WATER RESOURCE RESTORATION SPONSORSHIP PROGRAM
PHASE 1 BLOOMFIELD SWAMP CONCEPTUAL RESTORATION PLAN

Prepared for:

Western Reserve Land Conservancy
OUR LAND. OUR LEGACY.

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1.0 INTRODUCTION

The Western Reserve Land Conservancy (the Conservancy) is a 501(c)(3) organization whose mission is to preserve agricultural and natural lands in northeast Ohio through property and conservation easement acquisitions. Acquiring land also presents opportunities to restore natural resources impaired by historical land uses and practices.

The Conservancy has control over 1,100 acres of land along Snyder Ditch in northern Trumbull and southern Ashtabula counties (Figure 1-1) and is seeking grant funding to permanently protect the property. The property is known as the Bloomfield Swamp property, hereafter referred to as the Property. The Property is located in Orwell (T8N, R4W) Township of Ashtabula County (Sections 16 and 25) and Bloomfield Township of Trumbull County (Sections 137, 138, 139, 140, 124, 141, 125, and 142).

Snyder Ditch is the most prominent hydrological feature on the Property. Snyder Ditch (USGS HUC 041100040201) is a manmade drainage ditch that forms part of the headwaters of Rock Creek (HUC 0411000402), a major tributary of the Grand River (HUC 04110004). Snyder Ditch is a manmade feature constructed in a natural hydrological system that was historically comprised primarily of wetlands.

The land was logged and cleared in the late 1800s, early 1900s for farming. Snyder Ditch was constructed to drain the rich soils for farming in 1913. Combined, the land clearing and drainage removed several hundred acres of wetlands and potentially several thousand feet of warmwater stream channel that existed prior to those activities.

The Conservancy intends to protect and manage the property in perpetuity. The Conservancy is proposing to restore the hydrological system, wetlands, and streams on the Property to the extent practicable. It also proposes to improve the functional value of existing wetlands. This document presents the Conservancy's conceptual restoration plan (CRP) for the Property. Once implemented, the CRP will result in restoration of 224 acres of wetland, including creation of new wetlands, improvement of existing wetlands, and improvement and protection of water courses. In addition, 69.3 acres of upland prairie will be created adjacent to the restored wetlands. Attached Figures 1-2, 1-3, 1-4 and 1-5 illustrate the conceptual restoration plan, including delineation of the wetland and upland prairie restoration targets. The following sections of this document describe how the restoration targets can be met.

2.0 PROJECT SITE DESCRIPTION

2.1 Location

As shown in Figure 1-1, the Property is located in Orwell (T8N, R4W) Township of Ashtabula County (Sections 16 and 25) and Bloomfield Township of Trumbull County (Sections 137, 138, 139, 140, 124, 141, 125, and 142).

2.2 Ownership and Long-term Management

The Conservancy currently owns the property and has the ability to manage and protect it in perpetuity. The Conservancy will maintain secure access, routinely inspect structures for correct operation/function and site conditions, continue contracting for implementation of the long-term invasive species management plan, and provide long-term monitoring of the wetland restoration.

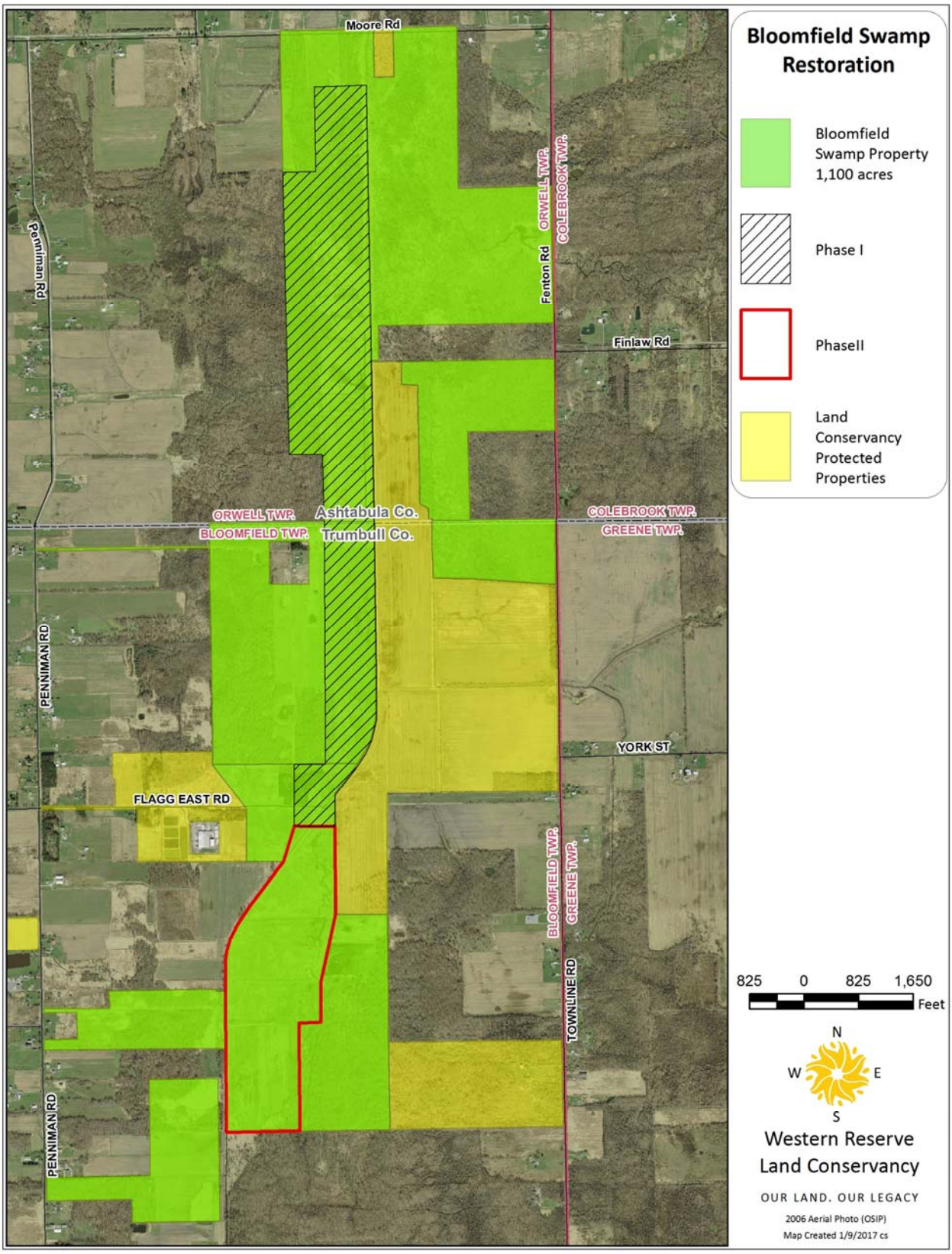

Figure 1-1: Property location map

2.3 Watershed Characteristics

The Property is located in the Lake Erie Basin, Grand River watershed (HUC #04110004) and Rock Creek sub-watershed (HUC #0411000402). Rock Creek is a major tributary of the Grand River with a drainage area of 71 square miles. Snyder Ditch forms the headwaters of Rock Creek. The northern extent of the Property is Moore Road. Snyder Ditch at Moore Road (River Mile 0.6; HUC #041100040201) has a drainage area of 29 square miles. Limited flow data are available for Upper Rock Creek. At Rock Creek, Ohio, the reported 2-year peak flood discharge is 2,490 cfs or 36 cfs/mi^2. By extrapolation, the 2-year peak flood discharge at Moore Road would be approximately 1,044 cfs.

2.4 Surficial Geology and Soils

The Property lies within the Grand River Low Plateau physiographic region of Ohio, the Glaciated Allegheny Plateaus (Appalachian Highlands, Glaciated Appalachian Plateaus). The geology, soils, topography, and hydrology are greatly influenced by glaciation. Within this physiographic region, relief is typically low with gentle, rolling hills created by thin to thick glacial drift. Soils are typically poorly drained and wetlands are common. This later characteristic is predominant in the Upper Rock Creek drainage basin and on the Property. The surface geology consists of clays and clay-loam deposited during the Wisconsinan age of continental glaciation with interbedded silt, sand, and gravel to varying degrees. Along the corridor of Snyder Ditch, organic deposits of then Holocene age are present. These organics deposits are typically less than 10 feet thick and are deposited over clay present adjacent to the organic deposits. These surficial geology characteristics are common in the Glaciated Appalachian Plateaus

Soils are reflective of these geological characteristics. Caneadea Silt Loam, Fitchville Silt Loam, and Mill Silt Loam on 0-2% slopes comprise 49% of the 29-square mile drainage area at Moore Road. The remaining 51% is comprised of various forms of loam soil types. Forty-six percent of the area is comprised of soils classified as hydric, typically occurring on floodplains, valley floors, depressions, till/lake plains, stream terraces, and ground or end moraines. These soils types and the dominant presence of hydric soils are indicative of the relatively low topographic relief, gentle slopes, poorly drained soils, depressions, and surface water conveyances typical of the drainage area and Property. They also give way to the development of wetlands and production of organic soils under poorly drained conditions.

2.5 Land Use and Cover

Based on 1992 land use data, the drainage area is comprised primarily of agricultural land (48%) and forests (35%), including forested wetland. The remaining area (18%) is comprised of herbaceous wetlands, scrub-shrub habitat (including wetlands), and open water. The Property and adjacent areas contains a large concentration of wetlands. Small urban centers such as Orwell, Ohio, make up a small fraction of the drainage area where most of the residential development is located. Scattered single-family residences are present around the Property, but in very low density. Land use on the Property itself is very typical of the overall drainage area.

2.6 Wetlands and Streams

The predominant hydrological feature is Snyder Ditch. Snyder Ditch is a manmade feature constructed in 1913 for the purpose of providing drainage in support of agriculture. Snyder Ditch conveys surface water that historically fed and created a large forested and scrub-shrub wetland complex known as the Bloomfield Swamp. Several unnamed natural tributaries originating west and east of Snyder Ditch historically fed Bloomfield Swamp and are present tributaries of Snyder Ditch. Portions of those natural tributaries have been channelized. In addition, several manmade agricultural ditches are present. They

were presumably created to provide agricultural drainage. They currently collect surface runoff and tile drainage from agricultural fields and convey that drainage into Snyder Ditch.

Snyder Ditch is classified as Modified Warmwater based on biological sampling at Moore Road (RM 0.6). It also carries designated uses for Agricultural and Industrial Water Supply and Primary Contact Recreation. There are no industries adjacent to the Property that currently use Snyder Ditch for water supply and it is unlikely that major industries would become established. However, the Village of Orwell owns the adjacent property to the north (just downstream of the Property), which has water wells on the property that supply the entire village with drinking water. In addition, the Village of Roaming Shores, another downstream community that was formed by damming Rock Creek to form a lake, has experienced sedimentation problems with their lake that have caused them to spend millions of dollars to dredge their lake which they depend on for drinking water and recreation. There are no current uses of Snyder Ditch for agricultural water supply adjacent to the Property. Snyder Ditch is used by farmers for drainage only, and will most likely continue to use it for that purpose.

The former wetland complex known as Bloomfield Swamp is fragmented and much of the wetland area has been lost due primarily to the construction of Snyder Ditch and other ditches in the vicinity of the Property.

3.0 RESTORATION GOALS, OBJECTIVES, AND TARGETS

3.1 Goals

- Functional lift of existing wetlands
- Create new wetlands where thought to formerly exist
- Restore, create, and maintain aquatic habitat for waterfowl, song birds, reptiles and amphibians, fish, and mammals
- Protect and improve Rock Creek, the Grand River, and Lake Erie
- Permanently protect 330 acres including restored wetlands and upland buffers

3.2 Objectives

- Restore hydrology
- Improve floristic quality and hydrology of existing wetlands to achieve likely minimum ORAM score of 70
- Increase and enhance aquatic habitats for general aquatic life support
- Create native prairie upland buffers
- Short-term and long-term management of invasive species
- Improve downstream habitat and water quality

3.3 Restoration Targets

Restoration targets are summarized in Table 3-1 for the projected wetland and upland community types. Targets are summarized for the entire project and Phase 1 portion of the project with funding awarded by the Ohio Environmental Protection Agency through the Water Resources Restoration Sponsorship Program (WRRSP). Restoration work in Ashtabula County is all located within the WRRSP Phase 1 portion of the project. Restoration targets for Trumbull County are split between the Phase 1 WRRSP portion of the project and Phase 2. See attached Figures 1-2, 1-3, 1-4 and 1-5 for delineations of the projected wetland and upland prairie restoration targets.

Table 3-1. Restoration targets.

Community Type	Entire Project	Phase 1 WRRSP	Ashtabula County	Trumbull County WRRSP	Trumbull County Phase 2
Palustrine Emergent Deep Water	8.9	8.9	5.8	3.1	0
Palustrine Emergent/Scrub-shrub	189.7	99.8	57.5	42.3	89.9
Palustrine Forested	25.4	0	25.4	0	0
Total Wetland	224	108.7	88.7	45.4	89.9
Upland Prairie	69.3	35.7	0	35.7	33.6

4.0 WETLAND HYDROLOGY

The 1905 USGS quadrangle maps depict the project site as being comprised primarily of wetlands with flow-through. While a primary north-south stream line is shown on the quadrangle maps, it is not known if the line represents an actual single-thread stream channel or just flow through the wetland complex formerly known as the Bloomfield Swamp. The wetland is also fed by several small tributaries within the project site that originate east and west of the wetland. At least some portion of the natural tributaries have been channelized. Those draining from west to east will continue to supply water to the restored wetlands along the west side of Snyder Ditch, while those draining from east to west will continue discharging to Snyder Ditch.

Due to the creation of Snyder Ditch and agricultural drains, water that once flowed through the historic wetland complex now bypasses those wetlands and is routed off the Property via Snyder Ditch. One of the primary goals of this restoration project is restore, to the extent practicable, the natural hydrological connectivity and rehydrate wetlands. Due to the presence of property along the east side of Snyder Ditch that is not controlled or protected by the Conservancy, the historical flow path through the wetland system cannot be completely restored to its historical location on the landscape. Attached Figure 4-1 demonstrates conceptually how hydrological restoration can be accomplished and the associated extent of restored wetland. A series of weirs could be used to direct flow out of Snyder Ditch, along Snyder Ditch through restored wetlands, and back into Snyder Ditch. The location and function of the five weirs is described below.

Weir #1 could be a tilting-gate weir mounted on a concrete sill. Its design elevation will be approximately 883.5 feet. Weir #1 will create a flow split in Snyder Ditch that will route water from Snyder Ditch near the south end of the Conservancy property and into wetlands located east of Snyder Ditch, creating a “pop-off”. A tipping gate weir allows small adjustments in the bed elevation of Snyder Ditch without restricting the cross-sectional flow capacity of Snyder Ditch. While the weir elevation can be designed to achieve the correct hydrological response, it can also be used to adjust and fine tune hydrology and adjust to future hydrological conditions. During periods of low flow, it is possible to have all flow within Snyder Ditch diverted through the wetlands. During high flow periods, flow may be split between Snyder Ditch and the wetlands to provide adequate upstream drainage. The adjustable tilting-gate weir will allow field adjustment of the flow split by adjusting the bed elevation to maximize diverted flow into the wetlands while minimizing backwater effects and potential for upstream, off-property flooding.

Weirs #2 and #3 will be broad-crested weirs used to maintain a minimum water elevation in wetlands between weirs #1 and #2 and create desirable backwater effect. Weir #2 is required due to the

topographic changes created by former peat mining. The approximate elevations of weirs #2 and #3 are 883.5 and 882.5 feet respectively. The weirs could be designed with either fixed orifices or a stepped cross-section to create desirable flow and backwater characteristics. A weir designed in this manner will create a full range of upstream water levels with seasonal fluctuations in response to seasonal precipitation and runoff rather than a stagnant upstream water elevation.

Weir #4 is required to route flow from the east side of Snyder Ditch to the west side, keeping flow on property under the control and protection of the Conservancy. This "cross-over" will be constructed by excavating topography east and west to the base elevation of Snyder Ditch and installing the same tilting-gate weir used at weir #1 with an approximate elevation of 881.5 feet. Weir #4 would have the same advantages as described for weir #1 above. In this case, the weir will create backwater sufficient to drive flow into wetlands located along the west side of Snyder Ditch. As with the pop-off, the cross-over may create a flow split, allowing the majority of the water to flow through restored wetlands and the potential for some flow down Snyder Ditch. During periods of low flow, it is possible to have all flow within Snyder Ditch diverted through the wetlands. During high flow periods, flow may be split between Snyder Ditch and the wetlands.

After flow crosses over from east to west, it will naturally flow northward along the west side of Snyder Ditch. Some excavation will be required through former peat mining cells surrounded by dikes to promote northward flow. Excavated conveyances will be vegetated broad bottoms with diverse topography to create diffuse flow through wetland vegetation as opposed to a single stream channel.

Weir #5 is required to allow wetland outflow to discharge back into Snyder Ditch south of Moore Road in a stable manner and control upstream water levels in restored wetlands. A broad-crested weir with fixed orifices or stepped cross-section will be used similar to weirs #2 and #3. This type of weir can be designed to create naturally fluctuating water levels upstream. The weir will also be stepped longitudinally to allow flow to drop to the base elevation of Snyder Ditch. The approximate elevation of Weir #5 is 877.5 feet.

Restoring wetland hydrology as conceptualized above will improve flow conditions in Snyder Ditch by reducing flow at all flow conditions, thereby increasing the overall cross-sectional area available to convey flow. It will reduce sediment loading downstream of Moore Road by decreasing erosive velocity in Snyder Ditch and restoring natural wetland functions including sediment filtering. Restoring natural wetland functions will also improve downstream water quality in Rock Creek.

Restoring wetland hydrology as conceptualized above will also create a natural hydrological wetland regime including low and high water periods created under seasonal rainfall patterns and storm events. Restoring naturally fluctuating water levels in the wetlands is important to creating and maintaining a diverse native wetland plant community and supporting aquatic life uses.

5.0 SOILS AND TOPOGRAPHY

Existing soils are reflective of the historical presence of water on the landscape and wetlands. Hydric soils are common on the property according to the USDA soils surveys. In addition, the Ohio surface geology maps for Ashtabula and Trumbull counties shows the presence of surface deposits that are organic in composition formed over lacustrine clay along poorly drained drainages and undrained depressions. Extensive historical peat mining is evidence of the presence of those organic soils. Based on these existing site conditions, soil conditions should support wetland restoration. Given the site has been used extensively for crop production, soil compaction could be a problem. However, only one field

is being actively used for crop production. The remainder of the site has been fallow and in other uses for several years. Existing vegetation in fallow agricultural areas helps to loosen soil with time and creates a more favorable soil horizon for plant growth. During construction and prior to flooding and planting, the one active agricultural field will be chisel plowed and cultivated with a disc harrow to loosen and aerate the upper soil horizon.

6.0 INVASIVE SPECIES MANAGEMENT

Phragmites australis (common reed, Phragmites) and *Phalaris arundinacea* (reed canary grass) are both present in existing wetlands that have been impacted by various property uses and hydrological alteration. Approximately 100 acres of the wetland restoration area will require invasive species management (Figure 4-1). Invasive species management will include both short-term intensive management activities to reduce the distribution and density of these species, and long-term maintenance activities to prevent their spread in the future. Each is handled separately below.

6.1 Short-term Management

As part of the initial restoration construction, Phragmites and reed canary grass will be treated using a combination of chemical herbicide application and burning over a two-year period. In large, dense stands where the density of native species is low, herbicide application via aerial means will be most economical. In areas where non-target native species are present at higher densities, ground application with back-pack sprayers and wicks will be used to reduce impact on non-target plants. Burning will not harm or reduce most of the desirable native species, but will help suppress regenerative growth of Phragmites and reed canary grass, while reducing the thick layer of thatch produced by those species. Reducing the thatch will promote growth of desirable native species. The short-term management of invasive species in this manner will span two full growing seasons to maximize success. Burns will be conducted in a manner that will not harm woody species.

6.2 Long-term Management

Following completion of the restoration construction, invasive species will be managed on an annual basis as long as there is a need to control the spread of Phragmites and reed canary grass. Long-term maintenance will be conducted by the Conservancy. An assessment of invasive species will be made in June annually to determine if invasive species management is needed. If needed, the same methods used in the short-term management will be used to control the spread of invasive species. Furthermore, tree planting will be targeted in areas susceptible to invasive species domination to suppress invasive species through shading and creating a more suitable environment for native species.

7.0 PLANT COMMUNITY TARGETS AND ESTABLISHMENT

Figure 7-1 shows conceptually how specific plant community zones can be created. Plant communities types will be dictated by water depths and hydroperiod, which can be predicted during final design using hydrological and hydraulic modeling tools. Native tree, shrub, grass, sedge, and forb species adapted to the climatic and physiographic conditions present will be used to establish wetland and upland plant assemblages similar to those found in similar native habitats of the Grand River Low Plateau physiographic region. Forested communities will be established through natural volunteerism and supplemental tree planting at the rate of 200 trees per acre over an estimated ten acres of restored wetland under soil and hydrological conditions best suited to forested wetland establishment (Figure 7-1). Such conditions are typically where soils are saturated to within twelve inches of the soil surface and/or seasonally inundated outside of the growing season. Scrub-shrub communities may develop within the same forested wetland areas until the forest canopy closes and shading limits the distribution and abundance of shrubs. Permanent scrub-shrub areas will develop through natural volunteerism.

Live cuttings can be used to establish shrubs from plant stock. In areas shown on Figure 7-1, planting of upland tree species and native prairie establishment will be used to establish upland buffers in disturbed upland areas adjacent to restored wetlands.

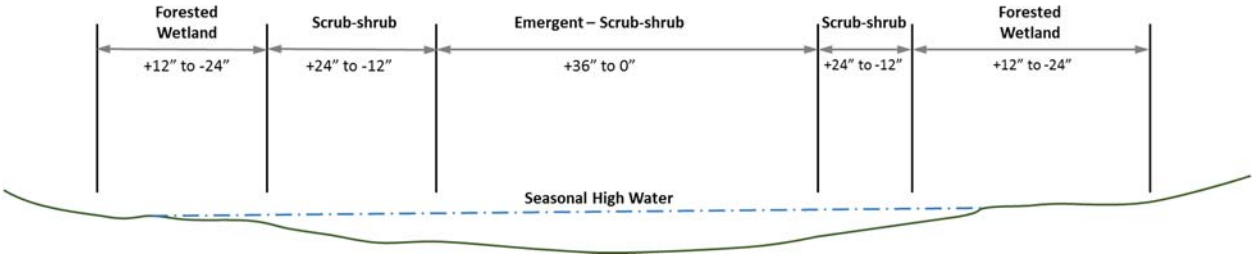

Figure 7-1: Conceptual plant community zones

8.0 PERMITTING REQUIREMENTS

Permitting required to implement this plan will be partly dictated by sources of funding – whether state or federal. Depending on whether the source of funding is state and/or federal, permitting requirements will need to meet the respective state and/or federal requirements. Regardless, permitting will be required to implement this conceptual restoration plan. It is anticipated that the following agencies will have to be consulted at a minimum and will/may require permits or approvals before the construction work can be initiated.

- Local Floodplain and Zoning Agencies (Ashtabula and Trumbull counties, Bloomfield and Orwell townships)
- Ohio Divisions of Wildlife and Water
- U.S. Army Corps of Engineers (Section 404 permit)
- Ohio Environmental Protection Agency (Section 401 Water Quality Certification)
- Ohio Historic Preservation Office
- U.S. Fish & Wildlife Service (Endangered Species Act, federally listed species)

9.0 MONITORING

The Conservancy will undertake annual post-construction monitoring to evaluate project outcomes. Monthly visual inspections will be made of the wetlands, weirs, and berms. During monthly inspections, structures will be checked for proper operation, function, and erosion. Berms will be checked for damage and erosion. In addition, annual spring frog and toad counts can be conducted using calling surveys and trained volunteers. Annual snake surveys are currently being conducted and would continue after restoration. Water levels can be monitored continuously using stilling wells, pressure transducers, and data loggers. Through cooperation and coordination with Ohio EPA, water quality in Snyder Ditch upstream and downstream of the Property can be conducted periodically. The Conservancy will prepare brief annual monitoring reports to publish on its website for viewing by the general public, agencies, other non-profit organizations, and restoration practitioners.

10.0 IMPLEMENTATION PLAN AND PRELIMINARY COST ESTIMATE

Implementation of this conceptual reclamation plan in a manner that accomplishes the stated goals, objectives, and targets for restoring the Bloomfield Swamp will have associated design, permitting, and construction costs. Preliminary cost estimates have been developed based on the conceptual plan to

facilitate planning and implementation for this unique wetland restoration project. Table 10-1 lists itemized preliminary cost estimates, with a total estimated project cost of $2.96 million.

Table 10-1: Design, permitting, and construction costs.

Cost Item	Number Units	Units	Unit Cost	Extended Cost
Design, Engineering, & Permitting	1	LS	$257,450	$257,450
Mobilization/Demobilization	1	LS	$30,000	$30,000
Lead Remediation	1	LS	$200,000	$200,000
Excavation & Grading	16,200	CYD	$30	$486,000
Berm Fortification & Road	16,000	Ft	$30	$480,000
Ditch Fill	4,700	Ft	$25	$117,500
Wetland Berm Grading	1,200	Ft	$25	$30,000
Culvert Removal	1	Ea	$5,000	$5,000
Ford Construction	1,200	Ft	$30	$36,000
Upland Prairie	70	Ac	$10,000	$696,000
Box Culverts	2	Ea	$25,000	$50,000
Weirs	5	Ea	$25,000	$125,000
Invasive Species Management (Year-1)	199	Ac	$1,000	$199,000
Restoration	15	Ac	$4,000	$60,000
Native Tree Planting	1,500	Ea	$40	$60,000
Construction Administration	1	LS	$128,725	$128,725
TOTAL				**$2,960,675**

Multiple sources of state and federal funding are being pursued to complete restoration. The Ohio Environmental Protection Agency has awarded a Water Resource Restoration Sponsorship Program (WRRSP) grant in the amount of $1.9 million. Costs for that portion of the project are presented in Table 10-2. To facilitate further funding efforts, costs for the Trumbull County and Ashtabula County portions of the Phase 1-WRRSP portion of the project are presented in Tables 10-3 and 10-4. Lastly, costs for the Phase 2 portion of the project located completely in Trumbull County are presented in Table 10-5.

Table 10-2: Design, permitting, and construction costs - WRRSP Phase 1.

Cost Item	Number Units	Units	Unit Cost	Extended Cost
Design, Engineering, & Permitting	1	LS	$168,100	$168,100
Mobilization/Demobilization	1	LS	$20,000	$20,000
Lead Remediation	1	LS	$200,000	$200,000
Excavation & Grading	9,700	CYD	$30	$291,000
Berm Fortification & Road	12,000	Ft	$30	$360,000
Ditch Fill	4,600	Ft	$25	$115,000
Wetland Berm Grading	1,200	Ft	$25	$30,000
Culvert Removal	1	Ea	$5,000	$5,000
Ford Construction	1,200	Ft	$30	$36,000
Upland Prairie	36	Ac	$10,000	$360,000
Box Culverts	1	Ea	$25,000	$25,000
Weirs	2	Ea	$25,000	$50,000
Invasive Species Management (Year-1)	109	Ac	$1,000	$109,000
Restoration	10	Ac	$4,000	$40,000
Native Tree Planting	1,000	Ea	$40	$40,000
Construction Administration	1	LS	$84,050	$84,050
TOTAL				**$1,933,150**

Table 10-3: Design, permitting, and construction costs - Ashtabula County.

Cost Item	Number Units	Units	Unit Cost	Extended Cost
Design, Engineering, & Permitting	1	LS	$66,400	$46,400
Mobilization/Demobilization	1	LS	$10,000	$10,000
Lead Remediation	0	LS	$200,000	$-
Excavation & Grading	0	CYD	$30	$-
Berm Fortification & Road	6,500	Ft	$30	$195,000
Ditch Fill	3,000	Ft	$25	$75,000
Wetland Berm Grading	1,200	Ft	$25	$30,000
Culvert Removal	0	Ea	$5,000	$-
Ford Construction	0	Ft	$30	$-
Upland Prairie	0	Ac	$10,000	$-
Box Culverts	0	Ea	$25,000	$-
Weirs	1	Ea	$25,000	$25,000
Invasive Species Management (Year-1)	89	Ac	$1,000	$89,000
Restoration	5	Ac	$4,000	$20,000
Native Tree Planting	500	Ea	$40	$20,000
Construction Administration	1	LS	$33,200	$23,200
TOTAL				$533,600

Table 10-4: Design, permitting, and construction costs - Trumbull County Phase 1.

Cost Item	Number Units	Units	Unit Cost	Extended Cost
Design, Engineering, & Permitting	1	LS	$101,700	$121,700
Mobilization/Demobilization	1	LS	$10,000	$10,000
Lead Remediation	1	LS	$200,000	$200,000
Excavation & Grading	9,700	CYD	$30	$291,000
Berm Fortification & Road	5,500	Ft	$30	$165,000
Ditch Fill	1,600	Ft	$25	$40,000
Wetland Berm Grading	0	Ft	$25	$-
Culvert Removal	1	Ea	$5,000	$5,000
Ford Construction	1,200	Ft	$30	$36,000
Upland Prairie	36	Ac	$10,000	$360,000
Box Culverts	1	Ea	$25,000	$25,000
Weirs	1	Ea	$25,000	$25,000
Invasive Species Management (Year-1)	20	Ac	$1,000	$20,000
Restoration	5	Ac	$4,000	$20,000
Native Tree Planting	500	Ea	$40	$20,000
Construction Administration	1	LS	$50,850	$60,850
TOTAL				$1,399,550

Table 10-5: Design, permitting, and construction costs - Trumbull County Phase 2.

Cost Item	Number Units	Units	Unit Cost	Extended Cost
Design, Engineering, & Permitting	1	LS	$89,350	$89,350
Mobilization/Demobilization	1	LS	$10,000	$10,000
Lead Remediation	0	LS	$200,000	$-
Excavation & Grading	6,500	CYD	$30	$195,000
Berm Fortification & Road	4,000	Ft	$30	$120,000
Ditch Fill	100	Ft	$25	$2,500
Wetland Berm Grading	0	Ft	$25	$-
Culvert Removal	0	Ea	$5,000	$-
Ford Construction	0	Ft	$30	$-
Upland Prairie	34	Ac	$10,000	$336,000
Box Culverts	1	Ea	$25,000	$25,000
Weirs	3	Ea	$25,000	$75,000
Invasive Species Management (Year-1)	90	Ac	$1,000	$90,000
Restoration	5	Ac	$4,000	$20,000
Native Tree Planting	500	Ea	$40	$20,000
Construction Administration	1	LS	$44,675	$44,675
TOTAL				**$1,027,525**