20	12	None/ OEPA Assmt.	N/A	Limited Resource Water	N/A	Yes	385	85
TOTAL FOR THE PREFERRED ROUTE											**~~20,181~~ 22,289 feet**	**~~5,487~~ 5,129 feet**

TABLE 8-3
Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
ALTERNATE ROUTE												
P-S001 UNT Sharon Creek	Alternate	Sheet 8-3A	Perennial	8	16	HHEI	51	N/A	Modified Class II PHWH	Yes	~~927~~883	~~87~~91
P-S002 UNT Sharon Creek	Alternate	Sheet 8-2A and 8-3A	Intermittent	3.5	6	HHEI	53	N/A	Modified Class II PHWH	No (HDD)	899	~~389~~0
P-S003 UNT Sharon Creek	Alternate	Sheet 8-2A and 8-3A	Ephemeral	2.5	2	HHEI	29	N/A	Class II~~I~~ PHWH	No (HDD)	95	~~3~~0
~~O-S004 UNT Sharon Creek~~	~~Alternate~~	~~Sheet 8-2A and 8-3A~~	~~Intermittent~~	~~3~~	~~8~~	~~HHEI~~	~~42~~	~~N/A~~	~~Class II PHWH~~	~~No~~	~~182~~	~~0~~
P-S004 UNT Sharon Creek	Alternate	Sheet 8-2A and 8-3A	Ephemeral	1	0	HHEI	13	N/A	Class I PHWH	No (HDD)	94	0
P-S005 UNT Sharon Creek	Alternate	Sheet 8-2A and 8-3A	Perennial	8	6	HHEI	62	N/A	Modified Class II PHWH	~~Yes~~ No (HDD)	218	~~85~~0
O-S007 UNT Sharon Creek	Alternate	Sheet 8-2A and 8-3A	Perennial	12	8	HHEI	69	N/A	Modified Class II PHWH	No (HDD)	98	0
P-S006 UNT Sharon Creek	Alternate	Sheet 8-3A	Intermittent	4	4	HHEI	31	N/A	Modified Class II PHWH	No	158	1
P-SRH06 UNT Sharon Creek	Alternate	Sheet 8-3A	Intermittent	8	4	HHEI	43	N/A	Modified Class II PHWH	No	144	~~43~~46

TABLE 8-3
Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
P-S030 UNT Sharon Creek	Alternate	Sheet 8-3B	Perennial	5	6	HHEI	52	N/A	Modified Class II PHWH	Yes	82	82
P-S031 UNT Sharon Creek	Alternate	Sheet 8-3B	Ephemeral	3	3	HHEI	31	N/A	Class II PHWH	No	103	~~17~~11
P-S032 UNT Sharon Creek	Alternate	Sheet 8-3B	Ephemeral	3	0	HHEI	16	N/A	Class I PHWH	No	51	~~39~~37
P-S025 UNT Sharon Creek	Alternate	Sheet 8-3B	Intermittent	3	2	HHEI	19	N/A	Modified Class I PHWH	Yes	146	146
P-S026 UNT Sharon Creek	Alternate	Sheet 8-3B	Intermittent	4	4	HHEI	41	N/A	Modified Class II PHWH	No	50	50
P-S027 UNT Sharon Creek	Alternate	Sheet 8-3B	Perennial	5	4	HHEI	63	N/A	Modified Class II PHWH	No	89	~~33~~29
P-S028 UNT Sharon Creek	Alternate	Sheet 8-3B	Ephemeral	4	0	HHEI	13	N/A	Modified Class I PHWH	No	31	31
P-S029 UNT Sharon Creek	Alternate	Sheet 8-3B	Intermittent	3	5	HHEI	40	N/A	Modified Class II PHWH	Yes	177	~~62~~57

TABLE 8-3

Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
P-S016 UNT Sharon Creek	Alternate	Sheet 8-3C	Intermittent	5	3	HHEI	54	N/A	Modified Class II PHWH	No	11	0
P-S015 UNT Sharon Creek	Alternate	Sheet 8-3C	Perennial	4	8	HHEI	61	N/A	Modified Class II PHWH	No	203	0
P-SRH13 UNT N. Branch Sycamore Creek	Alternate	Sheet 8-3C	Intermittent	9	3	HHEI	48	N/A	Modified Class II PHWH	No	144	0
G-SRH01 UNT Mill Creek	Alternate	Sheet 8-3E	Intermittent	8	10	HHEI	39	N/A	Modified Class II PHWH	~~No~~Yes	~~293~~289	88
G-SRH02 UNT Mill Creek	Alternate	Sheet 8-3E	Ephemeral	8	8	HHEI	58	N/A	Modified Class II PHWH	Yes	120	120
G-SRH03 Mill Creek	Alternate	Sheet 8-3E	Perennial	30+	>36	None/ OEPA Assmt.	N/A	Warmwater Habitat	N/A	Yes	~~280~~268	80
G-SRH04 UNT Mill Creek	Alternate	Sheet 8-3F	Ephemeral	3	0	HHEI	24	N/A	Modified Class I PHWH	Yes	250	~~124~~128
G-SRH05 Rossmoyne Creek	Alternate	Sheet 8-3G	Perennial	20+	14	None/ OEPA Assmt.	N/A	Warmwater Habitat	N/A	Yes	~~219~~241	~~83~~85

TABLE 8-3

Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]
G-SRH06 Mill Creek	Alternate	Sheet 8-3G	Perennial	30+	>36	None/ OEPA Assmt.	N/A	Warmwater Habitat	N/A	Yes ~~(Bore)~~	~~412~~403	~~161~~170
G-SRH07 UNT Mill Creek	Alternate	Sheet 8-3H	Ephemeral	3	0	HHEI	30	N/A	Modified Class II PHWH	No	~~136~~134	~~34~~31
G-SRH08 UNT Mill Creek	Alternate	Sheet 8-3H	Intermittent	9	6	HHEI	63	N/A	Modified Class II PHWH	Yes	~~238~~223	~~105~~99
G-S404 UNT Mill Creek	Alternate	Sheet 8-3I	Perennial	20	33	QHEI	66	N/A	Good	No	108	0
G-S400 UNT Mill Creek	Alternate	Sheet 8-3I	Ephemeral	2	0	HHEI	11	N/A	Modified Class I PHWH	No	174	174
G-S401 UNT Mill Creek	Alternate	Sheet 8-3I	Ephemeral	3	0	HHEI	21	N/A	Modified Class I PHWH	No	65	65
G-S402 UNT Mill Creek	Alternate	Sheet 8-3I	Ephemeral	1	0	HHEI	14	N/A	Modified Class I PHWH	No	13	13
G-S405[d] UNT Mill Creek	Alternate	Sheet 8-3H	Intermittent	-	-	-	-	-	-	-	-	-
TOTAL FOR THE ALTERNATE ROUTE											**~~5,850~~ 5,964 feet**	**~~1,863~~1,634 feet**

TABLE 8-3

Streams within the Preferred and Alternate Route Environmental Survey Corridor and Construction Work Area

Stream ID / Waterbody Name	Route	Figure	Flow Regime	Top of Bank Width (feet)	Maximum Pool Depth (in.)	Form	Score	OEPA Aquatic Life Use Designation	PHWH Class (HHEI)/ Narrative Rating (QHEI)	Crossed by Centerline[c]	Length (linear feet) within Survey Corridor[a]	Length (linear feet) within Construction Work Area[b]

a The width of the survey corridor was 280 feet wide.

b The width of the planned CWA = 80 feet wide.

c Unless noted in the "Crossed by Centerline" column, the planned crossing method is open cut trench (which is described in Section 4906-5-05 (B) of this Application).

d Stream G-S405 was observed from the property line; a detailed stream assessment will be performed in the future, as required.

(ii) Lakes, Ponds, and Reservoirs

No major lakes or reservoirs were observed along the proposed Preferred or Alternate Routes. ~~Two~~ Three ponds totaling ~~0.18~~0.24 acre~~s~~ were identified during the field evaluation along the Preferred Route. ~~Nine~~Eight ponds totaling ~~1.65~~2.02 acres were identified along the Alternate Route. Ponds within the survey corridors are shown on Figures 8-2A through 8-2H and Figures 8-3A through 8-~~3H~~ 3J and are summarized in Table 8-4.

Impacts to ponds from construction, operation, or maintenance of the proposed pipeline are not anticipated. Best management practices (BMPs) to control soil erosion and sedimentation, including utilization of silt fencing, filter sock, etc., will be used as appropriate during construction to minimize runoff siltation.

TABLE 8-4
Delineated Ponds within the Preferred Route and Alternate Route Environmental Survey Corridors

Pond ID	Route	Figure	Acreage within Survey Corridor	Acreage within Construction Work Area[a,b]	Linear Feet Crossed by Centerline [a,b]
O-P003	Preferred	8-2D	0.06	0.05	0
O-P300	Preferred	8-2D	0.12	0.01	0
O-P000	Preferred	8-2F	0.06	0	0
P-P100	Alternate	8-3C	1.05	<0.01	0
P-401	Alternate	8-3C	0.13	0	0
P-P001	Alternate	8-3C	0.48	0.02	0
PRH01	Alternate	8-3E	0.06	0	0
PRS02	Alternate	8-3E	0.05	0.05	0
PRH03	Alternate	8-3F	0.09	<0.01	0
PRH04	Alternate	8-3F	0.08	0	0
PRH05	Alternate	8-3F	0.08	0.08	0
~~PRH01~~	~~Alternate~~	~~8-3E~~	~~0.06~~	~~0~~	~~0~~
~~PRS02~~	~~Alternate~~	~~8-3E~~	~~0.05~~	~~0.05~~	~~0~~
		Total:	**~~1.83~~2.26**	**~~0.26~~0.23**	**0**

a "0" indicates the pond is not within the construction work area or crossed by the proposed centerline.

b All measurements listed as <0.01 were assumed to be 0.01 for calculations.

(2) Map of Facility, ROW, and Delineated Resources

Detailed maps at 1:7,000 scale depicting the delineated features, survey corridor, and proposed ROW are provided as Figures 8-2A through 8-2H and Figures 8-3A through 8-3J.

(3) Construction Impacts on Vegetation and Surface Waters

(a) Construction Impacts on Vegetation

The following discussion describes the potential impacts on woody and herbaceous vegetation along the proposed routes during construction.

Preferred Route: The plant communities that would be most impacted by construction of the Preferred Route are herbaceous plants (*e.g.*, grasses, etc.), shrubs, and trees associated with residential areas, woodlots, industrial areas, commercial areas, institutional areas, and recreation areas. Approximately ~~30,811~~28,493 linear feet (~~51.8~~48.2 acres) of the Preferred Route CWA crosses industrial/commercial/institutional areas, approximately ~~8,060~~10,356 linear feet (~~17.6~~20.6 acres) crosses woodlots, and approximately ~~6,305~~11,227 linear feet (~~11.1~~18.8 acres) crosses recreation areas (see Table 7-2 and 7-3). Given the CWA will be approximately 80 feet wide (maximum based on preliminary plans), the impacts to vegetation are not expected to have a significant cumulative effect on vegetation communities within any localized section of the pipeline route. Although the cumulative acreage of woodlots in the planned CWA is an estimated ~~17.6~~20.6 acres, the impacts from this clearing is would occur over the length of the 13.4 miles of the pipeline route. Duke Energy Ohio recognizes the importance of trees, shrubs and other vegetation to landowners and, where removal of such vegetation is necessary, Duke Energy Ohio will only remove trees, shrubs, etc. that are essential for construction and operation of the pipeline.

Alternate Route: The plant communities that would be most impacted by construction of the Alternate Route are herbaceous plants (*e.g.*, grasses, etc.), shrubs, and trees associated with residential areas, woodlots, industrial areas, commercial areas, institutional areas, and recreation areas. Approximately ~~10,196~~10,657 linear feet (~~20.7~~20.8 acres) of the Alternate Route CWA crosses woodlots, approximately ~~31,341~~29,163 linear feet (~~52.5~~49.0 acres) crosses industrial~~–~~/_commercial/institutional areas, and approximately ~~3,171~~4,846 linear feet (~~5.0~~6.9

acres) crosses recreation areas (see Table 7-2 and 7-3). In general, the same level of impacts to vegetation communities along the Preferred Route discussed above apply to the Alternate Route as well, although the woodlot acreage to be cleared for the Alternate Route would be greater than for the Preferred Route.

(b) Construction Impacts on Wetlands

Preferred Route: ~~Twenty-four~~Thirty (presumed jurisdictional) wetlands were identified along the Preferred Route survey corridor. ~~Six~~Three wetlands are crossed by the centerline of the Preferred Route~~, totaling~~ and ~~1.54~~1.61 acres are within the proposed CWA. More detailed information about each feature can be found in Table 8-3 in Section 4906-05-08(B)(1)(b)(ii). It is not anticipated that any vegetation clearing activities adjacent to wetlands will result in significant erosion and water quality degradation. As required, woody vegetation in or near wetlands will be hand-cut by chain saws rather than large machinery to the extent possible. Timber mats will be utilized as necessary for vehicles or equipment to cross through any wetland. It is expected that the use of construction equipment within wetland areas can be minimized as numerous access points are along the proposed route from existing roads and other paved surfaces.

Some palustrine forested (PFO) wetlands along the Preferred Route, up to an estimated ~~1.4~~1.42 acres, would be converted to palustrine emergent (PEM) wetlands once the trees are removed for construction within the planned 80-foot wide CWA. Emergent wetland areas will be seeded following the completion of construction activities and will be permitted to re-establish as functional wetlands.

Removal of vegetation debris adjacent to wetlands would be accomplished by hand, by using timber matting under standard equipment, or by the use of low-pressure rubber-wheeled vehicles, or vehicles equipped rubber tracks.

Alternate Route: ~~Twenty-two~~Twenty-eight (presumed jurisdictional) wetlands were identified along the Alternate Route. ~~Ten~~Nine wetlands are crossed by the centerline of the Alternate Route~~, totaling~~ and ~~1.07~~1.39 acres are within the proposed CWA. Detailed information about each feature can be found in Table 8-3 in Section 4906-05-08(B)(1)(b)(ii). The same vegetation

clearing and construction equipment access precautions described above for the Preferred Route applies to the Alternate Route.

Some PFO wetlands along the Alternate Route, up to an estimated ~~0.76~~0.94 acre~~s~~, would be converted to PEM wetlands once the trees are removed for construction within the planned 80-foot wide CWA.

(c) Construction Impacts on Waterbodies

The Preferred Route centerline crosses ~~20~~25 streams. The Alternate Route centerline crosses ~~12~~ 11 ~~–~~streams. Construction impacts on these features are included in Table 8-3 and further discussed in Section 4906-05-08(B)(3)(c). Horizontal directional drilling or other boring techniques will be used to install the pipeline beneath selected streams. Table 8-3 includes the crossing method for each stream, the majority of which will be open cut trench due to the relatively small size of streams.

Approximately ~~5,487~~5,129 linear feet of stream are located within the planned Preferred Route CWA, while approximately ~~1,863~~1,634 linear feet are located within the planned Alternate Route CWA.

No streams will be filled or permanently impacted. Some streams may have to be crossed by construction vehicles and equipment. Access to the Project will be evaluated when more detailed engineering is performed and landowner negotiations progress. If a new stream crossing is necessary, it would comply with one of the following three proposed methods to cross streams:

- Temporary Stream Ford
- Temporary Culvert Stream Crossings
- Temporary Access Bridge

Temporary stream fords are proposed for crossing low quality ephemeral and intermittent streams with a drainage basin less than one square mile. This will involve minimum clearing necessary to gain access to the stream and for passage of construction vehicles. Stone, rock, or aggregate of ODOT No.1 as a minimum size will be placed in the channel with a culvert to provide a solid base for vehicle passage. Alternatively, temporary timber mat bridges will be utilized for stream crossings.

- Disturbance of the stream will be kept to a minimum, stream bank vegetation will be preserved to the maximum extent practical, and the stream crossing width will be kept as narrow as possible. Clearing will be done by hand cutting rather than grubbing.

- Sediment laden runoff will be prevented from flowing from the access road directly into the stream. Diversions and swales will be used to direct runoff to storm water management locations. Silt fences or silt sock will be used as needed according to local topographic conditions.

- Aggregate stone and rock used for this type of stream crossing will not be removed. It will be formed so that it does not create an impoundment, impede fish passage (if present), or cause erosion of the stream banks.

- Following completion of the work, the areas cleared for the temporary access crossing will be stabilized with seed and erosion control matting where appropriate. Areas of exposed soil will be stabilized in accordance with the Storm Water Pollution Prevention Plan (SWPPP) which will be developed for the Project and will meet ODNR Rainwater and Land Development recommendations.

Culvert stream crossings are proposed as an option for crossing marginal quality perennial, ephemeral, and intermittent streams with a drainage basin of less than one mile. These crossings may be removed or remain in place in order to provide maintenance access to the line (critical if service is to be reliable).

- Disturbance of the stream will be kept to a minimum, stream bank vegetation will be preserved to the maximum extent practical, and the stream crossing width will be kept as narrow as possible. Clearing will be done by hand cutting techniques rather than grubbing. Roots and stumps will be left in place to aid stabilization and to accelerate re-vegetation.

- Sediment laden runoff controlled to minimize from flowing from the access road directly into the stream. Diversions and swales will be used to direct runoff to storm water management locations. Silt fence will be used as needed according to local topographic conditions.

- Culvert pipes will be placed on the existing streambed to avoid a drop or waterfall at the downstream end of the pipe, which would be a barrier to fish migration. Crossings will be placed in shallow areas rather than pools.

- Culverts will be sized to be at least three times the depth of the normal stream flow at the crossing location. The minimum diameter culvert that will be used is 18 inches.

- There will be a sufficient number of culvert pipes to cross the stream completely with no more than a 12-inch space between each one.

- Stone, rock, or aggregate of ODOT No.1 as a minimum size will be placed in the channel, and between culverts. To prevent washouts, larger stone may be used with gabion mattresses. No soil will be placed in the stream channel.

- After completion of construction, aggregate and structures such as culvert pipes used for the crossing will be left in place. Care will be taken so that aggregate does not create an impoundment or impede fish passage. Structures such as gabion mattresses will be removed.

- Stream banks will be stabilized planted as appropriate.

Temporary timber mat access bridges or culvert stream crossings will generally be used for higher quality perennial, ephemeral, and intermittent streams and streams with a drainage basin greater than one square mile.

- Disturbance of the stream will be kept to a minimum, stream bank vegetation will be preserved to the maximum extent practical, and the stream crossing width will be kept as narrow as possible. Clearing will be done by hand cutting rather than grubbing. Where possible roots and stumps will be left in place to aid stabilization and to accelerate re-vegetation.

- Sediment laden runoff will be controlled to minimize flowing from the access road directly into the stream. Diversions and swales will be used to direct runoff to storm water management locations. Silt fence and filter socks will be used as needed according to local topographic conditions.

- Timber mat bridges will be constructed to span the entire channel. If the channel width exceeds 8 feet, then bridge support will need to be placed in the channel. No more than one pier, footing, or support will be allowed for every 8 feet of span width. No footings, piers, or supports will be allowed for spans of less than 8 feet.

- No fill other than clean stone, free from soil, will be placed within the stream channel.

The specifics of these crossings will also be addressed in the Project SWPPP. Some of the access routes may be left in place for maintenance activity. Location specific details regarding the proposed access road stream crossing methods will be provided to the OPSB separately as engineering design proceeds.

Impacts to ponds are not anticipated by the construction, operation, or maintenance of the proposed pipeline. BMPs, including utilization of silt fence, filter sock, etc., will be used as appropriate during construction to minimize runoff siltation.

(4) Operation and Maintenance Impacts on Vegetation and Surface Water

During operation of the natural gas pipeline along either of the proposed Routes, Duke Energy Ohio will mitigate the overall permanent impacts on vegetation to the extent possible. The undeveloped land not disturbed by construction should retain its current vegetation composition and should continue successional development at a normal rate. Periodic mowing, already done along the residential sections, along the pipeline ROW is not expected to result in a significant environmental impact to the vegetation.

The potential impacts on woody and herbaceous vegetation along either of the proposed Routes will be limited to maintenance activities along the proposed pipeline ROW and access roads for monitoring the operation of the pipeline. Trees adjacent to the proposed pipeline ROW that are dead, dying, diseased, leaning, significantly encroaching, or prone to failure may require clearing to allow for safe operation of the pipeline. Vegetative waste (such as tree limbs and trunks) that is generated will be windrowed or chipped and disposed of appropriately depending on individual landowner requests.

Once the pipeline is in operation, no significant impacts to streams or drainage channels are anticipated. Only periodic selective removal of vegetation that interferes with the operation of the

pipeline will be required. No major lakes, ponds, or reservoirs should be affected by the operation or maintenance of the Preferred or Alternate Routes.

Duke Energy Ohio does not anticipate significant wetland impacts from the operation or maintenance of the Preferred and Alternate Routes. Woody vegetation that occurs within wetland areas may require periodic cutting. It is not anticipated that such activities would result in erosion or water quality degradation. Maintenance cutting of woody vegetation in wetland areas would be hand-cut by chain saws or other non-mechanized techniques.

(5) Mitigation Procedures

The following mitigation procedures will be used during construction, operation, and maintenance of the proposed Project to minimize the impact on vegetation and surface waters. A SWPPP, compatible with ODNR Rainwater and Land Development recommendations, will also be prepared and implemented as required by the OEPA, and will be made available on site during Project construction.

(a) Site Restoration and Soil Stabilization

A SWPPP as required by the OEPA will be developed specifically for the Project and specified BMPs will be implemented during construction to control erosion and sedimentation. Areas where soil has been disturbed will be seeded and mulched to prevent soil erosion and sedimentation. Experience shows that seeding in non-wetland and non-agricultural areas is advantageous to control erosion on areas disturbed by construction activities. In lightly disturbed wetland areas, existing seed banks are quite often capable of quickly reestablishing vegetation that is compatible with the surrounding wetland. If any unanticipated significant disturbance occurs in wetlands, topsoil will be segregated and replaced so that the existing seed banks will be allowed to re-vegetate the areas initially. Additional seeding will only take place if the existing seed bank does not repopulate an area. These measures should preserve the aesthetic qualities along the corridor, prevent erosion, and promote habitat diversity.

Construction access routes and staging areas will be selected to minimize impacts to wetlands and streams to the extent practical. Following construction, material storage sites, and temporary access roads as appropriate will be seeded with a suitable grass seed mixture as

specified in the SWPPP for restoring these disturbed areas. Due to the highly urbanized nature of the proposed Project routes, it is expected that much of the required access and laydown can be accomplished through the use of previously paved or graveled areas.

(b) Contingency Plan Stream and Wetland Crossings

The precise location and length of each horizontal directional drill and bore is being refined as part of the engineering plan for the Project. It is also anticipated that open cut and bores will be used to cross streams in the area. Duke Energy Ohio will develop frac-out contingency planning for the proposed Project stream crossings.

(c) Demarcation and Protection Methods

Wetlands, streams, and any other environmentally sensitive areas will be clearly staked, flagged and/or fenced in accordance with OPSB requirements and the SWPPP prior to the commencement of any clearing in order to minimize incidental impacts. BMPs such as utilization of silt fences, silt sock, and construction matting will be implemented as required during construction.

(d) Procedures for Inspection and Repair of Erosion Control Measures

Procedures for inspection and repair of erosion control measures, especially after rainfall events will be outlined in the SWPPP. These procedures will meet or exceed the applicable OEPA construction storm water permitting requirements.

(e) Stormwater Runoff Measures

BMPs, including utilization of silt fence, filter socks, etc., will be used as appropriate during construction to minimize runoff and sedimentation of streams and wetlands. Measures to divert storm water runoff away from slopes and other exposed surfaces will be outlined in the SWPPP. Surface stabilization measures including seeding, straw and matting will be utilized as the Project proceeds and as required by the applicable OEPA construction storm water permit to reduce erosive raindrop energy and stabilize soils.

(f) Vegetation Protection Methods

Vegetation that occurs within wetland areas may require periodic cutting. Maintenance cutting of woody vegetation in wetland areas would be hand-cut by chain saws or other non-mechanized techniques. Cutting of woody vegetation in wetlands and near stream banks will be limited to removal of only the cut-back required to safely perform construction and continue operation of the natural gas pipeline. Duke Energy Ohio will adhere to internal vegetation management procedures, including specifying that no mechanized or excessive clearing of vegetation be performed within the prescribed distance of a wetland or waterbody as discussed below.

(g) Clearing Methods

Duke Energy Ohio will not conduct mechanized clearing within wetland areas and will only selectively clear (via hand cutting techniques) trees and vegetation that have the potential to interfere with safe and reliable construction and operation of the pipeline. Selective clearing will be required to remove woody vegetation in wetlands that might impede construction or interfere with operation of the pipeline. Where wooded wetlands occur within the ROW, the trees will be removed. Clearing near streams may involve mechanized clearing methods, particularly on steep slopes that may be difficult to access on foot. Trees adjacent to the proposed pipeline ROW, including near wetlands or streams, that are dead, dying, diseased, leaning, significantly encroaching, or prone to failure may require clearing to allow for safe and reliable operation of the pipeline. Vegetative waste (such as tree limbs and trunks) that is generated during the construction phase will be windrowed or chipped and disposed of appropriately depending on landowner requests.

(h) Expected Use of Herbicides

Duke Energy Ohio does not anticipate the use of herbicides in connection with the Project during construction activities. The use of approved water-soluble herbicides may occur during maintenance activities in those areas where stubborn woody species re-establish post-clearing instead of the desired herbaceous vegetation. This use will be on a location specific basis and will be done in accordance with all applicable regulatory and reporting requirements.

(C) LITERATURE SURVEY OF THE PLANT AND ANIMAL LIFE POTENTIALLY AFFECTED

The Project area is primarily comprised of residences, commercial/industrial/institutional uses, recreation areas and utility or road ROW. There are very few undeveloped areas. Both the Preferred Route and Alternate Route have limited potential habitat for wildlife species outside of those compatible with urban landscapes. Lists of commercial and recreational species were created utilizing professional experience and the ODNR-DOW 2015-2016 Hunting and Trapping Regulations (ODNR, 2015).

Lists of protected species are typically based on their range within Hamilton County, as reported in correspondence from the ODNR-DOW and the review of USFWS county species distribution list. Details on the expected impacts of construction, operation and maintenance, and mitigation procedures can be found following the threatened and endangered, commercial, and recreational species descriptions below.

(1) Project Vicinity Species Descriptions

(a) Protected Species

Coordination with ODNR-DOW was initiated to obtain Ohio Natural Heritage Database records within a one-mile buffer area around the Preferred and Alternate Routes. ODNR records of state and federally listed species, provided in May 2016 and August 2016, did not indicate any federally or state listed species within 1,000 feet of the Project area. The USFWS federally listed species known to be present within at one or more locations within Hamilton County are provided in Table 8-6.

An informal consultation request ~~will be~~was submitted to the USFWS and ODNR-DOW ~~by~~ on September ~~23~~21, 2016 ~~to~~ seeking their input on whether the Project is likely to adversely affect any federally-listed or state-listed species. Copies of this consultation and any future agency consultation correspondence ~~including from the USFWS and ODNR-DOW,~~ regarding the Project will be provided to the OPSB case docket.

Duke Energy Ohio plans to utilize a 30-foot wide permanent ROW for the Project to allow for reliable operation of the line and to prevent encroachment. Duke Energy Ohio does not plan to conduct mechanized clearing within any wetland area and will only clear (via hand cutting techniques) those trees within or adjacent to wetland areas that have the potential to interfere

with safe construction and reliable operation of the pipeline. Trees adjacent to streams, in particular those on steep slopes, may be cleared using mechanized equipment where necessary.

TABLE 8-6
Federally-Listed Species in the Project Vicinity and Habitat Information

Common Name/ Species Name[a,c]	Federal Status[a]	State Status[c,e]	General Habitat Notes[a,b,f]	Recorded Location within Project Vicinity [a,d,f]	Potential Habitat in Project Area
Vertebrate Animals					
Indiana bat/ *Myotis sodalis*	Endangered	Endangered	Hibernacula = Caves and mines; Maternity and foraging habitat = small stream corridors with well-developed riparian woods and upland forests	No hibernacula of Indiana bats have been documented in Hamilton County. Summer records of this species were documented in Hamilton County in 20064	Yes
Northern long-eared bat/ *Myotis septentrionalis*	Threatened	Threatened	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. During late spring and summer, roosts and forages in upland forests	Hamilton County[1]	Yes
Bald eagle / *Haliaeetus leucocephalus*	Protected		Habitat includes estuaries, large lakes, reservoirs, rivers, and some seacoasts. In winter, the birds congregate near open water in tall trees for spotting prey and night roosts for sheltering.[6]	Hamilton County[6]	No
Invertebrate Animals					
Fanshell/ *Cyprogenia stegaria*	Endangered	Endangered	Medium to large rivers. Found in areas with a moderate current that have sand and gravel.[1]	Hamilton County[1]	No
Pink mucket pearly mussel/ *Lampsilis abrupta*	Endangered	Endangered	Found in mud and sand in the shallow riffles of major rivers and their tributaries.[1]	Hamilton County[1]	No
Rayed bean/ *Villosa fabalis*	Endangered	Endangered	Found in smaller, headwater creeks. Sometimes found in large rivers. [1]	Hamilton County[1]	Yes

TABLE 8-6
Federally-Listed Species in the Project Vicinity and Habitat Information

Common Name/ Species Name[a,c]	Federal Status[a]	State Status[c,e]	General Habitat Notes[a,b,f]	Recorded Location within Project Vicinity [a,d,f]	Potential Habitat in Project Area
Sheepnose/ *Plethobasus cyphyus*	Endangered	Endangered	Found in shallow areas of large rivers or streams. Prefers swift to moderate current.[1]	Hamilton County[1]	Yes
Snuffbox/ *Epioblasma triquetra*	Endangered	Endangered	Small to medium-sized creeks and some large rivers. Found in areas with a swift current. [1]	Hamilton County[1]	Yes
Vegetation					
Running buffalo clover/ *Trifolium stoloniferum*	Endangered	Endangered	Found in disturbed bottomland meadows that have shade during part of each day. [1]	Hamilton County[1]	Yes

Notes:
[a]USFWS,2015a
[b]NatureServe, 2015
[c]ODNR, 2016c
[d]USFWS, 2007
[e]ODNR, 2016d
[f]USFWS,2015b

(b) Commercial Species

The commercially important species along the proposed Routes consist of those hunted or trapped for fur or other byproducts, including the following species. This information was obtained from ODNR-DOW Species Guide Index (ODNR-DOW, 2016b).

Beaver (*Castor canadensis*): Beavers occur in forested ponds, lakes, and rivers. In rivers, beavers make burrows with an underwater entrance in the riverbank. However, in streams, lakes and ponds, beavers usually build dams that incorporate a lodge. Based on the habitat present along the Routes, the presence of beavers is unlikely as they could potentially inhabit only a few locations.

Coyote (*Canis latrans*): Historically, coyotes prefer open territory, but in Ohio they have adapted to various habitat types. Coyotes are a very adaptable species that has prospered despite the expanding presence of human impact. This species is likely found near or within the Project. A dead coyote was observed along highway I-71 near the Preferred Route during the field surveys.

Long-tailed weasel (*Mustela frenata*): The long-tailed weasel is an adaptable animal that can be found in terrestrial habitats near water. Based on habitat present along the Routes, this species is likely found near or within the Project, but was not observed during field investigations. However, they are generally nocturnal animals.

Mink (*Mustela vison*): Mink are usually found near water, both running and standing. Minks prefer wooded or brushy areas. This species was not observed during the field investigations.

Muskrat (*Ondatra zibethicus*): The muskrat is a large freshwater rodent. This species was not observed during the field investigations, but it could inhabit select locations along the Routes.

Raccoon (*Procyon lotor*): The raccoon is widespread in Ohio, even in many suburban and urban areas. Raccoons prefer wooded areas with water nearby. This nocturnal species was not observed during the field investigations, but it is likely present throughout the area.

Striped skunk (*Mephitis mephitis*): The skunk is an adaptable animal that occupies both rural and suburban areas. Their dens may be located under buildings, in open fields, on hillsides, or under logs in the woods, which may have been self-created or formerly used by other animals. This

primarily nocturnal species was not observed during the field investigations, but it likely exists along the Routes.

Virginia opossum (*Didelphis virginiana*): This marsupial's preferred habitat is an area interspersed with woods, wetlands, and farmland; however, they are an adaptable animal that can also be found in urban and suburban areas. This species was not observed during the field investigations, but it likely exists along the Routes.

(c) Recreational Species

Recreational terrestrial species consist of those hunted as game. Recreational species expected to inhabit areas along the pipeline corridors include those species listed below. This information was obtained from ODNR-DOW Species Guide Index (ODNR-DOW, 2016b).

(i) Fowl

American crow (*Corvus brachyrhynchos*): The American crow is found in all Ohio counties. They prefer habitats with open fields and trees. This species was not observed during the field investigations, but it likely exists along the Routes.

Geese: Several geese species can be found in Ohio, although typically during migration: snow geese (*Chen caerulescens*), greater white-fronted geese (*Anser albifrons*), cackling geese (*Branta hutchinsii*), and brant (*Branta bernicla*). The Canada goose (*Branta canadensis*) is commonly found throughout Ohio, both as residents and migrants. Habitat for Canada geese was observed along the Routes and Canada geese were the only goose species observed during field surveys.

Ruffed Grouse (*Bonasa umbellus*): Grouse habitat includes mixed hardwood shrub and forest stands. Although the ruffed grouse was not observed during field surveys, there are select locations along the proposed Route that contain appropriate habitat.

Teal: Several teal species could be found in Ohio. The cinnamon teal (*Anas cyanoptera*), green-winged teal (*Anas crecca*), and blue-winged teal (*Anas discors*) are waterfowl. They are usually birds of fresh, shallow marshes and rivers instead of large lakes and bays. Habitat for these species is present along the Routes. This species was not observed during field surveys.

Various duck species: Various duck species can be found in Ohio, most of which only during migration. The American black duck (*Anas rubripes*), redhead (*Aythya americana*), greater scaup (*Aythya marila*), lesser scaup (*Aythya affinis*), canvasback (*Aythya valisineria*), and northern pintail (*Anas acuta*) are usually only found in Ohio during migration and could be found near the proposed Routes at that time. The mallard (*Anas platyrhynchos*) and wood duck (*Aix sponsa*) are two duck species that regularly reside and migrate through Ohio.

Mallard: Most mallards occupy extensive wetlands; however, they are very adaptable. Mallards can be found inhabiting small farm ponds, ditches with flowing water, streams, lakes, and ponds in urban areas. Habitat for this species does exist throughout the Routes. This species was observed during the field surveys.

Wild turkey (*Meleagris gallopavo*): Wild turkeys are adaptable animals. Although they prefer mature forests, they can thrive in areas with as little as 15 percent forest cover. This species was observed during the field surveys.

(ii) Mammals

Eastern cottontail rabbit (*Sylvilagus floridanus*): This species is found in both rural and urban areas. They prefer open areas bordered by thickets or brush areas. This species prefers habitat found throughout the Routes and the species and its habitat was observed during the field surveys.

Gray, red, and fox squirrels (*Sciurus carolinensis, Tamiasurius hudsonicus,* and *Sciurus niger*, respectively): The fox squirrel is primarily an inhabitant of isolated woodlots 10 to 20 acres in size with a sparse understory. The eastern gray squirrel prefers more extensive woodland areas. The red squirrel prefers coniferous and mixed forests. Squirrels were observed during the field surveys along the Routes.

White-tailed deer (*Odocoileus virginianus*): White-tailed deer are found in rural and suburban areas. Indirect evidence and several sightings of this species were observed during the field surveys along the Routes.

(iii) Game Fish

Based upon the hydrologic connectivity and the nature of the surface water habitats known to occur within the Project, diverse game fish species are anticipated to inhabit some of the streams

that are crossed by the Routes. A list of game fish known to occur in Ohio was obtained from ODNR-DOW's Sport Fish of Ohio Field Guide (ODNR, 2009). The list was narrowed to fish most likely to be found within the Project area based on professional judgment and experience, and as such, the list of species presented in this section is not an exhaustive list of all species potentially present in the Project area. The listed species are known to be regionally common and likely to occur on a case-by-case basis, within the surface water features proposed to be crossed or encroached. Neither aquatic species nor habitat surveys were completed as part of the field surveys.

Bluegill (*Lepomis macrochirus*): Bluegill are found throughout the state, preferring clear ponds and lakes with rooted vegetation. This species is likely to occur in streams and ponds along the Routes.

Bullhead catfish (*Ameiurus spp.*): Bullhead catfish are found throughout the state. Brown bullheads prefer relatively clean, clear water with little to no vegetation. Yellow bullheads prefer areas with heavy vegetation. This species may occur in streams and ponds along the Routes.

Common Carp (*Cyprinus carpio*): Carp can be found throughout the state, preferring turbid waters rich in organic matter. It is likely that common carp are present in streams along the Routes.

Freshwater Drum (*Aplodinotus grunniens*): This species can be found in shallow large lakes and big rivers, typically in deeper pools. It is likely that this species is present along the Routes, specifically within West Fork Duck Creek.

Green Sunfish (*Lepomis cyanellus*): Green sunfish are present in most lakes and streams throughout the state and are tolerant of turbid water. They are regularly associated with some type of structure such as brush, vegetation, or rocks. This species is likely to occur in streams and ponds along the routes.

Largemouth Bass (*Micropterus salmoides*): Largemouth bass are found in ponds, lakes, and slow sluggish streams throughout the state. This species is likely to occur in streams and rivers along or near to the proposed Routes.

Longear Sunfish (*Lepomis megalotis*): Longear sunfish are found in streams and lakes throughout the state. They prefer sluggish, clear streams of moderate size with beds of aquatic vegetation. This species may occur in streams and ponds along the Routes.

Longnose Gar (*Lepisosteus osseus*): Longnose gar are a common Ohio fish. This species is likely to occur in larger streams and rivers near the Project Routes.

Rock bass (*Ambloplites rupestris*): Rock bass are widespread throughout the state. They prefer clear streams with coarse gravel and boulders. This species is unlikely to occur in streams and rivers along the Routes.

Smallmouth Bass (*Micropterus dolomieu*): Smallmouth bass are often abundant in quarries and thrive in streams with gravel or rock bottoms with a visible current. This species is unlikely to occur in larger streams and ponds along the Routes.

Spotted Bass *(Micropterus punctulatus*): Spotted bass occur in low gradient streams in southern Ohio. Spotted bass could potentially be found in the Project area.

White Crappie (*Pomoxis annularis*): White crappie can be found in larger ponds, lakes, and rivers. White crappie can tolerate a wide variety of habitats and conditions. This species is regularly found near structures such as fallen trees, stumps, docks, rocks, and aquatic vegetation.

(2) Construction Impacts on Identified Species

Based on the nature of the proposed Project activities and habitat characteristics of the surrounding vicinity, construction impacts to protected species are not anticipated. Duke Energy Ohio will coordinate with USFWS and ODNR regarding specific construction requirements, if required by these agencies. The construction impact on other specific identified species (recreational and commercial) is expected to minor as equivalent habitat that would be impacted during construction exists immediately adjacent to the CWA and the identified species are mobile.

(3) Operation and Maintenance Impacts on Identified Species

Minimal impacts are anticipated to protected wildlife during operation and maintenance of the natural gas pipeline. The selected routes are heavily developed with small pockets of vegetation present. Clearing of secondary growth vegetation will be required along some portions of the pipeline; however, approximately ~~71~~ 67 percent of the Preferred Route and ~~70~~ 77 percent of the Alternate Route are fully developed, minimizing the amount of clearing required. Operational

activities and periodic maintenance of the pipeline corridor are not anticipated to impact wildlife significantly due to the minimal permanent ground disturbance and existing developed nature of the area.

(4) Mitigation Procedures

If areas are identified during additional consultation with the USFWS and ODNR that are of special concern, Duke Energy Ohio will coordinate with these agencies to develop appropriate mitigation measures. The mitigation measure will be implemented if the area of special concern is located within the Route approved by the OPSB.

(D) SITE GEOLOGY

(1) Site Geology

Both the Preferred and Alternate Route corridors occur within the Till Plain section of the Central Lowland physiographic region (Fenneman and Johnson, 1946). The Illinoian Till Plain region of the Till Plain section is characterized by rolling ground moraine of older till generally lacking ice-constructional features such as moraines, kames, and eskers (ODGS, 1998). Bedrock geology beneath both routes consists primarily of Ordovician-aged shale and limestones of the Grant Lake and Fairview Formations, Miamitown Shale, Undivided; Kope Formation; Waynesville and Arnheim Formations, Undivided; and Point Pleasant Formation (USGS, 2014).

Approximately ~~64~~61 percent of the Preferred Route occurs within the Grant Lake and Fairview Formation, Miamitown Shale, undivided; ~~16~~15 percent within the Kope Formation; 12 percent within the Point Pleasant Formation; and ~~8~~12 percent within the Waynesville and Arnheim Formations, undivided (ODGS, 2005).

Approximately ~~39~~38 percent of the Alternate Route occurs within the Grant Lake and Fairview Formation, Miamitown Shale, undivided; ~~41~~42 percent within the Kope Formation; 14 percent within the Point Pleasant Formation; and 6 percent within the Waynesville and Arnheim Formations, undivided (ODGS, 2005).

(2) Slopes and Foundation Soil Suitability

Landslides can be an issue in the Cincinnati area. However, landslides can be predictable as they are typically caused by inherent geologic conditions. The presence of one or more of the following conditions can cause potential landslide issues: steep slopes, jointed rocks, fine-grained, permeable rock or sediment, clay or shale units subject to lubrication, and the introduction of large amounts of water. Additionally, one or more of the following triggering mechanisms are required to initiate downslope movement: vibrations, over-steepened slope, increased weight on the crown of a slope, and removal of vegetation (ODGS, 1995).

If bedrock slope failure occurs, Ordovician bedrock in Hamilton County generally experiences rotational slumps and earthflows. The majority of bedrock slope failures occur in the shale-dominated Kope Formation or the Miamitown Shale, to a lesser degree. Landslides tend to occur in the thick colluvium developed on these units when excessive hydrostatic pressure builds up in the colluvium (ODGS, 1995). Approximately ~~64~~61 percent of the Preferred Route occurs within the Miamitown Shale and ~~16~~15 percent within the Kope Formation. Approximately ~~39~~38 percent of the Alternate Route occurs within the Miamitown Shale and ~~41~~42 percent within the Kope Formation.

Landslides are not anticipated to be an issue during Project construction. As discussed in the following subsections, slopes are relatively shallow along both the Preferred and Alternate Routes and no areas along either route are rated as having “severe” potential for erosion.

(a) Slopes

Approximately 11 percent of the Preferred Route centerline traverses land where slopes exceed 12 percent. Slopes exceeding 12 percent occur along approximately 13 percent of the Alternate Route centerline. Duke Energy Ohio used more detailed and higher resolution data to recalculate slopes greater than 12 percent for this Application, resulting in changes to the percentage of the routes crossing slopes greater than 12 percent.

During construction, Duke Energy Ohio will implement a SWPPP and associated BMPs as necessary to control erosion and sedimentation in areas with slopes exceeding 12 percent. Once construction is complete, soils will be revegetated and stabilized. As a result, no erosional impacts resulting from slopes exceeding 12 percent are expected.

~~Slopes in the areas crossed by the Preferred Route do not exceed 12 percent except for very short distances along streams and road berms where slope mechanics are not expected to cause significant problems. The Alternate Route does not cross slopes greater than 12 percent. Overall, only 0.19 percent of the Preferred Route crosses land with slopes greater than 12 percent. Table 8-7 summarizes areas along the Preferred Route that consist of slopes greater than 12 percent.~~

~~TABLE 8-7~~
~~Slopes greater than 12 percent Along the Preferred Route~~

~~Route~~	~~Milepost Begin~~	~~Milepost End~~	~~Total Distance (feet)~~	~~Percent of Route~~
~~Preferred~~	~~9.327~~	~~9.333~~	~~30.4~~	~~0.04~~
	~~9.334~~	~~9.341~~	~~37.2~~	~~0.05~~
	~~10.362~~	~~10.370~~	~~39.1~~	~~0.06~~
	~~10.523~~	~~10.528~~	~~30.4~~	~~0.05~~
~~TOTAL~~			**~~137.1~~**	**~~0.19~~**

~~Source: USGS, 2016~~

(b) Erosion Potential

Erosion is the detachment and movement of soil material and may be natural or accelerated by human activity. Depending on the local landscape and weather conditions, erosion may be very slow or very rapid (USDA NRCS, 1993). The NRCS rates erosion hazard both verbally and numerically. Verbally the hazard is described as “slight,” “moderate,” and “severe” for roads/trails. The ratings in this interpretation indicate the hazard of soil loss from unsurfaced roads and trails. The ratings are based on soil erosion factor K, slope, and content of rock fragments. These terms are defined in Table 8-8.

TABLE 8-8
NRCS Erosion Hazard Verbal Classification

NRCS Erosion Hazard Classification	Definition
Slight	Little or no erosion is likely.
Moderate	Indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed.
Severe	Indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Source: USDA NRCS, 2016

Water erosion results from the removal of soil material by flowing water and is dependent upon a number of site-specific factors, including soil erodibility factor, topography (slope steepness and length), rainfall, and crop management and conservation practices. Wind erosion can occur in regions of low rainfall or areas experiencing low rainfall, especially during periods of drought. Wind erosion generally is not related to the slope gradient, and wind erosion hazard is increased by removing or reducing the vegetation (USDA NRCS, 1993).

TABLE 8-9
Soil Erosion Hazard Results for the Project

Route	Erosion Hazard	Total Length Along Proposed Route (miles)	Percent of Route
Preferred	Moderate	~~0.47~~0.51	~~3.5~~3.6%
	Slight	~~1.90~~2.17	~~14.2~~15.5%
	Not Rated	~~11.01~~11.32	~~82.2~~80.9%
Alternate	Moderate	0.08	0.6
	Slight	3.23	24.8
	Not Rated	~~9.72~~9.69	74.6

Source: USDA NRCS, 2016

None of the soils crossed by the Preferred Route are classified as having a severe erosion hazard and ~~3.5~~3.6 percent have a moderate erosion hazard ranking. The remainder of the Preferred Route has an erosion hazard that is either slight or not rated. None of the soils crossed by the Alternate Route are classified as having severe erosion hazard and approximately 0.6 percent have a moderate erosion hazard ranking. The remainder of the Alternate Route has slight susceptibility to erosion or were not rated by the NRCS.

To decrease the occurrence of bedrock slope failure and reduce the erosion hazard potential, subsurface disturbance along the pipeline route will be limited to the trench line. Appropriate engineering slope protections, including trench breakers, will be installed during construction to help limit subsurface water volumes, erosion, and velocities and the associated potential for slope failures. In addition, post-construction surface slope breakers (*i.e.*, water bars) will be installed on steep slopes to help prevent similar surface water runoff issues. Any slope failures that occur as a result of the Project will be promptly corrected by Duke Energy Ohio.

(E) ENVIRONMENTAL AND AVIATION REGULATION COMPLIANCE

(1) Licenses, Permits, and Authorizations Required for the Project Facility

Coverage under the USACE's Nationwide Permit 12 for wetland and waterbody impacts, or possibly an individual 404 permit authorization, will be required. It is anticipated the Project will qualify for coverage under the OEPA's companion 401 Water Quality Certification of Nationwide Permit 12 and Duke Energy Ohio is planning to limit wetland and stream impacts below the limits required to utilize the General Permit process. The impacts to waters will be further evaluated to determine if the Project will require an individual 401 Water Quality Certification and/or an Isolated Wetlands Permit from the OEPA. It is also anticipated a Notice of Intent for construction storm water purposes will be filed with the OEPA and multiple highway and railroad crossing permits will be filed with the appropriate authorities.

(2) Construction Debris

As construction work proceeds, the ROW will be kept clean of all rubbish and debris resulting from the work. Refuse will be properly disposed to an approved landfill or other appropriate location. Where trees must be cleared from the ROW, the resulting brush will be chipped and/or windrowed, timber will be cut into appropriate lengths for sale or disposition by the landowner, and stumps will be chipped and/or hauled from the site. All excess vegetation will be properly disposed to an approved landfill or other suitable area at the landowners' request or as otherwise required.

(3) Stormwater and Erosion Control

A SWPPP will be prepared, BMPs implemented to minimize soil erosion and sedimentation and other pollutant discharges, and will be made available on site during Project construction. The SWPPP will include the following General Conditions, at a minimum:

<u>Erosion and Sediment Controls</u>

Implementation of erosion and sediment control practices will be based on the methods and standards described in the ODNR Rainwater and Land Development Manual (ODNR, 2014).

Wetlands, streams, and other environmentally sensitive areas will be clearly marked before the start of clearing and/or construction. Where avoidable, no construction or access will be permitted in these areas unless clearly specified in the SWPPP.

No permanent impacts to PEM wetlands are expected as the original surface grade will be restored and PEM wetlands will re-establish naturally along the ROW. With time, areas of PFO and palustrine scrub-shrub (PSS) wetlands will be converted to PEM wetlands once the pipeline is installed and the surface area is restored to promote vegetative growth as a PEM wetland. No permanent impacts to streams or headwaters are anticipated. Streams, including beds and banks, if disturbed during construction, will be re-stabilized immediately after in-channel work is completed. If required, stream reconstruction specialists will be used to restore stream channels and banks.

Grubbing activities will be required along the Project Route but will be limited to the extent possible within 25 feet of streams and wetland areas. Sediment basins, traps, and perimeter sediment controls will be implemented within 7 days of grubbing activities. Sediment controls will continue to function until disturbed areas are at least 70 percent stabilized as required by the applicable OEPA construction storm water permit.

Silt Fence: Silt Fencing and/or other appropriate barrier-control BMPs (e.g., silt sock) for erosion control will be installed as needed before ground-disturbing work begins. Barrier controls will be installed according to the methods recommended in the ODNR Rainwater and Land Development Manual before upslope land disturbance begins. In general, silt fence will be used where there is the possibility that sheet flow will carry sediment-laden water into downstream streams or wetlands. Other methods will be used where flow in ditches, channels or gullies is anticipated. The following installation guidelines will be followed:

- Silt fence, or equivalent controls, will be installed before upslope land disturbance begins.
- All silt fence will be placed as close to the contour as possible so that water will not concentrate at low points in the fence and so that small swales or depressions that may carry small concentrated flows to the silt fence are dissipated along its length.
- Ends of the silt fences will be brought upslope slightly so that water ponded by the silt fence will be prevented from flowing around the ends.

- Silt fence will be placed on the flattest area available.
- Where possible, vegetation will be preserved for 5 feet (or as much as possible) upslope from the silt fence.
- The height of the silt fence will be a minimum of 16 inches above the original ground surface.
- The silt fence will be placed in an excavated or sliced trench cut a minimum of 6 inches deep. The trench will be made with a trencher, cable laying machine, slicing machine, or other suitable device that will ensure an adequately uniform trench depth.
- The silt fence will be placed with the stakes on the downslope side of the geotextile. A minimum of 8 inches of geotextile will be below the ground surface. Excess material will lay on the bottom of the 6-inch deep trench. The trench will be backfilled and compacted on both sides of the fabric.
- Seams between sections of silt fence will be spliced together only at a support post with a minimum 6-inch overlap prior to driving into the ground.

Soil Stabilization: Disturbed areas that remain unworked for more than 21 days will be stabilized with seed and mulch no later than 14 days after the last construction in that area as required by the OEPA.

Maintenance / Inspection: Erosion and sediment control practices will be inspected at least once every 7 days and within 24 hours after any storm event greater than 0.5 inches of rain per 24-hour period as required by the OEPA.

Duke Energy Ohio will maintain erosion control measures in good working order. If a repair is necessary, it will be initiated within 24 hours of report. Silt fencing will be inspected for depth of sediment, for tears, for assurance fabric is securely attached to the fence posts, and to ensure that the fence posts are firmly in the ground. Seeded areas will be inspected for evidence of bare spots or washouts. Permanent records of the maintenance and inspection must be maintained throughout the construction period. Records will include, at a minimum, the name of the Inspector, major observations, date of inspection, certification of compliance, and corrective measures taken.

(4) Disposition of Contaminated Soil and Hazardous Materials

All materials stored on-site will be kept in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure. Products will be kept in their original containers with the original manufacturer's label. Manufacturer's recommendations for proper use and disposal will be followed. Material Safety Data Sheets/or Safety Data Sheets (MSDS) will be retained and available on-site at all times. Contaminated soil and/or hazardous materials will be tested, handled and/or disposed of appropriately to designated, approved disposal facilities.

(5) Maximum Height of Above Ground Structures

Duke Energy Ohio does not anticipate the need for structures taller than those already in place at WW Feed Station. A regulating station will be constructed at either the Norwood Station or the Line V tie-in at Fairfax, dependent on the final approved route.

(6) Dusty or Muddy Conditions Plan

The site and surrounding areas will be kept free from dust nuisance resulting from site activities. During excessively dry periods of active construction, dust suppression will be implemented where necessary through irrigation and/or mulching. Construction entrances will be established and maintained to a condition that will prevent tracking or flowing of sediment onto public ROW. Accumulated sediment spilled, dropped, washed, or tracked onto public ROWs will be removed as soon as practical.

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Highpoint Park Regulation Station (Proposed)

WW Feed Station

Figure 8-2A and 8-3A

Figure 8-3B

Figure 8-2B

Figure 8-3C

Figure 8-3D

Figure 8-3E

Figure 8-3F

Figure 8-3G

Figure 8-3H

Figure 8-3I

Figure 8-3J

Figure 8-2C

Figure 8-2D

Figure 8-2E

Figure 8-2F

Figure 8-2G

Figure 8-2H

Norwood Regulation Station (Alternate Route, Existing)

Fairfax Regulation Station (Preferred Route, Proposed)

LEGEND:

- Stations (Existing and Proposed)
- Preferred Route
- Alternate Route
- Existing Line V
- Figure Key

BASE MAP SOURCE:
USGS 7.5-minute Topographic Quadrangle
Cincinnati East 1982, Glendale 1982
Madeira 1983, Mason 1982

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Scale In Feet

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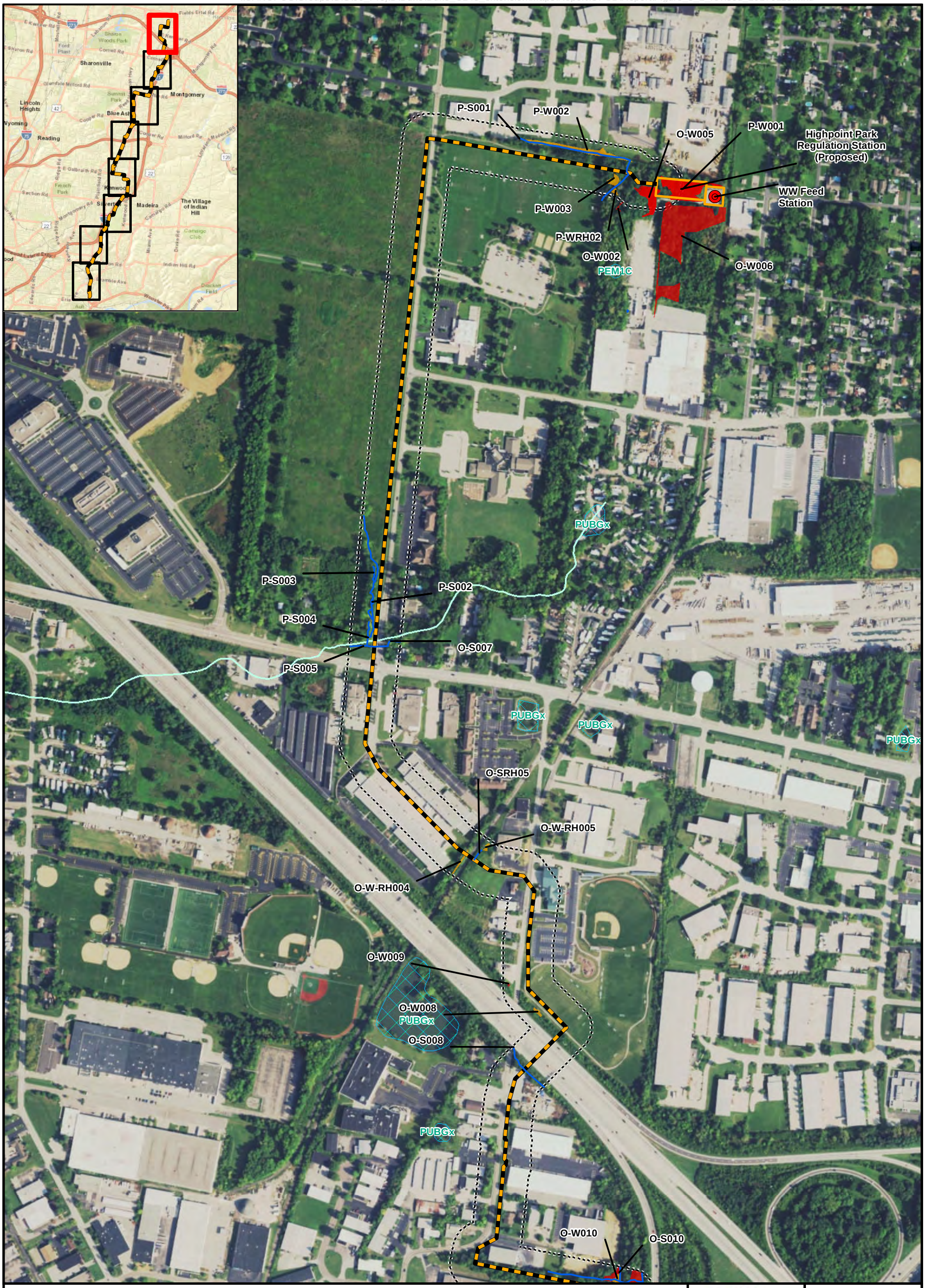
C314V Central Corridor Pipeline Extension Project

FIGURE 8-1
ECOLOGY INDEX MAP

PN: 672247	
CREATED BY: TH	ch2m.
REVIEWED BY:JN	



LEGEND:

- Station
- Preferred Route
- Ecological Field Survey Corridor - 280 feet wide
- Delineated Stream
- NHD Stream
- NWI Wetland
- Station
- Delineated Pond

Delineated Wetlands

- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub Shrub

BASE MAP SOURCE:
NAIP 2015

SPATIAL DATA SOURCES:
NHD Streams - National Hydrography Dataset
NWI Wetlands - US Fish and Wildlife Service

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Scale In Feet

DUKE ENERGY

C314V Central Corridor Pipeline Extension Project

FIGURE 8-2A,
PREFERRED ROUTE WETLAND AND WATERBODIES DELINEATION MAP

PN: 672247
CREATED BY:TH
REVIEWED BY:MF

ch2m

LEGEND:

- Station
- Preferred Route
- Ecological Field Survey Corridor - 280 feet wide
- Delineated Stream
- NHD Stream
- NWI Wetland
- Station
- Delineated Pond

Delineated Wetlands

- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub Shrub

BASE MAP SOURCE:
NAIP 2015

SPATIAL DATA SOURCES:
NHD Streams - National Hydrography Dataset
NWI Wetlands - US Fish and Wildlife Service

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Scale In Feet

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C314V Central Corridor Pipeline Extension Project

FIGURE 8-2B,
PREFERRED ROUTE WETLAND AND WATERBODIES DELINEATION MAP

PN: 672247
CREATED BY:TH
REVIEWED BY:MF

ch2m

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O-S047
O-S048
BO-S004
BO-S008
BO-S004
PUBGx
O-W017
BO-S005
PUBGx
BO-S007
BO-S006
O-S311
North Branch Sycamore Creek
PUBGx
O-S310
0-W301
PUBGx
PEM1Fx
O-S308
O-S060
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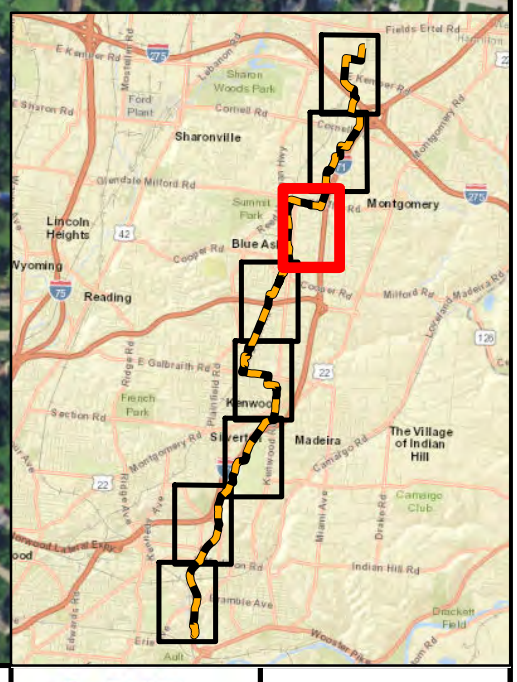
O-S061
O-W027



LEGEND:

- Station
- Preferred Route
- Ecological Field Survey Corridor - 280 feet wide
- Delineated Stream
- NHD Stream
- NWI Wetland
- Station
- Delineated Pond

Delineated Wetlands

- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub Shrub

BASE MAP SOURCE:
NAIP 2015

SPATIAL DATA SOURCES:
NHD Streams - National Hydrography Dataset
NWI Wetlands - US Fish and Wildlife Service

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Scale In Feet

DUKE ENERGY

C314V Central Corridor Pipeline Extension Project

FIGURE 8-2C,
PREFERRED ROUTE WETLAND AND WATERBODIES DELINEATION MAP

PN: 672247
CREATED BY:TH
REVIEWED BY:MF

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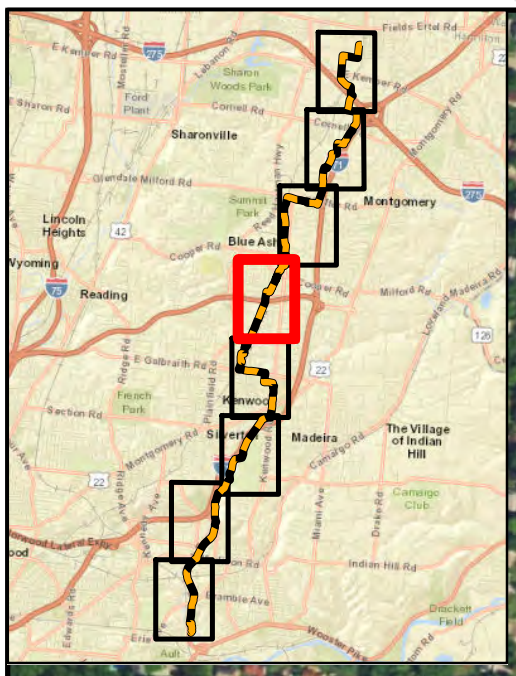

LEGEND:

- Station
- Preferred Route
- Ecological Field Survey Corridor - 280 feet wide
- Delineated Stream
- NHD Stream
- NWI Wetland
- Station
- Delineated Pond

Delineated Wetlands

- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub Shrub

BASE MAP SOURCE:
NAIP 2015

SPATIAL DATA SOURCES:
NHD Streams - National Hydrography Dataset
NWI Wetlands - US Fish and Wildlife Service

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Scale In Feet

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FIGURE 8-2D,
PREFERRED ROUTE WETLAND AND WATERBODIES DELINEATION MAP

PN: 672247
CREATED BY:TH
REVIEWED BY:MF

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LEGEND:

- Station
- Preferred Route
- Ecological Field Survey Corridor - 280 feet wide
- Delineated Stream
- NHD Stream
- NWI Wetland
- Station
- Delineated Pond

Delineated Wetlands

- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub Shrub

BASE MAP SOURCE:
NAIP 2015

SPATIAL DATA SOURCES:
NHD Streams - National Hydrography Dataset
NWI Wetlands - US Fish and Wildlife Service

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Scale In Feet

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C314V Central Corridor Pipeline Extension Project

FIGURE 8-2E,
PREFERRED ROUTE WETLAND AND WATERBODIES DELINEATION MAP

PN: 672247

CREATED BY:TH

REVIEWED BY:MF

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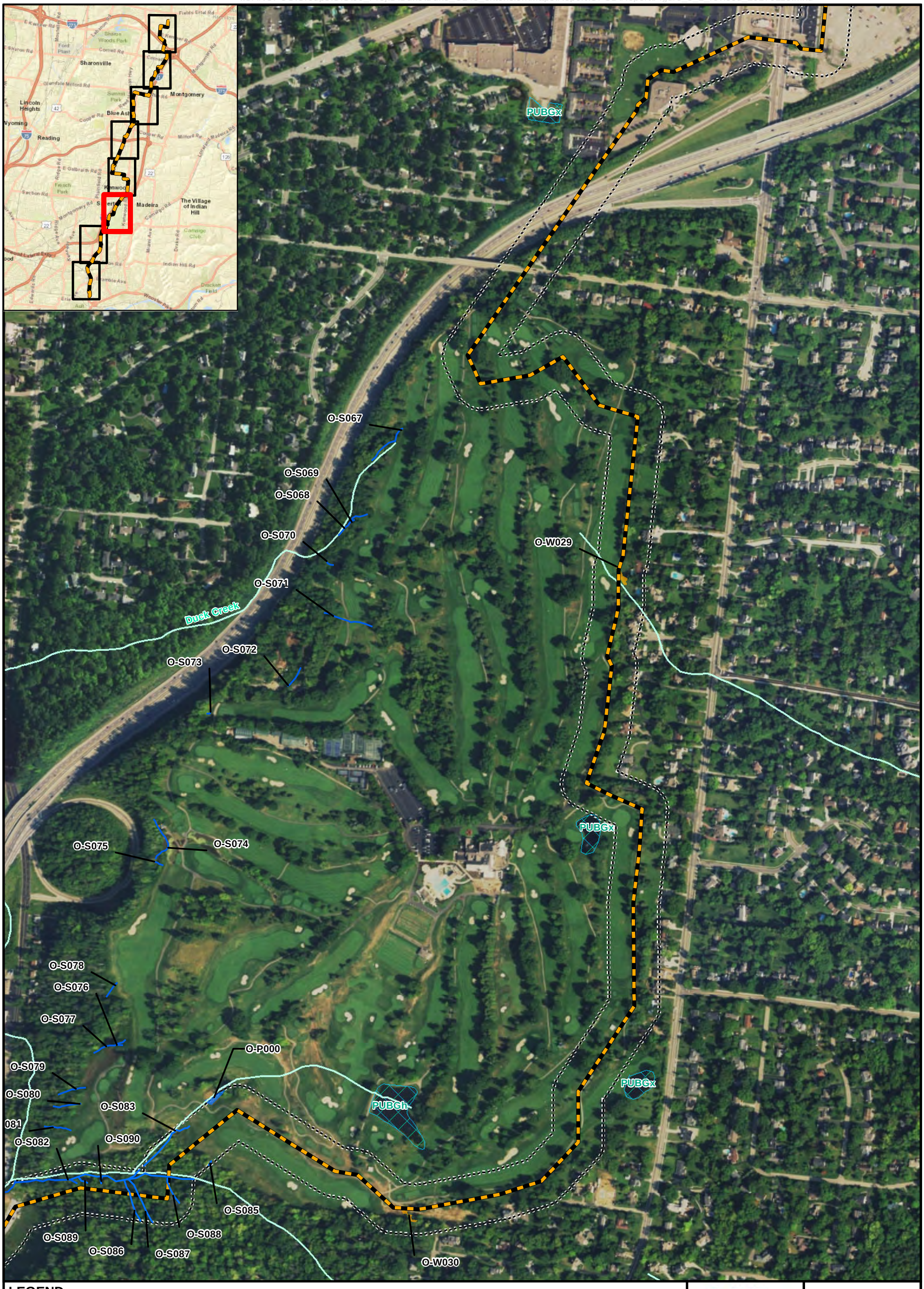

LEGEND:

- Station
- Preferred Route
- Ecological Field Survey Corridor - 280 feet wide
- Delineated Stream
- NHD Stream
- NWI Wetland
- Station
- Delineated Pond

Delineated Wetlands

- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub Shrub

BASE MAP SOURCE:
NAIP 2015

SPATIAL DATA SOURCES:
NHD Streams - National Hydrography Dataset
NWI Wetlands - US Fish and Wildlife Service

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Scale In Feet

DUKE ENERGY

C314V Central Corridor Pipeline Extension Project

FIGURE 8-2F,
PREFERRED ROUTE WETLAND AND WATERBODIES DELINEATION MAP

PN: 672247
CREATED BY:TH
REVIEWED BY:MF

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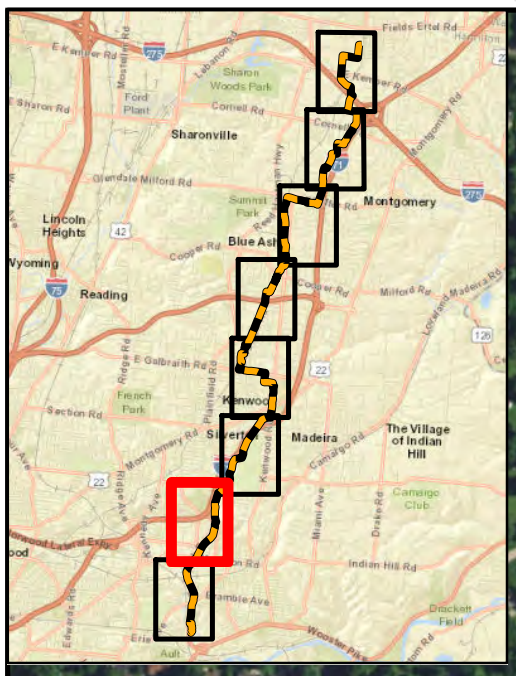

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O-S305
O-S306
O-S307
O-S108
BO-S100
BO-S101
Duck Creek
BO-W100
BO-W100
BO-S102
BO-S103
O-S301
O-W300
O-S302
BO-S104
BO-S105
BO-S106

LEGEND:

- Station
- Preferred Route
- Ecological Field Survey Corridor - 280 feet wide
- Delineated Stream
- NHD Stream
- NWI Wetland
- Station
- Delineated Pond

Delineated Wetlands

- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub Shrub

BASE MAP SOURCE:
NAIP 2015

SPATIAL DATA SOURCES:
NHD Streams - National Hydrography Dataset
NWI Wetlands - US Fish and Wildlife Service

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Scale In Feet

DUKE ENERGY.

C314V Central Corridor Pipeline Extension Project

FIGURE 8-2G,
PREFERRED ROUTE WETLAND AND WATERBODIES DELINEATION MAP

PN: 672247
CREATED BY:TH
REVIEWED BY:MF

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LEGEND:

- Station
- Preferred Route
- Ecological Field Survey Corridor - 280 feet wide
- Delineated Stream
- NHD Stream
- NWI Wetland
- Station
- Delineated Pond

Delineated Wetlands

- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub Shrub

BASE MAP SOURCE:
NAIP 2015

SPATIAL DATA SOURCES:
NHD Streams - National Hydrography Dataset
NWI Wetlands - US Fish and Wildlife Service

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Scale In Feet

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C314V Central Corridor Pipeline Extension Project

FIGURE 8-2H,
PREFERRED ROUTE WETLAND AND WATERBODIES DELINEATION MAP

PN: 672247
CREATED BY:TH
REVIEWED BY:MF

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Summary: Amended Application Amended Application for a Certificate of Environmental Compatibility and Public Need for the C314V Central Corridor Pipeline Extension Project, PUCO Case No. 16-253-GA-BTX (PART 6 OF 7) electronically filed by Carys Cochern on behalf of Kingery, Jeanne W Ms.