



THE HIGHLANDS DEVELOPMENT

OHIO COUNTY, WEST VIRGINIA

STREAM & WETLAND MITIGATION
PLAN & PLAN NARRATIVE

This document is being submitted as part of the complete application package for the CWA §404 Individual Permit and West Virginia §401 Water Quality Certification for impacts to United States Army Corps of Engineers jurisdictional aquatic resources.

Submitted on behalf of:
Ohio County Commission
Ohio County Development Authority
1500 Chapline Street, Room 215
Wheeling, WV 26003

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1.0 PROJECT DESCRIPTION

THE HIGHLANDS is a multi-phased commercial and retail development area being undertaken by the Ohio County Development Authority of Ohio County, West Virginia. THE HIGHLANDS is located near Triadelphia, West Virginia adjacent to Interstate 70. THE HIGHLANDS development, when completed, will encompass over 1,000 acres.

THE HIGHLANDS is now a unique asset to Ohio County and surrounding communities. The current development has over 1,000,000 square feet of warehouse/distribution center and major retail stores including Cabela's, Wal-Mart, Target, J.C. Penney's, and Kohls. THE HIGHLANDS will bring several thousand permanent jobs to the area, plus substantial tax revenue to Ohio County. THE HIGHLANDS is designated as a Tax Increment Financing (TIF) district. The TIF, among other positive assets, allows the County to collect a portion of sales and property taxes from businesses within its boundary. TIF lines are shown on the plan, and were established by the State at the onset of THE HIGHLANDS project.

The development of THE HIGHLANDS has required and will require filling and encroaching upon stream and wetland resources within the project area. To date, impacts have occurred to approximately one (1) acre of jurisdictional wetland and 850 linear feet of streams. At this time, these impacts have not been mitigated. In addition, 0.23 acre of wetland and 9,000 linear feet of stream impacts are proposed for proposed phase developments.

The wetland and stream mitigation plan being proposed by Wallace & Pancher, Inc. (WPI), for THE HIGHLANDS development will provide wetland and stream mitigation for all previous impacts and for the proposed impacts. The proposed mitigation plan proposes to conduct stream restoration and enhancement activities along a 16,300 foot-long reach of Middle Wheeling Creek along Middle Wheeling Creek Road approximately one two (2) miles southeast of THE HIGHLANDS development site, beginning near the Middle Wheeling Creek Road/Dallas Pike intersection and ending at the uppermost end of Middle Wheeling Creek Lake. This reach of Middle Wheeling Creek is considered to be a "mitigation corridor" as opposed to a specific area. Activities such as the creation of floodplains, bank stabilization, and riparian vegetation plantings will be completed at degraded sections of Middle Wheeling Creek within this 16,300 foot-long reach. Wetland habitat will be constructed within the newly created and existing floodplain areas.

Mitigation activities will not necessarily be conducted along each foot of Middle Wheeling Creek. Reaches of the stream which are not significantly degraded will not be altered. Reaches experiencing bank erosion and collapse, sediment aggradation, flow dissemination, etc., will be targeted for enhancement and restoration work that will create, in conjunction with the relatively stable reaches, a vastly improved, stable, ecologically valuable stream reach.

2.0 MITIGATION DESIGN CONSIDERATIONS

Certain issues were considered during the development of the mitigation plan. Such mitigation design considerations were:

1. WVDNR maintains a delayed harvest area for stocked trout (*Oncorhynchus mykiss*) within in Middle Wheeling Creek. The mitigation design should enhance existing habitat and create additional habitat for trout.
2. The mitigation design should not draw down the flow volume and depth of Middle Wheeling Creek as to make certain reaches of the stream inaccessible or inhabitable for stocked trout, native fishes, and all other native aquatic fauna.
3. Wetland mitigation areas should not be designed in such a manner that creates stagnant pools of standing water, thereby providing mosquito breeding habitat.
4. The predominance and shallow depth of bedrock within the mitigation corridor limits or excludes certain mitigation techniques, such as the installation of rock cross-vanes. Therefore, variations of such techniques need to be developed that will provide the same function but are more applicable to the conditions within the mitigation corridor.

3.0 GENERAL MITIGATION CONCEPT

In many cases, stream mitigation is approached by selecting spot locations where smaller projects can be completed so that the cumulative length or area equals the mitigation requirement. However, under this approach, completing spot-location mitigation may have only minimal positive effects because the improvements are isolated and spread throughout the watershed. Through consideration of multiple options, WPI determined that the mitigation would be far more positively effective if it were focused in a primary area. Thereby, WPI elected to pursue a mitigation corridor concept as opposed to completing mitigation in multiple locations in the immediate and adjacent watersheds. By focusing the mitigation effort within a specific reach of one (1) stream system, the effect of the mitigation activities at multiple locations within that reach will have a more significant cumulative positive effect on the quality of water and habitat within the corridor.

The mitigation concept has been developed under the principal of limiting mitigation activities to stream reaches where they will actually be effective. For instance, if a stream reach currently has accessible vegetated floodplains, the streambank will not be excavated to add a few additional feet of engineered floodplain simply for the sake of conducting some activity in the reach. Non-degraded reaches of the stream will be left in their current state, except for perhaps having additional riparian trees, shrubs, and/or seeding placed.

WPI employs Natural Stream Channel Design (NSCD) techniques when conducting stream mitigation to promote a stable stream corridor and improve aquatic health. The concept of a natural stream corridor would be realized through channel realignments, creating natural meanders and better defined thalwegs, installation of fish habitat structures

and random boulders, excavation of floodplains, and creation of floodplain and riparian wetlands.

3.1 STREAM MITIGATION

Stream mitigation will be achieved through enhancement of the stream channel of Middle Wheeling Creek using multiple methods. For example, this particular stretch of Middle Wheeling Creek has become significantly entrenched and has limited to no access to floodplains. Therefore, floodplains would be created along these entrenched reaches. The creation of floodplains will allow Middle Wheeling Creek to dissipate flow energy during flood events, which now are causing significant bank erosion and down-cutting of the stream bed. Other enhancement methods that will be applied within the mitigation reach are random boulder placements, bank stabilization, channel realignments (in critical areas), thalweg realignments, placement of fish habitat structures (e.g. rootwads, woody debris, pools), and planting of riparian vegetation. The combined effect of these methods will create a physically stable and energy-efficient reach of Middle Wheeling Creek. These methods will also improve aquatic habitat for macrobenthos, fishes, amphibians, and all other wildlife that utilize the stream.

3.2 WETLAND MITIGATION

Previously incurred and proposed wetland impacts at The Highlands total approximately one (1) acre. Wetland habitat will be created at a 1.5:1 ratio; therefore, at least one-and-a-half (1.5) acres of wetland mitigation is required. Rather than create a single wetland, multiple wetlands will be created within the newly created floodplains and in existing floodplain areas. The creation of floodplain wetlands serves two primary purposes: (1) the wetlands will provide additional habitat for aquatic biota; and, (2) the wetlands will provide floodwater storage during high-flow events thereby reducing flow stresses within the stream. The newly created wetlands will consist of emergent, shrub, forested and mixed vegetative habitats. The diversity of habitats will promote utilization by a wide array of aquatic and terrestrial wildlife and will aid in bioretention of floodwaters.

Although 1.5 acres of mitigation is required, more wetlands will be created. Due to the extent of the mitigation corridor, 1.5 acres of wetland would have minimal positive effect on Middle Wheeling Creek. Therefore, additional wetlands will be created in order to markedly improve the quality and effectiveness of the wetland habitat within the mitigation corridor.

4.0 SPECIFIC MITIGATION PLANS AND DETAILS

Prior to the development of the mitigation concept, reference reaches within the mitigation corridor were identified for the purpose of determining the wetted channel width, bankfull heights, and bankfull widths that should be present in this stream. Two (2) reference reaches were identified and cross-sectional surveys were completed within these reaches. Based upon cross-sectional surveys of the reference reaches, the wetted channel should be approximately twenty-five (25) feet wide, the bankfull width should be approximately thirty (30) feet, and the bankfull height (calculated as the difference between the bankfull elevation and the thalweg elevation) should be approximately one (1) foot. Six (6) additional cross-sections were surveyed in stream reaches which were degraded or appeared out of balance. In these degraded areas, bankfull heights ranged from 1.2 to 1.6 feet, indicating moderate to significant departure from the bankfull height identified at the reference reaches. Also in the degraded areas, bankfull widths ranged from thirty-five (35) to fifty (50) feet, indicating moderate to significant departure from the bankfull width indicated at the reference reaches. Finally, in the degraded areas, wetted channel widths ranged from seventeen (17) to forty-five (45) feet, again indicating moderate to significant departure from the wetted channel width indicated at the reference reaches.

Throughout most of the mitigation reach, floodplains are insufficient or inaccessible for Middle Wheeling Creek. The stream is significantly incised in the upper length of the mitigation reach. In some reaches, bank slopes are as much as nine (9) feet high with slopes as steep as 0.3:1. These steeply sloping banks, which are caused by the stream's aggressive down-cutting, have entrenched the stream, cutting it off from its floodplains. In its current state, the stream will continue to down-cut until it reaches bedrock. When it finally reaches the bedrock, the stream will begin to undercut its banks, causing mass wasting, as the stream attempts to widen itself and create floodplains. This process is the natural means by which Middle Wheeling Creek will achieve balance. However, this process would cause significant damage to private and public properties and roads, and would threaten homes and structures along the stream. In addition, the increase of suspended solids resulting from the bank erosion would be significantly detrimental to aquatic life in Middle Wheeling Creek and Middle Wheeling Creek Lake. In the lower half of the mitigation reach, the stream has reached the bedrock layer. Applying NSCD theory, floodplains within the mitigation reach should have a cumulative width of forty (40) feet at a height of approximately one (1) foot above the thalweg elevation. Therefore, a principal component of the mitigation plan developed by WPI is to create floodplains in areas where floodplains are not sufficient or accessible. The excavation of flood plains will facilitate the stream's balancing process, but it will prevent the potential losses and damages which could result from this natural process.

The following sections describe the specific mitigation activities that will be completed at particular locations, as defined by stream stationing. Refer to the mitigation plan drawings for visual representations of the stationing and the proposed activities.

4.1 Sta. 1+00 to Sta. 7+00 (700 linear feet)

Within the uppermost portion of the mitigation reach, the stream is moderately incised with decent development of natural floodplains. Riparian vegetation in this section is insufficient. Therefore, mitigation activities planned in this section are to remove debris blockages and plant additional riparian vegetation. Riparian planting will be primarily native trees and shrubs which will stabilize the stream banks and provide shading for the stream to reduce thermal pollution.

4.2 Sta. 7+00 to 12+50 (550 l.f.)

This stream section has become significantly incised and has no floodplain access. Bank slopes on the left bank (looking downstream) are steep and is situated along the toe of a hill slope. Therefore, floodplains will be excavated to a width of approximately 40 feet on the right bank. Floodplain seedmix, trees and shrubs will be planted in and adjacent to the newly created floodplains. Riparian vegetation will be planted along the left bank to provide bank stabilization.

4.3 Sta. 12+00 to 22+00 (1,000 l.f.)

This portion of Middle Wheeling Creek is deeply incised and the current channel alignment directly abuts Middle Wheeling Creek Road. To prevent Middle Wheeling Creek from undercutting and washing out the road, limestone riprap and Jersey barriers have historically been placed along the right streambank and road embankment. The radius of curvature for this stream meander is sixty (60) feet, which is too tight and is directing the stream's flow energy directly into the road embankment. Therefore, the stream will be re-aligned away from the road, creating a radius of curvature of approximately 100 feet, based upon NSCD principals. The new stream channel will be excavated within an open field area on the left bank of the stream. The realignment will shorten the stream length through this reach by 100 feet. By shortening the distance from the origin to the downstream terminus of this meander, the slope of the stream bed will be increased by 0.09% (i.e. existing slope 0.49%; proposed slope 0.58%). This slope increase is negligible. Boulders will be placed in the streambank along short bends in the channel. Rock cross-vanes cannot be used because the bedrock is too shallow and does not allow for the placement of footer rocks to anchor cross- vanes. Therefore, streambank boulders will be placed to prevent bank erosion and channel migration along these short bends. Floodplains will be created on both right and left banks. A 0.44 acre floodplain wetland will be constructed on the right bank between the relocated stream and Middle Wheeling Creek Road. This wetland will provide for attenuation of flood waters and will also serve to dissipate flow energy from the stream during floods, thereby prevent degradation to the road embankment. To further protect the road embankment, additional limestone riprap will be placed along the road embankment. Appropriate seedmixes and woody vegetation will be planted along the relocation reach and within the floodplain wetland.

4.4 Sta. 22+00 to 41+00 (1,900 l.f.)

This portion of Middle Wheeling Creek also flows parallel to Middle Wheeling Creek Road, between the road and the Camp Giscowhego property. The stream is moderately to minimally incised. Bedrock is exposed throughout the majority of this section. Narrow, isolated floodplains have developed within this reach, however floodplain access remains insufficient. Therefore, a 40-foot wide floodplain will be created along the left bank (opposite from the road) of this reach. At minimum, a 0.15 acre floodplain wetland will be constructed within this reach. Additional wetland habitat may be constructed at the contractor's discretion. Appropriate floodplain, wetland, and riparian vegetation will be planted to enhance stream stability. Short breaks in the floodplains will be required to allow for existing driveways that provide access to the camp.

4.5 Sta. 41+00 to 44+00 (300 l.f.)

No mitigation activities are proposed within this reach. Prior stream mitigation has been conducted in this reach.

4.6 Sta. 44+00 to 46+00 (200 l.f.)

This section is within the previous stream mitigation area. Floodplains were created on a relatively flat area on the right bank of the stream. As this area has settled, it has begun to develop small pockets of palustrine, emergent wetland. This location is thereby favorable for the creation of a larger, emergent and scrub/shrub floodplain wetland. This wetland will be approximately 0.17 acre in area. Minor excavation will create a depression which will provide stormwater retention and an attenuation area for runoff from the road and adjacent uplands and for floodwaters from Middle Wheeling Creek.

4.7 Sta. 46+00 to 55+00 (900 l.f.)

This section of Middle Wheeling Creek will have the greatest concentration of mitigation activities within the mitigation corridor. Several mitigation techniques will be applied in an overlapping manner. Therefore, activities within this section will be sub-divided to prevent confusion.

4.71 Sta. 46+00 to 50+50 (450 l.f.)

Currently, a relatively flat wooded area is situated along the right bank of Middle Wheeling Creek between the creek and Middle Wheeling Creek Road. This forested area is subjected to stormwater a stormwater input. Stormwater runoff is piped under the road from Middle Wheeling Creek Road and adjacent uplands. The stormwater is then conveyed to Middle Wheeling Creek through a channel (most likely an abandoned flood channel) which runs parallel to the road before turning to run directly to the stream. The current stormwater conveyance system does not provide for any

retention, attenuation, or cleansing of the stormwater before it discharges into Middle Wheeling Creek. Therefore, WPI is proposing to modify the grading in this wooded area to create a forested wetland. The stormwater conveyance channel would be constricted to allow water to be retained in the forested area. Grading within the wooded area would be done in such a manner as to create depressional areas within and between existing trees. This excavation would create a mosaic forested wetland habitat. Existing large trees would be left in place. Wetland tree species, such as American sycamore (*Platanus occidentalis*), and American elm (*Ulmus americana*) already exist within the wooded area. Selected smaller trees would be removed to allow easier access for excavation. The end result would be a mature forested wetland which would provide for stormwater treatment as well as providing a floodwater retention area for Middle Wheeling Creek during extreme flow events, and would provide habitat for aquatic and terrestrial wildlife.

4.72 Sta. 46+25 to 47+25 (100 l.f.)

Within this stretch of stream, Middle Wheeling Creek flows directly into a nearly vertical slope on the left bank, which has formed the apex of a short meander. At the point at which the stream meets this steep slope, the stream is eroding the bank and causing the bank to collapse. To stabilize and reinforce the left bank from further erosion, large boulders will be placed along the left bank. In addition, large debris blockages frequently occur at this meander due to a natural narrowing of the stream's cross-sectional area. Any debris creating a blockage at this point will be removed.

4.73 Sta. 47+00 to 55+00 (800 l.f.)

At this point within the mitigation reach, bedrock becomes the dominant stream bed material. Because of the presence of bedrock, the stream can no longer down-cut to create floodplains. As water flows over the bedrock, it spreads out, thereby losing velocity and subsequently loses its capacity for sediment and substrate transport. Suspended materials fall out of the water column and accumulate within the streambed. Within this stream section, the broad dispersal of the flow has created the condition by which sediment and substrate materials have accumulated in a non-uniform manner and they stream does not have a defined flowpath, thalweg, or floodplain. Typically, rock cross-vane structures could be installed to help direct the stream's flow in a particular path. This would facilitate the development of a defined flowpath, thalweg, and floodplain. However, the presence of bedrock within the stream prevents the use of cross-vanes, since footer rocks cannot be installed within the streambed to anchor the cross-vanes. Therefore, to create a thalweg for the stream, an alternative approach must be utilized. Simply excavating or shaping a thalweg using streambed materials would not work because the materials would simply be redistributed during the next high-flow event, thereby again eliminating a thalweg. To create a stable thalweg and floodplains, WPI is proposing to create boulder

floodplain cells within this reach. Please refer to the details in the Mitigation Plan sheets. In summary, groups of large boulders will be placed along both banks so that the boulders protrude toward the center of the stream. Boulder groupings would be set approximately 100 feet apart, thereby creating cells. Stream bed materials, such as sand, gravel, cobble, and rocks, excavated from this stream reach would be used to fill in the spaces between the boulder groupings. The placement and shaping of the streambed materials would create a defined channel and thalweg. The boulders will anchor the cells and absorb flow energy from the stream to prevent the displacement of the streambed material placed within the cells. To further stabilize the cells, soil would be mixed in with the streambed materials and shrubs and herbaceous vegetation will be planted. Initially, a fast-growing plant, such as annual ryegrass (*Lolium multiflorum*), would be planted to provide immediate stabilization until such time that the floodplain seedmix and shrubs could germinate and establish themselves.

4.8 Sta. 55+00 to 58+50 (350 l.f.)

No mitigation activities are proposed for this reach.

4.9 Sta. 58+50 to 65+50 (700 l.f.)

This reach of Middle Wheeling Creek is similar to that of the stream reach described in 4.3. The stream directly abuts Middle Wheeling Creek Road. The road is currently protected by a corrugated steel and piling wall. The stream will be relocated through this portion to move the channel away from the road. The re-alignment will be designed to create a radius of curvature of approximately 100 feet. Floodplains will be excavated along the streambanks. Boulders will be placed on the outside of minor bends in the relocation area and at the base of the existing retaining wall along the road. Appropriate seedmixes and woody vegetation will be planted along the relocation reach. The relocation will reduce the stream length through this area by ninety-four (94) feet. By shortening the distance from the origin to the downstream terminus of this meander, the slope of the stream bed will be increased by 0.02% (i.e. existing slope 0.47%; proposed slope 0.49%). This increase of slope is negligible.

4.10 Sta. 65+50 to 67.00 (150 l.f.)

No mitigation activities are proposed for this reach.

4.11 Sta. 67.00 to 73+00 (600 l.f.)

Within this reach of Middle Wheeling Creek, the stream substrate is composed entirely of bedrock. The stream cannot down-cut through the bedrock so the stream flow in this area spreads out to create a forty-five (45) foot-wide wetted channel. Water depth in this stream portion during normal flows is typically less than one

(1) inch. Due to the shape of the bedrock, the stream flow turns back into itself. This reach of the stream does not provide adequate habitat for aquatic organisms and, due to the shallow water and lack of vegetative and substrate cover, this reach acts as a migration barrier for trout and other fishes. WPI is proposing to cut a meandering channel and thalweg, approximately twenty (20) feet wide by one (1) foot deep, into the bedrock through this reach. The lack of streambed materials and prevalence of bedrock prevents successful usage of cross-vanes or boulder floodplain cells. Rather, by creating the thalweg in the bedrock, the stream will naturally develop floodplains as suspended and transported materials are deposited along the streambank. These materials will build up over time, covering the bedrock, and will become vegetated through natural succession. By concentrating the stream's flow into a channel, flow depths will be increased thereby facilitating upstream migration by trout and other fishes into the upper reaches of the mitigation corridor. In addition to the stream work, a 0.46 acre floodplain wetland will be constructed in a flat, low-lying area on the right bank of Middle Wheeling Creek. Hydrology for this wetland will be supplied primarily by precipitation, surface runoff, and floodwater from Middle Wheeling Creek. Appropriate wetland vegetation and seeding will be planted in the newly created wetland area.

4.12 Sta. 73+00 to 75+50 (250 l.f.)

No mitigation activities are proposed for this reach.

4.13 Sta. 75+50 to 83+50 (800 l.f.)

This reach of Middle Wheeling Creek is similar to the reach described in Sub-section 4.73. The stream substrate is primarily bedrock with a diffuse mix of sand, gravel, cobble, and small bolder materials. Flow through this area is diffuse, creating a reach with a poorly defined thalweg. In this reach, the boulder floodplain cell technique would again be used to create a channel of appropriate width and depth with accessible floodplains. Refer to Sub-section 4.73 and the Mitigation Plan drawings for details on the boulder floodplain cells.

4.14 Sta. 83+50 to 86+50 (300 l.f.)

No mitigation activities are proposed for this reach.

4.15 Sta. 86.50 to 95+50 (900 l.f.)

This reach of Middle Wheeling Creek is in a relatively stable condition. The wetted channel width is similar to that of the wetted channel width in the reference reaches. Streambed materials are similar to those within the stream sections described in Sub-section 4.73 and Section 4.13. WPI is not proposing to conduct and alteration to the cross-section of the stream in this area. Random boulders will be placed within the stream channel to create habitat for trout and other fishes. By

placing boulders within the stream, eddys will form on the downstream side of the boulder. The eddys can serve as shelter and resting areas for migrating trout. Macroenthos will shelter themselves and algae, plants, and detritus will accumulate in these eddys, thereby creating food sources for fishes. Also, sediments will accumulate within these eddys and on the backsides of the boulders. These accumulated sediments could potentially serve as spawning areas for fishes and other aquatic organisms.

4.16 Sta. 95+50 to 99+50 (400 l.f.)

No mitigation activities are proposed for this reach.

4.17 Sta. 99+50 to 103+25 (375 l.f.)

In this reach, the stream is currently flowing into a vertical cut on the right bank and is then deflected back into the established flow path. The stream has no access to floodplains on the right bank and limited access to floodplains on the left bank. Therefore, floodplains will be excavated primarily on the left bank and supplemented with floodplain excavation of on the right bank. The point at which the stream is currently flowing into the vertically cut bank will be armored with boulders to prevent further erosion and subsequent soil and sediment loading. Floodplain and riparian vegetation will be planted to stabilize the floodplains and riparian areas.

4.18 Sta. 103+25 to 106+50 (325 l.f.)

No mitigation activities are proposed for this reach.

4.19 Sta. 106+50 to 108+75 (225 l.f.)

To create in-stream fish habitat, the random boulder placement technique will be utilized in this reach in the same manner as is described in Section 4.15. The streambed in this reach is predominantly bedrock.

4.19 Sta. 108+75 to 118+25 (950 l.f.)

Within this reach, WPI is not proposing to alter the stream's existing cross-section. The streambed in this reach is predominantly bedrock. Additional fish habitat structures will be placed randomly through this reach in the form of rootwads which would be anchored into the streambanks. Rootwads will provide woody-debris habitat which will provide shelter for fishes and macroenthos and will create locations for plant material and detritus to accumulate. These rootwads are created by burying the trunk of a tree into the streambank with the rootball protruding into the stream. Rootwads function much the same as random boulders, except that they are placed in the stream banks.

4.20 Sta. 118+25 to 137+00 (1,875 l.f.)

This reach of Middle Wheeling Creek has a flow path which has placed the right bank of the stream against a nearly vertical hillside. The streambed in this reach is predominantly bedrock. Since this hillside is a natural structure, as opposed to the roadways in upper reaches, WPI is not proposing to alter the flowpath. Because the slope the hillside is so steep, there are no floodplains on the right bank of the stream. Floodplains are developing on the left bank, however, the floodplain is not consistent. Therefore, floodplains would be excavated to a width of 40 feet along approximately 1,200 feet on the left bank of Middle Wheeling Creek. In-stream and streambank fish habitat structures (e.g. random boulders and rootwads) would be placed within this reach as well.

4.21 Sta. 137+00 to 161+50 (2,450 l.f.)

No mitigation activities are proposed for this reach. The stream in this reach is not significantly degraded and appears to be in a state of balance. Near Station 161+50, Middle Wheeling Creek enters Middle Wheeling Creek Lake. This confluence point varies from season to season depending upon the frequency of precipitation. The fluctuation of the water makes it difficult to plan a mitigation strategy that would be worthwhile. In addition, the confluence area is dominated by a large palustrine emergent/scrub-shrub wetland. In order to conduct mitigation work in this reach, this wetland would be impacted by machinery. At this time, WPI believes that it is not prudent to impact the wetland to conduct stream mitigation in a reach that does not have an obvious need for mitigation. Therefore, no work is proposed in this reach.

5.0 SUMMARY

This mitigation plan has been designed to specifically for the conditions and limitations that are present within this reach of Middle Wheeling Creek. The reaches of Middle Wheeling Creek that are currently not in balance will be targeted for mitigation, while stream reaches which are functioning properly will remain unchanged. A minimum of 2.34 acres of wetlands will be created within the stream's floodplains or in the immediate riparian zone. As mentioned, riparian vegetation will be enhanced in all areas where necessary to improve shading in the mitigation area. Refer to the details of the Mitigation Plan for a list of trees, shrubs and seedmixes proposed for this project. Appropriate seeding will be spread in disturbed areas, and newly created floodplain and wetland areas. The creation of a defined channel and thalweg in the specified areas will help to increase the stream's depth, thereby making more of the stream accessible to fishes. Therefore, the cumulative effects of the various mitigation strategies employed within this reach of Middle Wheeling Creek will create a stable and healthy aquatic environment.