Poor House Run Hydrologic Assessment and Watershed Action Plan

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Appendix E: Constructability Analysis

POORHOUSE RUN STREAM RESTORATION
CONSTRUCTION FEASIBILITY REPORT

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RESOURCE
RESTORATION
GROUP, LLC

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PROJECT BACKGROUND

1. BRIEF HISTORY

In late October, 2021 Resource Restoration Group, LLC ("RRG") was tasked with conducting a construction feasibility analysis of the proposed Poorhouse Run Stream Restoration project for ShoreRivers ("SR") as part of a grant request for the town of Denton ("Town") in Caroline County, Maryland.

The project area consists of three streams all located in the Choptank River watershed: Poorhouse Run which originates at the confluence of the North and South Wye tributary located just east of the S. 5th Avenue and South Branch which enters Poorhouse Run from the southeast at the lower most extent of the project area as defined by SR in their existing site overview.

The purpose of this report is to identify construction constraints, limitations and/or opportunities as well as identify access points and travel corridors to enable SR to develop a feasible restoration plan for the project area(s).

Each of these streams were observed to have flow during the site visit conducted on November 9th, 2021 and assumed to be perennial with Use Class jurisdications.

2. METHODOLOGY

RRG focused on a number of variables while assessing the Poorhouse Run corridor for construction feasibility. They were: Project Phasing, Utilities, Topography, Equipment Access, Staging, Stream Flow, Resource Impacts and Design Methods and General Assumptions.

In an effort to organize the analysis, the project was split into sections to represent the most logical or likely construction phases. The phases are not prioritized by restoration need or in any sort of implementation order, but are separated by logical access and staging. These phases are shown below in Figure 1.

Within each phase, a number of variables were analyzed and documented. A brief summation of findings and recommendations are included per project phase.

Finally, an overall project map was developed to show preferred access points and haul roads in order to implement the entire project.

Figure 1. Poorhouse Run - Phase Map

ASSESSMENT

On Novermber 9th, 2021, staff from RRG walked the proposed restoration reach. During this field visit, construction access points that provided access to the floodplain were identified and mapped, visible utilities were identified, natural and man-made constraints were accounted for and ground conditions were assessed. Specific haul road alignments were not identified as they are very much dependent on the restoration design. It should be noted, that the channel alignment of Poorhouse Run varied from what is shown on the existing conditions map developed by SR as well as other mapping resources. In order to develop a detailed floodplain haul road network, a detailed topographic survey will need to be conducted. Below is a summary of each potential restoration phase.

1. PHASE 1 – NORTH & SOUTH WYE TRIBUTARY CONSTRUCTION

"Phase 1" is bound by S. 5th Avenue to the east and terminates when the North and South Wye Tributaries come together to form Poorhouse Run as shown in Figure 1 above. Of all the phases, this phase seems to be the most impaired. Bank heights ranged in values, but some eroding banks exceeded 5.0'.

A. Topography

The topography within the bounds of phase 1 is limiting. Access is extremely difficult to the north of the North Wye Tributary and should not be considered as appropriate access especially when coupled with the constraint of S. 5th Avenue. The area between North Wye Tributary and South Wye Tributary is general level, free from large timber and would be a suitable location to work from to access the North and South Wye Tributaries, however, access to this "island" is moderately difficult and should only be considered from two points as described below.

B. Equipment Access

Accessing the Phase 1 area from S. 5th Avenue was ruled out due to a variety of reasons. Specifically, traffic control. While it would be possible to put a construction access in, truck traffic would have to come directly into the center of the S. 5th Avenue intersection with Legion Road. This would require specialized traffic control throughout the duration of the project, which would drastically increase costs. Furthermore, the concrete curbing and sidewalk would likely be damaged in the process. This access should only be considered if construction could be in concert with the the proposed culvert replacement which would already have traffic detoured. If not, project access could be achieved from the Choptank Community Health System parking lot. There is a small area that would allow for access onto a small "flat" area as shown in the two photos below. It should be noted that this area is also designated as a fire lane, so trucks cannot be idle, parked or blocking this area during construction. Underground utilities are likely present here and should be accounted for during design development.

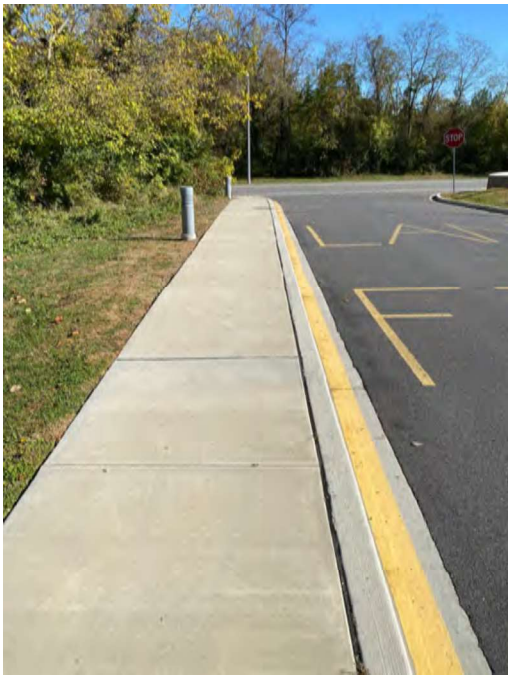

Photo 1. Phase 1 Road Access

Once staging access is obtained, access to the floodplain can be achieved by traversing along the backside of the existing stormwater BMP's and descending down to the lower extent of the South Wye Tributary. From this point, equipment would have to cross the stream channel. While a temporary bridge could be used in this instance, it would just more economical to pump baseflow during construction and simply cross the existing stream channel. The Figure below outlines the general road access, staging and floodplain access locations. This road access and staging would also be an option for Phase 2 work as well.

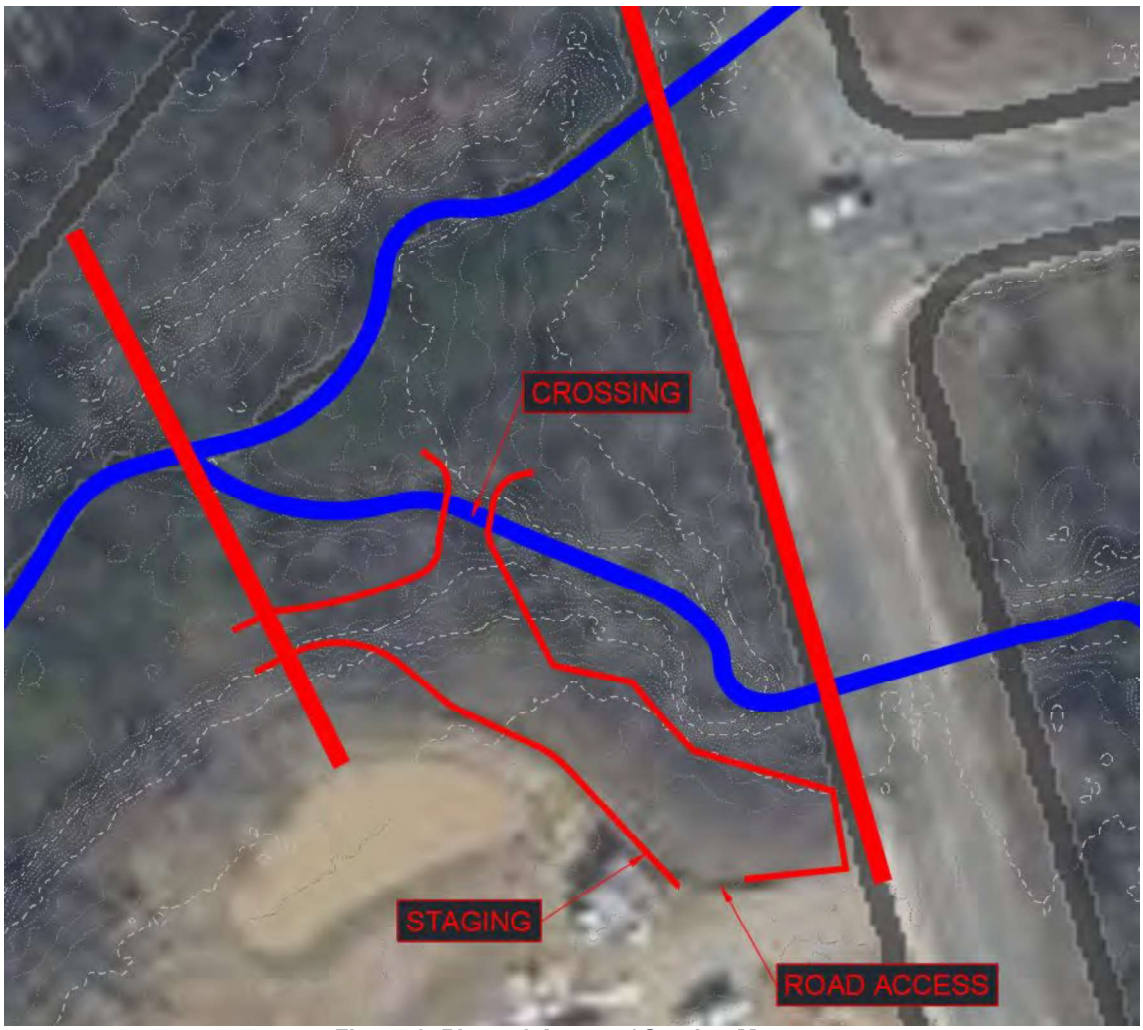

Figure 2. Phase 1 Access / Staging Map

C. Staging

Directly adjacent to the access point, the DEM surface shows a small flat area that would serve as a small equipment and staging area. While small, this area would be sufficient to receive materials, stockpile a small amount of material and be the primary access to the project site. Pick-up trucks or vehicles driven to the site by staff would need parked in the parking lot to avoid cluttering the proposed staging area. It should also be noted that in order to maximize the use of this area

trees would need to be cleared to the North to the furthest extent reasonable and an existing BMP forebay may have to modified temporarily. The modification would include filling a small depression which would reduce capacity of the forebay. This would be need to be restored to its pre-disturbed condition.

Photo 2. Phase 1 Staging Location

D. Streamflow

During the site visit, flow was present in both the North Wye and South Wye Tributaries. An estimate of streamflow indicates a typical 3" trash pump could be used to bypass the channel in a low-flow condition, however, this should be verified by the design engineer or selected construction contractor.

Maryland Department of Environment designates the North and South Wye Tributaries as Use Class 1 which does not allow for in-stream work from March 1 though June 15, inclusive, of any year.

E. Resource Impacts

RRG identified a designated Forest Conservation Area as indicated by the signage along the perimeter of the forested floodplain. It would be necessary to clear some trees to complete the restoration of Phase 1. However, the forest is not dense in the proposed work area. Impacts to existing wetlands would also be limited in the Phase 1 work area.

F. Design Methods

When analyzing the Phase 1 site, it seemed as though a Natural Channel Design (NCD) methodology would be best suited for the North Wye Tributary as there is still some connection to the floodplain in the lower extent. The South Wye suffers

from a substantial headcut failure due an undersized culvert. This tributary was viewed as a potential candidate for a Step-Pool Stormwater Conveyance (SPSC) or Regenerative Stream Conveyance system (RSC) which would allow for floodplain reconnection, attenuation and outfall protection.

G. General Assumptions

It was assumed that the ground conditions would support equipment traffic without significant alterations or improvements. Additionally, it was assumed that Choptank Community Health Systems would allow access from their parking lot. If access was not granted from this point, the cost of the project would increase considerably.

It was also assumed that this work would not be in conjunction with the culvert replacement on S. 5th Avenue and would be built independently. If this was not the case, and traffic was detoured due to the culvert replacement, the opportunity to access off of S. 5th Avenue during the culvert replacement work would also serve as a potential opportunity to eliminate the need to use the Choptank Health Systems lot access.

2. PHASE 2 – POORHOUSE RUN UPPER REACH (+/- 650 LF)

"Phase 2" is bound by the confluence of the North and South Wye Tributaries to the East and the western property boundary of the Choptank Community Health Systems parcel. This location was selected due to the change in topography on the left bank and the access potential. This bounding line can be seen in Figure 1 above. This phase showed limited erosion and downcutting as it is generally connected to its floodplain. Ground conditions varied and it should be noted that a significant seep is present on the left bank, most likely due to the stormwater BMP's that outlet onto this location. No underground or overhead utilities were observed.

A. Topography

The topography within the bounds of phase 2 is limiting. Access is not available to the north due to the extremely steep slopes as well as the residential development. The area to the south of Poorhouse Run is typical of a floodplain and is generally level and would be possible to traverse with some difficulty. The ground condition observed was typical of a floodplain with some saturated areas and toe of slope seeps.

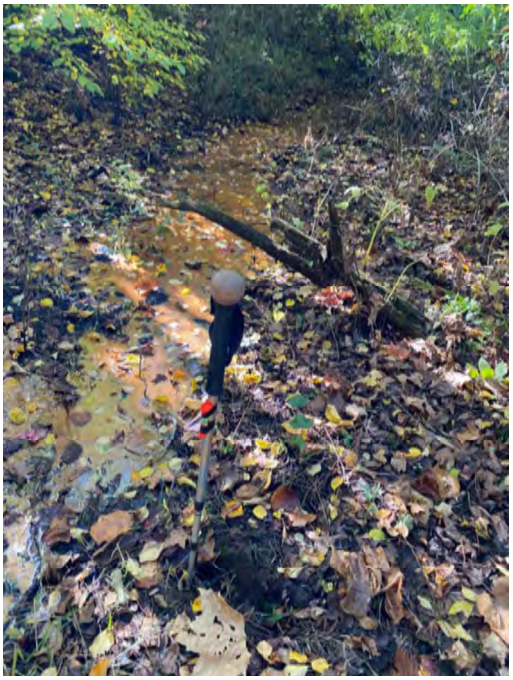

Photo 3. Phase 2 - Toe of Slope Seep

B. Equipment Access

Like Phase 1, Phase 2 project access could be achieved from the Choptank Community Health System parking lot. There is a small area that would allow for access onto a small "flat" area as shown in photos above. It should be noted that this area is also designated as a fire lane, so trucks cannot be idle, parked or blocking this area during construction. Underground utilities are likely present here and should be accounted for during design development.

Once staging access is obtained, access to the floodplain can be achieved by traversing along the backside of the existing stormwater BMP's and descending down to the lower extent of the South Wye Tributary, passing the Phase 1 crossing. From this point,equipment would have to travel on the left floodplain of Poorhouse Run to access the stream channel / work areas. Load protection matting would be needed in saturated areas along the toe of slope. Additionally, the BMP outlets would need to remain operational and unobstructed during construction. A crossing would need to be installed to access the right bank on the downstream most extent of the project phase. This crossing could alternatively be used to access Phase 2 from Phase 3 or vice versa. The Figure below outlines the general road access, staging and floodplain access locations.

Figure 3. Phase 2 Access / Staging Map

C. Staging

Directly adjacent to the access point, the DEM surface shows a small flat area that would serve as a small equipment and staging area. While small, this area would be sufficient to receive materials, stockpile a small amount of material and be the primary access to the project site. Pick-up trucks or vehicles driven to the site by staff would need parked in the parking lot to avoid cluttering the proposed staging area. It should also be noted that in order to maximize the use of this area trees would need to be cleared to the North to the furthest extent reasonable and an existing BMP forebay may have to modified temporarily. The modification would include filling a small depression which would reduce capacity of the forebay. This would be need to be restored to its pre-disturbed condition.

D. Streamflow

During the site visit, flow was present Poorhouse Run. An estimate of streamflow indicates 4" or larger pump may be needed to bypass this channel depending on flow conditions, however, this should be verified by the design engineer or selected construction contractor.

Maryland Department of Environment designates the Poorhouse Run as Use Class 1 which does not allow for in-stream work from March 1 though June 15, inclusive, of any year.

E. Resource Impacts

RRG identified a designated Environmental Preservation area as indicated by the signage along the perimeter of the forested floodplain. It would be necessary to clear some trees to complete the restoration of Phase 2. However, the forest is not dense in the proposed work area. Impacts to existing wetlands would also be limited in the Phase 2 work area.

F. Design Methods

When analyzing the Phase 2 site, it seemed as though a Natural Channel Design (NCD) methodology or RSC would be best suited for Poorhouse Run depending on the design goals and floodplain modification restrictions. Outside meanders seem to be eroding primarily where other banks seems generally stable.

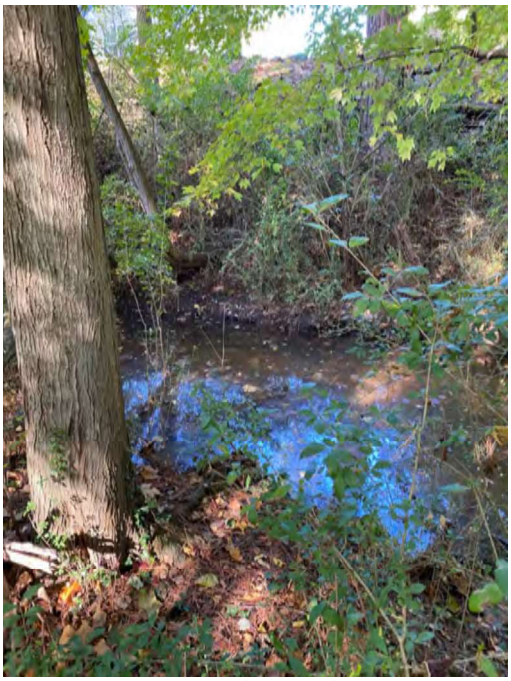

Photo 4. Phase 2 Stream Channel

G. General Assumptions

Additionally, it was assumed that Choptank Community Health Systems would allow access from their parking lot. If access was not granted from this point, Phase 2 would have to be accessed from the Phase 3 access point.

Outlets to the BMP facilities would have to be addressed during and after access to the Phase 2 work area. These outlets could not be blocked during construction and would likely have to be realigned in order to maintain fair ground conditions within the work area. Load protection matting would also be required for portions of Phase 2 access as a basic mulch hull road would likely not support equipment traffic.

3. PHASE 3 - POORHOUSE RUN LOWER REACH (+/- 915 LF)

"Phase 3" upstream bound is identified to the East as the western property boundary of the Choptank Community Health Systems parcel and ends at Poorhouse Runs confluence with Southern Branch. This location was selected due to the change in topography and landuse on the on the left bank and the access potential. This bounding line can be seen in Figure 1 above. This phase again showed limited erosion and downcutting as it is generally connected to its floodplain. Significant

erosion was limited to isolated locations generally associated with outside meander bends. Ground conditions varied throughout the floodplain with some areas moderately saturated and other areas being relatively firm and accessible. The stream channel alignment was observed to be different than what is shown on the mapped resources. No overhead utilities were observed within the working area, although a variety of undergound utilities and man-made constraints were observed in the areas to be used for site access.

A. Topography

The topography within the bounds of phase 3 varies significantly throughout the proposed work area. Access is not available to the right bank from the north for a majority of the project area length due to steep slopes and residential lots. The left bank has only a few location where the slopes are traversable. Of those slopes, even fewer outlet to a floodplain location with a landing. The majority of the steep slopes run directly to the stream channel which would not support vehicular access.

The lowest most extent of phase 3 can be accessed from either the left of right bank, though both access points may be necessary to work up and down stream of these locations.

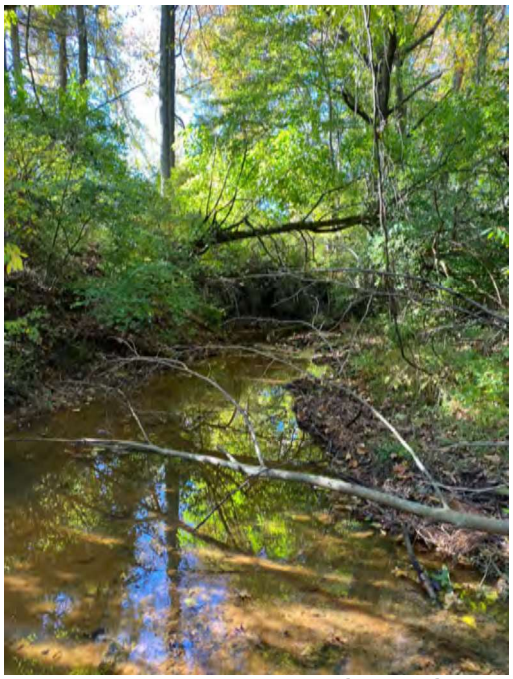

Photo 5. Phase 3 – Poorhouse Run Stream Channel

B. Equipment Access

Preferred access to Phase 3 of the work area would originate from the Food Lion parking lot. There is a spur coming off of that lot that serves as an entrance to a

paved footpath that accesses the park area. This road access point would serve as the primary entrance. A haul road would run adjacent to the paved footpath and then cut across the existing field to the proposed staging area which is located mid-way through the Phase 3 work area. In order to reach this staging area, the paved foot path would have to be crossed at least once as well as a underground water / hydrant pipe. It can be assumed additional utilities are present.

Photo 5. Phase 3 - Proposed Access from Parking Lot

Photo 6. Phase 3 - Hydrant Line along Proposed Access Road

Once staging access is obtained, access to the floodplain can be achieved by traversing at a few select points on the left bank of Poorhouse Run. Each of the identified locations would provide adequate access to the floodplain. If access from the Lions Park was used, as few as (1) stream crossing would be needed to address the entirtey of Phase 3. Due to varying ground conditions, the use of timber load protection matting is likely required in some floodplain locations. Detailed locations of the haul road depend on the restoration design as well as a detailed topographic survey of the channel and floodplain. The figure(s) below outlines the general road access, staging and floodplain access locations.

Figure 4. Phase 3 - Overall Access / Staging Map

C. Staging

Phase 3 has a multitude of possible staging locations due to it's proximity to a park / playing field. Ideally, on-road truck access would be made available the whole way to the tree line at the southern edge of Poorhouse Run. This would reduce the need for heavy equipment to travel back and forth to the main road access point. A central staging area is preferred as shown on the figure below. Additionally, a staging area can be used on the south side of the baseball field at Lions Park with limited impact to the park or forest surrounding. This staging area would be ideal for work on the north floodplain if necessary.

Figure 5. Phase 3 Staging and Access Points

D. Streamflow

During the site visit, flow was present Poorhouse Run. An estimate of streamflow indicates 4" or larger pump may be needed to bypass this channel depending on flow conditions, however, this should be verified by the design engineer or selected construction contractor.

Maryland Department of Environment designates the Poorhouse Run as Use Class 1 which does not allow for in-stream work from March 1 though June 15, inclusive, of any year.

E. Resource Impacts

RRG identified a designated Environmental Preservation area as indicated by the signage along the perimeter of the forested floodplain. It would be necessary to clear some trees to complete the restoration of Phase 2. However, the forest is not dense floodplain though large trees exist on high eroding high banks. Tree take is very depending on design methodology selected. Impacts to existing wetlands would increase in Phase 3 as compared to Phase 2.

F. Design Methods

When analyzing the Phase 2 site, it seemed as though a Natural Channel Design (NCD) methodology or RSC would be best suited for Poorhouse Run depending on the design goals and floodplain modification restrictions. Outside meanders seem to be eroding primarily where other banks seems generally stable.

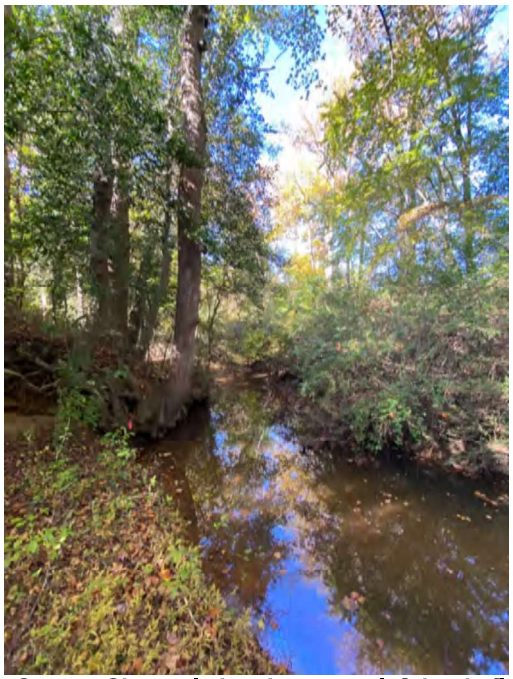

Photo 7. Phase 3 - Stream Channel showing steep left bank, flat right bank.

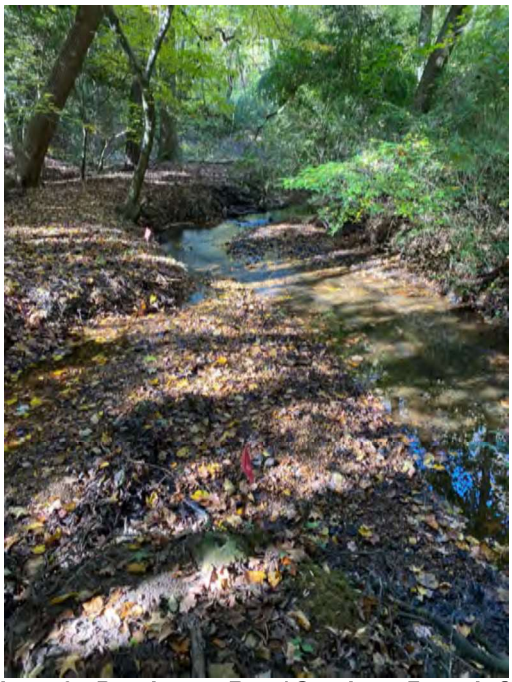

Photo 8. Phase 3 - Poorhouse Run / Southern Branch Confluence

G. General Assumptions

It was assumed that Lions Park would allow access from their parking lot. If access was not granted from this point, Phase 3 would have to be accessed from entirely from the Food Lion parking lot access point and multiple stream crossing points would have to be constructed.

It was also assumed that access could be granted through the recreational park / facility. The ground conditions there seemed to support vehicular traffic without much improvement or modification. Requiring timber load protection matting or other improvement to grant access would be costly.

The lowest most extent of Southern Branch should also be accessed from the Phase 3 access points if work is required at the confluence or upstream within 100'.

4. PHASE 4 - SOUTHERN BRANCH

The "Phase 4" upstream bound is identified as a headcut that originates downstream of a paved walking path separating the two recreational fields on Southern Branch. The southern bound is represented by a valley condition change just upstream of Southern Branch's confluence with Poorhouse Run. This bounding line can be seen in Figure 1 at the beginning of this document. This phase significant downcutting and disconnection from its floodplain. Ground conditions however were favorable for the majority of the project length. No underground or overhead utilities were observed within the working area, although man-made constraints were observed in the areas to be used for site access and staging.

A. Topography

The topography within the bounds of Phase 4 is typical of a eroding gully. Very steep slopes exist on either side of the stream channel at the downstream portion of the phase while upstream, the topography is relatively flat until you reach the eroded stream channel which is highly incised.

Photo 9. Phase 4 - Looking upstream from confluence.

B. Equipment Access

Preferred access to Phase 4 of the work area would originate from the Food Lion parking lot. There is a spur coming off of that lot that serves as an entrance to a paved footpath that accesses the park area. This road access point would serve as the primary entrance. A haul road would run adjacent to the paved footpath and then cut across the existing field to the proposed staging area which is located towards the upstream extent of the Phase 4 work area. This staging location could be moved as there is a considerable area available along the entirety of the right bank. In order to reach this staging area, the paved foot path would have to be crossed at least twice as well as an underground water / hydrant pipe. It can be assumed additional utilities are present.

Once staging access is obtained, access to the stream channel can be made where convenient depending on design methodology. The majority of the stream can be traversed along the right bank. There is also potential to treat the stream as the haul road if a RSC method was deemed appropriate. In which case, the channel could be filled and traversed on for the majority of the length of Phase 4. Access to the lower portion would only be possible from working downstream to upstream for a short distance. Figure 4, above, shows staging and access points for Phase 4.

C. Staging

Phase 4 staging can occur anywhere along the right bank of the stream channel. A natural was observed and it is assumed this area should be avoided for staging. A more appropriate staging location would be in the existing cleared field to limit impact to resources.

D. Streamflow

During the site visit, flow was present at the lowest extent of Southern Branch. It is assumed that it has cut into the groundwater table. An estimate of streamflow indicates a very small trash pump could bypass this channel depending on flow conditions, however, this should be verified by the design engineer or selected construction contractor.

Maryland Department of Environment designates the Southern Branch as Use Class 1 which does not allow for in-stream work from March 1 though June 15, inclusive, of any year.

E. Resource Impacts

RRG identified a designated Environmental Preservation area as indicated by the signage along the perimeter of the forested floodplain. It would be necessary to clear some trees to access the stream reach and to complete the restoration of Phase 4. Tree take is very depending on design methodology selected. Impacts to existing wetlands would be minimal in Phase 4.

F. General Assumptions

It was also assumed that access could be granted through the recreational park / facility. The ground conditions there seemed to support vehicular traffic without much improvement or modification. Requiring timber load protection matting or other improvement to grant access would be costly.