



Water Resources Delineation Report

Union Square Development Site
148.6 Acres, Massillon and Wise Roads
Green, Ohio

June, 2012



A Division of The Davey Tree Expert Company



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Executive Summary

The 148.6-acre site is located east of State Route 241 (Massillon Road), north of Wise Road, and west of Interstate 77 in Green, Summit County, Ohio. A water resources delineation was performed by Judith Mitchell on July 19–22, 24, and 25, 2011, December 7, 2011, January 9, 2012, and February 27, 2012.

The study area contains successional woods, mowed fields, an agricultural field, emergent wetlands, scrub/shrub wetlands, and forested wetlands. Much of the north and eastern portions of the site have been logged. A map showing the location and size of the water resources identified on the property is shown in Appendix A. A map showing general plant communities found on the site is in Appendix B. Twenty-three wetlands totaling 15.954 acres are found within the study area (Table 1). The wetlands all rated within Category 1 and 2 on the Ohio Rapid Assessment Method (ORAM) form. There are a total of 12 streams including ephemeral, intermittent, and perennial streams totaling 6,993 linear feet (Table 2). In addition to the wetlands and streams, there is a 0.130-acre pond and three retention basins totaling 1.325 acres found on the site (Table 3).

Table 1. Jurisdictional Wetlands Delineated on the Site

Wetlands	Type	Connectivity to Waters of the U.S. ¹	Area (Acres)	ORAM Score	ORAM Category
A	Forested	Non-isolated	0.795	56	2
B	Forested, scrub/shrub	Non-isolated	2.548	56	2
C	Scrub/shrub, emergent	Non-isolated	4.318	58	2
D	Forested, scrub/shrub	Non-isolated	1.435	43	modified 2
E	Emergent	Isolated	0.038	38	modified 2
F	Emergent	Isolated	0.007	20	1
G	Forested	Non-isolated	0.329	44.5	2
H	Scrub/shrub	Non-isolated	0.069	46	2
I	Forested	Non-isolated	0.150	40.5	modified 2
J	Emergent	Non-isolated	0.065	22.5	1
K	Emergent	Isolated	0.147	19.5	1
L	Emergent	Isolated	0.019	17	1
M	Scrub/shrub, emergent	Non-isolated	2.507	38.5	modified 2
N	Forested, scrub/shrub, emergent	Non-isolated	0.204	37.5	modified 2
O	Forested, scrub/shrub, emergent	Non-isolated	0.604	45.5	2
P	Emergent	Isolated	0.005	20.5	1
Q	Forested, scrub/shrub, emergent	Non-isolated	2.006	52.5	2
R	Scrub/shrub	Non-isolated	0.550	48.5	2
S	Emergent	Non-isolated	0.029	28	1
T	Scrub/shrub	Non-isolated	0.101	36	modified 2
U	Emergent	Non-isolated	0.016	43	modified 2
V	Emergent	Non-isolated	0.007	44.5	2
W	Forested	Isolated	0.005	40	modified 2
Total			15.954		

¹ The final determination of a wetlands' connectivity to Waters of the U.S. is made by the U.S. Army Corps of Engineers.

Table 2. Jurisdictional Drainageways Delineated on the Site

Stream	Type	Length (Linear Feet)	Average Bankfull Width (feet)
1	Intermittent	1,148	2.6
2	Ephemeral	14	1.3
3	Intermittent	103	6.9
4	Ephemeral	132	1.6
5	Intermittent	3,010	5.1
5a	Intermittent	44	2.3
5b	Ephemeral	138	2.0
5c	Ephemeral	105	2.0
6	Ephemeral	69	1.6
7	Ephemeral	70	2.0
8	Intermittent	469	3.6
9	Ephemeral	480	2.6
10	Perennial	1,039	6.9
11	Perennial	125	5.9
12	Ephemeral	47	2.0
Total		6,993	
Total Ephemeral		1,055	
Total Intermittent		4,774	
Total Perennial		1,164	

Table 3. Other Waters Delineated on the Site

Water	Area (Acres)
Pond	0.130
Retention Basin 1	0.882
Retention Basin 2	0.083
Retention Basin 3	0.360
Total	1.455

Introduction

Study Area Description and Location

The 148.6-acre site is located in Green, Summit County, Ohio (Appendix C). The property is east of State Route 241 (Massillon Road), north of Wise Road, and west of Interstate 77 (Appendix D).

The property contains successional woods, mowed fields, an agricultural field, emergent wetlands, scrub/shrub wetlands, and forested wetlands. Much of the north and eastern portions of the site have been logged.

There are a total of 12 small, ephemeral, intermittent, and perennial streams on the site. All of the streams flow to the east and northeast, eventually joining and forming a larger, perennial stream to the east of Interstate 77. This stream flows north and eventually enters the Tuscarawas River. The Tuscarawas River is a part of the 8,051-square-mile Muskingum River drainage Basin. The Muskingum River flows into the Ohio River at Marietta.

Secondary Source Information

The property is shown on the North Canton Quadrangle of the United States Geological Survey (USGS) maps (Appendix F). Elevations range from approximately 1,150 to 1,220 feet across the site.

The National Wetlands Inventory (NWI) map (North Canton Quadrangle) is in Appendix G. A palustrine, forested, broad-leaved deciduous, seasonal wetlands system (code PFO1C) is mapped along the northern property boundary. Two palustrine, unconsolidated bottom, intermittently exposed wetlands systems (code PUBG) are also mapped on the site.

A map from the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey showing the soil types located on and adjacent to the site is found in Appendix H. Table 4 provides a list of soil types mapped for the site.

Table 4. Soil Types Mapped for the Site

Map Unit	Soil Description
Ca	Canadice silty clay loam ¹
CdB	Canfield silt loam, 2 to 6 percent slopes
CdC	Canfield silt loam, 6 to 12 percent slopes
CdC2	Canfield silt loam, 6 to 12 percent slopes, moderately eroded
FcA	Fitchville silt loam, 0 to 2 percent slopes ²
FcB	Fitchville silt loam, 2 to 6 percent slopes
Ho	Holly silt loam ¹
ReA	Ravenna silt loam, 0 to 2 percent slopes ²
Sb	Sebring silt loam ¹
Ua	Udorthents
WuB	Wooster silt loam, 2 to 6 percent slopes
WuC	Wooster silt loam, 6 to 12 percent slopes
WuC2	Wooster silt loam, 6 to 12 percent slopes, moderately eroded

¹Hydric soil

²Non-hydric soil with hydric inclusions

Methodology

The *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) and *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (U.S. Army Corps of Engineers, 2012) were used in delineating wetlands within the study area. The water resources were delineated and surveyed on July 19–22, 24, 25, 2011, December 7, 2011, January 9, 2012, and February 27, 2012. The water resources delineation fieldwork, boundary mapping, and data analysis were performed by Judith Mitchell and Ben Schuplin. Ken Christensen prepared the vegetation, soils, and wetlands maps using AutoCAD® Map 2012 software. Shawn Bruzda prepared the maps included in Appendices C–H using ArcGIS® v.9.3. Judith Mitchell and Greg Snowden provided technical oversight and quality control.

Streams are identified as linear, flowing water features with a defined bed and bank. Streams are classified as ephemeral, intermittent, or perennial based upon flow regime. Ephemeral streams have flowing water only during, and for a short duration after, precipitation events. Intermittent streams have flowing water during certain times of the year, when groundwater and rainfall provide water for stream flow. During dry periods, intermittent streams may not have flowing water. Perennial streams have flowing water year-round, receiving water from groundwater and rainfall runoff.

Wetlands are identified based on three criteria: vegetation, soils, and hydrology. An area must meet all three criteria to be considered a jurisdictional wetland. Thirty-seven sampling points were established in the field to determine wetlands boundaries. Data sheets reporting the results of soils, vegetation, and hydrology analyses were completed for each sample station and are located in Appendix K.

Soil samples were obtained to determine the extent of hydric soils on the site. A standard Munsell soil color chart was used to determine the hue, value, and chroma of each soil sample. Soil samples were taken to a depth to adequately make a hydric soil determination. Criteria established by the National Technical Committee for Hydric Soils (1991) were used to determine hydric soils.

Wetland hydrology was characterized during this water resources delineation. Inundation and/or soil saturation were noted for each sample point. Secondary hydrological indicators, including watermarks, drift lines, sediment deposits, wetlands drainage patterns, blackened leaves, and morphological indicators, were also noted. Other hydrological indicators observed included iron/manganese concretions and oxidized root zones within the upper soil layers.

Quantitative vegetation data were collected at each sampling point. Dominance was estimated by percent areal cover. Four strata were considered for each sample point—trees, saplings/shrubs, herbs, and woody vines. Trees were defined as any woody plant having a diameter at breast height (DBH) greater than 3.0 inches. Saplings and shrubs were those woody plants with a DBH of less than 3.0 inches and greater than 3.2 feet in height. For each stratum, plant species within a plot were identified and percent areal cover was estimated for each species. Thirty-foot-radius plots were used for trees and vines; 15-foot-radius plots were used for saplings and shrubs; and 5-foot-radius plots were used for herbs.

Any species within a stratum comprising 20 percent or more of the total plot areal cover was considered to be dominant. Dominant species within all strata were then added to determine the percentage of wetlands vegetation for each sample point. The wetlands vegetation criterion was met if greater than 50 percent of the dominant vegetation was indicative of wetlands conditions.

Species identifications were based on Braun (1989) and Newcomb (1977). Reed (1988) was used to assign indicator statuses to each identified species. Plants with an indicator status of obligate (OBL), facultative wetland (FACW), or facultative (FAC) were considered to be indicative of wetlands conditions. Plants with an indicator status of facultative upland (FACU) or upland (UPL) were considered to be indicative of upland conditions. Plants that could only be identified to genus were sometimes assigned an indicator status based on the professional judgment of Davey Resource Group. These plants were classified as wetlands indicator species (WIS) or upland indicator species (UIS). See Appendix I for a more detailed explanation of wetlands vegetation indicator statuses.

Survey flags were placed at necessary points around each wetland to accurately depict the wetland upland boundary. The location of each flag was surveyed using a GeoXH™ Trimble® GeoExplorer® 6000 series Dual-frequency Global Navigation Satellite System or GNSS (GPS, GLONASS, SBAS [WAAS]) receiver and antenna with Everest™ multipath rejection technology and Floodlight technology with 220 channels, running professional TerraSync™ software capable of decimeter (10–75cm) accuracy after differential correction.

Trimble® GPS Pathfinder® Office software was used for postprocessing the GNSS field collected data incorporating Trimble® DeltaPhase™ differential correction technology using GPS data collected from an appropriate base station. The corrected GPS latitude-longitude positions were exported into a compatible coordinate system as an AutoCAD® drawing interchange file (DXF). The vegetation, soils, and wetlands maps included in this report were prepared using AutoCAD Map® 2012 software.

Wetlands that are hydrologically connected to other traditional navigable waters of the United States are considered non-isolated and fall under the federal jurisdiction of the U.S. Army Corps of Engineers (USACE). All hydrologically isolated wetlands that lack connectivity to other surface waters are regulated by Ohio Environmental Protection Agency (EPA).

Ohio Rapid Assessment Method (ORAM) forms (version 5.0) were completed for each wetland (Appendix L). The 10-page ORAM long form is included for each wetland. The ORAM evaluates the ecological quality of wetlands using a scoring form containing multiple questions. Wetlands are classified into categories as shown in Table 5. As part of the ORAM process, a review of the Ohio Biodiversity database was initiated to determine if any rare, threatened, or endangered species are location within or near the project area. Results of the database search will be presented as they become available.

Table 5. ORAM Scoring Breakpoints for Wetland Regulatory Categories

ORAM Score	Wetland Category
0-29.9	1
30-34.9	1 or 2 gray zone
35-44.9	Modified 2
45-59.9	2
60-64.9	2 or 3
65-100	3

Results

Vegetation

A map showing the locations of vegetative communities present on the property is in Appendix B. Because many of these areas have been logged, the communities are very much interspersed, with no clear vegetation change. The site contains successional woods, logged woods, upland old field, mowed fields, an agricultural field, emergent wetlands, scrub/shrub wetlands, and forested wetlands. Photographs showing water resources identified on the site are included in Appendix J.

Successional Woods. Portions of the site are successional woods. Common species found here include *Acer rubrum* (red maple, FAC), *Acer saccharum* (sugar maple, FACU), *Fagus grandifolia* (American beech, FACU), *Nyssa sylvatica* (black gum, FAC), *Quercus rubra* (red oak, FACU), *Rosa multiflora* (multiflora rose, FACU), *Rubus allegheniensis* (Allegheny blackberry, FACU), and *Viburnum recognitum* (northern arrow-wood, FAC).

Logged Woods. The northwest portion of the site has been logged. This area is in various stages of succession with a heavy herbaceous cover, shrubs, and scattered trees. Growing in this area are *Acer rubrum* (red maple, FAC), *Festuca rubra* (red fescue, FACU), *Prunus serotina* (black cherry, FACU), *Rosa multiflora* (multiflora rose, FACU), *Rubus allegheniensis* (Allegheny blackberry, FACU), *Solidago* sp. (goldenrod), and *Viburnum recognitum* (northern arrow-wood, FAC).

Upland Old Field. These areas of the site are dominated by *Rhamnus frangula* (glossy buckthorn, FAC), *Rosa multiflora* (multiflora rose, FACU), *Rubus allegheniensis* (Allegheny blackberry, FACU), *Solidago* sp. (goldenrod), and *Viburnum recognitum* (northern arrow-wood, FAC).

Mowed Fields. Mowed fields are found within portions of the site. Dominant species in these areas include *Andropogon virginicus* (broom sedge, FACU), *Dactylis glomerata* (orchard grass, FACU), *Phleum pratense* (timothy, FACU), *Rosa multiflora* (multiflora rose, FACU), *Solidago canadensis* (Canada goldenrod, FACU), and *S. rugosa* (rough leaved goldenrod, FAC).

Emergent Wetlands. Wetlands E, F, J–L, P, S, U, V, and portions of Wetlands C, M–O, and Q are emergent wetlands. Growing in these areas are *Impatiens capensis* (jewelweed, FACW), *Juncus effusus* (soft rush, FACW), *Leersia oryzoides* (rice cutgrass, OBL), *L. virginica* (white grass, FACW), *Phalaris arundinacea* (canary reed grass, FACW), *Scirpus cyperinus* (wool grass, FACW), and *Typha* sp. (cattails).

Scrub/Shrub Wetlands. Wetlands H, R, T, and portions of Wetlands B–D, M–O, and Q are scrub/shrub wetlands. These areas are dominated by *Cornus amomum* (silky dogwood, FACW), *C. foemina* (stiff dogwood, FAC), *Impatiens capensis* (jewelweed, FACW), *Leersia virginica* (white grass, FACW), *Rhamnus frangula* (glossy buckthorn, FAC), *Salix discolor* (pussy willow, FACW), *Toxicodendron radicans* (poison-ivy, FAC), and *Viburnum recognitum* (northern arrow-wood, FACW).

Forested Wetlands. Wetlands A, G, I, W, and portions of Wetland B, D, N, O, and Q are forested wetlands. These areas contain *Acer rubrum* (red maple, FAC), *Fraxinus pennsylvanica* (green ash, FACW), *Glyceria striata* (fowl manna grass, OBL), *Impatiens capensis* (jewelweed, FACW), *Toxicodendron radicans* (poison-ivy, FAC), *Ulmus americana* (American elm, FACW), and *Viburnum recognitum* (northern arrow-wood, FACW).

Soils

The soils on the site generally match what is mapped on the soil survey map. Hydric soils are generally limited to the wetland areas. All of the wetland areas meet the depleted matrix (F3) hydric soil indicator.

Hydrology

The majority of the wetlands on this site abut a stream and are not isolated. Wetland J drains into a retention pond which drains into Stream 6, providing connectivity to other jurisdictional waters. A small portion of Wetland Q does not directly connect to jurisdictional waters but is adjacent to the remainder of Wetland Q which directly abuts Stream 1 and so is not isolated. Wetlands D–F, K, L, and P have no connection to other surface waters and are isolated.

Indicators of hydrology that were observed in the wetlands on this site include sediment deposits, drainage patterns, saturation, and inundation.

Ohio Rapid Assessment Method (ORAM)

ORAM forms were completed for all wetlands on the site. ORAM scores and categories are shown in Table 1. The complete ORAM forms are in Appendix L. Most of the wetlands were assessed within the range of an ORAM Category 1 and modified 2. This reflects the disturbed nature of the wetlands due to past logging, the prevalence of invasive species, and the urbanized nature of the surrounding area.

Conclusions

A map showing the location and size of the jurisdictional wetlands and aquatic features identified on the property, along with the locations of sample points, is shown in Appendix A. Twenty-three wetlands totaling 15.954 acres, a 0.130-acre pond, and three retention basins totaling 1.325 acres are found within the study area. There are 1,164 linear feet of perennial streams, 4,774 linear feet of intermittent streams, and 1,055 linear feet of ephemeral streams on the site. In addition to the wetlands, there is a 0.130-acre pond and three retention basins totaling 1.325 acres on the site.

Davey Resource Group is confident that all jurisdictional wetlands and drainageways were identified on this site. No unusual or problem areas were found. All wetlands studies conducted by Davey Resource Group are objective and based strictly on professional judgment. Davey Resource Group and its employees have no vested interest in this property or the proposed project. Appendix L contains references used in the creation of this report, and Appendix M provides profiles of all Davey Resource Group personnel who contributed to this report.

All wetlands delineations must be verified by the U.S. Army Corps of Engineers to be considered official. This wetlands delineation is reflective of environmental conditions at the time the fieldwork was performed. Wetlands are dynamic natural systems; therefore, boundaries may change slightly over time. Wetlands delineations performed during extremely wet or dry weather conditions are subject to slight seasonal changes.

Appendix A Water Resources Map

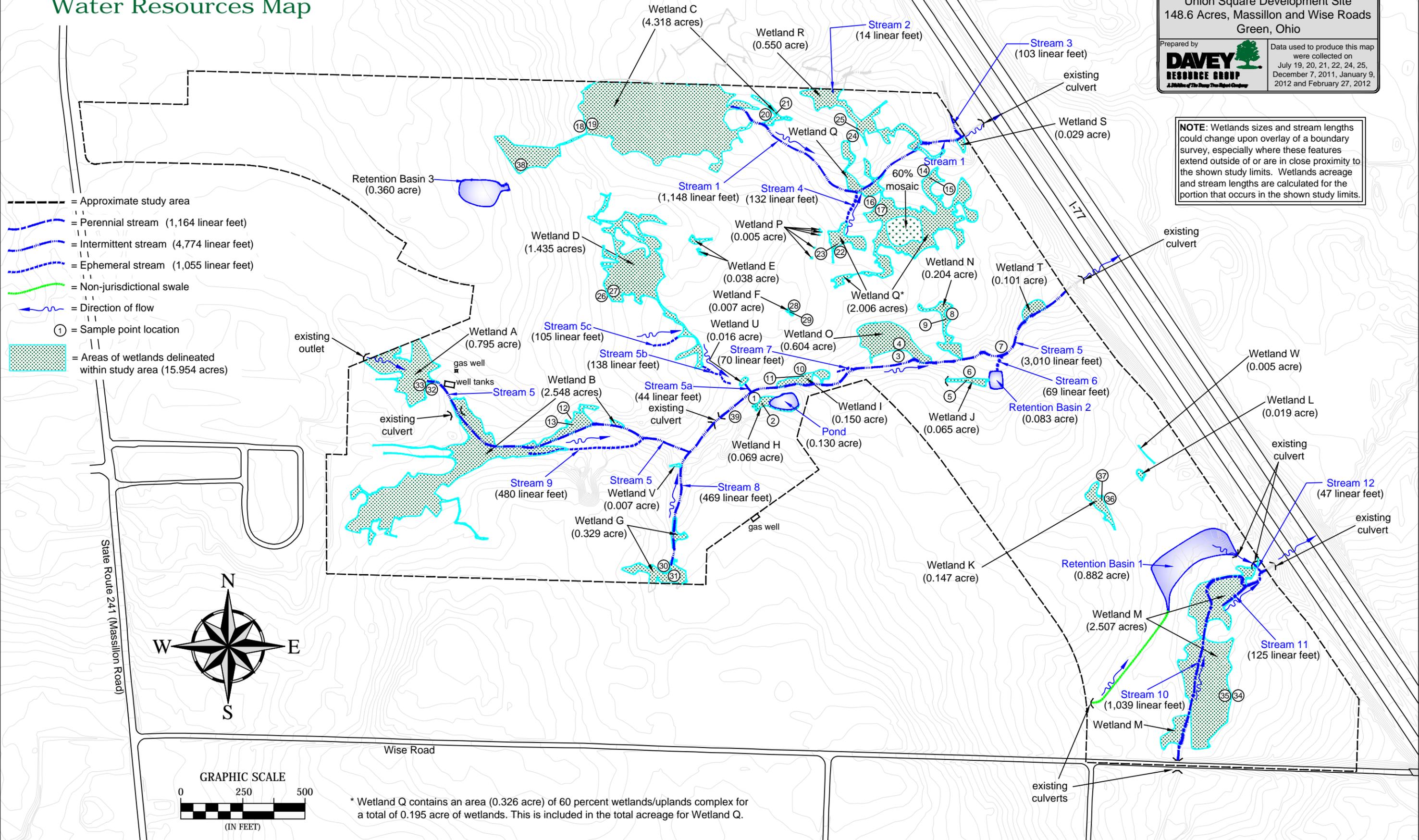
Prepared for
Benesch Friedlander Coplan & Aronoff

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Prepared by
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Data used to produce this map were collected on
July 19, 20, 21, 22, 24, 25,
December 7, 2011, January 9,
2012 and February 27, 2012

NOTE: Wetlands sizes and stream lengths could change upon overlay of a boundary survey, especially where these features extend outside of or are in close proximity to the shown study limits. Wetlands acreage and stream lengths are calculated for the portion that occurs in the shown study limits.



* Wetland Q contains an area (0.326 acre) of 60 percent wetlands/uplands complex for a total of 0.195 acre of wetlands. This is included in the total acreage for Wetland Q.

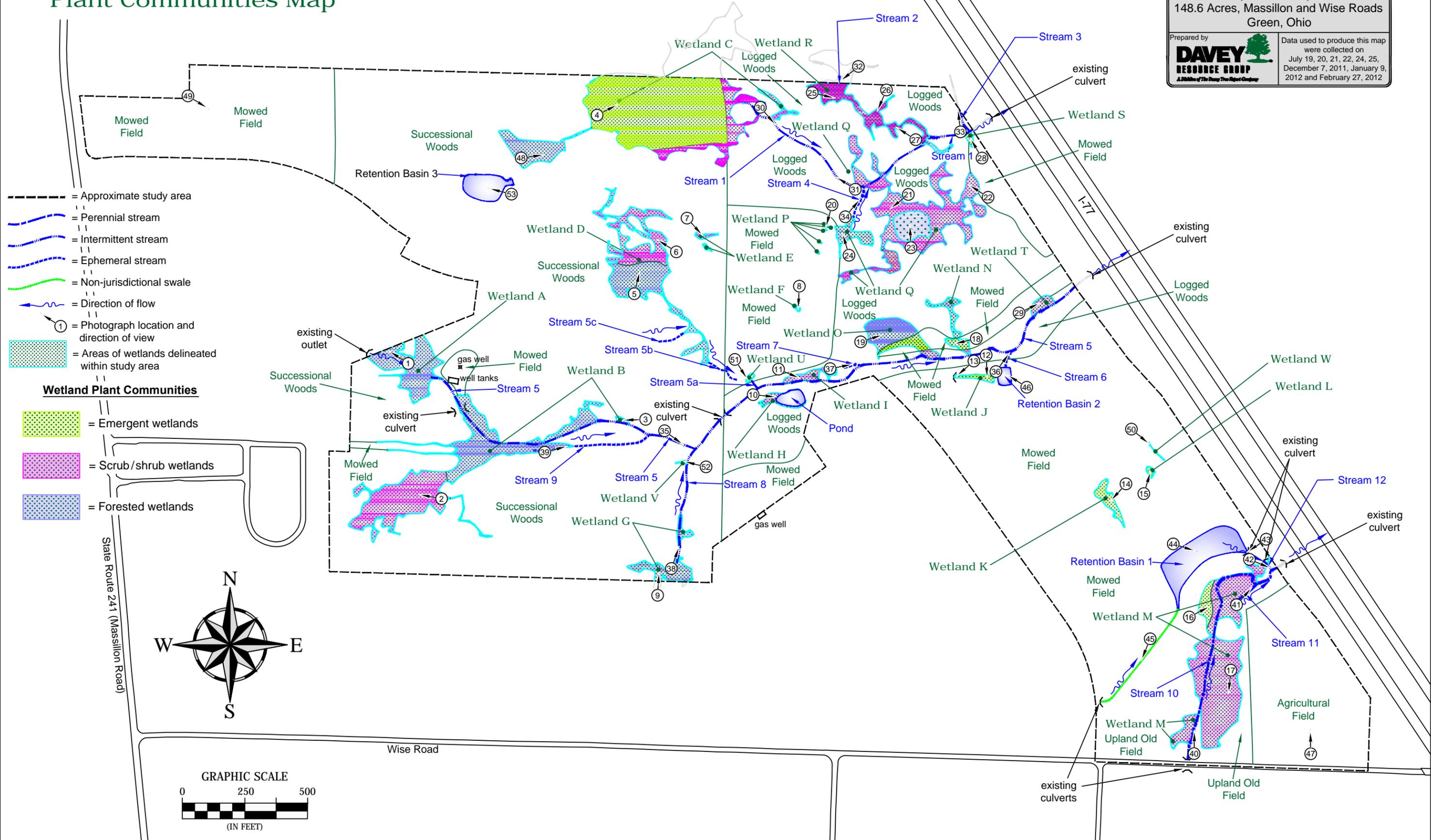
Appendix B Plant Communities Map

Prepared for
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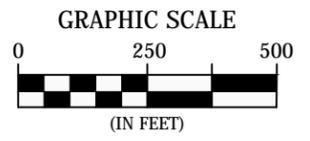
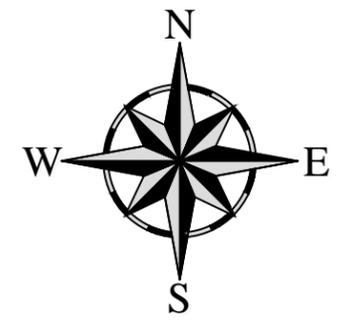
Data used to produce this map were collected on
July 19, 20, 21, 22, 24, 25,
December 7, 2011, January 9,
2012 and February 27, 2012



- - - - - = Approximate study area
- (solid blue) = Perennial stream
- - - (dashed blue) = Intermittent stream
- · - · - (dotted blue) = Ephemeral stream
- (dotted green) = Non-jurisdictional swale
- (blue with arrow) = Direction of flow
- ① = Photograph location and direction of view
- ▨ (dotted) = Areas of wetlands delineated within study area

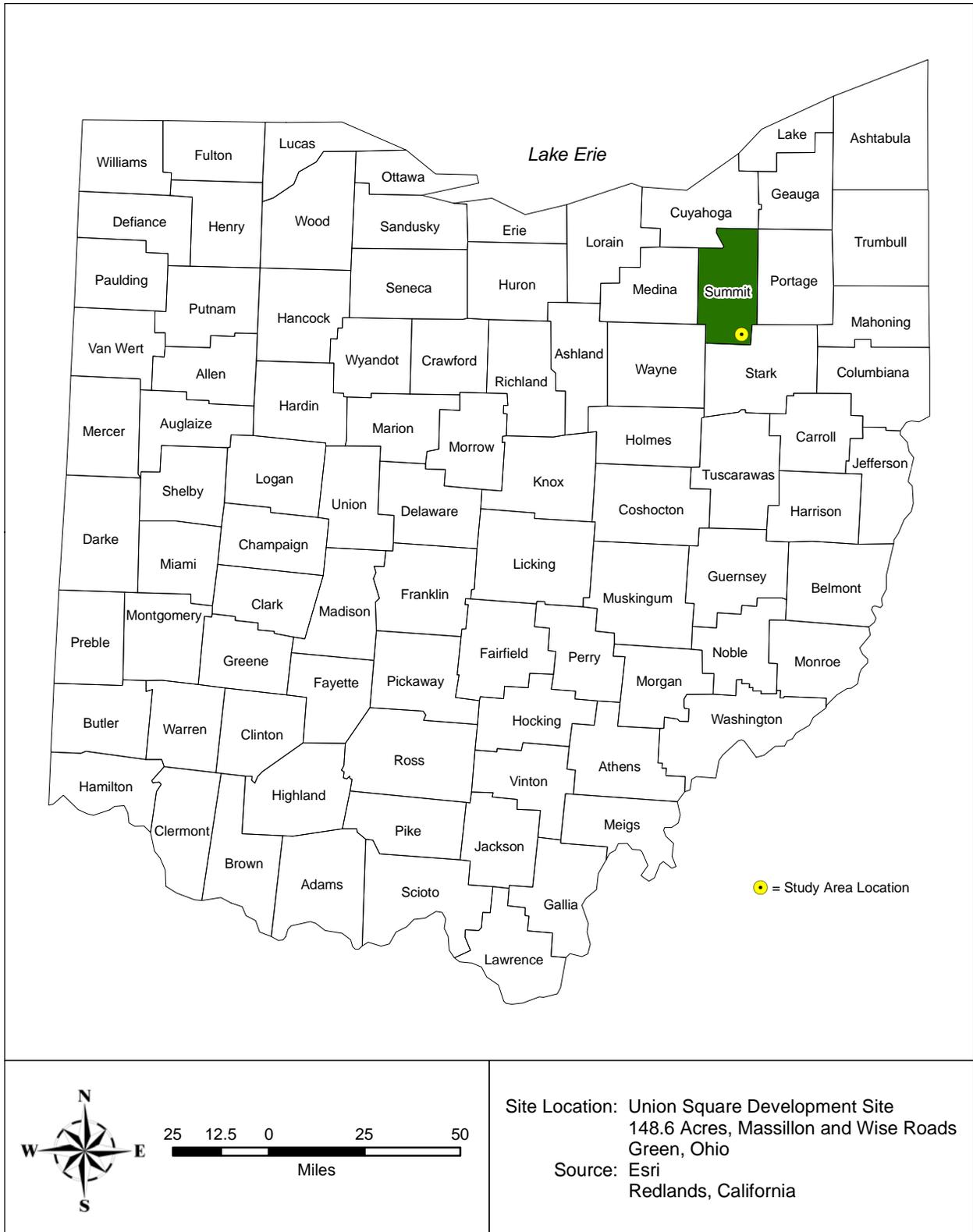
Wetland Plant Communities

- ▨ (green dotted) = Emergent wetlands
- ▨ (pink dotted) = Scrub/shrub wetlands
- ▨ (blue dotted) = Forested wetlands



Appendix C

Location of Summit County on Ohio County Map



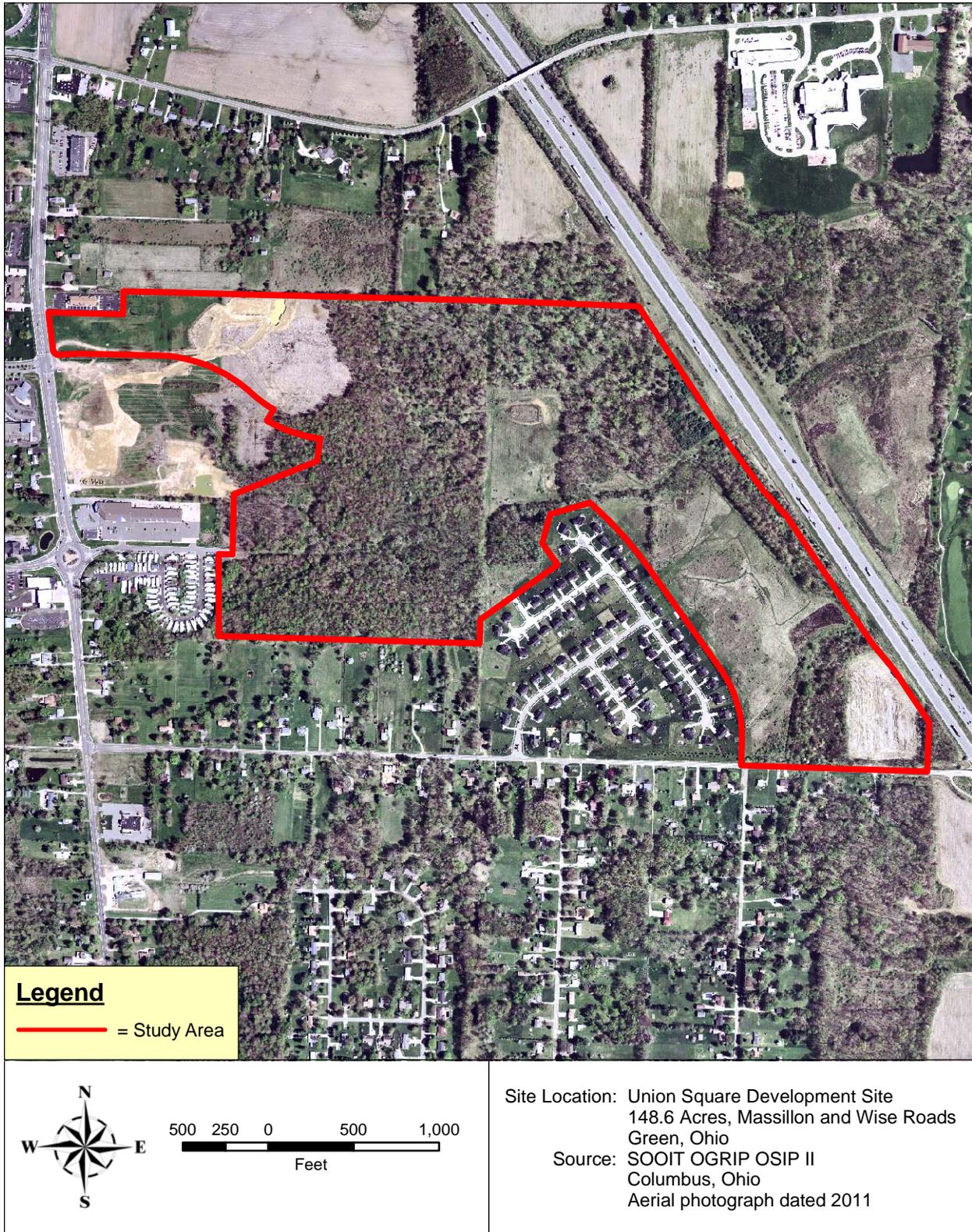
Appendix D

Location of Study Area on Highway Map



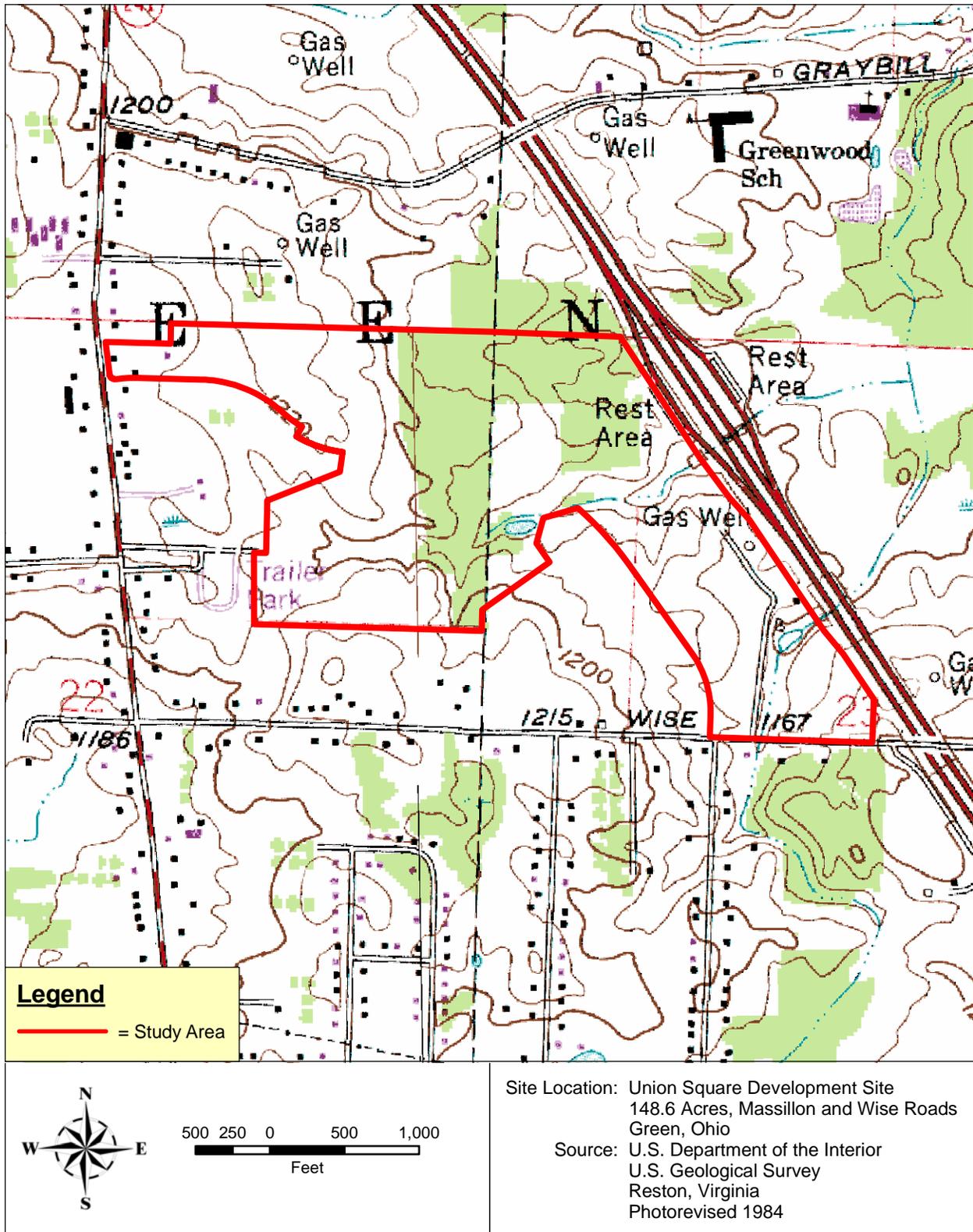
Appendix E

Location of Study Area on Aerial Photograph



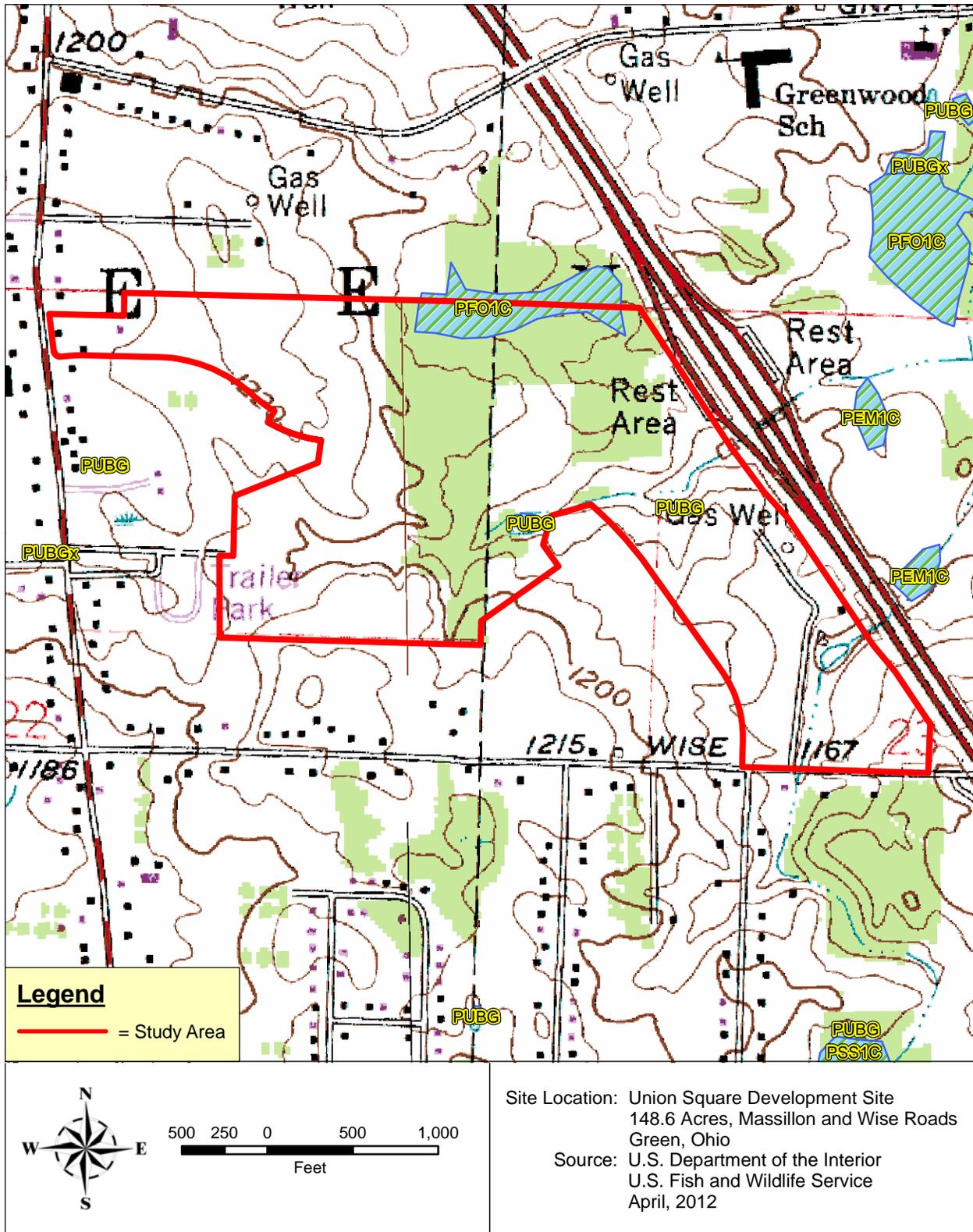
Appendix F

Location of Study Area on USGS 7.5-Minute Topographic Map (North Canton Quadrangle)



Appendix G

Location of Study Area on National Wetlands Inventory Map (North Canton Quadrangle)



Appendix I

Definition of Wetlands Vegetation Indicator Status (from Reed, 1988)

Obligate Wetlands (OBL). Occur almost always (estimated probability is greater than 99%) under natural conditions in wetlands.

Facultative Wetlands (FACW). Usually occur in wetlands (estimated probability 67–99%) but occasionally found in non-wetlands.

Facultative (FAC). Equally likely to occur in wetlands or non-wetlands (estimated probability 34–66%).

Facultative Upland (FACU). Usually occur in non-wetlands (estimated probability 67–99%) but occasionally found in wetlands (estimated probability 1–33%).

Obligate Upland (UPL). Occur in wetlands in another region, but occur almost always (estimated probability > 99%) under natural conditions in non-wetlands in the region specified. If a species does not occur in wetlands in any region, it is not on the National List.

Species for which little or no information was available to base an indicator status were assigned a no indicator (NI) status. An asterisk (*) after the indicator status indicates that the indicator status was based on limited ecological information.

The wetlands indicator categories should not be equated to degrees of wetness. Many obligate wetlands species occur in permanently or semipermanently flooded wetlands, but a number of obligates also occur, and some are restricted to wetlands that are only temporarily or seasonally flooded. The facultative upland species include a diverse collection of plants that range from weedy species adapted to exist in a number of environmentally stressful or disturbed sites (including wetlands), to species in which a portion of the gene pool (an ecotype) always occurs in wetlands. Both the weedy and ecotype representatives of the facultative upland category occur in seasonally and semipermanently flooded wetlands.

Davey Resource Group has added two additional indicators for situations when plants can only be identified to genus. A Wetlands Indicator Species (WIS) is a plant that is most likely obligate wetlands, facultative wetlands, or facultative. An Upland Indicator Species (UIS) is a plant that is most likely indicative of upland or facultative upland conditions. These additional indicators are used when species identification is not possible. A variety of factors are part of the UIS and WIS assignments. Indicator statuses of all locally occurring members of the genus in question are considered, as are the health and size of the population and the indicator status of nearby plants.

Appendix J

Photographs of Site



Photograph Location 1 (7-22-11) Wetland A is covered with lowland woods. Hydrology has been increased in this wetland by the outflow of water from the outlet pipe.



Photograph Location 2 (7-22-11) A portion of Wetland B is dominated by heavy scrub/shrub vegetation.



Photograph Location 3 (7-22-11) Wetland B is covered with lowland woods.



Photograph Location 4 (7-22-11) Much of Wetland C has been logged and is now dominated by emergent vegetation.



Photograph Location 5 (7-22-11) This portion of Wetland D is dominated by lowland woods.



Photograph Location 6 (7-22-11) This portion of Wetland D has been logged.



Photograph Location 7 (7-22-11) Wetland E is covered with dense shrubs.



Photograph Location 8 (7-22-11) Wetland F is an emergent wetland that is regularly mowed.



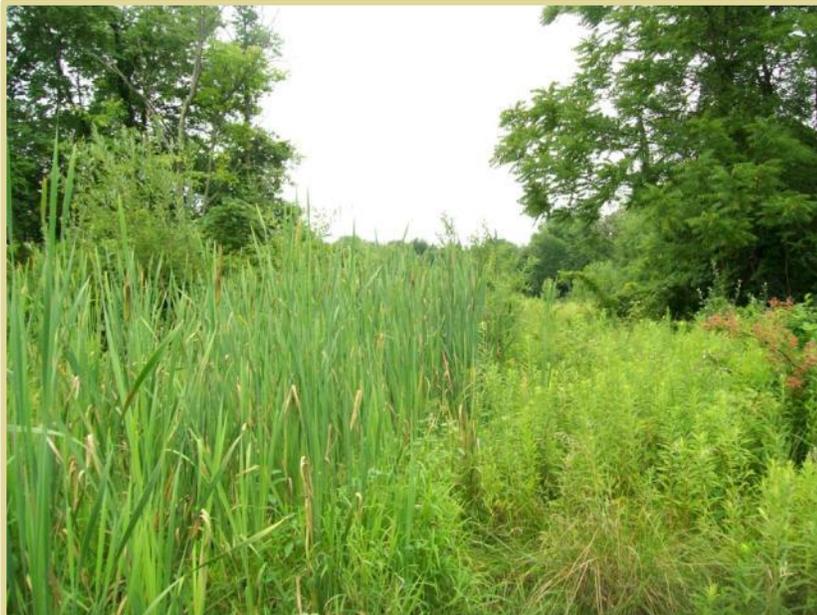
Photograph Location 9 (7-22-11) Wetland G is dominated by immature woods with areas of shrubs.



Photograph Location 10 (7-22-11) Wetland H is located in association with a small pond.



Photograph Location 11 (7-22-11) Wetland I is covered with dense scrub/shrub vegetation.



Photograph Location 12 (7-22-11) Wetland J is dominated by emergent vegetation.



Photograph Location 13 (7-22-11) Wetland J forms at this stormwater outlet.



Photograph Location 14 (7-22-11) Wetland K is dominated by invasive species including *Phalaris arundinacea* (reed canary grass, FACW) and *Typha angustifolia* (narrow-leaved cattails, OBL).



Photograph Location 15 (7-22-11) Wetland L is a small, isolated pocket of wetland dominated by emergent vegetation.



Photograph Location 16 (7-22-11) A small area of Wetland M is irregularly mowed.



Photograph Location 17 (7-22-11) The majority of Wetland M is dominated by heavy shrub vegetation.



Photograph Location 18 (7-22-11) This portion of Wetland N is occasionally mowed and is dominated by emergent vegetation.



Photograph Location 19 (7-22-11) This area of Wetland O is dominated by young lowland woods.



Photograph Location 20 (7-22-11) Small pockets of wetland are located in a mowed field. These areas, collectively called Wetland P, are dominated by cattails (*Typha* sp.).



Photograph Location 21 (7-22-11) The majority of Wetland Q has been logged. A mix of shrubs and emergent vegetation is growing in the logged portion of this wetland.



Photograph Location 22 (7-22-11) Because of the woody debris, access through Wetland Q can be difficult.



Photograph Location 23 (7-22-11) Within a portion of Wetland Q is an upland/wetland mosaic. American beech (*Fagus grandifolia*) trees are growing on upland mounds surrounded by areas of saturated soils.



Photograph Location 24 (7-22-11) Wetland Q has areas of lowland woods remaining with mixed shrubs.



Photograph Location 25 (7-22-11) Wetland R has a mix of emergent and scrub/shrub vegetation.



Photograph Location 26 (7-22-11) Wetland R has been logged and is now dominated by a mix of emergent vegetation and small shrubs.



Photograph Location 27 (7-22-11) Because of the woody debris, access through Wetland R can be difficult.



Photograph Location 28 (7-22-11) Surrounded by a few small saplings, Wetland S is dominated by emergent vegetation.



Photograph Location 29 (7-22-11) Wetland T is a mix of emergent and scrub/shrub vegetation.



Photograph Location 30 (7-22-11) The upper reach of Stream 1 is very small.



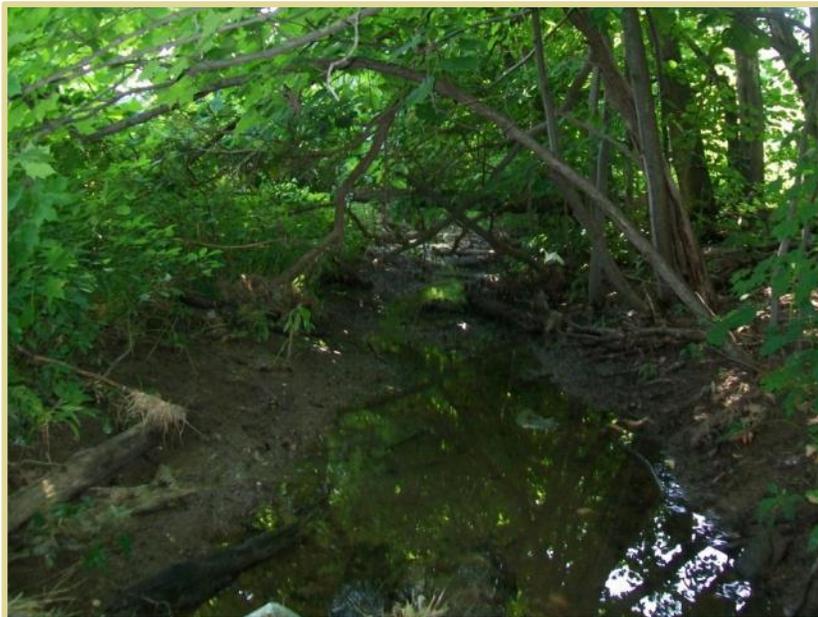
Photograph Location 31 (7-22-11) With the increase in hydrology to Stream 1, the quality of the habitat characteristics increase downstream.



Photograph Location 31 (7-22-11) The substrate of Stream 1 is dominated by sand and gravel.



Photograph Location 32 (7-22-11) Stream 2 is a small drainageway that drains north off site.



Photograph Location 33 (7-22-11) Stream 3 flows south, parallel to Route 77, and drains from off site into Stream 1.



Photograph Location 34 (7-22-11) Stream 4 is a small, ephemeral drainageway.



Photograph Location 35 (7-22-11) Stream 5 is an intermittent drainageway that drains west across the property, draining off site through a culvert under I-77.



Photograph Location 35 (7-22-11) The substrate of Stream 5 is dominated by gravel.



Photograph Location 36 (7-22-11) Stream 6 is a small, ephemeral stream that forms at the outlet of Retention Basin 2.



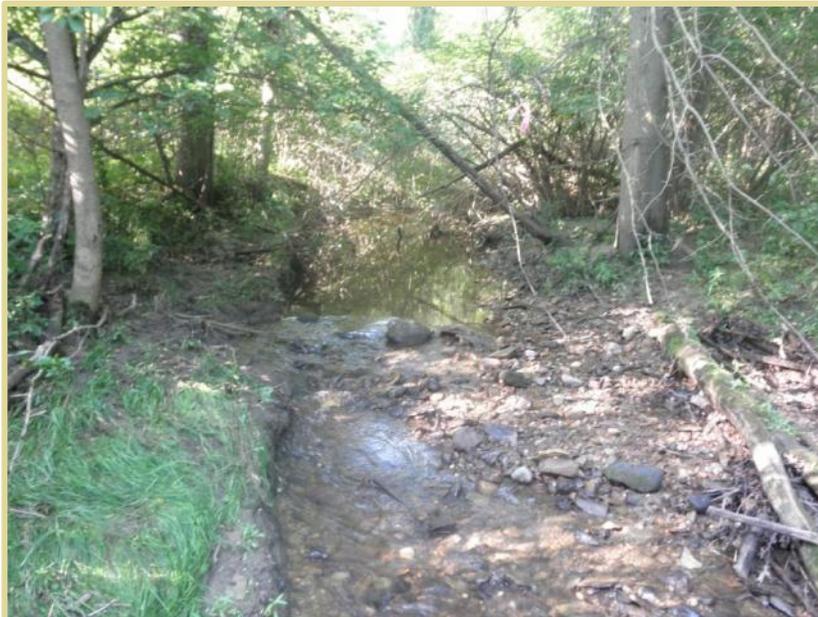
Photograph Location 37 (7-22-11) Stream 7 is a small, ephemeral drainageway.



Photograph Location 38 (7-22-11) Stream 8 is a small, ephemeral drainageway that has been channelized.



Photograph Location 39 (7-22-11) The ephemeral Stream 9 drains north and empties into Stream 5.



Photograph Location 40 (7-22-11) Stream 10 is a perennial stream draining north through Wetland M.



Photograph Location 40 (7-22-11) The substrate of Stream 10 is dominated by gravel.



Photograph Location 41 (7-22-11) Stream 11 is a perennial stream, draining into Stream 10.



Photograph Location 42 (7-22-11) Stream 12 is a small, intermittent drainageway that forms at the outlet of Retention Basin 1.



Photograph Location 43 (7-22-11) The headwall and outlet from Retention Basin 1 empties into Stream 12.



Photograph Location 44 (7-22-11) Retention Basin 1 was constructed to manage the stormwater for the adjacent housing development to the west.



Photograph Location 45 (7-22-11) The stormwater from the housing development to the west of the site drains through this bioswale to Retention Basin 1.



Photograph Location 46 (7-22-11) Retention Basin 1 was also constructed to manage stormwater from off site.



Photograph Location 47 (7-22-11) Corn (*Zea mays*) is growing in the southeast corner of the site.



Photograph Location 48 (7-22-11) The area west of Wetland C is covered with upland successional woods.



Photograph Location 49 (7-22-11) The western portion of the site is irregularly mowed.



Photograph Location 50 (1-9-12) Wetland W is a seasonally inundated swale through a forested area.



Photograph Location 51 (5-22-12) Wetland V is dominated by emergent vegetation.



Photograph Location 52 (5-22-12) Wetland U is dominated by *Phalaris arundinacea* (canary reed grass).



Photograph Location 53 (1-9-12) Retention Basin 3 has been excavated to manage the storm water draining off the adjacent property.