

## **STREAM AND WETLAND FUNCTIONAL ASSESSMENT**

### **STREAMS**

#### **EXISTING STREAMS**

In total, 18 jurisdictional streams were identified within the delineation area. The Primary Headwater Habitat Evaluation Index (HHEI) was used as a functional assessment tool to summarize biological habitat of a stream within the delineation area. The HHEI provides a quantitative method of comparison for the affected stream segment. Because all of the stream within the delineation area are undesignated by the Ohio EPA, the scores listed in the table below do not have context related to their ability to reach the warm water habitat designation. Rather, it serves to evaluate the integrity of the stream system as a whole and categorically rate the stream for the purpose of mitigation. Of the streams identified during the delineation, five streams (Streams 1, 6, 10, 12 and 13) achieved scores of 45 or higher. In total, 24,036 linear feet of stream occur within the original delineation area and 3,490 linear feet of these streams have proposed impacts under the proposed minimal degradation area.

#### **AQUATIC LIFE HABITAT**

##### *Intermittent & Perennial Streams*

The delineation area encompasses 449 acres and is drained primarily by unnamed tributaries of Stream 13 which discharges into Rush Run and unnamed tributaries discharging directly into Rush Run.

A common feature of the stream drainages is the existence of substrates consisting of unconsolidated boulders, slabs, cobbles, gravel, sand, and muck. The streams have substrate origins in sandstone and shale. Refer to the Primary Headwater Habitat Evaluation Index Field Sheets (HHEI) (Appendix I) for a more detailed description of the streams. Of the 18 streams verified by the Army Corps of Engineers, 8 streams are being proposed for impact.

Refer to Table 1 for descriptions of streams proposed for impact under the minimal degradation alternative (below).

*Table 1 –Stream Descriptions*

Stream ID	Description	Jurisdictional	Length Delineated	Channel Development	Riparian Width	HHEI Score
STREAM 5	EPHEMERAL	JURISDICTIONAL	158	Poor/Fair	WIDE	14
STREAM 11	EPHEMERAL	JURISDICTIONAL	196		WIDE	13
Stream ID	Description	Jurisdictional	Length Delineated	Channel Development	Riparian Width	HHEI Score
STREAM 1	INTERMITTENT	JURISDICTIONAL	1,381	Good	WIDE	47
STREAM 2	INTERMITTENT	JURISDICTIONAL	174	Poor/Fair	WIDE	19
STREAM 3	INTERMITTENT	JURISDICTIONAL	483	Fair	WIDE	26
STREAM 4	INTERMITTENT	JURISDICTIONAL	522	Poor/Fair	WIDE	19
STREAM 5	INTERMITTENT	JURISDICTIONAL	466	Poor/Fair	WIDE	14
STREAM 7	INTERMITTENT	JURISDICTIONAL	190	Fair	WIDE	25
STREAM 8	INTERMITTENT	JURISDICTIONAL	2492	Fair	WIDE	39
STREAM 9	INTERMITTENT	JURISDICTIONAL	16	Fair	WIDE	25
STREAM 12	INTERMITTENT	JURISDICTIONAL	644	Poor/Fair	WIDE	18
STREAM 14	INTERMITTENT	JURISDICTIONAL	1,575	Fair	WIDE	35
STREAM 15	INTERMITTENT	JURISDICTIONAL	1,072	Fair	WIDE	26
STREAM 16	INTERMITTENT	JURISDICTIONAL	2,948	Fair	WIDE	25
STREAM 17	INTERMITTENT	JURISDICTIONAL	207	Good	WIDE	65
STREAM 18	INTERMITTENT	JURISDICTIONAL	307	Poor/Fair	WIDE	18
Stream ID	Description	Jurisdictional	Length Delineated	Channel Development	Riparian Width	HHEI Score
STREAM 6	PERENNIAL	JURISDICTIONAL	436	Good	WIDE	49
STREAM 10	PERENNIAL	JURISDICTIONAL	787	Good	WIDE	65
STREAM 12	PERENNIAL	JURISDICTIONAL	1,732	Good	WIDE	49
STREAM 13	PERENNIAL	JURISDICTIONAL	7,596	Good	WIDE	50

*Ephemeral Streams*

Within the delineation area, 2 jurisdictional ephemeral streams were identified. A common feature of the ephemeral drainages is the existence of substrates consisting variously of unconsolidated cobbles, gravel, sand, silt, leaf pack wood/woody debris, fine detritus, and muck.

The ephemeral streams, for the most part originate higher on the hillsides and therefore have substrate origins largely in sandstone. Refer to Table 1 - Stream Descriptions, for more information pertaining to these streams.

### **STORMWATER ATTENUATION**

Stormwater attenuation was determined to be moderate to high for the streams identified within the delineation area. Despite having small channel dimensions (i.e. limited channel storage), a majority of the streams had moderately high width to depth ratios (entrenched channels have limited access to floodplains) and steep gradients (> 10%).

### **GROUNDWATER RECHARGE**

Groundwater recharge was determined to provide moderate function for streams within the study area due to high channel gradients. High channel gradients reduce the opportunity of groundwater to infiltrate and limited time of residence of groundwater in the stream.

### **WILDLIFE HABITAT**

On-site habitat is dominated by second-growth forest, old field and pasture. These habitat types provide abundant opportunity for a wide variety of game and non-game species. The trees on-site provide a relatively closed canopy and abundant mast for consumption. In addition, the forest floor is covered with shrub and herbaceous species.

### **NUTRIENT CYCLING**

Nutrient cycling functions were found to be low for many of the streams within the study area. As stated earlier, many of the streams on-site have steep gradients and therefore do not have an opportunity to retain large quantities of woody debris and leaf packs that aid in nutrient cycling functions. In addition, limited watershed sizes, limited flow, and limited solar exposure also limit the ability of these streams to provide higher nutrient cycling.

### **WATER QUALITY**

The streams on-site are located within a heavily forested area where trees and other vegetation help stabilize the soil. Forb species are present on the forest floor adjacent to the streams and help dissipate the energy of surface water prior to entering the stream channel thus reducing the amount of sediment entering the stream. According to the HHEI forms, none of the streams showed signs of extensive riffle embeddedness, showing that a normal amount of silt is entering the streams. This indicates that erosion from the abandoned mineland spoils is normal.

### **PROPOSED STREAMS**

#### **AQUATIC LIFE HABITAT**

The proposed stream mitigation includes the reconstruction of the impacted stream in its approximate pre-impact location, Grasses planted along stream banks will overhang the stream channel and provide nutrients and cover for aquatic life. Trees and shrubs planted within the riparian zone will shade portions of the stream and create varying microclimates. As these grasses, trees and shrubs mature, their roots will infiltrate the stream bank and create additional habitat. Trees not adjacent to the streambed will also function to improve water quality by slowing surface water flow to the stream, filtering sediment, and helping to sequester

contaminants. Riparian enhancement will be self-maintaining and given time to develop will continue to improve the quality of aquatic habitat within the reconstructed stream.

### **STORMWATER ATTENUATION**

Stormwater attenuation was determined to be moderate to high for the streams identified within the delineation area. The proposed stream mitigation will be designed using natural stream channel design techniques and will allow for the streams to naturally modify their channels to provide changing depth, width, and bank slope to accommodate changes in flow. Riparian enhancement in the stream buffer zone will also improve stormwater attenuation by containing stormwater runoff from the site while create a functional floodplain that will reduce storm flow velocities and regulate rates of discharge.

### **GROUNDWATER RECHARGE**

Groundwater recharge was determined to provide moderate function for streams within the study area due to relatively high channel gradients. The proposed stream mitigation is required to be located in the approximate pre-impact locations.

As the riparian zone matures, the buffer zone roots system will become more complex and will ultimately aid in groundwater recharge.

### **WILDLIFE HABITAT**

Wildlife habitat functions are expected to be replaced though the plait of riparian vegetation along stream banks and buffer zones. The post-mining land use will be undeveloped grazing land. Given the time to develop, intact riparian corridors will provide refuge and travel lanes for wildlife in the project area. The stream also provides a source of water and food (e.g., aquatic invertebrates, frogs, and salamanders) for local wildlife.

### **NUTRIENT CYCLING**

The proposed stream mitigation will provide a limited amount of nutrient cycling in the form of woody debris and leaf packs. Due to the limited size of the respective watersheds, lack of detritivore communities, limited solar exposure and limited flow, the proposed streams will be limited in their ability to provide higher nutrient cycling functions. Grasses planted along the stream banks will have into the water and provide additional nutrients to the stream, thus aiding in nutrient cycling as well.

### **WATER QUALITY**

A total of nine (9) sediment ponds will trap sediment resulting from construction and refuse disposal activities. The ponds are meant to reduce the transport of sediment and other substances while maintaining water quality standards in the watershed. Diversion ditches will also be constructed and maintained to assure that all runoff from the permit area is directed to the sediment ponds as designed. The proposed project is expected to improve the water quality within the watershed.

## WETLANDS

*Table 2 – Jurisdictional Wetland Descriptions*

<b>Wetland ID</b>	<b>HGM Class</b>	<b>Jurisdictional (Y/N)</b>	<b>ORAM Score</b>	<b>Acreage Delineated</b>
WD-A	PEM	Yes	45	0.04
WD-B	PEM	Yes	34	0.31
WD-C	PEM	Yes	19	0.06
WD-F	PEM	Yes	66	1.50
WD-G	PEM	Yes	55	0.53
WD-H	PEM	Yes	53	0.05
<b>Total Acreage Delineated</b>				<b>2.49</b>

### **EXISTING WETLANDS**

The area incorporates six (6) jurisdictional wetlands. The acreages of wetlands are identified and described in the Preliminary Jurisdictional Determination Report included as part of this application.

The six jurisdictional wetlands identified within the delineation area total 2.49 acres. None of these wetlands are intended to be permitted under the minimal degradation alternative.

ORAM Version 5.0 was used to rate the delineated wetlands in accordance with current OEPA standards and to determine the appropriate regulatory category in which to place the wetland. Additionally, the assessment was employed to evaluate the overall ecological quality and the level of function of a particular wetland. The numeric score obtained from the ORAM field form is not, and should not be considered an absolute number with intrinsic meaning however this score will allow for relative comparisons between wetlands.

### **HABITAT FOR WETLAND FLORA AND FAUNA**

Description of Wetland of the wetlands identified onsite can be found in the Preliminary Jurisdictional Determination Report included as part of this application.

### **FLOODWATER STORAGE AND GROUNDWATER RECHARGE**

This function was determined to be moderate due to the collective size and proximity to the other wetlands delineated for this project. The total of 2.49 acre of wetlands would have the ability to store an estimated maximum of 108,464 cubic feet of water.

### **NUTRIENT CYCLING**

The wetlands within the delineation area contribute to nutrient cycling primarily by decomposing plant material, animal remains, soil microorganisms, and by serving as a repository for nutrient rich sediment from erosion and flooding. The extent to which nutrient cycling functions are provided by these wetlands is primarily a function of wetland size and vegetative structure. Forested wetlands (none identified on-site) are generally considered to have higher nutrient cycling functions than scrub-shrub or emergent wetlands. The wetlands identified on-site are considered to provide minimal nutrient cycling functions.

## **WATER QUALITY**

The collective size of the individual wetlands was determined to have moderate water quality improvement functions. None of the wetlands individually provides anything more than minimal water quality functions. The ability of these wetlands to process and filter contaminants is limited by their small size, shallow depth and limited ability to store water. There is a direct relationship between retention time and the sequestration of contaminants as well as removal of suspended solids. Despite this, the presence and location of several small wetlands was determined to have a positive affect on water quality.

## **PROPOSED WETLANDS**

Under the preferred alternative 0.04 acres of wetland is proposed to be impacted. Please refer to the Compensatory Mitigation Plan for details concerning mitigation.