

1.0 INTRODUCTION

The purpose of this plan is to provide mitigation for impacts associated with the proposed Passive Drainage System (PDS) at Carbon Limestone Sanitary Landfill facility located in Poland Township, Mahoning County, Ohio. The proposed PDS site is owned by Republic Services, Inc. (Republic) and consists of approximately 58.8 acres of previously striped mined area (Figure 1).

This plan has been prepared to satisfy the requirements of Sections 401 and 404 of the Clean Water Act, as well as the Ohio Environmental Protection Agency's (EPA) Level III Isolated Wetland Permit. The plan describes the basis for the construction of replacement wetlands and streams, which will provide replacement functions and values for those impacted during the construction of the PDS. The proposed mitigation site is located on-site in Ohio near the Pennsylvania/Ohio State Line and referred to as the Mile One mitigation area (Figure 4) for its adjacency to the 1-mile marker on Kansas Road.

The Mile One mitigation area is comprised of an approximately 6.6-acre agricultural field and 2.6-acre area surrounding a pond. The agricultural field is currently tilled and planted with soybeans. Three sources of hydrology enter the site and have been altered to flow through three linear drainage ditches. Three separate drain tile systems also bisect these ditches to further de-water the field. A separate mitigation area exists north of Kansas Road, which traverses the Mile One mitigation area. This additional area provides wetland mitigation potential adjacent to an existing pond as well as stream mitigation to a drainage ditch, labeled as Tributary D. Please refer to Figure 5, Existing Conditions Map.

2.0 PROPOSED IMPACTS

2.1 PROPOSED WETLAND IMPACTS

The proposed PDS system will impact 17 wetlands totaling 3.815 acres. Please refer to Figure 2 for the location of all identified wetlands within the PDS project area. One additional wetland, Wetland X, will be impacted within the Mile One mitigation area. Wetland X exists within three ditched areas created to drain the site for farming. The enhanced acreage of Wetland X will be replaced within the wetland mitigation area. The following table summarizes the proposed wetland impacts, their classification, assessment category, regulatory, mitigation ratio, and proposed mitigation acreage.

**TABLE 1
WETLAND IMPACT SUMMARY**

IMPACTED WETLANDS							
WETLAND	ONSITE AREA (ACRES)		USFWS ¹ / CLASSIFICATION	REGULATING AGENCY ²	ORAM v.5.0 SCORE	MITIGATION RATIO ³	REQUIRED MITIGATION AREA (ACRES)
	TOTAL AREA (ACRES)	IMPACTED AREA (ACRES)					
A	0.210	0.000	PEM/OW	USACE, OEPA	15	-	-
B	0.270	0.000	PEM/PSS/OW	OEPA	30	-	-
C	0.140	0.060	PEM/PSS/OW	OEPA	30	1.5:1	0.210
D	0.072	0.072	PEM	OEPA	32.5	1.5:1	0.108
	0.108	0.108	PSS			2:1	0.216
E	0.030	0.000	PEM	OEPA	16	-	-
F	0.120	0.000	PEM/PSS	USACE, OEPA	39.5	-	-
G	0.983	0.008	PEM/OW	USACE, OEPA	40.5	1.5:1	0.012
	0.327	0.002	PSS			2:1	0.004
H	1.931	0.806	PEM/OW	USACE, OEPA	40.5	1.5:1	1.209
	1.040	0.434	PSS			2:1	0.868
I	0.040	0.035	PEM/OW	USACE, OEPA	40.5	1.5:1	0.053
	0.040	0.035	PSS			2:1	0.070

J	0.095	0.095	PEM	OEPA	28.5	1.5:1	0.143	
	0.095	0.095	PSS			2:1	0.190	
K	0.152	0.152	PEM/OW	OEPA	33.5	1.5:1	0.228	
	0.038	0.038	PSS			2:1	0.076	
L	0.690	0.503	PEM/OW	OEPA	36	1.5:1	0.755	
	0.230	0.168	PSS			2:1	0.336	
M	0.123	0.075	PEM/OW	OEPA	36	1.5:1	0.113	
	0.287	0.175	PSS			2:1	0.350	
N	0.270	0.090	PEM/OW	USACE, OEPA	27	1.5:1	0.135	
O	0.190	0.190	PEM	USACE, OEPA	24	1.5:1	0.285	
P	0.368	0.368	PEM	USACE, OEPA	31	1.5:1	0.552	
	0.123	0.123	PSS			2:1	0.246	
Q	0.190	0.090	PEM/OW	USACE, OEPA	31	1.5:1	0.135	
R	0.050	0.050	PEM/PSS	USACE, OEPA	31	1.5:1 ⁴	0.075	
S	0.010	0.000	PEM/OW	USACE, OEPA	58.5	-	-	
T	0.020	0.000	PEM	USACE, OEPA	39.5	-	-	
U	0.010	0.000	PEM	USACE, OEPA	36.5	-	-	
V	0.038	0.030	PEM/OW	USACE, OEPA	50	1.5:1	0.045	
	0.013	0.010	PSS			2:1	0.020	
W	0.004	0.004	PEM	OEPA	34	1.5:1	0.006	
X	0.300	0.261 ⁵	PEM	USACE, OEPA	11	1.5:1	0.260	
TOTAL	8.607	2.627 ⁶ (PEM) 1.188 (PSS)	Total Isolated Impacts: 1.545			-	4.324 (PEM) 2.376 (PSS)	
		3.815 ⁶	Total Jurisdictional Impacts: 2.270 ⁶				6.700	

1. BASED ON COWARDIAN AND COWORKERS, 1979. OW-OPEN WATER, P-PALUSTRINE, EM-EMERGENTS, SS-SCRUB SHRUB
2. WETLANDS CONSIDERED ISOLATED ARE ONLY REGULATED BY THE OEPA
3. BASED ON MITIGATION RATIOS OF 1.5:1 FOR PEM, 2:1 FOR PSS, AND 3:1 FOR PFO WETLANDS.
4. IMPACTS TO WETLANDS C & R ARE PROPOSED IN THE PEM PORTION ONLY.
5. IMPACTS TO WETLAND X ARE THE RESULT OF NATURAL STREAM CHANNEL DESIGN, AND WILL BE REPLACED AT A 1.5:1 RATIO WITHIN THE MITIGATION AREA.
6. TOTAL WETLAND IMPACTS FROM THE PROJECT ARE THOSE FROM CONSTRUCTION OF THE PDS ONLY, AND DO NOT INCLUDE IMPACTS TO WETLAND X FROM CONSTRUCTION OF THE MILE ONE MITIGATION AREA

The total required wetland mitigation area is 6.700 acres. Impacts to isolated wetlands accounted for 1.545 acres of the total wetland impacts. Wetland impacts were mitigated at a sliding scale of 1.5:1 for palustrine emergent wetlands (PEM) and 2:1 for palustrine scrub/shrub wetlands. Mitigation acreage for wetlands with more than one USFWS classification was calculated by

analyzing the location of proposed impacts to the corresponding USFWS classification within the wetland and assigning the corresponding mitigation ratio.

2.2 PROPOSED STREAM IMPACTS

Three stream segments, totaling 1,378 linear feet (l.f.), (39 l.f. of ephemeral, 77 l.f. of intermittent, and 1,262 l.f. of perennial) are proposed to be impacted by the PDS. Refer to Figure 2 for the location of all identified streams within the project area footprint. The following table provides a summary of the proposed stream impacts.

**TABLE 2
STREAM IMPACT SUMMARY**

IMPACTED STREAMS							
STREAM	ONSITE LENGTH (LINEAR FEET)		CLASSIFICATION	REGULATING AGENCY	QHEI/HHEI SCORE	STREAM CLASS	MITIGATION LENGTH ¹
	TOTAL LENGTH	IMPACTED LENGTH					
1	465	0	PERENNIAL	USACE, OEPA	63 (QHEI)	III	-
2	289	0	PERENNIAL	USACE, OEPA	61 (HHEI)	III	-
3	5,400	1,262	PERENNIAL	USACE, OEPA	50 (QHEI)	III	1,893
4	146	0	PERENNIAL	USACE, OEPA	75 (HHEI)	III	-
5	327	0	EPHEMERAL	USACE, OEPA	33 (HHEI)	I	-
6	318	77	INTERMITTENT	USACE, OEPA	47 (HHEI)	II	116
7	1,546	0	INTERMITTENT	USACE, OEPA	47 (HHEI)	Modified II	-
8	265	39	EPHEMERAL	OEPA	37 (HHEI)	I	59
9	40	0	PERENNIAL	USACE, OEPA	18 (HHEI)	I	-
10	463	0	INTERMITTENT	USACE, OEPA	33 (HHEI)	II	-
TOTAL	6,340	1,262	PERENNIAL	-	-	-	1,893
TOTAL	592	39	EPHEMERAL	-	-	-	116
TOTAL	2,327	77	INTERMITTENT	-	-	-	59
TOTAL	9,259	1,378	-	-	-	-	2,068

1. STREAM MITIGATION LENGTHS WERE CALCULATED USING A 1.5:1 RATIO
2. STREAMS CONSIDERED ISOLATED ARE ONLY REGULATED BY THE OEPA

The stream impacts will be mitigated at a 1.5:1 ratio within the wetland and stream mitigation area for a total length of 2,068 feet.

2.3 PROPOSED OPEN WATER IMPACTS

A total of eight open water areas (strip mining ponds) totaling 2.43 acre are proposed to be impacted (Figure 2). None of the ponds will be filled during the project. Impacts to these ponds will result from draining these open water areas from installation of the PDS. The following table summarizes the proposed pond impacts.

**TABLE 3
OPEN WATER IMPACT SUMMARY**

IMPACTED OPEN WATER AREAS		
Open Water	Total Area (Acres)	Impacted Area (Acres)
A	0.08	0.00
B	0.08	0.00
C	0.09	0.00
G	1.45	1.44
K	0.5	0.50
L	0.29	0.29
M	0.57	0.02
N	1.00	0.03
Q	0.22	0.04
S	0.48	0.01
V	0.80	0.10
Total	5.56	2.43

Open water impacts are not required to be mitigated due to their manmade creation as mining strip pits and sedimentation basins for past mining operations.

The PDS system will include the construction of two sedimentation ponds and one treatment wetland system. The open water components of both sedimentation ponds will total approximately 5.16 acres. The treatment wetland system will be approximately 3.44 acres and also incorporate an open water portion. Because these areas will need to be available for routine maintenance, they are not being constructed as waters of the state, and therefore not eligible for

mitigation credit. They will, however, serve functions and values similar to the open water areas being impacted by the PDS. The proposed sedimentation ponds and treatment wetland system will more than compensate for any loss of open water habitat from construction of the PDS.

2.4 WETLAND AND STREAM FUNCTIONS

WETLANDS

The onsite wetlands, streams, and ponds provide some habitat for wildlife such as rearing, resting, and feeding habitat for certain terrestrial and wetland adapted species. Based on observations of animal tracks and plant life, the wetlands, streams, ponds, and surrounding herbaceous areas provide foraging and feeding habitat, water sources, resting areas, and escape cover for small vertebrates, turkey, coyote, and white-tailed deer. To a limited extent, they also contribute to food chain production within the previously disturbed area.

22% of the wetlands were scored as Category I wetlands using the Ohio Rapid Assessment Method (ORAM) version 5.0. These wetlands, as defined by the ORAM, support minimal wildlife habitat, and minimal hydrological and recreational functions due to their disturbed and isolated nature. 78% of the wetlands were scored as Modified Category II or Category II wetlands, and provide moderate wildlife habitat, marginal hydrologic functions, and minimal recreational functions. The quality of these wetlands is hindered largely in part by their surrounding land use and dominant invasive species monoculture.

The study area exhibits characteristics of historical strip mining and past disturbances. At the time of the field investigation, successional grasses, shrubs, and small trees dominated the area. The dominant grass species within the study area included common reed (*Phragmites australis*), narrow-leaf cattail (*Typha angustifolia*), and reed canary grass (*Phalaris arundinacea*). The dominant shrub and tree species within the study area include black willow (*Salix nigra*), peach-leaf willow (*Salix amygdaloides*) eastern white pine (*Pinus strobus*), Morrow's honeysuckle (*Lonicera morrowii*), and multiflora rose (*Rosa multiflora*). The proposed project area is bounded to the north by historic strip mined areas, to the south by undeveloped previously and

actively mined land, to the east by State Line Road, and to the west by undeveloped landfill property. The buffers surrounding the identified aquatic resources have experienced historical and current disturbances and have not recovered or are still recovering. The disturbances to the upland habitat buffers are indirectly and directly affecting the quality of the identified aquatic resources as apparent in the wetland ORAM scores and stream PHWH and QHEI classes.

STREAMS

The streams proposed for impacts from the construction of the PDS were assessed using the Headwater Habitat Evaluation Index (HHEI) and the Qualitative Habitat Evaluation Index (QHEI). The combination of these two evaluation indices categorized each of the identified streams into Class I, II, Modified II or III streams. Due to the site characteristics, which include past disturbances from mining, the streams appear to be impaired and provide only minimal aquatic habitat functions.

Surveying for benthic macroinvertebrates within the on-site streams revealed organisms tolerant of pollution and those with short-lived life cycles. Macroinvertebrate communities were restricted to midge larvae (*Chironomid sp.*) and flat worms (*Platyhelminthes*). The lack of a sustained long-lived benthic macroinvertebrate community is most likely due to the highly variable flow regime of the streams. The constant fluctuations in flow from landfill activities prohibit the establishment of a sustained fish or benthic macroinvertebrate community.

Construction of the PDS will establish constant flows influenced only by seasonal variability. The installation of a naturally draining system will allow the on-site streams to establish naturally reproducing fish and benthic macroinvertebrate communities. Although impacts to on-site streams will be only temporary, Carbon Limestone will need to be able to access these drainages for routine maintenance to ensure adequate drainage capacity. Therefore, stream impacts will be mitigated for in the Mile One mitigation area through stream creation, enhancement, and protection.

The mitigation presented in this plan will provide greatly improved wetland and stream values and functions compared to the aquatic resources proposed to be impacted.

3.0 MITIGATION PLAN

3.1 MITIGATION GOALS

Mitigation goals serve as the basis for designing the wetland and stream mitigation project and measuring success.

3.1.1 Wetlands

The overall goal of the wetland mitigation is to provide biologically diverse wetland habitats that contain higher functions and values than those wetlands proposed to be impacted. This will be accomplished by offsetting the loss of 3.815 acres of wetlands with the creation of a minimum of 6.700 acres of wetland habitat within the project site. The entire Mile One mitigation complex, as proposed in this plan, consists of 9.6 acres. Of these 9.6 acres, 6.90 acres are proposed to function as jurisdictional wetlands following successful construction of the mitigation area. The remainder of the mitigation site will consist of restored streams and upland buffer habitats. The wetlands will provide high quality habitat for a variety of native plant and animal species and improve water quality within the watershed.

3.2 SUCCESS CRITERIA

The mitigation success criteria measure the success or failure of the project in meeting the defined mitigation goals. The following criteria will be used to measure the success of the proposed mitigation in compensating for impacts to wetlands and streams by the proposed project.

3.2.1 Wetlands

- (1) To offset the loss of 3.815 acres of emergent and scrub/shrub wetlands by creating a minimum of 6.700 acres of shrub/wet meadow, shallow marsh, intermediate marsh, and deep marsh wetland habitat.
- (2) Greater than 50% of the dominant plant species in the wetland mitigation area will be classified as obligate, facultative wetland, or facultative, according to NWPL¹ (1988). Planted woody vegetation in the wetland mitigation project area will have a minimum 70% survival rate and show a positive increase in height at the end of each year of monitoring during the five-year monitoring period.
- (3) Wetland mitigation success will also be determined based upon native species composition, presence of invasive species, and overall wildlife usage. The mitigation wetland shall contain no more than 5% invasive species. These success criteria will be determined by visual inspections during routine monitoring of the wetland mitigation site.

Upon approval of this mitigation plan by the Ohio EPA, Carbon Limestone will assume responsibility for achieving the success criteria specified above. Success monitoring and reporting will be performed for five years following construction of the mitigation project. Please refer to Section 4.7 for details relating to monitoring and reporting.

¹ Robert W. Lichvar and John T. Kartesz. 2009. North American Digital Flora: National Wetland Plant List, Version 2.4.0 (https://wetland_plants.usace.army.mil) U.S. Army Corps of Engineers, Engineer Research and Development Center, cold Regions Research and Engineering Laboratory, Hanover, WH, and BONAP, Chapel hill, NC. (June 6, 2012).

3.3 WETLAND MITIGATION

3.3.1 SITE SELECTION

The mitigation site has many desirable qualities that led to its selection, including:

- On-site location
- Dependable sources of hydrology
- Capability to re-establish connection between an upstream forested wetland and downstream scrub/shrub wetland
- Buried drain tiles and constructed ditches capable of being restored for stream mitigation credit
- Existing hydric soils and a high water table necessary for successful wetland creation

3.3.2 WETLAND CREATION

Carbon Limestone proposes to construct the 9.6-acre Mile One mitigation area on Carbon Limestone-owned property adjacent to the PDS project (see Figure 4). Mile One will be separated into two distinct areas separated by Kansas Road. The southern area is an agricultural field separated by constructed drainage ditches. These ditches will be restored to form natural stream channels with a direct connection to the floodplain, thus adjoining wetlands, and providing an adequate wetland hydrology source. The southern portion of Mile One is currently cultivated, planted, and harvested for soybeans. The mitigation plan proposes grading the area to create topography that will retain wetland hydrology. Substantial planting is proposed to establish aquatic, wetland, and upland vegetative communities. The grading plan, planting plan, and plant specifications for the onsite wetland mitigation area is shown on Figure 4.

3.3.2.1 Grading Plan

The grading plan incorporates depressional topography, elevated berms, natural stream channels, and a water control structure to maintain a seasonal high water table in the various wetland habitats. Grading of the mitigation site will primarily require excavation (cut). The exact elevations will be determined during the final design of the wetland mitigation area. The detailed mitigation plan as shown in Figure 4 is based upon survey information collected by CEC.

The elevation ranges of land surface relative to the water table of the created wetlands are summarized for each plant community in the following table. Specific elevations differ for the various wetland areas.

TABLE 4
WETLAND DESIGN CRITERIA SUMMARY

Habitat Type	Hydrologic Design Criteria	Acreage
Upland Buffer Habitat	> 0.5 ft above elevation of water table	1.75
Shrub/Wet Meadon Habitat	0.0' to 0.5' above elevation of water table	2.30
Shallow Marsh Habitat	0.0' to 0.5' below elevation of water table	2.75
Intermediate Marsh Habitat	0.5' to 1.0' below elevation of water table	1.45
Deep Marsh Habitat	1.0' to 1.5' below elevation of water table	0.40
Total Area		6.90*

*Total area includes wetland area only, and does not include upland buffer habitat.

3.3.2.2 Wetland Hydrology

The hydrology of the Mile One mitigation wetland will be maintained by a combination of direct precipitation, surface water runoff, stream flow, and shallow groundwater. The wetland area north of Kansas Road will be constructed to intercept the water level of the adjacent pond at an elevation of 1192.4. The wetland area south of Kansas Road will be constructed to impound water behind a berm at an approximate elevation of 1196.0 feet. The water control structure proposed for the berm area will be used to adjust the exact water elevation within the wetland

area after construction. Initially the water elevation will be maintained slightly lower than the final pool elevation. This will be done to promote plant establishment during the first growing season. After the wetland plants are established the optimal water elevation for the entire wetland area will be set using the water control structure. Once the optimal water level is established, the water control structure will be sealed in place.

The design of the mitigation area south of Kansas Road was based upon groundwater level measurements collected by CEC from standpipes installed in May 2012. Water level measurement data was incorporated into the design of the mitigation wetland by establishing an approximate water table level. Periodic on-going data collection will determine a finalized water table level which will be incorporated into the final design of the mitigation wetland.

The mitigation wetlands will exhibit a wide range of hydrologic regimes due to the micro-topography constructed within varying habitat elevations and water levels controlled by the pond, perimeter berm, and outfall structures. The shrub/wet meadow habitat should exhibit a seasonally saturated to a seasonally flooded/semi-permanently saturated soils moisture regime. The shallow and intermediate marsh habitats will be located in depressions and have a semi-permanently flooded to permanently flooded hydroperiod. The deep marsh habitat will exhibit a permanently flooded hydroperiod.

3.3.2.3 Wetland Plant Communities

The wetland vegetation specified in this mitigation plan will include the use of trees, shrubs, herbaceous, and aquatic vegetation to create a diverse wetland complex that provides wildlife habitat using native plant communities. Selection of temporary and permanent wetland and upland herbaceous seed mixtures was based on the commercial availability of products. The plant communities and planting specifications for the wetland mitigation areas are described below and shown on Figure 4.

Upland Buffer Habitat (1.75 acres)

The upland habitat adjacent to the wet shrub/emergent marsh habitat will be planted with trees that typically occur at the upland edges of marshes, including silver maple (*Acer saccharinum*), pin oak (*Quercus palustris*), and American sycamore (*Platanus occidentalis*). The landward portion of the upland buffer will also be planted with species selected to provide foraging mast and their potential to provide bat roosting habitat. These species include red maple (*Acer rubrum*), shagbark hickory (*Carya ovata*), and white oak (*Quercus alba*).

An upland buffer having variable width is proposed around the boundary of the wetland mitigation area. The upland buffer will be planted on all side slopes and surrounding upland areas of the excavated mitigation area. The upland buffer will be seeded with native warm season grasses designed to provide both food and shelter for wildlife and planted with a mixture of mast producing trees.

Shrub/Wet Meadow Habitat (2.30 acres)

The Shrub/Wet Meadow component of the wetlands will include plantings of sandbar willow (*Salix interior*), black willow (*Salix nigra*), speckled alder (*Alnus rugosa*), red-osier dogwood (*Cornus stolonifera*), northern arrow-wood (*Viburnum recognitum*), winter berry (*Ilex verticillata*), elderberry (*Sambucus canadensis*), and silky dogwood (*Cornus amomum*). These communities typically occur between upland habitats and at the edges of marshes where seasonal high water tables occur.

The emergent marsh component of the wetland will be planted with various sedges (*Carex spp.*), burreeds (*Sparganium spp.*), bulrushes (*Scirpus spp.*) blue vervain (*Verbena hastata*), Torrey's rush (*Juncus torreyi*), and soft rush (*Juncus effusus*). The emergent marsh habitat will be subject to variable water levels during the year, but these core species require shallow inundation for a portion of the growing season.

Shallow/Intermediate Marsh Habitat (4.20 acre)

The shallow/intermediate marsh planting habitat features emergent and floating-leaved rooted vegetation including arrow arum (*Peltandra virginica*), swamp smartweed (*Polygonum amphibium*) pickerelweed (*Pontederia cordata*), and button bush (*Cephalanthus occidentalis*). Other wetland vegetation from the emergent marsh zone will overlap into this area and provide ecological diversity.

Deep Marsh Habitat (0.40 acre)

This habitat will be created to mitigate the open water (pond) impacts, provide waterfowl habitat, and provide habitat diversity within the wetland mitigation area. The open water habitat will be enhanced with coarse woody debris and planted with American white water-lily (*Nymphaea odorata*), yellow pond-lilly (*Nuphar lutea*), American eel-grass (*Vallisneria americana*) and Sago pondweed (*Potamogeton pectinatus*).

3.3.3 ANTICIPATED WETLAND FUNCTIONS

The wetland mitigation area has been designed to provide replacement hydrologic and ecological functions greater than the proposed impacted wetlands. The varied depressional topography and hydroperiods of the wetland replacement area will provide a more diverse habitat for flora and fauna and enhanced water quality functions than with the proposed impacted wetlands.

Wildlife habitat will be enhanced by the construction of a wetland complex with a high level of horizontal and vertical habitat interspersion. The depressional area will provide breeding habitat for amphibians. The open water, marsh, and upland habitat will provide feeding, resting and rearing habitat for migratory and resident birds, amphibians, reptiles, and mammals.

3.3.4 HABITAT ENHANCEMENT FEATURES

The proposed wetland mitigation design includes several wildlife amenities that will enhance the overall wildlife habitat at the site. These include the installation of two 7-chamber bat boxes, two wood duck boxes, one mallard nesting tube, and several bluebird boxes. The bat boxes will be mounted on 16-foot pressure treated posts to provide a maternity roost that can house approximately 300 bats in each box. The two wood duck boxes and one mallard nesting tube will be installed adjacent to the open water areas. The wood duck boxes and mallard waddle will be installed approximately 52 to 60 inches above the high water elevation on a pressure-treated post equipped with a predator guard. The bluebird boxes will be installed within the upland buffer area.

3.4 STREAM MITIGATION

3.4.1 SITE SELECTION

To offset the impact of 1,378 feet of streams from construction of the PDS, a minimum of 2,067 linear feet of streams will be constructed within the mitigation area. Currently, three sources of hydrology contained within Wetland X (Figure 6), flow into the mitigation area and have been altered to flow through three separate linear drainage ditches. An additional stream mitigation area exists on the south side of Kansas Road. This stream, Tributary D, has been channelized for approximately 560 feet before discharging into a pond. Bisecting Wetland X are drain tiles buried underneath the field used to further drain the site for farming use. Pulling these drain tiles and reconstructing the drainage ditches to form three separate stream systems will account for approximately 3,000 feet of stream mitigation at the Mile One mitigation area.

3.4.2 STREAM RESTORATION/CREATION

Stream mitigation at the Mile One mitigation area is two-fold; opportunities exist to create streams by pulling drain tiles and re-designing channelized drainage ditches to form natural stream channels. The sections below outline the individual stream segments to be created.

Proposed Tributary A enters the mitigation area from its southeastern corner, flowing as a roadside ditch along Rapp Road. Currently, Tributary A continues to flow as a linear ditch for approximately 310 feet before veering northwest to flow toward a culvert under Kansas Road. Reconstructing a natural stream channel for Tributary A will account for approximately 473 feet of stream mitigation.

Proposed Tributary B drains a forested wetland to the south of the site. It enters the mitigation area through a culvert under a private driveway off of Rapp Road. Once in the mitigation area, it flows through a linear channelized drainage for approximately 400 feet before flowing into a culvert under Kansas Road. Reconstructing a natural stream channel for Tributary B will account for approximately 425 feet of stream mitigation.

Proposed Tributary C originates as a spring within a small vegetated area on the western boundary of the site. This intermittent spring then flows into a channelized drainage ditch for approximately 420 feet before joining Tributaries A and B and flowing through a culvert under Kansas Road. Reconstructing a natural stream channel for Tributary C will account for approximately 527 feet of stream mitigation.

Tributary D flows as a channelized ditch for approximately 550 feet from south of Kansas Road and discharges into a pond. Reconstructing a natural stream channel for Tributary D will account for approximately 645 feet of stream mitigation.

Additional stream mitigation opportunities exist from buried drain tiles within the wetland mitigation area. CEC used ground penetrating radar (GPR) to identify five separate drain tiles totaling approximately 920 feet in length. The removal of these buried tiles will provide

additional hydrology for the proposed creation of wetlands and streams within the Mile One mitigation area. Please refer to Table 5 below for a summary of the stream mitigation areas.

**TABLE 5
PROPOSED STREAM MITIGATION**

Stream Segment	Mitigation Measure	Mitigation Length (feet)
Tributary A	Stream restoration	473
Tributary B	Stream restoration	425
Tributary C	Stream Restoration	527
Tributary D	Stream Restoration	645
Drain Tiles	Removal	920
TOTAL LENGTH		3,093 (feet)

3.4.3 NATURAL STREAM CHANNEL DESIGN CRITERIA

The reconstructed drainage ditches will be built as natural channels that incorporate riffle and pool habitat, bank full wetland prone benches, and step pool complexes to control velocity and prevent down gradient erosion. The recreated stream channels will incorporate a rock line channel composed of material obtained from the wetland grading site or other on-site sources. The rock that will be placed in the constructed stream channel will range from gravel size to small cobble. No rip-rap or grouting material will be used to create the reconstructed stream segments.

After reconstruction of Tributaries A, B, C and D, all disturbed upland areas will be seeded with an upland buffer seed mix, a native warm season grass seed mix designed to provide both food and shelter for wildlife. The bank full wetland prone benches will be seeded with the shrub/wet meadow seed mixture. This mixture contains a diverse assemblage of wetland plant species that will provide habitat diversity, wildlife food sources, and wildlife cover. It is anticipated that

this stream mitigation will provide higher functions and values compared to the stream segments proposed to be impacted.

The stream mitigation will be graded alongside of the wetland mitigation grading. Upon establishment of final stream grades, the natural rock stream substrate will be placed in the designed stream channel and the step pool complexes will be constructed. The seed mixtures will be sown in the fall (October through November) or early spring (April). Within 24-hours following seeding, weed-free straw mulch will be placed in those areas not inundated with water. Refer to the Notes section on Figure 4 for additional information relating to seeding.

A temporary seed mixture will be used to stabilize the mitigation site if the construction sequence is delayed more than 30 days between grading and seeding of the area, or if final seeding is delayed until after October 15. Temporary seeding will only include oats (*Avena sativa*) for spring/summer planting and winter wheat (*Triticum aestivum*) for fall/winter planting.

The following guidelines are provided to ensure adequate erosion and sedimentation measures during construction of the stream mitigation area specified by this plan:

- Reduce the area and length of time that the site is cleared and graded
- Limit the amount of disturbed area exposed at any one time
- Provide immediate vegetative stabilization of disturbed areas
- Strict adherence to the design plans and specifications contained herein

Given the gradual topography, erosion control materials within Mile One to be used during construction will include silt fences, filter sock, and straw bales (as needed). These materials will be installed at down gradient locations and other areas on the site where earth is to be disturbed in order to confine sediment.

The following construction sequence is anticipated for the stream mitigation project:

- Installation of erosion control features
- Establish survey control
- Grading of stream channel
- Placement of natural rock within stream channel
- Seeding and mulching of all wetland and disturbed areas, and temporary seeding (if necessary)
- Upon completion of the wetland grading and planting, the elevation of the water control structure will be finalized

The streams that will be constructed as part of the mitigation will be protected in perpetuity, via an Environmental Covenant or Conservation Easement prepared by Carbon Limestone. Figure 4 identifies the area surrounding the wetland and stream mitigation site that will be protected in perpetuity. Carbon Limestone will forward a copy this Environmental Covenant or Conservation Easement to the Ohio EPA after the mitigation area has been constructed.

Routine monitoring of the wetland mitigation area will be conducted for a period of five years. Monitoring will occur bi-annually (spring and fall) during the first two years after the wetland mitigation area is constructed and annually (fall) during the final three years. Along with the wetland monitoring, the reconstructed stream channels will also be observed. An ecologist qualified to evaluate wetlands and streams will conduct the monitoring work.

The monitoring will include the following information:

- Overall stream channel stability
- An estimate of percent coverage of the dominant plant species
- Documentation of riffle/pool sequences and step pool complexes
- Photographs taken from permanent photo stations
- Observations of wildlife usage

- The presence of invasive and/or exotic vegetation
- Notes relating to the amount and velocity of flow within the new stream channel
- Problems encountered, if any, and a written plan to correct any deficiencies identified during the monitoring phase

If the constructed stream exhibits signs of instability, erosion, or poor vegetation growth within the 5-year monitoring period, remedial work will be completed.

3.5 CONSERVATION OF MITIGATION AREA

The wetlands that will be constructed as part of the mitigation will be protected in perpetuity, via an Environmental Covenant or Conservation Easement prepared by Carbon Limestone. Figure 4 identifies the area surrounding the wetland mitigation site that will be protected in perpetuity. Carbon Limestone will forward a copy this Environmental Covenant or Conservation Easement to the Ohio EPA after the mitigation area has been constructed.

3.6 CONSTRUCTION OF THE MITIGATION AREA

3.6.1 Construction Schedule

It is anticipated that grading of the wetland replacement areas identified in this plan will be initiated in 2012 or possibly 2013. Herbaceous wetland plantings will be installed during the fall (September 1 to October 15) or spring (April 15 to May 15). Planting of dormant trees and shrubs will be done in the fall (September 15 to November 15) or spring (April 15 to May 15). Seed mixtures will be sown in the fall (October through November) or early spring (April). Within 24-hours following seeding, weed-free straw mulch will be placed in those areas not inundated with water. Refer to the Notes section on Figure 4 for additional information relating to planting and seeding.

A temporary seed mixture will be used to stabilize the mitigation site if the construction sequence is delayed more than 30 days between grading and planting of the areas, or if final planting is delayed until after October 15. Temporary seeding will only include oats (*Avena sativa*) for spring/summer planting and winter wheat (*Triticum aestivum*) for fall/winter planting.

3.6.2 Erosion Control Measures

The following guidelines are provided to ensure adequate erosion and sedimentation control measures during construction of the wetland mitigation areas specified by this plan.

- Reduce the area and length of time that the site is cleared and graded
- Limit the amount of disturbed area exposed at any one time
- Provide immediate vegetative stabilization of disturbed areas
- Strict adherence to the design plans and specifications contained herein

Given the level topography of the area, the primary erosion control materials to be used during wetland construction will include silt fences, filter socks, and straw bales (as needed). These materials will be installed at down gradient locations and other areas on the site where earth is to be disturbed in order to confine sediment. Additionally, the mitigation area will be graded as a series of depressions which will act as sediment traps during construction.

Temporary and permanent vegetation of exposed soils will be performed by seeding and planting replacement wetlands and disturbed upland areas with appropriate grasses, forbs and woody plants. The goal of the project is ecological mitigation, therefore, plant species have been carefully selected for both their ability to control erosion and provide beneficial ecological functions.

3.6.3 Construction Sequence

The following construction sequence is anticipated for the wetland mitigation project:

- Installation of erosion control features;
- Establish survey control/wetland stakeouts;
- Stockpiling top layer of topsoil from top three feet of site;
- Fine grading of the mitigation area to a depth of one foot below final grades;
- Replacement of stockpiled topsoil;
- Installation of stock plant material; and
- Seeding and mulching of all wetland and disturbed areas. Temporary seeding, if necessary.

3.7 MONITORING AND MAINTENANCE PLAN

3.7.1 Site Inspection Schedule

Monitoring and maintenance of the wetland mitigation area will be conducted for a period of five years. Monitoring will occur bi-annually (spring and fall) during the first two years after the wetland mitigation area is constructed and annually (fall) during the final three years. A wetland ecologist qualified to evaluate and delineate wetlands will conduct the monitoring work.

3.7.2 Monitoring Parameters and Reporting

Yearly reports with photographs will be submitted to the Ohio EPA within 90 days of each late-summer/fall inspection. The monitoring reports will include the following information:

- (1) Identification of wetland plant species, ranked in order of dominance, for each wetland plant community type
- (2) Estimation of percent coverage of the dominant plant species

- (3) Measurement of water depths and estimated hydro-periods of wetland plant communities
- (4) Photographs taken from permanent photo stations and a plan showing the location and orientation of each photograph
- (5) Observations of wildlife usage
- (6) Presence of invasive and/or exotic vegetation and approximate composition percentage
- (7) Measurements of water level and the need to raise or lower water level within the wetland
- (8) An assessment of compliance with the mitigation success criteria

If the constructed wetland has not achieved the design objectives within the 5-year monitoring period, remedial work may be required to assure establishment of a minimum of 6.80 acres of functional wetlands. Corrective actions and remedial measures may include replanting vegetation, grading adjustments as necessary; and any other measures necessary for the success of the mitigation project. Replacement wetlands will be considered successful when they meet the design objectives as stated in the approved wetland mitigation plan.

3.8 SUMMARY AND CONCLUSIONS

This wetland mitigation plan has been prepared to describe the mitigation replacement proposed as compensation for impacts to wetlands and streams that will occur by installing the Passive Drainage System at the Carbon Limestone Sanitary Landfill facility located in Mahoning County, Ohio.

The proposed Project will impact a total of 17 isolated wetlands totaling 3.81524 acre, four stream segments totaling 2,067 linear feet (l.f.), and five ponds totaling 1.55 acres. To offset these impacts, Carbon Limestone proposes to create a total of 6.90 acres of on-site wetland mitigation and 3,000 feet of cumulative stream mitigation that will provide aquatic resources with higher functions and values than those proposed to be impacted.

**MILE ONE WETLAND AND STREAM MITIGATION PLAN
PROPOSED PASSIVE DRAINAGE SYSTEM
CARBON LIMESTONE LANDFILL
MAHONING COUNTY, OHIO**



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