Wetland Mitigation Plan

Crow Site Development
Brecksville, Ohio

September, 2012

DAVEY RESOURCE GROUP

A Division of The Davey Tree Expert Company

Wetland Mitigation Plan

Crowland Development
Brecksville, Ohio

September, 2012

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Objective

The objective is to provide compensatory wetland mitigation for impacts to 4.721 acres of federal wetlands and 0.201 acre of state regulated isolated wetlands, associated with the proposed Crow Site Development (Project) as per the application for an individual permit for such impacts made to the U.S. Army Corps of Engineers (USACE). There are 8 federally jurisdictional wetlands on the project site totaling 4.721 acres, and two state-regulated isolated wetlands totaling 0.201 acres.

The Project will result in impacts to 0.29 acres of Category 2 federal forested wetlands, 5.09 acres of modified Category 2 federal forest/wet meadow wetland, and 0.036 acre of a federal scrub/shrub and wet meadow wetlands. In addition, a total of 0.201 acre of Category 1 state-regulated wetlands will also be impacted. As mitigation for these wetland impacts the Applicant will restore 4.3 acres of wetland forest on the site and within the same sub-watershed in an area that historically may have supported wetland communities. This wetland restoration and creation, coupled with protection of adjacent existing wetlands with a preservation easement will fully compensate for the Project wetland impacts.

Site Selection

The proposed mitigation sites are located in the City of Brecksville, Ohio, Cuyahoga County, and is within the Project Site boundaries and within the same wetland sub-watershed (Attachment 1, Figures 1-3). The mitigation site has partially hydric soils that have a relatively shallow water table which has allowed hydrophytic vegetation to become established (Attachment 1, Figure 4 and Attachment 3). The selected wetland mitigation areas currently support a number of wetland forest species. It is very likely that the mitigation areas supported a predominance of wetland communities in the past, prior to land management activities. Although parts of the Project Site have naturally converted back to wetlands, sufficient drainage remains throughout the Project Site to maintain upland habitat.

Existing wetlands on the site are almost exclusively depressional wetlands. The poorly drained clay sub-soils underlying the topsoil retain rainwater for a sufficient time period to support wetland species. There is minimal contribution to wetland hydrology from adjacent watershed runoff, flooding from adjacent streams or from groundwater. The wetland restoration plan will alter the surface topography to disrupt historic man-made site drainage to re-create original site conditions and thus retain sufficient hydrology to restore the site to a wetland habitat, without adversely impacting the existing wetland communities.

Site Protection Instrument

A preservation easement will be prepared that will protect the preserved wetland, created wetlands, and adjacent upland buffers will preclude any future development within the on-site mitigation area. The preservation easement instrument will be presented to the Corps for approval prior to implementation.

Baseline Information

The Project Site was historically used almost entirely for farming, but the farming was abandoned and is now either open field or second growth forest. A portion of the second growth forest areas have reverted to forested wetlands. Off-site developments, construction of I-77, and the installation of a high pressure gas pipeline in the northwest corner of the site have drastically altered the historic site drainage patterns. Previous owners of the property continued these alterations by constructing a number of small

drainageways which have further altered the site's historic flow patterns. A number of deep ditches cross the Site and serve as primary drainageways leading to Streams A and B located in the center and northwestern corner of the Site respectively.

Wetland Delineation

Wetlands and other waters of the United States were originally delineated in May of 2000 by Beak Consultants Inc. (Beak) and a jurisdictional determination (JD) letter was issued on April 6, 2001 for the Project Site. Davey completed a re- delineation of the Site in 2010 which was confirmed with a new JD letter issued on January 12, 2011.

Within the Site are 38 federally regulated wetlands (totaling 12.06 acres), and six State of Ohio isolated wetlands (totaling 0.80 acres). Wetlands ranged in size from 0.008 to 3.6 acres. The site also contains 5,135 linear feet of perennial and ephemeral streams. The streams and federal wetlands are hydrologically connected to unnamed tributaries to Chippewa Creek, which is located north of the site. Chippewa Creek flows east to the Cuyahoga River approximately 2.5-miles northeast of the site (HUC 04110002 050)

Preconstruction Topography

The existing topography within the creation areas is relatively flat with the overall drainage to the north and east. An inspection using a Trimble GPS of the proposed wetland creation areas confirmed that only minor adjustments in the Site's micro-topography will be necessary to re-establish historic wetland hydrology. The GPS was used to identify the general locations of minor (6-12 inch deep) unregulated drainage swales that currently exist within the area and are limiting the expansion of the existing wetland areas.

The wetland restoration area was selected to be 1) adjacent to existing wetlands, 2) having minimal topographic relief), and 3) containing exiting drainages that could be easily disrupted to create additional post-rain surface flooding. These three criteria will result in a high probability of wetland restoration with minimal disturbance to the existing topography and vegetation.

Existing Vegetation

The proposed mitigation Sites are primarily young forest, with some successional old fields, and wetland communities. The wetland forest areas are dominated by red maple, pin oak, American elm, American hornbeam, green ash, and glossy buckthorn. Herb and shrub species include arrowwood, northern spicebush, poison ivy, bearded sedge, tussock sedge, sensitive fern, fowl bluegrass, soft rush, creeping Jennie, spotted touch me not, and swamp jack in the pulpit. The upland forest areas are dominated by northern red oak, American beech, red maple, pin oak, American elm, black cherry, tulip tree, glossy buckthorn, multiflora rose, Kentucky bluegrass, Virginia strawberry, trout lily, common cinquefoil, Christmas fern, and mayapple. The successional old fields are dominated by Kentucky bluegrass, smooth brome grass, dandelion, Queen Anne's lace, Virginia strawberry, tall goldenrod, common cinquefoil, rabbit foot clover, common plantain, teasel, and Allegheny blackberry.

Soil

Mahoning silt loam (MgA) comprises approximately 78% of the site and are classified as a partially hydric, somewhat poorly drained soils (Attachment 1, Figure 4 and Attachment 3). Depth to water table in these

soils is relatively shallow, typically 12-30 inches. This soil is found under almost all of the existing, regulated wetlands found on the site. As the delineation report prepared for the site indicates, wetland species are found throughout the proposed mitigation areas over these soils. It is anticipated that only minor changes in hydrology and or depressional areas will be necessary to convert the existing upland areas adjacent to the existing wetlands into wetlands.

Net Site Wetlands

As mitigation for these impacts the Applicant will restore 4.3 acres of forested wetlands within the same sub-watershed in an area that historically may have supported wetland communities.

On-Site Wetland Preservation

The Applicant will preserve 2.14 acres of federal wetlands (Attachment 2, Tables 1, 2, 3) on the site. Thirty of the 38 federal wetlands are completely avoided in the revised MDA.

Varying amounts of upland buffer will be maintained around the perimeters of the remaining wetlands preservation areas within the Project Site. Upland buffers will consist of native, undisturbed areas, constructed and re-vegetated slopes. Upland buffers will help protect the preservation and mitigation areas from indirect impacts associated with Project development.

All of the wetland, stream, and upland buffer areas within the on-site mitigation area will be preserved through conservation easements. Preservation measures will maintain the areas with the highest ecological quality and ensure that no future impacts occur within this area.

Wetland Mitigation

The primary function of the on-site wetland mitigation will be the restoration of a diversified forested wetland habitat, vernal pools and additional wildlife habitat for many species that inhabit wetlands and their adjacent areas within the area selected for on-site wetland mitigation. The wetland restoration mitigation area will also serve to provide an increased functionality for biological productivity. All remaining, restored and created wetland areas will be placed under a third-party conservation easement, and will thus be preserved and protected in perpetuity. A 4.3 acre mitigation area in the southwest corner of the project site was selected for on-site wetland mitigation.

Hydrology Sources

The primary source of water for the wetland creation areas will be retention of precipitation as well as runoff from adjacent parcels using drainage plugs and control berms. The wetland restoration plan calls for the alteration of existing site drainage by the construction of drainage plugs, limited to an elevation sufficient to block the existing drainages. The drainages proposed for blockage will be identified in the field and mapped with a sub-meter GPS instrument. In addition, a total of three small perimeter berms are also proposed to add additional wetland hydrology. These will also be located in the field and mapped with the same GPS unit. These berm locations will be set in areas where the construction of the original major drainage ditches created a sloped zone that allowed overland sheet flow drainage. The berms will restrict this overland sheet flow so that wetland hydrology will be re-established.

The combination of the berms construction and the blockage of remnant drainages will allow a natural restoration of the original wetland hydrology. In addition, irregularly shaped vernal pools will be created to

provide additional wetland habitat within the mitigation area. The vernal pools will be constructed to avoid larger trees, and minimize disturbance of existing vegetation. The existing vegetation consists of species capable of existing in a wetland forest habitat, and is already partially acclimated to an intermittently wet hydrological regime. As a result, the existing vegetation should not be adversely impacted by the slightly wetter regime.

The drainage plugs, perimeter berms and vernal pools will be constructed during the summer, when conditions are relatively dry, and when construction equipment can access the Site with minimal disturbance to the ground. Construction equipment anticipated to be used for this project will be small and lightweight. Equipment access into mitigation areas will be planned to avoid any significant clearing of mature trees.

Site Work

A typical drainage plug and berm detail drawing is included in Attachment 1 (Figure 6). The specific length and width of each of the berms will be determined in the field by the flagging. An environmental inspector will be used to ensure proper placement of each berm and to oversee the entire construction operation. The area where construction is to be done will be protected by the installation of silt fences to prevent any siltation or sedimentation from entering adjacent waters or wetlands.

In the location of the perimeter berms and in a three-foot area in front (upslope) of the proposed berm footprint, topsoil will be stripped off and stockpiled on the down slope side of the swale drainage area. Within this area, one foot of subsoil will be excavated to be used in for the berm itself. The site sub-soil (B horizon) is composed of clayey soils (MgA soil type). The clayey sub-soil will be used to create and impermeable plug across the existing drainage swale. The excavated area in front (upslope) will create a small vernal pool. Topsoil will then be spread back over the disturbed area, seeded with a wetland seed mix (Table 4) and covered with double sided bio-degradable matting (North American Green SC 150 BN (straw filling). As the area of disturbance will be quite small, additional planting or seeding is not considered necessary.

The vernal pools will be constructed in a similar fashion. Topsoil will be stripped off within the area vernal pool construction area and stockpiled. The subsoil will be excavated, unevenly, to create a depressional areas varying from 1.0 to 1.5 feet deep. The excavated subsoil will be used in other areas for drainage plugs and as a very low perimeter berm around the vernal pool. The stockpiled topsoil will be replaced within the vernal pool area to an approximated depth of 0.5 feet, making the final vernal pool grade from 0.5 to 1.0 feet deep. The vernal pool area will be immediately seeded with a wetland seed mix (Table 4).

Construction Timing

Construction can begin as soon as the final plan is approved by the Corps and before or at the same time as the permitted wetland fill is commenced. The impact of berm construction on back-flooding can be noted after rainfall events in the spring of the following year. It is anticipated that minor adjustments to berm heights or widths may be necessary after inspection in the late spring, when berm effectiveness can be fully evaluated.

Berms will be constructed as per construction documents. Soil under the berm locations will be initially stripped of topsoil and the subsoil undercut prior to construction of the berms to insure a proper berm seal. The berms will be compacted, and topsoil placed back over the berms. All berms will be seeded

and covered by bio or photo-degradable matting. Seeding will be done with a mix of erosion control species native to this area.

Once the berm summer construction is completed, an environmental scientist will inspect the berms in the first fall season. The inspection will be timed to shortly follow a significant rain event to see if any minor adjustments to berm height or width are required. Any required minor adjustments will be done immediately.

Monitoring Plan

A baseline report will be provided by December 31st of the year when construction of the mitigation areas is completed. The baseline report will include an as-built site topographic survey showing 0.5 ft contours throughout the onsite mitigation areas. The as-built drawing will include the extent and type of vegetative communities, stream locations, permanent photo stations, wetland monitoring transect locations, and locations of all monitoring piezometers. As part of the overall baseline report, the following specific information will be collected.

Wetlands

A plan view and at least one cross-section through the short axis and another through the long axis will be surveyed and mapped for each wetland mitigation area. In each wetland area, different plant communities will be identified and mapped. Dominant species will be documented.

Within each plant community, a semi-permanent sample point will be established and surveyed. Initial photographs will be taken, with direction and angle indicated on a figure. Future photographs will be taken at the same locations, direction and angle over the proposed monitoring period.

A piezometer will be installed in the wetland restoration area during the baseline monitoring survey. Its permanent location will be recorded and noted in the baseline report. The piezometer will be used to measure the ground water elevation in the wetland creation areas.

One permanent photographic location within each wetland restoration area and one vernal pool per mitigation area (total of 6 stations) will be staked and surveyed. Initial photographs will be taken, with direction and angle indicated on a figure. Future photographs will be taken at the same locations, direction and angle over the proposed monitoring period.

Post Baseline Wetland Monitoring

Hydrology Monitoring: Water level data will be collected in May and August of each monitoring year at each piezometer location. Ground water levels in the piezometer will be measured in the absence of inundated conditions. If no groundwater is noted within the upper 12 inches, other hydrology indicators, as defined by the USACE in the 1987 Manual and applicable regional supplements, will be noted as evidence of wetland hydrology.

Soils Monitoring: A minimum of one soil probe or test pit per acre of wetland mitigation area will be collected annually. The Applicant will describe the soil profile using the unified soil classification system and Muncell color chart and will note any hydric soil indicators as defined by the USACE in the 1987 Manual and applicable regional supplements.

Vegetation Monitoring: The location and name of each plant community type within the mitigation area and buffer area will be marked on a scaled drawing or scaled aerial photograph (base map) and named. A representative observation point will be selected in each plant community type in each distinct wetland mitigation area during the baseline assessment. This will be a point which best represents the characteristics of the entire plant community. The observation points will be marked on the baseline map. The dominant plant species will be visually determined in each vegetation layer of each community type, and the scientific names of these species will be included in the report. Dominant species are those species which have the greatest relative basal area (woody overstory), greatest height (woody overstory), greatest percentage of aerial coverage (herbaceous understory), and/or greatest number of stems (woody vines).

Vegetation Index of Biotic Integrity (VIBI): The applicant will assess the mitigation wetlands to obtain a VIBI score according to methods approved by the OEPA (http://www.epa.state.oh.us/dsw/401/40l/.html) during the growing season of the third and fifth years after completion of construction of the mitigation wetlands.

Photographic Documentation: Photos will be taken at the permanent photo stations installed during the baseline surveys to document the water levels, vegetation cover, and physical morphology.

Performance Criteria

Wetlands

The restored wetland area will exhibit all three wetland criteria within five years of construction. The 1987 Wetland Delineation Manual will be utilized to verify that the established performance goals are met. As the impacted wetlands were scored using the Ohio Rapid Assessment Methodology (ORAM) as Ohio category one wetlands, the restored wetlands will achieve a minimum score equivalent to a category 2 wetland.

Within five (5) years after completion of construction, the applicant will have created a minimum of 4.3 acres of jurisdictional Category 2 forested wetlands on site. As this project will be implemented in the Erie Ontario Lake-Plain (EOLP) eco-region, the minimum required VIBI scores for the Category 2 mitigation wetlands in the wetland mitigation area is 61.

No more than 5% aerial cover of the created wetlands will be vegetated with the following species: *Lythrum salicaria, Phalaris arundinacea, Phragmites australis, Rhamnus* spp., *Typha angustofolia,* and *Typha* x *glauca.* Corrective measures will be implemented to preclude the growth of the above listed species throughout the five year monitoring period should they appear within the created wetland areas.

The mitigation wetlands will have less than 10% of its total area as unvegetated open water. Unvegetated open water is defined as inundated areas where there is no or minimal emergent, rooted aquatic bed (e.g. *Nuphar advena*, *Nymphaeae odorata*, *Potamogeton spp*.), or submersed or floating non-rooted aquatic bed (e-g. *Utricularia spp., Ceratophyllum spp.* excluding species in the *Lemnaceae*) vegetation growing in the area of inundation.

The minimum and maximum inundation depths in all created wetlands are strongly influenced by rainfall totals and as such are difficult to predict with any accuracy. The Applicant will monitor the water levels in

the wetland creation areas and will report to the OEPA and USACE actual minimum and maximum observed water levels.

Corrective Measures

Corrective measures will be initiated, if necessary, to ensure that the wetland mitigation areas develop according to mitigation goals and objectives. Such measures could include re-grading of stream enhancement areas and additional erosion control, seeding or planting. If any deficiencies are noted during post-construction monitoring inspection, appropriate corrective measures will be identified in the annual monitoring reports.

Invasive Species

The Applicant will implement an invasive species control plan over the course of the required monitoring period as set forth in the USACE and OEPA permits. At the end of the each monitoring period the Applicant will provide an assessment of the presence and extent of invasive species to the USACE and OEPA along with a proposed control methodology and schedule for application.

Proposed control methods include wick and spray applications of an herbicide approved by the OEPA followed by manual clipping of all stems below the water line. After approximately two-weeks the wetland mitigation area will be re-evaluated to determine if re-treatment is necessary.

Long Term and Adaptive Management Plans

As the berm construction is planned across areas on small swales, berm stability or erosion is not anticipated to be a problem. Regardless, the berms will be inspected twice a year (spring and fall) for two years to ensure that the installed berms are stable and that vegetation was successfully established over the berms. If any need for repairs or re-seeding is noted, action will be taken to resolve the issue within two weeks of the identification of the problem.

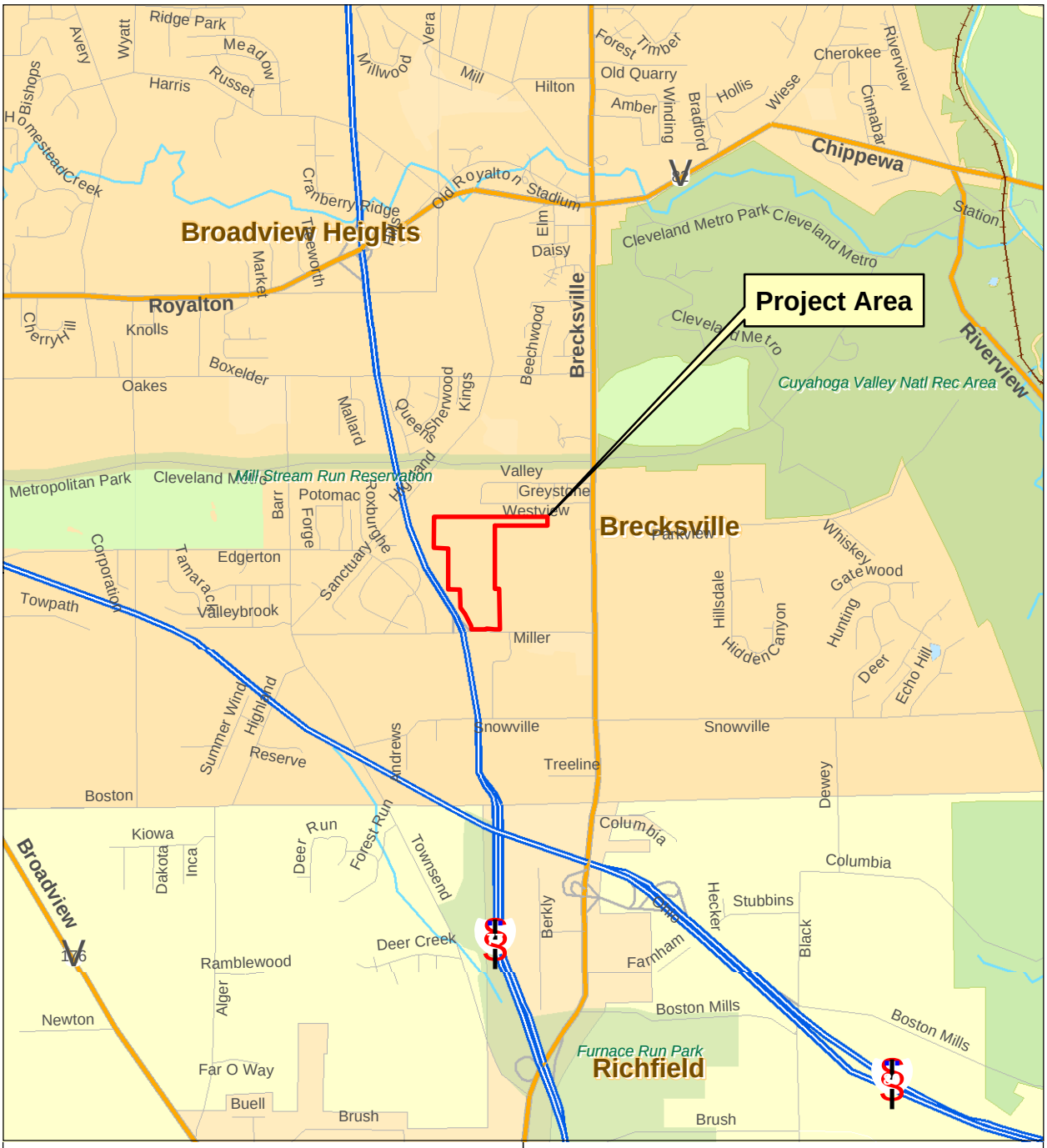
If invasive species are noted within the wetland restoration area to the extent that performance goals or standards are jeopardized, a plan will be prepared to address the removal of these species. The plan will be submitted to the Corps for review and approval and will be implemented after that approval.

The created wetlands are designed such that they will require no annual management or maintenance once they become established and reach their performance standards. The wetland mitigation area related to the Applicant's Project will become a part of the preservation area that will be protected and managed in perpetuity as per preservation language incorporated into a third party easement agreement, as per the permit requirements. A copy of the preservation document will be provided to the Corps for review before finalization.

Any unforeseen changes in site conditions including failure of structures or the presence of non-native species will be documented and addressed following the protocol identified the maintenance and management plan.

ATTACHMENT 1
FIGURES

Figure 1
Location of Project Area on Highway Map



Site Location: Crowland, Ltd.
City of Brecksville
Cuyahoga County, Ohio

Source: ESRI
Redlands, California

Figure 2
Project Area on Aerial Orthophotograph

N
W E
S

300 150 0 300 600
Feet

Site Location: Crowland, Ltd.
City of Brecksville
Cuyahoga County, Ohio
Source: U.S. Department of Agriculture
Natural Resources Conservation Service
Web Soil Survey
OIT OGRIP 2006 Orthophotograph

Custom Soil Resource Report
Soil Map

Map Scale: 1:8,430 if printed on A size (8.5" x 11") sheet.

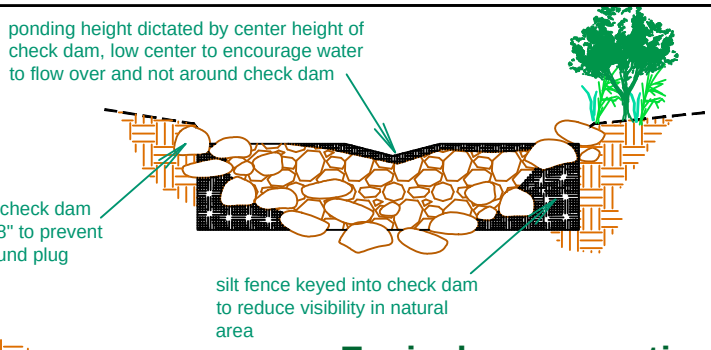
N

Meters
0 100 200 400 600

Feet
0 450 900 1,800 2,700

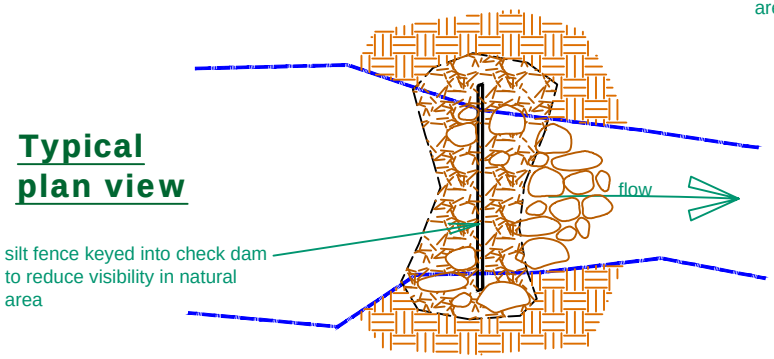
Figure 5

Typical rock ditch plug

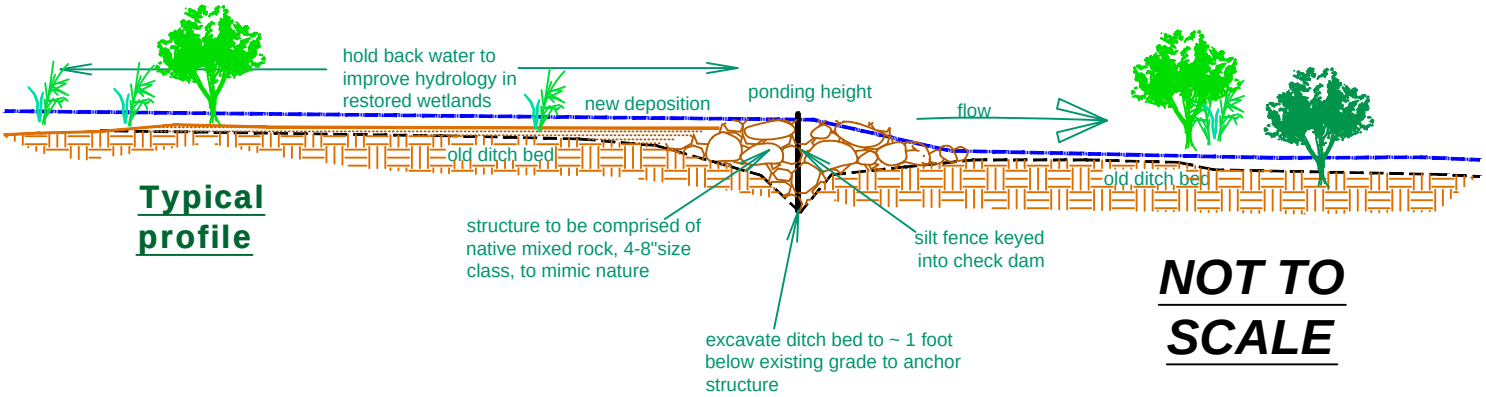


Typical cross-section (looking up channel)

Typical plan view

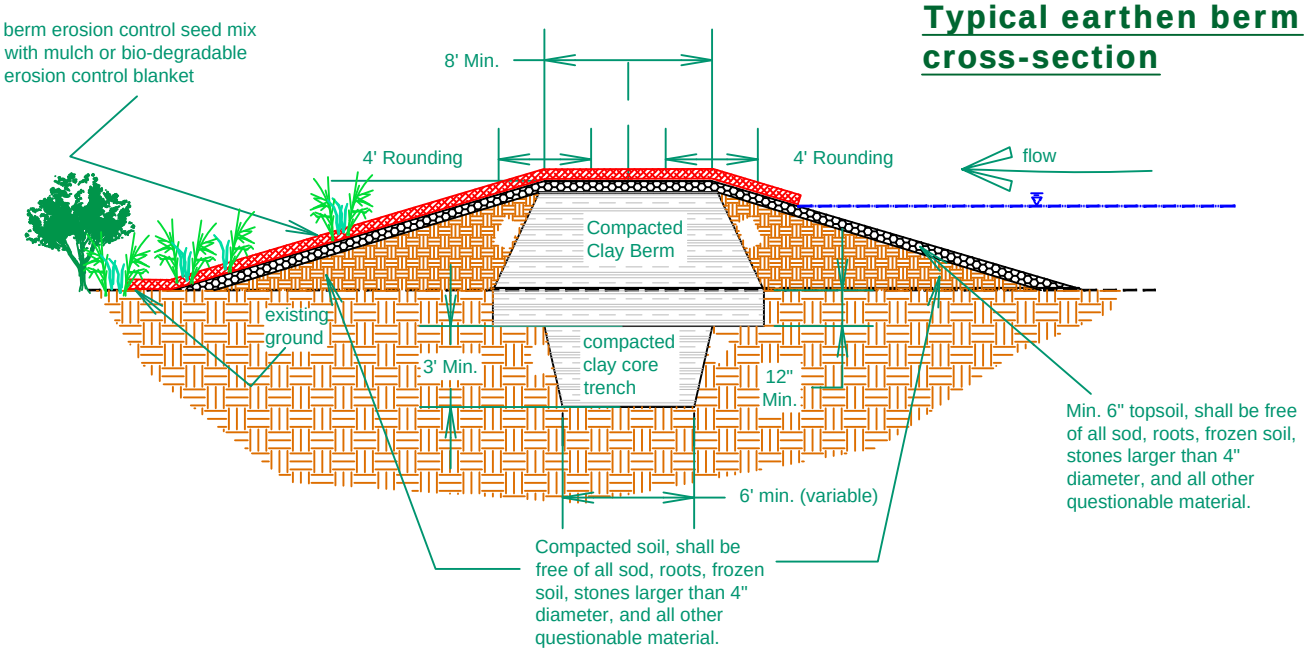


Typical profile



NOT TO SCALE

Typical earthen berm cross-section



Prepared by	Prepared for			
DAVEY RESOURCE GROUP A Division of The Davey Tree Expert Company	**Crowland, Ltd.**	City of Brecksville Cuyahoga County, Ohio	**Figure 4** Typical Wetland Berms and Ditch Plugs	Sheet **1** of **3**

ATTACHMENT 2
TABLES

Table 1 Existing Wetlands and Proposed Impacts

Wetlands ID	Community	Jurisdiction	Wetland Acreage	MDA Impacted (Acres)	MDA Avoided (Acres)	MDA Percent Avoided	ORAM Category
AA/BB/CC	Forested	Federal	0.62	0.002	0.62	99.7%	Mod 2
AAA	Scrub-Shrub	Federal	0.02	0.000	0.02	100.0%	1/2
BBB	Swale - Wet Meadow	Federal	0.063	0.033	0.03	47.6%	1
C	Scrub-Shrub	Federal	0.01	0.010	0.00	0.0%	Mod 2
CCC	Swale - Wet Meadow	Federal	0.009	0.000	0.01	100.0%	1
D	Forested	Federal	0.27	0.000	0.27	100.0%	Mod 2
DD	Forested	Federal	0.02	0.000	0.02	100.0%	Mod 2
DDD	Swale - Wet Meadow	Federal	0.028	0.028	0.00	0.0%	1
E	Forested	Federal	0.36	0.000	0.36	100.0%	2
EE	Forested	Federal	0.05	0.000	0.05	100.0%	Mod 2
EEE	Swale - Wet Meadow	Federal	0.008	0.008	0.00	0.0%	1
F	Forested	Federal	0.01	0.000	0.01	100.0%	Mod 2
FF	Forested	Federal	0.04	0.000	0.04	100.0%	Mod 2
FFF	Swale - Wet Meadow	Federal	0.014	0.000	0.01	100.0%	1
G/H*	Forested	Federal	0.71	0.000	0.71	100.0%	2
GG	Wet Meadow	Federal	0.08	0.000	0.08	100.0%	Mod 2
HH	Forested /Wet Meadow	Federal	0.20	0.200	0.00	0.0%	Mod 2
II	Forested /Wet Meadow	Federal	0.49	0.490	0.00	0.0%	Mod 2
J	Forested	Federal	0.59	0.020	0.57	96.6%	2
JJ	Forested /Wet Meadow	Federal	0.60	0.030	0.57	95.0%	Mod 2
K	Wet Meadow	Federal	0.10	0.010	0.09	90.0%	Mod 2
L	Forested	Federal	0.05	0.000	0.05	100.0%	Mod 2
M	Forested	Federal	0.03	0.000	0.03	100.0%	Mod 2
MM	Forested /Wet Meadow	Federal	3.60	3.600	0.00	0.0%	Mod 2
N	Forested	Federal	0.98	0.000	0.98	100.0%	2
NN	Forested	Federal	0.29	0.290	0.00	0.0%	Mod 2
O	Forested	Federal	0.19	0.000	0.19	100.0%	2
P	Forested	Federal	0.29	0.000	0.29	100.0%	2
Q	Forested	Federal	0.41	0.000	0.41	100.0%	2
QQ*	Forested	Federal	0.11	0.000	0.11	100.0%	1/2
R	Forested	Federal	0.08	0.000	0.08	100.0%	2
RR	Forested	Federal	0.12	0.000	0.12	100.0%	Mod 2
S	Forested	Federal	0.22	0.000	0.22	100.0%	Mod 2
T	Forested	Federal	0.07	0.000	0.07	100.0%	Mod 2
U/V*	Forested /Wet Meadow	Federal	1.01	0.000	1.01	100.0%	2
W	Forested	Federal	0.09	0.000	0.09	100.0%	2
X	Forested	Federal	0.002	0.000	0.00	100.0%	Mod 2
Y/Z*	Forested	Federal	0.23	0.000	0.23	100.0%	Mod 2
Total Wetlands			**12.06**	**4.721**	**7.34**	**60.9%**	

Table 2 Existing Isolated Wetlands and Proposed Impacts

Wetlands ID	Community	Jurisdiction	Wetland Acreage	MDA Impacted (Acres)	MDA Avoided (Acres)	MDA Percent Avoided	ORAM Category
A	Forested	Isolated	0.15	0.001	0.15	99.3%	Mod 2
B	Forested	Isolated	0.23	0.00	0.23	100.0%	Mod 2
GGG	Emergent/Wet Meadow	Isolated	0.10	0.00	0.10	100.00%	1
KK/LL	Forested/Wet Meadow	Isolated	0.20	0.20	0.00	0.0%	1/2
OO	Scrub-Shrub	Isolated	0.05	0.00	0.05	100.0%	1/2
PP	Wet Meadow	Isolated	0.07	0.00	0.07	100.0%	1/2
		Total	**0.80**	**0.201**	**0.599**	**74.9%**	

Table 3
Planting Species List

Species for Planting (Dependent on Availability)

Species	Common Name	Indicator Status[1]
Trees		
Acer rubrum	red maple	FAC
Acer saccharinum	silver maple	FAC
Acer saccharum	sugar maple	FACU-
Aesculus glabra	Ohio buckeye	FACU+
Alnus incana	speckled alder	FACW+
Alnus serrulata	smooth alder	OBL
Amelanchier arborea	downy service-berry	FAC-
Amelanchier laevis	smooth serviceberry	FAC
Betula alleghaniensis	yellow birch	FAC
Carpinus caroliniana	blue beech	FAC
Carya ovata	shagbark hickory	FACU-
Fagus grandifolia	American beech	FACU
Juglans nigra	black walnut	FACU
Liriodendron tulipifera	tulip tree	FACU
Nyssa sylvatica	black gum	FAC
Platanus occidentalis	sycamore	FACW-
Prunus serotina	black cherry	FACU
Quercus alba	white oak	FACU-
Quercus bicolor	swamp white oak	FACW+
Quercus imbricaria	shingle oak	FAC
Quercus macrocarpa	bur oak	FAC-
Quercus palustris	pin oak	FACW
Quercus rubra	red oak	FACU-
Salix nigra	black willow	FACW+
Shrubs		
Aronia melanocarpa	black chokeberry	FAC
Cephalanthus occidentalis	buttonbush	OBL
Cornus amomum	silky dogwood	FACW
Cornus racemosa	gray dogwood	FAC-
Cornus sericea	red-osier dogwood	FACW+
Ilex verticillata	winterberry	FACW+
Lindera benzoin	spicebush	FACW-
Ribes americanum	wild black currant	FACW
Rosa palustris	swamp rose	OBL
Salix discolor	pussy willow	FACW
Salix eriocephala	heart-leaved willow	FACW
Salix exigua	sandbar willow	OBL
Salix sericea	silky willow	OBL
Spiraea alba	meadow-sweet	FACW+
Spiraea tomentosa	steeplebush	FACW
Staphylea trifolia	American bladdernut	FAC
Vaccinium corymbosum	highbush blueberry	FACW-
Viburnum lentago	nannyberry	FAC
Viburnum recognitum	northern arrow-wood	FACW-
Viburnum opulus L. var. *americana*	highbush-cranberry	FACW

ATTACHMENT 3
Soil Survey

United States Department of Agriculture

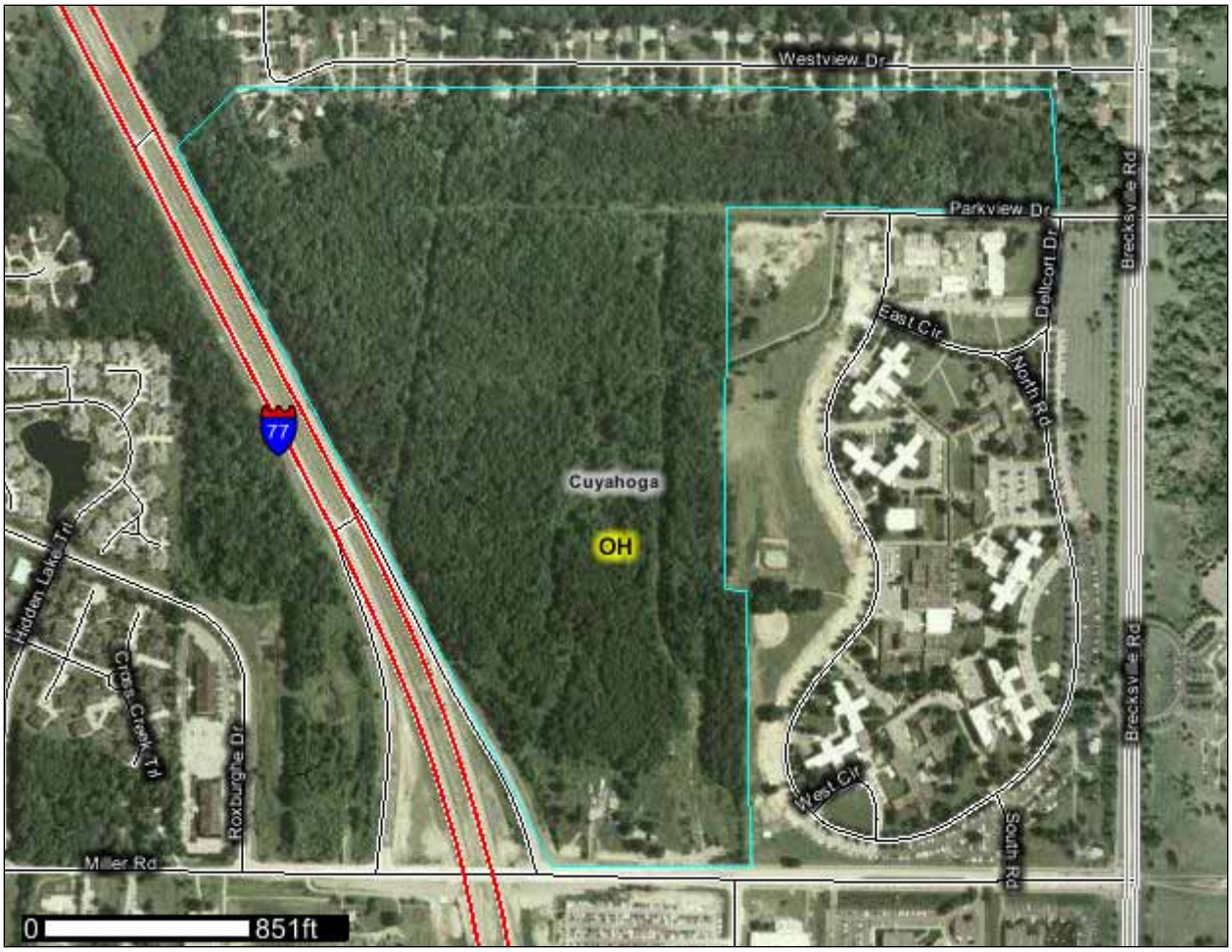
Natural Resources Conservation Service

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

Custom Soil Resource Report for

Cuyahoga County, Ohio

Crow Development Site



January 25, 2010

Preface

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

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

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

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

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

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Custom Soil Resource Report
Soil Map

Map Scale: 1:8,430 if printed on A size (8.5" x 11") sheet.

N

Meters
0 100 200 400 600

Feet
0 450 900 1,800 2,700

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Gully

Short Steep Slope

Other

Political Features

Cities

Water Features

Oceans

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:8,430 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 17N NAD83

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

Soil Survey Area: Cuyahoga County, Ohio
Survey Area Data: Version 10, Jan 6, 2009

Date(s) aerial images were photographed: 6/24/2004; 9/21/2004

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

Map Unit Legend

Cuyahoga County, Ohio (OH035)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
MgA	Mahoning silt loam, 0 to 2 percent slopes	101.2	78.3%
MgB	Mahoning silt loam, 2 to 6 percent slopes	13.2	10.2%
MmB	Mahoning-Urban land complex, undulating	1.4	1.1%
Ua	Udorthents, loamy	13.5	10.4%
Totals for Area of Interest		**129.2**	**100.0%**

Map Unit Descriptions

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

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

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

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

intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

Cuyahoga County, Ohio

MgA—Mahoning silt loam, 0 to 2 percent slopes

Map Unit Setting

Elevation: 600 to 1,300 feet
Mean annual precipitation: 27 to 42 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 130 to 200 days

Map Unit Composition

Mahoning and similar soils: 85 percent
Minor components: 15 percent

Description of Mahoning

Setting

Landform: Lake plains, till plains
Parent material: Till

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Moderate (about 8.5 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 7 inches: Silt loam
7 to 39 inches: Silty clay loam
39 to 60 inches: Clay loam

Minor Components

Condit

Percent of map unit: 5 percent
Landform: Depressions

Haskins

Percent of map unit: 5 percent
Landform: Lake plains, till plains
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear

Mitiwanga

Percent of map unit: 5 percent
Landform: Till plains

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear

MgB—Mahoning silt loam, 2 to 6 percent slopes

Map Unit Setting

Elevation: 600 to 1,300 feet
Mean annual precipitation: 27 to 42 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 130 to 200 days

Map Unit Composition

Mahoning and similar soils: 85 percent
Minor components: 15 percent

Description of Mahoning

Setting

Landform: Till plains
Parent material: Till

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Moderate (about 8.5 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 7 inches: Silt loam
7 to 39 inches: Silty clay loam
39 to 60 inches: Clay loam

Minor Components

Ellsworth

Percent of map unit: 8 percent
Landform: Till plains

Haskins

Percent of map unit: 7 percent
Landform: Lake plains, till plains

Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear

MmB—Mahoning-Urban land complex, undulating

Map Unit Setting

Elevation: 800 to 1,000 feet
Mean annual precipitation: 31 to 42 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 140 to 195 days

Map Unit Composition

Mahoning and similar soils: 55 percent
Urban land: 30 percent
Minor components: 15 percent

Description of Mahoning

Setting

Landform: Lake plains, till plains
Parent material: Till

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Moderate (about 8.5 inches)

Typical profile

0 to 7 inches: Silt loam
7 to 39 inches: Silty clay loam
39 to 60 inches: Clay loam

Minor Components

Ellsworth

Percent of map unit: 8 percent
Landform: Till plains

Condit

Percent of map unit: 7 percent
Landform: Depressions

Ua—Udorthents, loamy

Map Unit Setting

Elevation: 800 to 2,000 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 170 to 200 days

Map Unit Composition

Udorthents and similar soils: 100 percent

Description of Udorthents

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability (nonirrigated): 6s

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Hydric Rating by Map Unit (Crow Development Site)

This rating indicates the proportion of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is designated as "all hydric," "partially hydric," "not hydric," or "unknown hydric," depending on the rating of its respective components.

"All hydric" means that all components listed for a given map unit are rated as being hydric, while "not hydric" means that all components are rated as not hydric. "Partially hydric" means that at least one component of the map unit is rated as hydric, and at least one component is rated as not hydric. "Unknown hydric" indicates that at least one component is not rated so a definitive rating for the map unit cannot be made.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part

(Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

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

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

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

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Custom Soil Resource Report
Map—Hydric Rating by Map Unit (Crow Development Site)

Map Scale: 1:8,430 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 450 900 1,800 2,700

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

All Hydric

Partially Hydric

Not Hydric

Unknown Hydric

Not rated or not available

Political Features

Cities

Water Features

Oceans

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:8,430 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 17N NAD83

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

Soil Survey Area: Cuyahoga County, Ohio
Survey Area Data: Version 10, Jan 6, 2009

Date(s) aerial images were photographed: 6/24/2004; 9/21/2004

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

Table—Hydric Rating by Map Unit (Crow Development Site)

Hydric Rating by Map Unit— Summary by Map Unit — Cuyahoga County, Ohio				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
MgA	Mahoning silt loam, 0 to 2 percent slopes	Partially Hydric	101.2	78.3%
MgB	Mahoning silt loam, 2 to 6 percent slopes	Not Hydric	13.2	10.2%
MmB	Mahoning-Urban land complex, undulating	Partially Hydric	1.4	1.1%
Ua	Udorthents, loamy	Unknown Hydric	13.5	10.4%
Totals for Area of Interest			**129.2**	**100.0%**

Rating Options—Hydric Rating by Map Unit (Crow Development Site)

Aggregation Method: Absence/Presence

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Absence/Presence" returns a value that indicates if, for all components of a map unit, a condition is always present, never present, partially present, or whether the condition's presence or absence is unknown. The exact phrases used for a particular attribute may vary from what is shown below.

"Always present" means that the corresponding condition is present in all of a map unit's components.

"Never present" means that the corresponding condition is not present in any of a map unit's components.

"Partially present" means that the corresponding condition is present in some but not all of a map unit's components, or that the presence or absence of the corresponding condition cannot be determined for one or more components of the map unit.

"Unknown presence" means that for components where presence or absence can be determined, the corresponding condition is never present, but the presence or absence of the corresponding condition cannot be determined for one or more components.

The result returned by this aggregation method quantifies the degree to which the corresponding condition is present throughout the map unit.

Tie-break Rule: Lower

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

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