STREAM AND WETLAND FUNCTIONAL ASSESSMENT

STREAMS

EXISTING STREAMS

In total, 16 streams (jurisdictional ephemeral and intermittent) 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. The HHEI is a tool developed by the Ohio EPA to evaluate the ability or potential of a stream to achieve warm water habitat and other aquatic life use identified in OAC 3745-1-07. 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. In total, 7424 linear feet of jurisdictional stream were identified within the original delineation area with 6,030 linear feet of that falling within the proposed preferred alternative.

Of the streams reaches evaluated onsite, ten scored in the range of Class 1 PHWH (HHEI < 30) and six scored in the range of Class II PHWH (HHEI = 30-69) and none of the streams scored in the range Class III PHWH (HHEI > 70).

AQUATIC LIFE HABITAT

Intermittent & Perennial Streams

Drainage from the delineation area flows through two primary unnamed streams (Stream 1 and Stream 9) that each connect directly offsite with Wheeling Creek.

A common feature of the stream drainages is the existence of substrates consisting of unconsolidated cobbles, gravel, sand, and muck. Refer to the HHEI field forms (Appendix I) for a more detailed description of the streams.

Refer to Table 1 for descriptions of delineated streams (below).

Table 1 –Stream Descriptions

Stream ID	Description	Jurisdictional	Length Delineated	Channel Development	Riparian Width	HHEI Score
4	Ephemeral	Yes	343	Poor/Fair	Wide	14
5	Ephemeral	Yes	28	Poor/Fair	Wide	28
6	Ephemeral	Yes	14	Poor/Fair	Moderate	47
7	Ephemeral	Yes	22	Stable	Moderate	37
7A	Ephemeral	Yes	76	Poor/Fair	Moderate	No Score
11	Ephemeral	Yes	583	Poor/Fair	Wide	15
14	Ephemeral	Yes	30	Poor/Fair	Moderate	25
15	Ephemeral	Yes	15	Stable	Moderate	26
Stream ID	**Description**	**Jurisdictional**	**Length Delineated**	**Channel Development**	**Riparian Width**	**HHEI Score**
1	Intermittent	Yes	1,204	Stable	Wide	50
2	Intermittent	Yes	35	Stable	Wide	38
3	Intermittent	Yes	368	Stable	Narrow	24
5	Intermittent	Yes	517	Fair	Moderate	28
6	Intermittent	Yes	96	Fair	Moderate	47
7	Intermittent	Yes	367	Stable	Moderate	37
8	Intermittent	Yes	382	Stable	Moderate	31
9	Intermittent	Yes	3,128	Stable	Moderate	37
10	Intermittent	Yes	108	Fair	Wide	19
12	Intermittent	Yes	282	Stable	Wide	26
13	Intermittent	Yes	533	Stable	Wide	26
14	Intermittent	Yes	316	Fair	Wide	25
15	Intermittent	Yes	280	Stable	Wide	26

Ephemeral Streams

Within the delineation area, eight jurisdictional ephemeral stream reaches were identified. A common feature of the ephemeral drainages is the existence of substrates consisting variously of unconsolidated 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 surrounding landscape 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 plaint 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 four sediment ponds (four temporary and zero permanent) 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

EXISTING WETLANDS

Six (6) jurisdictional wetlands were identified within the original delineation boundary. The acreages of wetlands are identified are described in the Preliminary Jurisdictional Determination Report, the General Descriptions of the Aquatic Environment Directly Affected and the table below.

Of the jurisdictional wetlands identified within the delineation area, four are intended to be permitted under the preferred alternative.

ORAM Version 5.0 was used to rate the delineated wetland 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.

Table 2 – Wetland Descriptions

Wetland ID	HGM Class	Jurisdictional (Y/N)	ORAM Score	Acreage Delineated
WD-A	PEM	Yes	47	1.23
WD-B	PEM	Yes	17	0.07
WD-C	PEM	Yes	27	0.06
WD-D	PEM	Yes	25	0.11
WD-E	PEM	Yes	46	0.30
WD-F	PEM	Yes	37	0.06
			Total Acreage Delineated	**1.83**

HABITAT FOR WETLAND FLORA AND FAUNA

The wetland delineated on the Lafferty-Kaczor area have all been either created by pre-law mining or affected by cattle grazing. Despite the scores of wetlands A, E and F the wetland should not be considered to be of high quality. The reasons for the elevated scoring are due mainly to substantial hydrologic input and buffers rather than the vegetative/habitat quality of the wetlands directly.

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 1.83 acres of jurisdictional wetlands would have the ability to store an estimated maximum of 79,715 cubic feet of water.

NUTRIENT CYCLING

The wetlands within the delineation area contributes 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. In addition, the presence of pre-law mine drainage and cattle likely have an overwhelming negative affect on water quality. 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

HABITAT FOR WETLAND FLORA AND FAUNA

The proposed mitigation wetland will provide increasing amounts of habitat for wetland flora and fauna than the existing wetland because the wetland area impacted by the project will be replaced with a larger wetland (0.945 acres). The mitigation wetland will provide increased plant diversity as indicated in the Compensatory Mitigation Plan. Increased plant diversity provides a greater variety of host plants, food sources, nutrients, and shelter for a variety of wildlife.

FLOODWATER STORAGE AND GROUNDWATER RECHARGE

Floodwater storage and groundwater recharge will improve in the mitigation wetland. Due to its size (1.5 times the impacted wetland acreage), the mitigation wetland will have a greater capacity to retain water, thus increasing both the ability to store floodwater and recharge groundwater.

NUTRIENT CYCLING

Nutrient cycling will improve due the increased diversity of the plant community of the mitigation wetland. Diverse plant communities possess greater ability to breakdown and convert nutrients to biologically usable forms.

WATER QUALITY

The proposed mitigation wetland will provide greater surface area than the existing wetland and is expected to provide more moderate water quality functions related to surface water residing in the wetland for longer periods. Increased plant diversity will also increase the wetlands' ability to sequester contaminants contained in surface water entering the wetland.