
Technical Memo 3

SUBJECT: Portage Creek Stream Stability Assessment
Hampton Creek Wetland Areas
City of Portage, Kalamazoo County, Michigan – **DRAFT**

DATE: December 2, 2019

PROJECT NO.: 181663

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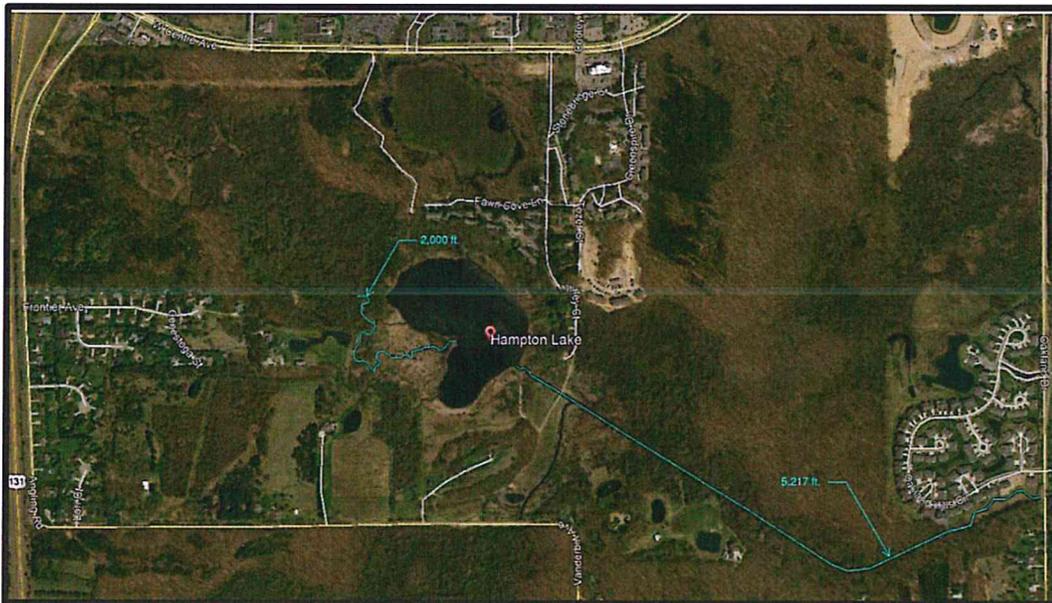
Appendix 1 Site Photolog

Introduction

The City of Portage (City) requested Fishbeck to conduct a stream stability assessment for Portage Creek (Creek) to document existing morphologic conditions of the Creek. The assessment is necessary to meet permitting requirements noted in the Michigan Department of Environment, Great Lakes, and Energy (EGLE) June 24, 2019 pre-application letter for the proposed Hampton Creek Wetland Area stormwater outlet. Morphologic indicators used to evaluate conditions of the Creek included: stable and unstable channel cross-sections, pattern, profile, sediment supply and transport, floodplain connectivity, substrate, and width to depth ratio. The morphological conditions obtained during the assessment and associated data collected will be used to understand potential impacts to stream stability as a result of constructing a new outlet from the Hampton Creek and Greenspire Bogs. The purpose of this report is to provide a summary of the geomorphic conditions identified and/or obtained. The project area is shown in Figure 1, attached, and the survey area is shown in Figure 2, below.



Figure 2 – Assessment Area



Methodology

Fishbeck staff conducted the assessment on August 19, 2019, by traversing approximately 7,217 lineal feet of the Creek's corridor. The assessment extended approximately 2,000 lineal feet upstream of Hampton Lake (Lake) and downstream approximately 5,217 lineal feet from the Lake to Oakland Drive. The assessment did not extend further upstream than noted, given site constraints and limited safe access to the Creek. Upstream areas flow through the Gourdneck State Game Area, which consists of a large wetland/bog complex that has extremely thick, dense vegetation. Coupled with dense vegetative cover, organic and saturated mucky soils exist throughout this area, making access difficult by foot. Accessing the upper reaches via canoe during water quality sampling also

proved more difficult than anticipated, given woody obstructions encountered in the channel. Forging the obstructions was not feasible, given lack of consolidated soils directly adjacent the Creek.

Although not visually inspected, similar channel morphology and stream characteristics can be anticipated upstream of the assessment area, given the expansive natural area the Creek traverses. Review of aerial photography notes presence of a consistent and stable channel pattern from US-131 to the Lake. Also, areas of erosion and deposition were not observed. Lastly, unstable channel morphology would likely result in transfer of impairments to downstream areas within the assessment area, which were not observed.

Morphologic features of the Creek were documented, and typical site conditions were photographed, Appendix 1. Detailed survey, including cross section and profile, were not conducted as part of the assessment. Channel slope was estimated using 2-foot topographic contours.

Geomorphic Assessment

Portage Creek (Creek) is a natural watercourse that flows through large, open, natural areas, including wetland and wooded corridors. Headwaters of the Creek are large impoundments located west of US-131. From US-131, the Creek flows downstream through large wetland areas associated with the Gourdneck State Game Area to Hampton Lake. Downstream of the Lake, the Creek traverses primarily wooded corridors, is under the jurisdiction of the Kalamazoo County Drain Commissioner and has been historically straightened, dredged, and maintained.

Overall, the Creek is in excellent conditions in terms of stability and conveyance and flooding does not appear to be a concern. The Creek is very stable and has little to no impairments. Stable channel morphology exists



throughout the assessment area. Effective sediment transport exists throughout the Creek, as no channel aggradation, lateral migration, or mid-channel bars were observed. Visually clear water, lack of odor, absence of biofilm, and presence of aquatic organisms (frogs, damselflies, snakes, etc.) were noted throughout the assessment area, which are all indicative of good water quality. Additionally, although not sampled, water temperatures were cool in both open canopy and wooded corridor areas. Good water quality can be attributed to the impoundment area upstream of US-131, large surrounding wetland complexes, natural areas associated with the Creek, and significant base flow from groundwater. The assessment area can be partitioned into two distinct geomorphic units, given the significant difference in channel pattern and unique morphologic features, and are

described below.

Morphologic Unit 1: Upstream Hampton Lake

The Creek traverses through large wetland complexes and has direct connection with the wetland and floodplain areas. A sinuous channel pattern exists and consists of moderate, sweeping, gentle meanders. Channel limits are defined primarily by instream vegetation, as channel banks defined by soil are intermittent and generally do not exist. Where soil does form banks, it is saturated, soft, and being held together by vegetation. Water flows freely

between the Creek and adjacent areas, which is consistent with high groundwater levels which have been noted in the area. Boggy and saturated soils exist directly adjacent to the Creek in wetland and floodplain areas. Stable streamside vegetation exists throughout the entire area, including but not limited to purple loosestrife, sandbar willow, and cattails, and few trees exist along the channel corridor. Channel substrate is comprised of sands, pebbles, and organic matter, and is relatively unconsolidated and soft. Some woody debris was noted in the channel, offering bed diversity and creating small pools. Vegetation exists within the channel bed but is not adversely impacting channel hydraulics. Excellent floodplain connectivity exists.



Based on channel characteristics, the channel can be classified as a Rosgen E4 or E5-type channel. It should be noted that bankfull width was measured from edge of vegetation line, as defined channel banks and bankfull indicators generally do not exist. Given site conditions, entrenchment ratio was not determined.

Table 1 – Unit 1 Geomorphic Characteristics

Parameter	Measurement
Bankfull width	15 ft
Bankfull depth	1.7 ft
Width-to-depth ratio	8.82
Stream slope	0.14%
Sinuosity	2.0

Morphologic Unit 2: Downstream Hampton Lake

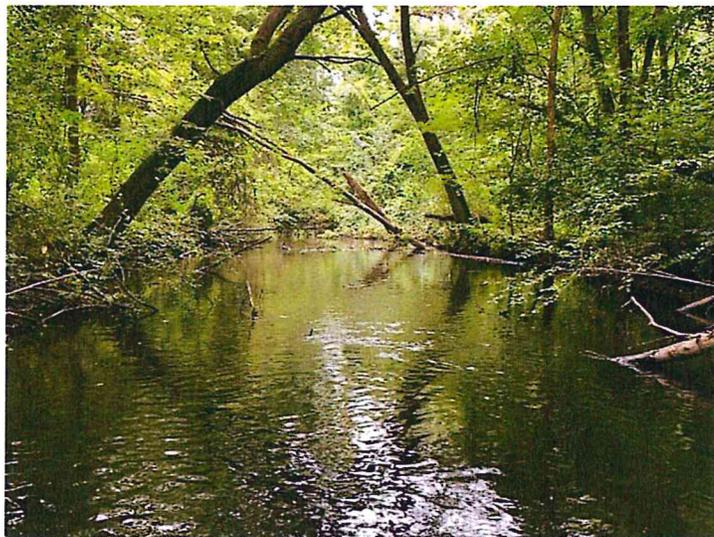
Distinctly different than upstream areas, Unit 2 is primarily linear, incised, and traverses mostly wooded corridor. The upper 4,499 lineal feet section of the Creek has been straightened and is maintained as a county drain. However, the most downstream section (727 lineal feet) near Oakland Drive, more closely resembles stream morphology upstream of the Lake due to a recent stream improvement project. Natural channel design techniques were likely used for the stream improvement project, resulting in stable meanders and increased sinuosity as compared to upstream areas of the morphologic unit.



Immediately downstream of the Lake, the Creek flows through wetland and wide floodplain areas. Numerous dead cherry, ash, and elm trees were observed adjacent the Creek, suggesting the area may have historically been upland. The channel bed is comprised primarily of sands and pebbles, and some silt. No riffle-pool sequences were observed. Dominant stream vegetation in upper reaches consist of lily pads, watercress, and various sedges, while no instream vegetation exists within the wooded corridor. Currently, this area has good sediment transport, as no mid-channel bars or bed aggradation were observed. However, sediment loading to this area is somewhat

limited given the upstream wetlands, Lake, and lack of inputs within the reach. If sediment load were to significantly increase, mid-channel bars and aggradation may develop, especially in the wooded corridor where woody obstructions prohibit sediment transport, resulting in unstable channel morphology.

Groundwater seepage was observed along channel banks throughout the wooded corridor, resulting in minor slumps.



Fallen trees and minor log jams were also intermittently observed within the wooded corridor. The woody debris is offering bed diversity and does not appear to be adversely directing flow or impacting channel hydraulics. Excellent floodplain connectivity exists immediately downstream of the Lake; however, limited floodplain connectivity exists along the wooded reaches, as evidenced by spoil berms from historic dredge activities. Channel downcutting and lateral migration was not observed within this area.

Historic dredging and maintenance make it somewhat difficult to accurately classify the modified channel, as sinuosity has been eliminated in the upper section. However, based on existing channel characteristics, the upper 4,499 lineal feet

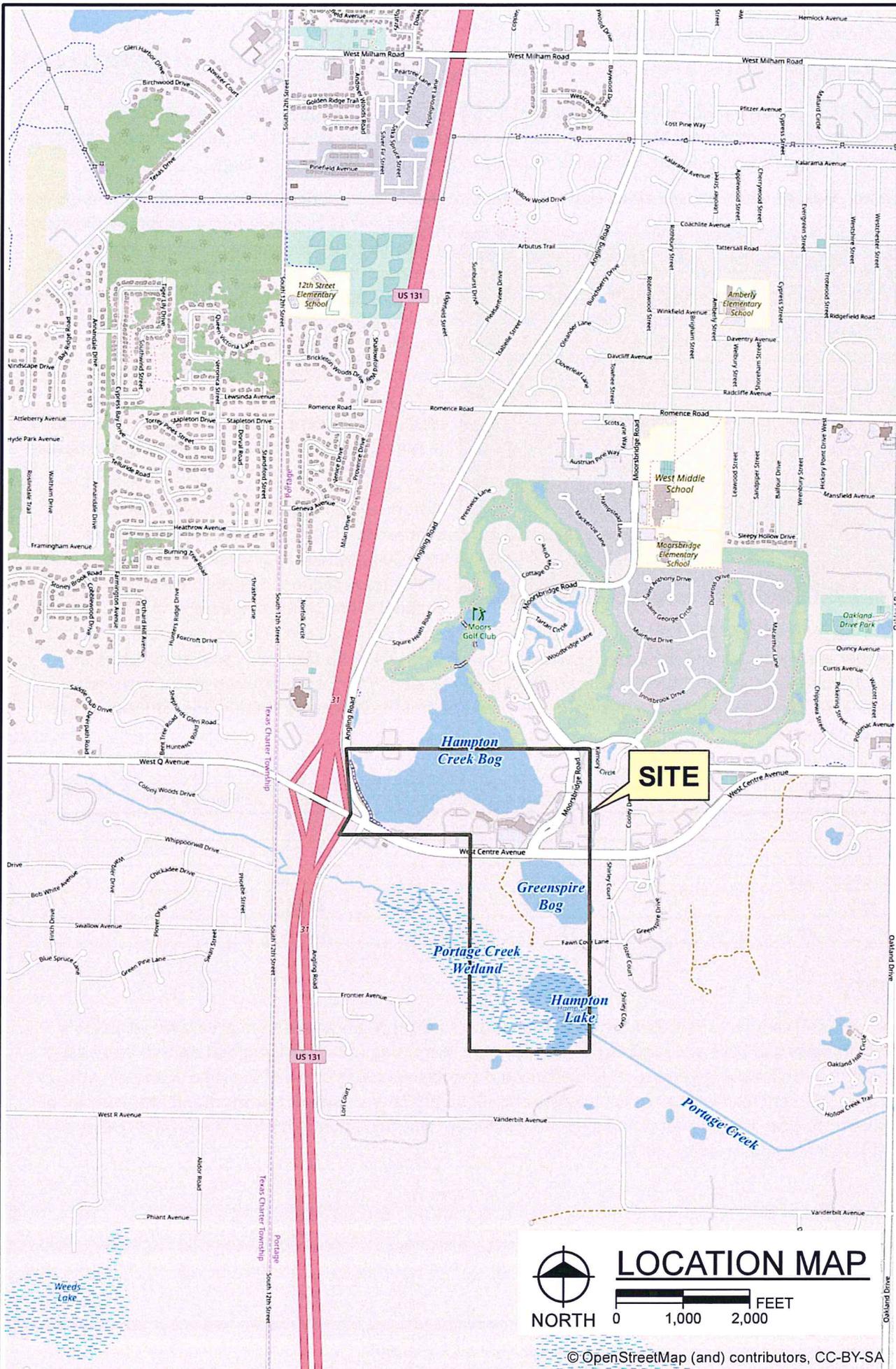
channel can be most closely classified as a Rosgen B5A-type channel. Although constructed, the improved 727 lineal feet area near Oakland Drive can be classified as a Rosgen C4 or C5 channel. Visual observation of channel morphology and stream characteristics in the improved section of channel are consistent with those upstream of Lake. However, a greater width-to-depth ratio and smaller study area result in the different stream classification categories.

Table 2 – Unit 2 Geomorphic Characteristics

Parameter	Upper 4,499 Lineal Feet	Lower 727 Lineal Feet
Bankfull width	31.78 ft	31.0 ft
Bankfull depth	2.18 ft	1.6 ft
Width-to-depth ratio	14.56	19.38
Stream slope	0.04%	0.14%
Sinuosity	1.12	1.16

Summary

The Creek is a significant feature within the watershed. Both sections of the assessment area have very stable channel morphology and have adequate sediment transport. Increasing base flow conditions within these areas will likely not be problematic, given the large wetland and storage areas upstream of the Lake. However, little to no increase in sediment load will be critical to ensure continue effective sediment transport and preservation of fish and aquatic habitat areas. Pollutant loading should also be minimized to maintain existing water quality and support of viable fish and aquatic wildlife.



LOCATION MAP

0 1,000 2,000 FEET

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Hard copy is intended to be 8.5"x11" when plotted. Scale(s) indicated and graphic quality may not be accurate for any other size.

City of Portage
Kalamazoo County, Michigan
Hampton Creek Wetland Area
Surface Water Evaluation

PROJECT NO.
181663

FIGURE NO.
1



Photo 1—Looking west upstream (US) from Lake confluence



Photo 2—Looking northeast (US)

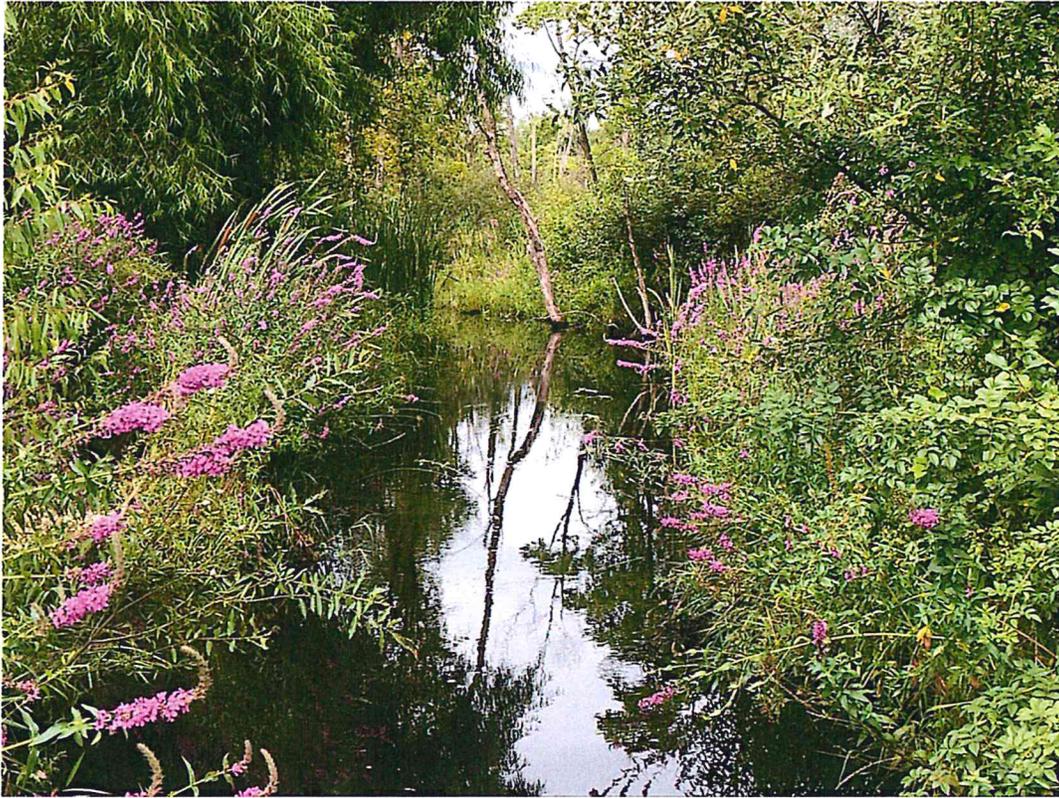


Photo 3—Looking southwest downstream (DS)

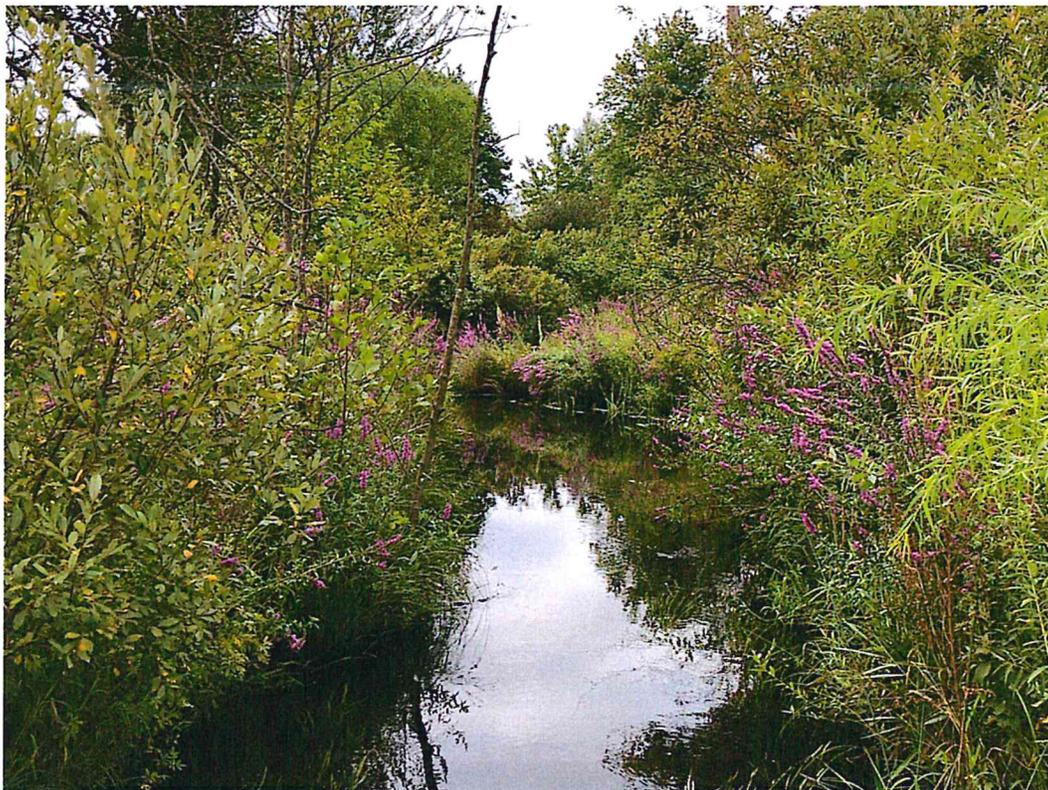


Photo 4—Looking south (DS)



Photo 5 —Looking west (US)



Photo 6—Looking east (DS)



Photo 7—Looking east (DS)



Photo 8 —Looking west (US)



Photo 9—Looking east (DS)



Photo 10—Looking west (DS)

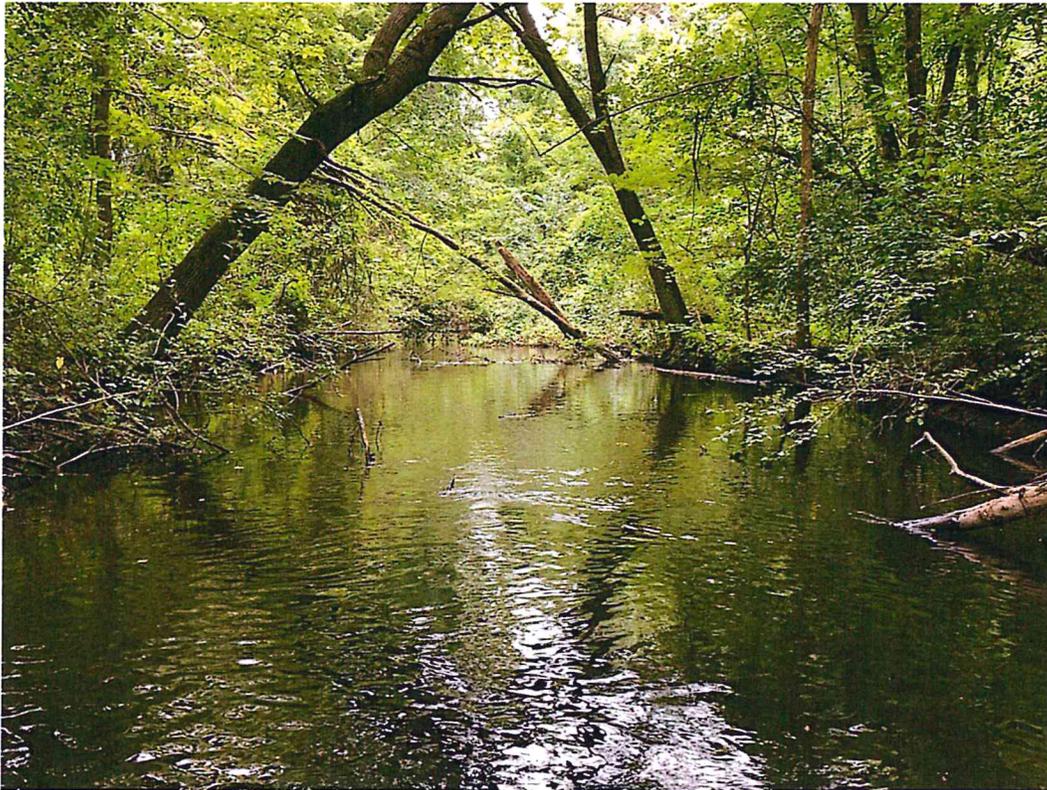


Photo 11—Looking east (DS)



Photo 12—Looking west (US)



Photo 13—Looking east (DS)

