COLLINS PARK STREAM RESTORATION FEASIBILITY STUDY

Toledo, Ohio

Project No.: 17005
Date: 12/20/2023

Prepared for:

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Authorization for Release

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The undersigned attest, to the best of their knowledge, that this document and the information contained herein is accurate and conforms to EnviroScience's internal Quality Assurance standards.

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1.0 INTRODUCTION

The Collins Park Stream Restoration project area consists of a half-mile portion of Duck Creek located on the 90-acre Collins Park Municipal Golf Course property. The project reach lies between York Street and Consaul Street in eastern Toledo, Ohio. Duck Creek is located within the Maumee Area of Concern (AOC) and is less than four miles long, beginning at Hecklinger Pond in East Toledo. It flows throughout the Toledo/Oregon city limits and is the last stream to join with the Maumee River before it enters Maumee Bay. This segment of Duck Creek is heavily channelized, with much of the creek flowing through subsurface culverts. The immediate surrounding land use is a golf course and maintained parkland. Restoration in this area is anticipated to improve fish and wildlife habitat, reduce sedimentation, and improve stream water quality and ecosystem health.

The Duck Creek alignment travels through the middle of the golf course, affecting a large percentage of the course. However, headwater streams do not technically require a large footprint to function properly. The existing condition of Duck Creek is a product of a channelized over-wide state. Ditching has created a channel form to manage high flows that only occur 1-2 times a season. The majority of the year, the base flow and lower storm events do not have the capability to move even the fine silts and sands resulting in an aggradation process. EnviroScience has been tasked by the City of Toledo to create three design alternatives to address the stream's current inability to move sediment efficiently. The EnviroScience design team has previously completed projects on active golf courses where spaces between the active play areas can be leveraged to restore the riparian corridor and provide floodplain storage and wetlands. Channel realignment can be shifted to reduce or enhance the difficulty level of the golf by changing the locations and widths of the crossings. EnviroScience will evaluate three design options: complete restoration of the property and removal of golf play, restoration of the stream alignment and floodplain to the maximum extent possible while still allowing golf play, and a minimal approach to restoration of the stream and floodplain.

2.0 EXISTING CONDITIONS

The project study area is approximately 90 acres, including a 2,765 LF reach of Duck Creek within the golf course property. The details of the existing data review, site survey, wetland delineation, habitat, and hydraulic modeling are described below. Data collection methods for this project were documented and approved by the US EPA Region 5 as part of a Quality Assurance Protection Plan (QAPP).

2.1 SITE CHARACTERIZATION

DLZ completed geotechnical investigations to determine the subsurface conditions to the depths of the borings, evaluate the engineering characteristics of the subsurface materials, and provide information to assist in the design of the proposed restoration and associated foundations. In June 2023, DLZ performed their field exploration at the site, which included seven Standard Penetration Test (SPT) borings and twelve Direct Push borings. EnviroScience determined the boring locations based on initial restoration concepts. See page 17 of Appendix A for the boring locations map.

2.1.1 Environmental Characterization

Samples were taken from all but two of the Direct Push borings for chemical testing to determine the presence of soil contamination at the site. During the exploration, the Direct Push samples were screened with a photo-ionization detector (PID) for possible volatile organic compounds (VOCs). The Direct Push borings GP-05 and GP-07 samples had readings of 0.1 and 2.9 parts per million (ppm), respectively, while the remaining Direct Push samples had no detectable PID readings. The readings at GP-05 and GP-07 are considered low. However, chemical testing is necessary to document the presence of any specific VOCs (as well as metals, herbicides, and pesticides). Results of the chemical testing showed no detectable amounts of contaminants analyzed in all ten samples.

2.1.2 Geotechnical Exploration

The SPT borings (7 total) generally encountered 4 to 9 inches of topsoil at the ground surface. Under the topsoil or at the ground surface, the borings encountered stiff to hard cohesive soils with occasional interbeds of granular soils. In general, the subsurface conditions across the entire project area consisted of cohesive fill or possible fill soils overlying soft to hard cohesive soils with interbedded layers of silt and sand. With proper earthwork, these subsurface conditions are generally considered suitable for general construction and foundation supports. Shallow footings founded on the existing stiff to hard cohesive soils or structural fill can be designed for a net allowable bearing capacity of 2,500 pounds per square foot (psf), assuming an overall soil settlement of one inch or less. For a full report detailing the procedures, findings, and recommendations of the geotechnical exploration, see Appendix A.

2.2 SURVEY DATA

DLZ performed a topo survey and drone flight of the project area in April 2023. The elevation datum for the survey is NAVD88, and the horizontal datum is NAD83 Ohio State Plane, North Zone (US Foot). The data was collected using a combination of Trimble R12 GPS receivers, Trimble S7 Total Station, and SenseFly eBee Fixed Wing X mapping drone with the Aerial Camera Aeria payload. One flight was completed to provide a surface model and background of the project site. Areas along Duck Creek and wooded areas were surveyed using Total Station S7as a supplement to drone surface model. No property boundary pins were re-surveyed or located for this project. Culverts inverts and limits crossing York St. and Consaul St. were also surveyed. Once all the data was obtained in the field, it was processed and imported to AutoCAD Civil 3D to generate a basemap for the project. Ortho mosaic aerial imagery was also developed from the drone flight.

2.2.1 Existing Site Infrastructure

The existing infrastructure heavily influences the functional condition of Duck Creek. Along the alignment, Duck Creek alternates between an open ditch and six subsurface culverts within the golf course and culverts at either end of the project area under Consaul and York Streets. The culverts account for 1,228 LF of the 2,765 LF reach of Duck Creek within the golf course property. All six culverts within the golf course are 60-inch concrete pipes with no headwalls and installed solely for golf course play and accessibility. Numerous subsurface drains designed to provide drainage to fairway and greens convey water into Duck Creek as well. A small headwater ditch crossing Hole #1 as an open channel then flows into a stormwater basin. The outlet of this stormwater basin is 10" clay tile that continues as subsurface drainage to Duck Creek out letting directly to the Creek between Hole #4 and #7. A City of Toledo sanitary sewer crosses through the site, starting on the east at Collins Park Ave and running southwest until crossing Duck Creek just downstream of Consaul St. The depth of this infrastructure is currently unknown and further investigation would be required in final design to determine if it affects any aspects of the design

Figure 2.1 Existing Site Culverts

2.3 SURFACE WATER & ECOLOGICAL EVALUATION

A delineation of wetlands and other water was performed at the project site in April 2023. The project area delineated consisted of approximately 91 acres. The ecological evaluation of the fish and benthic community was completed throughout an approximately 3,420 LF reach of Duck Creek, which extends beyond the limits of the golf course both upstream and downstream. Fish and macroinvertebrate sampling were also conducted at two locations within the project area in June and August 2023.

2.3.1 Existing Wetlands and Endangered Species

Five distinct vegetative communities were identified within the project area, including three wetland communities. The onsite wetlands are comprised of palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forested (PFO) vegetative communities. Four wetlands were identified within the project area and account for approximately 0.396 acres of wetland onsite. One perennial Stream, Duck Creek (2,071 LF), and one intermittent stream (456 LF) were identified within the project area accounting for a total of 2,527 linear feet of waterway. This length does not include the 1,228 LF of stream which is culverted under Consaul Rd, Collins Park Ave, and throughout the golf course property. The full Wetland and Other Waters Delineation Report can be found in Appendix B.

2.3.2 Existing Habitat Conditions

The existing conditions at the site were evaluated for physical habitat, water quality, and fish and benthic macroinvertebrate communities. The biology was surveyed in two sample locations within the project area using Ohio EPA protocols.

Physical Habitat

A baseline Qualified Habitat Evaluation Index assessment was completed at two locations in the project area using methods outlined in the Ohio EPA training manual (Rankin, 1989). A full description of the locations evaluated and the scoring sheets can be found in the Wetland

Delineation Report (Appendix B). The QHEI scores of 20 and 19.5 are consistent with a narrative ranking of 'Poor' with dominant substrates of muck and silt. The 'Poor' substrates are reinforced by the more quantitative method of a substrate pebble count. A pebble count was completed in August 2023 on Duck Creek and the particle size analysis is shown below in Figure 2.2. The results of this effort indicate that no sand, gravel, cobble or other typically desirable stream substrate types are present on the surface of Duck Creek. The complete dominance of silt/clay particles creates both an unstable substrate and poor habitat for the benthic and fish communities. Figure 2.2 .

Figure 2.2 Particle Size Analysis

Particle Size Analysis

D16 (mm)	0.01
D35 (mm)	0.02
D50 (mm)	0.03
D84 (mm)	0.05
D95 (mm)	0.06
D100 (mm)	0.06
Silt/Clay (%)	100
Sand (%)	0
Gravel (%)	0
Cobble (%)	0
Boulder (%)	0
Bedrock (%)	0

Total Particles = 100

D50 0.03 mm

Water Quality Results

Water chemistry samples were collected at three locations on Duck Creek in the project area: the most downstream portion of Duck Creek near York Street (DWS) (same location as fish and macroinvertebrate sampling), the center of the project area (MID) (same location as fish and macroinvertebrate sampling) and the most upstream portion available prior to being culverted (UPS). The water samples were collected for chemical analysis for Phosphorus, Turbidity, Total Suspended Solids, Nitrogen, and Total Kjeldahl Nitrogen. Sampling was conducted on August 3rd and analyzed by Pace Analytical. Water samples were either collected from the stream directly into a pre-cleaned container provided by the laboratory or into a pre-cleaned and field-rinsed container for transfer to the laboratory-provided container. The results of the water chemistry results can be found in Appendix C with a summary in the table below.

Table 2.1. Water Chemistry Results

Site / Parameter	UPS	MID	DWS
Phosphorus	186 ug/L	Non-Detect	131 ug/L
Turbidity	121 NTU	69.7 NTU	49.1 NTU
Total Suspended Solids	94 mg/L	14 mg/L	20 mg/L
Nitrogen, NO2 plus NO3	Non-Detect	Non-Detect	Non-Detect
Total Kjeldahl Nitrogen	0.87 mg/L	0.59 mg/L	0.87 mg/L

Field measurements were also taken using a portable YSI Pro DSS Multi-Parameter Water Quality Meter for water temperature, pH, specific conductance, and dissolved oxygen (Table 2.2). The field meter was calibrated daily according to the manufacturer's specifications prior to the collection of samples. The DO measurements for the MID site and DWS site are quite low and, specifically at the MID site, incompatible with fish life. This low dissolved oxygen reading is likely due to the extremely low flow and stagnant silt filled habitat. No fish were observed at that collection point.

Table 2.2. Water Quality Measurements

Site	Temperature (C)	DO (mg/L)	pH	Conductivity	Flow
UPS	25.4	5.18	7.54	1184	n/a
MID	19.1	0.60	7.30	1020	None
DWS	19.4	2.03	7.60	1062	None

Fish Community Results

Fish community surveys were conducted in two sampling locations within the project area using a Smith-Root longline electrofisher. All available habitat types within each reach were sampled following Ohio EPA protocols. Stunned fish were captured and kept in a live well for enumeration and identification. Captured fish were identified to species, counted, photographed, and released. At the most downstream reach of Duck Creek near York Road, a total of 6 individuals from two species were collected: Central Mudminnow and Northern Pike, which resulted in an IBI score of 12 (Appendix D). At the upstream sampling location, located in the center of the project area, zero fish were observed and no IBI score could be calculated.

Table 2.3: Fish IBI Results

Metric:	Indigenous Fish Species (#)	Darter/ Sculpin Species (#)	Headwater Species (#)	Minnow Species (#)	Sensitive Species (#)	Tolerant Species (%)	Omnivores (%)	Insectivores (%)	Pioneering (%)	Rel. No. (#/300m)	Simple Lithophils (#)	DELTs (%)	Total IBI Score
Value:	2	0	0	0	0	83.3	0.0	83.3	0.0	2.3	0	0.0	
Metric Score:	1	1	1	1	1	1	1	1	1	1	1	1	12
Low End Adjustment:	YES					*	*	*	*		*	*	

Benthic Macroinvertebrate Results

Macroinvertebrate community sampling was conducted in the same locations as the fish sampling using quantitative and qualitative techniques described in *Biological Criteria for the Protection of Aquatic Life: Volume III. Standardized Biological Field Sampling and Laboratory Methods for Assessing Fish and Macroinvertebrate Communities.* (Ohio EPA, 2015). Quantitative samples were collected by deploying modified Hester Dendy samplers for a period of 6 weeks. Qualitative samples were collected by sampling all available habitats using a kick net, as well as hand-picking organisms from *in situ* substrates, debris, and plant materials. Taxa lists from the laboratory identification of collected macroinvertebrates are provided in Appendix E. The macroinvertebrate communities at both sampling locations were primarily comprised of Chironomids, Isopods, Oligochaeta, Turbellaria, and Hirudinida with Isopoda and Oligochaeta being the dominant taxa at both sites. Invertebrate Community Index (ICI) scores were calculated for both sampling locations (Table 2.4).

Table 2.4: Macroinvertebrate ICI Results

Metric	**MID – Site Duck Creek**	**DWS – Site Duck Creek**
Total Quantitative Taxa	22 (0)	22 (2)
Number Mayfly Taxa	0 (0)	0 (0)
Number Caddisfly Taxa	0 (0)	0 (0)
Number Dipteran Taxa	8 (2)	13 (2)
Percent Mayfly	0.00% (0)	0.00% (0)
Percent Caddisfly	0.00% (0)	0.00% (0)
Percent Tanytarsini	0.43% (2)	8.46% (2)
% Other Dipterans and non-Insects	99.57% (0)	91.54% (0)
Percent Tolerant	39.06% (0)	21.56% (2)
Number Qualitative EPT Taxa	0 (0)	0 (0)
Total Score / Narrative Rating	4 / Very Poor	8 / Poor

2.3.3 Surface Water and Ecological Conditions Summary

The physical habitat quality and channelized condition is at the core of the detrimental impacts to Duck Creek. The shape of the channel morphology is largely what is responsible for the low QHEI scores and key influences on the fish and benthic community within the golf course. Namely, the overwide ditch configuration spreads the base flow water surface out such that the depth of water becomes too minimal to support aquatic life. The shallow water is easily warmed and overheated, lowering dissolved oxygen. The wide channel width also encourages sediment deposition of fine silts which is the dominant substrate type. Silt substrates are considered a highly negative influence attribute for habitat quality. The overwide straight channel width lacks planform diversity and scour creating a very uniform bottom absence of depth or flow diversity.

Modification of the channel to a narrower and deeper average depth allowing a more confined base flow will improve flow depth and ability to transport the fine channel choking silts. Restoring a more natural channel geometry will encourage pool scour associated with geometric curves of the channel. Restoring an appropriately sized channel to the watershed drainage area with a vegetated floodprone region will encourage more frequent interaction with overbank areas to provide a depository for the fine silts currently stored within the overwide ditch. These modifications, along with adding coarse woody debris to improve the in-stream habitat structure will promote additional local streambed scour for pool development and flow diversity potential of Duck Creek.

2.4 EXISTING CONDITIONS HYDRAULIC MODEL

The stream corridor for the existing condition was modeled in HEC-RAS (Version 6.3.1) software produced by the U.S. Army Corps of Engineers Hydrologic Engineering Center. Steady-state flow conditions were used to evaluate the capacity of the channel and associated floodplains. The flow rates used for the steady-state analysis were obtained from StreamStats. According to StreamStats, the 100-year flow rate for this reach of Duck Creek is 191 cubic feet per second (CFS). However, this flow rate is based on a 0.86-square-mile drainage area. As part of a previous design project on a downstream reach of Duck Creek, EnviroScience completed a watershed analysis. This analysis showed that roughly 0.21-square-miles of drainage area, which was being attributed to Duck Creek was diverted to Otter Creek via a culvert at Seaman St. See Figure 2.3 below for the drainage area breakdown. Based on this finding, the adjusted drainage area for the Collins Park reach of Duck Creek is approximately 0.65-square miles. Therefore, the flow rates associated with this adjusted drainage area were interpolated from the StreamStats flow rates and are provided in Table 2.5. below.

Figure 2.3 Drainage Area, StreamStats

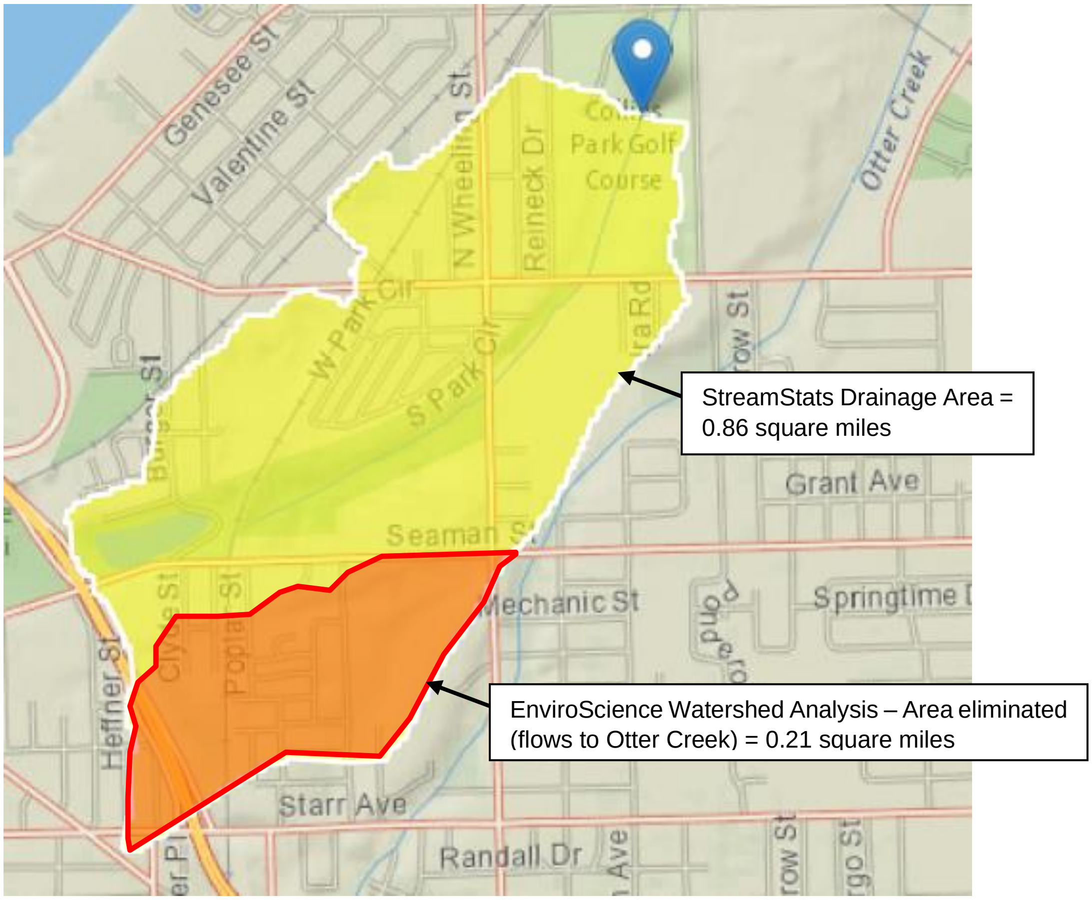
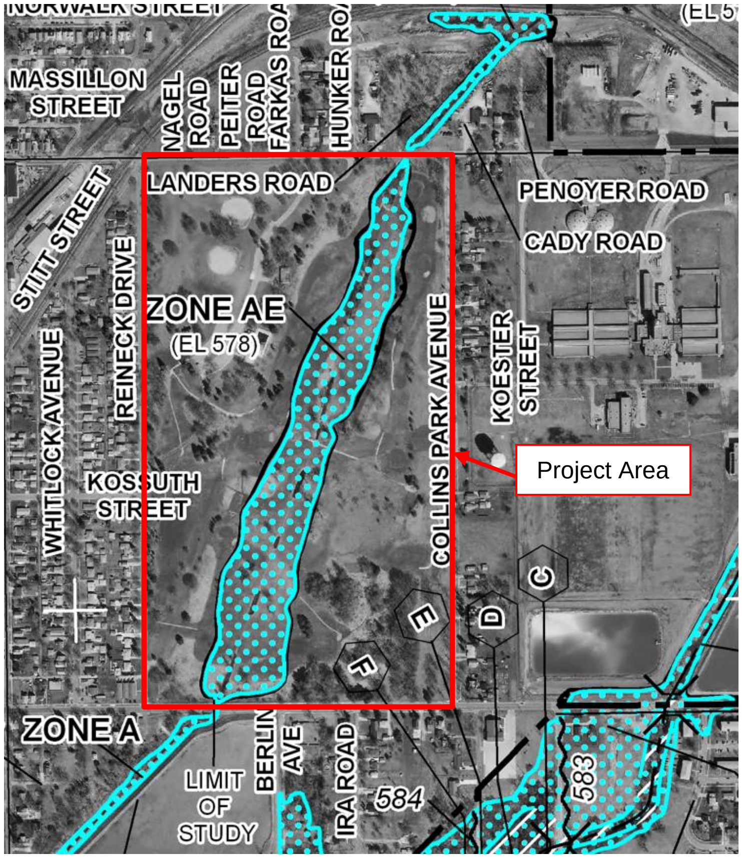


Table 2.5: Annual Exceedance Probability (AEP) Storm Flow Rates

AEP Storm	Flow Rate (CFS)
50%	41
20%	65
10%	82
4%	105
2%	124
1%	143

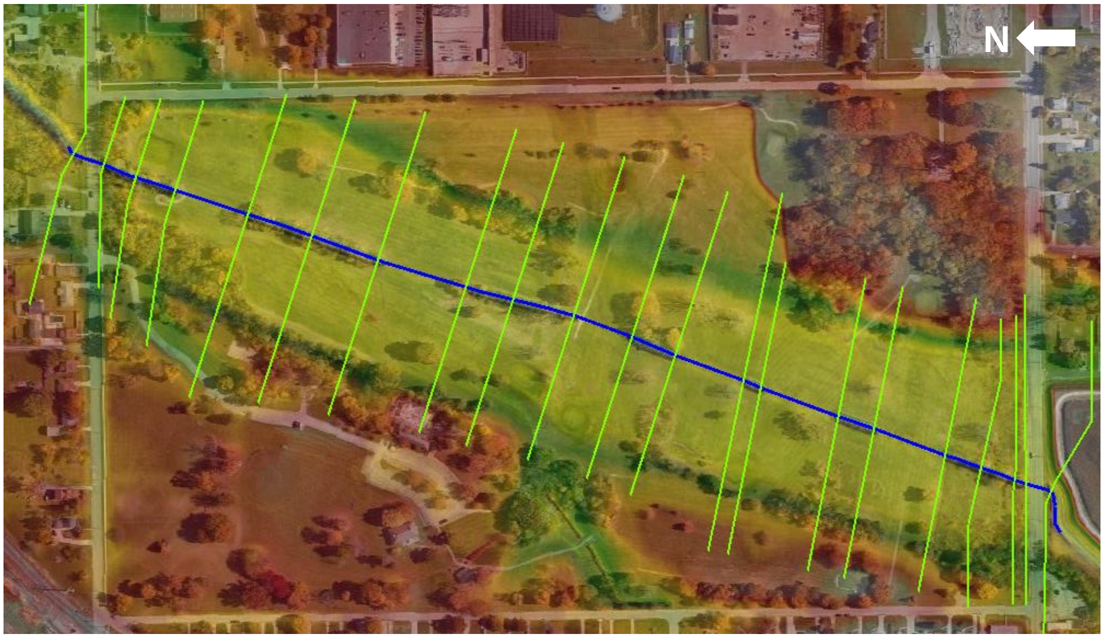
Duck Creek has not been studied by the Federal Emergency Management Agency (FEMA); however, the project area is identified as being in a Special Flood Hazard Area (SFHA) AE according to the Flood Insurance Rate Map (FIRM #39095C0115E, Panel 115 of 425 Effective August 16, 2011). See Figure 2.4 below for the project location on the FIRM. The designation of Zone AE means that the area is subject to inundation of the 100-year storm (1% annual chance flood), and the base flood elevation (BFE) has been identified. The BFE identified in this area is 578.2 due to the backwater from the Maumee River. The full FIRM Panel and other pertinent FEMA data can be found in Appendix F.

Figure 2.4 FEMA FIRM Panel, Project Area



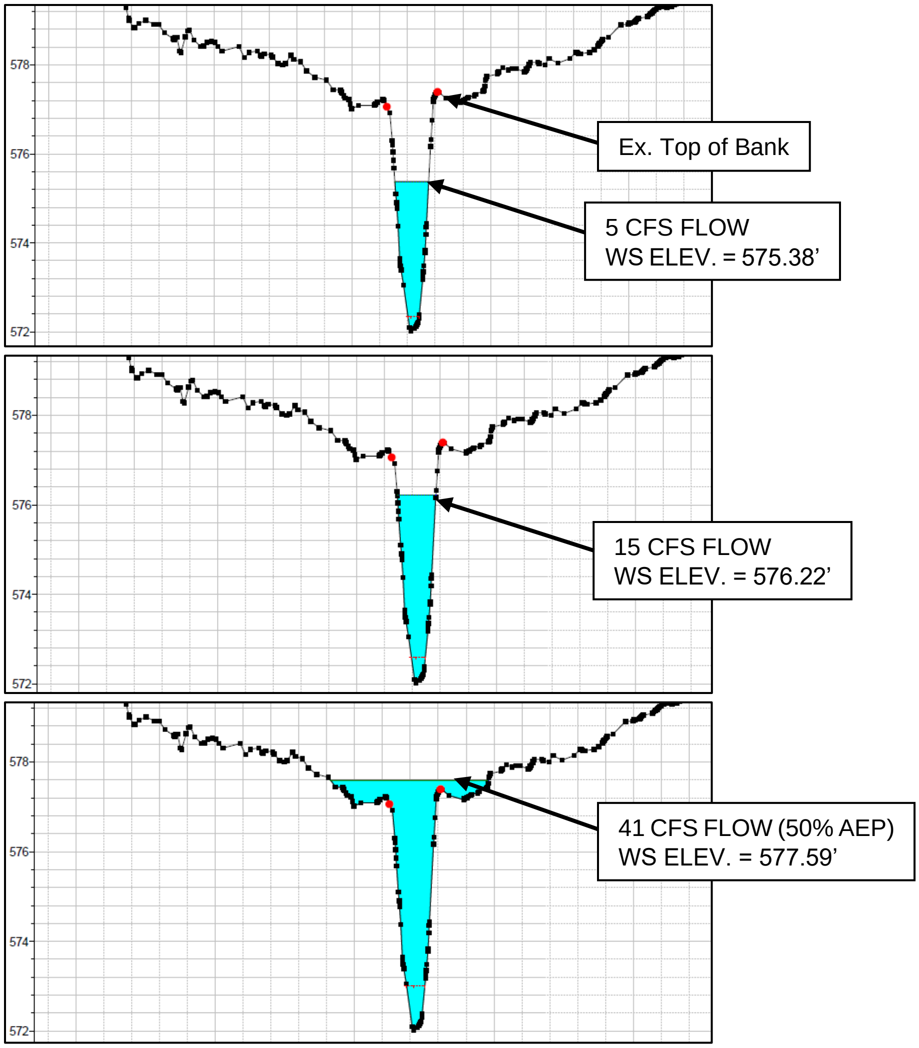
Once the digital basemap was created, the existing conditions surface was exported from Civil 3D into HEC-RAS. Within the RAS Mapper tool of HEC-RAS, 21 cross-sections were cut through the study reach, as shown in Figure 2.5. Cross-sections were placed upstream and downstream of each road crossing and culvert, with additional cross-sections placed as necessary throughout the site to capture important features and conditions. The culvert structures were added individually into the model to show the constrictions throughout the reach. Assumptions for Manning's roughness coefficients (n-value) were made for within the existing channel, culverts, and overbank areas. The n-value for the existing stream channel was 0.045, typical for sluggish, weedy reaches with some rocks and pools. Since the culverts located in the study reach are concrete pipes, a roughness coefficient of 0.013 was assigned to all. Finally, an n-value of 0.03 was assigned to the overbank areas due to the short, maintained golf course grass through most of the site.

Figure 2.5 Existing Conditions HEC-RAS Model, Cross-Section Locations



A steady flow simulation was run for the existing conditions model. Flow profiles for the adjusted 1%, 2%, 4%, 10%, 20%, and 50% annual exceedance probability (AEP) storm flow rates, as listed in Table 2.5, were modeled. Additionally, flow profiles for 5 CFS and 15 CFS were generated to capture low to base flow conditions similar to a 1-yr (100% AEP) storm. The existing conditions results showed very little connectivity to the surrounding floodplain in the higher frequency (lower flow rate) storms. For the 5 cfs, 15 cfs, and 41 cfs (50% AEP) profiles, the flow was mostly maintained within the channel. See Figure 2.6 below for example cross-sections for each of these profiles. See Appendix G for all HEC-RAS results, including cross-sections, plan views, and tables.

Figure 2.6 Existing Conditions HEC-RAS Model, Cross-Section Results



At the 50% AEP flow rate, we see some areas where the water has escaped the channel limits (See Figure 2.6). However, we do not see constant overbank floodplain connectivity through the reach until the 20% AEP profile. While this is likely the desired effect of this channelization through the golf course, this does not allow for regular interaction with the floodplain and creates stagnate, standing water and in-channel sediment storage. This is a big hindrance to creating desirable habitat for fish, macroinvertebrates, and amphibious species that would typically live in and around this stream. Two main factors create this situation: the oversized cross-sectional areas of the channels and the six culverts throughout the project site. The culverts restrict the flow through the reach and force the geometry to maintain a straight alignment through the course. The large cross-sectional area does not allow for effective base flow conveyance and creates a disconnect from the surrounding floodplain by containing all flows within the channel limits. Additionally, this large cross-sectional area creates sedimentation issues as it causes the velocity to drop, making it harder to move sediment effectively through the reach. Moving forward into the preliminary design, EnviroScience identified both items as issues to be addressed.

3.0 PRELIMINARY DESIGN

The project feasibility study goals outlined three restoration options. The initial intent of the three restoration options were to provide a range of alternatives to present to local stake holders, residents and park users during a series of public engagement sessions. The three restoration options were;

A. Partial Site Restoration
B. Minimal Site Restoration
C. Full Site Restoration

The varying degrees of site restoration implied in the names of the options were centered largely around modifications to the Duck Creek in relation to the golf course. The theme of Options A and B was to create a balance and integration of golf course play with ecological improvements while Option C was a complete removal of the golf course and full restoration of the property. More specifically, each design option focused design goals reducing downstream sedimentation and sludge, improving biodiversity with native species, introducing nursery habitat, cover and forage for fish, amphibians, reptiles, waterfowl, and macroinvertebrates. Below is an overview of the three restoration options (A, B, and C).

The feasibility of any design modifications to Duck Creek would be weighed heavily upon the reaction and feedback from residents and park users. Prior to any design work being performed, the project team held a public engagement session at the Birmingham Library on March 21, 2023 with the sole purpose of introducing the public to the upcoming feasibility study and listening to feedback about potential golf course modifications. The overwhelming feedback and response from the attendees at the event was that the golf course was a priority and that removing the course fully was not desired. However, the public was open to modifications, improvements and a balancing of ecological improvements with the course. Feedback was solicited from the public through active listening, written survey questionnaire and a website link questionnaire that was left open for 31 days. In total, the project team received 51 responses as part of this initial engagement.

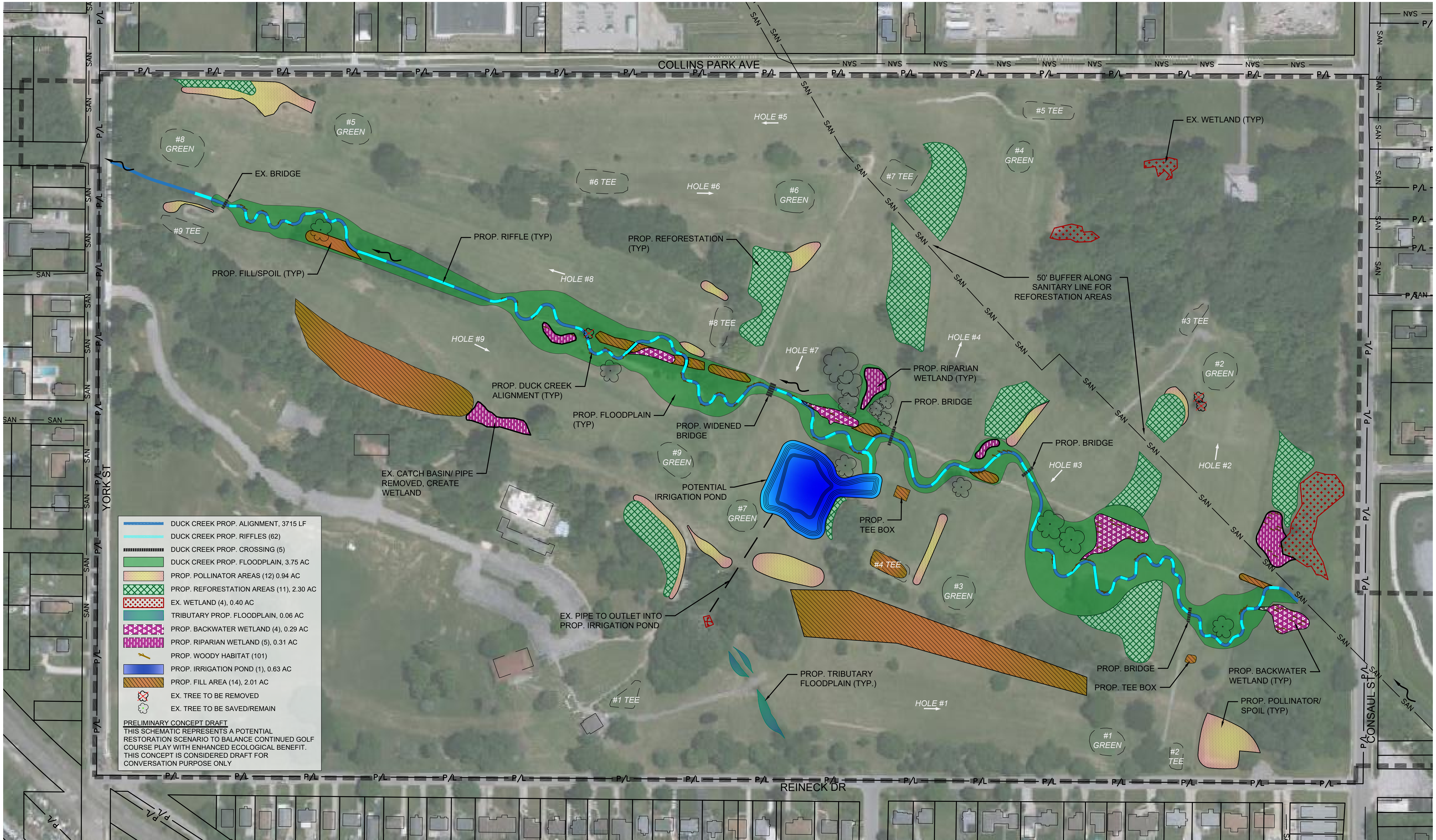
Absorbing the results of the engagement survey, the project team proceeded into the conceptual design phase. The survey and existing condition analysis provided an accurate representation of the project reach and identified impairments to the functional condition that allowed for conceptualization of multiple restoration options. The project team prioritized Options A and B following the clear public opinion about keeping the golf course. More details on Options A and B are provided below.

3.1 RESTORATION OPTION A: PARTIAL SITE RESTORATION

Restoration Option A consists of a partial site restoration. This option stretched the footprint of the improvements to the maximum extent possible while still balancing and maintaining the function of the existing site as a golf course.

Table 3.1 Summary of Improvements, Option A

Feature	Size or Number
Duck Creek Proposed Alignment Length	3,715 LF
Duck Creek Proposed Riffles	62
Duck Creek Proposed Floodplain	3.75 AC
Proposed Pollinator Areas	0.94 AC
Proposed Reforestation Areas	2.30 AC
Tributary Proposed Floodplain	0.06 AC
Proposed Backwater Wetland	0.29 AC
Proposed Riparian Wetland	0.31 AC
Proposed Woody Habitat	101
Potential Irrigation Pond	0.63 AC
Proposed Fill Area	2.01 AC



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CONCEPTUAL PLAN - ALTERNATIVE A

COLLINS PARK FEASIBILITY STUDY

CITY OF TOLEDO

DRAWN BY: JB
CHECKED BY: AH
DATE: SEPT. 20, 2023
VERT. SCALE: NA
HORZ. SCALE: 1" = 200'

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3.1.1 Natural Channel Design

EnviroScience began the design process for Option A by evaluating how the design of a natural channel through the reach would need to interact with golf course play and existing or proposed cart path crossing locations. The proposed channel improvements include changes to the stream alignment, profile, and cross section. The proposed stream is approximately 3,715 LF, increasing the length of the reach by roughly 950 LF.

Channel Dimension

One of the main issues with the existing channel is the ineffective cross-sectional area which is currently too large in both the width and depth dimensions to successfully transport sediment through the reach and provide functional habitat. The existing stream within the project area has top widths averaging between 25 – 30ft, and bankfull depths between 3 – 6ft. The stream's dimension or cross-section is determined based on hydrologic and hydraulic (H&H) relationships to the watershed size, gradient, and geology. At this early conceptual stage, EnviroScience based the proposed bankfull channel section on the drainage area and design experience in a nearby downstream reach of Duck Creek. This data pointed the design team to a bankfull channel width of 6-ft, with the riffle cross-section maximum depth of 1.5-ft and cross sectional area of approximately 5.6 sq.ft at a riffle location. These channel dimensions establish a narrow width-depth ratio channel that are common in low gradient scenarios. These are often the channel configurations that ditches will evolve to post channelization.

Channel Geometry

The new stream alignment was created to provide sinuosity through the reach while keeping in mind the playability of the course, the existing vegetation to be saved, and the integration or replacement of existing crossings. The channel alignment underwent a comment review period and a field verification to finalize the alignment. In general, alignment was shifted to enhance golf play within active play areas while in between golf holes more liberty was taken with channel geometry to improve habitat complexity.

An initial conceptual alignment design for Option A was created by EnviroScience for review and input from the City of Toledo and other project stakeholders. Once all comments were incorporated, EnviroScience coordinated a stake out and walk-through of the design on-site. The purpose of this effort was to ground truth the design against existing site features and golf playability, while also collecting input from golf course specialists. The walk-through took place on June 22, 2023. In addition to representatives from the project design team, the City of Toledo, and other project stakeholders, in attendance were Terry Baller, a golf course designer subcontracted by EnviroScience, and Brian Yoder, the City of Toledo's golf course architect. Input from attendees, especially the golf course specialists, was tracked during the site walk using a survey-grade GNSS receiver and data collector (Spectra Precision SP80 and Ranger 3). The channel alignment was adjusted as necessary to work with golf play, avoid trees that are to remain, and better align into existing culvert crossing locations that must remain for cart and golf course maintenance access.

3.1.2 Floodplain Expansion

As mentioned in the existing hydraulics modeling section, floodplain connectivity was a major concern. The current stream banks of Duck Creek are very high, roughly 5 ft on average. To mitigate these issues, Option A proposed creating several large floodplain expansion areas, which involves excavating 1-2 ft of material to establish a floodplain bench for flows to access during high-frequency storm events. In addition to the floodplain expansion along Duck Creek, there is a small tributary on the west side of the property where small floodplain expansions were also proposed.

As mentioned in the channel design, the site walk-through in June helped the EnviroScience team adjust the limits of the floodplain expansion areas to best suit the vision of the golf course while maximizing restoration and habitat improvements through the reach. In many instances during the site-walk, the golf course representative and design specialist expanded the floodplain limits EnviroScience originally proposed. From a golf course perspective, this reduced the area for landing a ball making the hole more challenging. Data points were collected along the adjusted boundary and reincorporated into the updated Option A design. The revised design includes 3.75 acres of floodplain expansion along Duck Creek with an additional 0.06 acres along the unnamed tributary, totaling approximately 4,600 CY of excavation. Material excavated to create these floodplains will either be spoiled within the existing stream channel or in nearby spoil locations.

3.1.3 Backwater and Riparian Wetland Creation

In addition to the floodplain expansion areas, riparian and backwater wetlands were designed in Option A to create additional water storage/treatment areas as well as different habitats for plants and wildlife. Backwater wetlands were created using abandoned sections of the existing stream alignment. The existing stream is mostly plugged and filled to divert flow into the proposed channel. However, some areas can remain partially or completely open to allow for backwater flows. These backwater wetlands are hydrologically connected to the Duck Creek channel and water level is controlled by the downstream riffle crest elevation. These backwater wetlands will provide important spring-time spawning habitat for migrating Lake Erie fish species such as the northern pike. Bowfin is another wetland oriented Lake Erie species that has been identified in Duck Creek downstream post-restoration at the Cleveland Cliffs project site. These communities will require containerized plants of submerged, floating leaf or emergent species to be planted within the open water communities due to the presence of permanent water. Riparian wetlands are depressions created throughout the floodplain and immediate surrounding areas. These excavations vary from 2-4 ft deep. Material excavated to create these wetlands will either be spoiled within the existing stream channel or nearby spoil locations. These wetlands are not connected to Duck Creek's base flow but hydrological will be dependent on surface runoff precipitation and overbank flood flow. These communities could develop into emergent marsh communities and/or eventually scrub-shrub or forested communities over time. Specific species lists and restoration approaches would be finalized in final design.

3.1.4 Potential Irrigation Pond / Open Water Habitat

A 0.57-acre open water pond is proposed to provide both an irrigation source for the golf course as well as a large connected open water habitat. The hydrology for this feature would be supplied by cutting the existing subsurface tile drain from the storm water basin outlet. This feature would also be a substantial modification and increase difficulty for Hole #7. The current concept configuration provides a depth of 7-8 ft for this pond. The outlet of this pond is desired to create a continuous or at least spring-time connection to the pond for additional fish habitat for migrating or resident species.

3.1.5 Riparian Enhancement with Reforestation and Pollinator Habitat Areas

The riparian corridor is a vital ecological component for a healthy stream and watershed. Duck Creek has lost a sizable portion of the riparian corridor through the golf course. While it is not practical to replace the entire corridor back to a forested condition while maintaining golf course operations, some areas can be leveraged to create different vegetation regimes, including forest and native grasses and wildflowers. During our site walk with the golf course experts, areas not conflicting with golf play were identified for creating or expanding forested areas and native pollinator areas. It is important that low-growing native species are planted in active play areas while the larger canopy and taller growing plants are installed outside of the course boundaries. Restoration Option A includes reforestation areas totaling 2.30 acres. In addition to these areas, plantings are proposed along the stream banks to provide additional habitat. A total of 1,000 trees and 250 shrubs are proposed for the reforestation areas, with a planting density of 300 stems per acre and the remaining stems planted along the stream corridor. Additionally, 3,913 live stakes are proposed along both stream banks at 2-ft-on-center spacing. Approximately 0.94 acres of pollinator areas are identified in Option A. In addition to these areas, around one acre of the proposed spoil areas could also be used for native pollinator habitat. Specific species lists and restoration approaches would be finalized in final design.

3.1.6 Site Material Balance

The excavation of the new channel alignment, floodplains, and wetland areas generates roughly 7,755 CY of earthen material. The potential irrigation pond generates an additional 7,345 CY of earthen material. Some of this material is used to plug and fill abandoned portions of the existing channel. The remainder of the material must be strategically spoiled throughout the site. EnviroScience saw this as an opportunity to provide fill material to improve existing tee boxes. This provides a benefit both to the golf course and to the project in being able to spoil all material on site. Three large spoil areas were also sighted along the western boundaries of the golf course, which provides local spoil for all work areas. These large spoil areas provide flexibility to the design. Should the irrigation pond be included, the spoil areas have been calculated to provide enough capacity to hold all excavated materials generated on-site. However, if the irrigation pond is not constructed, these spoil areas can easily be reduced or eliminated.

3.1.7 Habitat Improvements

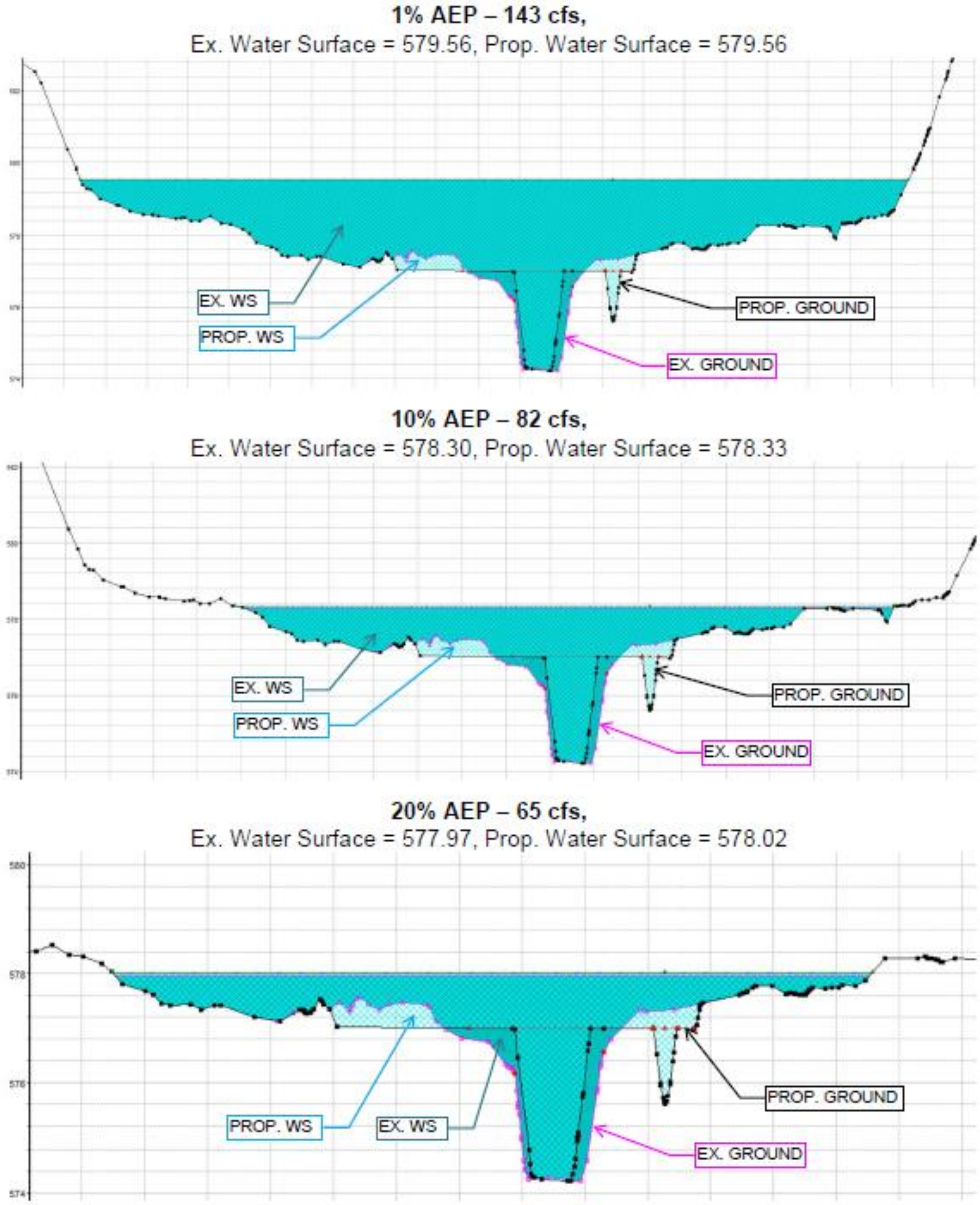
Restoration Option A includes a multitude of habitat improvements. Most of these have been touched on in previous sections, such as restored channel geometry and substrate, backwater and riparian wetlands, native plantings and seeding. Other habitat improvements include the installation of 101 woody habitat structures throughout the stream corridor. In the concept plan these are represented as generic woody habitat symbols but each of these areas would be designed in more detail during the next design phase. The woody habitat structures would function to provide the local channel complexity and scour that wood provides in streams for the fish, wildlife and benthic communities. Due to the size of the stream, woody material as small as 6-14 inches in diameter at varying lengths could be used in the stream. The woody material would be locked into place either by partial burial or pinned into place with large woody pins cut and produced on-site. It is assumed at this stage that woody material for habitats would be sourced on-site during construction from clearing operations.

3.1.8 Proposed Conditions Hydraulic Model

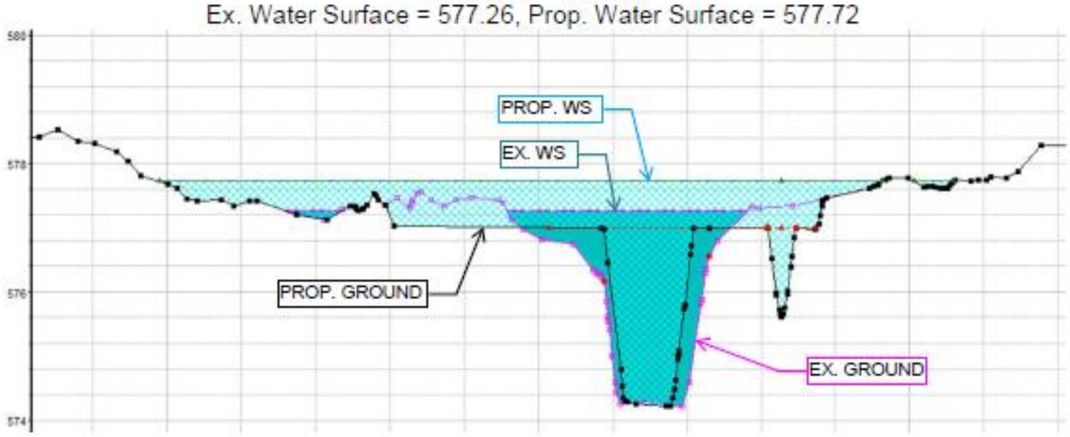
EnviroScience's proposed Restoration Option A was incorporated into the AutoCAD basemap. The proposed design, including stream realignment, fill of abandoned sections of the existing alignment, removal of culverts, floodplain expansion, and wetland creation were incorporated into a proposed AutoCAD elevation surface, from which the proposed conditions hydraulic model was generated. See Appendix G for all proposed conditions modeling results, including cross-sections, tables, and profiles.

Comparing the resultant water surface elevations from the proposed conditions model to the existing conditions model, we see increases in nearly all storm profiles. The elevation increases are more significant in the higher frequency, lower flow rate storms, including 5 cfs, 15 cfs, and 41 cfs (50% AEP). The changes in water elevation become less significant to no change in the larger storms, including the 20%, 10%, and 1% AEP events. The increase in water surface elevation in the higher frequency storms is due to the raised grade approach combined with the smaller channel cross-sectional area of the proposed stream. The raised thalweg elevations of the stream along with a smaller cross-sectional area, forces flow out of the channel banks sooner, allowing flows to expand through the proposed floodplains and wetland areas. From a water quality and habitat improvement perspective, these results are positive. In the current condition, this interconnectivity of the floodplain and stream is missing because it takes large storm events to overtop the high banks of the channel. In this proposed plan, with the smaller channel and excavated floodplains, the connection between both will be activated more frequently.

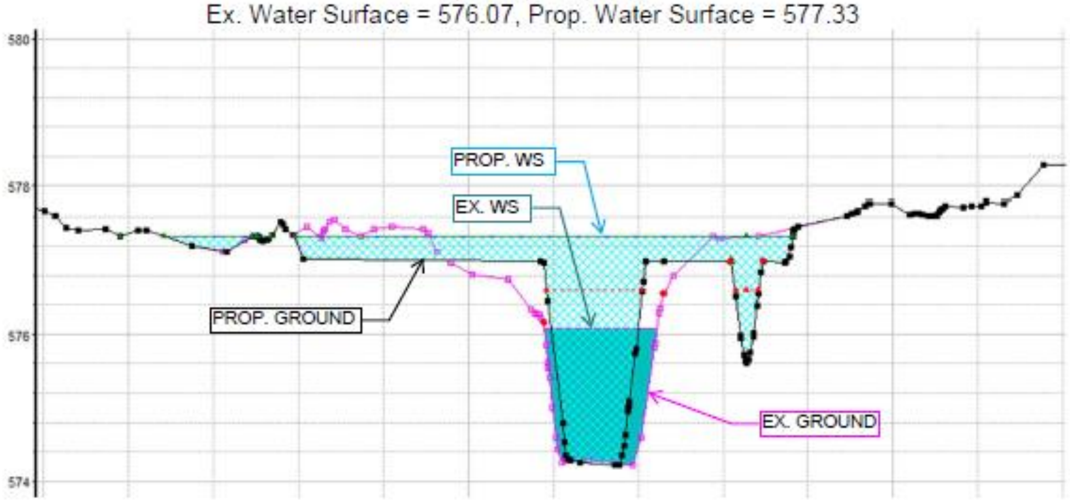
Figure 3.1 Existing vs. Proposed HEC-RAS Model, Cross-Section Results



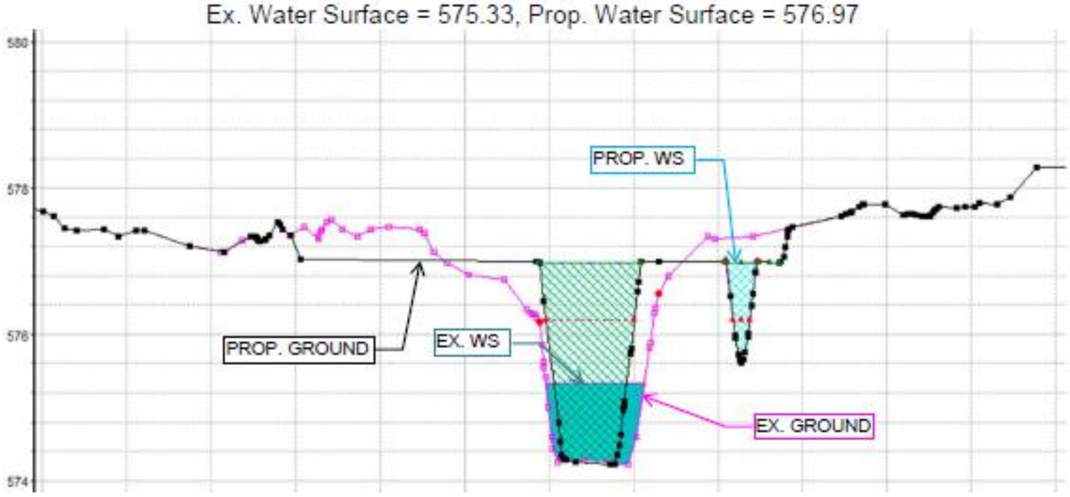
50% AEP – 41 cfs,
Ex. Water Surface = 577.26, Prop. Water Surface = 577.72



~1 yr flow = 15 cfs,
Ex. Water Surface = 576.07, Prop. Water Surface = 577.33



5 cfs,
Ex. Water Surface = 575.33, Prop. Water Surface = 576.97



3.1.9 Preliminary Cost Estimate

To aid in the development of a preliminary cost estimate, EnviroScience generated construction quantities based on preliminary survey data collected with respect to the conceptual design grades for the channel, floodplain, and wetland restoration features. Developing these quantities allowed for a more accurate accounting of the potential earth moving, time and other cost variables associated with the project. The table below provides the costs of major components for the proposed Option A restoration. The costs do not include maintenance or invasive species management.

Table 3.2: Option A Construction Cost Estimate

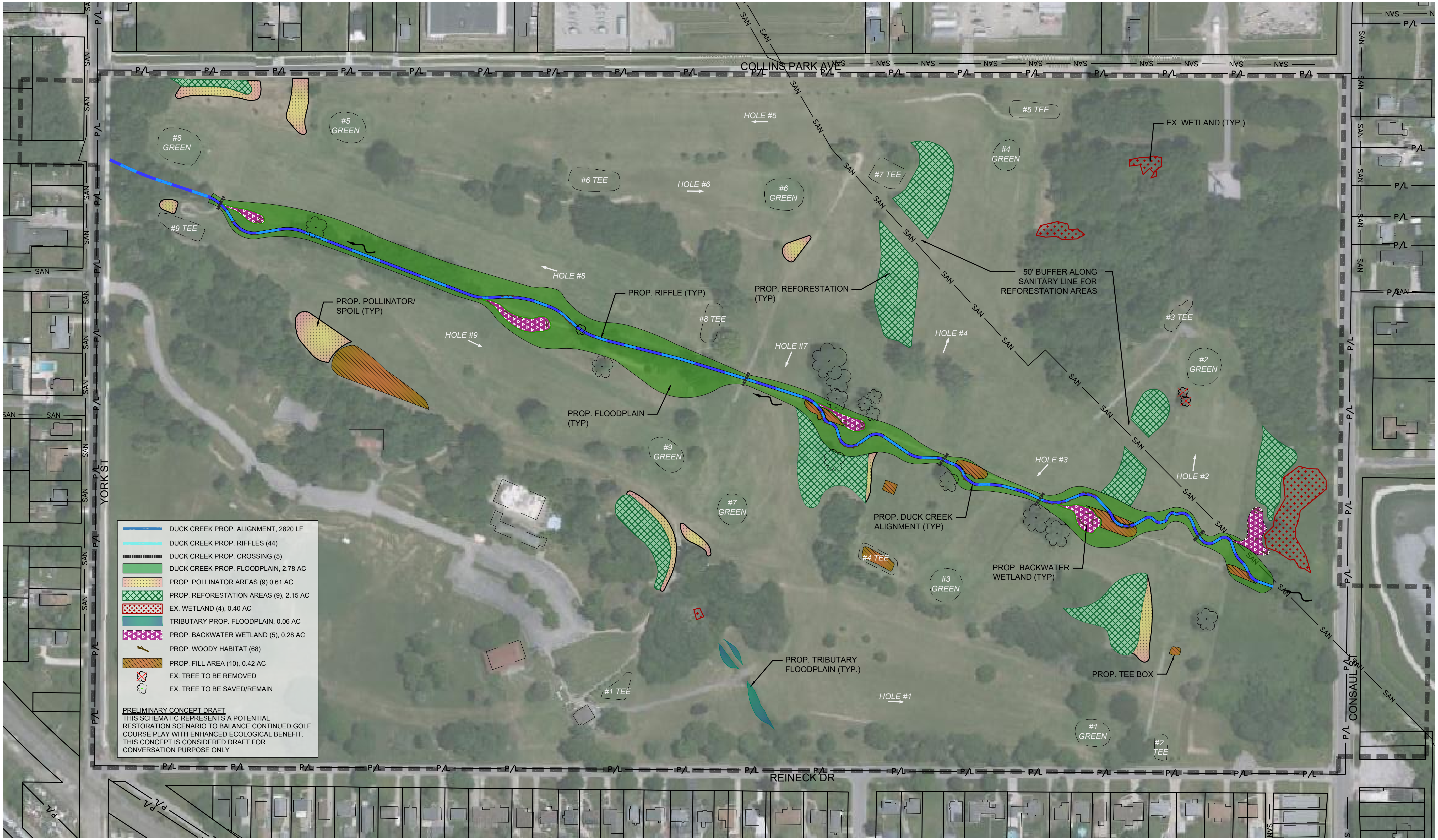
Items	Costs
Demolition	$ 43,500.00
Earthwork, Not Including Irrigation Pond	$ 226,230.00
Irrigation Pond (Optional)	$ 94,765.00
Stream Substrate Installation	$ 110,925.00
Native Plantings	$ 224,595.84
Stream Crossings/Bridges	$ 40,000.00
Erosion & Sediment Control	$ 171,056.00
Construction General Conditions & Mobilization	$ 57,500.00
Contingency (20%)	$ 193,715.00
Construction Total: Option A	**$ 1,162,286.84**

3.2 RESTORATION OPTION B: MINIMAL SITE RESTORATION

Restoration Option B consists of a minimal site restoration. This option kept the stream alignment close to the existing alignment but with increased daylighting and narrow floodplain benches. This restoration option is focused on improving the channel dimension for improved sediment transport and slope stabilization through decreased bank heights while minimizing disturbance to the surrounding landscape.

Table 3.3 Summary of Improvements, Option B

Feature	Size or Number
Duck Creek Proposed Alignment Length	2,820 LF
Duck Creek Proposed Riffles	44
Duck Creek Proposed Floodplain	2.78 AC
Proposed Pollinator Areas	0.61 AC
Proposed Reforestation Areas	2.15 AC
Tributary Proposed Floodplain	0.06 AC
Proposed Backwater Wetland	0.28 AC
Proposed Riparian Wetland	N/A
Proposed Woody Habitat	68
Potential Irrigation Pond	N/A
Proposed Fill Area	0.42 AC



EnviroScience
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800-940-4025 | EnviroScienceInc.com

SHEET: 2 / 2

CONCEPTUAL PLAN - ALTERNATIVE B
COLLINS PARK FEASIBILITY STUDY
CITY OF TOLEDO

DRAWN BY: JB
CHECKED BY: AH
DATE: JULY 25, 2023
VERT. SCALE: NA
HORZ. SCALE: 1" = 200'

P:\10_PROJECTS\T\TOLEDO_CITY_OF\430R\17005_COLLINS PARK STREAM RESTORATION FEASIBILITY PROJECT\RESTORATION DESIGN\PRELIMINARY_DESIGN\SHEETS\FIGURE.DWG -- FIG ALT 2-11X17 -- 9/21/2023 2:48:04 PM -- ANGELINA HOTZ

3.2.1 Natural Channel Design

EnviroScience's design process for Option B focuses more on the channel dimension improvements than the channel geometry and alignment. While some meandering is proposed at the upstream end of the project area, this is prior to entering the main golf play areas of the site. Once within the active golf play area, the channel will maintain its current straight path, with more of the channel being daylighted through the removal of most culverts. The proposed channel improvements include changes to the stream alignment, profile, and cross-section. The proposed stream is approximately 2,820 LF, increasing the length of the reach by 55 LF.

Channel Dimension

The channel's dimension issues and proposed improvements are the same as discussed for Option A. The proposed bankfull channel section is 6 ft in width and 1.5 ft in depth.

Channel Geometry

The new stream alignment was created to provide some sinuosity while mostly maintaining the existing banks and culvert crossing locations.

3.2.2 Floodplain Expansion

For the same reasons discussed for Option A, floodplain expansion is proposed in Option B. Excavation depths for floodplain expansion are anticipated to be similar in Option B, having 1-2 ft in total along Duck Creek. The floodplain expansion areas will not be as wide as proposed in Option A, only extending a maximum of 75ft from the channel and averaging between 20-40ft on either side of the channel. The total proposed floodplain expansion along Duck Creek is 2.78 acres. The same floodplain expansion of 0.06 acres along the small tributary on the west side of the property that was proposed in Option A is included in Option B as well.

3.2.3 Wetland Creation

In addition to the floodplain expansion areas, backwater wetlands were designed in Option B to create additional water storage/treatment areas as well as different habitats for plants and wildlife. Backwater wetlands were created using abandoned sections of the existing stream alignment for a total of 0.28 acres. The existing stream is mostly plugged and filled to divert flow into the proposed channel. However, some areas can remain partially or completely open to allow for backwater flows. The advantage of this type of habitat creation is that it generates no additional earthwork and can be made using mostly existing grades within the abandoned stream channel. No riparian wetlands are proposed in Option B to minimize this restoration option's footprint.

3.2.4 Riparian Enhancement with Reforestation & Pollinator Habitat Areas

Restoration Option B includes 2.15 acres of reforestation areas. In addition to the reforestation areas, plantings, including live stakes, trees, and shrubs are proposed along the stream banks to provide additional habitat. Assuming 300 stems per acre in the reforestation areas results in 645 trees planted. More trees and shrubs would be planted throughout the stream corridor. Additionally, live stakes are proposed along both stream banks, at 2-ft-on-center spacing, in areas that do not impede golf play or crossing locations. Approximately 0.61 acres of pollinator areas are identified in Option B. In addition to these areas, around 0.23 acres of the proposed spoil areas could also be used for native pollinator habitat.

3.2.5 Site Material Balance

The site material balance approach is similar to that of Option A. Material excavated to create a new channel, floodplains, and wetlands will be spoiled in abandoned sections of the stream and in spoil locations identified throughout the site. This option still includes several spoil areas intended to improve or raise tee boxes. Due to this approach being smaller than Option A, there is less material that needs spoiled. Therefore, spoil areas are smaller, and there is more flexibility regarding where this material can be placed and how it can be shaped to suit both habitat improvements and golf play best.

3.2.6 Habitat Improvements

Restoration Option B includes a multitude of habitat improvements. Most of these have been touched on in previous sections, such as restored channel geometry and substrate, backwater and riparian wetlands, native plantings and seeding. Other habitat improvements include the installation of 68 woody habitat structures throughout the stream corridor.

3.2.7 Proposed Conditions Hydraulic Model

A proposed conditions hydraulic model was not developed for Option B. The results, as far as getting flows out onto the landscape at higher frequency storms, are anticipated to be similar to Option A. However, with the smaller floodplain expansion areas, it is likely that flows would extend out of the floodplain limits and into golf play areas sooner than shown in Option A. Should this be the desired option moving forward, a proposed model should be generated to evaluate water surface elevations throughout the reach.

3.3 RESTORATION OPTION C: FULL SITE RESTORATION

The City of Toledo requested a third option be evaluated in which the entire site was restored to a natural area. This option would involve converting the entire site to a use that maximizes fish habitat, floodplain restoration, and public use as a natural area. However, on March 21, 2023, a public meeting was held in which the community expressed overwhelming support for the golf course to remain open. The project team and its stakeholders agreed that due to this public sentiment, it was best to eliminate a full site restoration from the options being evaluated.

4.0 CONCLUSIONS

Based upon the preliminary data gathered and initial designs and models, the following conclusions regarding feasibility, project benefits, and general recommendations are provided for the Collins Park - Duck Creek Restoration.

Immediate benefits of the proposed improvements include improved water quality through natural filtration and settling within the floodplain expansion and wetland areas, improved stream function including better sediment transport, which will help alleviate sediment buildup through the study reach, and improved habitat for fish and macroinvertebrates through flow diversity from the riffle and pool installations and native plantings. While the improvements do not appear to generate enough storage capacity to lower flood elevations, the modeling shows we will be activating the floodplain more frequently which achieves our goal of habitat improvement.

The design team recommends proceeding with Option A, as it provides the maximum possible restoration potential along with maintaining and, in some cases, improving golf play on the site. A table of anticipated costs associated with the final design, permitting, and construction of Option A is provided in Table 4.1 below.

Table 4.1: Option A: Final Design, Engineering, Permitting and Construction Cost Estimate

Item	Cost
Construction Total (Including 20% Contingency)	$ 1,162,286.84
Final Design & Engineering	$ 92,983.00
Permitting & Regulatory	$ 69,738.00
Construction Administration & Oversight	$174,344.00
Total Estimated Project Cost (Option A)	**$ 1,499,351.84**

5.0 LITERATURE CITED

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Appendix A

INNOVATIVE IDEAS
EXCEPTIONAL DESIGN
UNMATCHED CLIENT SERVICE

ARCHITECTURE • ENGINEERING • PLANNING
SURVEYING • CONSTRUCTION SERVICES

FINAL REPORT OF SUBSURFACE EXPLORATION

Duck Creek Restoration

TOLEDO, OHIO

Prepared For:

Enviroscience, Inc.
5070 Stow Road
Stow, Ohio 44224

Prepared By:

DLZ OHIO, INC.

DLZ Job No. 2321-3030.00

July 19, 2023

EXECUTIVE SUMMARY

This report includes the findings of the subsurface exploration performed for the Duck Creek Restoration project located within Collins Park Golf Course in the City of Toledo, Ohio. The exploration has been performed essentially in accordance with DLZ Ohio, Inc.'s proposal for the subsurface exploration dated October 4, 2022.

This exploration was performed to determine the subsurface conditions at the site, and to provide recommendations to assist in the restoration of Duck Creek within the Collins Park Golf Course property. It is understood that the actual design of any restoration work and necessary structure foundations will be performed by others.

The subsurface conditions were evaluated by drilling a total of seven Standard Penetration Test (SPT) borings and performing twelve Direct Push borings. The borings, except for B-6 (a SPT boring), generally encountered 4 to 9 inches of topsoil at the ground surface. Underlying the topsoil or at ground surface, the borings encountered stiff to hard cohesive soils (CL, CL-ML) with occasional interbeds of granular soils.

A sample was taken from each of the Direct Push borings, except GP-03 and GP-10, for chemical testing to determine whether there is soil contamination at the site. During the exploration, the Direct Push samples were screened with a photo-ionization detector (PID) for possible volatile organic compounds (VOCs). The samples from the Direct Push borings GP-05 and GP-07 had readings of 0.1 and 2.9 parts per million (ppm), respectively, while the remaining Direct Push samples had no detectable PID readings. The observations indicated that most of the Direct Push samples did not indicate any signs of VOC related contamination. The readings in GP-05 and GP-07 are considered low, however, chemical testing is necessary to document the presence of any specific VOCs (as well as metals, herbicides, and pesticides). Results of the chemical testing showed no detectable amounts of contaminants analyzed (volatile organic compounds, semi-volatile organic compounds, metals, herbicides, pesticides) in all ten samples.

Shallow footings founded on the existing stiff to hard cohesive native soils or structural fill can be designed for a net allowable bearing capacity of 2,500 pounds per square foot (psf).

Table of Contents

1.0 INTRODUCTION AND PROJECT DESCRIPTION

This report includes the findings of the subsurface exploration performed for the Duck Creek Restoration project located within Collins Park Golf Course in the City of Toledo, Ohio. The exploration has been performed essentially in accordance with DLZ Ohio, Inc.'s proposal for the subsurface exploration dated October 4, 2022.

The purpose of this exploration was to 1) determine the subsurface conditions to the depths of the borings, 2) evaluate the engineering characteristics of the subsurface materials, and 3) provide information to assist in the design of the proposed restoration and associated foundations. It is understood that the actual design of the restoration work as well as the foundations will be performed by others.

DLZ has performed the exploration in accordance with generally accepted geotechnical engineering practices. No warranties, either expressed or implied, are made as to the professional advice included in this report.

2.0 GEOLOGY AND OBSERVATIONS OF THE PROJECT

The project site is located within Collins Park Golf Course which is located in the City of Toledo, Ohio, approximately one mile east of the Maumee River and two miles south of Lake Erie, in Lucas County, Ohio. Physiographically, Lucas County falls in the Huron-Erie Lake Plains Section of the Central Lowland Province. The project site is located on the Maumee Lake Plain physiographic unit. Generalized geologic references indicate that the site was glaciated by both the Illinoian and Wisconsin ice sheets. The drift is reportedly thick, between 80 to 140 feet. The bedrock consists of dolomites of the Greenfield Member of the Monroe Group.

The site is located within a suburban neighborhood and is adjacent to the Collins Park Water Treatment Plant. The site generally lies in a shallow valley, with Duck Creek located along the valley base. The partially culverted creek runs from south to north; however, the water is generally stagnant.

3.0 EXPLORATION

3.1 FIELD EXPLORATION

Seven (7) Standard Penetration Test (SPT) borings, designated B-1 to B-7, and twelve (12) Direct Push borings, designated GP-01 to GP-12, were advanced for the project between June 6 and 9, 2023. The SPT borings were drilled using a track-mounted combination Auger and Direct Push drill rig. Geotechnical sampling was advanced between sampling intervals with 3¼-inch ID hollow-stem augers (HSA). Disturbed soil samples were obtained at intervals no greater than 2.5 feet with a 2-inch OD split-barrel sampler in general accordance with ASTM D-1586 (AASHTO T206) until the planned boring termination depths.

Direct Push borings were completed with a Geoprobe soil sampling unit. Soil samples were collected continuously with a 4 foot-long Dual Tube sampling system with a disposable plastic liner to capture the soil samples as the boring was advanced. Upon retrieval of the sample barrel, portions of the sample were immediately placed in a resealable plastic bag for headspace screening with a photo-ionization detector (PID). This procedure was performed for each Direct Push boring. The PID readings as well as observations made regarding the composition, texture, moisture content, evidence of contaminants, if any, etc., were recorded on field logs.

Boring logs, included in Appendix I, represent DLZ's interpretation of the field logs and may include modifications based on laboratory observations. The logs describe the materials encountered, their estimated thicknesses, and the depths where samples were obtained.

Information concerning the drilling procedures is presented in Appendix I. The as-drilled boring locations are shown on the boring location plan presented in Appendix I. The borings were staked in the field by representatives of DLZ based on locations provided by Enviroscience, Inc., and the ground surface elevations were estimated from available surveyed topographic mapping. The estimated ground surface elevations at the boring locations are listed on the individual boring logs. Boring logs are presented in Appendix I.

3.2 LABORATORY TESTING PROGRAM

3.2.1 SOIL INDEX TESTING

The soil index laboratory testing program consisted of visual classification, general index, and loss on ignition (LOI) testing. The testing was performed by DLZ's laboratory located in Columbus, Ohio. The results of the lab testing are presented on the boring logs and the individual test reports in Appendix II.

3.2.2 ENVIRONMENTAL TESTING

Soil samples were collected for chemical analyses from ten of the Direct Push borings to assess the environmental condition of the site. This environmental testing was performed by Summit Environmental Technologies, Inc. in Cuyahoga Falls, Ohio; the tests and methods used are summarized in the table below.

Table No. 1 – Summary of Analyses and Methods

Test	Method
TCLP Mercury	EPA Method 7470A
TCLP Metals	EPA Method 6010
TCLP Semi-Volatiles	EPA Method 8270C
TCLP Pesticides	EPA Method 8081A
TCLP Herbicides	EPA Method 8321
TCLP Volatiles	EPA Method 8260

The results are discussed in Section 4.4. The individual test reports are presented in Appendix II.

4.0 FINDINGS

The following sections present the generalized subsurface conditions encountered by the borings. The soil transitions and groundwater conditions might differ vertically and laterally from the observations made in the boreholes. For more detailed information, please refer to the boring logs presented in Appendix I. Please note that the strata contact lines shown on the boring logs represent approximate boundaries between soil types.

4.1 SOIL CONDITIONS

The SPT borings, except for B-6, encountered topsoil of between 4 and 9 inches in thickness at the ground surface. Underlying the topsoil or at ground surface, the borings generally encountered fill or possible fill soils consisting of lean clay (CL) and very loose to loose silt (ML). The fill and possible fill soils were dry to damp and generally contained an organic odor and root hairs. The natural soils encountered in the borings consisted of soft to hard lean clay (CL) and silty clay (CL-ML) with interbedded layers of very loose to dense silty sand (SM), clayey sand (SC), and silt (ML) to the completion depth of the borings of 25.0 feet.

The Direct Push borings (6 feet deep each) generally encountered medium stiff to hard cohesive soils (CL, CL-ML), except GP-03, which encountered silty sand (SM).

4.2 GROUNDWATER CONDITIONS

Seepage was first encountered in borings B-1, B-3, B-4, and B-5 at depths of between 7.5 and 9.0 feet below the ground surface. The remaining borings did not encounter seepage. At the completion of drilling, groundwater was observed in borings B-1, B-3, B-4, and B-5 at depths of between 16.1 and 24.0 feet, as well as in borings B-2 and B-6 at depths of 6.4 and 24.1 feet, respectively. No measurable groundwater levels were encountered at completion of drilling in any of the remaining SPT or Direct Push borings.

It should be noted that groundwater levels were measured inside the hollow stem augers or in boreholes that might have collapsed. Additionally, groundwater levels may fluctuate with seasonal variations and following periods of heavy or prolonged precipitation. Therefore, the readings indicated on the boring logs may not be representative of the long-term groundwater level in this area. Long-term monitoring would be needed to obtain a more accurate estimate of the groundwater table elevation.

4.3 FIELD SCREENING AND TESTING

All collected direct push samples were screened for volatile organic vapors using a photo-ionization detector (PID). The instrument was calibrated daily with 100 parts per million (ppm) isobutlene standard gas. During the screening process, portions of the recovered soils were placed into clean zippered top polyethylene bags. The air within the bag was allowed to equilibrate with the soil gas before the PID was used to sense the presence of organic vapors. The organic vapor screening results found that two direct push borings samples from two Direct Push borings, GP-05 and GP-07, recorded readings of 0.1 and 2.9 (ppm), respectively. The other direct push samples did not contain detectable concentrations of organic vapors. The observations indicated that the Direct Push samples did not exhibit signs (visual, olfactory, or elevated screening instrument readings) that suggest the presence of VOCs or other potential contaminants. The PID readings in GP-05 and GP-07 are considered very low and generally are not considered indicative of the presence of VOCs. However, PID measurements are intended as a preliminary site screening method and chemical testing is necessary to document the presence of any specific VOCs (including semi volatile organic compounds), as well as metals, herbicides, and pesticides. Testing results are reported in Section 4.4.

pH testing was conducted in the field using a handheld instrument. Testing was immediately conducted after the sample collection to ensure accurate representative data for these parameters. Results of the pH are presented in the following table.

Table No. 1 – Summary of pH Observations

Direct Push Boring	pH (S.U.)	Direct Push Boring	pH (S.U.)
GP-01	5.1	GP-07	4.9
GP-02	5.9	GP-08	5.8
GP-03	5.7	GP-09	6.4
GP-04	5.9	GP-10	5.9
GP-05	6.4	GP-11	6.5
GP-06	5.4	GP-12	5.8

4.4 SOIL CHEMICAL TESTING RESULTS

Chemical testing of the soil samples was conducted by Summit Environmental Technologies, Inc. Samples were collected into laboratory-supplied jars, labeled with identifying information, and placed into coolers with ice packs to preserve the integrity of the samples. Following the completion of the fieldwork, the samples were delivered by courier to be lab under chain of custody to the laboratory for analysis. Ten samples were tested by the lab using the Toxicity Characteristic Leaching Procedure (TCLP) method to identify if the samples contained detectable or characteristically hazardous levels of chemical compounds, as defined by the Environment Protection Agency. The laboratory results of the chemical testing are included in Appendix II. The TCLP testing of the samples reported no detections for metals, volatiles, semi-volatiles, herbicides, or pesticides above the practical quantitation limit (PQL). For reference, the individual PQL levels for each metal or compound tested are listed on the Analytical Reports provided in Appendix II. The PQLs were all at or below the minimum concentrations that are identified as hazardous as regulated in 40 CFR 261.24, which is presented in Appendix II.

5.0 ANALYSES AND RECOMMENDATIONS

The subsurface exploration consisted of drilling a total of 19 borings to determine the subsurface conditions as they relate to the proposed restoration of Duck Creek and to determine if the near surface soils at the site are contaminated.

PID screening resulted in readings of 0.1 and 2.9 ppm in samples from GP-05 and GP-07, respectively, while the remaining samples had no detectable PID reading. Analytical testing of samples from 10 Direct Push borings did not result in positive detections for the contaminants analyzed. Based on the results of this subsurface exploration, the subsurface conditions at the site are generally considered suitable for the proposed restoration.

Currently, the design details of the proposed restoration work are not available. If the design information becomes available, DLZ should be informed so that the recommendations and conclusions presented in this report may be revised as necessary. Foundation recommendations, as well as excavation and groundwater considerations are discussed in more detail in the following sections.

5.1 SITE/STRUCTURE SUBGRADE PREPARATION

Prior to structure or pavement subgrade preparation, all topsoil, vegetation, organic soils, fill, possible fill, debris, and other materials deemed unsuitable by the geotechnical engineer, should be stripped and removed within and 10 feet beyond the limits of the proposed improvements. Where encountered, topsoil can be stockpiled and used as fill within non-structural areas, such as landscaping zones. It should be noted that the actual conditions may differ from those encountered in the borings during this investigation.

Once the structure or pavement footprint has been stripped or excavated to the proposed subgrade, the exposed areas should be proofrolled with a heavy piece of construction equipment to determine if any soft, yielding areas are present. If any yielding areas are revealed they should be undercut to firm, non-yielding soils, and replaced with engineered fill as discussed below.

All fill placed across the site should be compacted to the specified percentage of the maximum dry density as determined by Standard Proctor Test, ASTM D 698. Table 2 outlines the required compactive efforts required across the site during site development. Material moisture content may need to be adjusted as required in order to achieve proper compaction and stability.

Table 2: Compaction of Fill Materials

Location of Fill	Maximum Lift Thickness (Loose non-compacted)	% of Maximum Dry Density (ASTM D1557)	Percentage Points from Optimum Moisture Content
Earthwork (Outside Floodplain)	12-inch	90	+/- 3
Yielding Undercuts	8-inch	98[1]	+/- 3
Fill in Structure Areas	8-inch	100	+/- 3

1 – The top 12 inches of all subgrade within structures should be compacted to not less than 100% of the maximum dry density.

No particle size greater than two inches in any direction should be placed as fill. Any particle size greater than two inches should be broken down until it is less than two inches, or it should be removed from the lift. All potential imported fill materials should be identified and approved by the geotechnical engineer prior to placement. Approval requires that moisture-density relationship tests, hydrometer analysis, and Atterberg limits be determined for each fill material prior to their placement.

It is recommended that earthwork be performed under continuous observation and testing by a soil technician with the general guidance of a geotechnical engineer. Additional recommendations regarding site grading and compaction requirements are included in Appendix III, "General Earthwork".

When excavating for foundations, it is recommended that the excavations be cut flat and have essentially horizontal bottoms undisturbed by the method of excavation. For structures founded on sand deposits, the bottoms of the excavations should be compacted with a vibratory compactor. However, if wet sand conditions are encountered, a static compactor may be used for the initial lift of fill materials.

5.2 FOUNDATION RECOMMENDATIONS

In general, the subsurface conditions across the entire project area consisted of cohesive fill or possible fill soils overlying soft to hard cohesive soils with interbedded layers of silt and sand. With proper earthwork, these subsurface conditions are generally considered suitable for general construction and foundation supports. It should be noted that the fill and possible fill consisted of dry to damp clays which will be difficult to compact and might require moisture correction. Dry clay can be blocky when excavated and difficult to break down in order to add moisture. If the dry to damp soils are too difficult to get to within +/-3 percentage points of their optimum moisture content, overexcavation and replacement with structural fill should be considered.

Shallow footings founded on the existing stiff to hard cohesive soils or structural fill can be designed for a net allowable bearing capacity of 2,500 pounds per square foot (psf) assuming an overall soil settlement of one inch or less. It was assumed that the bottom of the shallow footings have minimum widths of 36, 24, and 18 inches for isolated spread footings, continuous strip footings, and trench footings, respectively. All footings should be founded at a minimum depth of 42 inches below exterior grade for frost protection.

Settlement analyses were not conducted for this project since the structure type, foundation widths, and loading are not known at the time of this reporting. Once these design details are available, DLZ should be informed for settlement evaluations.

Relative to the footings and footing excavations, the following additional recommendations are presented:

1. All exterior footings should be founded deep enough for frost protection, which is 42 inches in this area.

2. It is recommended that footing excavation bottoms be examined by the geotechnical engineer prior to placement of reinforcing steel and concrete in order to determine the suitability of the supporting soils.

3. All footing excavations should be cut flat with the bottoms comprised of firm soil undisturbed by the method of excavation or softened by standing water. For structures founded on sand deposits, the bottom of the excavations should be compacted with a vibratory compactor. However, if wet sand conditions are encountered, a static compactor may be used for the initial lift of fill material. Reinforcing steel and concrete should be placed the same day that the footings are excavated.

4. The bottoms of the excavations should be kept essentially dry.

5. While excavating for the footings, weaker materials or otherwise unsuitable soils may be encountered deeper than indicated by the borings. Excavations that encounter these materials will need to be over-excavated until suitable bearing material is encountered. The size of the over-excavation should be increased one foot beyond the original foundation footprint for each foot of over-excavation below the planned bearing level (sometimes referred to as 1:1 oversizing). Granular soils should be used for the engineered fill beneath the structure. Compaction of the engineered fill should be in accordance with Table 2 of this report. Alternatively, lean concrete or controlled low strength material (CLSM) with a minimum 28-day compressive strength of 1,000 pounds per square inch (psi) may be used as engineered fill.

5.3 EXCAVATION AND GROUNDWATER CONSIDERATIONS DURING CONSTRUCTION

All excavations should be constructed in accordance with applicable local, state, and federal safety regulations including the current OSHA Excavation and Trench Safety Standards (29 CFR Part 1926). Excavations deeper than five feet must be laid back or braced to protect workers entering the excavations. Slopes or bracing for excavations 20 feet or more in depth must be designed by a registered professional engineer. The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, and/or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom.

Several borings first encountered groundwater seepage at depths of 7.5 and 9.0 feet below the ground surface, and the soil was wet at the bottom of Direct Push boring GP-10 (6 feet below ground surface) Given the proximity of Duck Creek, groundwater should be considered to be consistent with the water level in Duck Creek. However, shallower seepage may be encountered in isolated granular seams or layers not disclosed by the borings.

Groundwater conditions can change with time, seasonal changes, and precipitation. The reported groundwater findings represent only the conditions encountered at the time of drilling and may not be indicative of the long-term groundwater conditions. Although large quantities of groundwater are not anticipated in the overburden, the contractor should be prepared to perform dewatering to maintain reasonably dry excavations and also be prepared to deal with unexpected seepage and precipitation entering any excavations.

6.0 CLOSING REMARKS

We appreciate having the opportunity to be of service to you on this project. Please do not hesitate to call if you have any questions concerning this report.

Respectfully submitted,

DLZ OHIO, INC.

Richard J. Hessler
Geotechnical Engineer

Eric W. Tse, P.E.
Geotechnical Engineer

RJH/EWT

APPENDIX I

General Information
Legend
Boring Location Plan
Standard Penetration Test Boring Logs – Seven (7) Borings
Direct Push Boring Logs – Twelve (12) Borings

GENERAL INFORMATION
DRILLING PROCEDURES AND LOGS OF BORINGS

Drilling and sampling were conducted in accordance with procedures generally recognized and accepted as standardized methods of investigation of subsurface conditions concerning geotechnical engineering considerations. Borings were drilled with either a truck-mounted or ATV-mounted drill rig.

Drive split-barrel sampling was performed in 1.5 foot increments at intervals not exceeding 5 feet. In the event the sampler encountered resistance to penetration of 6 inches or less after 50 blows of the drop hammer, the sampling increment was discontinued. Standard penetration data were recorded and one or more representative samples were preserved from each sampling increment.

In borings where rock was cored, NXM or NQ size diamond coring tools were used.

In the laboratory all samples were visually classified by a soils engineer. Moisture contents of representative fine-grained soil samples were determined. A limited number of samples, considered representative of foundation materials present, were selected for performance of grain-size analyses and plasticity characteristics tests. The results of these tests are shown on the boring logs.

The boring logs included in the Appendix have been prepared on the basis of the field record of drilling and sampling, and the results of the laboratory examination and testing of samples. Stratification lines on the boring logs indicating changes in soil stratigraphy represent depths of changes approximated by the driller, by sampling effort and recovery, and by laboratory test results. Actual depths to changes may differ somewhat from the estimated depths, or transitions may occur gradually and not be sharply defined. The boring logs presented in this report therefore contain both factual and interpretative information and are not an exact copy of the field log.

Although it is considered that the borings have disclosed information generally representative of site conditions, it should be expected that between borings conditions may occur which are not precisely represented by any one of the borings. Soil deposition processes and natural geologic forces are such that soil and rock types and conditions may change in short vertical intervals and horizontal distances.

Soil/rock samples will be stored at our laboratory for a period of six months. After this period of time, they will be discarded, unless notified to the contrary by the client.

LEGEND - BORING LOG TERMINOLOGY

Explanation of each column, progressing from left to right

1. Depth (in feet) - refers to distance below the ground surface.

2. Elevation (in feet) - is referenced to mean sea level, unless otherwise noted.

3. Standard Penetration (N) - the number of blows required to drive a 2-inch O.D., 1-3/8 inch I.D., split-barrel sampler, using a 140-pound hammer with a 30-inch free fall. The blows are recorded in 6-inch drive increments. Standard penetration resistance is determined from the total number of blows required for one foot of penetration by summing the second and third 6-inch increments of an 18-inch drive.

   50/n - indicates number of blows (50) to drive a split-barrel sampler a certain number of inches (n) other than the normal 6-inch increment.

   WOR – indicates the split-barrel sampler advanced the 6-inch increment from the weight of the rods alone.

   WOH – indicates the split-barrel sampler advanced the 6-inch increment from the combined weight of the hammer and rods alone.

4. The length of the sampler drive is indicated graphically by horizontal lines across the "Standard Penetration" and "Recovery" columns.

5. Sample recovery from each drive is indicated numerically in the column headed "Recovery".

6. The drive sample location is designated by the heavy vertical bar in the "Sample No., Drive" column.

7. The length of hydraulically pressed "Undisturbed" samples is indicated graphically by horizontal lines across the "Press" column.

8. Sample numbers are designated consecutively, increasing in depth.

9. Soil Description

   a. The following terms are used to describe the relative compactness and consistency of soils:

Granular Soils - Compactness

Term	Blows/Foot Standard Penetration
Very Loose	0 – 4
Loose	4 – 10
Medium Dense	10 – 30
Dense	30 – 50
Very Dense	over 50

Cohesive Soils – Consistency

Term	Unconfined Compression tons/sq. ft	Blows/Foot Standard Penetration	Hand Manipulation
Very Soft	less than 0.25	below 2	Easily penetrated by fist
Soft	0.25 – 0.50	2 – 4	Easily penetrated by thumb
Medium Stiff	0.50 – 1.0	4 – 8	Penetrated by thumb with moderate pressure
Stiff	1.0 – 2.0	8 – 15	Readily indented by thumb but not penetrated
Very Stiff	2.0 – 4.0	15 – 30	Readily indented by thumb nail
Hard	over 4.0	over 30	Indented with difficulty by thumb nail

   b. Color - If a soil is a uniform color throughout, the term is single, modified by such adjective as light and dark. If the predominant color is shaded by a secondary color, the secondary color precedes the primary color. If two major and distinct colors are swirled throughout the soil, the colors are modified by the term "mottled".

   c. Texture is based on the Unified Classification System. Soil particle size definitions are as follows:

Description	Size	Description	Size
Boulders	Larger than 8"	Sand-Coarse	4.75 mm to 2.00 mm
Cobbles	8" to 3"	-Medium	2.00 mm to 0.42 mm
Gravel-Coarse	3" to 3/4"	-Fine	0.42 mm to 0.074 mm
-Fine	3/4" to 4.76 mm	Silt	0.074 mm to 0.005 mm
		Clay	Smaller than 0.005 mm

   d. The primary soil component is listed first and may include a modifier before and/or after it as indicated by the USCS classification system. The minor components are listed in order of decreasing percentage of particle size.

Coarse Grained Soils	Fine Grained Soils
5% - 12% silt/clay - "with silt/clay" post-modifier	15% - 30% sand/gravel- "with sand/gravel" post-modifier
> 15% sand/gravel – "with sand/gravel" post-modifier	> 30% sand/gravel – "sandy/gravelly" pre-modifier
> 12% silt/clay – "silty/clayey" pre-modifier	

e. The moisture content of **cohesive soils** (silts and clays) is expressed relative to plastic properties.

Term	Relative Moisture or Appearance
Dry	Powdery
Damp	Moisture content slightly below plastic limit
Moist	Moisture content above plastic limit, but below liquid limit
Wet	Moisture content above liquid limit

f. Moisture content of **cohesionless soils** (sands and gravels) is described as follows:

Term	Relative Moisture or Appearance
Dry	No moisture present
Damp	Internal moisture, but none to little surface moisture
Moist	Free water on surface
Wet	Voids filled with free water

10. Rock hardness and rock quality description.

a. The following terms are used to describe the relative hardness of the **bedrock.**

Term	Description
Very Soft	Difficult to indent with thumb nails; resembles hard soil but has rock structure
Soft	Resists indentation with thumb nail but can be abraded and pierced to a shallow depth by a pencil point.
Medium Hard	Resists pencil point, but can be scratched with a knife blade.
Hard	Can be deformed or broken by light to moderate hammer blows.
Very Hard	Can be broken only by heavy blows, and in some rocks, by repeated hammer blows.

b. Rock Quality Designation, RQD - This value is expressed in percent and is an indirect measure of rock soundness. It is obtained by summing the total length of all core pieces which are at least four inches long, and then dividing this sum by the total length of the core run.

11. Gradation - when tests are performed, the percentage of each particle size is listed in the appropriate column (defined in Item 9c).

12. When a test is performed to determine the natural moisture content, liquid limit moisture content, or plastic limit moisture content, the moisture content is indicated graphically.

13. The corrected standard penetration (N60) value in blows per foot is indicated graphically.

14. Soil Symbology

GW	Well-graded Gravel
GP	Poorly-graded Gravel
GW-GM	Well-graded Gravel with Silt
GP-GM	Poorly-graded Gravel with Silt
GM	Silty Gravel
SW	Well-graded Sand
SP	Poorly-graded Sand
SW-SM	Well-graded Sand with Silt

SP-SM	Poorly-graded Sand with Silt
SM	Silty Sand
SC-SM	Clayey, Silty Sand
SC	Clayey Sand
ML	Silt
CL-ML	Low Plasticity Silty Clay
CL	Low Plasticity Clay

DLZ

Legend

Boring Location

0 25 50
Scale in feet

City of Toledo
Duck Creek Restoration
Boring Location Plan

Client: Enviroscience, Inc. | *Project:* Duck Creek Restoration | *Job No.* 2321-3030.00

LOG OF: Boring B-1 | *Location:* As per plan | *Date Drilled:* 6/6/2023

WATER OBSERVATIONS:
Water seepage at: 9.0'
Water level at completion: 16.1' (inside augers)

DRILLING METHODS - Soil: HS Augers
ABANDONMENT - bentonite-cement grout

Rig (#) / ER: - GP 3126GT (-) / 100.1% | Driller: VD | Logger: JC

Natural Moisture Content, % - ● ; PL ⊢—⊣ LL ; N Value ○ ; / Non-Plastic - NP

Depth (ft)	Elev. (ft) 578.6	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.5	578.1					TOPSOIL - 6"						
		3 2 1	10	S-1	4.5+	POSSIBLE FILL: Hard brown LEAN CLAY (CL) with sand; slight organic odor; contains root hairs; dry.	0	0	2	19	41	38
3.0	575.6											
		2 1 1	2	S-2		POSSIBLE FILL: Very loose grayish brown SILT (ML); dry.						
		1 1 1	3	S-3								
6.0	572.6											
		1 1 1		S-4	<0.25	Very soft grayish brown LEAN CLAY (CL) with sand; contains silt lenses; contains root hairs; moist to wet.						
		WOH WOH 1	5	S-5	1.0							
9.0	569.6											
		3 4 4	18	S-6	2.5	Very stiff to hard grayish brown LEAN CLAY (CL); damp to moist. @ 9.0' - 10.5'; contains thin seepage zone.						
		4 5 9	1	S-7	-							
		7 6 5	12	S-8	4.5		1	2	5	13	31	48
		5 7 7	18	S-9	4.0							
18.5	560.1											
		5 5 12	18	S-10		Medium dense to dense grayish brown clayey SAND (SC); moist to wet.						
		7 9 10	18	S-11								
23.5	555.1											
		5 6 5	18	S-12	2.5	Very stiff grayish brown LEAN CLAY with sand (CL); moist.						
25.0	553.6					Bottom of Boring - 25.0'						

Client: Enviroscience, Inc.	Project: Duck Creek Restoration	Job No. 2321-3030.00
LOG OF: Boring B-2	Location: As per plan	Date Drilled: 6/7/2023

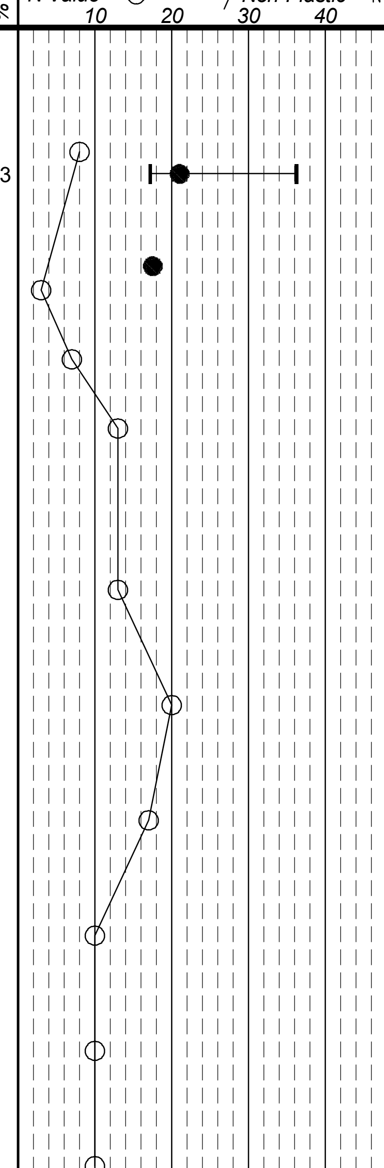
WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: 6.4' (with augers removed)

DRILLING METHODS - Soil: HS Augers
ABANDONMENT - bentonite-cement grout

Rig (#) / ER	Driller	Logger
- GP 3126GT (-) / 100.1%	VD	JC

Depth (ft)	Elev. (ft) 577.2	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.5	576.7						TOPSOIL - 6"						
3.0	574.2	3 3 2	14	S-1		4.5+	Hard brown LEAN CLAY with sand (CL); contains root hairs; damp.						
		1 1		S-2		2.0	Stiff grayish brown LEAN CLAY (CL); contains silt lenses; contains root hairs; damp to moist.	0	1	2	5	49	43
6.0	571.2	WOH 1 1	5	S-3		1.5							
7.5	569.7	1 2 2	7	S-4			Loose grayish brown clayey SAND (SC); moist.						
		3 3 5	10	S-5		2.0	Stiff grayish brown LEAN CLAY (CL); moist.						
11.0	566.2				ST-1								
		3 4 4	18	S-6		3.5	Very stiff grayish brown LEAN CLAY (CL); moist.						
16.0	561.2	5 5 7	18	S-7		4.0							
18.5	558.7	3 4 6	1	S-8		-	Medium stiff grayish brown LEAN CLAY with sand (CL); low recovery; wet.						
		2 3 3	10	S-9		0.5	Soft to medium stiff grayish brown LEAN CLAY (CL); moist.						
		2 3 3	18	S-10		1.0							
25.0	552.2	4 3 3	18	S-11		0.5	Bottom of Boring - 25.0'						

Natural Moisture Content, % - ●
PL ├──┤ LL
N Value ○ / Non-Plastic - NP



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Client: Enviroscience, Inc. | *Project:* Duck Creek Restoration | *Job No.* 2321-3030.00

LOG OF: Boring B-3 | *Location:* As per plan | *Date Drilled:* 6/7/2023

WATER OBSERVATIONS:
Water seepage at: 8.0'
Water level at completion: 24.0' (inside augers)

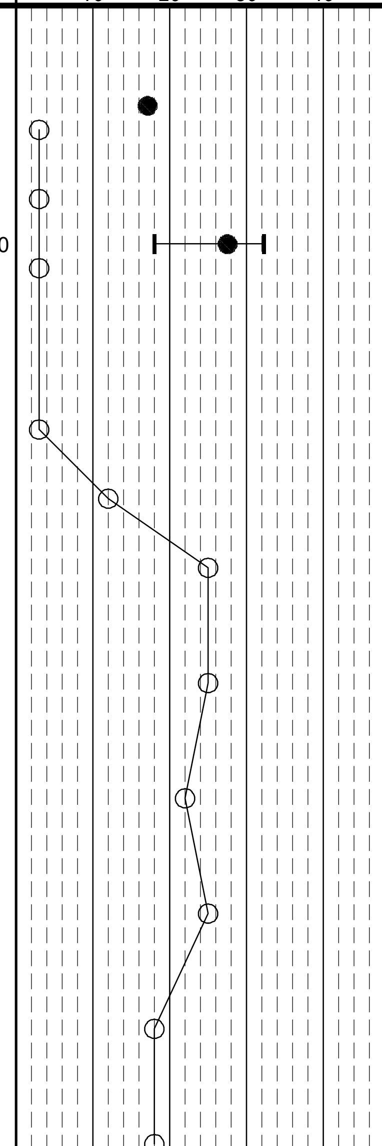
DRILLING METHODS - Soil: HS Augers
ABANDONMENT - bentonite-cement grout

Rig (#) / ER: - GP 3126GT (-) / 100.1% | *Driller:* VD | *Logger:* JC

Ground surface elevation: 577.4

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.6	576.8						TOPSOIL - 7"						
3.0	574.4	1, 1, 1	5	S-1		4.5+	POSSIBLE FILL: Hard light brown SILTY CLAY (CL-ML); contains root hairs; slight topsoil odor; damp.						
		WOH, 1, 1	2	S-2			Very soft to soft brown sandy LEAN CLAY (CL); contains root hairs; damp.						
		WOH, 1, 1	14	S-3		<0.25		3	4	12	21	30	30
8.0	569.4				ST-1								
9.5	567.9	1, 1, 1	6	S-4			Very loose grayish brown silty SAND (SM); wet.						
		3, 4, 3	14	S-5		2.5	Very stiff to hard grayish brown LEAN CLAY (CL); damp.						
		6, 6, 9	12	S-6		3.5							
		6, 7, 8	18	S-7		2.8							
		5, 5, 8	15	S-8		1.75	@ 16.0' - 18.5'; stiff.						
		5, 6, 9	14	S-9		2.75							
		3, 5, 6	18	S-10		4.5+	S-10 contains a piece of angular stone.						
25.0	552.4	3, 4, 7	10	S-11		2.75	Bottom of Boring - 25.0'						

Natural Moisture Content, % - ●
PL ⊢—⊣ LL
N Value ○ / Non-Plastic - NP
10 20 30 40



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Client: Enviroscience, Inc. | *Project:* Duck Creek Restoration | *Job No.* 2321-3030.00

LOG OF: Boring B-4 | *Location:* As per plan | *Date Drilled:* 6/8/2023

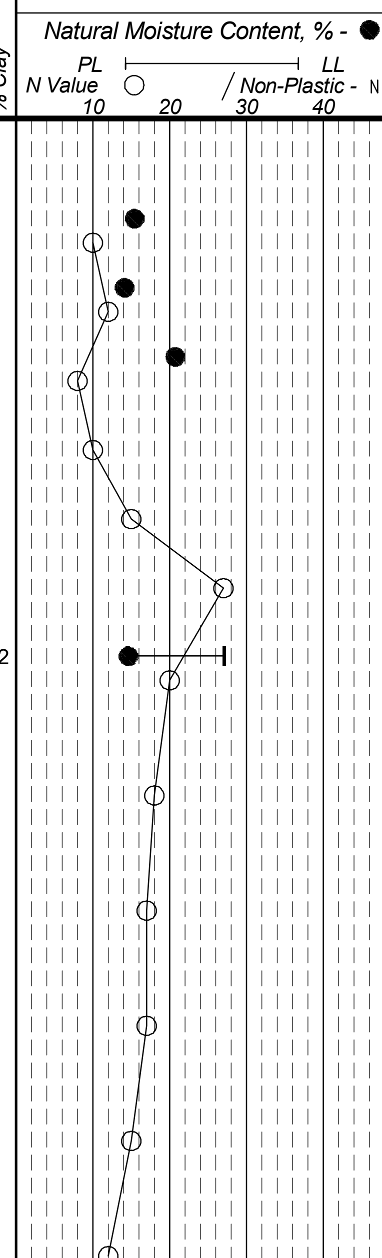
WATER OBSERVATIONS:
Water seepage at: 7.5'
Water level at completion: 19.7' (inside augers)

DRILLING METHODS - Soil: HS Augers
ABANDONMENT - bentonite-cement grout

Rig (#) / ER: - GP 3126GT (-) / 100.1% | *Driller:* VD | *Logger:* JC

Depth (ft)	Elev. (ft) 577.3	Blows per 6"	Recovery (in)	Sample No. (Drive)	Sample No. (Press / Core)	Hand Penetrometer (tsf)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.4	576.9						TOPSOIL - 5"						
2.8	574.5	4 3 3	4	S-1			POSSIBLE FILL: Very loose brown topsoil; dry.						
3.1	574.2	3 3 4	6	S-2		4.5+	POSSIBLE FILL; Loose brown SILT (ML); contains root hairs; dry.						
6.0	571.3	2 2 3	5	S-3		2.25	Very stiff to hard brown LEAN CLAY (CL); contains organic material; damp.						
		1 2 4	14	S-4		4.5	Very stiff to hard grayish brown LEAN CLAY with sand (CL); damp.						
		1 2 7	18	S-5		2.75							
		3 7 9	18	S-6		4.25							
		4 5 7	18	S-7		3.75		1	3	6	14	34	42
		4 4 7	18	S-8		4.5+							
18.5	558.8	2 4 6	18	S-9		2.75							
		4 5 5	18	S-10		1.25	Medium stiff to stiff grayish brown LEAN CLAY (CL); damp to moist.						
		4 4 5	18	S-11		1.5							
25.0	552.3	2 3 4	18	S-12		0.75	Bottom of Boring - 25.0'						

Natural Moisture Content, % - ●



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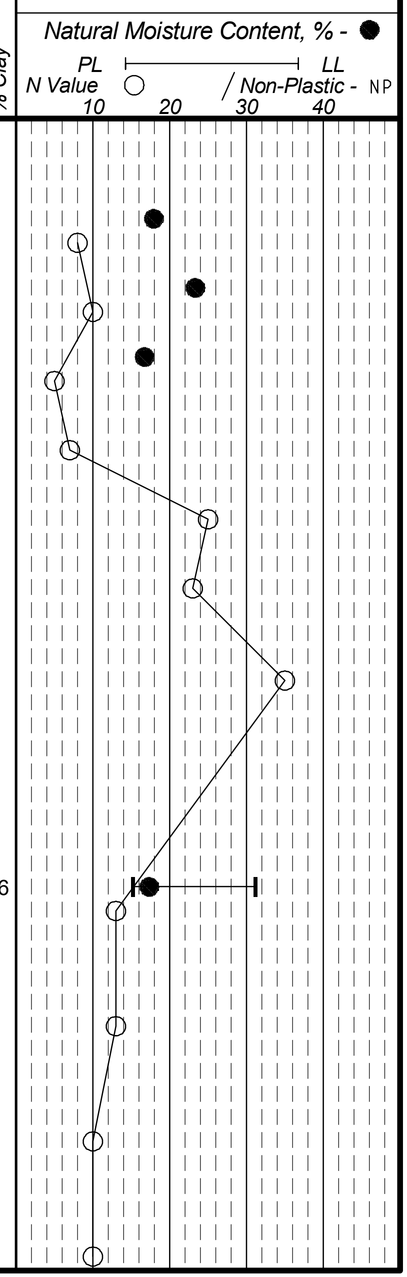
Client: Enviroscience, Inc.	Project: Duck Creek Restoration	Job No. 2321-3030.00
LOG OF: Boring B-5	Location: As per plan	Date Drilled: 6/8/2023

WATER OBSERVATIONS:
Water seepage at: 7.5'
Water level at completion: 18.2' (inside augers)

DRILLING METHODS - Soil: HS Augers
ABANDONMENT - bentonite-cement grout

Rig (#) / ER: - GP 3126GT (-) / 100.1% | Driller: VD | Logger: JC

Depth (ft)	Elev. (ft) 578.4	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.4	578.0						TOPSOIL - 5"						
3.0	575.4	2 2 3	5	S-1			POSSIBLE FILL: Loose brown SILT (ML); contains root hairs; dry.						
4.5	573.9	1 3 3	5	S-2		1.75	Stiff brown LEAN CLAY (CL); contains silt lenses; damp to moist.						
6.0	572.4	WOH 1 2	3	S-3			Loose brown SILT (ML); contains root hairs; dry.						
		1 2 2	9	S-4		2.75	Stiff to very stiff brown LEAN CLAY with sand (CL); damp to moist.						
9.0	569.4	4 5 10	8	S-5		1.0							
		4 5 9	0	S-6		-	Very stiff grayish brown LEAN CLAY with sand (CL); contains cobbles; moist to wet. S-6: drove sampler on large gravel stuck in spoon, resulted in no soil recovery.						
		5 9 12	12	S-7		-							
15.0	563.4				ST-1								
		3 3 5	18	S-8		1.8	Stiff to very stiff grayish brown LEAN CLAY (CL) with sand; damp to moist.	3	2	5	12	32	46
		3 3 5	18	S-9		1.75							
		2 3 3	18	S-10		-							
25.0	553.4	3 3 3	18	S-11		2.5	Bottom of Boring - 25.0'						



Client: Enviroscience, Inc. | **Project:** Duck Creek Restoration | **Job No.** 2321-3030.00

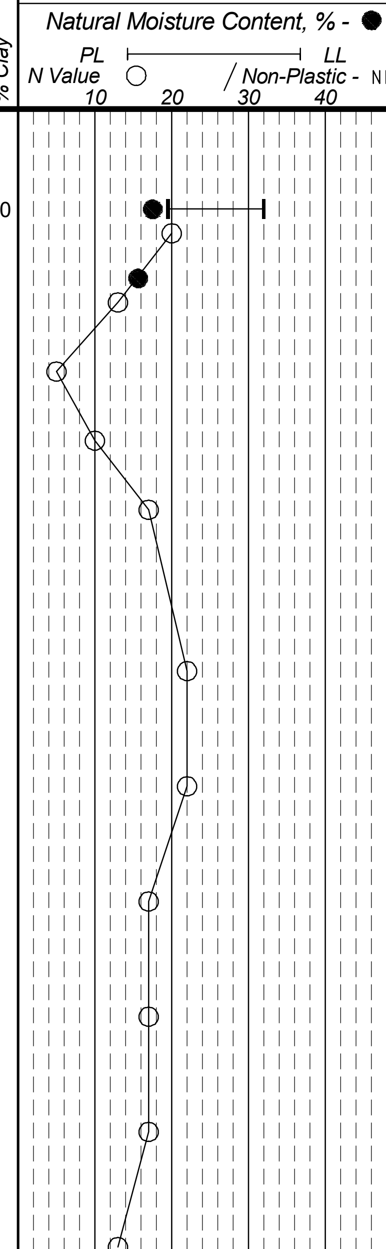
LOG OF: Boring B-6 | **Location:** As per plan | **Date Drilled:** 6/9/2023

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: 24.1' (inside augers)

DRILLING METHODS - Soil: HS Augers
ABANDONMENT - bentonite-cement grout

Rig (#) / ER	Driller	Logger
- GP 3126GT (-) / 100.1%	VD	JC

Depth (ft)	Elev. (ft) 577.4	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
							POSSIBLE FILL: Very stiff light brown LEAN CLAY (CL); contains root hairs; damp.						
		4 5 7	12	S-1		3.25		0	0	1	1	58	40
		2 3 5	6	S-2		3.0							
6.0	571.4	WOH 1 2	0	S-3									
		3 3 3	18	S-4		4.5+	Very stiff to hard brownish gray LEAN CLAY (CL); damp.						
		3 5 5	18	S-5		2.0							
11.0	566.4				ST-1								
		4 5 8	15	S-6		4.0	Very stiff to hard brownish gray LEAN CLAY (CL); damp.						
		4 5 8	18	S-7		4.5							
		4 5 5	18	S-8		4.0							
		4 4 6	18	S-9		3.25	@ 18.5' - 25.0'; damp to moist.						
		3 4 6	18	S-10		2.25							
25.0	552.4	1 3 5	18	S-11		2.0	Bottom of Boring - 25.0'						



DLZ Ohio, Inc. * 6121 Huntley Road, Columbus, Ohio 43229 * (614) 888-0040

Client: Enviroscience, Inc. | *Project:* Duck Creek Restoration | *Job No.* 2321-3030.00

LOG OF: Boring B-7 | *Location:* As per plan | *Date Drilled:* 6/9/2023

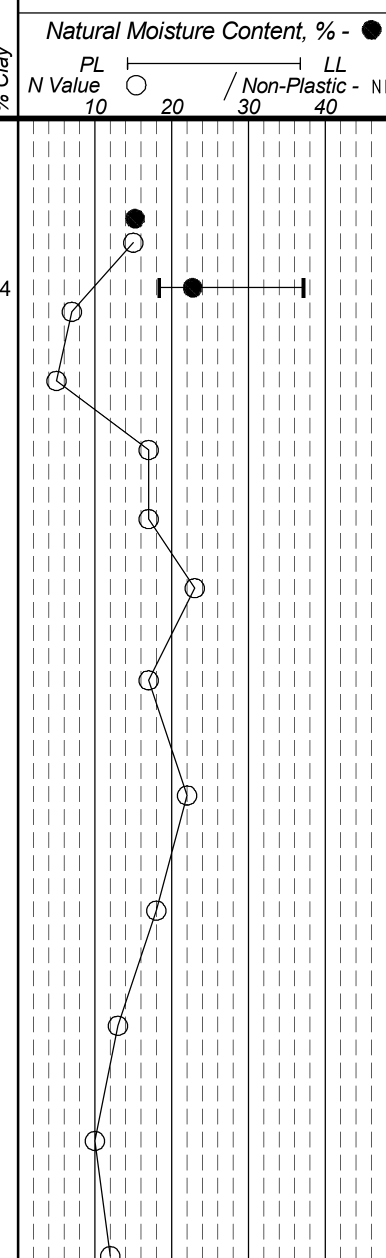
WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None (inside augers)

DRILLING METHODS - Soil: HS Augers
ABANDONMENT - bentonite-cement grout

Rig (#) / ER: - GP 3126GT (-) / 100.1% | *Driller:* VD | *Logger:* JC

Ground Elev. (ft): 578.4

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. (Drive)	Hand Penetrometer (tsf)	Description	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.8	577.7					TOPSOIL - 9"						
3.0	575.4	4 5 4	7	S-1	-	POSSIBLE FILL: Hard light brown LEAN CLAY (CL); dry.						
4.5	573.9	3 2 2	10	S-2	2.0	POSSIBLE FILL: Stiff brown LEAN CLAY (CL); dry to damp.	0	1	3	5	47	44
6.0	572.4	1 1 2	1	S-3	-	POSSIBLE FILL: Hard light brown LEAN CLAY (CL); low recovery; dry.						
6.2	572.2	3 5 5	10	S-4	3.25	Loose dark brown SAND (SP); damp.						
7.5	570.9					Very stiff brown SILTY CLAY (CL-ML); contains cobble shards; damp.						
		3 4 6	18	S-5	4.0	Very stiff to hard grayish brown LEAN CLAY (CL); damp.						
		3 5 9	18	S-6	4.5+							
		4 5 5	18	S-7	4.5+							
		4 5 8	18	S-8	3.5							
18.5	559.9	3 4 7	18	S-9	2.25							
		3 4 4	18	S-10	1.5	Medium stiff to stiff grayish brown LEAN CLAY (CL); damp to moist.						
		2 3 3	18	S-11	1.25							
25.0	553.4	2 4 3	18	S-12	0.75	Bottom of Boring - 25.0'						



Client: Enviroscience, Inc. | *Project:* Duck Creek Restoration | *Job No.* 2321-3030.00

LOG OF: Boring GP-01 | *Location:* As per plan | *Date Drilled:* 6/7/2023

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - Direct Push
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: - GP 3126GT (-) / 100.1% | *Driller:* VD | *Logger:* JC

Natural Moisture Content, % - ●; PL ├──┤ LL; N Value ○; / Non-Plastic - NP (scale 10, 20, 30, 40)

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
	577.9						TOPSOIL - 4" Advanced to 2.0 feet without sampling.							
2.0	575.9		48		1	4.5+	Hard dark brown LEAN CLAY (CL); damp. pH = 5.1 / PID = 0 ppm / LOI = 2.75%							
6.0	571.9						Bottom of Boring - 6.0'							

Depth scale: 5, 10, 15, 20, 25

DLZ Ohio, Inc. * 6121 Huntley Road, Columbus, Ohio 43229 * (614) 888-0040

Client: Enviroscience, Inc.	Project: Duck Creek Restoration	Job No. 2321-3030.00
LOG OF: Boring GP-02	Location: As per plan	Date Drilled: 6/7/2023

WATER OBSERVATIONS:
Water seepage at: 5.0'
Water level at completion: None

DRILLING METHODS - Direct Push
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: - GP 3126GT (-) / 100.1% | Driller: VD | Logger: JC

Natural Moisture Content, % - ●; PL ├──┤ LL; N Value ○; / Non-Plastic - NP; 10 20 30 40

Depth (ft)	Elev. (ft) 578.0	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
							TOPSOIL - 6"							
2.0	576.0						Advanced to 2.0 feet without sampling.							
5.0	573.0		48		1		Very stiff to hard light brown LEAN CLAY (CL); contains root hairs; dry. pH = 5.9 / PID = 0 ppm / LOI = 2.34%							
6.0	572.0						Loose dark brown SANDY SILT (SM); wet.							
							Bottom of Boring - 6.0'							

5 10 15 20 25

Client: Enviroscience, Inc.	Project: Duck Creek Restoration	Job No. 2321-3030.00
LOG OF: Boring GP-03	Location: As per plan	Date Drilled: 6/7/2023

WATER OBSERVATIONS:
Water seepage at: 2.0'
Water level at completion: None

DRILLING METHODS - Direct Push
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: - GP 3126GT (-) / 100.1% | Driller: VD | Logger: JC

Natural Moisture Content, % - ●; PL ├──┤ LL; N Value ○; / Non-Plastic - NP; 10, 20, 30, 40

Depth (ft)	Elev. (ft) 577.2	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
							TOPSOIL - 7"							
2.0	575.2						Advanced to 2.0 feet without sampling.							
6.0	571.2		48		1		Loose dark brown silty SAND with gravel (SM); wet. pH = 5.7 / PID = 0 ppm / LOI = 2.14%							
							Bottom of Boring - 6.0'							

Depth scale: 5, 10, 15, 20, 25

Client: Enviroscience, Inc.	Project: Duck Creek Restoration	Job No. 2321-3030.00
LOG OF: Boring GP-04	Location: As per plan	Date Drilled: 6/7/2023

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - Direct Push
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: - GP 3126GT (-) / 100.1% | Driller: VD | Logger: JC

Natural Moisture Content, % - ● | PL ├─┤ LL | N Value ○ | / Non-Plastic - NP | 10 20 30 40

Depth (ft)	Elev. (ft) 577.5	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetro-meter (tsf)	DESCRIPTION	Graphic Log	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
2.0	575.5						TOPSOIL - 6" Advanced to 2.0 feet without sampling.							
6.0	571.5		48		1	1.25	Stiff brown LEAN CLAY (CL); contains roots; damp. pH = 5.9 / PID = 0 ppm							
							Bottom of Boring - 6.0'							

Depth scale: 5, 10, 15, 20, 25

Client: Enviroscience, Inc. | Project: Duck Creek Restoration | Job No. 2321-3030.00

LOG OF: Boring GP-05 | Location: As per plan | Date Drilled: 6/6/2023

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - Direct Push
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: - GP 3126GT (-) / 100.1% | Driller: VD | Logger: JC

Natural Moisture Content, % - ●
PL ├──┤ LL
N Value ○
/ Non-Plastic - NP
10 20 30 40

Depth (ft)	Elev. (ft) 580.0	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
							TOPSOIL - 6"							
2.0	578.0						Advanced to 2.0 feet without sampling.							
6.0	574.0		48		1	1.75	Stiff brown LEAN CLAY (CL); contains roots; damp. pH = 6.4 / PID = 0.1 ppm / LOI = 2.98%							
							Bottom of Boring - 6.0'							

Depth scale: 5, 10, 15, 20, 25

Client: Enviroscience, Inc.	Project: Duck Creek Restoration	Job No. 2321-3030.00
LOG OF: Boring GP-06	Location: As per plan	Date Drilled: 6/8/2023

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - Direct Push
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: GP 3126GT (-) / 100.1% | Driller: VD | Logger: JC

Natural Moisture Content, % - ● ; PL ⊢—⊣ LL ; N Value ○ ; / Non-Plastic - NP (scale 10, 20, 30, 40)

Depth (ft)	Elev. (ft) 578.0	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
							TOPSOIL - 6"						
2.0	576.0						Advanced to 2.0 feet without sampling.						
6.0	572.0		48		1	2.5	Very stiff brown SILTY CLAY with sand (CL-ML); contains root hairs; damp. pH = 5.4 / PID = 0 ppm / LOI = 3.28%						

Bottom of Boring - 6.0'

Client: Enviroscience, Inc.	*Project:* Duck Creek Restoration	*Job No.* 2321-3030.00
LOG OF: Boring GP-07	*Location:* As per plan	*Date Drilled:* 6/8/2023

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - Direct Push
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER	*Driller*	*Logger*
- GP 3126GT (-) / 100.1%	VD	JC

Natural Moisture Content, % - ●
PL ⊢—⊣ *LL*
N Value ○ / *Non-Plastic -* NP
10 20 30 40

Depth (ft)	Elev. (ft) 578.0	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
							TOPSOIL - 6"							
2.0	576.0						Advanced to 2.0 feet without sampling.							
6.0	572.0		48		1	0.5	Medium stiff dark brown LEAN CLAY (CL); slight organic odor; contains root hairs; damp. pH = 4.9 / PID = 2.9 ppm / LOI = 3.55%							
							Bottom of Boring - 6.0'							

5
10
15
20
25

Client: Enviroscience, Inc.	Project: Duck Creek Restoration	Job No. 2321-3030.00
LOG OF: Boring GP-08	Location: As per plan	Date Drilled: 6/8/2023

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - Direct Push
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: - GP 3126GT (-) / 100.1% | Driller: VD | Logger: JC

Natural Moisture Content, % - ●; PL ├─┤ LL; N Value ○; / Non-Plastic - NP; scale 10 20 30 40

Depth (ft)	Elev. (ft) 578.3	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
							TOPSOIL - 5"							
2.0	576.3						Advanced to 2.0 feet without sampling.							
6.0	572.3		48		1	1.5	Stiff brown LEAN CLAY (CL); damp to moist. pH = 5.8 / PID = 0 ppm / 4.75%							
							Bottom of Boring - 6.0'							

Depth scale: 5, 10, 15, 20, 25

Client: Enviroscience, Inc.	Project: Duck Creek Restoration	Job No. 2321-3030.00
LOG OF: Boring GP-09	Location: As per plan	Date Drilled: 6/8/2023

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - Direct Push
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: - GP 3126GT (-) / 100.1% | Driller: VD | Logger: JC

Natural Moisture Content, % - ● | PL ├──┤ LL | N Value ○ | / Non-Plastic - NP

Depth (ft)	Elev. (ft) 577.4	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
							TOPSOIL - 7"							
2.0	575.4						Advanced to 2.0 feet without sampling.							
6.0	571.4		48		1	1.75	Stiff brown LEAN CLAY (CL); contains root hairs; damp to moist. pH = 6.4 / PID = 0 ppm / LOI = 5.46%							
							Bottom of Boring - 6.0'							

Client: Enviroscience, Inc.	Project: Duck Creek Restoration	Job No. 2321-3030.00
LOG OF: Boring GP-10	Location: As per plan	Date Drilled: 6/8/2023

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - Direct Push
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: - GP 3126GT (-) / 100.1% | Driller: VD | Logger: JC

Natural Moisture Content, % - ● | PL ⊢—⊣ LL | N Value ○ | / Non-Plastic - NP | 10 20 30 40

Depth (ft)	Elev. (ft) 578.0	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
2.0	576.0						TOPSOIL - 6" Advanced to 2.0 feet without sampling.						
6.0	572.0		48		1	1.5	Stiff brown LEAN CLAY (CL); contains root hairs; damp to moist. pH = 5.9 / PID = 0 ppm						
							Bottom of Boring - 6.0'						

5

10

15

20

25

Client: Enviroscience, Inc.	Project: Duck Creek Restoration	Job No. 2321-3030.00
LOG OF: Boring GP-11	Location: As per plan	Date Drilled: 6/8/2023

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - Direct Push
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: - GP 3126GT (-) / 100.1% | Driller: VD | Logger: JC

Natural Moisture Content, % - ●
PL ⊢—⊣ LL
N Value ○
/ Non-Plastic - NP

Depth (ft)	Elev. (ft) 578.2	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	N Value 10 20 30 40
							TOPSOIL - 7"								
2.0	576.2						Advanced to 2.0 feet without sampling.								
6.0	572.2		48		1	0.25	Soft brown LEAN CLAY (CL); moist. pH = 6.5 / PID = 0 ppm / LOI = 2.92%								
							Bottom of Boring - 6.0'								

Depth scale: 5, 10, 15, 20, 25

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Client: Enviroscience, Inc.	Project: Duck Creek Restoration	Job No. 2321-3030.00
LOG OF: Boring GP-12	Location: As per plan	Date Drilled: 6/8/2023

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - Direct Push
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: - GP 3126GT (-) / 100.1% | Driller: VD | Logger: JC

Natural Moisture Content, % - ●; PL ⊢—⊣ LL; N Value ○; / Non-Plastic - NP; scale 10, 20, 30, 40

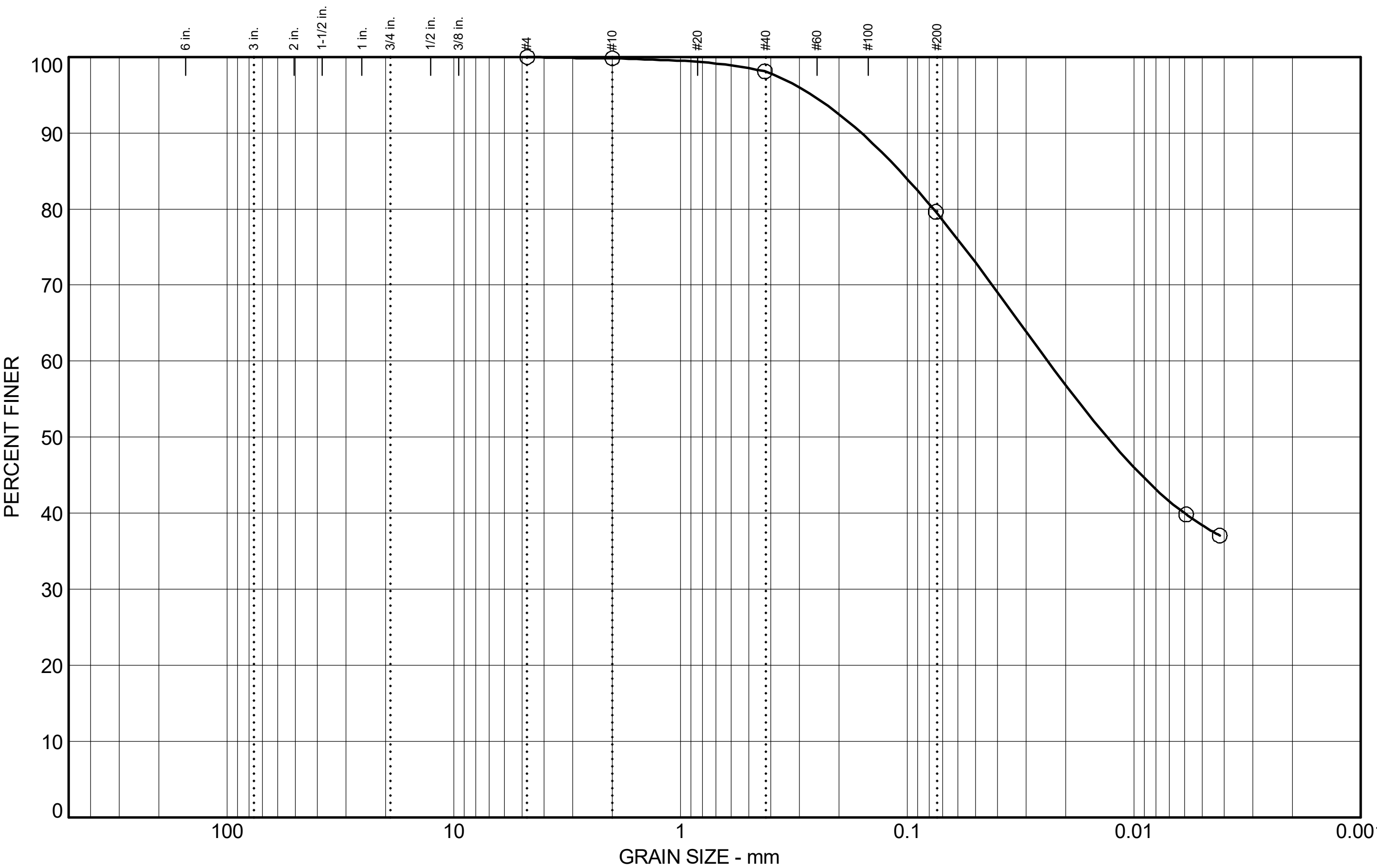
Depth (ft)	Elev. (ft) 585.0	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
							TOPSOIL - 5"							
2.0	583.0						Advanced to 2.0 feet without sampling.							
6.0	579.0		48		1	2.75	Very stiff brown LEAN CLAY (CL); contains root hairs; damp. pH = 5.8 / PID = 0 ppm / LOI = 5.4%							
							Bottom of Boring - 6.0'							

Depth scale: 5, 10, 15, 20, 25

APPENDIX II

Laboratory Test Results

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.2	1.7	18.5	41.2	38.5

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4.75	100.0		
2	99.8		
0.425	98.1		
0.075	79.6		

* (no specification provided)

Soil Description

low plasticity clay, fine sand

General Characteristics

Moisture Content = 22.1%

Atterberg Limits

LL= 32 PL= 17 PI= 15

Coefficients

D_{85}= 0.124 D_{60}= 0.021 D_{50}= 0.011
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

Remarks

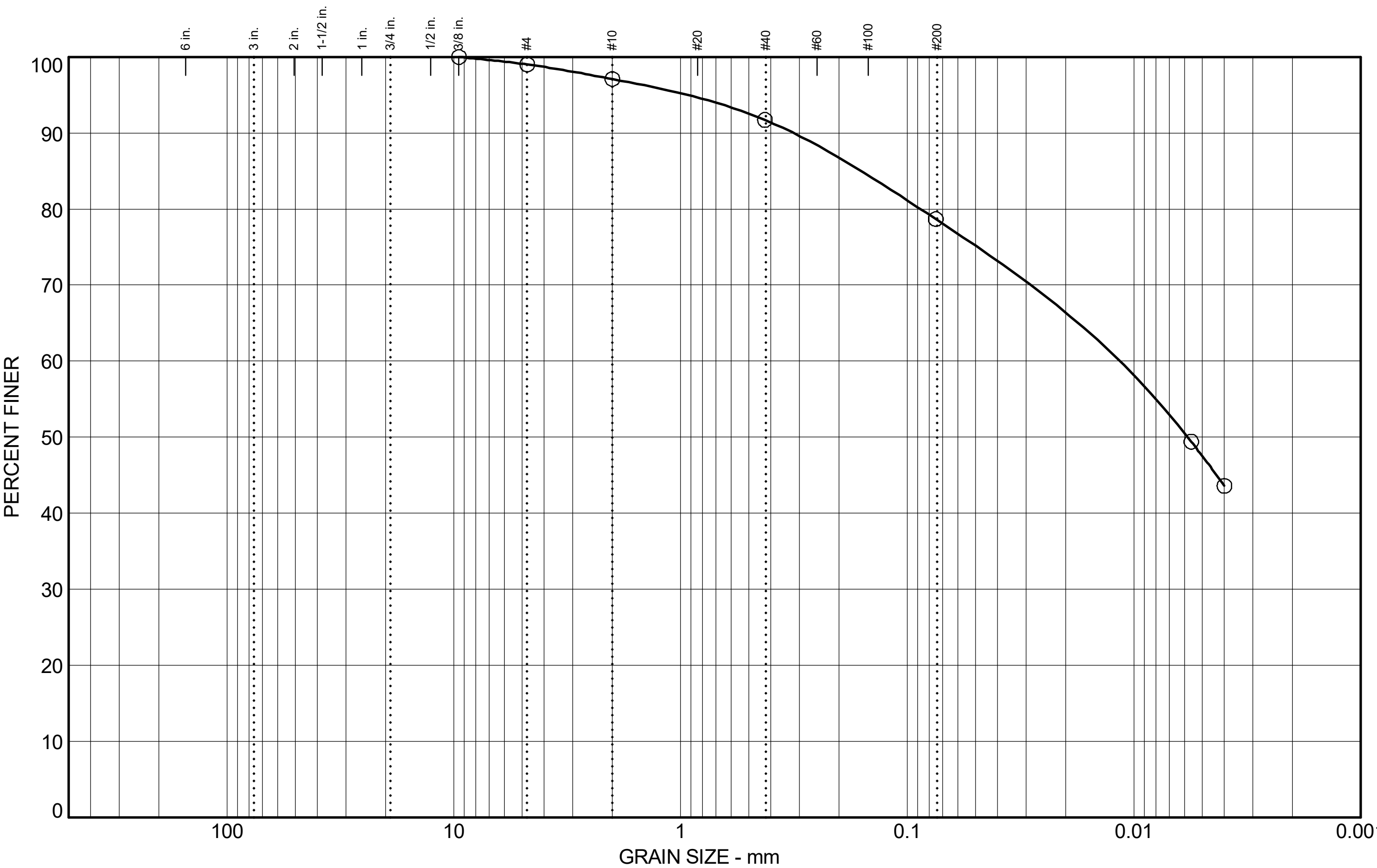
Group Index = 10

Sample No.: S-1 **Source of Sample:** B-1 **Date:**
Location: - **Depth / Elev:** 1.5' / 577.1'

DLZ

Client: Enviroscience, Inc.
Project: Duck Creek Restoration
Project No: 2321-3030.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	1.0	1.9	5.4	13.0	31.2	47.4

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9.5	100.0		
4.75	99.0		
2	97.1		
0.425	91.7		
0.075	78.7		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 14.5%

Atterberg Limits

LL= 29 PL= 15 PI= 14

Coefficients

D_{85}= 0.174 D_{60}= 0.014 D_{50}= 0.006
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

Remarks

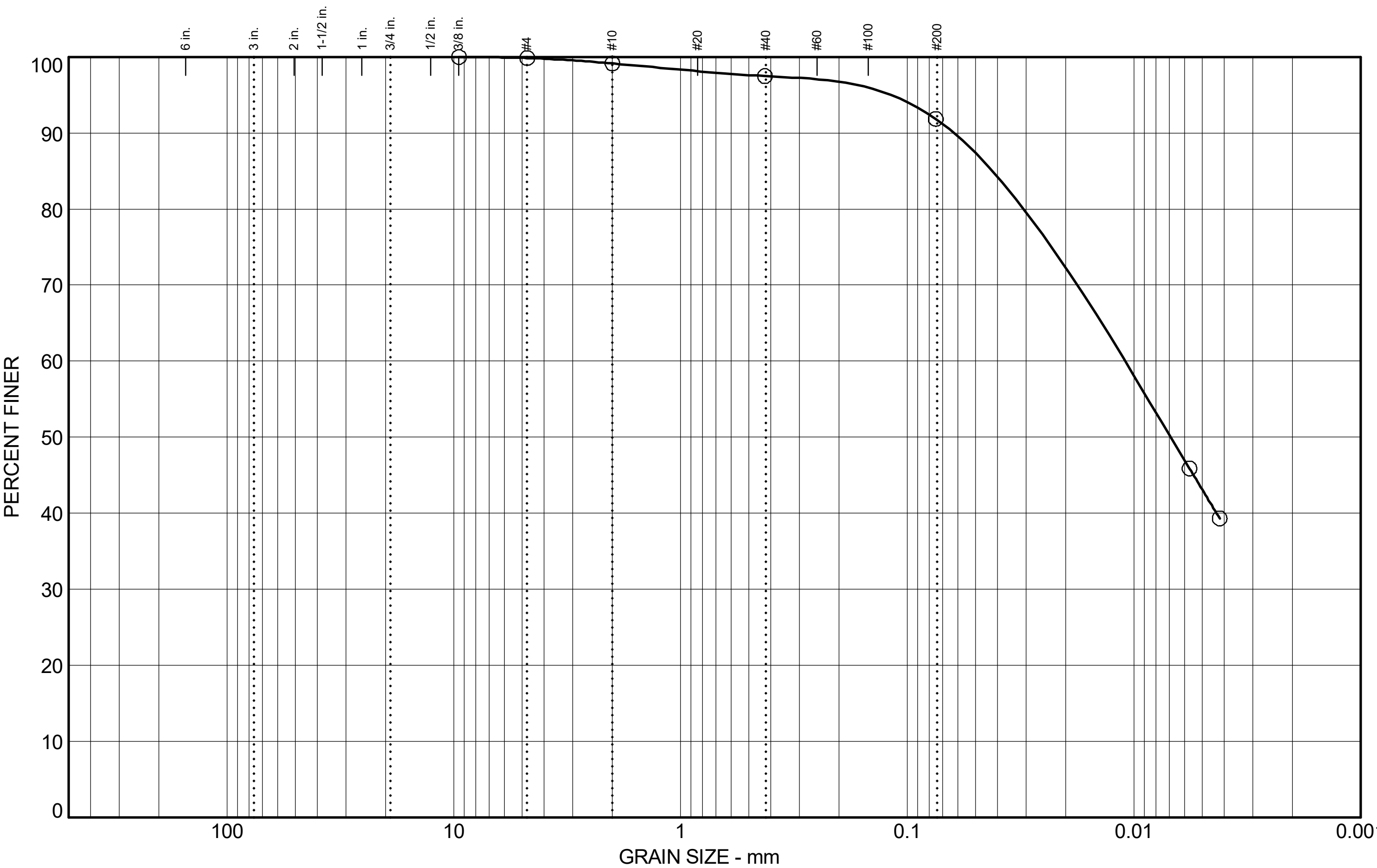
Group Index = 9

Sample No.: S-8 **Source of Sample:** B-1 **Date:**
Location: - **Depth / Elev:** 13.5' / 565.1'

DLZ

Client: Enviroscience, Inc.
Project: Duck Creek Restoration
Project No: 2321-3030.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.1	0.7	1.7	5.6	48.8	43.1

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9.5	100.0		
4.75	99.9		
2	99.2		
0.425	97.5		
0.075	91.9		

* (no specification provided)

Soil Description

moderate plasticity clay

General Characteristics

Moisture Content = 21.0%

Atterberg Limits

LL= 36 PL= 17 PI= 19

Coefficients

D_{85}= 0.051 D_{60}= 0.013 D_{50}= 0.007
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

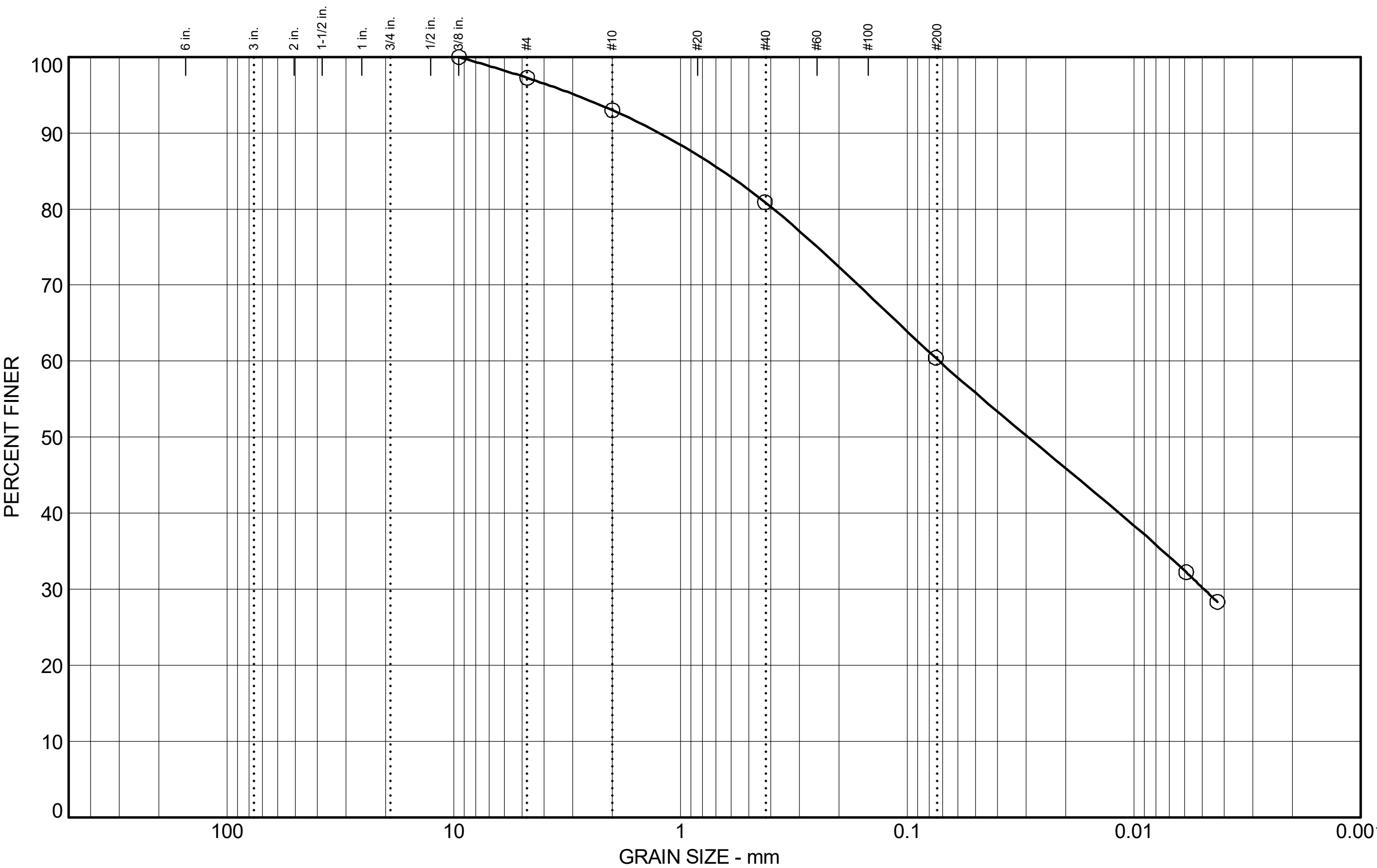
Remarks

Group Index = 17

Sample No.: S-2 **Source of Sample:** B-2 **Date:**
Location: - **Depth / Elev:** 3' / 574.2'

Client: Enviroscience, Inc.
Project: Duck Creek Restoration
Project No: 2321-3030.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	2.7	4.3	12.1	20.5	30.2	30.2

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9.5	100.0		
4.75	97.3		
2	93.0		
0.425	80.9		
0.075	60.4		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 27.5%

Atterberg Limits

LL= 32 PL= 18 PI= 14

Coefficients

D_{85}= 0.719 D_{60}= 0.072 D_{50}= 0.029
D_{30}= 0.005 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

Remarks

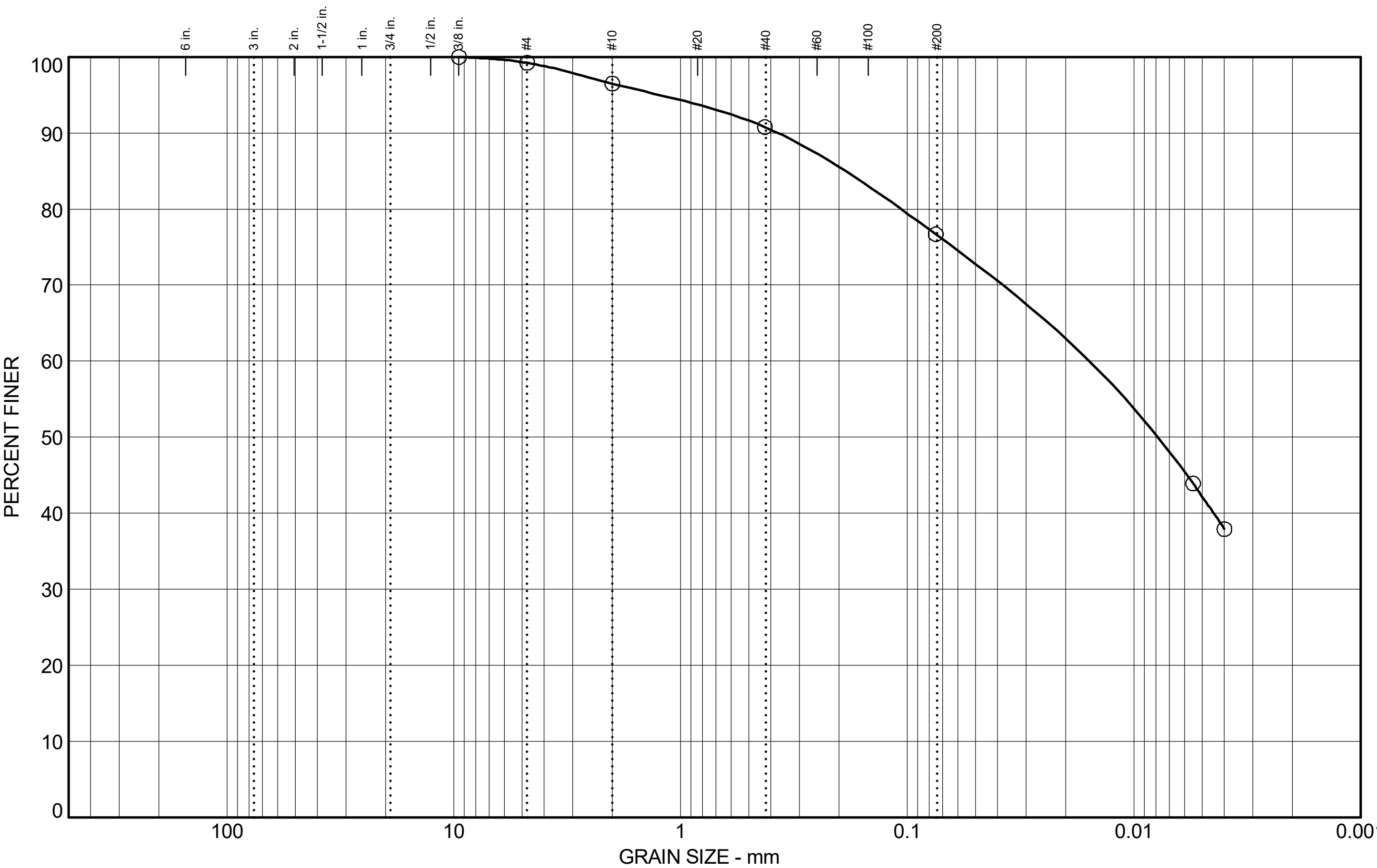
Group Index = 6

Sample No.: S-3 **Source of Sample:** B-3 **Date:**
Location: - **Depth / Elev:** 4.5' / 572.9'

DLZ

Client: Enviroscience, Inc.
Project: Duck Creek Restoration
Project No: 2321-3030.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.8	2.7	5.7	14.1	34.6	42.1

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9.5	100.0		
4.75	99.2		
2	96.5		
0.425	90.8		
0.075	76.7		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 14.6%

Atterberg Limits

LL= 27 PL= 14 PI= 13

Coefficients

D_{85}= 0.209 D_{60}= 0.02 D_{50}= 0.009
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

Remarks

Group Index = 8

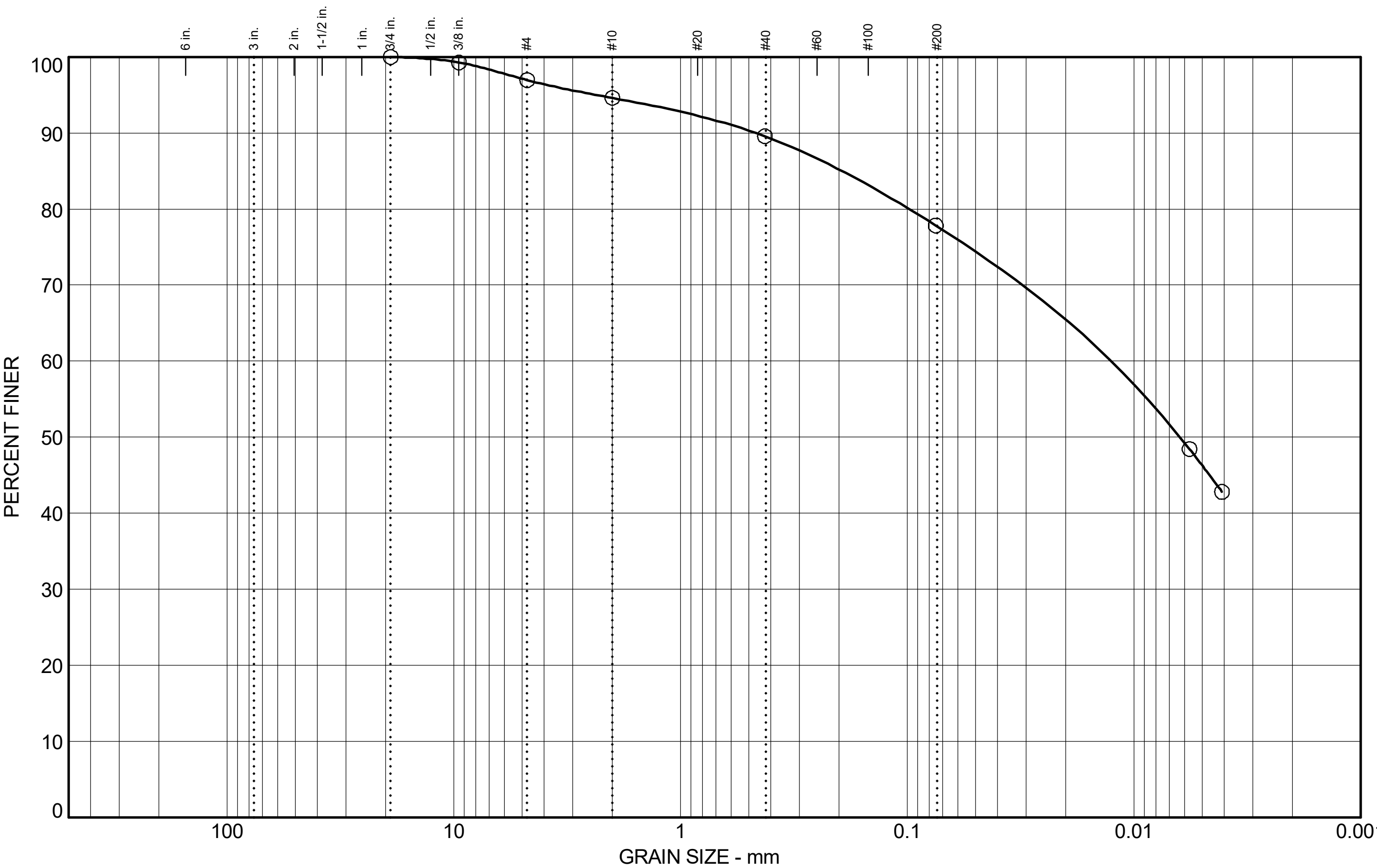
Sample No.: S-7 **Source of Sample:** B-4 **Date:**
Location: - **Depth / Elev:** 11' / 566.3'

DLZ

Client: Enviroscience, Inc.
Project: Duck Creek Restoration
Project No: 2321-3030.00 **Figure**

GRAIN SIZE II - DLZ MOD - DLZ TEMPLATE VER 2-2.GDT - 6/22/23 14:48 - X:\PROJECTS\2023\2321\303000 ENVIRONSCIENCE COL\GEOTECH\LOGS\DUCK CREEK RESTORATION.GPJ

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	3.0	2.3	5.0	11.7	31.6	46.2

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	99.3		
4.75	97.0		
2	94.6		
0.425	89.6		
0.075	77.8		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 17.3%

Atterberg Limits

LL= 31 PL= 15 PI= 16

Coefficients

D_{85}= 0.216 D_{60}= 0.016 D_{50}= 0.007
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

Remarks

Group Index = 10

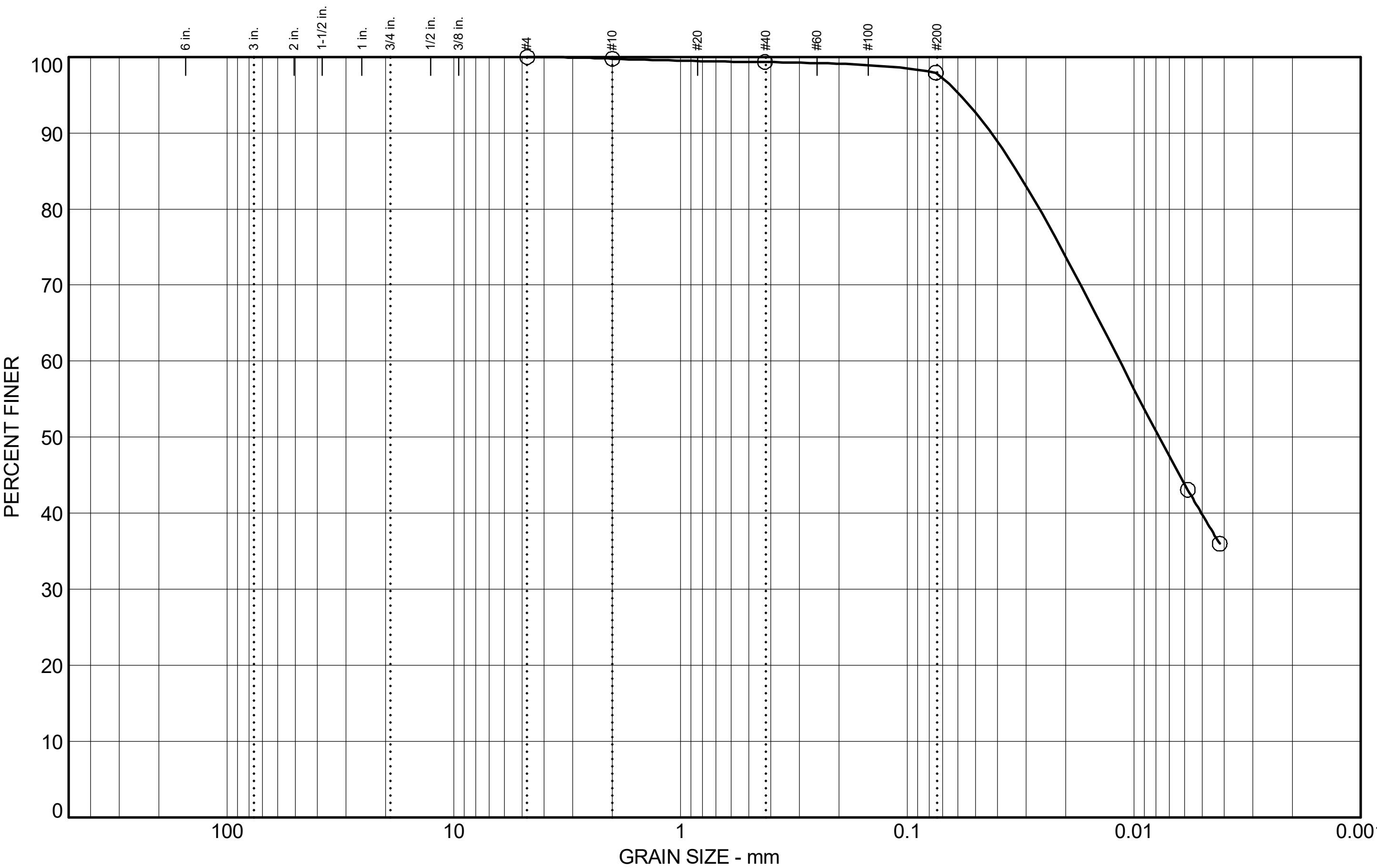
Sample No.: S-8 **Source of Sample:** B-5 **Date:**
Location: - **Depth / Elev:** 16' / 562.4'

DLZ

Client: Enviroscience, Inc.
Project: Duck Creek Restoration
Project No: 2321-3030.00 **Figure**

GRAIN SIZE II - DLZ MOD - DLZ TEMPLATE VER 2-2.GDT - 6/22/23 14:48 - X:\PROJECTS\2023\2321\303000 ENVIRONSCIENCE COL\GEOTECH\LOGS\DUCK CREEK RESTORATION.GPJ

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.2	0.4	1.4	58.1	39.8

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4.75	100.0		
2	99.8		
0.425	99.4		
0.075	97.9		

* (no specification provided)

Soil Description

low plasticity clay

General Characteristics

Moisture Content = 17.5%

Atterberg Limits

LL= 32 PL= 19 PI= 13

Coefficients

D_{85}= 0.041 D_{60}= 0.013 D_{50}= 0.008
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

Remarks

Group Index = 13

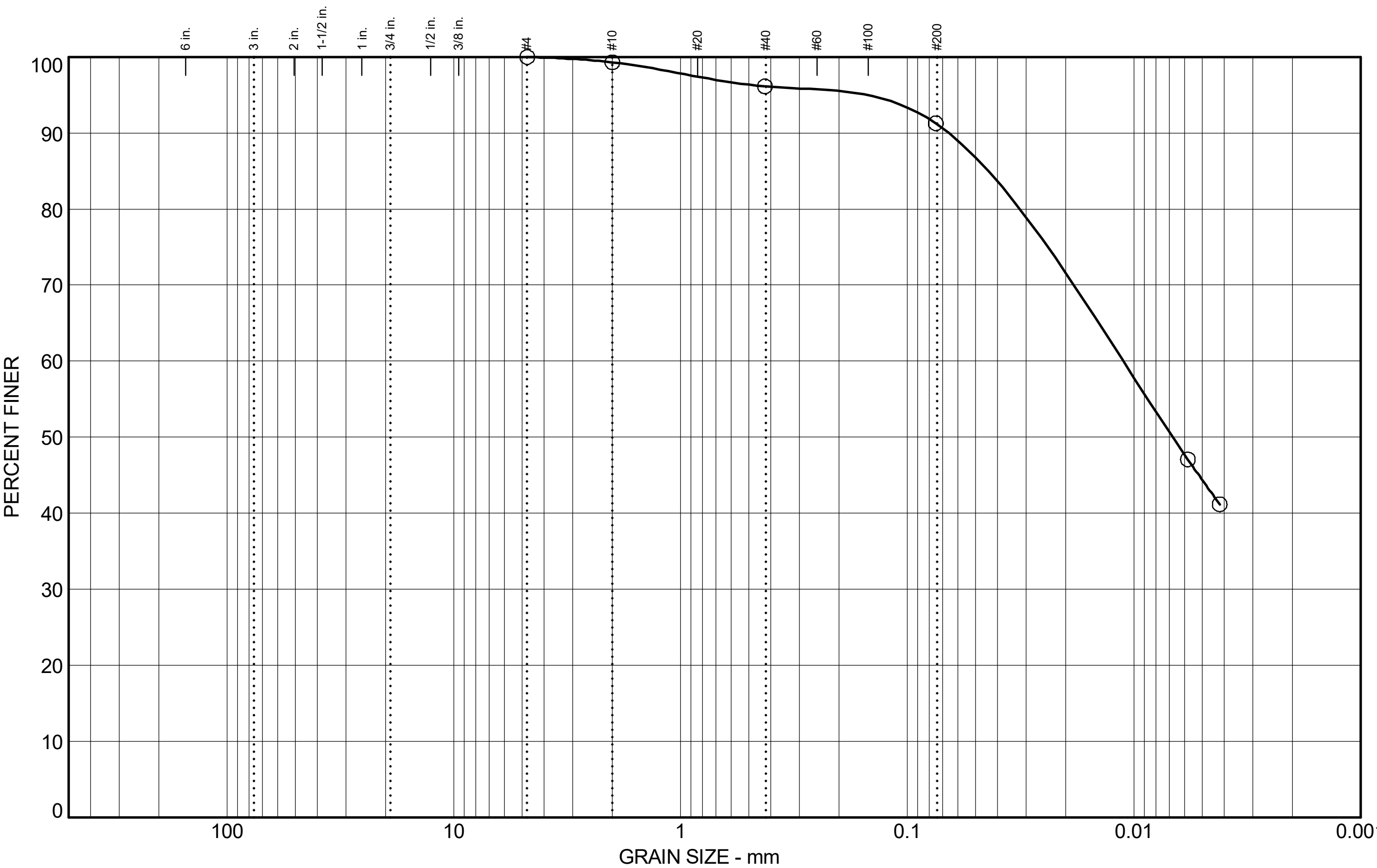
Sample No.: S-1 **Source of Sample:** B-6 **Date:**
Location: - **Depth / Elev:** 1.5' / 575.9'

DLZ

Client: Enviroscience, Inc.
Project: Duck Creek Restoration
Project No: 2321-3030.00 **Figure**

GRAIN SIZE II - DLZ MOD - DLZ TEMPLATE VER 2-2.GDT - 6/22/23 14:48 - X:\PROJECTS\2023\2321\303000 ENVIRONSCIENCE COL\GEOTECH\LOGS\DUCK CREEK RESTORATION.GPJ

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.7	3.2	4.9	46.9	44.3

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4.75	100.0		
2	99.3		
0.425	96.1		
0.075	91.3		

* (no specification provided)

Soil Description

moderate plasticity clay

General Characteristics

Moisture Content = 22.7%

Atterberg Limits

LL= 37 PL= 18 PI= 19

Coefficients

D_{85}= 0.052 D_{60}= 0.012 D_{50}= 0.007
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

Remarks

Group Index = 17

Sample No.: S-2 **Source of Sample:** B-7 **Date:**
Location: - **Depth / Elev:** 3' / 575.4'

DLZ

Client: Enviroscience, Inc.
Project: Duck Creek Restoration
Project No: 2321-3030.00 **Figure**

Report on Loss of Ignition
(AASHTO T-267)

DLZ Project No.: 2321-3030.00
Client: Enviroscience
Project Name: Duck Creek Resoration
Date: 6/28/2023

Boring No. **GP-1**
Sample No. **1**
Depth: **2.0'-6.0'**

Muffle Furnace Crucible ID: 411

Muffle Furnace Temperature	**455 ± 10^{o}C**
Mass of crucible & oven dry soil (A)	138.02
Mass of crucible (B)	105.99
Mass of oven dry soil (C)	32.03
Mass of sample & crucible after ashed in muffle furnace (D)	137.14
Mass of crucible (B)	105.99
Mass of ashed soil sample (E)	31.15

Loss on Ignition = $\frac{C - E}{C}$ * 100= **2.75**

Container Number:	PB-29
Wet Wt. + Container	260.29
Dry Wt. + Container	244.20
Wt. of Container	146.08
Dry Wt. of Soil	98.12
Moisture Content (%)	16.4

DLZ

Report on Loss of Ignition

(AASHTO T-267)

DLZ Project No.:	2321-3030.00	Boring No.	**GP-2**
Client:	Enviroscience	Sample No.	**1**
Project Name:	Duck Creek Resoration	Depth:	**2.0'-6.0'**
Date:	6/28/2023		

Muffle Furnace Crucible ID:	402
Muffle Furnace Temperature	**455 ± 10°C**
Mass of crucible & oven dry soil (A)	125.84
Mass of crucible (B)	97.60
Mass of oven dry soil (C)	28.24
Mass of sample & crucible after ashed in muffle furnace (D)	125.18
Mass of crucible (B)	97.60
Mass of ashed soil sample (E)	27.58
Loss on Ignition = $\frac{C - E}{C}$ * 100=	**2.34**

Container Number:	PB-42
Wet Wt. + Container	194.86
Dry Wt. + Container	188.00
Wt. of Container	140.00
Dry Wt. of Soil	48.00
Moisture Content (%)	14.3

DLZ

Report on Loss of Ignition

(AASHTO T-267)

DLZ Project No.: 2321-3030.00

Client: Enviroscience

Project Name: Duck Creek Resoration

Date: 6/28/2023

Boring No. **GP-4**

Sample No. **1**

Depth: **2.0'-6.0'**

Muffle Furnace Crucible ID: 401

Muffle Furnace Temperature	**455 ± 10^{o}C**
Mass of crucible & oven dry soil (A)	126.71
Mass of crucible (B)	100.98
Mass of oven dry soil (C)	25.73
Mass of sample & crucible after ashed in muffle furnace (D)	126.16
Mass of crucible (B)	100.98
Mass of ashed soil sample (E)	25.18

Loss on Ignition $= \frac{C - E}{C} * 100 =$ **2.14**

Container Number:	KM-2
Wet Wt. + Container	225.70
Dry Wt. + Container	211.55
Wt. of Container	149.57
Dry Wt. of Soil	61.98
Moisture Content (%)	22.8

DLZ

Report on Loss of Ignition
(AASHTO T-267)

DLZ Project No.:	2321-3030.00	Boring No.	**GP-5**
Client:	Enviroscience	Sample No.	**1**
Project Name:	Duck Creek Resoration	Depth:	**2.0'-6.0'**
Date:	6/28/2023		

Muffle Furnace Crucible ID: 407

Muffle Furnace Temperature	**455 ± 10°C**
Mass of crucible & oven dry soil (A)	130.61
Mass of crucible (B)	98.43
Mass of oven dry soil (C)	32.18
Mass of sample & crucible after ashed in muffle furnace (D)	129.65
Mass of crucible (B)	98.43
Mass of ashed soil sample (E)	31.22
Loss on Ignition = $\frac{C - E}{C}$ * 100=	**2.98**

Container Number:	PB-22
Wet Wt. + Container	201.91
Dry Wt. + Container	190.64
Wt. of Container	138.90
Dry Wt. of Soil	51.74
Moisture Content (%)	21.8

DLZ

Report on Loss of Ignition

(AASHTO T-267)

DLZ Project No.: 2321-3030.00
Boring No. **GP-6**
Client: Enviroscience
Sample No. **1**
Project Name: Duck Creek Resoration
Depth: **2.0'-6.0'**
Date: 6/28/2023

Muffle Furnace Crucible ID: 403

Muffle Furnace Temperature	**455 ± 10°C**
Mass of crucible & oven dry soil (A)	134.64
Mass of crucible (B)	106.59
Mass of oven dry soil (C)	28.05
Mass of sample & crucible after ashed in muffle furnace (D)	133.72
Mass of crucible (B)	106.59
Mass of ashed soil sample (E)	27.13
Loss on Ignition = $\frac{C - E}{C}$ * 100=	**3.28**

Container Number:	PB-23
Wet Wt. + Container	222.92
Dry Wt. + Container	209.12
Wt. of Container	143.92
Dry Wt. of Soil	65.20
Moisture Content (%)	21.2

DLZ

Report on Loss of Ignition

(AASHTO T-267)

DLZ Project No.: 2321-3030.00

Client: Enviroscience

Project Name: Duck Creek Resoration

Date: 6/28/2023

Boring No. **GP-7**

Sample No. **1**

Depth: **2.0'-6.0'**

Muffle Furnace Crucible ID: 413

Muffle Furnace Temperature	**455 ± 10^{o}C**
Mass of crucible & oven dry soil (A)	131.87
Mass of crucible (B)	107.92
Mass of oven dry soil (C)	23.95
Mass of sample & crucible after ashed in muffle furnace (D)	131.02
Mass of crucible (B)	107.92
Mass of ashed soil sample (E)	23.10
Loss on Ignition = $\frac{C - E}{C}$ * 100=	**3.55**

Container Number:	PB-24
Wet Wt. + Container	229.12
Dry Wt. + Container	213.64
Wt. of Container	149.98
Dry Wt. of Soil	63.66
Moisture Content (%)	24.3

DLZ

Report on Loss of Ignition

(AASHTO T-267)

DLZ Project No.:	2321-3030.00	Boring No.	**GP-8**
Client:	Enviroscience	Sample No.	**1**
Project Name:	Duck Creek Resoration	Depth:	**2.0'-6.0'**
Date:	6/28/2023		

Muffle Furnace Crucible ID: X

Muffle Furnace Temperature	**455 ± 10°C**
Mass of crucible & oven dry soil (A)	103.52
Mass of crucible (B)	78.06
Mass of oven dry soil (C)	25.46
Mass of sample & crucible after ashed in muffle furnace (D)	102.31
Mass of crucible (B)	78.06
Mass of ashed soil sample (E)	24.25

Loss on Ignition = $\frac{C - E}{C}$ * 100= **4.75**

Container Number:	PB-46
Wet Wt. + Container	215.32
Dry Wt. + Container	199.26
Wt. of Container	142.20
Dry Wt. of Soil	57.06
Moisture Content (%)	28.1

DLZ

Report on Loss of Ignition

(AASHTO T-267)

DLZ Project No.:	2321-3030.00	Boring No.	**GP-9**
Client:	Enviroscience	Sample No.	**1**
Project Name:	Duck Creek Resoration	Depth:	**2.0'-6.0'**
Date:	6/28/2023		

Muffle Furnace Crucible ID: J

Muffle Furnace Temperature	**455 ± 10°C**
Mass of crucible & oven dry soil (A)	90.73
Mass of crucible (B)	73.71
Mass of oven dry soil (C)	17.02
Mass of sample & crucible after ashed in muffle furnace (D)	89.80
Mass of crucible (B)	73.71
Mass of ashed soil sample (E)	16.09

Loss on Ignition = $\frac{C - E}{C}$ * 100= **5.46**

Container Number:	PB-50
Wet Wt. + Container	224.45
Dry Wt. + Container	202.57
Wt. of Container	136.80
Dry Wt. of Soil	65.77
Moisture Content (%)	33.3

DLZ

Report on Loss of Ignition
(AASHTO T-267)

DLZ Project No.: 2321-3030.00
Client: Enviroscience
Project Name: Duck Creek Resoration
Date: 6/28/2023

Boring No. **GP-11**
Sample No. **1**
Depth: **2.0'-6.0'**

Muffle Furnace Crucible ID: N

Muffle Furnace Temperature	**455 ± 10°C**
Mass of crucible & oven dry soil (A)	96.06
Mass of crucible (B)	71.72
Mass of oven dry soil (C)	24.34
Mass of sample & crucible after ashed in muffle furnace (D)	95.35
Mass of crucible (B)	71.72
Mass of ashed soil sample (E)	23.63

Loss on Ignition = $\frac{C - E}{C}$ * 100= **2.92**

Container Number:	PB-28
Wet Wt. + Container	229.19
Dry Wt. + Container	212.40
Wt. of Container	153.49
Dry Wt. of Soil	58.91
Moisture Content (%)	28.5

DLZ

Report on Loss of Ignition

(AASHTO T-267)

DLZ Project No.: 2321-3030.00

Client: Enviroscience

Project Name: Duck Creek Resoration

Date: 6/28/2023

Boring No. **GP-12**

Sample No. **1**

Depth: **2.0'-6.0'**

Muffle Furnace Crucible ID: T

Muffle Furnace Temperature	**455 ± 10^{o}C**
Mass of crucible & oven dry soil (A)	97.45
Mass of crucible (B)	74.85
Mass of oven dry soil (C)	22.60
Mass of sample & crucible after ashed in muffle furnace (D)	96.23
Mass of crucible (B)	74.85
Mass of ashed soil sample (E)	21.38

Loss on Ignition = $\frac{C - E}{C}$ * 100= **5.40**

Container Number:	PB-52
Wet Wt. + Container	205.85
Dry Wt. + Container	193.26
Wt. of Container	142.79
Dry Wt. of Soil	50.47
Moisture Content (%)	24.9

DLZ

PRELIMINARY

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report
(consolidated)

WO#: **23060707**

Date Reported:

CLIENT: DLZ

Collection Date: 6/7/2023 9:35:00 AM

Project: Duck Creek Restoration

Lab ID: 23060707-001

Matrix: SOLID

Client Sample ID: GP-1

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP **TCLP MERCURY**				**SW7470A**	**SW7470A**	Analyst: **MP**
TCLP Mercury	ND	0.00200		mg/L	1	6/14/2023 8:43:00 AM
FULL TCLP **TCLP METALS**				**SW6010**	**SW3010A**	Analyst: **RJE**
TCLP Arsenic(As)	ND	0.100		mg/L	1	6/13/2023 8:21:00 PM
TCLP Barium(Ba)	ND	1.00		mg/L	1	6/13/2023 8:21:00 PM
TCLP Cadmium(Cd)	ND	0.100		mg/L	1	6/13/2023 8:21:00 PM
TCLP Chromium(Cr)	ND	0.200		mg/L	1	6/13/2023 8:21:00 PM
TCLP Lead(Pb)	ND	0.100		mg/L	1	6/13/2023 8:21:00 PM
TCLP Selenium(Se)	ND	0.100		mg/L	1	6/13/2023 8:21:00 PM
TCLP Silver(Ag)	ND	0.100		mg/L	1	6/13/2023 8:21:00 PM
FULL TCLP **TCLP SEMI-VOLATILES**				**SW8270C**	**SW3510C**	Analyst: **JAP**
1,4-Dichlorobenzene	ND	0.0250		mg/L	1	6/15/2023 2:40:00 AM
2,4,5-Trichlorophenol	ND	0.0250		mg/L	1	6/15/2023 2:40:00 AM
2,4,6-Trichlorophenol	ND	0.0250		mg/L	1	6/15/2023 2:40:00 AM
2,4-Dinitrotoluene	ND	0.00500		mg/L	1	6/15/2023 2:40:00 AM
Cresols, Total	ND	0.0500		mg/L	1	6/15/2023 2:40:00 AM
Hexachloro-1,3-butadiene	ND	0.00500		mg/L	1	6/15/2023 2:40:00 AM
Hexachlorobenzene	ND	0.00500		mg/L	1	6/15/2023 2:40:00 AM
Hexachloroethane	ND	0.0250		mg/L	1	6/15/2023 2:40:00 AM
Nitrobenzene	ND	0.0250		mg/L	1	6/15/2023 2:40:00 AM
Pentachlorophenol	ND	0.0250		mg/L	1	6/15/2023 2:40:00 AM
Pyridine	ND	0.0250		mg/L	1	6/15/2023 2:40:00 AM
Surr: 2-Fluorophenol	77.6	10 - 135		%Rec	1	6/15/2023 2:40:00 AM
Surr: Phenol-d6	69.2	10 - 161		%Rec	1	6/15/2023 2:40:00 AM
Surr: Nitrobenzene-d5	64.7	16.8 - 150		%Rec	1	6/15/2023 2:40:00 AM
Surr: 2,4,6-Tribromophenol	87.7	32.5 - 179		%Rec	1	6/15/2023 2:40:00 AM
Surr: 2-Fluorobiphenyl	63.9	34 - 133		%Rec	1	6/15/2023 2:40:00 AM
Surr: p-Terphenyl-d14	82.9	60.8 - 163		%Rec	1	6/15/2023 2:40:00 AM
FULL TCLP **TCLP PESTICIDES**				**SW8081A**	**SW3510C**	Analyst: **MES**

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **23060707**

Date Reported:

CLIENT: DLZ **Collection Date:** 6/7/2023 9:35:00 AM

Project: Duck Creek Restoration

Lab ID: 23060707-001 **Matrix:** SOLID

Client Sample ID: GP-1

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP **TCLP PESTICIDES**				**SW8081A**	**SW3510C**	Analyst: **MES**
Chlordane, total	ND	0.0250		mg/L	10	6/15/2023 5:45:00 PM
Toxaphene	ND	0.0500		mg/L	10	6/15/2023 5:45:00 PM
Endrin	ND	0.00500		mg/L	10	6/15/2023 5:45:00 PM
gamma-BHC	ND	0.00500		mg/L	10	6/15/2023 5:45:00 PM
Heptachlor	ND	0.00500		mg/L	10	6/15/2023 5:45:00 PM
Heptachlor epoxide	ND	0.00500		mg/L	10	6/15/2023 5:45:00 PM
Methoxychlor	ND	0.00500		mg/L	10	6/15/2023 5:45:00 PM
Surr: TCMX	91.4	10 - 119		%Rec	10	6/15/2023 5:45:00 PM
Surr: DCB	97.1	10 - 119		%Rec	10	6/15/2023 5:45:00 PM
FULL TCLP **TCLP HERBICIDES**				**SW8321**		Analyst: **JDB**
2,4-D	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
2,4,5-TP	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
Surr: DCAA	130	70 - 130		%Rec	50	6/14/2023 4:00:00 PM
FULL TCLP **TCLP VOLATILES**				**SW8260**		Analyst: **MTG**
1,1-Dichloroethene	ND	0.100		mg/L	20	6/14/2023 1:54:00 AM
1,2-Dichloroethane	ND	0.100		mg/L	20	6/14/2023 1:54:00 AM
MEK	ND	2.00		mg/L	20	6/14/2023 1:54:00 AM
Benzene	ND	0.100		mg/L	20	6/14/2023 1:54:00 AM
Carbon tetrachloride	ND	0.100		mg/L	20	6/14/2023 1:54:00 AM
Chlorobenzene	ND	1.00		mg/L	20	6/14/2023 1:54:00 AM
Chloroform	ND	0.100		mg/L	20	6/14/2023 1:54:00 AM
Tetrachloroethene	ND	0.100		mg/L	20	6/14/2023 1:54:00 AM
Trichloroethene	ND	0.100		mg/L	20	6/14/2023 1:54:00 AM
Vinyl chloride	ND	0.0400		mg/L	20	6/14/2023 1:54:00 AM
Surr: 4-Bromofluorobenzene	98.2	70 - 130		%Rec	20	6/14/2023 1:54:00 AM
Surr: Dibromofluoromethane	113	70 - 130		%Rec	20	6/14/2023 1:54:00 AM
Surr: Toluene-d8	89.4	70 - 130		%Rec	20	6/14/2023 1:54:00 AM

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **23060707**

Date Reported:

CLIENT:	DLZ	**Collection Date:**	6/7/2023 8:45:00 AM
Project:	Duck Creek Restoration		
Lab ID:	23060707-002	**Matrix:**	SOLID
Client Sample ID:	GP-2		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP TCLP MERCURY				**SW7470A**	**SW7470A**	Analyst: **MP**
TCLP Mercury	ND	0.00200		mg/L	1	6/14/2023 8:45:00 AM
FULL TCLP TCLP METALS				**SW6010**	**SW3010A**	Analyst: **RJE**
TCLP Arsenic(As)	ND	0.100		mg/L	1	6/13/2023 8:25:00 PM
TCLP Barium(Ba)	ND	1.00		mg/L	1	6/13/2023 8:25:00 PM
TCLP Cadmium(Cd)	ND	0.100		mg/L	1	6/13/2023 8:25:00 PM
TCLP Chromium(Cr)	ND	0.200		mg/L	1	6/13/2023 8:25:00 PM
TCLP Lead(Pb)	ND	0.100		mg/L	1	6/13/2023 8:25:00 PM
TCLP Selenium(Se)	ND	0.100		mg/L	1	6/13/2023 8:25:00 PM
TCLP Silver(Ag)	ND	0.100		mg/L	1	6/13/2023 8:25:00 PM
FULL TCLP TCLP SEMI-VOLATILES				**SW8270C**	**SW3510C**	Analyst: **JAP**
1,4-Dichlorobenzene	ND	0.0250		mg/L	1	6/15/2023 3:14:00 AM
2,4,5-Trichlorophenol	ND	0.0250		mg/L	1	6/15/2023 3:14:00 AM
2,4,6-Trichlorophenol	ND	0.0250		mg/L	1	6/15/2023 3:14:00 AM
2,4-Dinitrotoluene	ND	0.00500		mg/L	1	6/15/2023 3:14:00 AM
Cresols, Total	ND	0.0500		mg/L	1	6/15/2023 3:14:00 AM
Hexachloro-1,3-butadiene	ND	0.00500		mg/L	1	6/15/2023 3:14:00 AM
Hexachlorobenzene	ND	0.00500		mg/L	1	6/15/2023 3:14:00 AM
Hexachloroethane	ND	0.0250		mg/L	1	6/15/2023 3:14:00 AM
Nitrobenzene	ND	0.0250		mg/L	1	6/15/2023 3:14:00 AM
Pentachlorophenol	ND	0.0250		mg/L	1	6/15/2023 3:14:00 AM
Pyridine	ND	0.0250		mg/L	1	6/15/2023 3:14:00 AM
Surr: 2-Fluorophenol	70.2	10 - 135		%Rec	1	6/15/2023 3:14:00 AM
Surr: Phenol-d6	63.9	10 - 161		%Rec	1	6/15/2023 3:14:00 AM
Surr: Nitrobenzene-d5	60.8	16.8 - 150		%Rec	1	6/15/2023 3:14:00 AM
Surr: 2,4,6-Tribromophenol	83.2	32.5 - 179		%Rec	1	6/15/2023 3:14:00 AM
Surr: 2-Fluorobiphenyl	62.0	34 - 133		%Rec	1	6/15/2023 3:14:00 AM
Surr: p-Terphenyl-d14	82.8	60.8 - 163		%Rec	1	6/15/2023 3:14:00 AM
FULL TCLP TCLP PESTICIDES				**SW8081A**	**SW3510C**	Analyst: **MES**

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

Summit Environmental Technologies, Inc.
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TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **23060707**

Date Reported:

CLIENT: DLZ

Collection Date: 6/7/2023 8:45:00 AM

Project: Duck Creek Restoration

Lab ID: 23060707-002

Matrix: SOLID

Client Sample ID: GP-2

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP TCLP PESTICIDES				**SW8081A**	**SW3510C**	Analyst: **MES**
Chlordane, total	ND	0.0250		mg/L	10	6/15/2023 6:07:00 PM
Toxaphene	ND	0.0500		mg/L	10	6/15/2023 6:07:00 PM
Endrin	ND	0.00500		mg/L	10	6/15/2023 6:07:00 PM
gamma-BHC	ND	0.00500		mg/L	10	6/15/2023 6:07:00 PM
Heptachlor	ND	0.00500		mg/L	10	6/15/2023 6:07:00 PM
Heptachlor epoxide	ND	0.00500		mg/L	10	6/15/2023 6:07:00 PM
Methoxychlor	ND	0.00500		mg/L	10	6/15/2023 6:07:00 PM
Surr: TCMX	85.9	10 - 119		%Rec	10	6/15/2023 6:07:00 PM
Surr: DCB	89.1	10 - 119		%Rec	10	6/15/2023 6:07:00 PM
FULL TCLP TCLP HERBICIDES				**SW8321**		Analyst: **JDB**
2,4-D	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
2,4,5-TP	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
Surr: DCAA	127	70 - 130		%Rec	50	6/14/2023 4:00:00 PM
FULL TCLP TCLP VOLATILES				**SW8260**		Analyst: **MTG**
1,1-Dichloroethene	ND	0.100		mg/L	20	6/14/2023 2:20:00 AM
1,2-Dichloroethane	ND	0.100		mg/L	20	6/14/2023 2:20:00 AM
MEK	ND	2.00		mg/L	20	6/14/2023 2:20:00 AM
Benzene	ND	0.100		mg/L	20	6/14/2023 2:20:00 AM
Carbon tetrachloride	ND	0.100		mg/L	20	6/14/2023 2:20:00 AM
Chlorobenzene	ND	1.00		mg/L	20	6/14/2023 2:20:00 AM
Chloroform	ND	0.100		mg/L	20	6/14/2023 2:20:00 AM
Tetrachloroethene	ND	0.100		mg/L	20	6/14/2023 2:20:00 AM
Trichloroethene	ND	0.100		mg/L	20	6/14/2023 2:20:00 AM
Vinyl chloride	ND	0.0400		mg/L	20	6/14/2023 2:20:00 AM
Surr: 4-Bromofluorobenzene	97.6	70 - 130		%Rec	20	6/14/2023 2:20:00 AM
Surr: Dibromofluoromethane	113	70 - 130		%Rec	20	6/14/2023 2:20:00 AM
Surr: Toluene-d8	91.3	70 - 130		%Rec	20	6/14/2023 2:20:00 AM

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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Analytical Report
(consolidated)

WO#: **23060707**

Date Reported:

CLIENT: DLZ **Collection Date:** 6/7/2023 1:42:00 PM
Project: Duck Creek Restoration
Lab ID: 23060707-004 **Matrix:** SOLID
Client Sample ID: GP-4

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP TCLP MERCURY				**SW7470A**	**SW7470A**	Analyst: **MP**
TCLP Mercury	ND	0.00200		mg/L	1	6/14/2023 8:48:00 AM
FULL TCLP TCLP METALS				**SW6010**	**SW3010A**	Analyst: **RJE**
TCLP Arsenic(As)	ND	0.100		mg/L	1	6/13/2023 8:38:00 PM
TCLP Barium(Ba)	ND	1.00		mg/L	1	6/13/2023 8:38:00 PM
TCLP Cadmium(Cd)	ND	0.100		mg/L	1	6/13/2023 8:38:00 PM
TCLP Chromium(Cr)	ND	0.200		mg/L	1	6/13/2023 8:38:00 PM
TCLP Lead(Pb)	ND	0.100		mg/L	1	6/13/2023 8:38:00 PM
TCLP Selenium(Se)	ND	0.100		mg/L	1	6/13/2023 8:38:00 PM
TCLP Silver(Ag)	ND	0.100		mg/L	1	6/13/2023 8:38:00 PM
FULL TCLP TCLP SEMI-VOLATILES				**SW8270C**	**SW3510C**	Analyst: **JAP**
1,4-Dichlorobenzene	ND	0.0250		mg/L	1	6/15/2023 3:48:00 AM
2,4,5-Trichlorophenol	ND	0.0250		mg/L	1	6/15/2023 3:48:00 AM
2,4,6-Trichlorophenol	ND	0.0250		mg/L	1	6/15/2023 3:48:00 AM
2,4-Dinitrotoluene	ND	0.00500		mg/L	1	6/15/2023 3:48:00 AM
Cresols, Total	ND	0.0500		mg/L	1	6/15/2023 3:48:00 AM
Hexachloro-1,3-butadiene	ND	0.00500		mg/L	1	6/15/2023 3:48:00 AM
Hexachlorobenzene	ND	0.00500		mg/L	1	6/15/2023 3:48:00 AM
Hexachloroethane	ND	0.0250		mg/L	1	6/15/2023 3:48:00 AM
Nitrobenzene	ND	0.0250		mg/L	1	6/15/2023 3:48:00 AM
Pentachlorophenol	ND	0.0250		mg/L	1	6/15/2023 3:48:00 AM
Pyridine	ND	0.0250		mg/L	1	6/15/2023 3:48:00 AM
Surr: 2-Fluorophenol	69.7	10 - 135		%Rec	1	6/15/2023 3:48:00 AM
Surr: Phenol-d6	63.8	10 - 161		%Rec	1	6/15/2023 3:48:00 AM
Surr: Nitrobenzene-d5	59.3	16.8 - 150		%Rec	1	6/15/2023 3:48:00 AM
Surr: 2,4,6-Tribromophenol	81.2	32.5 - 179		%Rec	1	6/15/2023 3:48:00 AM
Surr: 2-Fluorobiphenyl	59.5	34 - 133		%Rec	1	6/15/2023 3:48:00 AM
Surr: p-Terphenyl-d14	77.5	60.8 - 163		%Rec	1	6/15/2023 3:48:00 AM
FULL TCLP TCLP PESTICIDES				**SW8081A**	**SW3510C**	Analyst: **MES**

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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Analytical Report

(consolidated)

WO#: **23060707**

Date Reported:

CLIENT: DLZ | **Collection Date:** 6/7/2023 1:42:00 PM

Project: Duck Creek Restoration

Lab ID: 23060707-004 | **Matrix:** SOLID

Client Sample ID: GP-4

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP TCLP PESTICIDES				**SW8081A**	**SW3510C**	Analyst: **MES**
Chlordane, total	ND	0.0250		mg/L	10	6/15/2023 6:29:00 PM
Toxaphene	ND	0.0500		mg/L	10	6/15/2023 6:29:00 PM
Endrin	ND	0.00500		mg/L	10	6/15/2023 6:29:00 PM
gamma-BHC	ND	0.00500		mg/L	10	6/15/2023 6:29:00 PM
Heptachlor	ND	0.00500		mg/L	10	6/15/2023 6:29:00 PM
Heptachlor epoxide	ND	0.00500		mg/L	10	6/15/2023 6:29:00 PM
Methoxychlor	ND	0.00500		mg/L	10	6/15/2023 6:29:00 PM
Surr: TCMX	90.5	10 - 119		%Rec	10	6/15/2023 6:29:00 PM
Surr: DCB	105	10 - 119		%Rec	10	6/15/2023 6:29:00 PM
FULL TCLP TCLP HERBICIDES				**SW8321**		Analyst: **JDB**
2,4-D	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
2,4,5-TP	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
Surr: DCAA	127	70 - 130		%Rec	50	6/14/2023 4:00:00 PM
FULL TCLP TCLP VOLATILES				**SW8260**		Analyst: **MTG**
1,1-Dichloroethene	ND	0.100		mg/L	20	6/14/2023 2:45:00 AM
1,2-Dichloroethane	ND	0.100		mg/L	20	6/14/2023 2:45:00 AM
MEK	ND	2.00		mg/L	20	6/14/2023 2:45:00 AM
Benzene	ND	0.100		mg/L	20	6/14/2023 2:45:00 AM
Carbon tetrachloride	ND	0.100		mg/L	20	6/14/2023 2:45:00 AM
Chlorobenzene	ND	1.00		mg/L	20	6/14/2023 2:45:00 AM
Chloroform	ND	0.100		mg/L	20	6/14/2023 2:45:00 AM
Tetrachloroethene	ND	0.100		mg/L	20	6/14/2023 2:45:00 AM
Trichloroethene	ND	0.100		mg/L	20	6/14/2023 2:45:00 AM
Vinyl chloride	ND	0.0400		mg/L	20	6/14/2023 2:45:00 AM
Surr: 4-Bromofluorobenzene	96.4	70 - 130		%Rec	20	6/14/2023 2:45:00 AM
Surr: Dibromofluoromethane	109	70 - 130		%Rec	20	6/14/2023 2:45:00 AM
Surr: Toluene-d8	91.5	70 - 130		%Rec	20	6/14/2023 2:45:00 AM

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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Analytical Report

(consolidated)

WO#: **23060707**

Date Reported:

CLIENT: DLZ
Collection Date: 6/6/2023 12:02:00 PM
Project: Duck Creek Restoration
Lab ID: 23060707-005
Matrix: SOLID
Client Sample ID: GP-5

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP TCLP MERCURY				**SW7470A**	**SW7470A**	Analyst: **MP**
TCLP Mercury	ND	0.00200		mg/L	1	6/14/2023 8:57:00 AM
FULL TCLP TCLP METALS				**SW6010**	**SW3010A**	Analyst: **RJE**
TCLP Arsenic(As)	ND	0.100		mg/L	1	6/13/2023 8:48:00 PM
TCLP Barium(Ba)	ND	1.00		mg/L	1	6/13/2023 8:48:00 PM
TCLP Cadmium(Cd)	ND	0.100		mg/L	1	6/13/2023 8:48:00 PM
TCLP Chromium(Cr)	ND	0.200		mg/L	1	6/13/2023 8:48:00 PM
TCLP Lead(Pb)	ND	0.100		mg/L	1	6/13/2023 8:48:00 PM
TCLP Selenium(Se)	ND	0.100		mg/L	1	6/13/2023 8:48:00 PM
TCLP Silver(Ag)	ND	0.100		mg/L	1	6/13/2023 8:48:00 PM
FULL TCLP TCLP SEMI-VOLATILES				**SW8270C**	**SW3510C**	Analyst: **JAP**
1,4-Dichlorobenzene	ND	0.0250		mg/L	1	6/15/2023 4:22:00 AM
2,4,5-Trichlorophenol	ND	0.0250		mg/L	1	6/15/2023 4:22:00 AM
2,4,6-Trichlorophenol	ND	0.0250		mg/L	1	6/15/2023 4:22:00 AM
2,4-Dinitrotoluene	ND	0.00500		mg/L	1	6/15/2023 4:22:00 AM
Cresols, Total	ND	0.0500		mg/L	1	6/15/2023 4:22:00 AM
Hexachloro-1,3-butadiene	ND	0.00500		mg/L	1	6/15/2023 4:22:00 AM
Hexachlorobenzene	ND	0.00500		mg/L	1	6/15/2023 4:22:00 AM
Hexachloroethane	ND	0.0250		mg/L	1	6/15/2023 4:22:00 AM
Nitrobenzene	ND	0.0250		mg/L	1	6/15/2023 4:22:00 AM
Pentachlorophenol	ND	0.0250		mg/L	1	6/15/2023 4:22:00 AM
Pyridine	ND	0.0250		mg/L	1	6/15/2023 4:22:00 AM
Surr: 2-Fluorophenol	65.8	10 - 135		%Rec	1	6/15/2023 4:22:00 AM
Surr: Phenol-d6	59.6	10 - 161		%Rec	1	6/15/2023 4:22:00 AM
Surr: Nitrobenzene-d5	57.7	16.8 - 150		%Rec	1	6/15/2023 4:22:00 AM
Surr: 2,4,6-Tribromophenol	76.4	32.5 - 179		%Rec	1	6/15/2023 4:22:00 AM
Surr: 2-Fluorobiphenyl	59.1	34 - 133		%Rec	1	6/15/2023 4:22:00 AM
Surr: p-Terphenyl-d14	76.8	60.8 - 163		%Rec	1	6/15/2023 4:22:00 AM
FULL TCLP TCLP PESTICIDES				**SW8081A**	**SW3510C**	Analyst: **MES**

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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Analytical Report

(consolidated)

WO#: **23060707**

Date Reported:

CLIENT: DLZ
Collection Date: 6/6/2023 12:02:00 PM
Project: Duck Creek Restoration
Lab ID: 23060707-005
Matrix: SOLID
Client Sample ID: GP-5

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP **TCLP PESTICIDES**				**SW8081A**	**SW3510C**	Analyst: **MES**
Chlordane, total	ND	0.0250		mg/L	10	6/15/2023 6:51:00 PM
Toxaphene	ND	0.0500		mg/L	10	6/15/2023 6:51:00 PM
Endrin	ND	0.00500		mg/L	10	6/15/2023 6:51:00 PM
gamma-BHC	ND	0.00500		mg/L	10	6/15/2023 6:51:00 PM
Heptachlor	ND	0.00500		mg/L	10	6/15/2023 6:51:00 PM
Heptachlor epoxide	ND	0.00500		mg/L	10	6/15/2023 6:51:00 PM
Methoxychlor	ND	0.00500		mg/L	10	6/15/2023 6:51:00 PM
Surr: TCMX	89.4	10 - 119		%Rec	10	6/15/2023 6:51:00 PM
Surr: DCB	94.4	10 - 119		%Rec	10	6/15/2023 6:51:00 PM
FULL TCLP **TCLP HERBICIDES**				**SW8321**		Analyst: **JDB**
2,4-D	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
2,4,5-TP	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
Surr: DCAA	135	70 - 130	S	%Rec	50	6/14/2023 4:00:00 PM
FULL TCLP **TCLP VOLATILES**				**SW8260**	**SW1311M**	Analyst: **EMB**
1,1-Dichloroethene	ND	0.100		mg/L	20	6/14/2023 11:01:00 PM
1,2-Dichloroethane	ND	0.100		mg/L	20	6/14/2023 11:01:00 PM
MEK	ND	2.00		mg/L	20	6/14/2023 11:01:00 PM
Benzene	ND	0.100		mg/L	20	6/14/2023 11:01:00 PM
Carbon tetrachloride	ND	0.100		mg/L	20	6/14/2023 11:01:00 PM
Chlorobenzene	ND	1.00		mg/L	20	6/14/2023 11:01:00 PM
Chloroform	ND	0.100		mg/L	20	6/14/2023 11:01:00 PM
Tetrachloroethene	ND	0.100		mg/L	20	6/14/2023 11:01:00 PM
Trichloroethene	ND	0.100		mg/L	20	6/14/2023 11:01:00 PM
Vinyl chloride	ND	0.0400		mg/L	20	6/14/2023 11:01:00 PM
Surr: 4-Bromofluorobenzene	97.0	70 - 130		%Rec	20	6/14/2023 11:01:00 PM
Surr: Dibromofluoromethane	97.0	70 - 130		%Rec	20	6/14/2023 11:01:00 PM
Surr: Toluene-d8	101	70 - 130		%Rec	20	6/14/2023 11:01:00 PM

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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Analytical Report

(consolidated)

WO#: **23060707**

Date Reported:

CLIENT: DLZ
Collection Date: 6/8/2023 8:10:00 AM
Project: Duck Creek Restoration
Lab ID: 23060707-006
Matrix: SOLID
Client Sample ID: GP-6

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP TCLP MERCURY				**SW7470A**	**SW7470A**	Analyst: **MP**
TCLP Mercury	ND	0.00200		mg/L	1	6/14/2023 9:00:00 AM
FULL TCLP TCLP METALS				**SW6010**	**SW3010A**	Analyst: **RJE**
TCLP Arsenic(As)	ND	0.100		mg/L	1	6/13/2023 8:52:00 PM
TCLP Barium(Ba)	ND	1.00		mg/L	1	6/13/2023 8:52:00 PM
TCLP Cadmium(Cd)	ND	0.100		mg/L	1	6/13/2023 8:52:00 PM
TCLP Chromium(Cr)	ND	0.200		mg/L	1	6/13/2023 8:52:00 PM
TCLP Lead(Pb)	ND	0.100		mg/L	1	6/13/2023 8:52:00 PM
TCLP Selenium(Se)	ND	0.100		mg/L	1	6/13/2023 8:52:00 PM
TCLP Silver(Ag)	ND	0.100		mg/L	1	6/13/2023 8:52:00 PM
FULL TCLP TCLP SEMI-VOLATILES				**SW8270C**	**SW3510C**	Analyst: **JAP**
1,4-Dichlorobenzene	ND	0.0250		mg/L	1	6/15/2023 4:56:00 AM
2,4,5-Trichlorophenol	ND	0.0250		mg/L	1	6/15/2023 4:56:00 AM
2,4,6-Trichlorophenol	ND	0.0250		mg/L	1	6/15/2023 4:56:00 AM
2,4-Dinitrotoluene	ND	0.00500		mg/L	1	6/15/2023 4:56:00 AM
Cresols, Total	ND	0.0500		mg/L	1	6/15/2023 4:56:00 AM
Hexachloro-1,3-butadiene	ND	0.00500		mg/L	1	6/15/2023 4:56:00 AM
Hexachlorobenzene	ND	0.00500		mg/L	1	6/15/2023 4:56:00 AM
Hexachloroethane	ND	0.0250		mg/L	1	6/15/2023 4:56:00 AM
Nitrobenzene	ND	0.0250		mg/L	1	6/15/2023 4:56:00 AM
Pentachlorophenol	ND	0.0250		mg/L	1	6/15/2023 4:56:00 AM
Pyridine	ND	0.0250		mg/L	1	6/15/2023 4:56:00 AM
Surr: 2-Fluorophenol	69.0	10 - 135		%Rec	1	6/15/2023 4:56:00 AM
Surr: Phenol-d6	63.9	10 - 161		%Rec	1	6/15/2023 4:56:00 AM
Surr: Nitrobenzene-d5	60.2	16.8 - 150		%Rec	1	6/15/2023 4:56:00 AM
Surr: 2,4,6-Tribromophenol	83.1	32.5 - 179		%Rec	1	6/15/2023 4:56:00 AM
Surr: 2-Fluorobiphenyl	61.7	34 - 133		%Rec	1	6/15/2023 4:56:00 AM
Surr: p-Terphenyl-d14	82.5	60.8 - 163		%Rec	1	6/15/2023 4:56:00 AM
FULL TCLP TCLP PESTICIDES				**SW8081A**	**SW3510C**	Analyst: **MES**

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **23060707**

Date Reported:

CLIENT: DLZ

Collection Date: 6/8/2023 8:10:00 AM

Project: Duck Creek Restoration

Lab ID: 23060707-006

Matrix: SOLID

Client Sample ID: GP-6

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP **TCLP PESTICIDES**				**SW8081A**	**SW3510C**	Analyst: **MES**
Chlordane, total	ND	0.0250		mg/L	10	6/15/2023 7:13:00 PM
Toxaphene	ND	0.0500		mg/L	10	6/15/2023 7:13:00 PM
Endrin	ND	0.00500		mg/L	10	6/15/2023 7:13:00 PM
gamma-BHC	ND	0.00500		mg/L	10	6/15/2023 7:13:00 PM
Heptachlor	ND	0.00500		mg/L	10	6/15/2023 7:13:00 PM
Heptachlor epoxide	ND	0.00500		mg/L	10	6/15/2023 7:13:00 PM
Methoxychlor	ND	0.00500		mg/L	10	6/15/2023 7:13:00 PM
Surr: TCMX	89.5	10 - 119		%Rec	10	6/15/2023 7:13:00 PM
Surr: DCB	100	10 - 119		%Rec	10	6/15/2023 7:13:00 PM
FULL TCLP **TCLP HERBICIDES**				**SW8321**		Analyst: **JDB**
2,4-D	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
2,4,5-TP	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
Surr: DCAA	132	70 - 130	S	%Rec	50	6/14/2023 4:00:00 PM
FULL TCLP **TCLP VOLATILES**				**SW8260**	**SW1311M**	Analyst: **EMB**
1,1-Dichloroethene	ND	0.100		mg/L	20	6/14/2023 11:26:00 PM
1,2-Dichloroethane	ND	0.100		mg/L	20	6/14/2023 11:26:00 PM
MEK	ND	2.00		mg/L	20	6/14/2023 11:26:00 PM
Benzene	ND	0.100		mg/L	20	6/14/2023 11:26:00 PM
Carbon tetrachloride	ND	0.100		mg/L	20	6/14/2023 11:26:00 PM
Chlorobenzene	ND	1.00		mg/L	20	6/14/2023 11:26:00 PM
Chloroform	ND	0.100		mg/L	20	6/14/2023 11:26:00 PM
Tetrachloroethene	ND	0.100		mg/L	20	6/14/2023 11:26:00 PM
Trichloroethene	ND	0.100		mg/L	20	6/14/2023 11:26:00 PM
Vinyl chloride	ND	0.0400		mg/L	20	6/14/2023 11:26:00 PM
Surr: 4-Bromofluorobenzene	97.2	70 - 130		%Rec	20	6/14/2023 11:26:00 PM
Surr: Dibromofluoromethane	97.8	70 - 130		%Rec	20	6/14/2023 11:26:00 PM
Surr: Toluene-d8	100	70 - 130		%Rec	20	6/14/2023 11:26:00 PM

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

Summit Environmental Technologies, Inc.
ENVIRONMENTAL TECHNOLOGIES, INC.
Analytical Laboratories

Summit Environmental Technologies, Inc.
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Website: http://www.settek.com

Analytical Report
(consolidated)

WO#: **23060707**

Date Reported:

CLIENT: DLZ

Collection Date: 6/8/2023 10:20:00 AM

Project: Duck Creek Restoration

Lab ID: 23060707-007

Matrix: SOLID

Client Sample ID: GP-7

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP TCLP MERCURY				**SW7470A**	**SW7470A**	Analyst: **MP**
TCLP Mercury	ND	0.00200		mg/L	1	6/14/2023 9:02:00 AM
FULL TCLP TCLP METALS				**SW6010**	**SW3010A**	Analyst: **RJE**
TCLP Arsenic(As)	ND	0.100		mg/L	1	6/13/2023 8:55:00 PM
TCLP Barium(Ba)	ND	1.00		mg/L	1	6/13/2023 8:55:00 PM
TCLP Cadmium(Cd)	ND	0.100		mg/L	1	6/13/2023 8:55:00 PM
TCLP Chromium(Cr)	ND	0.200		mg/L	1	6/13/2023 8:55:00 PM
TCLP Lead(Pb)	ND	0.100		mg/L	1	6/13/2023 8:55:00 PM
TCLP Selenium(Se)	ND	0.100		mg/L	1	6/13/2023 8:55:00 PM
TCLP Silver(Ag)	ND	0.100		mg/L	1	6/13/2023 8:55:00 PM
FULL TCLP TCLP SEMI-VOLATILES				**SW8270C**	**SW3510C**	Analyst: **JAP**
1,4-Dichlorobenzene	ND	0.0250		mg/L	1	6/16/2023 4:35:00 PM
2,4,5-Trichlorophenol	ND	0.0250		mg/L	1	6/16/2023 4:35:00 PM
2,4,6-Trichlorophenol	ND	0.0250		mg/L	1	6/16/2023 4:35:00 PM
2,4-Dinitrotoluene	ND	0.00500		mg/L	1	6/16/2023 4:35:00 PM
Cresols, Total	ND	0.0500		mg/L	1	6/16/2023 4:35:00 PM
Hexachloro-1,3-butadiene	ND	0.00500		mg/L	1	6/16/2023 4:35:00 PM
Hexachlorobenzene	ND	0.00500		mg/L	1	6/16/2023 4:35:00 PM
Hexachloroethane	ND	0.0250		mg/L	1	6/16/2023 4:35:00 PM
Nitrobenzene	ND	0.0250		mg/L	1	6/16/2023 4:35:00 PM
Pentachlorophenol	ND	0.0250		mg/L	1	6/16/2023 4:35:00 PM
Pyridine	ND	0.0250		mg/L	1	6/16/2023 4:35:00 PM
Surr: 2-Fluorophenol	64.5	10 - 135		%Rec	1	6/16/2023 4:35:00 PM
Surr: Phenol-d6	54.4	10 - 161		%Rec	1	6/16/2023 4:35:00 PM
Surr: Nitrobenzene-d5	65.3	16.8 - 150		%Rec	1	6/16/2023 4:35:00 PM
Surr: 2,4,6-Tribromophenol	64.6	32.5 - 179		%Rec	1	6/16/2023 4:35:00 PM
Surr: 2-Fluorobiphenyl	65.3	34 - 133		%Rec	1	6/16/2023 4:35:00 PM
Surr: p-Terphenyl-d14	68.5	60.8 - 163		%Rec	1	6/16/2023 4:35:00 PM
FULL TCLP TCLP PESTICIDES				**SW8081A**	**SW3510C**	Analyst: **MES**

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

SUMMIT ENVIRONMENTAL TECHNOLOGIES, INC. *Analytical Laboratories*

Summit Environmental Technologies, Inc.
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TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **23060707**

Date Reported:

CLIENT: DLZ

Collection Date: 6/8/2023 10:20:00 AM

Project: Duck Creek Restoration

Lab ID: 23060707-007

Matrix: SOLID

Client Sample ID: GP-7

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP **TCLP PESTICIDES**				**SW8081A**	**SW3510C**	Analyst: **MES**
Chlordane, total	ND	0.0250		mg/L	10	6/15/2023 7:35:00 PM
Toxaphene	ND	0.0500		mg/L	10	6/15/2023 7:35:00 PM
Endrin	ND	0.00500		mg/L	10	6/15/2023 7:35:00 PM
gamma-BHC	ND	0.00500		mg/L	10	6/15/2023 7:35:00 PM
Heptachlor	ND	0.00500		mg/L	10	6/15/2023 7:35:00 PM
Heptachlor epoxide	ND	0.00500		mg/L	10	6/15/2023 7:35:00 PM
Methoxychlor	ND	0.00500		mg/L	10	6/15/2023 7:35:00 PM
Surr: TCMX	86.1	10 - 119		%Rec	10	6/15/2023 7:35:00 PM
Surr: DCB	95.0	10 - 119		%Rec	10	6/15/2023 7:35:00 PM
FULL TCLP **TCLP HERBICIDES**				**SW8321**		Analyst: **JDB**
2,4-D	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
2,4,5-TP	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
Surr: DCAA	130	70 - 130	S	%Rec	50	6/14/2023 4:00:00 PM
FULL TCLP **TCLP VOLATILES**				**SW8260**	**SW1311M**	Analyst: **EMB**
1,1-Dichloroethene	ND	0.100		mg/L	20	6/14/2023 11:50:00 PM
1,2-Dichloroethane	ND	0.100		mg/L	20	6/14/2023 11:50:00 PM
MEK	ND	2.00		mg/L	20	6/14/2023 11:50:00 PM
Benzene	ND	0.100		mg/L	20	6/14/2023 11:50:00 PM
Carbon tetrachloride	ND	0.100		mg/L	20	6/14/2023 11:50:00 PM
Chlorobenzene	ND	1.00		mg/L	20	6/14/2023 11:50:00 PM
Chloroform	ND	0.100		mg/L	20	6/14/2023 11:50:00 PM
Tetrachloroethene	ND	0.100		mg/L	20	6/14/2023 11:50:00 PM
Trichloroethene	ND	0.100		mg/L	20	6/14/2023 11:50:00 PM
Vinyl chloride	ND	0.0400		mg/L	20	6/14/2023 11:50:00 PM
Surr: 4-Bromofluorobenzene	96.6	70 - 130		%Rec	20	6/14/2023 11:50:00 PM
Surr: Dibromofluoromethane	95.3	70 - 130		%Rec	20	6/14/2023 11:50:00 PM
Surr: Toluene-d8	98.2	70 - 130		%Rec	20	6/14/2023 11:50:00 PM

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **23060707**

Date Reported:

CLIENT: DLZ

Collection Date: 6/8/2023 2:45:00 PM

Project: Duck Creek Restoration

Lab ID: 23060707-008

Matrix: SOLID

Client Sample ID: GP-8

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP **TCLP MERCURY**				**SW7470A**	**SW7470A**	Analyst: **MP**
TCLP Mercury	ND	0.00200		mg/L	1	6/14/2023 9:36:00 AM
FULL TCLP **TCLP METALS**				**SW6010**	**SW3010A**	Analyst: **RJE**
TCLP Arsenic(As)	ND	0.100		mg/L	1	6/14/2023 12:23:00 PM
TCLP Barium(Ba)	ND	1.00		mg/L	1	6/14/2023 12:23:00 PM
TCLP Cadmium(Cd)	ND	0.100		mg/L	1	6/14/2023 12:23:00 PM
TCLP Chromium(Cr)	ND	0.200		mg/L	1	6/14/2023 12:23:00 PM
TCLP Lead(Pb)	ND	0.100		mg/L	1	6/14/2023 12:23:00 PM
TCLP Selenium(Se)	ND	0.100		mg/L	1	6/14/2023 12:23:00 PM
TCLP Silver(Ag)	ND	0.100		mg/L	1	6/14/2023 12:23:00 PM
FULL TCLP **TCLP SEMI-VOLATILES**				**SW8270C**	**SW3510C**	Analyst: **JAP**
1,4-Dichlorobenzene	ND	0.0250		mg/L	1	6/16/2023 5:09:00 PM
2,4,5-Trichlorophenol	ND	0.0250		mg/L	1	6/16/2023 5:09:00 PM
2,4,6-Trichlorophenol	ND	0.0250		mg/L	1	6/16/2023 5:09:00 PM
2,4-Dinitrotoluene	ND	0.00500		mg/L	1	6/16/2023 5:09:00 PM
Cresols, Total	ND	0.0500		mg/L	1	6/16/2023 5:09:00 PM
Hexachloro-1,3-butadiene	ND	0.00500		mg/L	1	6/16/2023 5:09:00 PM
Hexachlorobenzene	ND	0.00500		mg/L	1	6/16/2023 5:09:00 PM
Hexachloroethane	ND	0.0250		mg/L	1	6/16/2023 5:09:00 PM
Nitrobenzene	ND	0.0250		mg/L	1	6/16/2023 5:09:00 PM
Pentachlorophenol	ND	0.0250		mg/L	1	6/16/2023 5:09:00 PM
Pyridine	ND	0.0250		mg/L	1	6/16/2023 5:09:00 PM
Surr: 2-Fluorophenol	68.5	10 - 135		%Rec	1	6/16/2023 5:09:00 PM
Surr: Phenol-d6	59.6	10 - 161		%Rec	1	6/16/2023 5:09:00 PM
Surr: Nitrobenzene-d5	65.7	16.8 - 150		%Rec	1	6/16/2023 5:09:00 PM
Surr: 2,4,6-Tribromophenol	70.7	32.5 - 179		%Rec	1	6/16/2023 5:09:00 PM
Surr: 2-Fluorobiphenyl	64.7	34 - 133		%Rec	1	6/16/2023 5:09:00 PM
Surr: p-Terphenyl-d14	69.9	60.8 - 163		%Rec	1	6/16/2023 5:09:00 PM
FULL TCLP **TCLP PESTICIDES**				**SW8081A**	**SW3510C**	Analyst: **MES**

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **23060707**

Date Reported:

CLIENT: DLZ
Collection Date: 6/8/2023 2:45:00 PM
Project: Duck Creek Restoration
Lab ID: 23060707-008
Matrix: SOLID
Client Sample ID: GP-8

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP TCLP PESTICIDES				**SW8081A**	**SW3510C**	Analyst: **MES**
Chlordane, total	ND	0.0250		mg/L	10	6/15/2023 7:57:00 PM
Toxaphene	ND	0.0500		mg/L	10	6/15/2023 7:57:00 PM
Endrin	ND	0.00500		mg/L	10	6/15/2023 7:57:00 PM
gamma-BHC	ND	0.00500		mg/L	10	6/15/2023 7:57:00 PM
Heptachlor	ND	0.00500		mg/L	10	6/15/2023 7:57:00 PM
Heptachlor epoxide	ND	0.00500		mg/L	10	6/15/2023 7:57:00 PM
Methoxychlor	ND	0.00500		mg/L	10	6/15/2023 7:57:00 PM
Surr: TCMX	82.1	10 - 119		%Rec	10	6/15/2023 7:57:00 PM
Surr: DCB	101	10 - 119		%Rec	10	6/15/2023 7:57:00 PM
FULL TCLP TCLP HERBICIDES				**SW8321**		Analyst: **JDB**
2,4-D	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
2,4,5-TP	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
Surr: DCAA	116	70 - 130		%Rec	50	6/14/2023 4:00:00 PM
FULL TCLP TCLP VOLATILES				**SW8260**	**SW1311M**	Analyst: **EMB**
1,1-Dichloroethene	ND	0.100		mg/L	20	6/15/2023 12:15:00 AM
1,2-Dichloroethane	ND	0.100		mg/L	20	6/15/2023 12:15:00 AM
MEK	ND	2.00		mg/L	20	6/15/2023 12:15:00 AM
Benzene	ND	0.100		mg/L	20	6/15/2023 12:15:00 AM
Carbon tetrachloride	ND	0.100		mg/L	20	6/15/2023 12:15:00 AM
Chlorobenzene	ND	1.00		mg/L	20	6/15/2023 12:15:00 AM
Chloroform	ND	0.100		mg/L	20	6/15/2023 12:15:00 AM
Tetrachloroethene	ND	0.100		mg/L	20	6/15/2023 12:15:00 AM
Trichloroethene	ND	0.100		mg/L	20	6/15/2023 12:15:00 AM
Vinyl chloride	ND	0.0400		mg/L	20	6/15/2023 12:15:00 AM
Surr: 4-Bromofluorobenzene	96.6	70 - 130		%Rec	20	6/15/2023 12:15:00 AM
Surr: Dibromofluoromethane	93.6	70 - 130		%Rec	20	6/15/2023 12:15:00 AM
Surr: Toluene-d8	98.5	70 - 130		%Rec	20	6/15/2023 12:15:00 AM

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

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Analytical Laboratories

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Website: http://www.settek.com

Analytical Report
(consolidated)

WO#: **23060707**

Date Reported:

CLIENT:	DLZ	**Collection Date:**	6/8/2023 1:30:00 PM
Project:	Duck Creek Restoration		
Lab ID:	23060707-009	**Matrix:**	SOLID
Client Sample ID:	GP-9		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP **TCLP MERCURY**				**SW7470A**	**SW7470A**	Analyst: **MP**
TCLP Mercury	ND	0.00200		mg/L	1	6/14/2023 9:39:00 AM
FULL TCLP **TCLP METALS**				**SW6010**	**SW3010A**	Analyst: **RJE**
TCLP Arsenic(As)	ND	0.100		mg/L	1	6/14/2023 12:26:00 PM
TCLP Barium(Ba)	ND	1.00		mg/L	1	6/14/2023 12:26:00 PM
TCLP Cadmium(Cd)	ND	0.100		mg/L	1	6/14/2023 12:26:00 PM
TCLP Chromium(Cr)	ND	0.200		mg/L	1	6/14/2023 12:26:00 PM
TCLP Lead(Pb)	ND	0.100		mg/L	1	6/14/2023 12:26:00 PM
TCLP Selenium(Se)	ND	0.100		mg/L	1	6/14/2023 12:26:00 PM
TCLP Silver(Ag)	ND	0.100		mg/L	1	6/14/2023 12:26:00 PM
FULL TCLP **TCLP SEMI-VOLATILES**				**SW8270C**	**SW3510C**	Analyst: **JAP**
1,4-Dichlorobenzene	ND	0.0250		mg/L	1	6/16/2023 5:44:00 PM
2,4,5-Trichlorophenol	ND	0.0250		mg/L	1	6/16/2023 5:44:00 PM
2,4,6-Trichlorophenol	ND	0.0250		mg/L	1	6/16/2023 5:44:00 PM
2,4-Dinitrotoluene	ND	0.00500		mg/L	1	6/16/2023 5:44:00 PM
Cresols, Total	ND	0.0500		mg/L	1	6/16/2023 5:44:00 PM
Hexachloro-1,3-butadiene	ND	0.00500		mg/L	1	6/16/2023 5:44:00 PM
Hexachlorobenzene	ND	0.00500		mg/L	1	6/16/2023 5:44:00 PM
Hexachloroethane	ND	0.0250		mg/L	1	6/16/2023 5:44:00 PM
Nitrobenzene	ND	0.0250		mg/L	1	6/16/2023 5:44:00 PM
Pentachlorophenol	ND	0.0250		mg/L	1	6/16/2023 5:44:00 PM
Pyridine	ND	0.0250		mg/L	1	6/16/2023 5:44:00 PM
Surr: 2-Fluorophenol	66.5	10 - 135		%Rec	1	6/16/2023 5:44:00 PM
Surr: Phenol-d6	58.3	10 - 161		%Rec	1	6/16/2023 5:44:00 PM
Surr: Nitrobenzene-d5	62.4	16.8 - 150		%Rec	1	6/16/2023 5:44:00 PM
Surr: 2,4,6-Tribromophenol	69.9	32.5 - 179		%Rec	1	6/16/2023 5:44:00 PM
Surr: 2-Fluorobiphenyl	64.5	34 - 133		%Rec	1	6/16/2023 5:44:00 PM
Surr: p-Terphenyl-d14	73.8	60.8 - 163		%Rec	1	6/16/2023 5:44:00 PM
FULL TCLP **TCLP PESTICIDES**				**SW8081A**	**SW3510C**	Analyst: **MES**

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

Original

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: **23060707**

Date Reported:

CLIENT: DLZ **Collection Date:** 6/8/2023 1:30:00 PM

Project: Duck Creek Restoration

Lab ID: 23060707-009 **Matrix:** SOLID

Client Sample ID: GP-9

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP TCLP PESTICIDES				**SW8081A**	**SW3510C**	Analyst: **MES**
Chlordane, total	ND	0.0250		mg/L	10	6/15/2023 8:19:00 PM
Toxaphene	ND	0.0500		mg/L	10	6/15/2023 8:19:00 PM
Endrin	ND	0.00500		mg/L	10	6/15/2023 8:19:00 PM
gamma-BHC	ND	0.00500		mg/L	10	6/15/2023 8:19:00 PM
Heptachlor	ND	0.00500		mg/L	10	6/15/2023 8:19:00 PM
Heptachlor epoxide	ND	0.00500		mg/L	10	6/15/2023 8:19:00 PM
Methoxychlor	ND	0.00500		mg/L	10	6/15/2023 8:19:00 PM
Surr: TCMX	92.6	10 - 119		%Rec	10	6/15/2023 8:19:00 PM
Surr: DCB	96.5	10 - 119		%Rec	10	6/15/2023 8:19:00 PM
FULL TCLP TCLP HERBICIDES				**SW8321**		Analyst: **JDB**
2,4-D	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
2,4,5-TP	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
Surr: DCAA	133	70 - 130	S	%Rec	50	6/14/2023 4:00:00 PM
FULL TCLP TCLP VOLATILES				**SW8260**	**SW1311M**	Analyst: **EMB**
1,1-Dichloroethene	ND	0.100		mg/L	20	6/15/2023 12:40:00 AM
1,2-Dichloroethane	ND	0.100		mg/L	20	6/15/2023 12:40:00 AM
MEK	ND	2.00		mg/L	20	6/15/2023 12:40:00 AM
Benzene	ND	0.100		mg/L	20	6/15/2023 12:40:00 AM
Carbon tetrachloride	ND	0.100		mg/L	20	6/15/2023 12:40:00 AM
Chlorobenzene	ND	1.00		mg/L	20	6/15/2023 12:40:00 AM
Chloroform	ND	0.100		mg/L	20	6/15/2023 12:40:00 AM
Tetrachloroethene	ND	0.100		mg/L	20	6/15/2023 12:40:00 AM
Trichloroethene	ND	0.100		mg/L	20	6/15/2023 12:40:00 AM
Vinyl chloride	ND	0.0400		mg/L	20	6/15/2023 12:40:00 AM
Surr: 4-Bromofluorobenzene	96.4	70 - 130		%Rec	20	6/15/2023 12:40:00 AM
Surr: Dibromofluoromethane	94.6	70 - 130		%Rec	20	6/15/2023 12:40:00 AM
Surr: Toluene-d8	99.9	70 - 130		%Rec	20	6/15/2023 12:40:00 AM

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
PL	Permit Limit	RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode		

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Analytical Report
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WO#: **23060707**

Date Reported:

CLIENT: DLZ **Collection Date:** 6/8/2023 1:45:00 PM

Project: Duck Creek Restoration

Lab ID: 23060707-011 **Matrix:** SOLID

Client Sample ID: GP-11

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP TCLP MERCURY				**SW7470A**	**SW7470A**	Analyst: **MP**
TCLP Mercury	ND	0.00200		mg/L	1	6/14/2023 9:41:00 AM
FULL TCLP TCLP METALS				**SW6010**	**SW3010A**	Analyst: **RJE**
TCLP Arsenic(As)	ND	0.100		mg/L	1	6/14/2023 12:30:00 PM
TCLP Barium(Ba)	ND	1.00		mg/L	1	6/14/2023 12:30:00 PM
TCLP Cadmium(Cd)	ND	0.100		mg/L	1	6/14/2023 12:30:00 PM
TCLP Chromium(Cr)	ND	0.200		mg/L	1	6/14/2023 12:30:00 PM
TCLP Lead(Pb)	ND	0.100		mg/L	1	6/14/2023 12:30:00 PM
TCLP Selenium(Se)	ND	0.100		mg/L	1	6/14/2023 12:30:00 PM
TCLP Silver(Ag)	ND	0.100		mg/L	1	6/14/2023 12:30:00 PM
FULL TCLP TCLP SEMI-VOLATILES				**SW8270C**	**SW3510C**	Analyst: **JAP**
1,4-Dichlorobenzene	ND	0.0250		mg/L	1	6/16/2023 6:18:00 PM
2,4,5-Trichlorophenol	ND	0.0250		mg/L	1	6/16/2023 6:18:00 PM
2,4,6-Trichlorophenol	ND	0.0250		mg/L	1	6/16/2023 6:18:00 PM
2,4-Dinitrotoluene	ND	0.00500		mg/L	1	6/16/2023 6:18:00 PM
Cresols, Total	ND	0.0500		mg/L	1	6/16/2023 6:18:00 PM
Hexachloro-1,3-butadiene	ND	0.00500		mg/L	1	6/16/2023 6:18:00 PM
Hexachlorobenzene	ND	0.00500		mg/L	1	6/16/2023 6:18:00 PM
Hexachloroethane	ND	0.0250		mg/L	1	6/16/2023 6:18:00 PM
Nitrobenzene	ND	0.0250		mg/L	1	6/16/2023 6:18:00 PM
Pentachlorophenol	ND	0.0250		mg/L	1	6/16/2023 6:18:00 PM
Pyridine	ND	0.0250		mg/L	1	6/16/2023 6:18:00 PM
Surr: 2-Fluorophenol	64.9	10 - 135		%Rec	1	6/16/2023 6:18:00 PM
Surr: Phenol-d6	55.9	10 - 161		%Rec	1	6/16/2023 6:18:00 PM
Surr: Nitrobenzene-d5	65.1	16.8 - 150		%Rec	1	6/16/2023 6:18:00 PM
Surr: 2,4,6-Tribromophenol	70.3	32.5 - 179		%Rec	1	6/16/2023 6:18:00 PM
Surr: 2-Fluorobiphenyl	65.6	34 - 133		%Rec	1	6/16/2023 6:18:00 PM
Surr: p-Terphenyl-d14	71.0	60.8 - 163		%Rec	1	6/16/2023 6:18:00 PM
FULL TCLP TCLP PESTICIDES				**SW8081A**	**SW3510C**	Analyst: **MES**

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
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WO#: **23060707**

Date Reported:

CLIENT: DLZ

Collection Date: 6/8/2023 1:45:00 PM

Project: Duck Creek Restoration

Lab ID: 23060707-011

Matrix: SOLID

Client Sample ID: GP-11

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP TCLP PESTICIDES				**SW8081A**	**SW3510C**	Analyst: **MES**
Chlordane, total	ND	0.0250		mg/L	10	6/15/2023 8:41:00 PM
Toxaphene	ND	0.0500		mg/L	10	6/15/2023 8:41:00 PM
Endrin	ND	0.00500		mg/L	10	6/15/2023 8:41:00 PM
gamma-BHC	ND	0.00500		mg/L	10	6/15/2023 8:41:00 PM
Heptachlor	ND	0.00500		mg/L	10	6/15/2023 8:41:00 PM
Heptachlor epoxide	ND	0.00500		mg/L	10	6/15/2023 8:41:00 PM
Methoxychlor	ND	0.00500		mg/L	10	6/15/2023 8:41:00 PM
Surr: TCMX	99.0	10 - 119		%Rec	10	6/15/2023 8:41:00 PM
Surr: DCB	114	10 - 119		%Rec	10	6/15/2023 8:41:00 PM
FULL TCLP TCLP HERBICIDES				**SW8321**		Analyst: **JDB**
2,4-D	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
2,4,5-TP	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
Surr: DCAA	132	70 - 130	S	%Rec	50	6/14/2023 4:00:00 PM
FULL TCLP TCLP VOLATILES				**SW8260**	**SW1311M**	Analyst: **EMB**
1,1-Dichloroethene	ND	0.100		mg/L	20	6/15/2023 1:05:00 AM
1,2-Dichloroethane	ND	0.100		mg/L	20	6/15/2023 1:05:00 AM
MEK	ND	2.00		mg/L	20	6/15/2023 1:05:00 AM
Benzene	ND	0.100		mg/L	20	6/15/2023 1:05:00 AM
Carbon tetrachloride	ND	0.100		mg/L	20	6/15/2023 1:05:00 AM
Chlorobenzene	ND	1.00		mg/L	20	6/15/2023 1:05:00 AM
Chloroform	ND	0.100		mg/L	20	6/15/2023 1:05:00 AM
Tetrachloroethene	ND	0.100		mg/L	20	6/15/2023 1:05:00 AM
Trichloroethene	ND	0.100		mg/L	20	6/15/2023 1:05:00 AM
Vinyl chloride	ND	0.0400		mg/L	20	6/15/2023 1:05:00 AM
Surr: 4-Bromofluorobenzene	97.0	70 - 130		%Rec	20	6/15/2023 1:05:00 AM
Surr: Dibromofluoromethane	95.5	70 - 130		%Rec	20	6/15/2023 1:05:00 AM
Surr: Toluene-d8	98.9	70 - 130		%Rec	20	6/15/2023 1:05:00 AM

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
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WO#: **23060707**

Date Reported:

CLIENT: DLZ

Collection Date: 6/8/2023 3:05:00 PM

Project: Duck Creek Restoration

Lab ID: 23060707-012

Matrix: SOLID

Client Sample ID: GP-12

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP **TCLP MERCURY**				**SW7470A**	**SW7470A**	Analyst: **MP**
TCLP Mercury	ND	0.00200		mg/L	1	6/14/2023 9:44:00 AM
FULL TCLP **TCLP METALS**				**SW6010**	**SW3010A**	Analyst: **RJE**
TCLP Arsenic(As)	ND	0.100		mg/L	1	6/14/2023 12:43:00 PM
TCLP Barium(Ba)	ND	1.00		mg/L	1	6/14/2023 12:43:00 PM
TCLP Cadmium(Cd)	ND	0.100		mg/L	1	6/14/2023 12:43:00 PM
TCLP Chromium(Cr)	ND	0.200		mg/L	1	6/14/2023 12:43:00 PM
TCLP Lead(Pb)	ND	0.100		mg/L	1	6/14/2023 12:43:00 PM
TCLP Selenium(Se)	ND	0.100		mg/L	1	6/14/2023 12:43:00 PM
TCLP Silver(Ag)	ND	0.100		mg/L	1	6/14/2023 12:43:00 PM
FULL TCLP **TCLP SEMI-VOLATILES**				**SW8270C**	**SW3510C**	Analyst: **JAP**
1,4-Dichlorobenzene	ND	0.0250		mg/L	1	6/21/2023 3:11:00 PM
2,4,5-Trichlorophenol	ND	0.0250		mg/L	1	6/21/2023 3:11:00 PM
2,4,6-Trichlorophenol	ND	0.0250		mg/L	1	6/21/2023 3:11:00 PM
2,4-Dinitrotoluene	ND	0.00500		mg/L	1	6/21/2023 3:11:00 PM
Cresols, Total	ND	0.0500		mg/L	1	6/21/2023 3:11:00 PM
Hexachloro-1,3-butadiene	ND	0.00500		mg/L	1	6/21/2023 3:11:00 PM
Hexachlorobenzene	ND	0.00500		mg/L	1	6/21/2023 3:11:00 PM
Hexachloroethane	ND	0.0250		mg/L	1	6/21/2023 3:11:00 PM
Nitrobenzene	ND	0.0250		mg/L	1	6/21/2023 3:11:00 PM
Pentachlorophenol	ND	0.0250		mg/L	1	6/21/2023 3:11:00 PM
Pyridine	ND	0.0250		mg/L	1	6/21/2023 3:11:00 PM
Surr: 2-Fluorophenol	76.4	10 - 135		%Rec	1	6/21/2023 3:11:00 PM
Surr: Phenol-d6	66.1	10 - 161		%Rec	1	6/21/2023 3:11:00 PM
Surr: Nitrobenzene-d5	82.8	16.8 - 150		%Rec	1	6/21/2023 3:11:00 PM
Surr: 2,4,6-Tribromophenol	79.5	32.5 - 179		%Rec	1	6/21/2023 3:11:00 PM
Surr: 2-Fluorobiphenyl	79.2	34 - 133		%Rec	1	6/21/2023 3:11:00 PM
Surr: p-Terphenyl-d14	90.1	60.8 - 163		%Rec	1	6/21/2023 3:11:00 PM
FULL TCLP **TCLP PESTICIDES**				**SW8081A**	**SW3510C**	Analyst: **MES**

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
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CLIENT: DLZ
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Project: Duck Creek Restoration
Lab ID: 23060707-012
Matrix: SOLID
Client Sample ID: GP-12

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
FULL TCLP **TCLP PESTICIDES**				**SW8081A**	**SW3510C**	Analyst: **MES**
Chlordane, total	ND	0.0250		mg/L	10	6/15/2023 9:03:00 PM
Toxaphene	ND	0.0500		mg/L	10	6/15/2023 9:03:00 PM
Endrin	ND	0.00500		mg/L	10	6/15/2023 9:03:00 PM
gamma-BHC	ND	0.00500		mg/L	10	6/15/2023 9:03:00 PM
Heptachlor	ND	0.00500		mg/L	10	6/15/2023 9:03:00 PM
Heptachlor epoxide	ND	0.00500		mg/L	10	6/15/2023 9:03:00 PM
Methoxychlor	ND	0.00500		mg/L	10	6/15/2023 9:03:00 PM
Surr: TCMX	93.3	10 - 119		%Rec	10	6/15/2023 9:03:00 PM
Surr: DCB	96.5	10 - 119		%Rec	10	6/15/2023 9:03:00 PM
FULL TCLP **TCLP HERBICIDES**				**SW8321**		Analyst: **JDB**
2,4-D	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
2,4,5-TP	ND	0.500		mg/L	50	6/14/2023 4:00:00 PM
Surr: DCAA	133	70 - 130	S	%Rec	50	6/14/2023 4:00:00 PM
FULL TCLP **TCLP VOLATILES**				**SW8260**	**SW1311M**	Analyst: **EMB**
1,1-Dichloroethene	ND	0.100		mg/L	20	6/15/2023 1:30:00 AM
1,2-Dichloroethane	ND	0.100		mg/L	20	6/15/2023 1:30:00 AM
MEK	ND	2.00		mg/L	20	6/15/2023 1:30:00 AM
Benzene	ND	0.100		mg/L	20	6/15/2023 1:30:00 AM
Carbon tetrachloride	ND	0.100		mg/L	20	6/15/2023 1:30:00 AM
Chlorobenzene	ND	1.00		mg/L	20	6/15/2023 1:30:00 AM
Chloroform	ND	0.100		mg/L	20	6/15/2023 1:30:00 AM
Tetrachloroethene	ND	0.100		mg/L	20	6/15/2023 1:30:00 AM
Trichloroethene	ND	0.100		mg/L	20	6/15/2023 1:30:00 AM
Vinyl chloride	ND	0.0400		mg/L	20	6/15/2023 1:30:00 AM
Surr: 4-Bromofluorobenzene	95.1	70 - 130		%Rec	20	6/15/2023 1:30:00 AM
Surr: Dibromofluoromethane	95.1	70 - 130		%Rec	20	6/15/2023 1:30:00 AM
Surr: Toluene-d8	100	70 - 130		%Rec	20	6/15/2023 1:30:00 AM

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
M	Manual Integration used to determine area response	ND	Not Detected
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W	Sample container temperature is out of limit as specified at testcode		

Original

Title 40 —Protection of Environment
Chapter I —Environmental Protection Agency
Subchapter I —Solid Wastes
Part 261 —Identification and Listing of Hazardous Waste
Subpart C —Characteristics of Hazardous Waste

Authority: 42 U.S.C. 6905, 6912(a), 6921, 6922, 6924(y) and 6938.

Source: 45 FR 33119, May 19, 1980, unless otherwise noted.

§ 261.24 Toxicity characteristic.

(a) A solid waste (except manufactured gas plant waste) exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW–846, as incorporated by reference in § 260.11 of this chapter, the extract from a representative sample of the waste contains any of the contaminants listed in table 1 at the concentration equal to or greater than the respective value given in that table. Where the waste contains less than 0.5 percent filterable solids, the waste itself, after filtering using the methodology outlined in Method 1311, is considered to be the extract for the purpose of this section.

(b) A solid waste that exhibits the characteristic of toxicity has the EPA Hazardous Waste Number specified in Table 1 which corresponds to the toxic contaminant causing it to be hazardous.

TABLE 1 —MAXIMUM CONCENTRATION OF CONTAMINANTS FOR THE TOXICITY CHARACTERISTIC

EPA HW No.[1]	Contaminant	CAS No.[2]	Regulatory Level (mg/L)
D004	Arsenic	7440–38–2	5.0
D005	Barium	7440–39–3	100.0
D018	Benzene	71–43–2	0.5
D006	Cadmium	7440–43–9	1.0
D019	Carbon tetrachloride	56–23–5	0.5
D020	Chlordane	57–74–9	0.03
D021	Chlorobenzene	108–90–7	100.0
D022	Chloroform	67–66–3	6.0
D007	Chromium	7440–47–3	5.0
D023	o-Cresol	95–48–7	[4] 200.0
D024	m-Cresol	108–39–4	[4] 200.0
D025	p-Cresol	106–44–5	[4] 200.0
D026	Cresol		[4] 200.0
D016	2,4-D	94–75–7	10.0
D027	1,4-Dichlorobenzene	106–46–7	7.5
D028	1,2-Dichloroethane	107–06–2	0.5
D029	1,1-Dichloroethylene	75–35–4	0.7
D030	2,4-Dinitrotoluene	121–14–2	[3] 0.13

EPA HW No.[1]	Contaminant	CAS No.[2]	Regulatory Level (mg/L)
D012	Endrin	72–20–8	0.02
D031	Heptachlor (and its epoxide)	76–44–8	0.008
D032	Hexachlorobenzene	118–74–1	[3] 0.13
D033	Hexachlorobutadiene	87–68–3	0.5
D034	Hexachloroethane	67–72–1	3.0
D008	Lead	7439–92–1	5.0
D013	Lindane	58–89–9	0.4
D009	Mercury	7439–97–6	0.2
D014	Methoxychlor	72–43–5	10.0
D035	Methyl ethyl ketone	78–93–3	200.0
D036	Nitrobenzene	98–95–3	2.0
D037	Pentachlorophenol	87–86–5	100.0
D038	Pyridine	110–86–1	[3] 5.0
D010	Selenium	7782–49–2	1.0
D011	Silver	7440–22–4	5.0
D039	Tetrachloroethylene	127–18–4	0.7
D015	Toxaphene	8001–35–2	0.5
D040	Trichloroethylene	79–01–6	0.5
D041	2,4,5-Trichlorophenol	95–95–4	400.0
D042	2,4,6-Trichlorophenol	88–06–2	2.0
D017	2,4,5-TP (Silvex)	93–72–1	1.0
D043	Vinyl chloride	75–01–4	0.2

[1] Hazardous waste number.

[2] Chemical abstracts service number.

[3] Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level.

[4] If o-, m-, and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 mg/l.

[55 FR 11862, Mar. 29, 1990, as amended at 55 FR 22684, June 1, 1990; 55 FR 26987, June 29, 1990; 58 FR 46049, Aug. 31, 1993; 67 FR 11254, Mar. 13, 2002; 71 FR 40259, July 14, 2006]

APPENDIX III

General Earthwork

GENERAL EARTHWORK RECOMMENDATIONS

Earthwork is most efficiently accomplished using large, heavy duty equipment, unimpeded by obstacles. Consequently, it is preferable to complete as much of this work as possible before initiating other phases of construction, such as footing excavation and installation of underground utilities. Backfill will be required around the proposed structures. The following is recommended concerning earthwork construction.

1. Stripping, clearing, and grubbing.

In all areas where fill is to be placed to support structures, drives, parking areas or other pavements, the following is proposed:

Strip and remove all sod, topsoil, and other organic soils

Remove all trees and shrubs, designated to be cleared, including grubbing of roots of larger trees.

Remove all trash, debris, rubble, existing random fill, soil softened by standing water and any other soft soil as determined necessary by the geotechnical engineer. The fill placement should begin on firm, relatively unyielding foundation material.

The fill foundation should be stripped and cleared beyond the limits of the structure by a distance not less than the thickness of the fill below the structure foundation plus 10 feet. For drives, parking areas or other paved areas, the fill foundation should be stripped and cleared for a distance of at least 5 feet beyond the limits of the pavement.

2. Fill Material - Composition

Material satisfactory for use as fill includes clayey silt and silty clay soils or sand and gravel, free of topsoil, organic or other decomposable matter, rocks having a major dimension greater than 6 inches, or frozen soil.

Soils having a maximum dry density of less than 90 pounds per cubic foot as established by ASTM procedure D 698 (Standard Proctor) are not considered suitable for use as fill.

Soil described as SILT (USCS ML or ODOT A-4b) is considered questionably suitable for use as fill material because the stability of this material is very sensitive to increases in moisture. This soil should not be placed within three feet of the top of the subgrade.

For lawn areas, landscaping areas and screening mounds not supporting any construction, topsoil or waste clean soil from site grading may be used.

3. Fill Material - Moisture

Predominantly fine-grained fill materials, clayey silts and silty clays, are recommended to contain moisture not exceeding two percent above optimum moisture as established by ASTM procedure D 698, or less if found to be needed to obtain stability beneath the compaction equipment. This provides the best assurance of establishing not only adequate density for ultimate support of construction; but, also provides stability of the compacted soil under the dynamic loading induced by the heavy weight construction equipment during placement.

Predominantly sand and gravel fill material is not as sensitive to moisture content with regard to stability. Therefore, we recommend no specified limitation, as long as specified density and stability can be established.

4. Moisture Adjustment

If the moisture content of the material from the fill source is not appropriate to establish density, moisture adjustment of the fill will be required.

If the moisture content of the fill being placed is too high, appropriate adjustment entails spreading and exposing to the sun and wind for drying and using equipment such as a disc and/or a grader.

If the moisture content of the fill is too low, a water truck with a sprinkler bar may be required. After sprinkling, the soil should be thoroughly mixed with a disc and/or a grader.

5. Equipment

Fill should be compacted with heavy-duty equipment. For example:

Fine-grained subgrade and silty clays may be efficiently compacted using a sheepsfoot roller comparable to a Caterpillar 815 self-propelled roller.

Coarse-grained fill (sand and gravels) having little or no silt and clay sizes, may be efficiently compacted using a heavy, self-propelled, vibratory smooth wheel roller.

Coarse-grained fill having about 10% or more silt and clay sizes may be efficiently compacted using a sheepsfoot roller comparable to a Caterpillar 815 self-propelled roller.

6. Lift Thickness

Fill should be placed in horizontal layers, 8-inch loose thickness, and compacted uniformly to approximately 6-inch thickness.

If equipment is used which is lighter weight than recommended above, lift thickness should be appropriately thinner.

7. Fill Density

In areas to support pavements and building construction, the fill should be compacted to the density requirements as recommended.

8. Season of Earthwork

Weather conditions are very important to efficiency in working soils. Generally, earthwork is accomplished most efficiently between May and November. Cold periods may hamper moisture adjustment. If the temperature is below freezing for prolonged periods, frozen material on the fill surface must be removed before subsequent lifts may be placed. In addition, densification of fill is more difficult when air temperatures are below freezing. Granular material, such as bank run sand and gravel, is somewhat less sensitive to weather conditions but is not immune from difficulties that may be presented by precipitation and low temperatures.

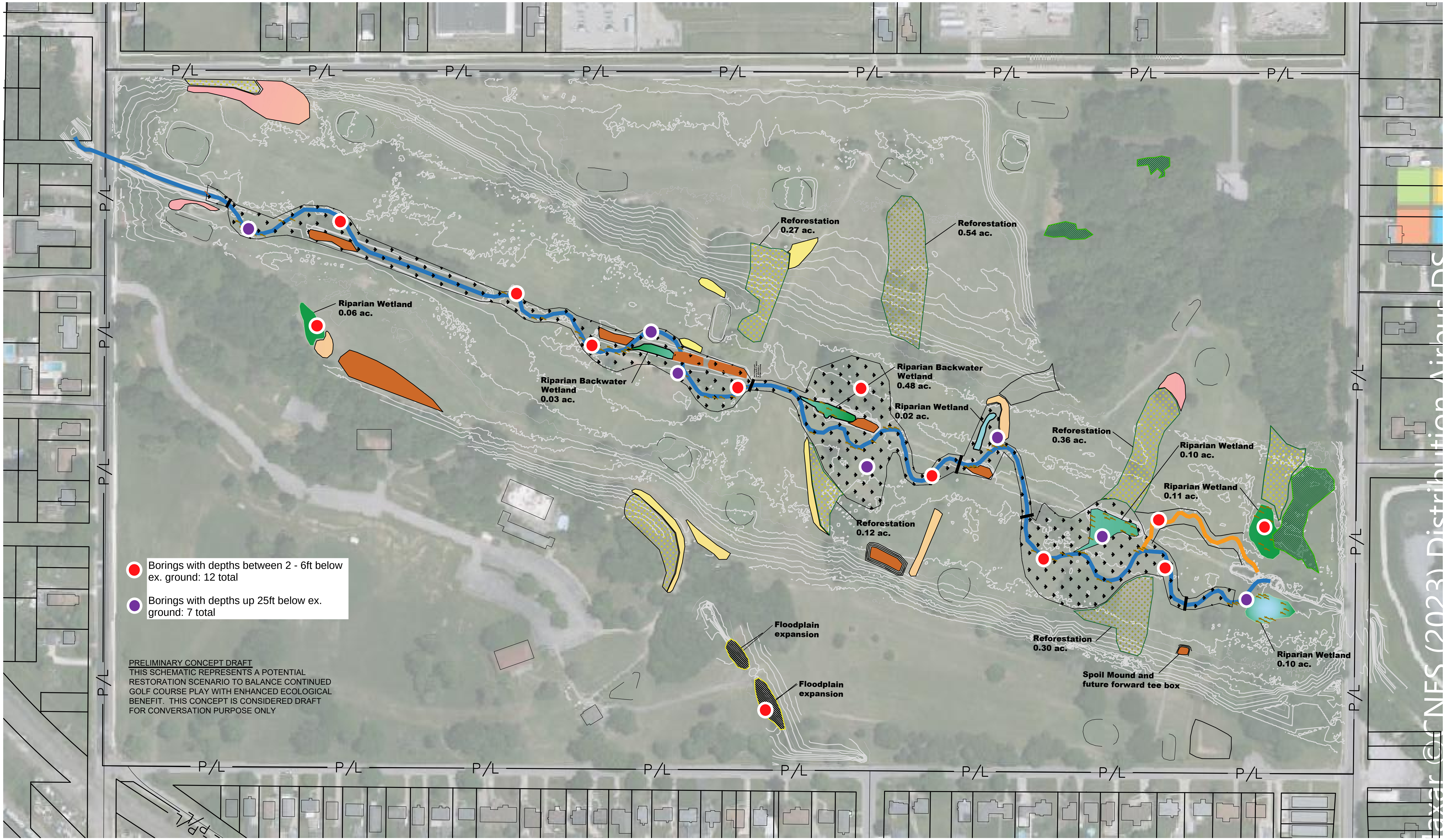
9. Trench Backfill

Trench backfill should be controlled, compacted fill placed in accordance with recommendations presented above.

It is recommended that suitable granular material be used to backfill trenches that traverse beneath buildings, drives or parking areas.

10. General

All fill should be placed and compacted under continuous observation and testing by a soils technician under the general guidance of the geotechnical engineer.



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SHEET: 3 / 3

CONCEPTUAL PLAN - ALTERNATIVE 3
COLLINS PARK FEASIBILITY STUDY
CITY OF TOLEDO

DRAWN BY: JB
CHECKED BY: AH
DATE: MAY 2023
VERT. SCALE: NA
HORIZ. SCALE: 1" = 200'

P:\10_PROJECTS\T\TOLEDO_CITY_OF\430R\17005_COLLINS PARK STREAM RESTORATION FEASIBILITY PROJECT\RESTORATION DESIGN\PRELIMINARY_DESIGN\SHEETS\FIGURE.DWG -- FIG ALT 3 --11X17 -- 5/17/2023 3:30:18 PM -- THAD GREGORY

Appendix B

WETLAND AND OTHER WATERS DELINEATION REPORT

For Collins Park Stream Restoration Feasibility Study
City of Toledo, Lucas County, Ohio

Prepared for: City of Toledo
Department of Public Utilities
Division of Environmental Services
One Government Center
640 Jackson Center
Toledo, Ohio 43604

Project No.: 17005
Date: November 13, 2023

Prepared by:

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Collins Park Stream Restoration Feasibility Study

Document Date: 11/13/2023

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Toledo, Ohio 43604

Authorization for Release

The analyses, opinions, and conclusions in this document are based entirely on EnviroScience's unbiased, professional judgment. EnviroScience's compensation is not in any way contingent on any action or event resulting from this study. Neither EnviroScience nor any EnviroScience employee has any vested interest in the property examined in this study.

The undersigned attest, to the best of their knowledge, that this document and the information contained herein is accurate and conforms to EnviroScience's internal Quality Assurance standards.

Luke Wilson
Environmental Biologist

Carolyn Krause
Biologist

Elise Bartelme
Wetland Biologist / Technical Reviewer

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EXECUTIVE SUMMARY

EnviroScience, Inc. performed a delineation of wetlands and other waters on April 18, 2023, at the Collins Park Stream Restoration Feasibility Study site. The project area includes the Collins Park Golf Course totaling approximately 91.467 acres and is located at 624 Reineck Drive in the City of Toledo, Lucas County, Ohio. The approximate center coordinates for the project area are 41.662242°N -83.482361°W. The maps provided in Appendix A depict the project area. Representative photographs are included in Appendix B.

The project area is primarily located within the existing Collins Park Golf Course. Five distinct vegetative communities were identified within the project area, including three wetland communities. The surrounding properties consist of forested, agricultural, and rural residential land uses.

Four wetlands were identified within the project area and account for approximately 0.396 acres of wetland onsite. The onsite wetlands are comprised of palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forested (PFO)vegetative communities. One perennial stream, Duck Creek, and one intermittent stream were identified within the project area accounting for 2,527 linear feet (1.255 acres) of waterway. One open water feature was identified and accounts for 0.149 acres of additional waterway.

Wetlands and other waterbodies are under the jurisdiction of the Ohio Environmental Protection Agency (OEPA) or the U.S. Army Corps of Engineers (USACE). No filling may occur in these areas without their written permission. If impacts to onsite water resources are proposed, coordination with USACE and OEPA may be required, and permits issued under the 2021 and 2022 Nationwide Permits (NWP) program, or a 401 Water Quality Certification may be necessary. Please contact the OEPA Division of Surface Water at (614) 644-2001 or the Buffalo District USACE at (716) 879-4330 before working in these areas. However, if all onsite water resources are avoided, a USACE NWP or OEPA Water Quality Certification would not be required for this project.

1.0 INTRODUCTION AND DESCRIPTION

EnviroScience, Inc. performed a delineation of wetlands and other waters on April 18, 2023, at the Collins Park Stream Restoration Feasibility Study site. The project area includes the Collins Park Golf Course totaling approximately 91.467 acres and is located at 624 Reineck Drive in the City of Toledo, Lucas County, Ohio. The approximate center coordinates for the project area are 41.662242°N -83.482361°W. The maps provided in Appendix A depict the project area. Representative photographs are included in Appendix B.

The project area is located east of Reineck Drive within the Collins Park Golf Course. Five distinct vegetative communities were identified within the project area, including three wetland communities. The surrounding properties consist of urban residential, commercial, industrial, and recreational land uses. Four wetlands were identified within the project area and account for approximately 0.396 acres. One perennial stream, Duck Creek, and one intermittent stream were identified within the project area accounting for 2,527 linear feet (1.255 acres) of waterway. One open water feature was identified and accounts for 0.149 acres of additional waterway.

All aquatic resources are within the Lower Maumee and Cedar-Portage River watersheds (Hydrologic Unit Codes [HUC]: 04100009 and 04100010), which drain approximately 1,080 and 969 square miles in northwesternn Ohio, respectively. It is within the Huron/Erie Lake Plains ecoregion (Woods et al., 1998) of Ohio. The project area is located within the area covered by the Northcentral-Northeast Supplement (USACE, 2012) and associated plant list (USACE, 2020). The project area is regulated by the USACE Buffalo District.

2.0 METHODS

Government agencies regulate coastal and inland waters for commerce, flood control, and water quality. These water bodies provide numerous functions and values necessary to protect and sustain our quality of life. Wetlands comprise a significant portion of regulated waters. USACE and U.S. Environmental Protection Agency (USEPA) jointly define wetlands as:

> "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

The remaining deep water aquatic habitats (open waters) are defined by the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) as:

> ". . . areas that are permanently inundated at mean annual water depths >6.6 ft or permanently inundated areas <6.6 ft in depth that do not support rooted emergent or woody plant species."

The methods used for determining and delineating wetlands and open waters strictly adhere to those found in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region* (USACE, 2012). Wetlands and open water boundaries were determined by the disappearance of one or more of their diagnostic characteristics.

Ordinary high-water marks (OHWM) defined the outermost regulatory boundaries of ephemeral and open waters.

Each sample plot and the perimeter of each wetland and other water was surveyed and marked in the field with plain pink flags and pink "wetland boundary" flags, respectively. A global positioning system (GPS) unit with submeter accuracy was used, in conjunction with aerial photography and topographic maps, for the survey. Computer-Aided Design (CAD) software was used to determine wetland dimensions, and Geographic Information Systems (

2.1 WETLANDS

2.1.1 Determination

A review of secondary literature sources was performed to find known wetlands and other significant ecological resources and areas with high potential for wetlands in or near the proposed project area. Resources included the following:

1. U.S. Geological Survey (USGS) topographic maps
2. National Wetlands Inventory (NWI) maps
3. Web Soil Survey
4. Aerial Photographs
5. Federal Emergency Management Agency Flood Insurance Rate Maps

A field inspection of the project area was then completed to identify major plant communities and to locate potential wetlands visually. The routine, onsite (Level 2) wetland determination was used to perform the delineation. Wetland communities were classified according to the classification scheme of Cowardin et al. (1979) (Table 2.1). Mature nonwetland communities that had reached a stable equilibrium were classified according to Anderson (1982) and Gordon (1966, 1969). Disturbed and successional nonwetland communities were classified as one of the categories described in Table 2.2.

Table 2.1 Wetland Communities (Cowardin et al. 1979)

Community	Description
PEM	Palustrine Emergent
PSS	Palustrine Scrub-Shrub
PFO	Palustrine Forested
POW	Palustrine Open Water

Table 2.2 Disturbed and Successional Nonwetland Communities

Community		Description
Disturbed	Urban/ Maintained	Regularly maintained land; residential; industrial
	Agricultural	Land used for producing crops or raising livestock; cropland; pastureland
	Cleared	Disturbed areas devoid of most vegetation from recent clearing, grading, or filling
S u	Open Field	Herbaceous community without woody vegetation

	Old Field	Herbaceous community having woody vegetation coverage of <50%
	Scrub-Shrub	Community dominated by woody vegetation <6 m (20 ft) tall
	Forest	Community dominated by woody vegetation >6 m (20 ft) tall

Sample plots were established within each natural community and potential wetland within the project area. Complete data for each sample plot were collected and recorded on the USACE Routine Wetland Determination Data Forms contained in the applicable USACE Regional Supplement (USACE, 2012). Vegetation, hydrology, and soils were evaluated at each sample plot; sample plot data forms are included in Appendix C.

2.1.1.1 Vegetation

Four plant strata were evaluated within specific radii of the plot center to detect the presence or absence of hydrophytic vegetation. Each stratum was ranked by aerial cover in descending order of abundance. Table 2.3 provides information on each vegetative stratum.

Table 2.3 Vegetative Strata

Stratum	Definition	Survey Area
Tree	Woody plants > or equal to 3 in. (7.6 cm) diameter at breast height (dbh), regardless of height	30 ft (9.1 m) radius
Sapling/shrub	Woody plants <3 in. (7.6 cm) dbh and ≥3.28 ft (1 m) tall	15 ft (4.6 m) radius
Herbaceous	Herbs and woody plants less than 3.28 ft (1 m) in height	5 ft (1.5 m) radius
Woody vines	Woody vines >3.28 ft (1 m) in height	30 ft (9.1 m) radius

Percent dominance was obtained for each species and within each stratum. Dominant species are those that, cumulatively totaled in order of abundance, immediately exceed 50% and include any individual species with an abundance of 20% or more (USACE, 2012). Dominant taxa were identified using recognized local guides: nomenclature follows the *National List of Scientific Plant Names* (USDA, 1982). Following the identification of each plant species present within the plot, all dominant species within each stratum were assigned a wetland indicator status, according to Lichvar (2020). Indicators are summarized in Table 2.4.

Table 2.4 Plant Indicators

Indicator	Category	Definition
OBL	Obligate Wetland	Almost exclusively (>99% of occurrences) found in wetlands
FACW	Facultative Wetland	Most likely found in wetlands (67-99% of occurrences)
FAC	Facultative	Equally likely found in wetlands or nonwetlands (34-66%)
FACU	Facultative Upland	Most likely found in nonwetlands (1-33% occurrence in wetlands)
UPL	Obligate Upland	Almost exclusively found in nonwetlands (<1% occurrence in wetlands)

An “NL” (no listing) designation is given to species whose identification was not determined sufficiently enough to assign an indicator. Once the indicator status is assigned to each dominant species, the evaluator can perform the percent dominance test according to the protocol outlined within the applicable Regional Supplement (USACE, 2012) to determine if the plot meets the criterion for hydrophytic vegetation.

2.1.1.2 Hydrology

Surface and subsurface hydrologic indicators were evaluated at the sample plot and throughout the adjacent community to detect the presence or absence of wetland hydrology. Primary sources of wetland hydrology include direct precipitation, headwater flooding, backwater flooding, groundwater, or any combination of these. When obtaining data at each sample plot, the evaluator observes evidence of hydrology. Primary indicators of hydrology (only one of these is necessary to indicate sufficient wetland hydrology) include the presence of surface water, watermarks, sediment deposits, drift deposits, etc. (USACE, 2012). Secondary indicators of hydrology (which require two or more at each sample plot) include surface soil cracks, drainage patterns, crayfish burrows, etc. (USACE, 2012).

2.1.1.3 Soils

The upper horizons of the soil at each sample plot were examined to detect the presence or absence of hydric soils indicators. Current USACE guidance requires the evaluator to assess the upper twenty inches of soil for hydric soil characteristics. Most indicators of hydric soils require an assessment of soil matrix color and mottle characteristics (Environmental Laboratory, 1987; USACE, 2012) for each horizon. These characteristics were determined by comparing a moist sample with the *Munsell Soil Color Chart* (Munsell Color, 2009) or *The Globe Soil Color Book* (Visual Color Systems, 2004).

2.1.2 Cowardin Wetland Classification

The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory uses the *Classification of Wetlands and Deepwater Habitats of the United States* to classify wetland habitat types (Cowardin et al., 1979). This classification system is hierarchical and defines five major systems: Marine, Estuarine, Riverine, Lacustrine, and Palustrine. The Palustrine system was the only type of wetland system identified within the project area and is defined as including all nontidal wetlands dominated by trees, shrubs, persistent emergent, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean driven-derived salts is below 0.5 percent (Cowardin et al., 1979).

2.1.3 ORAM Categorization

Each wetland system was categorized following version 5.0 of the OEPA's Ohio Rapid Assessment Method for Wetlands (ORAM) (Mack, 2000, 2001). Field scoring forms are contained in Appendix D.

OEPA has established three primary and three intermediate categories of wetland quality that are based on a wetland's size, its hydrologic function, the types of plant communities present, the physical structure of the wetland plant community, and the wetland's level of disturbance (OAC 3745-1-54). The relationship between the various wetland categories and their respective ORAM scores is presented in Table 2.5. EnviroScience also evaluated the project area for the presence of state threatened and endangered species as part of the ORAM evaluation.

Category 3 wetlands have the highest quality and are generally characterized by a high level of biological diversity and topographical variation, large numbers of native species, or a high level of functional importance to its surroundings. Category 2 wetlands can support a moderate wildlife community or maintain mid-level hydrological functions. Category 2 also includes wetlands that may be of lower quality or degraded but have reasonable potential to be restored (Modified Category 2). Category 1 wetlands are of the lowest quality. They are generally characterized by hydrological isolation, lack of plant species diversity, insufficient habitat availability, and limited potential to perform major wetland functions (OAC 3745-1-54).

Table 2.5 ORAM Scores and Categories

ORAM Score	ORAM Category	Description
0-29.9	Category 1	The lowest quality, generally characterized by hydrological isolation, lack of plant species diversity, insufficient habitat availability, and limited potential to perform major wetland functions.
30-34.9	Category 1 or 2 (Gray Zone)	ORAM score is insufficient to categorize wetlands. In the absence of a nonrapid method such as VIBI, assign the wetland to the higher functional category (Category 2).
35-44.9	Modified Category 2	Category 2 wetlands that may be of lower quality or degraded but have reasonable potential to be restored.
45-59.9	Category 2	Wetlands that can support a moderate wildlife community or maintain mid-level hydrological functions.
60-64.9	Category 2 or 3 (Gray Zone)	ORAM score is insufficient to categorize wetlands. In the absence of a nonrapid method such as VIBI, assign the wetland to the higher functional category (Category 3).
65-100	Category 3	Highest quality, generally characterized by a high level of biological diversity and topographical variation, threatened or endangered species, large numbers of native species, or a high level of functional importance to its surroundings.

Since the ORAM is a rapid assessment method, certain wetland scores fail to differentiate the wetland's functional category clearly. The so-called "gray zone" wetlands fall between the definite scoring breaks between the categories. OEPA requires that "gray zone" wetlands be considered as the higher category unless more detailed functional assessments such as the VIBI or AmphIBI are conducted on those wetlands. As a result of this requirement, wetlands whose scores fall between the breakpoints for Categories 1 and 2 wetlands (1 or 2 gray zone wetlands) will be considered as Category 2 wetlands for purposes of this report. Wetlands whose scores fall between the breakpoints for Categories 2 and 3 wetlands (2 or 3 gray zone wetlands) will be considered a Category 3 wetland for purposes of this report.

2.2 OTHER WATERS

Other waters include ephemeral and open waters. These waters are broken down into two categories: 1) ponds and lakes; and 2) streams and rivers.

2.2.1 Ponds and Lakes

Palustrine systems other than wetlands, and lacustrine waters are addressed as ponds and lakes, respectively. These non-linear open waters may harbor important aquatic communities such as vegetated shallows (aquatic bed) and mudflats. They are classified according to Cowardin et al. (1979).

2.2.2 Streams and Rivers

Riverine systems are linear, flowing waters bounded by a channel. Cowardin et al. (1979) divides these systems into four groups; however, for this report, streams are placed into one of the three regulatory types listed below.

Ephemeral: An ephemeral stream only conveys runoff precipitation and meltwater. It is permanently located above the water table and is most often dry.

Intermittent: An intermittent stream is located below the water table for parts of the year but does have dry periods.

Perennial: A perennial stream typically has flowing water throughout the entire year.

In addition to flow characteristics, USACE has defined other regulatory categories that apply to streams, which are listed below (USACE and USEPA, 2007).

Traditional Navigable Waters (TNW): All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide.

Relatively Permanent Waters (RPW): Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months).

Non-Relatively Permanent Waters (Non-RPW): Non-navigable tributaries of traditional navigable waters that are not relatively permanent where the tributaries typically do not have continuous flow at least seasonally (e.g., typically three months).

USACE and USEPA will assert jurisdiction under the Clean Water Act on TNWs and all wetlands adjacent to them, non-navigable tributaries of TNWs that are RPW, and wetlands that directly abut such tributaries. In addition, the agencies will assert jurisdiction over every water body that is not an RPW if that water body is determined (based on a fact-specific analysis) to have a significant nexus with a TNW.

"A significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or an insubstantial effect on the chemical, physical, and/or biological, integrity of a TNW. Principal considerations when evaluating significant nexus include the volume, duration, and frequency of the flow of water in the tributary and the proximity of the tributary to a TNW, plus the hydrologic, ecologic, and other functions performed by the tributary and all of its adjacent wetlands

2.2.3 HHEI and QHEI

Data collection for all streams included the completion of either the OEPA Headwater Habitat Evaluation Index (HHEI) for primary headwater habitat (PHWH) streams or the Qualitative Habitat Evaluation Index (QHEI) for larger streams. Biologists are OEPA trained to assess streams using the QHEI and HHEI. Following the OEPA guidance, any stream with a drainage area of less than or equal to 1.0 mi^2 (2.589 km^2) and pools with a maximum water depth less than or equal to 15.75 in. (40 cm) were evaluated using the HHEI (OEPA, 2020). The QHEI was used to evaluate streams with drainage areas greater than 1.0 mi^2 and pools with maximum water depths greater than 15.75 in. (40 cm). The assessment location is representative of the stream/headwater within the project area. Stream forms are included in Appendix E.

3.0 LITERATURE REVIEW

The following sections detail background information on the project area and contain a further explanation of the various maps located in Appendix A.

3.1 USGS TOPOGRAPHIC MAP

The USGS 7.5-minute topographic series map of the site (Oregon Quadrangle) is shown in Figure 2 (Appendix A). The project area is depicted within Collins Park. The landscape is depicted as mostly flat along the eastern and western boundaries, with either side of the project area gently sloping towards the middle toward a channelized perennial stream. This stream corresponds to Duck Creek onsite. A sludge pit is located adjacent to Duck Creek at the southern edge of the project area and corresponds to open water feature OW-1 onsite. The onsite elevation is approximately 575 feet above mean sea level (AMSL) to 595 AMSL.

3.2 NWI MAP

The National Wetlands Inventory (NWI) map (Oregon Quadrangle) of the project area is shown in Figure 3 (Appendix A). One permanently flooded unknown riverine system with unconsolidated bottom (R5UBH) flows southwest through the project area. This stream corresponds to Duck Creek. One excavated limnetic lacustrine system with an unconsolidated bottom (L1UB1Hx) is depicted in the southern end of the project area. This corresponds to open water feature OW-1 onsite.

3.3 COUNTY SOIL SURVEY

The project area is found on the *Soil Survey of Lucas County, Ohio,* and was accessed on the Soil Survey Geographic (SSURGO) Database (USDA Web Soil Survey, 2023) (Appendix A, Figure 4). Seven soil types were identified within the project area. Approximately 1.152 acres of water (W) is depicted. This corresponds to Open Water OW-1 onsite. The onsite soils are summarized in Table 3.1 below.

Table 3.1 Soil Types Mapped within the Project Area

Symbol	Soil Name	Status	Common Landform*	Percent Hydric	Acres in Project Area	Percent Within Project Area
DdA	Del Rey loam, 0 to 3 percent slopes	Non-hydric with hydric inclusions	till plains	7	3.914	4.3
FuA	Fulton silt clay loam, 0 to 2 percent slopes	Non-hydric with hydric inclusions	depressions, drainageways	6	27.917	30.5
FuB	Fulton silty clay loam, 2 to 6 percent slopes	Not hydric with hydric inclusions	ND	10	0.473	0.5
FwA	Fulton-Urban land complex, 0 to 3 percent slopes	Non-hydric with hydric inclusions	ND	10	3.687	4.0
SuC2	St. Clair silty clay loam, 4 to 12 percent slopes, eroded	Not hydric	ground moraines, end	0	29.057	31.8

Symbol	Soil Name	Status	Common Landform*	Percent Hydric	Acres in Project Area	Percent Within Project Area
			moraines, lake plains			
To	Toledo silty clay, 0 to 1 percent slopes	Predominantly hydric	rises on lakebeds (relict) on lake plains	93	12.967	14.2
Uo	Udorthents, loamy	Not hydric	ND	0	12.300	13.4

*ND = No Data.

3.4 AERIAL PHOTOGRAPHY

A recent aerial photograph of the project area is shown in Figure 5 (Appendix A). The project area is located within a rural residential and commercial setting. The project area is within the existing Collins Park bound by York Street to the north, Collins Park Avenue to the East, Consaul Street to the South and Reineck Drive to the west. The central portion of the project area is depicted as an open golf course with patches of trees throughout the project area. The clubhouse and other maintenance bays for the golf course are located within the central portion of the park along with associated paved and gravel trails throughout the site. A perennial stream flows onsite from the northeast corner of the project area and flows to the southwestern corner. This stream corresponds to Duck Creek. A larger tract of forest is located in the southeastern corner of the project area. North of Consul Street in the southern end of the project area open field with areas of saturation is visible on either side of duck Creek. A small portion of the project area crosses Consaul Street at the southern end. An open water feature, corresponding to Open Water OW-1 onsite, is located southeast of Duck Creek.

3.5 FEMA FLOOD INSURANCE RATE MAP

The Federal Emergency Management Agency (FEMA) produces Flood Insurance Rate Maps (FIRMs), which show the locations of predictable floodplain during precipitation flood events. The 100-year floodplain of Duck Creek is depicted within the project area. (Figure 6; Appendix A).

3.6 OHIO HISTORIC PRESERVATION OFFICE REVIEW

On December 15, 2022, EnviroScience performed an Ohio Historic Preservation Office (OHPO) Literature Review of historical properties for the assessment area (Appendix G). The area searched included the site and adjacent parcels. The literature review included a search for records of Ohio Genealogical Society (OGS) Cemeteries, National Register Listed Properties, National Register Listed Districts, Ohio Archaeological Inventory Properties, Ohio Historic Inventory Properties, Determinations of Eligibility, and Phase 1, 2, or 3 Survey Areas. A total of forty features were identified within or adjacent to the assessment area. These include one Ohio Archaeological Inventory Site and its boundary, thirty-five Ohio Historical Inventory Properties, one National Register Determination of Eligibility, two Phase I Surveyed Areas, and one National Register Listed District.

3.7 U.S. FISH AND WILDLIFE SERVICE

On May 9, 2023, EnviroScience performed an Information for Planning and Consultation (IPaC) search for federally listed species for the project area (Appendix G). These species are the federally endangered Indiana bat (*Myotis sodalis*), the proposed federally endangered tricolored bat (*Perimyotis subflavus*), the federally endangered piping plover (*Charadrius melodus*), the federally threatened rufa red knot (*Calidris canutus rufa*), the federally endangered karner blue butterfly (*Lycaeides melissa samuelis*), the candidate species monarch butterfly (*Danaus plexippus*) and the eastern prairie fringed orchid (*Platanthera leucophaea*). Habitat for the bald eagle (*Haliaeetus leucocephalus*) was also reviewed due to its protection under the Bald and Golden Eagle Protection Act.

Living or dead trees three inches diameter at breast height (dbh) or greater with shedding or peeling bark or cavities may serve as roosting trees for the Indiana bat. Tricolored bats also roost in trees, although they primarily utilize clusters of leaves of live or recently dead deciduous hardwood trees. In addition, man-made structures such as sheds and barns may serve as roosting habitat for the tricolored bat. Tricolored bats are proposed for listing as federally endangered, although that process is not complete as of the date of this report. No sheds, barns or potential roosting habitat trees were identified within the assessment area. If this project has federal ties (including impacts to onsite wetlands), coordination with USFWS is required prior to tree clearing. If trees must be cleared, USFWS will likely require that this be completed between October 1st and March 31st.

The piping plover and rufa red knot both utilize coastal beaches and shorelines along Lake Erie including sand, gravel, and cobble beaches and mudflats. No habitat for the piping plover or red knot was identified within the study area.

Karner blue butterflies can be found within open pine and oak savannas that support wild lupine and other nectar producing plants. Habitat for the Karner blue butterfly was not identified within the project area.

Monarch butterflies require milkweed host plants for reproduction. Milkweed was observed in open habitats within the assessment area. However, consultation with USFWS is not required for candidate species.

Habitat for eastern prairie fringed orchid consists of wet prairies and meadows. No habitat for the eastern prairie fringed orchid exists on the site.

The bald eagle prefers open bodies of water with an abundance of fish and requires mature stands of trees for roosting and nesting. No bald eagles or their nests were observed in the assessment area.

3.8 OHIO NATURAL HERITAGE DATABASE

Information regarding state listed species was requested from the ODNR Natural Heritage Database (NHD). The ODNR issued site-specific comments on June 16, 2023 (Appendix H). The NHD indicated the following rare species records were identified within a one-mile radius of the assessment area:

- American eel (*Anguilla rostrata*), state threatened
- Blanding’s turtle (*Emydoidea blandingii*), state threatened

The ODNR indicated that "we do not give out specific location data for the Blanding's Turtle, due to the sensitivity of that information, so it is not shown on the map. However, it is not recorded within the specified boundaries of your project area."

Additionally, ODNR indicated that, "Our inventory program has not completely surveyed Ohio and relies on information supplied by many individuals and organizations. Therefore, a lack of records for any particular area is not a statement that rare species or unique features are absent from that area."

4.0 RESULTS

Seven sample plots were established within five vegetative communities. Three of these communities are considered wetland. Table 4.1 summarizes the sample plot data.

Table 4.1 Sample Plot Results

Sample Plot	Photo*	Community**	Hydrophytic Vegetation	Wetlands Hydrology	Hydric Soil	Status	Location
1	1	PEM	X	X	X	Wetland	W-1
2	2	Forest				Non-wetland	SP-2
3	3	Open Field				Non-wetland	SP-3
4	4	PEM	X	X		Wetland	W-2
5	5	PSS	X	X	X	Wetland	W5
6	6	Forest				Non-wetland	SP-6
7	7	PFO	X	X	X	Wetland	W4

*Photos are located in Appendix B.
**PEM = Palustrine Emergent, PSS = Palustrine Scrub-Shrub, PFO = Palustrine Forested.

Each sample plot, delineated wetland, and other waters are illustrated in Figure 5 (Appendix A). The following section describes general conditions found within each plant community and summarizes information from the data forms, located in Appendix C. Representative photographs are included in Appendix B.

4.1 NON-WETLANDS

Two upland vegetative communities, open field and forest, are located within the project area. Dominant species in this community are discussed below, and complete vegetative data is included in the Sample Plot Forms provided in Appendix C.

The open field community is represented by Sample Plot 3. The herbaceous stratum is dominated by tall false rye grass *(Schedonorus arundinaceus*, FACU). No evidence of hydric soils or wetland hydrology was observed within this community.

The forest community is represented by Sample Plots 2 and 6. The dominant species in the tree stratum includes black walnut (*Juglans nigra,* FACU), red oak (*Quercus rubra,* FACU), and American basswood (*Tilia americana*, FACU) with lesser amounts of slippery elm (*Ulmus rubra*, FAC). The shrub stratum was dominated by white ash (*Fraxinus americana,* FACU) and Amur honeysuckle (*Lonicera maackii*, UPL) with lesser amounts of an unknown raspberry species (*Rubus* sp.) and coral berry (*Symphoricampos orbiculatus,* FACU). The herbaceous stratum was dominated by an unknown sedge (*Carex* sp.) and white avens (*Geum canadense*, FAC) with lesser amounts of beggars-lice (*Hackelia virginiana,* FACU), greater burdock (*Arctium lappa*, UPL), and an unknown bedstraw species (*Galium* sp.). The woody vine stratum was dominated by eastern poison ivy (*Toxicodendron radicans*, FAC). No evidence of hydric soils or wetland hydrology was observed within this community.

4.2 WETLANDS

Four wetlands were identified and delineated within the project area. The onsite portions of these wetlands consist of palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forested (PFO) vegetative communities. These wetlands were categorized using the ORAM v.5.0 scoring method and using the methods described in Section 2.1.2, above. The scoring forms are included in Appendix D. Wetland results are given in Table 4.2 and are briefly described in the following section. Wetland size has been determined for the portions of the wetlands within the project area. These wetlands are depicted in Figure 5 (Appendix A). Representative photographs are included in Appendix B.

Table 4.2 Wetland Results within the Project Area

Wetland	Photo*	Cowardin Class**	ORAM Score	ORAM Category	Size Within Project Area (acres)
W-1	8-11	PEM	27	Category 1	0.007
W-2	12-15	PEM	24.5	Category 1	0.294
W-3	16-19	PSS	27	Category 1	0.056
W-4	20	PFO	28	Category 1	0.039
Total Wetlands					**0.396**

*Photos are located in Appendix B.
PEM = Palustrine Emergent, PSS = Palustrine Scrub-Shrub, PFO = Palustrine Forested.
***Site map located in Appendix A, Figure 5.

Wetland W-1 is a depressional wetland within a stormwater retention basin comprised of PEM vegetation and is represented by Sample Plot 1. The herbaceous stratum was dominated by floating manna grass (*Glyceria septentrionalis*, OBL) and rough barnyard grass (*Echinochloa muricata,* OBL) with lesser amounts of purple loosestrife (*Lythrum salicaria*, OBL), spotted touch-me-not (*Impatiens capensis,* FACW), and pale-yellow iris (*Iris pseudacorus,* OBL). The dominant species within the sapling/shrub stratum was black willow (*Salix nigra,* OBL). Vegetation was absent within the tree and woody vine strata. Wetland W-1 assessed within the range of a Category 1 wetland using the ORAM. This wetland is very small and exhibits medium upland buffer widths and has moderately high intensity of surrounding land use. It has seasonal/intermittent surface water input from a stormwater drainage system. This wetland has poor to fair habitat development and is recovering from modifications to the natural hydrologic regime. Wetland W-1 has evidence of substrate disturbance and habitat alteration. Additionally, this wetland has a sparse coverage of invasive plants.

Wetland W-2 is a depressional wetland at the southern end of the golf course on the east side of Duck Creek. Wetland W-2 is composed of a PEM vegetative community and is represented by Sample Plot 4. The herbaceous stratum of Wetland W-2 was dominated by common reed (*Phragmites australis*, FACW), with lesser amounts of rice cutgrass (*Leersia oryzoides,* OBL) and purple-leaf willowherb (*Epilobium coloratum*, OBL). The woody vine layer was dominated by an unknown grape species (*Vitis* sp.). Vegetation was absent within the tree and sapling/shrub strata. Wetland W-2 assessed within the range of a Category 1 wetland using the ORAM. This wetland is small and exhibits narrow upland buffer widths with a moderately high intensity of surrounding land use. It has seasonal/intermittent surface water input from rainwater runoff and flooding from Duck Creek. This wetland has fair habitat development and is recovering from modifications to the natural hydrologic regime. It has evidence of modifications to the natural hydrologic regime, substrate disturbance and habitat alteration. Additionally, this wetland has a moderate coverage of invasive plants.

Wetland W-3 is a depressional wetland on the edge of the woodlot in the southeastern portion of the project area. The onsite portion of Wetland W-3 is composed of PSS vegetation and is represented by Sample Plot 5. The shrub stratum of Wetland W-3 is dominated by American elm, with lesser amounts of English hawthorn (*Crataegus monogyna,* FACU) and red maple (*Acer rubrum*, FAC). The herbaceous stratum includes a small amount of yellow bristle grass (*Setaria pumila*, FAC). Vegetation was absent within the tree and woody vine strata. Wetland W-4 assessed within the range of a Category 1 wetland using the ORAM. This wetland is very small, exhibits medium upland buffer widths, and has moderately high intensity of surrounding land use. It receives water input from precipitation. This wetland has fair habitat development and is recovering from modifications to the natural hydrologic regime. Wetland W-3 exhibits evidence of substrate disturbance and habitat alteration. Additionally, invasive vegetation is nearly absent.

Wetland W-4 is a series of interconnected vernal pools within the woodlot in the southeastern portion of the project area. The onsite portion of Wetland W-3 is composed of PFO vegetation and is represented by Sample Plot 7. The tree stratum was dominated in by ash-leaf maple (*Acer negundo*, FAC) and American basswood (*Tilia americana*, FAC), with lesser amounts of eastern cottonwood (*Populus deltoides*, FAC) and pin oak (*Quercus palustris*, FACW). The sapling/shrub layer was dominated by green ash (*Fraxinus pennsylvanica*, FACW) and European buckthorn (*Rhamnus cathartica,* FAC). The herbaceous stratum included a small amount of white avens and rough-leaf dogwood saplings (*Cornus drummondii,* FAC). Wetland W-3 assessed within the range of a Category 1 wetland using the ORAM. This wetland very small, exhibits medium upland buffer widths, and has moderately high to low intensity of surrounding land use. It receives water input from precipitation. This wetland has fair habitat development and is recovering from modifications to the natural hydrologic regime, substrate disturbance, and habitat alteration. Additionally, this wetland has a sparse coverage of invasive vegetation.

4.3 STREAMS AND RIVERS

One perennial stream, Duck Creek, and one ephemeral stream, Stream S-1, were identified and delineated within the project area. The results are depicted in Table 4.3 and illustrated in Figure 5 (Appendix A). The onsite portions of Duck Creek and Stream S-1 have been assessed using the QHEI and HHEI, respectively, as described in Section 2.2.3, above; the scoring forms are included in Appendix E. Representative photographs are included in Appendix B.

Table 4.3 Stream Results within the Project Area

Stream		Photo*	Type	Average Bankfull Width (feet)	Length Within Project Area (linear feet)	Area Within Project Area (acres)	QHEI/HHEI Score and Narrative Rating **
Duck Creek	a	21-23	Perennial	16.4	285	0.107	20 and 19.5 Poor WWH
	b			21.0	249	0.120	
	c			26.2	128	0.077	
	d			20.8	69	0.033	
	e			27.0	153	0.095	
	f			23.3	339	0.181	
	g			26.4	417	0.253	
	h			23.4	223	0.120	
	i			40.8	208	0.195	
S-1	a	24-26	Ephemeral	10.9	132	0.033	34 Mod Class II PHW
	b			5.5	324	0.041	
Total Stream					**2,527**	**1.255**	

*Photos are located in Appendix B
** WWH = Warmwater Habitat, Mod = Modified, PHW = Primary Headwater
***Site map located in Appendix A, Figure 5.

Duck Creek is a perennial stream which flows generally southwest through a series of culverts within the project area. Duck Creek was assessed using the QHEI at two locations: one in the central portion of the golf course (segment f) and one in the northeastern portion (segment h and i). The QHEI scores for Duck Creek are consistent with a narrative ranking of 'Poor' and designates it as 'Warmwater Habitat' with regards to aquatic life use (ALU) potential at both locations. Dominant substrates include muck and silt.

Stream S-1 is an intermittent stream that flows from the culvert under Reineck Drive through a culvert under a walking path, through Wetland W-1, and finally a culvert under the golf course within the project area. Stream S-1 eventually flows into Duck Creek underground. Stream S-1 assessed within the range of a Modified Class II Primary Headwater Habitat (PHWH) using the HHEI. Dominant substrates include silt and leaf pack/woody debris, with lesser amounts of fine detritus.

4.4 PONDS AND LAKES

One open water aquatic resource was identified within the project area. The onsite open water feature is an excavated pond on the southern end of the project area south of Consul Street. Due to an onsite fence with barbed wire around this feature, boundaries of this resource were delineated using aerial photography. Additionally, photos of the onsite feature could not be collected due to the presence of a large berm located between the barbed-wire fence and the Open Water OW-1 feature.

Table 4.4 Open Water Results within the Project Area

Open Water	Photo*	Cowardin Class	Area within Project Area (acres)
OW-1	4-7	Lacustrine Freshwater Pond	0.149
Total Open Water			**0.149**

*Photos are included in Appendix B.

5.0 REGULATORY JURISDICTION

The wetlands and streams described in this document are under the jurisdiction either of USACE or OEPA. No filling may occur in these areas without their written permission. Please contact the OEPA Division of Surface Water at (614) 644-2001 or the Buffalo District USACE (614) 644-2001 before working in these areas.

6.0 ASSUMPTIONS AND DISCLAIMERS

The constant influence of human activity on the project area can result in a rapid change of ecological boundaries. Over time, natural succession and changes in hydrology can also affect these boundaries. The precision of GPS collected data is subject to variation caused by canopy cover, atmospheric interference, and satellite configuration. Because slight inaccuracies are possible, all acreages and derived boundaries presented in this report are approximate.

The results and conclusions contained in this report apply to the year and date in which the data were collected. This report is not considered officially valid until USACE approves it. The report is then valid for a period of five years. Refer to the USACE Regulatory Guidance Letter #94-1 (May 23, 1994).

7.0 LITERATURE CITED

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Appendix A

Figures

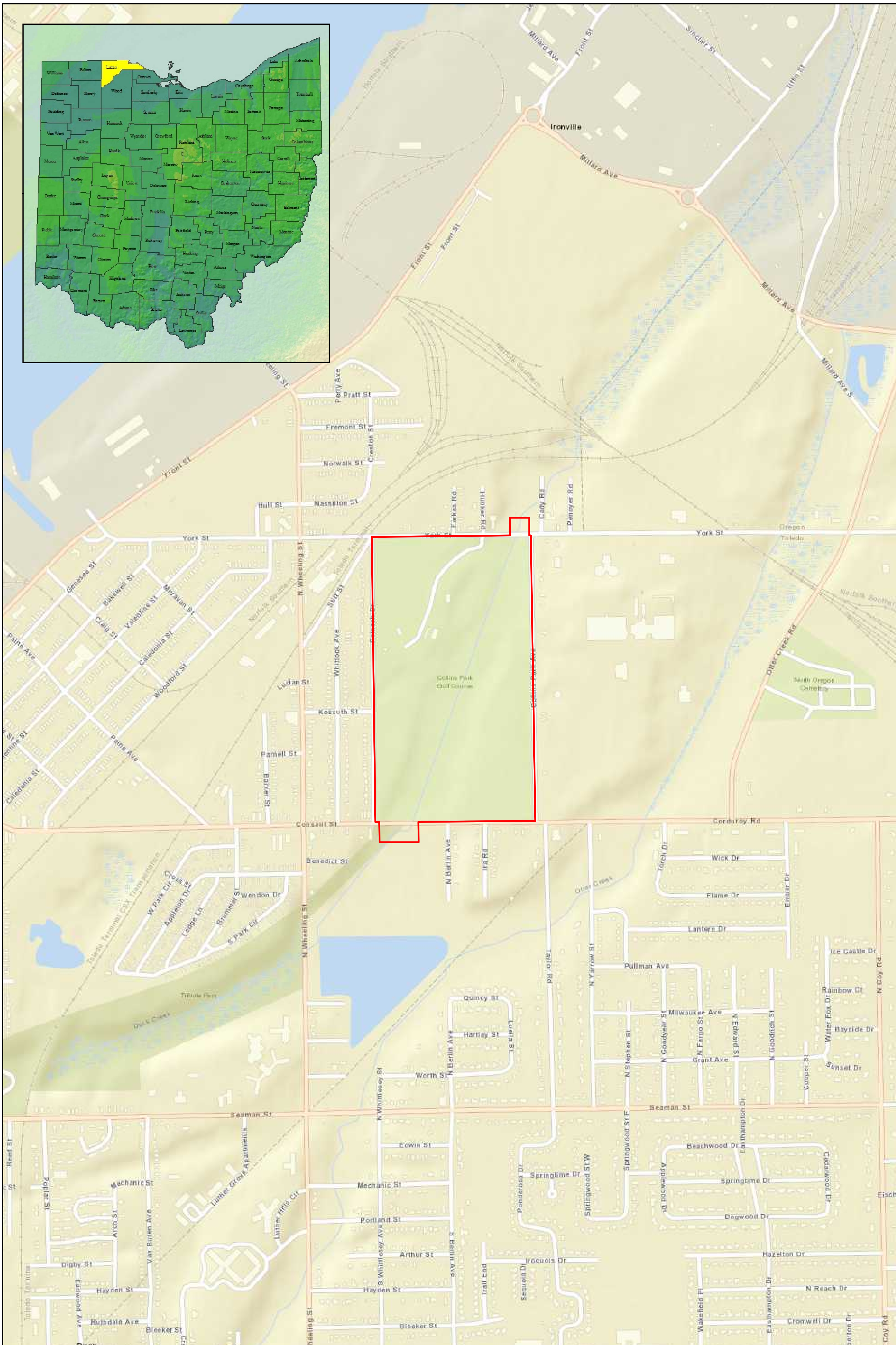

Figure 1. Location of Site on Highway Map of Lucas County, Ohio. Collins Park Stream Restoration Feasibility Study.

Study Area

0 500 1,000 2,000 Feet

0 150 300 600 Meters

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Date: 12/15/2022

Basemap courtesy of Esri.

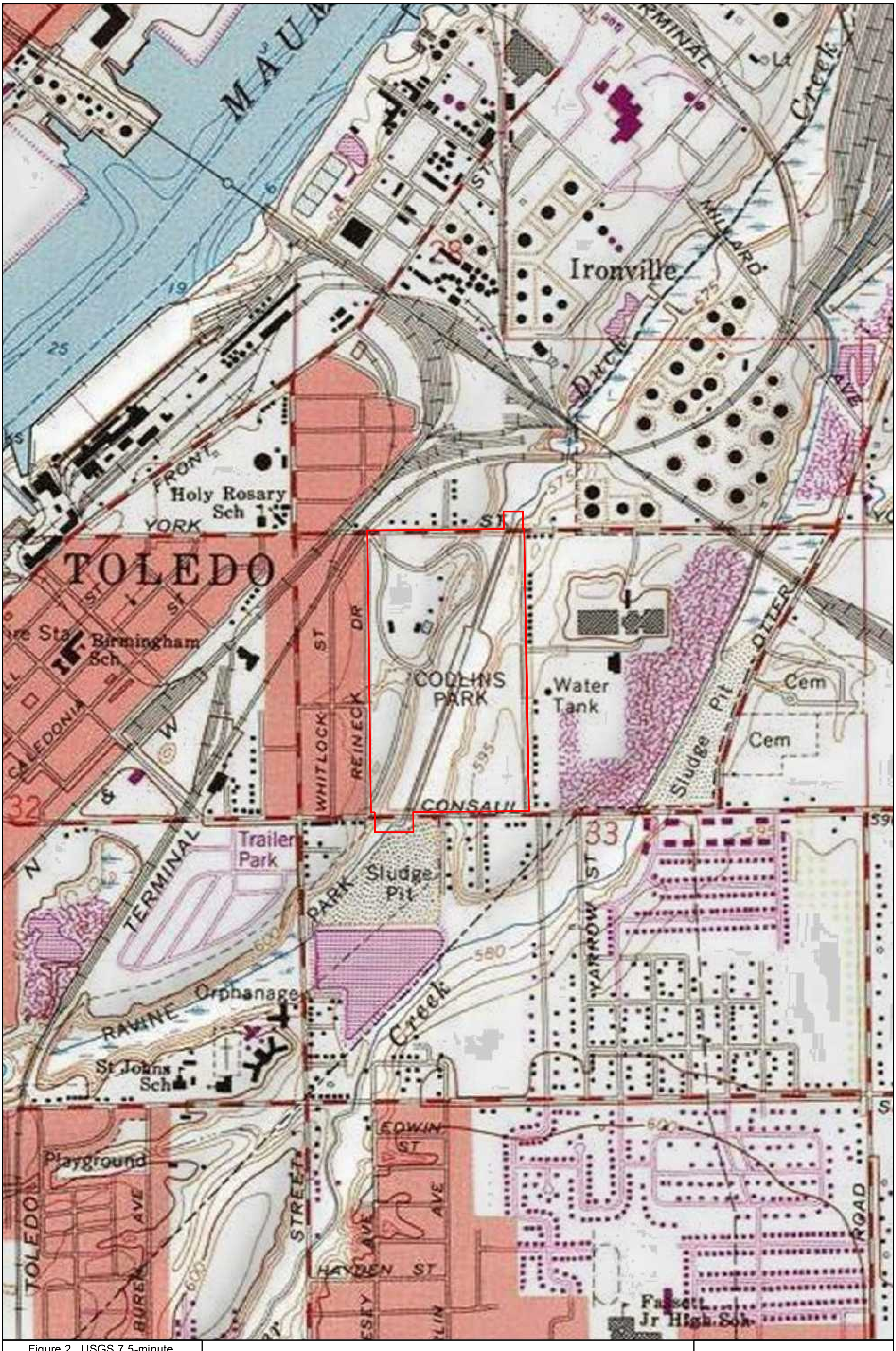

Figure 2. USGS 7.5-minute Topographic Map of Oregon Quadrangle. Collins Park Stream Restoration Feasibility Study.

Study Area

0 500 1,000 2,000 Feet

0 150 300 600 Meters

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Date: 12/15/2022

Basemap courtesy of National Geographic Society (2013).

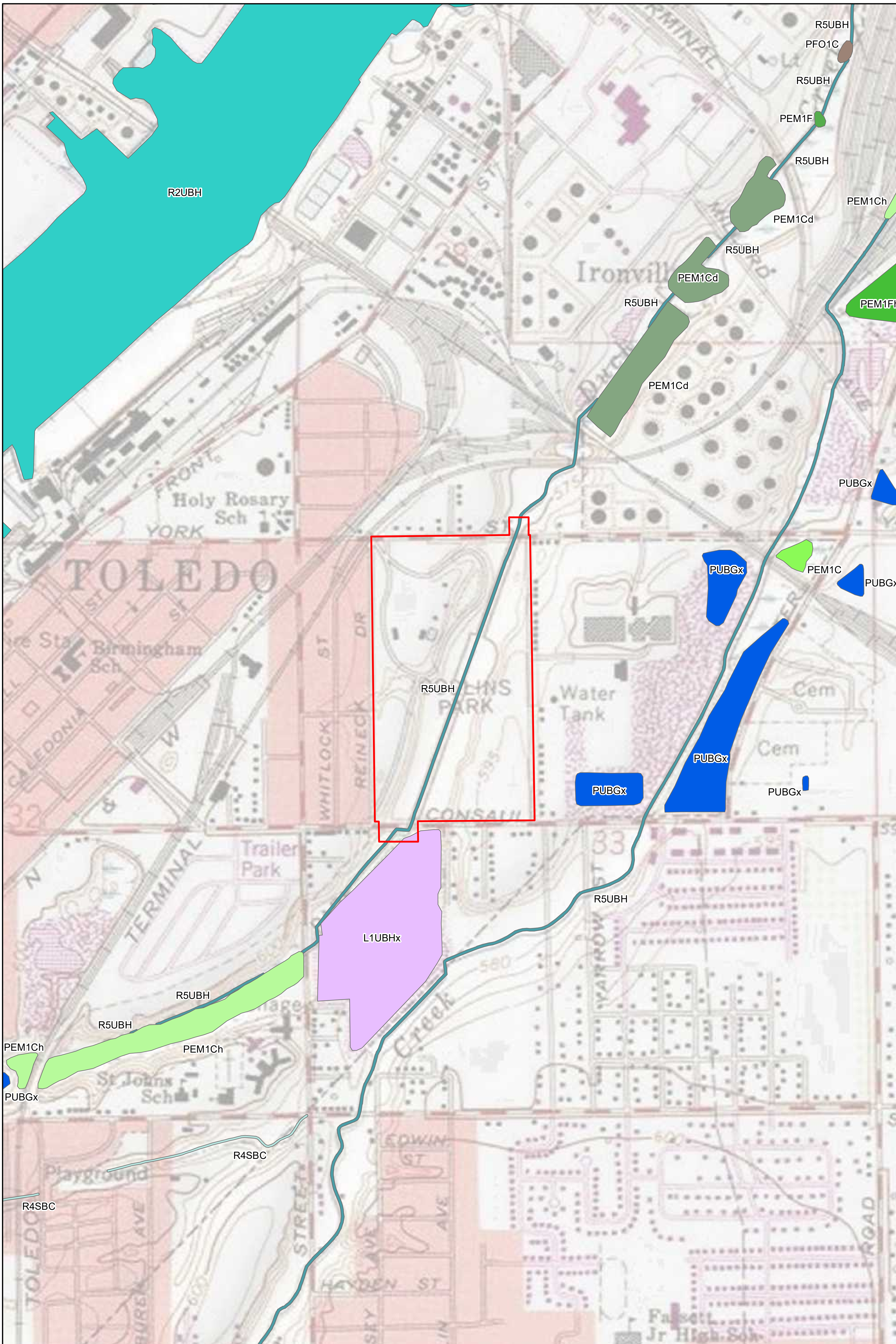

Figure 3.
NWI Map of Site
Oregon Quadrangle.
Collins Park Stream
Restoration Feasibility Study.

Study Area

0 500 1,000 2,000 Feet

0 150 300 600 Meters

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Path: C:\Users\CameronTurney\OneDrive - EnviroScience, Inc\Desktop\Projects\CollinsPark\GIS\Map3_NWI.mxd

Date: 12/15/2022

Basemap courtesy of National Geographic Society (2013). NWI data courtesy of USFWS (current as of October 1, 2020).

Figure 4.
Soil Map of Site in
Lucas County, Ohio.
Collins Park Stream
Restoration Feasibility Study.

Study Area

0 500 1,000 2,000 Feet

0 150 300 600 Meters

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Path: C:\Users\CameronTurney\OneDrive - EnviroScience, Inc\Desktop\Projects\CollinsPark\GIS\Map4_Soil.mxd

Date: 12/15/2022

Basemap courtesy of Esri. Soil data courtesy of SSURGO.

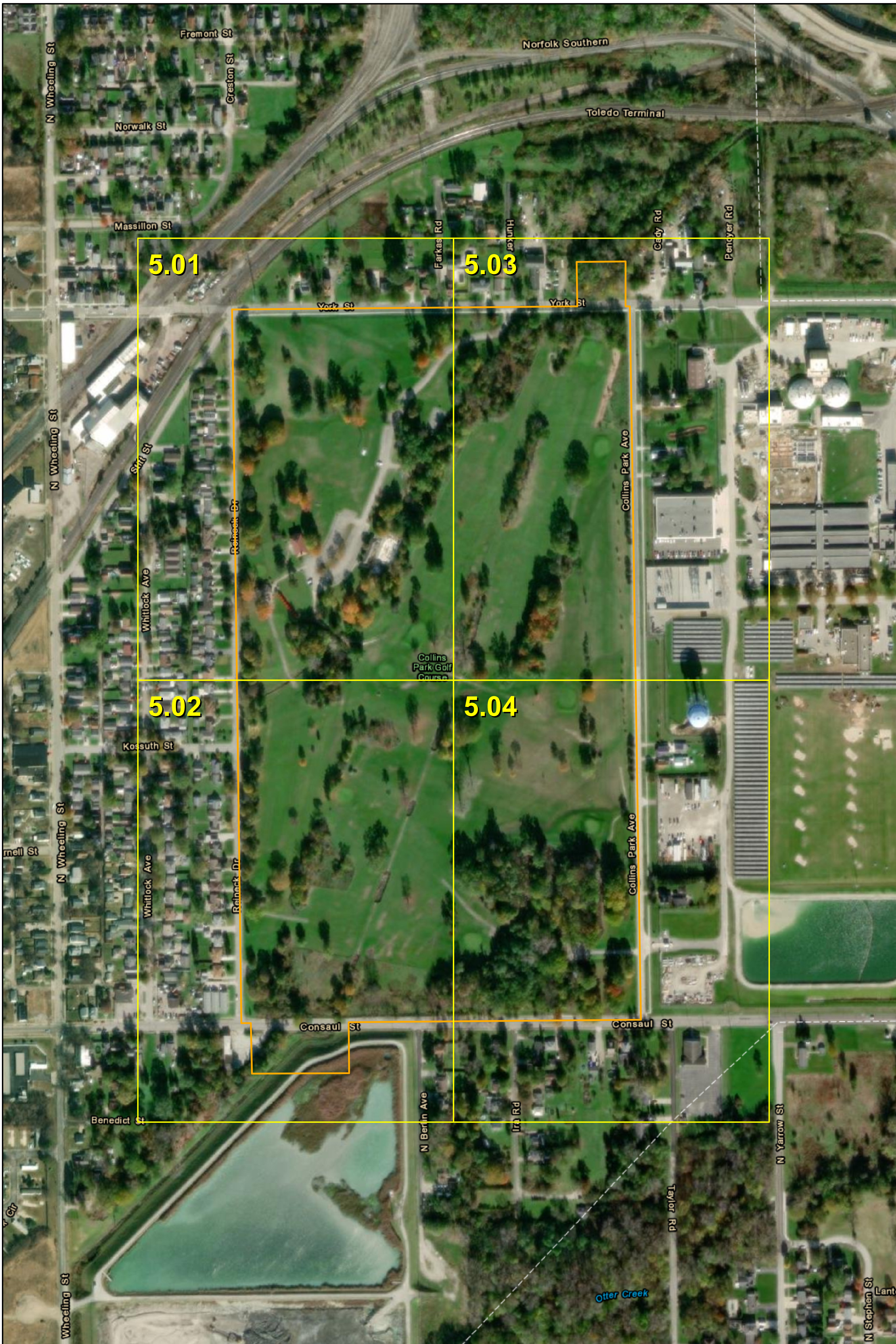

Figure 5. Site Map of Wetlands and Other Water Resources. Collins Park Stream Restoration Feasibility Study.

Study Area

0 150 300 600 Feet

0 50 100 200 Meters

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Basemap courtesy of Esri.

Path: P:\10_Projects\T\Toledo_City_of\430R\17005_Collins Park Stream Restoration Feasibility Project\Data\Wetland Delineation\GIS\Map5_Overview.mxd

Date: 5/17/2023

Figure 5.01. Site Map of Wetlands and Other Water Resources.
Collins Park Stream Restoration Feasibility Study.

Sample Plot	Stream (Ephemeral)	Wetland (PFO)
Manhole	Stream (Perennial)	Wetland (PSS)
Inlet	Wetland (PEM)	Open Water
Culvert		Study Area

0 50 100 200 Feet

0 15 30 60 Meters

5.01

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Basemap courtesy of Esri.

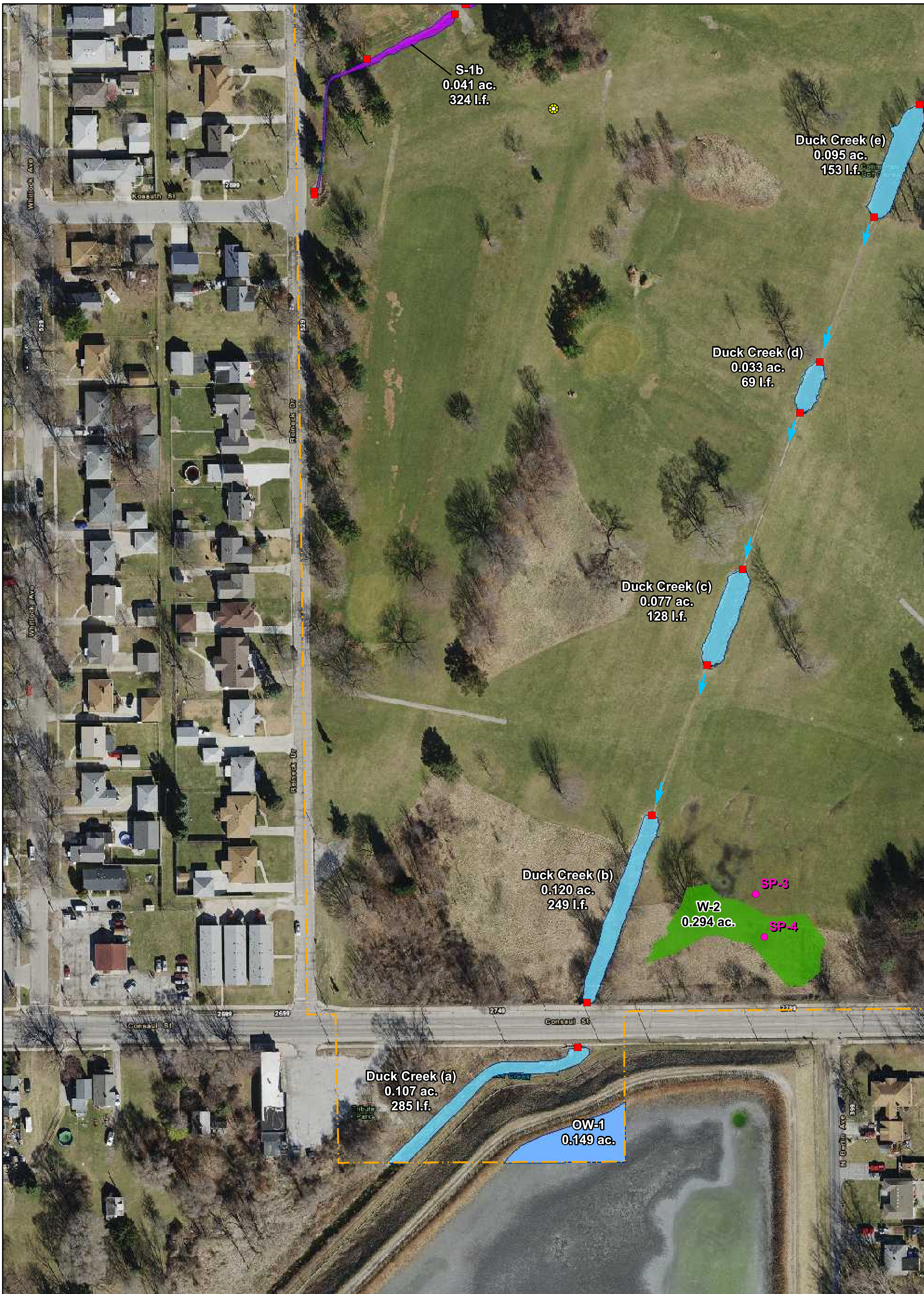

Figure 5.02. Site Map of Wetlands and Other Water Resources.
Collins Park Stream Restoration Feasibility Study.

Sample Plot	Stream (Ephemeral)	Wetland (PFO)
Manhole	Stream (Perennial)	Wetland (PSS)
Inlet	Wetland (PEM)	Open Water
Culvert		Study Area

0 50 100 200 Feet
0 15 30 60 Meters

5.02

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Basemap courtesy of Esri.

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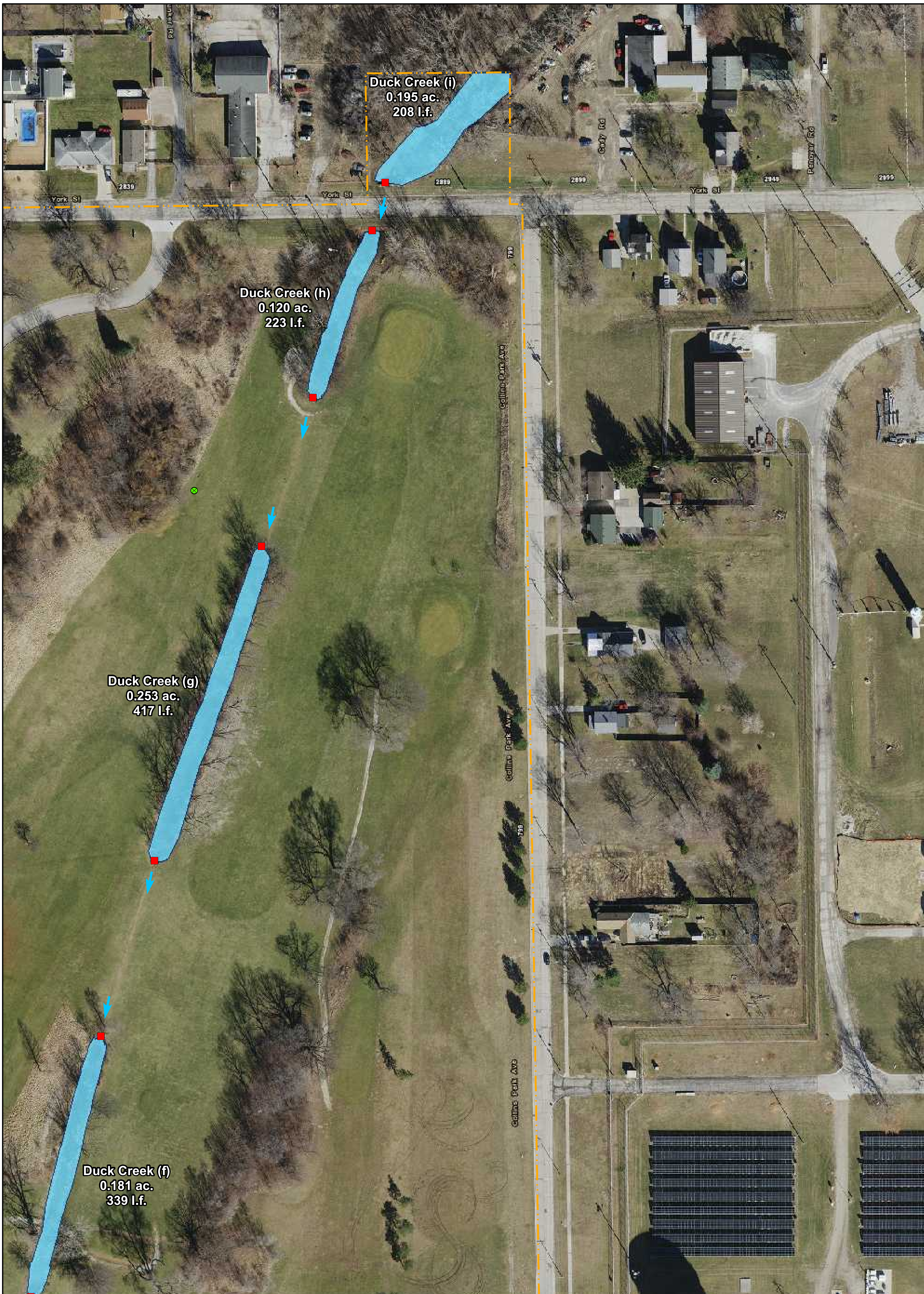

Figure 5.03. Site Map of Wetlands and Other Water Resources.
Collins Park Stream Restoration Feasibility Study.

- Sample Plot
- Manhole
- Inlet
- Culvert
- Stream (Ephemeral)
- Stream (Perennial)
- Wetland (PEM)
- Wetland (PFO)
- Wetland (PSS)
- Open Water
- Study Area

0 50 100 200 Feet

0 15 30 60 Meters

5.03

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Basemap courtesy of Esri.

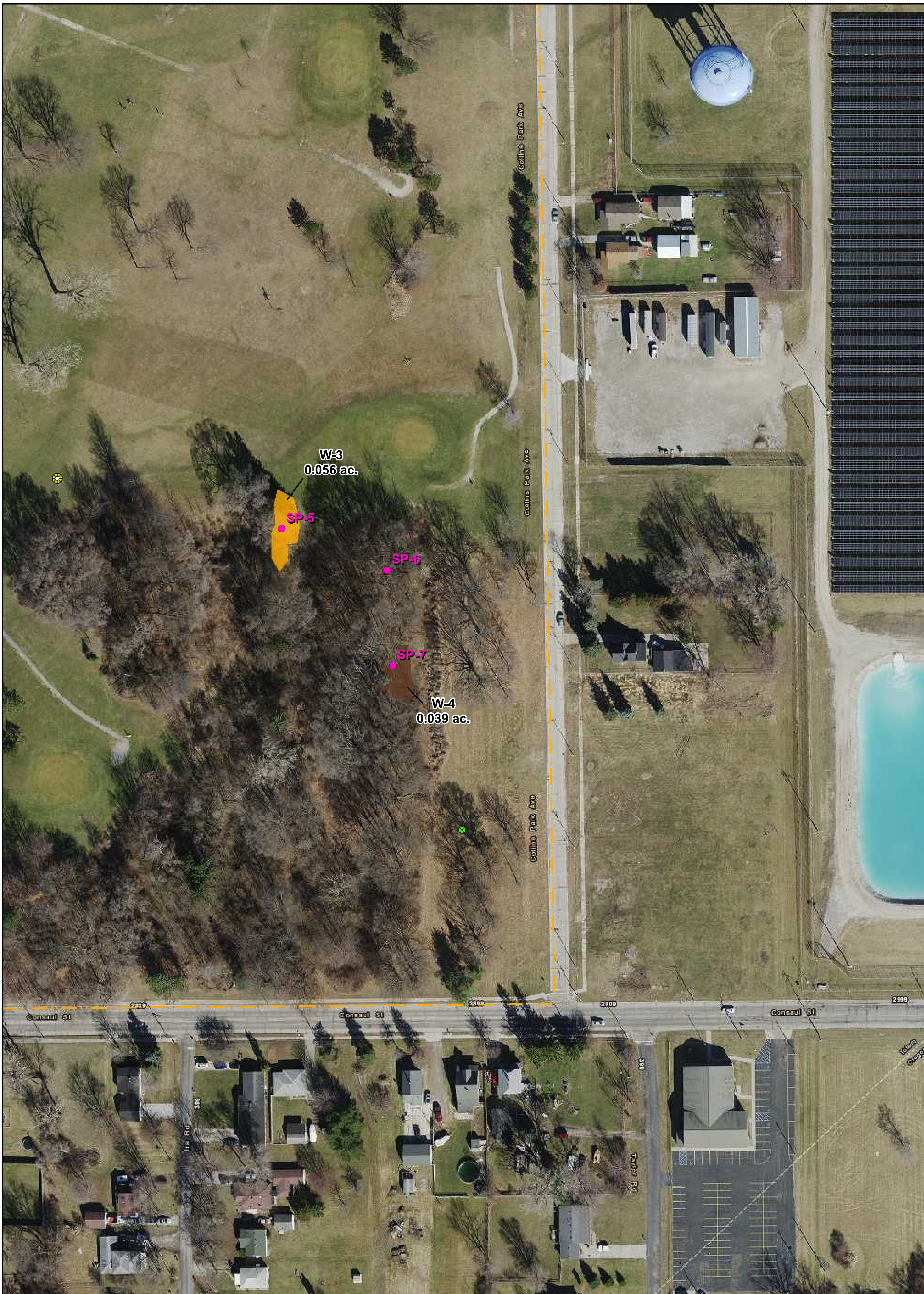

Figure 5.04. Site Map of Wetlands and Other Water Resources.
Collins Park Stream Restoration Feasibility Study.

- Sample Plot
- Manhole
- Inlet
- Culvert
- Stream (Ephemeral)
- Stream (Perennial)
- Wetland (PEM)
- Wetland (PFO)
- Wetland (PSS)
- Open Water
- Study Area

0 50 100 200 Feet

0 15 30 60 Meters

5.04

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Basemap courtesy of Esri.

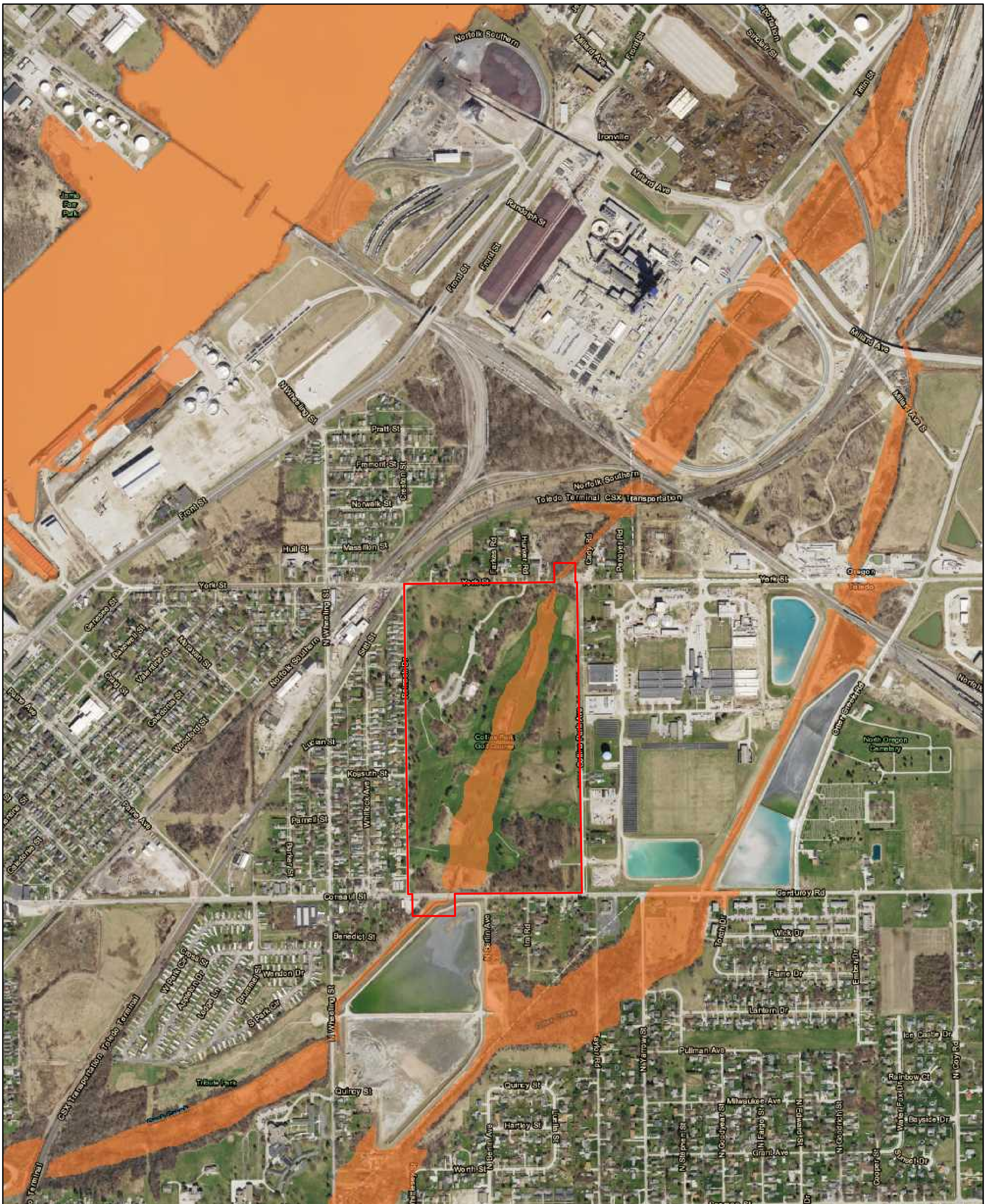

Figure 6.
FEMA Map of Site in
Lucas County, Ohio.
Collins Park Stream
Restoration Feasibility Study.

100-Year Flood Zone
Study Area

0 500 1,000 2,000 Feet
0 150 300 600 Meters

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Date: 12/15/2022 Path: C:\Users\CameronTurney\OneDrive - EnviroScience, Inc\Desktop\Projects\CollinsPark\GIS\Map6_FEMA.mxd

Basemap courtesy of Esri. Flood data courtesy of FEMA.

Appendix B

Photographs

Photo 1. Sample Plot 1 representing a palustrine emergent (PEM) vegetative community within Wetland W-1.

Photo 2. Sample Plot 2 representing an upland forest vegetative community.

Photo 3. Sample Plot 3 representing an open field vegetative community.

Photo 4. Sample Plot 4 representing a PEM vegetative community

Photo 5. Sample Plot 5 representing a palustrine scrub-shrub (PSS) vegetative community within Wetland W-3.

Photo 6. Sample Plot 6 representing an upland forest community.

Photo 7. Sample Plot 7 representing a palustrine forested (PFO) vegetative community Within Wetland W-4.

Photo 8. Wetland W-1, facing north.

Photo 9. Wetland W-1, facing east.

Photo 10. Wetland W-1, facing south.

Photo 11. Wetland W-1, facing west.

Photo 12. Wetland W-2, facing north.

Photo 13. Wetland W-2, facing east.

Photo 14. Wetland W-2, facing south.

Photo 15. Wetland W-2, facing west.

Photo 16. Wetland W-3, facing north.

Photo 17. Wetland W-3, facing east.

Photo 18. Wetland W-3, facing south.

Photo 19. Wetland W-3, facing west.

Photo 20. Wetland W-4 facing east.

Photo 21. Representative photo of Duck Creek, facing northwest upstream.

Photo 22. Representative photo of Duck Creek, facing southwest downstream.

Photo 23. Representative photo of Duck Creek substrate.

Photo 24. Stream S-1 facing west, upstream.

Photo 25. Stream S-1 facing east, downstream.

Photo 26. Stream S-1 substrate.

Appendix C

Routine Wetland Determination Data Forms

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region** See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R	*OMB Control #: 0710-0024, Exp: 11/30/2024* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Collins Park Stream Restoration Feasibility Project City/County: Toledo/Lucas Sampling Date: 4/18/23

Applicant/Owner: City of Toledo State: OH Sampling Point: SP-1

Investigator(s): C. Krause and L. Wilson, Enviroscience, Inc. Section, Township, Range: ____

Landform (hillside, terrace, etc.): stormwater basin Local relief (concave, convex, none): concave Slope %: 0-5

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 41.662358 Long: -83.483831 Datum: WGS84

Soil Map Unit Name: SuC2: St. Clair silty clay loam, 4 to 12 percent slopes, eroded NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil X, or Hydrology ___ significantly disturbed? Are “Normal Circumstances” present? Yes ___ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area**
Hydric Soil Present?	Yes X No ___	**within a Wetland?** **Yes** X **No** ___
Wetland Hydrology Present?	Yes X No ___	If yes, optional Wetland Site ID: Wetland W-1

Remarks: (Explain alternative procedures here or in a separate report.)
PEM wetland along Stream S-1a

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)		Secondary Indicators (minimum of two required)
___ Surface Water (A1)	___ Water-Stained Leaves (B9)	___ Surface Soil Cracks (B6)
X High Water Table (A2)	___ Aquatic Fauna (B13)	X Drainage Patterns (B10)
X Saturation (A3)	___ Marl Deposits (B15)	___ Moss Trim Lines (B16)
___ Water Marks (B1)	___ Hydrogen Sulfide Odor (C1)	___ Dry-Season Water Table (C2)
___ Sediment Deposits (B2)	___ Oxidized Rhizospheres on Living Roots (C3)	___ Crayfish Burrows (C8)
X Drift Deposits (B3)	___ Presence of Reduced Iron (C4)	___ Saturation Visible on Aerial Imagery (C9)
X Algal Mat or Crust (B4)	___ Recent Iron Reduction in Tilled Soils (C6)	___ Stunted or Stressed Plants (D1)
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)	___ Geomorphic Position (D2)
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)	___ Shallow Aquitard (D3)
___ Sparsely Vegetated Concave Surface (B8)		___ Microtopographic Relief (D4)
		X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes X	No ___	Depth (inches): 2
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP-1

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		

Sapling/Shrub Stratum (Plot size: 15 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix nigra*	10	Yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
	10 =Total Cover		

Herb Stratum (Plot size: 5 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Glyceria septentrionalis*	25	Yes	OBL
2. *Echinochloa muricata*	20	Yes	OBL
3. *Lythrum salicaria*	10	No	OBL
4. *Impatiens capensis*	3	No	FACW
5. *Iris pseudacorus*	2	No	OBL
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60 =Total Cover		

Woody Vine Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point SP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	100					Loamy/Clayey	
6-8	10YR 4/2	90	7.5YR 4/6	10	C	PL	Loamy/Clayey	Prominent redox concentrations
8-14	10YR 3/2	100					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
X Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
___ High Chroma Sands (S11) (**LRR K, L)**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Marl (F10) (**LRR K, L**)
___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Red Parent Material (F21) **(outside MLRA 145)**
___ Very Shallow Dark Surface (F22)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ___

Remarks:

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R	*OMB Control #: 0710-0024, Exp: 11/30/2024* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Collins Park Stream Restoration Feasibility Project City/County: Toledo/Lucas Sampling Date: 4/18/23

Applicant/Owner: City of Toledo State: OH Sampling Point: SP2

Investigator(s): C. Krause and L. Wilson, Enviroscience, Inc. Section, Township, Range: ____

Landform (hillside, terrace, etc.): hillside Local relief (concave, convex, none): convex Slope %: 4

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 41.662284 Long: -83.48384 Datum: WGS84

Soil Map Unit Name: SuC2: St. Clair silty clay loam, 4 to 12 percent slopes, eroded NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No X	**Is the Sampled Area within a Wetland?**	**Yes** ____ **No** X
Hydric Soil Present?	Yes ____ No X	If yes, optional Wetland Site ID:	____
Wetland Hydrology Present?	Yes ____ No X		

Remarks: (Explain alternative procedures here or in a separate report.)
Upland forest habitat south of Wetland W-1

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	___ Water-Stained Leaves (B9)
___ High Water Table (A2)	___ Aquatic Fauna (B13)
___ Saturation (A3)	___ Marl Deposits (B15)
___ Water Marks (B1)	___ Hydrogen Sulfide Odor (C1)
___ Sediment Deposits (B2)	___ Oxidized Rhizospheres on Living Roots (C3)
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)
___ Algal Mat or Crust (B4)	___ Recent Iron Reduction in Tilled Soils (C6)
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)
___ Sparsely Vegetated Concave Surface (B8)	

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No indicators of wetland hydrology observed.

VEGETATION – Use scientific names of plants.

Sampling Point: SP2

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Juglans nigra*	40	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	40	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Fraxinus americana*	20	Yes	FACU
2. *Lonicera maackii*	5	No	UPL
3. *Rubus*	2	No	
4.			
5.			
6.			
7.			
	27	=Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. *Carex*	20	Yes	
2. *Geum canadense*	10	Yes	FAC
3. *Hackelia virginiana*	5	No	FACU
4. *Arctium lappa*	2	No	UPL
5. *Galium*	1	No	
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	38	=Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1. N/A			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	10	x 3 =	30
FACU species	65	x 4 =	260
UPL species	7	x 5 =	35
Column Totals:	82 (A)		325 (B)

Prevalence Index = B/A = 3.96

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)
No indicators of hydrophytic vegetation observed.

SOIL

Sampling Point SP2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	100					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ______

Hydric Soil Present? **Yes** ___ **No** X

Remarks:
Root refusal at 6"

No indicators of hydric soils observed.

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R	*OMB Control #: 0710-0024, Exp: 11/30/2024* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Collins Park Stream Restoration Feasibility Project City/County: Toledo/Lucas Sampling Date: 4/18/23

Applicant/Owner: City of Toledo State: OH Sampling Point: SP3

Investigator(s): L. Wilson and C. Krause, Enviroscience, Inc. Section, Township, Range: ____

Landform (hillside, terrace, etc.): Flat Local relief (concave, convex, none): None Slope %: 0

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 41.659053 Long: -83.482874 Datum: WGS84

Soil Map Unit Name: To: Toledo silty clay, 0 to 1 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation N , Soil N , or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes Y No ___

Are Vegetation N , Soil N , or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X	**Is the Sampled Area within a Wetland?** **Yes** ___ **No** X
Hydric Soil Present?	Yes ___	No X	If yes, optional Wetland Site ID: ____
Wetland Hydrology Present?	Yes ___	No X	

Remarks: (Explain alternative procedures here or in a separate report.)
Open field community located north of Wetland W-2

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No evidence of wetland hydrology observed.

VEGETATION – Use scientific names of plants.

Sampling Point: SP3

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		=Total Cover	
Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		=Total Cover	
Herb Stratum (Plot size: 5')			
1. *Schedonorus arundinaceus*	100	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100	=Total Cover	
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)
No evidence of hydrophytic vegetation observed.

SOIL

Sampling Point SP3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/2	100					Loamy/Clayey	
10-14	10YR 4/2	80	10YR 6/6	20	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** ___ **No** X

Remarks:
No evidence of hydric soils observed.

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region** See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R	*OMB Control #: 0710-0024, Exp: 11/30/2024* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Collins Park Stream Restoration Feasibility Project City/County: Toledo/Lucas Sampling Date: 4/18/23

Applicant/Owner: City of Toledo State: OH Sampling Point: SP4

Investigator(s): C. Krause and L. Wilson, Enviroscience, Inc. Section, Township, Range: ____

Landform (hillside, terrace, etc.): floodplain Local relief (concave, convex, none): concave Slope %: 0-5

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 41.658906 Long: -83.482832 Datum: WGS84

Soil Map Unit Name: SuC2: St. Clair silty clay loam, 4 to 12 percent slopes, eroded NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil X, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area**
Hydric Soil Present?	Yes ___ No X	**within a Wetland?** **Yes** ___ **No** X
Wetland Hydrology Present?	Yes X No ___	If yes, optional Wetland Site ID: Wetland W-4

Remarks: (Explain alternative procedures here or in a separate report.)
PEM wetland located west of Duck Creek and north of Consaul Street. Soils are significantly disturbed but wetland status is determined based on remiaing two indicators.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	___ Water-Stained Leaves (B9)	
X High Water Table (A2)	___ Aquatic Fauna (B13)	
X Saturation (A3)	___ Marl Deposits (B15)	
___ Water Marks (B1)	___ Hydrogen Sulfide Odor (C1)	
___ Sediment Deposits (B2)	___ Oxidized Rhizospheres on Living Roots (C3)	
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)	
___ Algal Mat or Crust (B4)	___ Recent Iron Reduction in Tilled Soils (C6)	
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)	
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)	
___ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes X	No ___	Depth (inches): 6
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 4

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP4

Tree Stratum (Plot size: 30 ft)

	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
5.			
6.			
7.			
		=Total Cover	

Sapling/Shrub Stratum (Plot size: 15 ft)

	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
5.			
6.			
7.			
		=Total Cover	

Herb Stratum (Plot size: 5 ft)

	Absolute % Cover	Dominant Species?	Indicator Status
1. *Phragmites australis*	60	Yes	FACW
2. *Leersia oryzoides*	15	No	OBL
3. *Epilobium coloratum*	5	No	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	80	=Total Cover	

Woody Vine Stratum (Plot size: 30 ft)

	Absolute % Cover	Dominant Species?	Indicator Status
1. *Vitis*	5	Yes	
2.			
3.			
4.			
	5	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	60	x 2 =	120
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	80 (A)		140 (B)

Prevalence Index = B/A = 1.75

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point SP4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 4/1	100					Loamy/Clayey	
8-12	10YR 5/2	50					Loamy/Clayey	disturbed soil; additional matrix colors below

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
___ High Chroma Sands (S11) (**LRR K, L)**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Marl (F10) (**LRR K, L**)
___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Red Parent Material (F21) **(outside MLRA 145)**
___ Very Shallow Dark Surface (F22)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ______

Hydric Soil Present? **Yes** ___ **No** X

Remarks:
Additional matrix colors 8-12": 10YR 5/8 20%; 10YR 5/4 30% - Hydric soils are not present; however, there is evidence of soil disturbance and the soil indicator is not needed to determine wetland status. Soils appear to be recovering and will likely show a hydric status in the future.

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region** See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R	*OMB Control #: 0710-0024, Exp: 11/30/2024* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Collins Park Stream Restoration Feasibility Project City/County: Toledo/Lucas Sampling Date: 4/18/23

Applicant/Owner: City of Toledo State: OH Sampling Point: SP5

Investigator(s): C. Krause and L. Wilson, Enviroscience, Inc. Section, Township, Range: ____

Landform (hillside, terrace, etc.): hilltop Local relief (concave, convex, none): concave Slope %: 0-5

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 41.660329 Long: -83.480800 Datum: WGS84

Soil Map Unit Name: DdA: Del Rey loam, 0 to 3 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ____ (If no, explain in Remarks.)

Are Vegetation ____ , Soil X , or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____ , Soil ____ , or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X No ____	If yes, optional Wetland Site ID: Wetland W-5

Remarks: (Explain alternative procedures here or in a separate report.)
PSS wetland along edge of golf course to the west of Collins Park Avenue

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)		Secondary Indicators (minimum of two required)
____ Surface Water (A1)	X Water-Stained Leaves (B9)	____ Surface Soil Cracks (B6)
X High Water Table (A2)	____ Aquatic Fauna (B13)	____ Drainage Patterns (B10)
X Saturation (A3)	____ Marl Deposits (B15)	____ Moss Trim Lines (B16)
____ Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	____ Dry-Season Water Table (C2)
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	____ Crayfish Burrows (C8)
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	____ Saturation Visible on Aerial Imagery (C9)
X Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Stunted or Stressed Plants (D1)
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	____ Geomorphic Position (D2)
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	X Shallow Aquitard (D3)
X Sparsely Vegetated Concave Surface (B8)		____ Microtopographic Relief (D4)
		X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____	
Water Table Present?	Yes X	No ____	Depth (inches): 4	
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0	**Wetland Hydrology Present? Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: SP5

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
5.			
6.			
7.			
		=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Ulmus americana*	70	Yes	FACW
2. *Crataegus monogyna*	5	No	FACU
3. *Acer rubrum*	2	No	FAC
4.			
5.			
6.			
7.			
	77	=Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. *Setaria pumila*	3	No	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	3	=Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1. N/A			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point SP5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 5/1	95	10YR 6/8	5	C	PL	Loamy/Clayey	Prominent redox concentrations
4-14	10YR 5/2	70					Loamy/Clayey	disturbed soil; additional matrix colors below

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: hardpan

Depth (inches): 4

Hydric Soil Present? **Yes** X **No** ___

Remarks:
addional matrix colors 5-14": 10YR 6/3 20%; 10YR 5/6 10%

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region** See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R	*OMB Control #: 0710-0024, Exp: 11/30/2024* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Collins Park Stream Restoration Feasibility Project City/County: Toledo/Lucas Sampling Date: 4/18/23

Applicant/Owner: City of Toledo State: OH Sampling Point: SP6

Investigator(s): C. Krause and L. Wilson, Enviroscience, Inc. Section, Township, Range: ____

Landform (hillside, terrace, etc.): hilltop Local relief (concave, convex, none): convex Slope %: 2

Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 41.660191 Long: -83.480312 Datum: WGS84

Soil Map Unit Name: FuA: Fulton silty clay loam, 0 to 2 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** X
Hydric Soil Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____
Wetland Hydrology Present?	Yes ____	No X	

Remarks: (Explain alternative procedures here or in a separate report.)
Upland forest in southeast corner of the project area between Wetland W-3 and Wetland W-4.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	___ Water-Stained Leaves (B9)	
___ High Water Table (A2)	___ Aquatic Fauna (B13)	
___ Saturation (A3)	___ Marl Deposits (B15)	
___ Water Marks (B1)	___ Hydrogen Sulfide Odor (C1)	
___ Sediment Deposits (B2)	___ Oxidized Rhizospheres on Living Roots (C3)	
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)	
___ Algal Mat or Crust (B4)	___ Recent Iron Reduction in Tilled Soils (C6)	
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)	
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)	
___ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Moss Trim Lines (B16)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Microtopographic Relief (D4)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No indicators of wetland hydrology observed.

VEGETATION – Use scientific names of plants.

Sampling Point: SP6

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Quercus rubra*	50	Yes	FACU
2. *Tilia americana*	25	Yes	FACU
3. *Ulmus rubra*	5	No	FAC
4.			
5.			
6.			
7.			
	80	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Lonicera maackii*	40	Yes	UPL
2. *Fraxinus americana*	25	Yes	FACU
3. *Symphoricarpos orbiculatus*	10	No	FACU
4.			
5.			
6.			
7.			
	75	=Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. *Geum canadense*	5	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5	=Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1. *Toxicodendron radicans*	5	Yes	FAC
2.			
3.			
4.			
	5	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	15	x 3 =	45
FACU species	110	x 4 =	440
UPL species	40	x 5 =	200
Column Totals:	165 (A)		685 (B)

Prevalence Index = B/A = 4.15

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)
No indicators of hydrophytic vegetation observed.

SOIL

Sampling Point SP6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 4/1	100					Loamy/Clayey	
8-14	10YR 4/1	50					Loamy/Clayey	additional matrix colors below

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ______

Hydric Soil Present? **Yes** ___ **No** X

Remarks:
additional matrix colors 8-14": 10YR 5/2 40%; 7.5YR 5/6 10%

No indicators of hydric soils observed.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Collins Park Stream Restoration Feasibility Project City/County: Toledo/Lucas Sampling Date: 4/18/23
Applicant/Owner: City of Toledo State: OH Sampling Point: SP7
Investigator(s): C. Krause and L. Wilson, Enviroscience, Inc. Section, Township, Range: ____
Landform (hillside, terrace, etc.): hilltop Local relief (concave, convex, none): concave Slope %: 0-5
Subregion (LRR or MLRA): LRR L, MLRA 99 Lat: 41.659863 Long: -83.480281 Datum: WGS84
Soil Map Unit Name: FuA: Fulton silty clay loam, 0 to 2 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil X, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area**
Hydric Soil Present?	Yes X No ___	**within a Wetland?** **Yes** X **No** ___
Wetland Hydrology Present?	Yes X No ___	If yes, optional Wetland Site ID: Wetland W-4

Remarks: (Explain alternative procedures here or in a separate report.)
PFO wetland within forested portion of southeast corner of project area.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	X Water-Stained Leaves (B9)
___ High Water Table (A2)	___ Aquatic Fauna (B13)
___ Saturation (A3)	___ Marl Deposits (B15)
___ Water Marks (B1)	___ Hydrogen Sulfide Odor (C1)
___ Sediment Deposits (B2)	X Oxidized Rhizospheres on Living Roots (C3)
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)
___ Algal Mat or Crust (B4)	___ Recent Iron Reduction in Tilled Soils (C6)
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)
X Sparsely Vegetated Concave Surface (B8)	

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: SP7

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer negundo*	30	Yes	FAC
2. *Tilia americana*	10	Yes	FACU
3. *Populus deltoides*	5	No	FAC
4. *Quercus palustris*	5	No	FACW
5.			
6.			
7.			
	50	=Total Cover	

Sapling/Shrub Stratum (Plot size: 15 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Fraxinus pennsylvanica*	20	Yes	FACW
2. *Rhamnus cathartica*	10	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	30	=Total Cover	

Herb Stratum (Plot size: 5 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Geum canadense*	1	No	FAC
2. *Cornus drummondii*	1	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	2	=Total Cover	

Woody Vine Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:		(A)	(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
_X_ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** _X_ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point SP7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/2	100					Loamy/Clayey	
6-12	10YR 4/1	95	7.5YR 5/6	5	C	PL	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: hardpan

Depth (inches): 4

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Appendix D

Ohio Rapid Assessment Method for Wetlands

v. 5.0 Rating Forms

Background Information

Name:	Carolyn Krause
Date:	9/25/2023
Affiliation:	EnviroScience, Inc
Address:	5070 Stow Road, Stow, OH 44224
Phone Number:	330-688-0111
e-mail address:	CKrause@EnviroScienceInc.com
Name of Wetland:	W-1
Vegetation Communit(ies):	PEM
HGM Class(es):	Depression/Riverine

Location of Wetland: include map, address, north arrow, landmarks, distances, roads, etc.
See attached.

Lat/Long or UTM Coordinate	41.662364, -83.483833
USGS Quad Name	Oregon
County	Lucas
City/Township	Toledo
Section and Subsection	
Hydrologic Unit Code	4100009
Site Visit	4/18/2023
National Wetland Inventory Map	See Figure 3 of Wetland Delineation Report
Ohio Wetland Inventory Map	n/a
Soil Survey	See Figure 4 of Wetland Delineation Report
Delineation report/map	See Figure 6 of Wetland Delineation Report

Name of Wetland:	**W-1**
Wetland Size (acres, hectares):	0.007 ac

Sketch: Include north arrow, relationship with other surface waters, vegetation zones, etc.
See Attached.

Comments, Narrative Discussion, Justification of Category Changes:

Final score : 27	**Category: 1**

Scoring Boundary Worksheet

INSTRUCTIONS. The initial step in completing the ORAM is to identify the "scoring boundaries" of the wetland being rated. In many instances this determination will be relatively easy and the scoring boundaries will coincide with the "jurisdictional boundaries." For example, the scoring boundary of an isolated cattail marsh located in the middle of a farm field will likely be the same as that wetland's jurisdictional boundaries. In other instances, however, the scoring boundary will not be as easily determined. Wetlands that are small or isolated from other surface waters often form large contiguous areas or heterogeneous complexes of wetland and upland. In separating wetlands for scoring purposes, the hydrologic regime of the wetland is the main criterion that should be used. Boundaries between contiguous or connected wetlands should be established where the volume, flow, or velocity of water moving through the wetland changes significantly. Areas with a high degree of hydrologic interaction should be scored as a single wetland. In determining a wetland's scoring boundaries
use the guidelines in the ORAM Manual Section 5.0. In certain instances, it may be difficult to establish the scoring boundary for the wetland being rated. These problem situations include wetlands that form a patchwork on the landscape, wetlands divided by artificial boundaries like property fences, roads, or railroad embankments, wetlands that are contiguous with streams, lakes, or rivers, and estuarine or coastal wetlands. These situations are discussed below, however, it is recommended that Rater contact Ohio EPA, Division of Surface Water, 401/Wetlands Section if there are additional questions or a need for further clarification of the appropriate scoring boundaries of a particular wetland.

#	Steps in properly establishing scoring boundaries	done?	not applicable
Step 1	Identify the wetland area of interest. This may be the site of a proposed impact, a reference site, conservation site, etc.	☑	☐
Step 2	Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both natural and human- induced changes including, constrictions caused by berms or dikes, points where the water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic interaction between the wetlands or parts of a single wetland.	☑	☐
Step 3	Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within the areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction are included within the scoring boundary.	☑	☐
Step 4	Determine if artificial boundaries, such as property lines, state lines, roads, railroad embankments, etc., are present. These should not be used to establish scoring boundaries unless they coincide with areas where the hydrologic regime changes.	☑	☐
Step 5	In all instances, the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.	☐	☑
Step 6	Consult ORAM Manual Section 5.0 for how to establish scoring boundaries for wetlands that form a patchwork on the landscape, divided by artificial boundaries, contiguous to streams, lakes or rivers, or for dual classifications.	☐	☑

End of Scoring Boundary Determination. Begin Narrative Rating on next page.

Narrative Rating

INSTRUCTIONS. Answer each of the following questions. Questions 1, 2, 3 and 4 should be answered based on Information obtained from the site visit or the literature and by submitting a Data Services Request to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Data Services, 1889 Fountain Square Court, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/dnap . The remaining questions are designed to be answered primarily by the results of the site visit. Refer to the User's Manual for descriptions of these wetland types. Note: "Critical habitat" is legally defined in the Endangered Species Act and is the geographic area containing physical or biological features essential to the conservation of a listed species or as an area that may require special management considerations or protection. The Rater should contact the Region 3 Headquarters or the Columbus Ecological Services Office for updates as to whether critical habitat has been designated for other federally listed threatened or endangered species. "Documented" means

the wetland is listed in the appropriate State of Ohio database.

#	Question	YES	NO
1	**Critical Habitat.** Is the wetland in a township, section, or subsection of a United States Geological Survey 7.5 minute Quadrangle that has been designated by the U.S. Fish and Wildlife Service as "critical habitat" for any threatened or endangered plant or animal species? Note: as of January 1, 2001, of the federally listed endangered or threatened species which can be found in Ohio, the Indiana Bat has had critical habitat designated (50 CFR 17.95(a)) and the piping plover has had critical habitat proposed (65 FR 41812 July 6, 2000).	☐ Wetland should be evaluated for possible Category 3 status. Go to Question 2	☑ Go to Question 2
2	**Threatened or Endangered Species.** Is the wetland known to contain an individual of, or documented occurrences of federal or state-listed threatened or endangered plant or animal species?	☐ Wetland is a Category 3 wetland. Go to Question 3	☑ Go to Question 3
3	**Documented High Quality Wetland.** Is the wetland on record in Natural Heritage Database as a high quality wetland?	☐ Wetland is a Category 3 wetland. Go to Question 4	☑ Go to Question 4
4	**Significant Breeding or Concentration Area.** Does the wetland contain documented regionally significant breeding or nonbreeding waterfowl, neotropical songbird, or shorebird concentration areas?	☐ Wetland is a Category 3 wetland. Go to Question 5	☑ Go to Question 5
5	**Category 1 Wetlands.** Is the wetland less than 0.5 hectares (1 acre) in size and **hydrologically isolated** and either 1) comprised of vegetation that is dominated (greater than eighty per cent areal cover) by *Phalaris arundinacea, Lythrum salicaria,* or *Phragmites australis* , or 2) an acidic pond created or excavated on mined lands that has little or no vegetation?	☐ Wetland is a Category 3 wetland. Go to Question 6	☑ Go to Question 6
6	**Bogs.** Is the wetland a peat-accumulating wetland that 1) has no significant inflows or outflows, 2) supports acidophilic mosses, particularly *Sphagnum* spp., 3) the acidophilic mosses have >30% cover, 4) at least one species from Table 1 is present, and 5) the cover of invasive species (see Table 1) is <25%?	☐ Wetland is a Category 3 wetland. Go to Question 7	☑ Go to Question 7
7	**Fens.** Is the wetland a carbon accumulating (peat, muck) wetland that is saturated during most of the year, primarily by a discharge of free flowing, mineral rich, ground water with a circumneutral ph (5.5-9.0) and with one or more plant species listed in Table 1 and the cover of invasive species listed in Table 1 is <25%?	☐ Wetland is a Category 3 wetland. Go to Question 8	☑ Go to Question 8a
8a	**"Old Growth Forest."** Is the wetland a forested wetland and is the forest characterized by, but not limited to, the following characteristics: overstory canopy trees of great age (exceeding at least 50% of a projected maximum attainable age for a species); little or no evidence of human-caused understory disturbance during the past 80 to 100 years; an all-aged structure and multilayered canopies; aggregations of canopy trees interspersed with canopy gaps; and significant numbers of standing dead snags and downed logs?	☐ Wetland is a Category 3 wetland. Go to Question 8b	☑ Go to Question 8b

8b	**Mature forested wetlands**. Is the wetland a forested wetland with 50% or more of the cover of upper forest canopy consisting of deciduous trees with large diameters at breast height (dbh), generally diameters greater than 45cm (17.7in) dbh?	☐ Wetland should be evaluated for possible Category 3 status Go to Question 9a	Go to Question 9a ☑
9a	**Lake Erie coastal and tributary wetlands**. Is the wetland located at an elevation less than 575 feet on the USGS map, adjacent to this elevation, or along a tributary to Lake Erie that is accessible to fish?	Go to Question 9b ☐	Go to Question 10 ☑
9b	Does the wetland's hydrology result from measures designed to prevent erosion and the loss of aquatic plants, i.e. the wetland is partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?	☐ Wetland should be evaluated for possible Category 3 status Go to Question 9d	Go to Question 9c ☑
9c	Are Lake Erie water levels the wetland's primary hydrological influence, i.e. the wetland is hydrologically unrestricted (no lakeward or upland border alterations), or the wetland can be characterized as an "estuarine" wetland with lake and river influenced hydrology. These include sandbar deposition wetlands, estuarine wetlands, river mouth wetlands, or those dominated by submersed aquatic vegetation.	Go to Question 9d ☐	Go to Question 9d ☑
9d	Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant native species can also be present?	☐ Wetland is a Category 3 wetland. Go to Question 10	Go to Question 9e ☑
9e	Does the wetland have a predominance of non-native or disturbance tolerant native plant species within its vegetation communities?	☐ Wetland should be evaluated for possible Category 3 status. Go to Question 10	Go to Question 10 ☑
10	**Lake Plain Sand Prairies (Oak Openings)** Is the wetland located in Lucas, Fulton, Henry, or Wood Counties and can the wetland be characterized by the following description: the wetland has a sandy substrate with interspersed organic matter, a water table often within several inches of the surface, and often with a dominance of the gramineous vegetation listed in Table 1 (woody species may also be present). The Ohio Department of Natural Resources Division of Natural Areas and Preserves can provide assistance in confirming this type of wetland and its quality.	☐ Wetland is a Category 3 wetland. Go to Question 11	Go to Question 11 ☑
11	**Relict Wet Prairies**. Is the wetland a relict wet prairie community dominated by some or all of the species in Table 1. Extensive prairies were formerly located in the Darby Plains (Madison and Union Counties), Sandusky Plains (Wyandot, Crawford, and Marion Counties), northwest Ohio (e.g. Erie, Huron, Lucas, Wood Counties), and portions of western Ohio Counties (e.g. Darke, Mercer, Miami, Montgomery, Van Wert etc.).	☐ Wetland should be evaluated for possible Category 3 status. Complete Quantitative Rating.	Complete Quantitative Rating. ☑

Table 1. Characteristic plant species.

invasive/exotic spp	fen species	bog species	0ak Opening species	wet prairie species
Lythrum salicaria	*Zygadenus elegans var. glaucus*	*Calla palustris*	*Carex cryptolepis*	*Calamagrostis*
Myriophyllum spicatum	*Cacalia plantaginea*	*Carex atlantica var. capillacea*	*Carex lasiocarpa*	*Calamogrostis stricta*
Najas minor	*Carex flava*	*Carex echinata*	*Carex stricta*	*Carex atherodes*
Phalaris arundinacea	*Carex sterilis*	*Carex oligosperma*	*Cladium mariscoides*	*Carex buxbaumii*
Phragmites australis	*Carex stricta*	*Carex trisperma*	*Calamagrostis stricta*	*Carex pellita*
Potamogeton crispus	*Deschampsia caespitosa*	*Chamaedaphne calyculata*	*Calamagrostis canadensis*	*Carex sartwellii*
Ranunculus ficaria	*Eleocharis rostellata*	*Decodon verticillatus*	*Quercus palustris*	*Gentiana andrewsii*
Rhamnus frangula	*Eriophorum viridicarinatum*	*Eriophorum virginicum*		*Helianthus*
Typha angustifolia	*Gentianopsis spp.*	*Larix laricina*		*Liatris spicata*
Typha xglauca	*Lobelia kalmii*	*Nemopanthus mucronatus*		*Lysimachia*
	Parnassia glauca	*Schechzeria palustris*		*Lythrum alatum*
	Potentilla fruticosa	*Sphagnum spp.*		*Pycnanthemum*
	Rhamnus alnifolia	*Vaccinium macrocarpon*		*Silphium*
	Rhynchospora capillacea	*Vaccinium corymbosum*		*Sorghastrum nutans*
	Salix candida	*Vaccinium oxycoccos*		*Spartina pectinata*
	Salix myricoides	*Woodwardia virginica*		*Solidago riddellii*
	Salix serissima	*Xyris difformis*		
	Solidago ohioensis			
	Tofieldia glutinosa			
	Triglochin maritimum			
	Triglochin palustre			

End of Narrative Rating. Begin Quantitative Rating on next page.

ORAM v. 5.0 Field Form Quantitative Rating

Site:	Collins Park	Rater(s):	Carolyn Krause	Date:	9/25/23

subtotal	max6pts	Wetland:	W-1
0	0		

Final Score	Category
27	1

Metric 1. Wetland Area (size).

Select one size class and assign score.

Subtotal	Score	Size class
		> 50 acres (<20.2ha) (6 pts)
		25 to <50 acres (10.1 to <20.2ha) (5 pts)
0		10 to <25 acres (4 to <10.1ha) (4 pts)
		3 to 10<acres (1.2 to <4ha) (3 pts)
		0.3 to <3 acres (0.12 to <1.2ha) (2 pts)
		0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
	0	<0.1 acres (0.04ha) (0 pts)

Metric 2. Upland buffers and surrounding land use.

subtotal	max14pts
7	7

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

Subtotal	Score	Option
		WIDE. Buffers average 50m (164 ft) or more around wetland perimeter (7)
4	4	MEDIUM. Buffers average 25m to <50m (82 to <164 ft) around wetland perimeter (4)
		NARROW. Buffers average 10m to <25m (32 ft to <82 ft) around wetland perimeter (1)
		VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

Subtotal	Score	Option
		VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
3		LOW. Old field (>10 years), shrubland, young second growth forest. (5)
	3	MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
		HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

Metric 3. Hydrology.

subtotal	max30pts
18	11

3a. Sources of water. Score all that apply.

Subtotal	Score	Option
		High pH groundwater (5)
		Other groundwater (3)
4	1	Precipitation (1)
	3	Seasonal/Intermittent surface water (3)
		Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

Subtotal	Score	Option
		100 year floodplain (1)
	1	Between stream/lake and other human use (1)
1		Part of wetland/upland (e.g. forest), complex (1)
		Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

Subtotal	Score	Option
		>0.7 (27.6in) (3)
2	2	04. to 0.7m (15.7 to 27.6in) (2)
		<0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

Subtotal	Score	Option
		Semi-to permanently inundated/saturated (4)
	3	Regularly inundated/saturated (3)
3		Seasonally inundated (2)
		Seasonally saturated in upper 30 cm (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

Subtotal	Score	Option
		None or none apparent (12)
		Recovered (7)
1		Recovering (3)
	1	Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [ ] dike
- [ ] weir
- [x] stormwater input
- [ ] point source (non stormwater)
- [ ] filling/grading
- [ ] dirt road
- [x] dredging
- [x] other: wetland is a constructed stormwater basin

Metric 4. Habitat alteration and development.

subtotal	max20pts
27	9

4a. Substrate disturbance. Score one or dbl check and average.

Subtotal	Score	Option
		None or none apparent (4)
2.5	3	Recovered (3)
	2	Recovering (2)
		Recent or no recovery (1)

4c. Habitat alteration. Score one or dbl check and average.

Subtotal	Score	Option
		None or none apparent (9)
4.5	6	Recovered (6)
	3	Recovering (3)
		Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

Subtotal	Score	Option
		Excellent (7)
		Very good (6)
		Good (5)
2		Moderately good (4)
		Fair (3)
	2	Poor to fair (2)
		Poor (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [ ] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [x] dredging
- [ ] farming
- [ ] nutrient enrichment

27

Subtotal this page

ORAM v. 5.0 Field Form Quantitative Rating

Site:	Collins Park	**Rater(s):**	Carolyn Krause	**Date:**	9/25/23
		Wetland:	W-1		

27
Subtotal1st page

subtotal	max10pts
27	0

Metric 5. Special Wetlands

Check all that apply and score as indicated.

Score	Box	Item
		Bog (10)
		Fen (10)
		Old growth forest (10)
		Mature forested wetland (5)
0		Lake Erie Coastal/tributary wetland-unrestricted hydrology (10)
		Lake Erie Coastal/tributary wetland-restricted hydrology (5)
		Lake Plain Sand Prairies (Oak Openings) (10)
		Relict Wet Prairies (10)
		Known occurrence state/federal threatened or endangered species (10)
		Significant migratory songbird/water fowl habitat or usage (10)
		Category 1 Wetland. See question 1 Qualitative Rating - 10

subtotal	max20pts
27	0

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities
Score all present using 0 to 3 scale.

Score	Box	Item
		Aquatic bed
	0	Emergent
0		Shrub
		Forest
		Mudflats
		Open water
		Other ________

6b. Horizontal (plan view) interspersion.
Select only one.

Score	Box	Item
		High (5)
		Moderately high (4)
1		Moderate (3)
		Moderately low (2)
	1	Low (1)
		None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage.

Score	Box	Item
		Extensive >75% cover (-5)
		Moderate 25-75% cover (-3)
-1	-1	Sparse 5-25% cover (-1)
		Nearly absent <5% cover (0)
		Absent (1)

6d. Microtopography
Score all present using 1 to 3 scale.

Score	Box	Item
		Vegetated hummocks/tussocks
		Coarse woody debris > 15cm (6in)
0		Standing dead >25cm (10in) dbh
		Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either commprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality.
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of hgh quality.
3	Present and comprises significant part or more of wetland's vegetation and is of high quality.

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or distrubance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered spp.
high	A predominance of native species, with nonative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened or endangered spp

Mudflat and Open Water Class Quality

0	Absent
1	Low 0.1 to 1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

27.0 **GRAND TOTAL (max 100 pts)**

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

last revised 1 February 2001 jjm

Comments:

End of Quantitative Rating. Complete Categorization Worksheets.

ORAM Summary Worksheet

		YES	NO	Result
Narrative Rating	Question 1 Critical Habitat	☐	☑	If yes, Category 3.
	Question 2. Threatened or Endangered Species	☐	☑	If yes, Category 3.
	Question 3. High Quality Natural Wetland	☐	☑	If yes, Category 3.
	Question 4. Significant bird habitat	☐	☑	If yes, Category 3.
	Question 5. Category 1 Wetlands	☐	☑	If yes, Category 1.
	Question 6. Bogs	☐	☑	If yes, Category 3.
	Question 7. Fens	☐	☑	If yes, Category 3.
	Question 8a. Old Growth Forest	☐	☑	If yes, Category 3.
	Question 8b. Mature Forested Wetland	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9b. Lake Erie Wetlands - Restricted	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9d. Lake Erie Wetlands – Unrestricted with native plants	☐	☑	If yes, Category 3
	Question 9e. Lake Erie Wetlands - Unrestricted with invasive plants	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 10. Oak Openings	☐	☑	If yes, Category 3
	Question 11. Relict Wet Prairies	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
Quantitative Rating	Metric 1. Size	0		
	Metric 2. Buffers and surrounding land use	7		
	Metric 3. Hydrology	11		
	Metric 4. Habitat	9		
	Metric 5. Special Wetland Communities	0		
	Metric 6. Plant communities, interspersion, microtopography	0		
	TOTAL SCORE	27		1

Complete Wetland Categorization Worksheet.

Wetland Categorization Worksheet

Choices	Yes	NO	Evaluation of Categorization Result of ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 2, 3, 4, 6, 7, 8a, 9d, 10	☐ Wetland is categorized as a Category 3 wetland	☑	Is quantitative rating score *less* than the Category 2 scoring threshold (*excluding* gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been over- categorized by the ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 1, 8b, 9b, 9e, 11	☐ Wetland should be evaluated for possible Category 3 status	☑	Evaluate the wetland using the 1) narrative criteria in OAC Rule 3745-1-54(C) and 2) the quantitative rating score. If the wetland is determined to be a Category 3 wetland using either of these, it should be categorized as a Category 3 wetland. Detailed biological and/or functional assessments may also be used to determine the wetland's category.
Did you answer "Yes" to Narrative Rating No. 5	☐ Wetland is categorized as a Category 1 wetland	☑	Is quantitative rating score *greater* than the Category 2 scoring threshold *(including* any gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been under-categorized by the ORAM
Does the quantitative score fall within the scoring range of a Category 1, 2, or 3 wetland?	☑ Wetland is assigned to the appropriate category based on the scoring range	☐	If the score of the wetland is located within the scoring range for a particular category, the wetland should be assigned to that category. In all instances however, the narrative criteria described in OAC Rule 3745-1-54(C) can be used to clarify or change a categorization based on a quantitative score.
Does the quantitative score fall with the *"gray zone"* for Category 1 or 2 or Category 2 or 3 wetlands?	☐ Wetland is assigned to the higher of the two categories or assigned to a category based on detailed assessments and the narrative criteria	☑	Rater has the option of assigning the wetland to the higher of the two categories or to assign a category based on the results of a nonrapid wetland assessment method, e.g. functional assessment, biological assessment, etc, and a consideration of the narrative criteria in OAC rule 3745-1- 54(C).
Does the wetland otherwise exhibit *moderate OR superior* hydrologic OR habitat, OR recreational functions AND the wetland was *not* categorized as a Category 2 wetland (in the case of moderate functions) or a Category 3 wetland (in the case of superior functions) by this method?	☐ Wetland was undercategorized by this method. A written justification for recategorization should be provided on Background Information Form	☑ Wetland is assigned to category as determined by the ORAM.	A wetland may be undercategorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54(C)(2) and (3) are controlling, and the under-categorization should be corrected. A written justification with supporting reasons or information for this determination should be provided.

Final Category

1

End of Ohio Rapid Assessment Method for Wetlands.

Background Information

Name:	Carolyn Krause
Date:	9/25/2023
Affiliation:	EnviroScience, Inc
Address:	5070 Stow Road, Stow, OH 44224
Phone Number:	330-688-0111
e-mail address:	CKrause@EnviroScienceInc.com
Name of Wetland:	W-2
Vegetation Communit(ies):	PEM
HGM Class(es):	Depression

Location of Wetland: include map, address, north arrow, landmarks, distances, roads, etc.
See attached.

Lat/Long or UTM Coordinate	41.658919, -83.482921
USGS Quad Name	Oregon
County	Lucas
City/Township	Toledo
Section and Subsection	
Hydrologic Unit Code	4100009
Site Visit	4/18/2023
National Wetland Inventory Map	See Figure 3 of Wetland Delineation Report
Ohio Wetland Inventory Map	n/a
Soil Survey	See Figure 4 of Wetland Delineation Report
Delineation report/map	See Figure 6 of Wetland Delineation Report

Name of Wetland:	**W-2**
Wetland Size (acres, hectares):	0.294 ac

Sketch: Include north arrow, relationship with other surface waters, vegetation zones, etc.
See Attached.

Comments, Narrative Discussion, Justification of Category Changes:

Final score : 24.5 **Category: 1**

Scoring Boundary Worksheet

INSTRUCTIONS. The initial step in completing the ORAM is to identify the "scoring boundaries" of the wetland being rated. In many instances this determination will be relatively easy and the scoring boundaries will coincide with the "jurisdictional boundaries." For example, the scoring boundary of an isolated cattail marsh located in the middle of a farm field will likely be the same as that wetland's jurisdictional boundaries. In other instances, however, the scoring boundary will not be as easily determined. Wetlands that are small or isolated from other surface waters often form large contiguous areas or heterogeneous complexes of wetland and upland. In separating wetlands for scoring purposes, the hydrologic regime of the wetland is the main criterion that should be used. Boundaries between contiguous or connected wetlands should be established where the volume, flow, or velocity of water moving through the wetland changes significantly. Areas with a high degree of hydrologic interaction should be scored as a single wetland. In determining a wetland's scoring boundaries
use the guidelines in the ORAM Manual Section 5.0. In certain instances, it may be difficult to establish the scoring boundary for the wetland being rated. These problem situations include wetlands that form a patchwork on the landscape, wetlands divided by artificial boundaries like property fences, roads, or railroad embankments, wetlands that are contiguous with streams, lakes, or rivers, and estuarine or coastal wetlands. These situations are discussed below, however, it is recommended that Rater contact Ohio EPA, Division of Surface Water, 401/Wetlands Section if there are additional questions or a need for further clarification of the appropriate scoring boundaries of a particular wetland.

#	Steps in properly establishing scoring boundaries	done?	not applicable
Step 1	Identify the wetland area of interest. This may be the site of a proposed impact, a reference site, conservation site, etc.	☑	☐
Step 2	Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both natural and human- induced changes including, constrictions caused by berms or dikes, points where the water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic interaction between the wetlands or parts of a single wetland.	☑	☐
Step 3	Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within the areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction are included within the scoring boundary.	☑	☐
Step 4	Determine if artificial boundaries, such as property lines, state lines, roads, railroad embankments, etc., are present. These should not be used to establish scoring boundaries unless they coincide with areas where the hydrologic regime changes.	☑	☐
Step 5	In all instances, the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.	☐	☑
Step 6	Consult ORAM Manual Section 5.0 for how to establish scoring boundaries for wetlands that form a patchwork on the landscape, divided by artificial boundaries, contiguous to streams, lakes or rivers, or for dual classifications.	☐	☑

End of Scoring Boundary Determination. Begin Narrative Rating on next page.

Narrative Rating

INSTRUCTIONS. Answer each of the following questions. Questions 1, 2, 3 and 4 should be answered based on Information obtained from the site visit or the literature and by submitting a Data Services Request to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Data Services, 1889 Fountain Square Court, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/dnap . The remaining questions are designed to be answered primarily by the results of the site visit. Refer to the User's Manual for descriptions of these wetland types. Note: "Critical habitat" is legally defined in the Endangered Species Act and is the geographic area containing physical or biological features essential to the conservation of a listed species or as an area that may require special management considerations or protection. The Rater should contact the Region 3 Headquarters or the Columbus Ecological Services Office for updates as to whether critical habitat has been designated for other federally listed threatened or endangered species. "Documented" means

the wetland is listed in the appropriate State of Ohio database.

#	Question	YES	NO
1	**Critical Habitat.** Is the wetland in a township, section, or subsection of a United States Geological Survey 7.5 minute Quadrangle that has been designated by the U.S. Fish and Wildlife Service as "critical habitat" for any threatened or endangered plant or animal species? Note: as of January 1, 2001, of the federally listed endangered or threatened species which can be found in Ohio, the Indiana Bat has had critical habitat designated (50 CFR 17.95(a)) and the piping plover has had critical habitat proposed (65 FR 41812 July 6, 2000).	☐ Wetland should be evaluated for possible Category 3 status. Go to Question 2	☑ Go to Question 2
2	**Threatened or Endangered Species.** Is the wetland known to contain an individual of, or documented occurrences of federal or state-listed threatened or endangered plant or animal species?	☐ Wetland is a Category 3 wetland. Go to Question 3	☑ Go to Question 3
3	**Documented High Quality Wetland.** Is the wetland on record in Natural Heritage Database as a high quality wetland?	☐ Wetland is a Category 3 wetland. Go to Question 4	☑ Go to Question 4
4	**Significant Breeding or Concentration Area.** Does the wetland contain documented regionally significant breeding or nonbreeding waterfowl, neotropical songbird, or shorebird concentration areas?	☐ Wetland is a Category 3 wetland. Go to Question 5	☑ Go to Question 5
5	**Category 1 Wetlands.** Is the wetland less than 0.5 hectares (1 acre) in size and **hydrologically isolated** and either 1) comprised of vegetation that is dominated (greater than eighty per cent areal cover) by *Phalaris arundinacea, Lythrum salicaria,* or *Phragmites australis* , or 2) an acidic pond created or excavated on mined lands that has little or no vegetation?	☐ Wetland is a Category 3 wetland. Go to Question 6	☑ Go to Question 6
6	**Bogs.** Is the wetland a peat-accumulating wetland that 1) has no significant inflows or outflows, 2) supports acidophilic mosses, particularly *Sphagnum* spp., 3) the acidophilic mosses have >30% cover, 4) at least one species from Table 1 is present, and 5) the cover of invasive species (see Table 1) is <25%?	☐ Wetland is a Category 3 wetland. Go to Question 7	☑ Go to Question 7
7	**Fens.** Is the wetland a carbon accumulating (peat, muck) wetland that is saturated during most of the year, primarily by a discharge of free flowing, mineral rich, ground water with a circumneutral ph (5.5-9.0) and with one or more plant species listed in Table 1 and the cover of invasive species listed in Table 1 is <25%?	☐ Wetland is a Category 3 wetland. Go to Question 8	☑ Go to Question 8a
8a	**"Old Growth Forest."** Is the wetland a forested wetland and is the forest characterized by, but not limited to, the following characteristics: overstory canopy trees of great age (exceeding at least 50% of a projected maximum attainable age for a species); little or no evidence of human-caused understory disturbance during the past 80 to 100 years; an all-aged structure and multilayered canopies; aggregations of canopy trees interspersed with canopy gaps; and significant numbers of standing dead snags and downed logs?	☐ Wetland is a Category 3 wetland. Go to Question 8b	☑ Go to Question 8b

8b	**Mature forested wetlands**. Is the wetland a forested wetland with 50% or more of the cover of upper forest canopy consisting of deciduous trees with large diameters at breast height (dbh), generally diameters greater than 45cm (17.7in) dbh?	☐ Wetland should be evaluated for possible Category 3 status Go to Question 9a	☑ Go to Question 9a
9a	**Lake Erie coastal and tributary wetlands**. Is the wetland located at an elevation less than 575 feet on the USGS map, adjacent to this elevation, or along a tributary to Lake Erie that is accessible to fish?	☐ Go to Question 9b	☑ Go to Question 10
9b	Does the wetland's hydrology result from measures designed to prevent erosion and the loss of aquatic plants, i.e. the wetland is partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?	☐ Wetland should be evaluated for possible Category 3 status Go to Question 9d	☑ Go to Question 9c
9c	Are Lake Erie water levels the wetland's primary hydrological influence, i.e. the wetland is hydrologically unrestricted (no lakeward or upland border alterations), or the wetland can be characterized as an "estuarine" wetland with lake and river influenced hydrology. These include sandbar deposition wetlands, estuarine wetlands, river mouth wetlands, or those dominated by submersed aquatic vegetation.	☐ Go to Question 9d	☑ Go to Question 9d
9d	Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant native species can also be present?	☐ Wetland is a Category 3 wetland. Go to Question 10	☑ Go to Question 9e
9e	Does the wetland have a predominance of non-native or disturbance tolerant native plant species within its vegetation communities?	☐ Wetland should be evaluated for possible Category 3 status. Go to Question 10	☑ Go to Question 10
10	**Lake Plain Sand Prairies (Oak Openings)** Is the wetland located in Lucas, Fulton, Henry, or Wood Counties and can the wetland be characterized by the following description: the wetland has a sandy substrate with interspersed organic matter, a water table often within several inches of the surface, and often with a dominance of the gramineous vegetation listed in Table 1 (woody species may also be present). The Ohio Department of Natural Resources Division of Natural Areas and Preserves can provide assistance in confirming this type of wetland and its quality.	☐ Wetland is a Category 3 wetland. Go to Question 11	☑ Go to Question 11
11	**Relict Wet Prairies**. Is the wetland a relict wet prairie community dominated by some or all of the species in Table 1. Extensive prairies were formerly located in the Darby Plains (Madison and Union Counties), Sandusky Plains (Wyandot, Crawford, and Marion Counties), northwest Ohio (e.g. Erie, Huron, Lucas, Wood Counties), and portions of western Ohio Counties (e.g. Darke, Mercer, Miami, Montgomery, Van Wert etc.).	☐ Wetland should be evaluated for possible Category 3 status. Complete Quantitative Rating.	☑ Complete Quantitative Rating.

Table 1. Characteristic plant species.

invasive/exotic spp	fen species	bog species	0ak Opening species	wet prairie species
Lythrum salicaria	*Zygadenus elegans var. glaucus*	*Calla palustris*	*Carex cryptolepis*	*Calamagrostis*
Myriophyllum spicatum	*Cacalia plantaginea*	*Carex atlantica var. capillacea*	*Carex lasiocarpa*	*Calamogrostis stricta*
Najas minor	*Carex flava*	*Carex echinata*	*Carex stricta*	*Carex atherodes*
Phalaris arundinacea	*Carex sterilis*	*Carex oligosperma*	*Cladium mariscoides*	*Carex buxbaumii*
Phragmites australis	*Carex stricta*	*Carex trisperma*	*Calamagrostis stricta*	*Carex pellita*
Potamogeton crispus	*Deschampsia caespitosa*	*Chamaedaphne calyculata*	*Calamagrostis canadensis*	*Carex sartwellii*
Ranunculus ficaria	*Eleocharis rostellata*	*Decodon verticillatus*	*Quercus palustris*	*Gentiana andrewsii*
Rhamnus frangula	*Eriophorum viridicarinatum*	*Eriophorum virginicum*		*Helianthus*
Typha angustifolia	*Gentianopsis spp.*	*Larix laricina*		*Liatris spicata*
Typha xglauca	*Lobelia kalmii*	*Nemopanthus mucronatus*		*Lysimachia*
	Parnassia glauca	*Schechzeria palustris*		*Lythrum alatum*
	Potentilla fruticosa	*Sphagnum spp.*		*Pycnanthemum*
	Rhamnus alnifolia	*Vaccinium macrocarpon*		*Silphium*
	Rhynchospora capillacea	*Vaccinium corymbosum*		*Sorghastrum nutans*
	Salix candida	*Vaccinium oxycoccos*		*Spartina pectinata*
	Salix myricoides	*Woodwardia virginica*		*Solidago riddellii*
	Salix serissima	*Xyris difformis*		
	Solidago ohioensis			
	Tofieldia glutinosa			
	Triglochin maritimum			
	Triglochin palustre			

End of Narrative Rating. Begin Quantitative Rating on next page.

ORAM v. 5.0 Field Form Quantitative Rating

Site:	Collins Park	**Rater(s):**	Carolyn Krause	**Date:**	9/25/23

Wetland: W-2

24.5	1
Final Score	**Category**

1	1
subtotal	max6pts

Metric 1. Wetland Area (size).

Select one size class and assign score.

Score: 1

	> 50 acres (<20.2ha) (6 pts)
	25 to <50 acres (10.1 to <20.2ha) (5 pts)
	10 to <25 acres (4 to <10.1ha) (4 pts)
	3 to 10<acres (1.2 to <4ha) (3 pts)
	0.3 to <3 acres (0.12 to <1.2ha) (2 pts)
1	0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
	<0.1 acres (0.04ha) (0 pts)

5	4
subtotal	max14pts

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

Score: 1

	WIDE. Buffers average 50m (164 ft) or more around wetland perimeter (7)
	MEDIUM. Buffers average 25m to <50m (82 to <164 ft) around wetland perimeter (4)
1	NARROW. Buffers average 10m to <25m (32 ft to <82 ft) around wetland perimeter (1)
	VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

Score: 3

	VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
	LOW. Old field (>10 years), shrubland, young second growth forest. (5)
3	MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
	HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

17	12
subtotal	max30pts

Metric 3. Hydrology.

3a. Sources of water. Score all that apply.

Score: 1

	High pH groundwater (5)
	Other groundwater (3)
1	Precipitation (1)
	Seasonal/Intermittent surface water (3)
	Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

Score: 2

1	100 year floodplain (1)
1	Between stream/lake and other human use (1)
	Part of wetland/upland (e.g. forest), complex (1)
	Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

Score: 1

	>0.7 (27.6in) (3)
	04. to 0.7m (15.7 to 27.6in) (2)
1	<0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

Score: 3

	Semi-to permanently inundated/saturated (4)
3	Regularly inundated/saturated (3)
	Seasonally inundated (2)
	Seasonally saturated in upper 30 cm (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

Score: 5

	None or none apparent (12)
7	Recovered (7)
3	Recovering (3)
	Recent or no recovery (1)

Check all disturbances observed

☐ ditch	☐ point source (non stormwater)
☐ tile	☐ filling/grading
☐ dike	☐ dirt road
☐ weir	☐ dredging
☑ stormwater input	☐ other

24.5	7.5
subtotal	max20pts

Metric 4. Habitat alteration and development.

4a. Substrate disturbance. Score one or dbl check and average.

Score: 2.5

	None or none apparent (4)
3	Recovered (3)
2	Recovering (2)
	Recent or no recovery (1)

4c. Habitat alteration. Score one or dbl check and average.

Score: 3

	None or none apparent (9)
	Recovered (6)
3	Recovering (3)
	Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

Score: 2

	Excellent (7)
	Very good (6)
	Good (5)
	Moderately good (4)
	Fair (3)
2	Poor to fair (2)
	Poor (1)

Check all disturbances observed

☑ mowing	☐ shrub/sapling removal
☐ grazing	☐ herbaceous/aquatic bed removal
☐ clearcutting	☐ sedimentation
☐ selective cutting	☐ dredging
☐ woody debris removal	☐ farming
☐ toxic pollutants	☐ nutrient enrichment

24.5

Subtotal this page

ORAM v. 5.0 Field Form Quantitative Rating

Site:	Collins Park	Rater(s):	Carolyn Krause	Date:	9/25/23
		Wetland:	W-2		

24.5
Subtotal1st page

24.5	0
subtotal	max10pts

Metric 5. Special Wetlands

Check all that apply and score as indicated.

0

Score	Item
	Bog (10)
	Fen (10)
	Old growth forest (10)
	Mature forested wetland (5)
	Lake Erie Coastal/tributary wetland-unrestricted hydrology (10)
	Lake Erie Coastal/tributary wetland-restricted hydrology (5)
	Lake Plain Sand Prairies (Oak Openings) (10)
	Relict Wet Prairies (10)
	Known occurrence state/federal threatened or endangered species (10)
	Significant migratory songbird/water fowl habitat or usage (10)
	Category 1 Wetland. See question 1 Qualitative Rating - 10

24.5	0
subtotal	max20pts

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities

Score all present using 0 to 3 scale.

1

Score	Community
	Aquatic bed
1	Emergent
	Shrub
	Forest
	Mudflats
	Open water
	Other ____________

6b. Horizontal (plan view) interspersion.

Select only one.

0

Score	Interspersion
	High (5)
	Moderately high (4)
	Moderate (3)
	Moderately low (2)
	Low (1)
0	None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage.

-3

Score	Coverage
	Extensive >75% cover (-5)
-3	Moderate 25-75% cover (-3)
	Sparse 5-25% cover (-1)
	Nearly absent <5% cover (0)
	Absent (1)

6d. Microtopography

Score all present using 1 to 3 scale.

2

Score	Feature
1	Vegetated hummocks/tussocks
	Coarse woody debris > 15cm (6in)
	Standing dead >25cm (10in) dbh
1	Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either commprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality.
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of hgh quality.
3	Present and comprises significant part or more of wetland's vegetation and is of high quality.

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or distrubance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered spp.
high	A predominance of native species, with nonative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened or endangered spp

Mudflat and Open Water Class Quality

0	Absent
1	Low 0.1 to 1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

24.5 GRAND TOTAL (max 100 pts)

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

last revised 1 February 2001 jjm

Comments:

End of Quantitative Rating. Complete Categorization Worksheets.

ORAM Summary Worksheet

		YES	NO	Result
Narrative Rating	Question 1 Critical Habitat	☐	☑	If yes, Category 3.
	Question 2. Threatened or Endangered Species	☐	☑	If yes, Category 3.
	Question 3. High Quality Natural Wetland	☐	☑	If yes, Category 3.
	Question 4. Significant bird habitat	☐	☑	If yes, Category 3.
	Question 5. Category 1 Wetlands	☐	☑	If yes, Category 1.
	Question 6. Bogs	☐	☑	If yes, Category 3.
	Question 7. Fens	☐	☑	If yes, Category 3.
	Question 8a. Old Growth Forest	☐	☑	If yes, Category 3.
	Question 8b. Mature Forested Wetland	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9b. Lake Erie Wetlands - Restricted	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9d. Lake Erie Wetlands – Unrestricted with native plants	☐	☑	If yes, Category 3
	Question 9e. Lake Erie Wetlands - Unrestricted with invasive plants	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 10. Oak Openings	☐	☑	If yes, Category 3
	Question 11. Relict Wet Prairies	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
Quantitative Rating	Metric 1. Size	1		
	Metric 2. Buffers and surrounding land use	4		
	Metric 3. Hydrology	12		
	Metric 4. Habitat	7.5		
	Metric 5. Special Wetland Communities	0		
	Metric 6. Plant communities, interspersion, microtopography	0		
	TOTAL SCORE	24.5		1

Complete Wetland Categorization Worksheet.

Wetland Categorization Worksheet

Choices	Yes	NO	Evaluation of Categorization Result of ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 2, 3, 4, 6, 7, 8a, 9d, 10	☐ Wetland is categorized as a Category 3 wetland	☑	Is quantitative rating score *less* than the Category 2 scoring threshold (*excluding* gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been over- categorized by the ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 1, 8b, 9b, 9e, 11	☐ Wetland should be evaluated for possible Category 3 status	☑	Evaluate the wetland using the 1) narrative criteria in OAC Rule 3745-1-54(C) and 2) the quantitative rating score. If the wetland is determined to be a Category 3 wetland using either of these, it should be categorized as a Category 3 wetland. Detailed biological and/or functional assessments may also be used to determine the wetland's category.
Did you answer "Yes" to Narrative Rating No. 5	☐ Wetland is categorized as a Category 1 wetland	☑	Is quantitative rating score *greater* than the Category 2 scoring threshold *(including* any gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been under-categorized by the ORAM
Does the quantitative score fall within the scoring range of a Category 1, 2, or 3 wetland?	☑ Wetland is assigned to the appropriate category based on the scoring range	☐	If the score of the wetland is located within the scoring range for a particular category, the wetland should be assigned to that category. In all instances however, the narrative criteria described in OAC Rule 3745-1-54(C) can be used to clarify or change a categorization based on a quantitative score.
Does the quantitative score fall with the *"gray zone"* for Category 1 or 2 or Category 2 or 3 wetlands?	☐ Wetland is assigned to the higher of the two categories or assigned to a category based on detailed assessments and the narrative criteria	☑	Rater has the option of assigning the wetland to the higher of the two categories or to assign a category based on the results of a nonrapid wetland assessment method, e.g. functional assessment, biological assessment, etc, and a consideration of the narrative criteria in OAC rule 3745-1- 54(C).
Does the wetland otherwise exhibit *moderate OR superior* hydrologic OR habitat, OR recreational functions AND the wetland was *not* categorized as a Category 2 wetland (in the case of moderate functions) or a Category 3 wetland (in the case of superior functions) by this method?	☐ Wetland was undercategorized by this method. A written justification for recategorization should be provided on Background Information Form	☑ Wetland is assigned to category as determined by the ORAM.	A wetland may be undercategorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54(C)(2) and (3) are controlling, and the under-categorization should be corrected. A written justification with supporting reasons or information for this determination should be provided.

Final Category

1

End of Ohio Rapid Assessment Method for Wetlands.

Background Information

Name:	Carolyn Krause
Date:	9/25/2023
Affiliation:	EnviroScience, Inc
Address:	5070 Stow Road, Stow, OH 44224
Phone Number:	330-688-0111
e-mail address:	CKrause@EnviroScienceInc.com
Name of Wetland:	W-3
Vegetation Communit(ies):	PSS
HGM Class(es):	Depression

Location of Wetland: include map, address, north arrow, landmarks, distances, roads, etc.
See attached.

Lat/Long or UTM Coordinate	41.660333, -83.48079
USGS Quad Name	Oregon
County	Lucas
City/Township	Toledo
Section and Subsection	
Hydrologic Unit Code	4100009
Site Visit	4/18/2023
National Wetland Inventory Map	See Figure 3 of Wetland Delineation Report
Ohio Wetland Inventory Map	n/a
Soil Survey	See Figure 4 of Wetland Delineation Report
Delineation report/map	See Figure 6 of Wetland Delineation Report

Name of Wetland:	**W-3**	
Wetland Size (acres, hectares):		0.056 ac

Sketch: Include north arrow, relationship with other surface waters, vegetation zones, etc.
See Attached.

Comments, Narrative Discussion, Justification of Category Changes:

Final score : 27	**Category: 1**

Scoring Boundary Worksheet

INSTRUCTIONS. The initial step in completing the ORAM is to identify the "scoring boundaries" of the wetland being rated. In many instances this determination will be relatively easy and the scoring boundaries will coincide with the "jurisdictional boundaries." For example, the scoring boundary of an isolated cattail marsh located in the middle of a farm field will likely be the same as that wetland's jurisdictional boundaries. In other instances, however, the scoring boundary will not be as easily determined. Wetlands that are small or isolated from other surface waters often form large contiguous areas or heterogeneous complexes of wetland and upland. In separating wetlands for scoring purposes, the hydrologic regime of the wetland is the main criterion that should be used. Boundaries between contiguous or connected wetlands should be established where the volume, flow, or velocity of water moving through the wetland changes significantly. Areas with a high degree of hydrologic interaction should be scored as a single wetland. In determining a wetland's scoring boundaries
use the guidelines in the ORAM Manual Section 5.0. In certain instances, it may be difficult to establish the scoring boundary for the wetland being rated. These problem situations include wetlands that form a patchwork on the landscape, wetlands divided by artificial boundaries like property fences, roads, or railroad embankments, wetlands that are contiguous with streams, lakes, or rivers, and estuarine or coastal wetlands. These situations are discussed below, however, it is recommended that Rater contact Ohio EPA, Division of Surface Water, 401/Wetlands Section if there are additional questions or a need for further clarification of the appropriate scoring boundaries of a particular wetland.

#	Steps in properly establishing scoring boundaries	done?	not applicable
Step 1	Identify the wetland area of interest. This may be the site of a proposed impact, a reference site, conservation site, etc.	☑	☐
Step 2	Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both natural and human- induced changes including, constrictions caused by berms or dikes, points where the water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic interaction between the wetlands or parts of a single wetland.	☑	☐
Step 3	Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within the areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction are included within the scoring boundary.	☑	☐
Step 4	Determine if artificial boundaries, such as property lines, state lines, roads, railroad embankments, etc., are present. These should not be used to establish scoring boundaries unless they coincide with areas where the hydrologic regime changes.	☑	☐
Step 5	In all instances, the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.	☐	☑
Step 6	Consult ORAM Manual Section 5.0 for how to establish scoring boundaries for wetlands that form a patchwork on the landscape, divided by artificial boundaries, contiguous to streams, lakes or rivers, or for dual classifications.	☐	☑

End of Scoring Boundary Determination. Begin Narrative Rating on next page.

Narrative Rating

INSTRUCTIONS. Answer each of the following questions. Questions 1, 2, 3 and 4 should be answered based on Information obtained from the site visit or the literature and by submitting a Data Services Request to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Data Services, 1889 Fountain Square Court, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/dnap . The remaining questions are designed to be answered primarily by the results of the site visit. Refer to the User's Manual for descriptions of these wetland types. Note: "Critical habitat" is legally defined in the Endangered Species Act and is the geographic area containing physical or biological features essential to the conservation of a listed species or as an area that may require special management considerations or protection. The Rater should contact the Region 3 Headquarters or the Columbus Ecological Services Office for updates as to whether critical habitat has been designated for other federally listed threatened or endangered species. "Documented" means

the wetland is listed in the appropriate State of Ohio database.

#	Question	YES	NO
1	**Critical Habitat.** Is the wetland in a township, section, or subsection of a United States Geological Survey 7.5 minute Quadrangle that has been designated by the U.S. Fish and Wildlife Service as "critical habitat" for any threatened or endangered plant or animal species? Note: as of January 1, 2001, of the federally listed endangered or threatened species which can be found in Ohio, the Indiana Bat has had critical habitat designated (50 CFR 17.95(a)) and the piping plover has had critical habitat proposed (65 FR 41812 July 6, 2000).	☐ Wetland should be evaluated for possible Category 3 status. Go to Question 2	☑ Go to Question 2
2	**Threatened or Endangered Species.** Is the wetland known to contain an individual of, or documented occurrences of federal or state-listed threatened or endangered plant or animal species?	☐ Wetland is a Category 3 wetland. Go to Question 3	☑ Go to Question 3
3	**Documented High Quality Wetland.** Is the wetland on record in Natural Heritage Database as a high quality wetland?	☐ Wetland is a Category 3 wetland. Go to Question 4	☑ Go to Question 4
4	**Significant Breeding or Concentration Area.** Does the wetland contain documented regionally significant breeding or nonbreeding waterfowl, neotropical songbird, or shorebird concentration areas?	☐ Wetland is a Category 3 wetland. Go to Question 5	☑ Go to Question 5
5	**Category 1 Wetlands.** Is the wetland less than 0.5 hectares (1 acre) in size and **hydrologically isolated** and either 1) comprised of vegetation that is dominated (greater than eighty per cent areal cover) by *Phalaris arundinacea, Lythrum salicaria,* or *Phragmites australis* , or 2) an acidic pond created or excavated on mined lands that has little or no vegetation?	☐ Wetland is a Category 3 wetland. Go to Question 6	☑ Go to Question 6
6	**Bogs.** Is the wetland a peat-accumulating wetland that 1) has no significant inflows or outflows, 2) supports acidophilic mosses, particularly *Sphagnum* spp., 3) the acidophilic mosses have >30% cover, 4) at least one species from Table 1 is present, and 5) the cover of invasive species (see Table 1) is <25%?	☐ Wetland is a Category 3 wetland. Go to Question 7	☑ Go to Question 7
7	**Fens.** Is the wetland a carbon accumulating (peat, muck) wetland that is saturated during most of the year, primarily by a discharge of free flowing, mineral rich, ground water with a circumneutral ph (5.5-9.0) and with one or more plant species listed in Table 1 and the cover of invasive species listed in Table 1 is <25%?	☐ Wetland is a Category 3 wetland. Go to Question 8	☑ Go to Question 8a
8a	**"Old Growth Forest."** Is the wetland a forested wetland and is the forest characterized by, but not limited to, the following characteristics: overstory canopy trees of great age (exceeding at least 50% of a projected maximum attainable age for a species); little or no evidence of human-caused understory disturbance during the past 80 to 100 years; an all-aged structure and multilayered canopies; aggregations of canopy trees interspersed with canopy gaps; and significant numbers of standing dead snags and downed logs?	☐ Wetland is a Category 3 wetland. Go to Question 8b	☑ Go to Question 8b

8b	**Mature forested wetlands**. Is the wetland a forested wetland with 50% or more of the cover of upper forest canopy consisting of deciduous trees with large diameters at breast height (dbh), generally diameters greater than 45cm (17.7in) dbh?	☐ Wetland should be evaluated for possible Category 3 status Go to Question 9a	☑ Go to Question 9a
9a	**Lake Erie coastal and tributary wetlands**. Is the wetland located at an elevation less than 575 feet on the USGS map, adjacent to this elevation, or along a tributary to Lake Erie that is accessible to fish?	☐ Go to Question 9b	☑ Go to Question 10
9b	Does the wetland's hydrology result from measures designed to prevent erosion and the loss of aquatic plants, i.e. the wetland is partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?	☐ Wetland should be evaluated for possible Category 3 status Go to Question 9d	☑ Go to Question 9c
9c	Are Lake Erie water levels the wetland's primary hydrological influence, i.e. the wetland is hydrologically unrestricted (no lakeward or upland border alterations), or the wetland can be characterized as an "estuarine" wetland with lake and river influenced hydrology. These include sandbar deposition wetlands, estuarine wetlands, river mouth wetlands, or those dominated by submersed aquatic vegetation.	☐ Go to Question 9d	☑ Go to Question 9d
9d	Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant native species can also be present?	☐ Wetland is a Category 3 wetland. Go to Question 10	☑ Go to Question 9e
9e	Does the wetland have a predominance of non-native or disturbance tolerant native plant species within its vegetation communities?	☐ Wetland should be evaluated for possible Category 3 status. Go to Question 10	☑ Go to Question 10
10	**Lake Plain Sand Prairies (Oak Openings)** Is the wetland located in Lucas, Fulton, Henry, or Wood Counties and can the wetland be characterized by the following description: the wetland has a sandy substrate with interspersed organic matter, a water table often within several inches of the surface, and often with a dominance of the gramineous vegetation listed in Table 1 (woody species may also be present). The Ohio Department of Natural Resources Division of Natural Areas and Preserves can provide assistance in confirming this type of wetland and its quality.	☐ Wetland is a Category 3 wetland. Go to Question 11	☑ Go to Question 11
11	**Relict Wet Prairies**. Is the wetland a relict wet prairie community dominated by some or all of the species in Table 1. Extensive prairies were formerly located in the Darby Plains (Madison and Union Counties), Sandusky Plains (Wyandot, Crawford, and Marion Counties), northwest Ohio (e.g. Erie, Huron, Lucas, Wood Counties), and portions of western Ohio Counties (e.g. Darke, Mercer, Miami, Montgomery, Van Wert etc.).	☐ Wetland should be evaluated for possible Category 3 status. Complete Quantitative Rating.	☑ Complete Quantitative Rating.

Table 1. Characteristic plant species.

invasive/exotic spp	fen species	bog species	0ak Opening species	wet prairie species
Lythrum salicaria	*Zygadenus elegans var. glaucus*	*Calla palustris*	*Carex cryptolepis*	*Calamagrostis*
Myriophyllum spicatum	*Cacalia plantaginea*	*Carex atlantica var. capillacea*	*Carex lasiocarpa*	*Calamogrostis stricta*
Najas minor	*Carex flava*	*Carex echinata*	*Carex stricta*	*Carex atherodes*
Phalaris arundinacea	*Carex sterilis*	*Carex oligosperma*	*Cladium mariscoides*	*Carex buxbaumii*
Phragmites australis	*Carex stricta*	*Carex trisperma*	*Calamagrostis stricta*	*Carex pellita*
Potamogeton crispus	*Deschampsia caespitosa*	*Chamaedaphne calyculata*	*Calamagrostis canadensis*	*Carex sartwellii*
Ranunculus ficaria	*Eleocharis rostellata*	*Decodon verticillatus*	*Quercus palustris*	*Gentiana andrewsii*
Rhamnus frangula	*Eriophorum viridicarinatum*	*Eriophorum virginicum*		*Helianthus*
Typha angustifolia	*Gentianopsis spp.*	*Larix laricina*		*Liatris spicata*
Typha xglauca	*Lobelia kalmii*	*Nemopanthus mucronatus*		*Lysimachia*
	Parnassia glauca	*Schechzeria palustris*		*Lythrum alatum*
	Potentilla fruticosa	*Sphagnum spp.*		*Pycnanthemum*
	Rhamnus alnifolia	*Vaccinium macrocarpon*		*Silphium*
	Rhynchospora capillacea	*Vaccinium corymbosum*		*Sorghastrum nutans*
	Salix candida	*Vaccinium oxycoccos*		*Spartina pectinata*
	Salix myricoides	*Woodwardia virginica*		*Solidago riddellii*
	Salix serissima	*Xyris difformis*		
	Solidago ohioensis			
	Tofieldia glutinosa			
	Triglochin maritimum			
	Triglochin palustre			

End of Narrative Rating. Begin Quantitative Rating on next page.

ORAM v. 5.0 Field Form Quantitative Rating

Site:	Collins Park	Rater(s):	Carolyn Krause	Date:	9/25/23

subtotal	max6pts	Wetland:	W-3
0	0		

Final Score	Category
27	1

Metric 1. Wetland Area (size).

Select one size class and assign score.

	Score	Size class
		> 50 acres (<20.2ha) (6 pts)
		25 to <50 acres (10.1 to <20.2ha) (5 pts)
0		10 to <25 acres (4 to <10.1ha) (4 pts)
		3 to 10<acres (1.2 to <4ha) (3 pts)
		0.3 to <3 acres (0.12 to <1.2ha) (2 pts)
		0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
	0	<0.1 acres (0.04ha) (0 pts)

subtotal	max14pts
7	7

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

	Score	
		WIDE. Buffers average 50m (164 ft) or more around wetland perimeter (7)
4	4	MEDIUM. Buffers average 25m to <50m (82 to <164 ft) around wetland perimeter (4)
		NARROW. Buffers average 10m to <25m (32 ft to <82 ft) around wetland perimeter (1)
		VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

	Score	
		VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
3		LOW. Old field (>10 years), shrubland, young second growth forest. (5)
	3	MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
		HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

subtotal	max30pts
16	9

Metric 3. Hydrology.

3a. Sources of water. Score all that apply.

	Score	
		High pH groundwater (5)
		Other groundwater (3)
1	1	Precipitation (1)
		Seasonal/Intermittent surface water (3)
		Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

	Score	
		100 year floodplain (1)
		Between stream/lake and other human use (1)
1	1	Part of wetland/upland (e.g. forest), complex (1)
		Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

	Score	
		>0.7 (27.6in) (3)
1		04. to 0.7m (15.7 to 27.6in) (2)
	1	<0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

	Score	
		Semi-to permanently inundated/saturated (4)
		Regularly inundated/saturated (3)
1		Seasonally inundated (2)
	1	Seasonally saturated in upper 30 cm (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

	Score	
		None or none apparent (12)
	7	Recovered (7)
5	3	Recovering (3)
		Recent or no recovery (1)

Check all disturbances observed

- ☐ ditch
- ☐ tile
- ☐ dike
- ☐ weir
- ☐ stormwater input
- ☐ point source (non stormwater)
- ☐ filling/grading
- ☐ dirt road
- ☐ dredging
- ☐ other

subtotal	max20pts
26	10

Metric 4. Habitat alteration and development.

4a. Substrate disturbance. Score one or dbl check and average.

	Score	
		None or none apparent (4)
2.5	3	Recovered (3)
	2	Recovering (2)
		Recent or no recovery (1)

4c. Habitat alteration. Score one or dbl check and average.

	Score	
		None or none apparent (9)
4.5	6	Recovered (6)
	3	Recovering (3)
		Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

	Score	
		Excellent (7)
		Very good (6)
		Good (5)
3		Moderately good (4)
	3	Fair (3)
		Poor to fair (2)
		Poor (1)

Check all disturbances observed

- ☑ mowing
- ☐ grazing
- ☐ clearcutting
- ☐ selective cutting
- ☐ woody debris removal
- ☐ toxic pollutants
- ☐ shrub/sapling removal
- ☐ herbaceous/aquatic bed removal
- ☐ sedimentation
- ☐ dredging
- ☐ farming
- ☐ nutrient enrichment

26

Subtotal this page

ORAM v. 5.0 Field Form Quantitative Rating

Site:	Collins Park	**Rater(s):**	Carolyn Krause	**Date:**	9/25/23
			Wetland:	W-3	

26
Subtotal1st page

26	0
subtotal	max10pts

Metric 5. Special Wetlands

Check all that apply and score as indicated.

0

	Bog (10)
	Fen (10)
	Old growth forest (10)
	Mature forested wetland (5)
	Lake Erie Coastal/tributary wetland-unrestricted hydrology (10)
	Lake Erie Coastal/tributary wetland-restricted hydrology (5)
	Lake Plain Sand Prairies (Oak Openings) (10)
	Relict Wet Prairies (10)
	Known occurrence state/federal threatened or endangered species (10)
	Significant migratory songbird/water fowl habitat or usage (10)
	Category 1 Wetland. See question 1 Qualitative Rating - 10

27	1
subtotal	max20pts

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities
Score all present using 0 to 3 scale.

0

	Aquatic bed
0	Emergent
0	Shrub
	Forest
	Mudflats
	Open water
	Other

6b. Horizontal (plan view) interspersion.
Select only one.

1

	High (5)
	Moderately high (4)
	Moderate (3)
	Moderately low (2)
1	Low (1)
	None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage.

0

	Extensive >75% cover (-5)
	Moderate 25-75% cover (-3)
	Sparse 5-25% cover (-1)
0	Nearly absent <5% cover (0)
	Absent (1)

6d. Microtopography
Score all present using 1 to 3 scale.

0

0	Vegetated hummocks/tussocks
0	Coarse woody debris > 15cm (6in)
0	Standing dead >25cm (10in) dbh
0	Amphibian breeding pools

Vegetation Community Cover Scale	
0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either commprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality.
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of hgh quality.
3	Present and comprises significant part or more of wetland's vegetation and is of high quality.

Narrative Description of Vegetation Quality	
low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or distrubance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered spp.
high	A predominance of native species, with nonative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened or endangered spp

Mudflat and Open Water Class Quality	
0	Absent
1	Low 0.1 to 1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale	
0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

27.0 **GRAND TOTAL (max 100 pts)**

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

last revised 1 February 2001 jjm

Comments:

End of Quantitative Rating. Complete Categorization Worksheets.

ORAM Summary Worksheet

		YES	NO	Result
Narrative Rating	Question 1 Critical Habitat	☐	☑	If yes, Category 3.
	Question 2. Threatened or Endangered Species	☐	☑	If yes, Category 3.
	Question 3. High Quality Natural Wetland	☐	☑	If yes, Category 3.
	Question 4. Significant bird habitat	☐	☑	If yes, Category 3.
	Question 5. Category 1 Wetlands	☐	☑	If yes, Category 1.
	Question 6. Bogs	☐	☑	If yes, Category 3.
	Question 7. Fens	☐	☑	If yes, Category 3.
	Question 8a. Old Growth Forest	☐	☑	If yes, Category 3.
	Question 8b. Mature Forested Wetland	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9b. Lake Erie Wetlands - Restricted	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9d. Lake Erie Wetlands – Unrestricted with native plants	☐	☑	If yes, Category 3
	Question 9e. Lake Erie Wetlands - Unrestricted with invasive plants	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 10. Oak Openings	☐	☑	If yes, Category 3
	Question 11. Relict Wet Prairies	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
Quantitative Rating	Metric 1. Size	0		
	Metric 2. Buffers and surrounding land use	7		
	Metric 3. Hydrology	9		
	Metric 4. Habitat	10		
	Metric 5. Special Wetland Communities	0		
	Metric 6. Plant communities, interspersion, microtopography	1		
	TOTAL SCORE	27		1

Complete Wetland Categorization Worksheet.

Wetland Categorization Worksheet

Choices	Yes	NO	Evaluation of Categorization Result of ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 2, 3, 4, 6, 7, 8a, 9d, 10	☐ Wetland is categorized as a Category 3 wetland	☑	Is quantitative rating score *less* than the Category 2 scoring threshold (*excluding* gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been over- categorized by the ORAM
Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 1, 8b, 9b, 9e, 11	☐ Wetland should be evaluated for possible Category 3 status	☑	Evaluate the wetland using the 1) narrative criteria in OAC Rule 3745-1-54(C) and 2) the quantitative rating score. If the wetland is determined to be a Category 3 wetland using either of these, it should be categorized as a Category 3 wetland. Detailed biological and/or functional assessments may also be used to determine the wetland's category.
Did you answer "Yes" to Narrative Rating No. 5	☐ Wetland is categorized as a Category 1 wetland	☑	Is quantitative rating score *greater* than the Category 2 scoring threshold *(including* any gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been under-categorized by the ORAM
Does the quantitative score fall within the scoring range of a Category 1, 2, or 3 wetland?	☑ Wetland is assigned to the appropriate category based on the scoring range	☐	If the score of the wetland is located within the scoring range for a particular category, the wetland should be assigned to that category. In all instances however, the narrative criteria described in OAC Rule 3745-1-54(C) can be used to clarify or change a categorization based on a quantitative score.
Does the quantitative score fall with the *"gray zone"* for Category 1 or 2 or Category 2 or 3 wetlands?	☐ Wetland is assigned to the higher of the two categories or assigned to a category based on detailed assessments and the narrative criteria	☑	Rater has the option of assigning the wetland to the higher of the two categories or to assign a category based on the results of a nonrapid wetland assessment method, e.g. functional assessment, biological assessment, etc, and a consideration of the narrative criteria in OAC rule 3745-1- 54(C).
Does the wetland otherwise exhibit *moderate OR superior* hydrologic OR habitat, OR recreational functions AND the wetland was *not* categorized as a Category 2 wetland (in the case of moderate functions) or a Category 3 wetland (in the case of superior functions) by this method?	☐ Wetland was undercategorized by this method. A written justification for recategorization should be provided on Background Information Form	☑ Wetland is assigned to category as determined by the ORAM.	A wetland may be undercategorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54(C)(2) and (3) are controlling, and the under-categorization should be corrected. A written justification with supporting reasons or information for this determination should be provided.

Final Category

1

End of Ohio Rapid Assessment Method for Wetlands.

Background Information

Name:	Carolyn Krause
Date:	9/25/2023
Affiliation:	EnviroScience, Inc
Address:	5070 Stow Road, Stow, OH 44224
Phone Number:	330-688-0111
e-mail address:	CKrause@EnviroScienceInc.com
Name of Wetland:	W-4
Vegetation Communit(ies):	PFO
HGM Class(es):	Depression

Location of Wetland: include map, address, north arrow, landmarks, distances, roads, etc.
See attached.

Lat/Long or UTM Coordinate	41.65983, -83.480248
USGS Quad Name	Oregon
County	Lucas
City/Township	Toledo
Section and Subsection	
Hydrologic Unit Code	4100009
Site Visit	4/18/2023
National Wetland Inventory Map	See Figure 3 of Wetland Delineation Report
Ohio Wetland Inventory Map	n/a
Soil Survey	See Figure 4 of Wetland Delineation Report
Delineation report/map	See Figure 6 of Wetland Delineation Report

Name of Wetland:	**W-4**	
Wetland Size (acres, hectares):		0.039 ac

Sketch: Include north arrow, relationship with other surface waters, vegetation zones, etc.
See Attached.

Comments, Narrative Discussion, Justification of Category Changes:

Final score : 28	**Category: 1**

Scoring Boundary Worksheet

INSTRUCTIONS. The initial step in completing the ORAM is to identify the “scoring boundaries” of the wetland being rated. In many instances this determination will be relatively easy and the scoring boundaries will coincide with the “jurisdictional boundaries.” For example, the scoring boundary of an isolated cattail marsh located in the middle of a farm field will likely be the same as that wetland’s jurisdictional boundaries. In other instances, however, the scoring boundary will not be as easily determined. Wetlands that are small or isolated from other surface waters often form large contiguous areas or heterogeneous complexes of wetland and upland. In separating wetlands for scoring purposes, the hydrologic regime of the wetland is the main criterion that should be used. Boundaries between contiguous or connected wetlands should be established where the volume, flow, or velocity of water moving through the wetland changes significantly. Areas with a high degree of hydrologic interaction should be scored as a single wetland. In determining a wetland’s scoring boundaries
use the guidelines in the ORAM Manual Section 5.0. In certain instances, it may be difficult to establish the scoring boundary for the wetland being rated. These problem situations include wetlands that form a patchwork on the landscape, wetlands divided by artificial boundaries like property fences, roads, or railroad embankments, wetlands that are contiguous with streams, lakes, or rivers, and estuarine or coastal wetlands. These situations are discussed below, however, it is recommended that Rater contact Ohio EPA, Division of Surface Water, 401/Wetlands Section if there are additional questions or a need for further clarification of the appropriate scoring boundaries of a particular wetland.

#	Steps in properly establishing scoring boundaries	done?	not applicable
Step 1	Identify the wetland area of interest. This may be the site of a proposed impact, a reference site, conservation site, etc.	☑	☐
Step 2	Identify the locations where there is physical evidence that hydrology changes rapidly. Such evidence includes both natural and human- induced changes including, constrictions caused by berms or dikes, points where the water velocity changes rapidly at rapids or falls, points where significant inflows occur at the confluence of rivers, or other factors that may restrict hydrologic interaction between the wetlands or parts of a single wetland.	☑	☐
Step 3	Delineate the boundary of the wetland to be rated such that all areas of interest that are contiguous to and within the areas where the hydrology does not change significantly, i.e. areas that have a high degree of hydrologic interaction are included within the scoring boundary.	☑	☐
Step 4	Determine if artificial boundaries, such as property lines, state lines, roads, railroad embankments, etc., are present. These should not be used to establish scoring boundaries unless they coincide with areas where the hydrologic regime changes.	☑	☐
Step 5	In all instances, the Rater may enlarge the minimum scoring boundaries discussed here to score together wetlands that could be scored separately.	☐	☑
Step 6	Consult ORAM Manual Section 5.0 for how to establish scoring boundaries for wetlands that form a patchwork on the landscape, divided by artificial boundaries, contiguous to streams, lakes or rivers, or for dual classifications.	☐	☑

End of Scoring Boundary Determination. Begin Narrative Rating on next page.

Narrative Rating

INSTRUCTIONS. Answer each of the following questions. Questions 1, 2, 3 and 4 should be answered based on Information obtained from the site visit or the literature and by submitting a Data Services Request to the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Data Services, 1889 Fountain Square Court, Building F-1, Columbus, Ohio 43224, 614-265-6453 (phone), 614-265-3096 (fax), http://www.dnr.state.oh.us/dnap . The remaining questions are designed to be answered primarily by the results of the site visit. Refer to the User's Manual for descriptions of these wetland types. Note: "Critical habitat" is legally defined in the Endangered Species Act and is the geographic area containing physical or biological features essential to the conservation of a listed species or as an area that may require special management considerations or protection. The Rater should contact the Region 3 Headquarters or the Columbus Ecological Services Office for updates as to whether critical habitat has been designated for other federally listed threatened or endangered species. "Documented" means

the wetland is listed in the appropriate State of Ohio database.

#	Question	YES	NO
1	**Critical Habitat.** Is the wetland in a township, section, or subsection of a United States Geological Survey 7.5 minute Quadrangle that has been designated by the U.S. Fish and Wildlife Service as "critical habitat" for any threatened or endangered plant or animal species? Note: as of January 1, 2001, of the federally listed endangered or threatened species which can be found in Ohio, the Indiana Bat has had critical habitat designated (50 CFR 17.95(a)) and the piping plover has had critical habitat proposed (65 FR 41812 July 6, 2000).	☐ Wetland should be evaluated for possible Category 3 status. Go to Question 2	☑ Go to Question 2
2	**Threatened or Endangered Species.** Is the wetland known to contain an individual of, or documented occurrences of federal or state-listed threatened or endangered plant or animal species?	☐ Wetland is a Category 3 wetland. Go to Question 3	☑ Go to Question 3
3	**Documented High Quality Wetland.** Is the wetland on record in Natural Heritage Database as a high quality wetland?	☐ Wetland is a Category 3 wetland. Go to Question 4	☑ Go to Question 4
4	**Significant Breeding or Concentration Area.** Does the wetland contain documented regionally significant breeding or nonbreeding waterfowl, neotropical songbird, or shorebird concentration areas?	☐ Wetland is a Category 3 wetland. Go to Question 5	☑ Go to Question 5
5	**Category 1 Wetlands.** Is the wetland less than 0.5 hectares (1 acre) in size and **hydrologically isolated** and either 1) comprised of vegetation that is dominated (greater than eighty per cent areal cover) by *Phalaris arundinacea, Lythrum salicaria,* or *Phragmites australis* , or 2) an acidic pond created or excavated on mined lands that has little or no vegetation?	☐ Wetland is a Category 3 wetland. Go to Question 6	☑ Go to Question 6
6	**Bogs.** Is the wetland a peat-accumulating wetland that 1) has no significant inflows or outflows, 2) supports acidophilic mosses, particularly *Sphagnum* spp., 3) the acidophilic mosses have >30% cover, 4) at least one species from Table 1 is present, and 5) the cover of invasive species (see Table 1) is <25%?	☐ Wetland is a Category 3 wetland. Go to Question 7	☑ Go to Question 7
7	**Fens.** Is the wetland a carbon accumulating (peat, muck) wetland that is saturated during most of the year, primarily by a discharge of free flowing, mineral rich, ground water with a circumneutral ph (5.5-9.0) and with one or more plant species listed in Table 1 and the cover of invasive species listed in Table 1 is <25%?	☐ Wetland is a Category 3 wetland. Go to Question 8	☑ Go to Question 8a
8a	**"Old Growth Forest."** Is the wetland a forested wetland and is the forest characterized by, but not limited to, the following characteristics: overstory canopy trees of great age (exceeding at least 50% of a projected maximum attainable age for a species); little or no evidence of human-caused understory disturbance during the past 80 to 100 years; an all-aged structure and multilayered canopies; aggregations of canopy trees interspersed with canopy gaps; and significant numbers of standing dead snags and downed logs?	☐ Wetland is a Category 3 wetland. Go to Question 8b	☑ Go to Question 8b

8b	**Mature forested wetlands**. Is the wetland a forested wetland with 50% or more of the cover of upper forest canopy consisting of deciduous trees with large diameters at breast height (dbh), generally diameters greater than 45cm (17.7in) dbh?	☐ Wetland should be evaluated for possible Category 3 status Go to Question 9a	☑ Go to Question 9a
9a	**Lake Erie coastal and tributary wetlands**. Is the wetland located at an elevation less than 575 feet on the USGS map, adjacent to this elevation, or along a tributary to Lake Erie that is accessible to fish?	☐ Go to Question 9b	☑ Go to Question 10
9b	Does the wetland's hydrology result from measures designed to prevent erosion and the loss of aquatic plants, i.e. the wetland is partially hydrologically restricted from Lake Erie due to lakeward or landward dikes or other hydrological controls?	☐ Wetland should be evaluated for possible Category 3 status Go to Question 9d	☑ Go to Question 9c
9c	Are Lake Erie water levels the wetland's primary hydrological influence, i.e. the wetland is hydrologically unrestricted (no lakeward or upland border alterations), or the wetland can be characterized as an "estuarine" wetland with lake and river influenced hydrology. These include sandbar deposition wetlands, estuarine wetlands, river mouth wetlands, or those dominated by submersed aquatic vegetation.	☐ Go to Question 9d	☑ Go to Question 9d
9d	Does the wetland have a predominance of native species within its vegetation communities, although non-native or disturbance tolerant native species can also be present?	☐ Wetland is a Category 3 wetland. Go to Question 10	☑ Go to Question 9e
9e	Does the wetland have a predominance of non-native or disturbance tolerant native plant species within its vegetation communities?	☐ Wetland should be evaluated for possible Category 3 status. Go to Question 10	☑ Go to Question 10
10	**Lake Plain Sand Prairies (Oak Openings)** Is the wetland located in Lucas, Fulton, Henry, or Wood Counties and can the wetland be characterized by the following description: the wetland has a sandy substrate with interspersed organic matter, a water table often within several inches of the surface, and often with a dominance of the gramineous vegetation listed in Table 1 (woody species may also be present). The Ohio Department of Natural Resources Division of Natural Areas and Preserves can provide assistance in confirming this type of wetland and its quality.	☐ Wetland is a Category 3 wetland. Go to Question 11	☑ Go to Question 11
11	**Relict Wet Prairies**. Is the wetland a relict wet prairie community dominated by some or all of the species in Table 1. Extensive prairies were formerly located in the Darby Plains (Madison and Union Counties), Sandusky Plains (Wyandot, Crawford, and Marion Counties), northwest Ohio (e.g. Erie, Huron, Lucas, Wood Counties), and portions of western Ohio Counties (e.g. Darke, Mercer, Miami, Montgomery, Van Wert etc.).	☐ Wetland should be evaluated for possible Category 3 status. Complete Quantitative Rating.	☑ Complete Quantitative Rating.

Table 1. Characteristic plant species.

invasive/exotic spp	fen species	bog species	0ak Opening species	wet prairie species
Lythrum salicaria	*Zygadenus elegans var. glaucus*	*Calla palustris*	*Carex cryptolepis*	*Calamagrostis*
Myriophyllum spicatum	*Cacalia plantaginea*	*Carex atlantica var. capillacea*	*Carex lasiocarpa*	*Calamogrostis stricta*
Najas minor	*Carex flava*	*Carex echinata*	*Carex stricta*	*Carex atherodes*
Phalaris arundinacea	*Carex sterilis*	*Carex oligosperma*	*Cladium mariscoides*	*Carex buxbaumii*
Phragmites australis	*Carex stricta*	*Carex trisperma*	*Calamagrostis stricta*	*Carex pellita*
Potamogeton crispus	*Deschampsia caespitosa*	*Chamaedaphne calyculata*	*Calamagrostis canadensis*	*Carex sartwellii*
Ranunculus ficaria	*Eleocharis rostellata*	*Decodon verticillatus*	*Quercus palustris*	*Gentiana andrewsii*
Rhamnus frangula	*Eriophorum viridicarinatum*	*Eriophorum virginicum*		*Helianthus*
Typha angustifolia	*Gentianopsis spp.*	*Larix laricina*		*Liatris spicata*
Typha xglauca	*Lobelia kalmii*	*Nemopanthus mucronatus*		*Lysimachia*
	Parnassia glauca	*Schechzeria palustris*		*Lythrum alatum*
	Potentilla fruticosa	*Sphagnum spp.*		*Pycnanthemum*
	Rhamnus alnifolia	*Vaccinium macrocarpon*		*Silphium*
	Rhynchospora capillacea	*Vaccinium corymbosum*		*Sorghastrum nutans*
	Salix candida	*Vaccinium oxycoccos*		*Spartina pectinata*
	Salix myricoides	*Woodwardia virginica*		*Solidago riddellii*
	Salix serissima	*Xyris difformis*		
	Solidago ohioensis			
	Tofieldia glutinosa			
	Triglochin maritimum			
	Triglochin palustre			

End of Narrative Rating. Begin Quantitative Rating on next page.

ORAM v. 5.0 Field Form Quantitative Rating

Site:	Collins Park	**Rater(s):**	Carolyn Krause	**Date:**	9/25/23
			Wetland:	W-4	

28	1
Final Score	**Category**

subtotal	max6pts
0	0

Metric 1. Wetland Area (size).

Select one size class and assign score.

		> 50 acres (<20.2ha) (6 pts)
		25 to <50 acres (10.1 to <20.2ha) (5 pts)
0		10 to <25 acres (4 to <10.1ha) (4 pts)
		3 to 10<acres (1.2 to <4ha) (3 pts)
		0.3 to <3 acres (0.12 to <1.2ha) (2 pts)
		0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
	0	<0.1 acres (0.04ha) (0 pts)

subtotal	max14pts
8	8

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

		WIDE. Buffers average 50m (164 ft) or more around wetland perimeter (7)
4	4	MEDIUM. Buffers average 25m to <50m (82 to <164 ft) around wetland perimeter (4)
		NARROW. Buffers average 10m to <25m (32 ft to <82 ft) around wetland perimeter (1)
		VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

		VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
4	5	LOW. Old field (>10 years), shrubland, young second growth forest. (5)
	3	MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
		HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

subtotal	max30pts
17	9

Metric 3. Hydrology.

3a. Sources of water. Score all that apply.

		High pH groundwater (5)
		Other groundwater (3)
1	1	Precipitation (1)
		Seasonal/Intermittent surface water (3)
		Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

		100 year floodplain (1)
		Between stream/lake and other human use (1)
1	1	Part of wetland/upland (e.g. forest), complex (1)
		Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

		>0.7 (27.6in) (3)
1		04. to 0.7m (15.7 to 27.6in) (2)
	1	<0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

		Semi-to permanently inundated/saturated (4)
		Regularly inundated/saturated (3)
1		Seasonally inundated (2)
	1	Seasonally saturated in upper 30 cm (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

		None or none apparent (12)
	7	Recovered (7)
5	3	Recovering (3)
		Recent or no recovery (1)

Check all disturbances observed

- ☐ ditch
- ☐ tile
- ☐ dike
- ☐ weir
- ☐ stormwater input
- ☐ point source (non stormwater)
- ☐ filling/grading
- ☐ dirt road
- ☐ dredging
- ☐ other

subtotal	max20pts
27	10

Metric 4. Habitat alteration and development.

4a. Substrate disturbance. Score one or dbl check and average.

		None or none apparent (4)
2.5	3	Recovered (3)
	2	Recovering (2)
		Recent or no recovery (1)

4c. Habitat alteration. Score one or dbl check and average.

		None or none apparent (9)
4.5	6	Recovered (6)
	3	Recovering (3)
		Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

		Excellent (7)
		Very good (6)
		Good (5)
3		Moderately good (4)
	3	Fair (3)
		Poor to fair (2)
		Poor (1)

Check all disturbances observed

- ☐ mowing
- ☐ grazing
- ☐ clearcutting
- ☐ selective cutting
- ☐ woody debris removal
- ☐ toxic pollutants
- ☐ shrub/sapling removal
- ☐ herbaceous/aquatic bed removal
- ☐ sedimentation
- ☐ dredging
- ☐ farming
- ☐ nutrient enrichment

27

Subtotal this page

last revised 1 February 2001 jjm

ORAM v. 5.0 Field Form Quantitative Rating

Site:	Collins Park	Rater(s):	Carolyn Krause	Date:	9/25/23
		Wetland:	W-4		

27
Subtotal1st page

subtotal	max10pts
27	0

Metric 5. Special Wetlands

Check all that apply and score as indicated.

Score	Box	Item
		Bog (10)
		Fen (10)
		Old growth forest (10)
		Mature forested wetland (5)
0		Lake Erie Coastal/tributary wetland-unrestricted hydrology (10)
		Lake Erie Coastal/tributary wetland-restricted hydrology (5)
		Lake Plain Sand Prairies (Oak Openings) (10)
		Relict Wet Prairies (10)
		Known occurrence state/federal threatened or endangered species (10)
		Significant migratory songbird/water fowl habitat or usage (10)
		Category 1 Wetland. See question 1 Qualitative Rating - 10

subtotal	max20pts
28	1

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities

Score all present using 0 to 3 scale.

Score	Box	Item
		Aquatic bed
		Emergent
0		Shrub
	0	Forest
		Mudflats
		Open water
		Other ____________

6b. Horizontal (plan view) interspersion.

Select only one.

Score	Box	Item
		High (5)
		Moderately high (4)
1		Moderate (3)
		Moderately low (2)
	1	Low (1)
		None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage.

Score	Box	Item
		Extensive >75% cover (-5)
		Moderate 25-75% cover (-3)
-1	-1	Sparse 5-25% cover (-1)
		Nearly absent <5% cover (0)
		Absent (1)

6d. Microtopography

Score all present using 1 to 3 scale.

Score	Box	Item
	0	Vegetated hummocks/tussocks
	1	Coarse woody debris > 15cm (6in)
1	0	Standing dead >25cm (10in) dbh
	0	Amphibian breeding pools

Vegetation Community Cover Scale	
0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either commprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality.
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of hgh quality.
3	Present and comprises significant part or more of wetland's vegetation and is of high quality.

Narrative Description of Vegetation Quality	
low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or distrubance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare, threatened or endangered spp.
high	A predominance of native species, with nonative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened or endangered spp

Mudflat and Open Water Class Quality	
0	Absent
1	Low 0.1 to 1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale	
0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

28.0 **GRAND TOTAL (max 100 pts)**

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

last revised 1 February 2001 jjm

Comments:

End of Quantitative Rating. Complete Categorization Worksheets.

ORAM Summary Worksheet

		YES	NO	Result
Narrative Rating	Question 1 Critical Habitat	☐	☑	If yes, Category 3.
	Question 2. Threatened or Endangered Species	☐	☑	If yes, Category 3.
	Question 3. High Quality Natural Wetland	☐	☑	If yes, Category 3.
	Question 4. Significant bird habitat	☐	☑	If yes, Category 3.
	Question 5. Category 1 Wetlands	☐	☑	If yes, Category 1.
	Question 6. Bogs	☐	☑	If yes, Category 3.
	Question 7. Fens	☐	☑	If yes, Category 3.
	Question 8a. Old Growth Forest	☐	☑	If yes, Category 3.
	Question 8b. Mature Forested Wetland	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9b. Lake Erie Wetlands - Restricted	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 9d. Lake Erie Wetlands – Unrestricted with native plants	☐	☑	If yes, Category 3
	Question 9e. Lake Erie Wetlands - Unrestricted with invasive plants	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
	Question 10. Oak Openings	☐	☑	If yes, Category 3
	Question 11. Relict Wet Prairies	☐	☑	If yes, evaluate for Category 3; may also be 1 or 2.
Quantitative Rating	Metric 1. Size	0		
	Metric 2. Buffers and surrounding land use	8		
	Metric 3. Hydrology	9		
	Metric 4. Habitat	10		
	Metric 5. Special Wetland Communities	0		
	Metric 6. Plant communities, interspersion, microtopography	1		
	TOTAL SCORE	28		1

Complete Wetland Categorization Worksheet.

Wetland Categorization Worksheet

Choices	Yes	NO	Evaluation of Categorization Result of ORAM
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Did you answer "Yes" to any of the following questions: Narrative Rating Nos. 1, 8b, 9b, 9e, 11	Wetland should be evaluated for possible Category 3 status ☐	☑	Evaluate the wetland using the 1) narrative criteria in OAC Rule 3745-1-54(C) and 2) the quantitative rating score. If the wetland is determined to be a Category 3 wetland using either of these, it should be categorized as a Category 3 wetland. Detailed biological and/or functional assessments may also be used to determine the wetland's category.
Did you answer "Yes" to Narrative Rating No. 5	Wetland is categorized as a Category 1 wetland ☐	☑	Is quantitative rating score *greater* than the Category 2 scoring threshold *(including* any gray zone)? If yes, reevaluate the category of the wetland using the narrative criteria in OAC Rule 3745-1-54(C) and biological and/or functional assessments to determine if the wetland has been under-categorized by the ORAM
Does the quantitative score fall within the scoring range of a Category 1, 2, or 3 wetland?	Wetland is assigned to the appropriate category based on the scoring range ☑	☐	If the score of the wetland is located within the scoring range for a particular category, the wetland should be assigned to that category. In all instances however, the narrative criteria described in OAC Rule 3745-1-54(C) can be used to clarify or change a categorization based on a quantitative score.
Does the quantitative score fall with the *"gray zone"* for Category 1 or 2 or Category 2 or 3 wetlands?	Wetland is assigned to the higher of the two categories or assigned to a category based on detailed assessments and the narrative criteria ☐	☑	Rater has the option of assigning the wetland to the higher of the two categories or to assign a category based on the results of a nonrapid wetland assessment method, e.g. functional assessment, biological assessment, etc, and a consideration of the narrative criteria in OAC rule 3745-1- 54(C).
Does the wetland otherwise exhibit *moderate OR superior* hydrologic OR habitat, OR recreational functions AND the wetland was *not* categorized as a Category 2 wetland (in the case of moderate functions) or a Category 3 wetland (in the case of superior functions) by this method?	Wetland was undercategorized by this method. A written justification for recategorization should be provided on Background Information Form ☐	☑ Wetland is assigned to category as determined by the ORAM.	A wetland may be undercategorized using this method, but still exhibit one or more superior functions, e.g. a wetland's biotic communities may be degraded by human activities, but the wetland may still exhibit superior hydrologic functions because of its type, landscape position, size, local or regional significance, etc. In this circumstance, the narrative criteria in OAC Rule 3745-1-54(C)(2) and (3) are controlling, and the under-categorization should be corrected. A written justification with supporting reasons or information for this determination should be provided.

Final Category

1

End of Ohio Rapid Assessment Method for Wetlands.

Appendix E

Stream Assessment Forms

OhioEPA **Qualitative Habitat Evaluation Index and Use Assessment Field Sheet** QHEI Score: 20

Stream & Location: DUCK CR. - SITE F RM: ___ . ___ Date: 6/22/23

Scorers Full Name & Affiliation: ALTFATER - ES

River Code: __ - __ - __ STORET #: ____ Lat./Long. (NAD 83 - decimal °) 41.66277 83.7817919 / 413 Office verified location ☐

1] SUBSTRATE Check ONLY Two substrate TYPE BOXES; estimate % or note every type present. Check ONE (Or 2 & average)

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE	ORIGIN	QUALITY
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]			☐ LIMESTONE [1]	☒ HEAVY [-2] (SILT)
☐☐ BOULDER [9]			☐☐ DETRITUS [3]			☒ TILLS [1]	☐ MODERATE [-1]
☐☐ COBBLE [8]			☒☒ MUCK [2]	✓		☐ WETLANDS [0]	☐ NORMAL [0]
☐☐ GRAVEL [7]			☐☐ SILT [2]	✓		☐ HARDPAN [0]	☐ FREE [1]
☐☐ SAND [6]			☐☐ ARTIFICIAL [0]			☐ SANDSTONE [0]	☒ EXTENSIVE [-2] (EMBEDDEDNESS)
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)			☐ RIP/RAP [0]	☐ MODERATE [-1]
						☒ LACUSTURINE [0]	☐ NORMAL [0]
						☐ SHALE [-1]	☐ NONE [1]
						☐ COAL FINES [-2]	

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Substrate: 0.5 (Maximum 20)

Comments: WETLAND LIKE STREAM - LOW GRADIENT, MINIMAL FLOW; MAY BE INFLUENCED BY LAKE LEVEL

2] INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

0 UNDERCUT BANKS [1] | 0 POOLS > 70cm [2] | 0 OXBOWS, BACKWATERS [1]
1 OVERHANGING VEGETATION [1] | 0 ROOTWADS [1] | 1 AQUATIC MACROPHYTES [1]
1 SHALLOWS (IN SLOW WATER) [1] | 0 BOULDERS [1] | 1 LOGS OR WOODY DEBRIS [1]
0 ROOTMATS [1]

AMOUNT — Check ONE (Or 2 & average): ☐ EXTENSIVE >75% [11] ☐ MODERATE 25-75% [7] ☐ SPARSE 5-<25% [3] ☒ NEARLY ABSENT <5% [1]

Cover: 5 (Maximum 20)

Comments: VERY MARGINAL INSTREAM COVER THROUGOUT SITE

3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☒ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☒ RECENT OR NO RECOVERY [1]	

Channel: 5 (Maximum 20)

Comments

4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	(L R)
☒☒ NONE / LITTLE [3]	☐☐ WIDE > 50m [4]	☐☐ FOREST, SWAMP [3]	☐☐ CONSERVATION TILLAGE [1]
☐☐ MODERATE [2]	☐☐ MODERATE 10-50m [3]	☐☐ SHRUB OR OLD FIELD [2]	☐☐ URBAN OR INDUSTRIAL [0]
☐☐ HEAVY / SEVERE [1]	☐☐ NARROW 5-10m [2]	☒☒ RESIDENTIAL, PARK, NEW FIELD [1]	☐☐ MINING / CONSTRUCTION [0]
	☒☒ VERY NARROW < 5m [1]	☐☐ FENCED PASTURE [1]	Indicate predominant land use(s) past 100m riparian.
	☐☐ NONE [0]	☐☐ OPEN PASTURE, ROWCROP [0]	

Riparian: 5 (Maximum 10)

Comments: GOLF COURSE PROPERTY

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH (Check ONE (ONLY!))	CHANNEL WIDTH (Check ONE (Or 2 & average))	CURRENT VELOCITY (Check ALL that apply)	
☐ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☒ SLOW [1] (VERY)
☐ 0.7-<1m [4]	☒ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☒ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☒ < 0.2m [0]		Indicate for reach - pools and riffles.	

Recreation Potential: Primary Contact / Secondary Contact (circle one and comment on back)

Pool / Current: 2.5 (Maximum 12)

Comments: GREATEST DEPTH AT CULVERT OPENINGS; 95% OF STREAM <0.2M

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (Or 2 & average). ☒ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
☐ BEST AREAS > 10cm [2]	☐ MAXIMUM > 50cm [2]	☐ STABLE (e.g., Cobble, Boulder) [2]	☐ NONE [2]
☐ BEST AREAS 5-10cm [1]	☐ MAXIMUM < 50cm [1]	☐ MOD. STABLE (e.g., Large Gravel) [1]	☐ LOW [1]
☐ BEST AREAS < 5cm [metric=0]		☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]	☐ MODERATE [0]
			☐ EXTENSIVE [-1]

Riffle / Run: 0 (Maximum 8)

Comments

6] GRADIENT (ft/mi) ☒ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

DRAINAGE AREA (0.86 mi²)

%POOL: 100 %GLIDE: ___ %RUN: ___ %RIFFLE: ___

Gradient: 2 (Maximum 10)

A] SAMPLED REACH
Check ALL that apply

METHOD
- ☐ BOAT
- ☐ WADE
- ☒ L. LINE
- ☐ OTHER

STAGE (1st-sample pass- 2nd)
- ☐ HIGH ☐
- ☐ UP ☐
- ☐ NORMAL ☐
- ☒ LOW ☒
- ☐ DRY ☐

DISTANCE
- ☐ 0.5 Km
- ☐ 0.2 Km
- ☐ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_____ meters

CLARITY (1st --sample pass-- 2nd)
- ☒ < 20 cm ☐
- ☐ 20-<40 cm ☐
- ☐ 40-70 cm ☐
- ☐ > 70 cm/ CTB ☐
- ☐ SECCHI DEPTH ☐

1st pass CLEAR TO BOTTOM cm
2nd pass _____ cm

CANOPY
- ☐ > 85%- OPEN
- ☒ 55%-<85%
- ☐ 30%-<55%
- ☐ 10%-<30%
- ☐ <10%- CLOSED

Comment RE: Reach consistency/ Is reach typical of steam?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

96% OF STREAM CHANNEL (FLOWING CHANNEL) IS LESS THAN 18" WIDE AND LESS THAN 3 CM DEEP. SINK INTO MUCK SUBSTRATES 1'. BANK FULL WIDTH OF CHANNEL ≈ 18'. LOTS OF ARROW WEED IN MUD/MUCK FLATS.

B] AESTHETICS
- ☐ NUISANCE ALGAE
- ☐ INVASIVE MACROPHYTES
- ☐ EXCESS TURBIDITY
- ☐ DISCOLORATION
- ☐ FOAM / SCUM
- ☐ OIL SHEEN
- ☐ TRASH / LITTER
- ☐ NUISANCE ODOR
- ☐ SLUDGE DEPOSITS
- ☐ CSOs/SSOs/OUTFALLS

C] RECREATION — AREA DEPTH
POOL: ☐ >100ft² ☐ >3ft

D] MAINTENANCE
PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

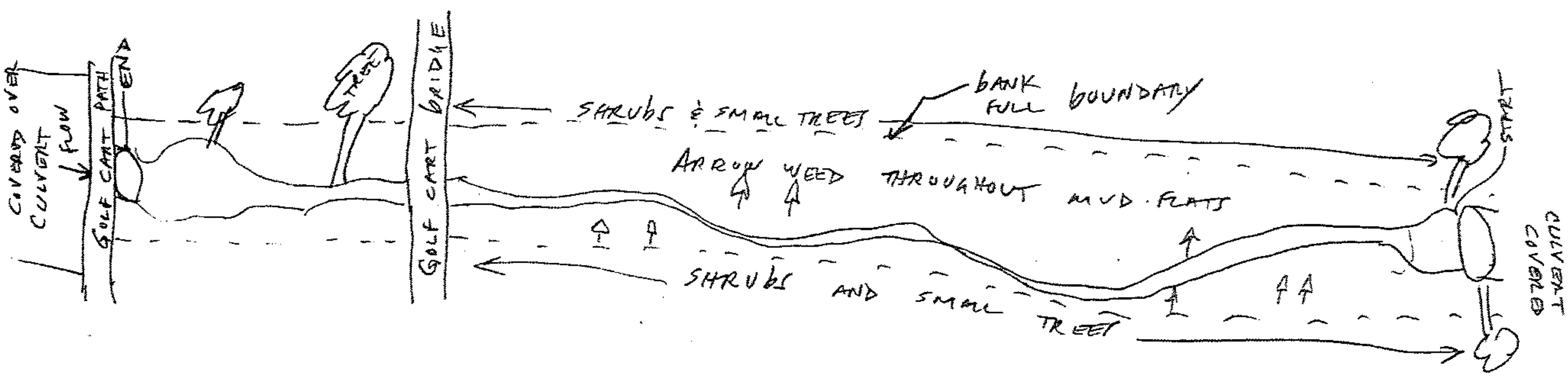
Circle some & COMMENT

E] ISSUES
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_2O / TILE / H_2O TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENTS
- $\bar{x}$ width
- $\bar{x}$ depth
- max. depth
- $\bar{x}$ bankfull width
- bankfull $\bar{x}$ depth
- W/D ratio
- bankfull max. depth
- floodprone x^2 width
- entrench. ratio
- Legacy Tree:

Stream Drawing:

NO FISH — VERY SHALLOW
VERY LOW D.O.



(G)

Ohio EPA Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 19.5

Stream & Location: Duck Creek (N, i) RM: __ Date: 6/22/23

Scorers Full Name & Affiliation: ALTFATER ES

River Code: __ STORET #: __ Lat./Long.: (NAD 83 - decimal °) 41.66055182 . Y 803877 Office verified location ☐

1] SUBSTRATE
Check ONLY Two substrate TYPE BOXES; estimate % or note every type present. Check ONE (Or 2 & average)

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE	ORIGIN	QUALITY
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]			☐ LIMESTONE [1]	☒ HEAVY [-2] (SILT)
☐☐ BOULDER [9]			☐☐ DETRITUS [3]			☒ TILLS [1]	☐ MODERATE [-1] (SILT)
☐☐ COBBLE [8]			☒☒ MUCK [2]	✓		☐ WETLANDS [0]	☐ NORMAL [0] (SILT)
☐☐ GRAVEL [7]			☐☐ SILT [2]	✓		☐ HARDPAN [0]	☐ FREE [1] (SILT)
☐☐ SAND [6]			☐☐ ARTIFICIAL [0]			☐ SANDSTONE [0]	☒ EXTENSIVE [-2] (EMBEDDEDNESS)
☐☐ BEDROCK [5]						☐ RIP/RAP [0]	☐ MODERATE [-1] (EMBEDDEDNESS)
						☒ LACUSTURINE [0]	☐ NORMAL [0] (EMBEDDEDNESS)
						☐ SHALE [-1]	☐ NONE [1] (EMBEDDEDNESS)
						☐ COAL FINES [-2]	

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Comments: AREA MAY BE LAKE INFLUENCED DEPENDING ON LAKE LEVEL

Substrate Maximum 20: 0.5

2] INSTREAM COVER
Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

__ UNDERCUT BANKS [1]
__ OVERHANGING VEGETATION [1]
1 SHALLOWS (IN SLOW WATER) [1]
__ ROOTMATS [1]
__ POOLS > 70cm [2]
__ ROOTWADS [1]
__ BOULDERS [1]
__ OXBOWS, BACKWATERS [1]
__ AQUATIC MACROPHYTES [1]
1 LOGS OR WOODY DEBRIS [1]

AMOUNT — Check ONE (Or 2 & average)
☐ EXTENSIVE >75% [11]
☐ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☒ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20: 3

3] CHANNEL MORPHOLOGY
Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☒ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☒ RECENT OR NO RECOVERY [1]	

Comments: NON-FUNCTIONING SINUOSITY

Channel Maximum 20: 5

4] BANK EROSION AND RIPARIAN ZONE
Check ONE in each category for EACH BANK (Or 2 per bank & average). River right looking downstream.

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	(L R)
☒☒ NONE / LITTLE [3]	☐☐ WIDE > 50m [4]	☐☐ FOREST, SWAMP [3]	☐☐ CONSERVATION TILLAGE [1]
☐☐ MODERATE [2]	☐☐ MODERATE 10-50m [3]	☐☐ SHRUB OR OLD FIELD [2]	☐☐ URBAN OR INDUSTRIAL [0]
☐☐ HEAVY / SEVERE [1]	☒☒ NARROW 5-10m [2]	☒☒ RESIDENTIAL, PARK, NEW FIELD [1]	☐☐ MINING / CONSTRUCTION [0]
	☐☐ VERY NARROW < 5m [1]	☐☐ FENCED PASTURE [1]	
	☐☐ NONE [0]	☐☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10: 6

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH (Check ONE (ONLY!))	CHANNEL WIDTH (Check ONE (Or 2 & average))	CURRENT VELOCITY (Check ALL that apply)	
☐ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☒ SLOW [1] (VERY)
☐ 0.7-<1m [4]	☒ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☒ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]			

Indicate for reach - pools and riffles.

Recreation Potential: Primary Contact / Secondary Contact (circle one and comment on back)

Comments

Pool / Current Maximum 12: 3

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (Or 2 & average). ☒ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
☐ BEST AREAS > 10cm [2]	☐ MAXIMUM > 50cm [2]	☐ STABLE (e.g., Cobble, Boulder) [2]	☐ NONE [2]
☐ BEST AREAS 5-10cm [1]	☐ MAXIMUM < 50cm [1]	☐ MOD. STABLE (e.g., Large Gravel) [1]	☐ LOW [1]
☐ BEST AREAS < 5cm [metric=0]		☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]	☐ MODERATE [0]
			☐ EXTENSIVE [-1]

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT (ft/mi) ☒ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

DRAINAGE AREA (10.86 mi²)

%POOL: 100 %GLIDE: __ %RUN: __ %RIFFLE: __

Gradient Maximum 10: 2

A] SAMPLED REACH
Check ALL that apply

METHOD
- ☐ BOAT
- ☐ WADE
- ☒ L. LINE
- ☐ OTHER

STAGE (1st-sample pass-2nd)
- ☐ HIGH ☐
- ☐ UP ☐
- ☐ NORMAL ☐
- ☒ LOW ☐
- ☐ DRY ☐

DISTANCE
- ☐ 0.5 Km
- ☐ 0.2 Km
- ☐ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

130 meters

CLARITY (1st —sample pass— 2nd)
- ☐ < 20 cm ☐
- ☒ 20-<40 cm ☐
- ☐ 40-70 cm ☐
- ☐ > 70 cm/ CTB ☐
- ☐ SECCHI DEPTH ☐

1st pass ______ cm
2nd pass ______ cm

CANOPY
- ☐ > 85%- OPEN
- ☐ 55%-<85%
- ☐ 30%-<55%
- ☐ 10%-<30%
- ☒ <10%- CLOSED

Comment RE: Reach consistency/ Is reach typical of steam?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

FLOWING CHANNEL LESS THAN 2.5' WIDE AND LESS THAN 3 CM DEEP – 80% OF STREAM. EIGHT FISH SPECIES COLLECTED BY OEPA IN 1997 WITH AVG. WATER DEPTH OF 20 CM (VS. 2-3 CM TODAY).

B] AESTHETICS
- ☐ NUISANCE ALGAE
- ☐ INVASIVE MACROPHYTES
- ☐ EXCESS TURBIDITY
- ☐ DISCOLORATION
- ☐ FOAM / SCUM
- ☐ OIL SHEEN
- ☐ TRASH / LITTER
- ☐ NUISANCE ODOR
- ☐ SLUDGE DEPOSITS
- ☐ CSOs/SSOs/OUTFALLS

C] RECREATION AREA DEPTH
POOL: ☐ >100ft² ☐ >3ft

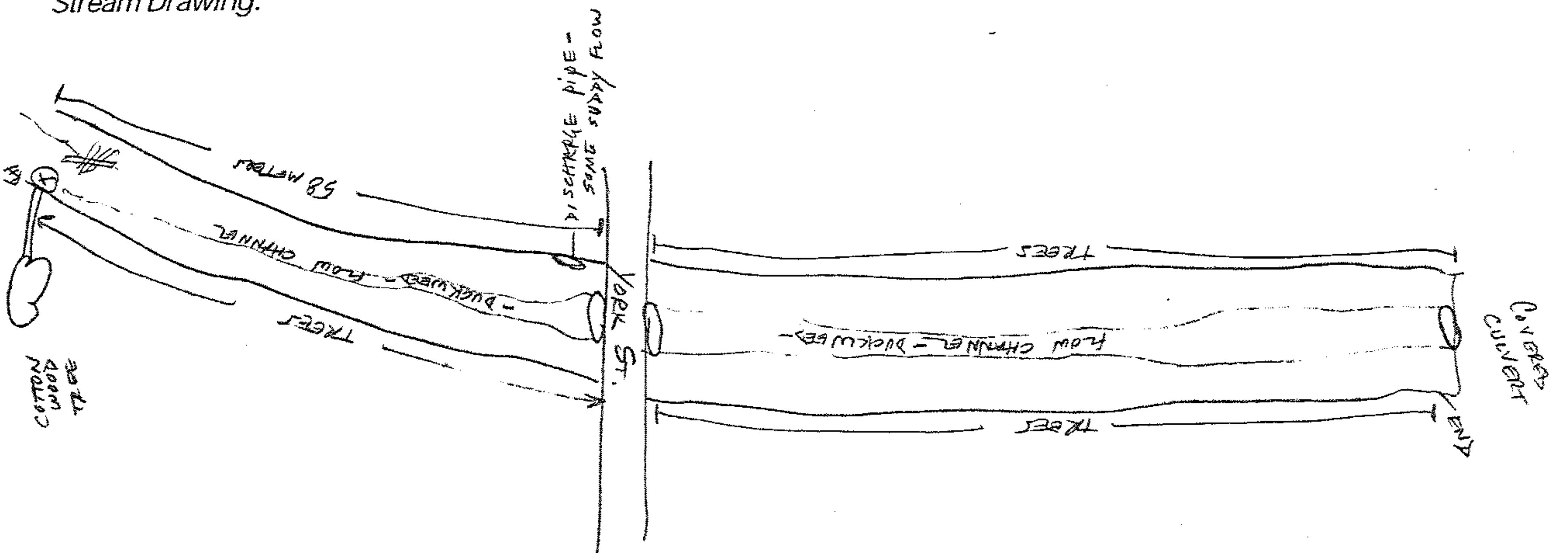
D] MAINTENANCE
PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

Circle some & COMMENT

E] ISSUES
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_2O / TILE / H_2O TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENTS
$\bar{x}$ width
$\bar{x}$ depth
max. depth
$\bar{x}$ bankfull width
bankfull $\bar{x}$ depth
W/D ratio
bankfull max. depth
floodprone x^2 width
entrench. ratio
Legacy Tree:

Stream Drawing:



Modified Class II PHW
(Perennial or Intermittent)

Ohio EPA Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3): 34

SITE NAME/LOCATION S-1 Collins Park

SITE NUMBER ______ RIVER BASIN Lower Maumee DRAINAGE AREA (mi²) 0.12

LENGTH OF STREAM REACH (ft) 200 LAT. 41.66205 LONG. -83.48433 RIVER CODE ______ RIVER MILE ______

DATE 4/18/23 SCORER C. Krause COMMENTS ______

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL MODIFICATIONS: ☐ NONE / NATURAL CHANNEL ☑ RECOVERED ☐ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type of substrate present. Check *ONLY* two predominant substrate *TYPE* boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE		PERCENT	TYPE		PERCENT
☐☐	BLDR SLABS [16 pts]		☑☐	SILT [3 pt]	20
☐☐	BOULDER (>256 mm) [16 pts]		☐☑	LEAF PACK/WOODY DEBRIS [3 pts]	70
☐☐	BEDROCK [16 pt]		☐☐	FINE DETRITUS [3 pts]	10
☐☐	COBBLE (65-256 mm) [12 pts]		☐☐	CLAY or HARDPAN [0 pt]	
☐☐	GRAVEL (2-64 mm) [9 pts]		☐☐	MUCK [0 pts]	
☐☐	SAND (<2 mm) [6 pts]		☐☐	ARTIFICIAL [3 pts]	

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock Ø

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: (A) 6

TOTAL NUMBER OF SUBSTRATE TYPES: (B) 3

HHEI Metric Points — Substrate Max = 40: 9 (A + B)

2. Maximum Pool Depth *(Measure the maximum pool depth within the 61 meter (200 ft)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☐ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☐ > 5 cm - 10 cm [15 pts]
- ☑ < 5 cm [5 pts]
- ☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS ______ **MAXIMUM POOL DEPTH (centimeters):** 4

Pool Depth Max = 30: 5

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters [30 pts]
- ☐ > 3.0 m - 4.0 m [25 pts]
- ☑ > 1.5 m - 3.0 m [20 pts]
- ☐ > 1.0 m - 1.5 m [15 pts]
- ☐ ≤ 1.0 m [5 pts]

COMMENTS ______ **AVERAGE BANKFULL WIDTH (meters):** 2.9

Bankfull Width Max=30: 20

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH (Per Bank)

L	R	
☐	☐	Wide >10m
☐	☐	Moderate 5-10m
☐	☐	Narrow <5m
☑	☑	None

FLOODPLAIN QUALITY (Most Predominant per Bank)

L	R		L	R	
☐	☐	Mature Forest, Wetland	☐	☐	Conservation Tillage
☐	☐	Immature Forest, Shrub or Old Field	☐	☐	Urban or Industrial
☑	☑	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS ______

FLOW REGIME *(At Time of Evaluation)* (Check *ONLY* one box):

- ☑ Stream Flowing
- ☐ Subsurface flow with isolated pools (Interstitial)
- ☐ Moist Channel, isolated pools, no flow (Intermittent)
- ☐ Dry channel, no water (Ephemeral)

COMMENTS ______

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check *ONLY* one box):

- ☑ None
- ☐ 0.5
- ☐ 1.0
- ☐ 1.5
- ☐ 2.0
- ☐ 2.5
- ☐ 3.0
- ☐ >3

STREAM GRADIENT ESTIMATE

☑ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? - ☐ Yes ☑ No QHEI Score ________ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☑ WWH Name: Maumee River Distance from Evaluated Stream 2.3 mi
☐ CWH Name: ________ Distance from Evaluated Stream ________
☐ EWH Name: ________ Distance from Evaluated Stream ________

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: Oregon NRCS Soil Map Page: ______ NRCS Soil Map Stream Order ______

County: Lucas Township / City: Toledo

MISCELLANEOUS

Base Flow Conditions? (Y/N): Y Date of last precipitation: 4/17/23 Quantity: 0.1 "

Photograph Information: ________

Elevated Turbidity? (Y/N): N Canopy (% open): 70

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: ________

Field Measures: Temp (°C)______ Dissolved Oxygen (mg/l) ______ pH (S.U.) ______ Conductivity (μmhos/cm) ______

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: ________

Additional comments/description of pollution impacts: ________

BIOTIC EVALUATION

Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

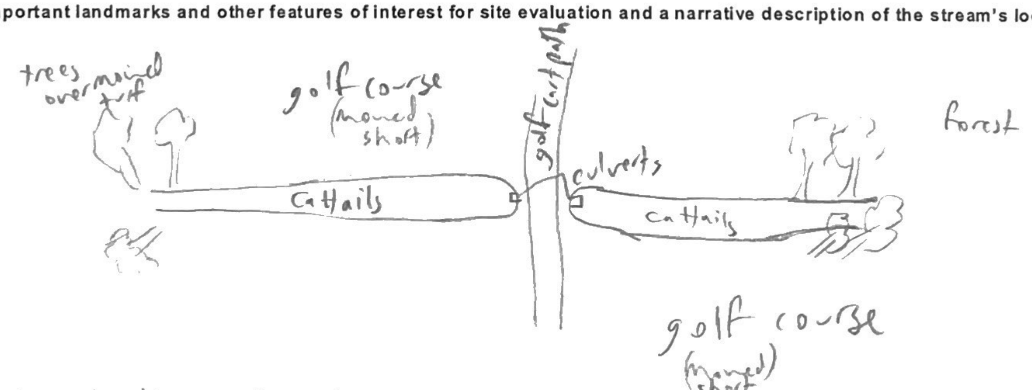
Fish Observed? (Y/N)_____ Voucher? (Y/N)_____ Salamanders Observed? (Y/N)_____ Voucher? (Y/N)_____
Frogs or Tadpoles Observed? (Y/N)____ Voucher? (Y/N)____ Aquatic Macroinvertebrates Observed? (Y/N)____ Voucher? (Y/N)____

Comments Regarding Biology: ________

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location

FLOW ➡



straight channel choked w/ cattails & dead leaves. Lots of trash.

April 4, 2002 Revision__

Appendix F

OHPO Desktop Review Results

Site Name: **Collins Park Stream Restoration Feasibility Study**
County: **Lucas**
Quadrangle: **Oregon**

Ohio Archaeological Inventory (Archaeological Sites) **TOTAL:** 1

NUMBER	SITE NAME	UTM ZONE	EASTING	NORTHING
LU0594		17	293541	4614549

Ohio Historic Inventory (Historic Structures) **TOTAL:** 35

NUMBER	PRESENT NAME	OTHER NAME	ADDRESS	UTM ZONE	EASTING	NORTHING
LUC0173810	Joseph Duwve House		420 Collins Park A	17	293564	4614687
LUC0225710	Ralph L Kohlofer House		2803 York St	17	293288	4615470
LUC0175610	Milton Carswell House		2876 Consaul St	17	293525	4614609
LUC0174910	Mary Compton House		646 Collins Park A	17	293557	4615224
LUC0188210	SA Lovell		830 Farkas St	17	293346	4615545
LUC0226010	Garey Tschappat House		2918 York St	17	293595	4615425
LUC0174110	Rose Axt House		460 Collins Park A	17	293564	4614831
LUC0175210	Wenceslaus Nemicek House		720 Collins Park A	17	293558	4615316
LUC0208810			Penover St	17	293634	4615493
LUC0174410	Lawrence Duwve House		534 Collins Park A	17	293569	4614957
LUC0175410	CS Genson House		2866 Consaul St	17	293481	4614607
LUC0223510	Hoosier Magnetics In	American Brake Shoe Bldg	700 N Wheeling S	17	292906	4615260
LUC0175710	Carl Berlincourt House		2913 Consaul St	17	293593	4614664
LUC0174710	JM Nemecek House		642 Collins Park A	17	293554	4615183
LUC0175010	James Thorrington House		702 Collins Park A	17	293557	4615278
LUC0198610	Karen Roberson House		322 Ira Dr	17	293420	4614487
LUC0226110			2922 York St	17	293619	4615426
LUC0188310	B Hart House		840 Farkas St	17	293348	4615590
LUC0174210	Peter Vas House		466 Collins Park A	17	293564	4614854
LUC0174810	JE Singler House		644 Collins Park A	17	293555	4615205
LUC0175110	Larry Prescott House		712 Collins Park A	17	293555	4615294
LUC0173910	R Giovannli House		438 Collins Park A	17	293564	4614760
LUC0225810	Ronald T Rasi House		2813 York St	17	293346	4615467
LUC0174510	Teresa Nemecek House		634 Collins Park A	17	293555	4615146
LUC0334310	Culvert Retainer Walls		Taylor Rd	17	293572	4614336

LUC0225910	Anna Kocera House		2912 York St	17	293574	4615426
LUC0223610	Hoosier Magnetics In	American Brake Shoe Facto	700 N Wheeling S	17	292947	4615321
LUC0174010	Thomas Muenzer House		444 Collins Park A	17	293566	4614782
LUC0174610	Thomas Hert House		636 Collins Park A	17	293554	4615166
LUC0168010	Holy Rosary Church	St Ignatius Church Paris	2565 York St	17	292843	4615491
LUC0226210	Beryl Gyde House		2923 York St	17	293626	4615472
LUC0173710	Bill Cerveny House		408 Collins Park A	17	293563	4614666
LUC0174310	RA Black House		530 Collins Park A	17	293569	4614930
LUC0225610	Elroy Graza Sr House		2733 York St	17	293199	4615472
LUC0175510	Anna Erfile House		2870 Consaul St	17	293504	4614609

National Register Listed Properties (National Register Listings) **TOTAL:** 0

NUMBER	RESOURCE NAME	ADDRESS	UTM ZONE	EASTING	NORTHING

No resources found within radius

Determinations of Eligibility (NR Determinations of Eligibility) **TOTAL:** 1

SER NO	PROJECT NAME	ADDRESS	UTM ZONE	EASTING	NORTHING
1047966	Collins Park Water Tr	3040 York St	17	293845.8176	4615162.354

Phase 1, 2, and 3 Surveyed Areas (Phase 1, 2, and 3) **TOTAL:** 2

NUMBER	PHASE	AUTHOR	YEAR	TITLE
13462	1	Dobson-Brown, Deborah	1994	A Cultural Resources Reconnaissance Survey of the Maumee River Crossing in Lucas and Wood Counties, Ohio (PID 10718)
19426	1	Gullett, Catherine	2014	Phase I Archaeological Survey for the Oregon North TOLD-241 Wireless Cellular Tower in the City of Toledo, Lucas County, Ohio

National Register Listed Districts (National Register Boundaries) **TOTAL:** 1

NUMBER	NAME	OTHER NAME	PROPERTIES
96000834	Birmingham Historic District		915

OGS Cemeteries **TOTAL:** 0

OGSID	ACCEPTED NAME	LOCATION	OHPO NUMBER	STATUS	Confident

No resources found within radius

Historic Tax Credit Projects **TOTAL:** 0

NUMBER	PROJECT NAME	ADDRESS	UTM ZONE	EASTING	NORTHING

No resources found within radius

OAI Site Boundaries **TOTAL:** 1

NUMBER	COMMENTS
LU0594	Digitized from a georeferenced map taken from the OAI; extent is approximate and unknown, see OAI

Historic Previously Surveyed Area **TOTAL:** 0

ID	ORGANIZATION	DATE	TITLE

No resources found within radius

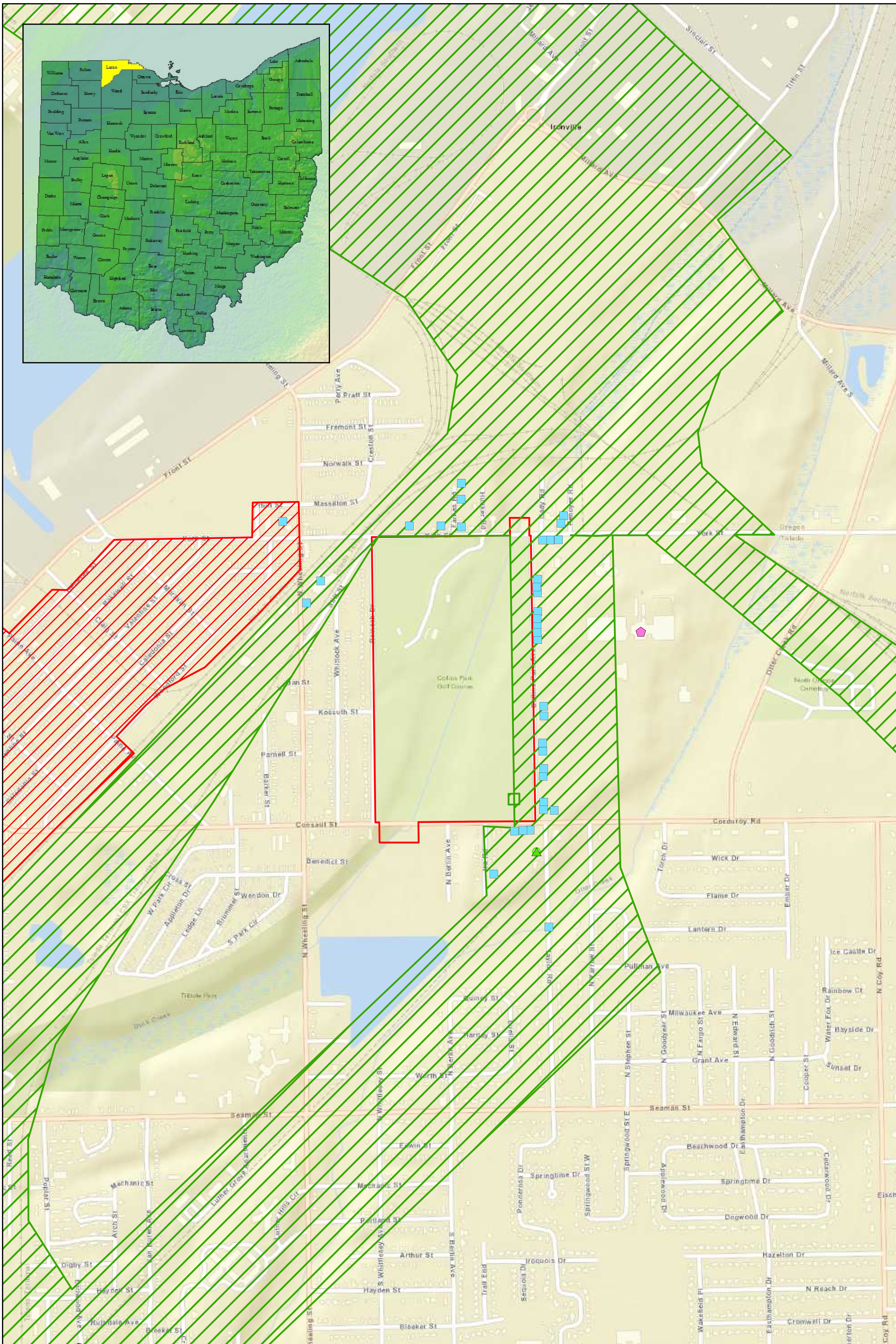


Figure 1.
OHPO Overview Map of Lucas County, Ohio.
Collins Park Stream Restoration Feasibility Study.

Historic Structures
Determinations of Eligibility
Archaeological Sites
Phase 1 Surveyed Area
OAI Site Boundaries
NR Boundaries
Study Area

0 500 1,000 2,000 Feet
0 150 300 600 Meters

EnviroScience™
Excellence In Any Environment

Path: C:\Users\CameronTurney\OneDrive - EnviroScience, Inc\Desktop\Projects\CollinsPark\OHPO\Map1_OHPO.mxd

Date: 12/15/2022

Basemap courtesy of Esri. Historic data courtesy of The Ohio History Connection (www.ohiohistory.org). Date created: 12/15/2022.

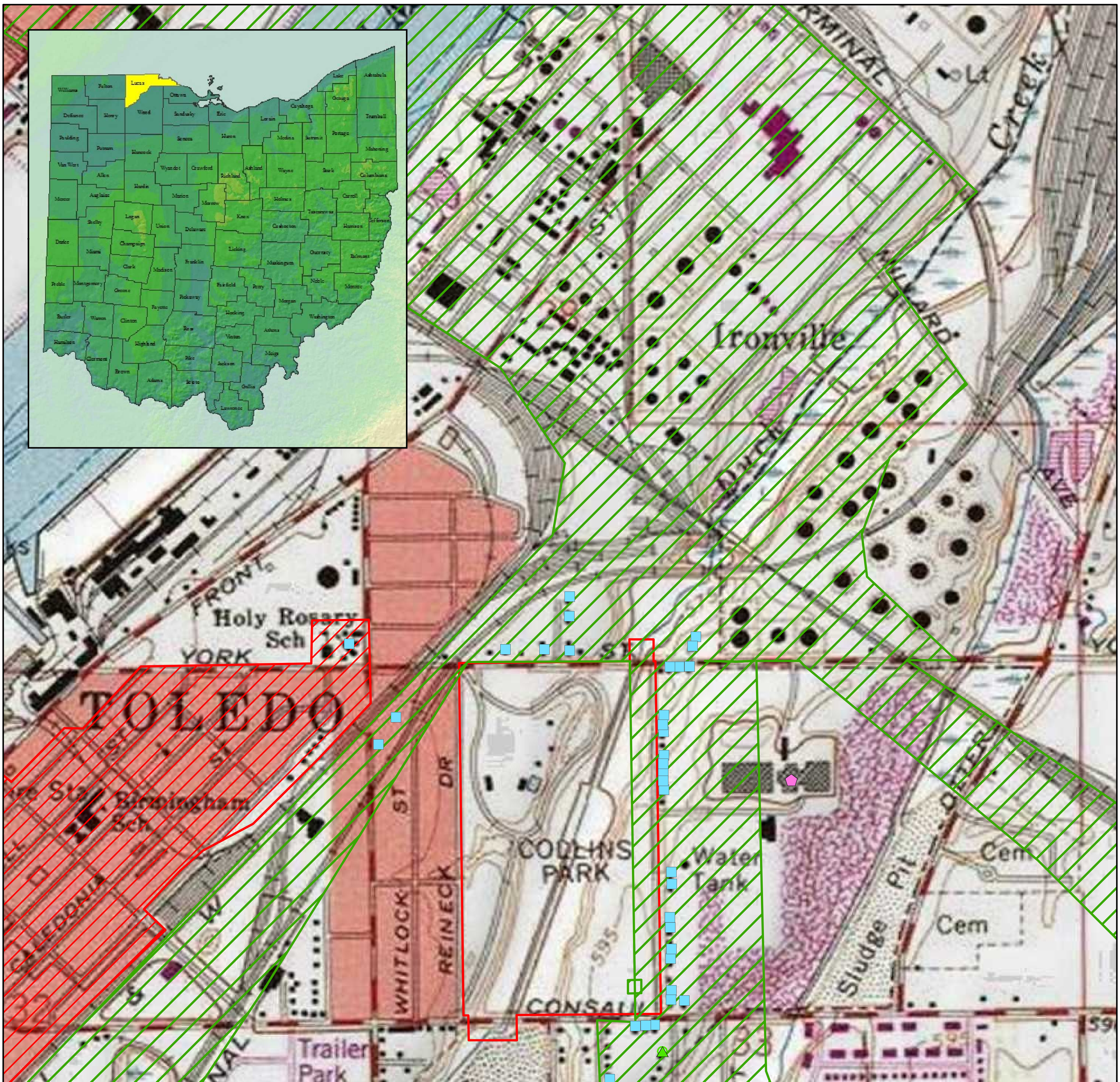


Figure 2.
OHPO Topographic Map
of Oregon Quadrangle.
Collins Park Stream
Restoration Feasibility Study.

- Historic Structures
- Determinations of Eligibility
- Archaeological Sites
- Phase 1 Surveyed Area
- OAI Site Boundaries
- NR Boundaries
- Study Area

0 500 1,000 2,000 Feet
0 150 300 600 Meters

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Path: C:\Users\CameronTurney\OneDrive - EnviroScience, Inc\Desktop\Projects\CollinsPark\OHPO\Map2_OHPO.mxd

Date: 12/15/2022

Basemap courtesy of Esri. Historic data courtesy of The Ohio History Connection (www.ohiohistory.org). Date created: 12/15/2022.

Appendix G

Information for Planning and Consultation Review

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Lucas County, Ohio

Local office

Ohio Ecological Services Field Office

(614) 416-8993
(614) 416-8994

4625 Morse Road, Suite 104

4625 Morse Road, Suite 104
Columbus, OH 43230-8355

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

2. [NOAA Fisheries](), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Indiana Bat Myotis sodalis Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/5949	Endangered
Tricolored Bat Perimyotis subflavus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Birds

NAME	STATUS
Piping Plover Charadrius melodus There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/6039	Endangered
Red Knot Calidris canutus rufa Wherever found There is **proposed** critical habitat for this species. https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane Grus americana No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/758	EXPN

Insects

NAME	STATUS

Karner Blue Butterfly Lycaeides melissa samuelis Wherever found There is **proposed** critical habitat for this species. https://ecos.fws.gov/ecp/species/6656	Endangered
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Eastern Prairie Fringed Orchid Platanthera leucophaea Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/601	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Golden-plover *Pluvialis dominica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10

Bobolink Dolichonyx oryzivorus — Breeds May 20 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Canada Warbler Cardellina canadensis — Breeds May 20 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Cerulean Warbler Dendroica cerulea — Breeds Apr 22 to Jul 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/2974

Chimney Swift Chaetura pelagica — Breeds Mar 15 to Aug 25

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Eastern Whip-poor-will Antrostomus vociferus — Breeds May 1 to Aug 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Golden Eagle Aquila chrysaetos — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Golden-winged Warbler Vermivora chrysoptera — Breeds May 1 to Jul 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8745

King Rail Rallus elegans — Breeds May 1 to Sep 5

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8936

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Marbled Godwit Limosa fedoa — Breeds May 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9481

Red-headed Woodpecker Melanerpes erythrocephalus — Breeds May 10 to Sep 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Rusty Blackbird Euphagus carolinus — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Short-billed Dowitcher Limnodromus griseus — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9480

Wood Thrush Hylocichla mustelina — Breeds May 10 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted

Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

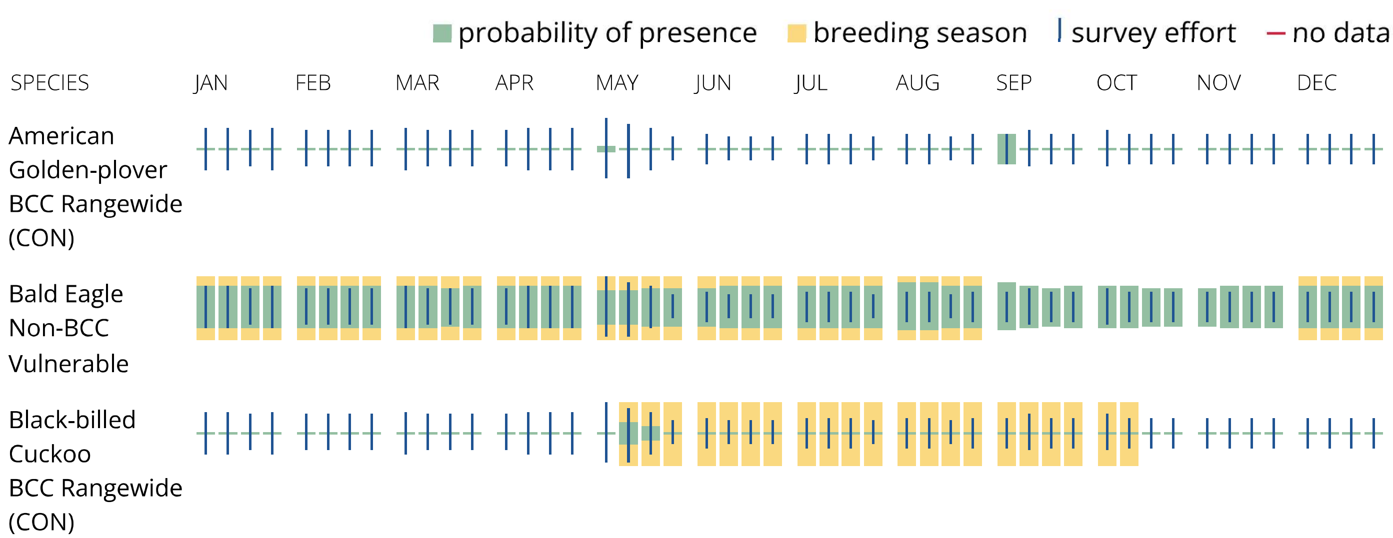
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

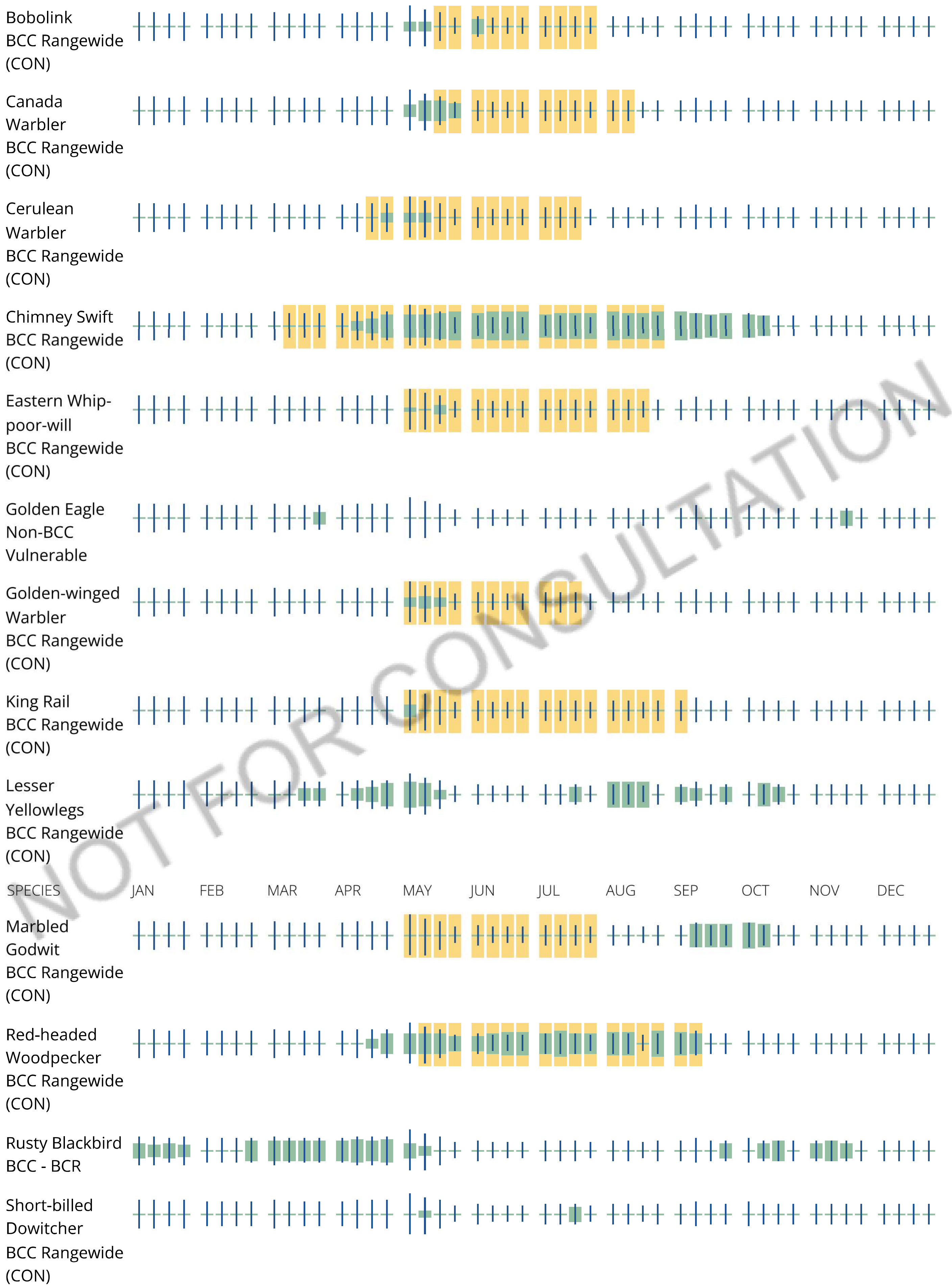
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

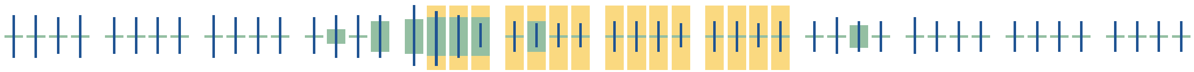
No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.




Bobolink
BCC Rangewide
(CON)
Canada
Warbler
BCC Rangewide
(CON)
Cerulean
Warbler
BCC Rangewide
(CON)
Chimney Swift
BCC Rangewide
(CON)
Eastern Whip-
poor-will
BCC Rangewide
(CON)
Golden Eagle
Non-BCC
Vulnerable
Golden-winged
Warbler
BCC Rangewide
(CON)
King Rail
BCC Rangewide
(CON)
Lesser
Yellowlegs
BCC Rangewide
(CON)
SPECIES
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Marbled
Godwit
BCC Rangewide
(CON)
Red-headed
Woodpecker
BCC Rangewide
(CON)
Rusty Blackbird
BCC - BCR
Short-billed
Dowitcher
BCC Rangewide
(CON)

Wood Thrush
BCC Rangewide
(CON)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix H

ODNR Natural Heritage Database Information

Jeff Johnson, Chief
Division of Natural Areas & Preserves
2045 Morse Rd, Building H
Columbus, Ohio 43229

June 16, 2023

Luke Wilson,
EnviroScience, Inc.
5070 Stow Rd
Stow, OH 44224

Re: DR23_242

Dear Luke,

I have reviewed the Natural Heritage Database for the Collins Park Stream Restoration Feasibility Project area in the City of Toledo, Lucas County, Ohio. We have records for two rare species dating from 1980 within a mile of the project area. They are listed below and one is shown on the attached map by number in blue.

1. American Eel (*Anguilla rostrata*), state threatened
2. Blanding's Turtle (*Emydoidea blandingii*), state threatened [not shown on map]

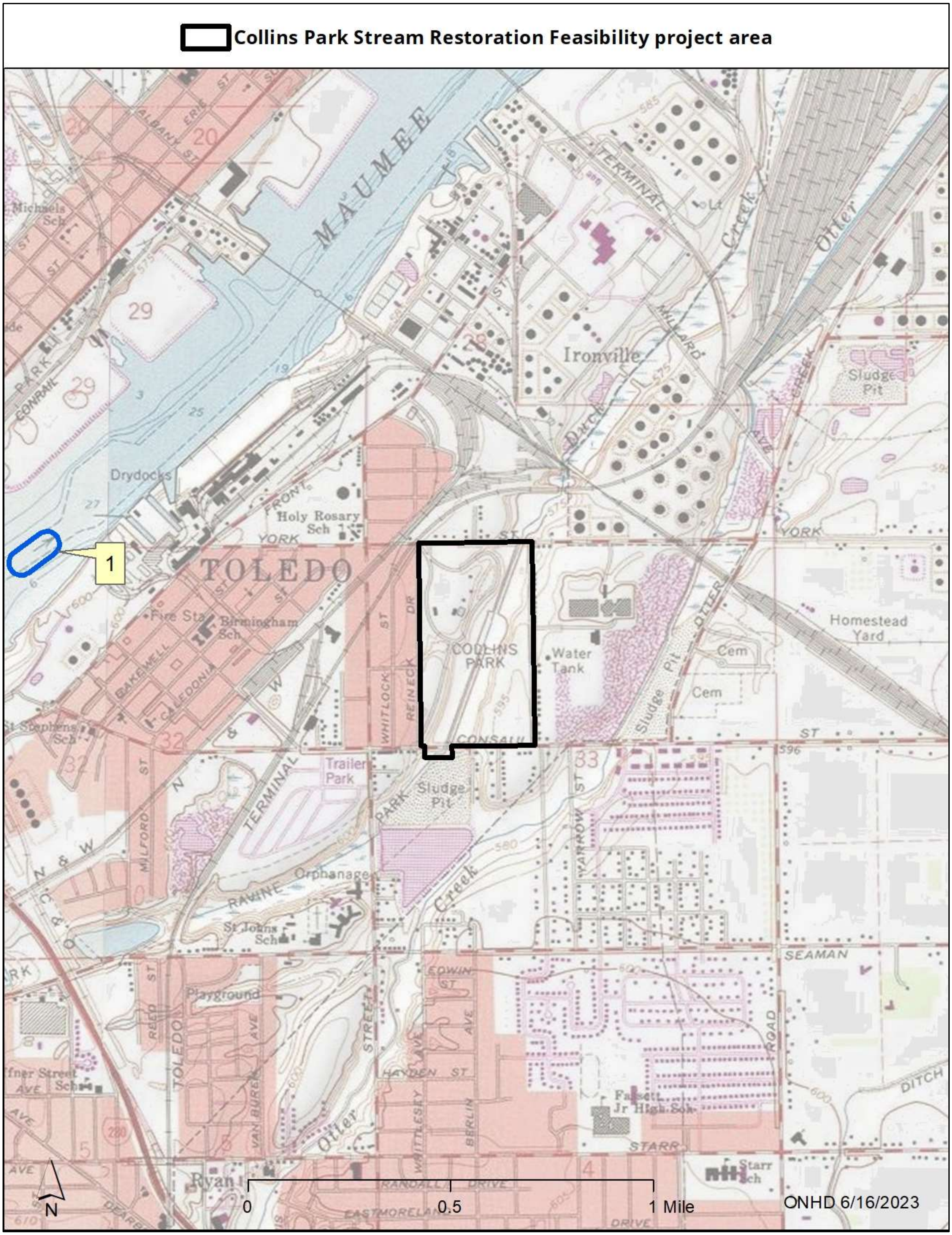
Please note that we do not give out specific location data for the Blanding's Turtle, due to the sensitivity of that information, so it is not shown on the map. However, it is not recorded within the specified boundaries of your project area.

Our inventory program has not completely surveyed Ohio and relies on information supplied by many individuals and organizations. Therefore, a lack of records for any particular area is not a statement that rare species or unique features are absent from that area. This letter only represents a review of rare species and natural features data within the Ohio Natural Heritage Database. It does not fulfill coordination under the National Environmental Policy Act (NEPA) or the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S. C. 661 et seq.) and does not supersede or replace the regulatory authority of any local, state or federal agency nor relieve the applicant of the obligation to comply with any local, state or federal laws or regulations.

Please contact me by email or voicemail at 614-265-6818 if I can be of further assistance.

Sincerely,

Kendra Millam
Ohio Natural Heritage Program


Collins Park Stream Restoration Feasibility project area
MAUMEE
TOLEDO
Ironville
COLLINS PARK
Water Tank
Drydocks
Holy Rosary Sch
Birmingham Sch
Fire Sta
Sludge Pit
Homestead Yard
Cem
Trailer Park
Orphanage
St Johns Sch
Playground
Fassett Jr High Sch
Starr Sch
Ryan
Otter Creek
Duck Creek
YORK ST
CONSAUL ST
SEAMAN
TERMINAL
FRONT
1
0
0.5
1 Mile
N
ONHD 6/16/2023

Appendix C

Pace Analytical Services, LLC
25 Holiday Drive
Englewood, OH 45322
(937)832-8242

August 18, 2023

NIcole Stolic
EnviroScience
5070 Stow
Stow, OH 44224

RE: Project: 17005 Collins Park
Pace Project No.: 52121481

Dear NIcole Stolic:

Enclosed are the analytical results for sample(s) received by the laboratory on August 04, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Dayton

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Alicia Barnes
alicia.barnes@pacelabs.com
(937)832-8242
Project Manager

Enclosures

cc: Emily Pechatis, EnviroScience, Inc

Pace Analytical Services, LLC
25 Holiday Drive
Englewood, OH 45322
(937)832-8242

CERTIFICATIONS

Project:	17005 Collins Park
Pace Project No.:	52121481

Pace Analytical Services Dayton

25 Holiday Drive, Englewood, OH 45322
Florida Certification #: E871136
Ohio VAP Certification #: CL0032
Kentucky UST Certification #: 123049
Kentucky Wastewater Certification #: KY98039
Ohio EPA Drinking Water Lab #872

Pace Analytical Services, LLC
25 Holiday Drive
Englewood, OH 45322
(937)832-8242

SAMPLE SUMMARY

Project: 17005 Collins Park
Pace Project No.: 52121481

Lab ID	Sample ID	Matrix	Date Collected	Date Received
52121481001	**Collins - URS**	Water	08/03/23 13:00	08/04/23 12:02
52121481002	**Collins - Mid**	Water	08/03/23 10:20	08/04/23 12:02
52121481003	**Collins - DWS**	Water	08/03/23 11:50	08/04/23 12:02

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SAMPLE ANALYTE COUNT

Project: 17005 Collins Park
Pace Project No.: 52121481

Lab ID	Sample ID	Method	Analysts	Analytes Reported
52121481001	**Collins - URS**	EPA 200.7	SRI	1
		SM 2130B-11	CMH	1
		SM 2540D	CJB	1
		SM 4500G	KMW	1
		SM 4500-NO3 F-11	CMH	1
		SM 4500-Norg D-11	CMH	1
52121481002	**Collins - Mid**	EPA 200.7	SRI	1
		SM 2130B-11	CMH	1
		SM 2540D	CJB	1
		SM 4500G	KMW	1
		SM 4500-NO3 F-11	CMH	1
		SM 4500-Norg D-11	CMH	1
52121481003	**Collins - DWS**	EPA 200.7	SRI	1
		SM 2130B-11	CMH	1
		SM 2540D	CJB	1
		SM 4500G	KMW	1
		SM 4500-NO3 F-11	CMH	1
		SM 4500-Norg D-11	CMH	1

PASI-DAY = Pace Analytical Services - Dayton

Pace Analytical Services, LLC
25 Holiday Drive
Englewood, OH 45322
(937)832-8242

ANALYTICAL RESULTS

Project: 17005 Collins Park
Pace Project No.: 52121481

Sample: Collins - URS | **Lab ID: 52121481001** | Collected: 08/03/23 13:00 | Received: 08/04/23 12:02 | Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7 Pace Analytical Services - Dayton							
Phosphorus	**186**	ug/L	100	1	08/09/23 16:01	08/10/23 18:34	7723-14-0	
2130B Turbidity	Analytical Method: SM 2130B-11 Pace Analytical Services - Dayton							
Turbidity	**121**	NTU	0.10	1		08/04/23 17:04		N2
2540D Total Suspended Solids	Analytical Method: SM 2540D Pace Analytical Services - Dayton							
Total Suspended Solids	**94.0**	mg/L	10.0	1		08/08/23 11:30		
4500 OG Oxygen, Dissolved	Analytical Method: SM 4500G Pace Analytical Services - Dayton							
Oxygen, Dissolved	**10.3**	mg/L	0.10	1		08/18/23 16:51	7782-44-7	H3,H6, N2
4500NO3-F, NO2/NO3 pres.	Analytical Method: SM 4500-NO3 F-11 Pace Analytical Services - Dayton							
Nitrogen, NO2 plus NO3	ND	mg/L	0.10	1		08/14/23 12:05		
4500 Total Kjeldahl Nitrogen	Analytical Method: SM 4500-Norg D-11 Preparation Method: SM 4500-Norg D-11 Pace Analytical Services - Dayton							
Nitrogen, Kjeldahl, Total	**0.87**	mg/L	0.50	1	08/15/23 11:04	08/16/23 14:56	7727-37-9	

Sample: Collins - Mid | **Lab ID: 52121481002** | Collected: 08/03/23 10:20 | Received: 08/04/23 12:02 | Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7 Pace Analytical Services - Dayton							
Phosphorus	ND	ug/L	100	1	08/09/23 16:01	08/10/23 18:35	7723-14-0	
2130B Turbidity	Analytical Method: SM 2130B-11 Pace Analytical Services - Dayton							
Turbidity	**69.7**	NTU	0.10	1		08/04/23 17:04		N2
2540D Total Suspended Solids	Analytical Method: SM 2540D Pace Analytical Services - Dayton							
Total Suspended Solids	**14.0**	mg/L	10.0	1		08/08/23 11:30		
4500 OG Oxygen, Dissolved	Analytical Method: SM 4500G Pace Analytical Services - Dayton							
Oxygen, Dissolved	**9.9**	mg/L	0.10	1		08/18/23 16:49	7782-44-7	H3,H6, N2

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25 Holiday Drive
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(937)832-8242

ANALYTICAL RESULTS

Project: 17005 Collins Park
Pace Project No.: 52121481

Sample: Collins - Mid | **Lab ID: 52121481002** | Collected: 08/03/23 10:20 | Received: 08/04/23 12:02 | Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
4500NO3-F, NO2/NO3 pres.	Analytical Method: SM 4500-NO3 F-11 Pace Analytical Services - Dayton							
Nitrogen, NO2 plus NO3	ND	mg/L	0.10	1		08/14/23 12:06		
4500 Total Kjeldahl Nitrogen	Analytical Method: SM 4500-Norg D-11 Preparation Method: SM 4500-Norg D-11 Pace Analytical Services - Dayton							
Nitrogen, Kjeldahl, Total	**0.59**	mg/L	0.50	1	08/15/23 11:04	08/16/23 14:57	7727-37-9	

Sample: Collins - DWS | **Lab ID: 52121481003** | Collected: 08/03/23 11:50 | Received: 08/04/23 12:02 | Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7 Pace Analytical Services - Dayton							
Phosphorus	**131**	ug/L	100	1	08/09/23 16:01	08/10/23 18:37	7723-14-0	
2130B Turbidity	Analytical Method: SM 2130B-11 Pace Analytical Services - Dayton							
Turbidity	**49.1**	NTU	0.10	1		08/04/23 17:04		N2
2540D Total Suspended Solids	Analytical Method: SM 2540D Pace Analytical Services - Dayton							
Total Suspended Solids	**20.0**	mg/L	10.0	1		08/08/23 11:30		
4500 OG Oxygen, Dissolved	Analytical Method: SM 4500G Pace Analytical Services - Dayton							
Oxygen, Dissolved	**10.2**	mg/L	0.10	1		08/18/23 16:50	7782-44-7	H3,H6, N2
4500NO3-F, NO2/NO3 pres.	Analytical Method: SM 4500-NO3 F-11 Pace Analytical Services - Dayton							
Nitrogen, NO2 plus NO3	ND	mg/L	0.10	1		08/14/23 11:35		
4500 Total Kjeldahl Nitrogen	Analytical Method: SM 4500-Norg D-11 Preparation Method: SM 4500-Norg D-11 Pace Analytical Services - Dayton							
Nitrogen, Kjeldahl, Total	**0.87**	mg/L	0.50	1	08/15/23 11:04	08/16/23 14:58	7727-37-9	

Pace Analytical Services, LLC
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QUALITY CONTROL DATA

Project: 17005 Collins Park
Pace Project No.: 52121481

QC Batch: 107944 | Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 | Analysis Description: 200.7 Metals, Total
Laboratory: Pace Analytical Services - Dayton
Associated Lab Samples: 52121481001, 52121481002, 52121481003

METHOD BLANK: 501536 | Matrix: Water
Associated Lab Samples: 52121481001, 52121481002, 52121481003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	ug/L	ND	100	08/10/23 18:16	

LABORATORY CONTROL SAMPLE: 501537

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	ug/L	1250	1270	102	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 501538 501539

Parameter	Units	52121429001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	ug/L	ND	1250	1250	1290	1290	102	103	70-130	0	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 501540 501541

Parameter	Units	52121432002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	ug/L	0.17 mg/L	1250	1250	1440	1470	102	104	70-130	2	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: 17005 Collins Park
Pace Project No.: 52121481

QC Batch:	107808	Analysis Method:	SM 2130B-11
QC Batch Method:	SM 2130B-11	Analysis Description:	2130B Turbidity
		Laboratory:	Pace Analytical Services - Dayton

Associated Lab Samples: 52121481001, 52121481002, 52121481003

METHOD BLANK: 500810 Matrix: Water

Associated Lab Samples: 52121481001, 52121481002, 52121481003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Turbidity	NTU	ND	0.10	08/04/23 17:04	N2

LABORATORY CONTROL SAMPLE: 500811

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Turbidity	NTU	1	0.98	98	90-110	N2

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: 17005 Collins Park
Pace Project No.: 52121481

QC Batch: 107874
QC Batch Method: SM 2540D
Analysis Method: SM 2540D
Analysis Description: 2540D Total Suspended Solids
Laboratory: Pace Analytical Services - Dayton
Associated Lab Samples: 52121481001, 52121481002, 52121481003

METHOD BLANK: 501093 Matrix: Water
Associated Lab Samples: 52121481001, 52121481002, 52121481003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Suspended Solids	mg/L	ND	0.50	08/08/23 11:29	

LABORATORY CONTROL SAMPLE: 501095

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Suspended Solids	mg/L	30	33.0	110	83-111	

SAMPLE DUPLICATE: 501094

Parameter	Units	52121431002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	ND	ND		5	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
25 Holiday Drive
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QUALITY CONTROL DATA

Project: 17005 Collins Park
Pace Project No.: 52121481

QC Batch: 108090 | Analysis Method: SM 4500-NO3 F-11
QC Batch Method: SM 4500-NO3 F-11 | Analysis Description: 4500NO3-F Nitrate + Nitrite, preserved
Laboratory: Pace Analytical Services - Dayton
Associated Lab Samples: 52121481001, 52121481002, 52121481003

METHOD BLANK: 502369 | Matrix: Water
Associated Lab Samples: 52121481001, 52121481002, 52121481003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, NO2 plus NO3	mg/L	ND	0.10	08/14/23 11:39	

LABORATORY CONTROL SAMPLE: 502370

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, NO2 plus NO3	mg/L	2.5	2.6	105	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 502371 502372

Parameter	Units	52121537002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, NO2 plus NO3	mg/L	25.8	400	400	25.2	24.4	0	0	90-110	3	10	M1

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: 17005 Collins Park
Pace Project No.: 52121481

QC Batch: 108125
QC Batch Method: SM 4500-Norg D-11
Analysis Method: SM 4500-Norg D-11
Analysis Description: 4500N -D TKN
Laboratory: Pace Analytical Services - Dayton
Associated Lab Samples: 52121481001, 52121481002, 52121481003

METHOD BLANK: 502530 Matrix: Water
Associated Lab Samples: 52121481001, 52121481002, 52121481003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	ND	0.50	08/16/23 14:50	

LABORATORY CONTROL SAMPLE: 502531

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	20	18.2	91	81-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 502532 502533

Parameter	Units	52121470002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, Kjeldahl, Total	mg/L	1.6	10	10	10.2	9.8	86	82	81-133	4	10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

Pace Analytical Services, LLC
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QUALIFIERS

Project:	17005 Collins Park
Pace Project No.:	52121481

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

H3	Sample was received or analysis requested beyond the recognized method holding time.
H6	Analysis initiated outside of the 15 minute EPA required holding time.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
N2	The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

Pace Analytical Services, LLC
25 Holiday Drive
Englewood, OH 45322
(937)832-8242

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 17005 Collins Park
Pace Project No.: 52121481

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
52121481001	**Collins - URS**	EPA 200.7	107944	EPA 200.7	107995
52121481002	**Collins - Mid**	EPA 200.7	107944	EPA 200.7	107995
52121481003	**Collins - DWS**	EPA 200.7	107944	EPA 200.7	107995
52121481001	**Collins - URS**	SM 2130B-11	107808		
52121481002	**Collins - Mid**	SM 2130B-11	107808		
52121481003	**Collins - DWS**	SM 2130B-11	107808		
52121481001	**Collins - URS**	SM 2540D	107874		
52121481002	**Collins - Mid**	SM 2540D	107874		
52121481003	**Collins - DWS**	SM 2540D	107874		
52121481001	**Collins - URS**	SM 4500G	108322		
52121481002	**Collins - Mid**	SM 4500G	108322		
52121481003	**Collins - DWS**	SM 4500G	108322		
52121481001	**Collins - URS**	SM 4500-NO3 F-11	108090		
52121481002	**Collins - Mid**	SM 4500-NO3 F-11	108090		
52121481003	**Collins - DWS**	SM 4500-NO3 F-11	108090		
52121481001	**Collins - URS**	SM 4500-Norg D-11	108125	SM 4500-Norg D-11	108197
52121481002	**Collins - Mid**	SM 4500-Norg D-11	108125	SM 4500-Norg D-11	108197
52121481003	**Collins - DWS**	SM 4500-Norg D-11	108125	SM 4500-Norg D-11	108197

Pace Analytical®

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY

WO# : 52121481

52121481

Container Preservative Type **: 2 1

Lab Project Manager:

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other ______________

Company: EnviroScience, Inc

Address: 5070 Stow, OH 44224

Billing Information:

Report To: NStolic@enviroscienceinc.com

Email To: Nicole Stolic

Copy To:

Site Collection Info/Address:

Customer Project Name/Number: 17005 Collins Park

State: OH / County/City: Toledo

Time Zone Collected: [ ] PT [ ] MT [ ] CT [X] ET

Phone:

Email:

Site/Facility ID #:

Compliance Monitoring? [ ] Yes [ ] No

Collected By (print): Nicole Stolic

Purchase Order #:

Quote #:

DW PWS ID #:

DW Location Code:

Collected By (signature): Nicole Stolic

Turnaround Date Required: Standard

Immediately Packed on Ice: [X] Yes [ ] No

Sample Disposal: [X] Dispose as appropriate [ ] Return [ ] Archive: ____ [ ] Hold: ____

Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)

Field Filtered (if applicable): [ ] Yes [ ] No

Analysis: ______________

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Analyses:

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Time	Composite End Date	Time	Res Cl	# of Ctns	Dissolved Oxygen & Turbidity	TSS	TKN & Nitrate	Total Phosphorus
Collins - URS	Surface Water	G	8-3-23	1300				4	✓	✓	✓	✓
Collins - Mid	Surface Water	G	8-3-23	1020				4	✓	✓	✓	✓
Collins - DWS	Surface Water	G	8-3-23	1150				4	✓	✓	✓	✓

Lab Profile/Line:

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y	N	NA
Custody Signatures Present	Y	N	NA
Collector Signature Present	Y	N	NA
Bottles Intact	Y	N	NA
Correct Bottles	Y	N	NA
Sufficient Volume	Y	N	NA
Samples Received on Ice	Y	N	NA
VOA - Headspace Acceptable	Y	N	NA
USDA Regulated Soils	Y	N	NA
Samples in Holding Time	Y	N	NA
Residual Chlorine Present	Y	N	NA
Cl Strips:			
Sample pH Acceptable	Y	N	NA
pH Strips: 525186			
Sulfide Present	Y	N	NA
Lead Acetate Strips:			

LAB USE ONLY:

Lab Sample # / Comments:

Customer Remarks / Special Conditions / Possible Hazards: GLNPO

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #: 2832171

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:

Temp Blank Received: Y N NA

Therm ID#: 521RA

Cooler 1 Temp Upon Receipt: 2.0 oC

Cooler 1 Therm Corr. Factor: -.2 oC

Cooler 1 Corrected Temp: 1.8 oC

Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Nicole Stolic / EnviroScience	8-3-23 / 1534	Emma Watson	8/04/23 1202

MTJL LAB USE ONLY

Table #:

Acctnum:

Template:

Prelogin:

PM:

PB:

Trip Blank Received: Y N NA

HCL MeOH TSP Other

Non Conformance(s): YES / NO

of: ______

Date: 8/04/23 **Client** EnviroScience, Inc **COC #** 2832171

Please write the **NUMBER** of the specific type of sample container in correspondance to the **Line #** on the coc.

COC Line #	Matrix	Vials: # of Vials	Vials: # of Trip Blanks	Glass/Amber: 4-8oz Unpres Jar	Glass/Amber: LLHg	Glass/Amber: Unpres	Glass/Amber: Sulfuric	Glass/Amber: Cyanide	Glass/Amber: SOC	Glass/Amber: HAA5	Plastic: Unpres	Plastic: Sulfuric	Plastic: Nitric	Plastic: Cyanide	Plastic: Sulfide	Other: Sterile	Other: Ziploc Bag	Other: Other
1											2	1	1					
2											2	1	1					
3											2	1	1					
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		

Workorder #

WO#: 52121481
PM: MST Due Date: 08/18/23
CLIENT: EnviroScienc

Matrixes:
WT Water
SL Sludge
OL Oil
WP Wipe
WW Wastewater
DW Drinking Water
GW Ground Water

Sterile=Bacteria Total Coliform, Ecoli, Counts, Fecals, HPCs
Sulfuric=Yellow=H2SO4
Red=Nitric=HNO3
Green=Cyanide=NaOH

Appendix D

Collins Park Stream Restoration
Duck Creek
6/22/2023
0

RM: 0.00
Drainage Area (mi^2): 0.85
Distance Fished (m): 105
Time Fished (sec): 607
Sampler Type: E

Crew Leader: Dave Altfater

Note: * - Metric score is low-end adjusted
* - Metric Low End Adjusted

Metric:	**Indigenous Fish Species (#)**	**Darter/ Sculpin Species (#)**	**Headwater Species (#)**	**Minnow Species (#)**	**Sensitive Species (#)**	**Tolerant Species (%)**	**Omnivores (%)**	**Insectivores (%)**	**Pioneering (%)**	**Rel. No. (#/300m)**	**Simple Lithophils (#)**	**DELTs (%)**	**Total IBI Score**
Value:	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.0	0	#DIV/0!	
Metric Score:	1	1	1	1	1	1	1	1	1	1	1	1	**12**
Low End Adjustment:	**YES**					*	*	*	*		*	*	

EnviroScience
Excellence In Any Environment

Station ID SITE E
Date 6/22/23 Time 10:24

Stream/River DUCK CR.
River Mile
Location SITE E - COLLINS PARK GOLF COURSE

Comments

County LUCAS

Lat/Long 41.6627413 -83.4817919
Drainage Area
Seconds fished 607

Samplers ALTFATER, YUPA
Sample Type E

Distance 105 M
Flow SLOW-NONE
Cond. 1020
Temp. 19.1°C
D.O. 0.60
pH 7.30

Species	Number Weighed	Total Counted	Total Weight	Weights/Counts					Delt Anomalies Deformities, Erosions Lesions, Tumors, Other					Vouchers
NO FISH									D	E	L	T	O	
									D	E	L	T	O	
									D	E	L	T	O	
									D	E	L	T	O	
									D	E	L	T	O	
									D	E	L	T	O	
									D	E	L	T	O	
									D	E	L	T	O	
									D	E	L	T	O	
									D	E	L	T	O	

EnviroScience
Excellence In Any Environment

Station ID G **Date** 6/22/23 **Time** 12:14

Stream/River DUCK CR. **River Mile** ____ **Location** Duck Creek, G

Comments

County LUCAS

Lat/Long 41.6660553, -83.4803877 **Drainage Area** ____ **Seconds fished** 705

Samplers ALTFATER, YUPA **Sample Type** E

Distance 130m **Flow** SLOW/NONE **Cond.** 1162 **Temp.** 19.4 **D.O.** 2.03 **pH** 7.60

g/mm

Species	Number Weighed	Total Counted	Total Weight	Weights/Counts LENGTHS					Delt Anomalies (Deformities, Erosions, Lesions, Tumors, Other)	Vouchers
CENTRAL MUDMINNOW				~~11/105~~	6/75	5/77	7/84	5/77	D E L T O	
				8/88		~~[illegible]~~				
NORTHERN PIKE				~~[illegible]~~	~~[illegible]~~	16/105			D E L T O	
					~~105~~					
									D E L T O	
									D E L T O	
									D E L T O	
									D E L T O	
									D E L T O	
									D E L T O	
									D E L T O	
									D E L T O	

Appendix E

Project Name:	Collins Park	**Methods:**	OEPA
Site #:	MID	**Collected by:**	N. Stolic
Drainage Area	0.86	**Collection date:**	8/3/2023
Coordinates	41.662893, -83.481672	**Identified by:**	M. Genco 2023

TAXA CODE	GROUP	FAMILY	Taxa Name	HD Final Count	#30	#40	Qual	Unique	Notes
98200	Bivalvia	Sphaeriidae	*Pisidium sp*	12	12		2	1	
98600	Bivalvia	Sphaeriidae	*Sphaerium sp*	16	16			1	
01320	Cnidaria	Hydridae	*Hydra sp*	32	17	15		1	
60830	Coleoptera	Haliplidae	Haliplus immaculicollis	0			1	1	
67800	Coleoptera	Hydrophilidae	Tropisternus sp	0			2	1	larvae
74501	Diptera	Ceratopogonidae	Ceratopogonidae	3	2	1		1	*Ceratopogon/Culicoides/Stylobezzia*
74501	Diptera	Ceratopogonidae	Ceratopogonidae	1	1			1	*Bezzia/ Probezzia/Palpomyia*
82700	Diptera	Chironomidae	*Chironomus sp*	5	5			1	
82800	Diptera	Chironomidae	*Cladopelma sp*	2	2			1	
83000	Diptera	Chironomidae	*Dicrotendipes sp*	2	2			1	immature
83300	Diptera	Chironomidae	*Glyptotendipes (G.) sp*	9	9			1	
85500	Diptera	Chironomidae	*Paratanytarsus sp*	3	3			1	
78650	Diptera	Chironomidae	*Procladius sp*	2	2			1	
96900	Gastropoda	Ancylidae	*Ferrissia sp*	1	1			1	
94400	Gastropoda	Lymnaeidae	*Fossaria sp*	0			2	1	Now *Lymnaea* according to FWGNA
95100	Gastropoda	Physidae	*Physella sp*	0			1	1	
94000	Gastropoda	Pleuroceridae	*Leptoxis sp*	10	10		1	1	
92615	Gastropoda	Viviparidae	*Cipangopaludina japonica*	0			1	1	
04935	Hirudinida	Erpobdellidae	*Erpobdella punctata punctata*	9	9			1	
04662	Hirudinida	Glossiphoniidae	*Helobdella fusca*	30	30		1	1	
04660	Hirudinida	Glossiphoniidae	*Helobdella sp*	1	1			1	
04664	Hirudinida	Glossiphoniidae	*Helobdella stagnalis*	64	64			1	
08601	Hydrachnidia		Hydrachnidia	1		1		1	
05800	Isopoda	Asellidae	*Caecidotea sp*	210	210		3	1	
02000	Nematoda		Nematoda	1		1		1	
03600	Oligochaeta		Oligochaeta	274	241	33		1	
01801	Turbellaria		Turbellaria	16	16		11	1	
Total:				704	653	51	25		

General Sample Notes:

	Metric	Result	Scoring Category
1	Total Quantitative Taxa	22	0
2	Number Mayfly Taxa	0	0
3	Number Caddisfly Taxa	0	0
4	Number Dipteran Taxa	8	2
5	Percent Mayfly	0.00%	0
6	Percent Caddisfly	0.00%	0
7	Percent Tanytarsini	0.43%	2
8	% Other Dips and Non-Insect	99.57%	0
9	Percent Tolerant	39.06%	0
10	Number Qual EPT Taxa	0	0
		ICI Score	4

Project Name:	Collins Park	**Methods:**	OEPA
Site #:	DWS	**Collected by:**	N. Stolic
Drainage Area	0.96	**Collection date:**	8/3/2023
Coordinates	41.665523, -83.480648	**Identified by:**	M. Genco 2023

TAXA CODE	GROUP	FAMILY	Taxa Name	HD Final Count	#30	#40	Qual	Unique	Notes
98200	Bivalvia	Sphaeriidae	*Pisidium sp*	0			4	1	
98001	Bivalvia	Sphaeriidae	Sphaeriidae	1	1				small
98600	Bivalvia	Sphaeriidae	*Sphaerium sp*	0			1	1	
01320	Cnidaria	Hydridae	*Hydra sp*	30	12	18		1	
66700	Coleoptera	Hydrophilidae	*Helochares maculicollis*	0			1	1	
67800	Coleoptera	Hydrophilidae	*Tropisternus sp*	0			1	1	adult
74501	Diptera	Ceratopogonidae	Ceratopogonidae	1		1		1	*Ceratopogon/ Culicoides/ Silobezzia*
77115	Diptera	Chironomidae	*Ablabesmyia janta*	2	2			1	
77100	Diptera	Chironomidae	*Ablabesmyia sp*	2	2			1	(Karelia)
82501	Diptera	Chironomidae	Chironomini	4	4				teneral or mentum obscured or imature
82700	Diptera	Chironomidae	*Chironomus sp*	2	2		1	1	small
80350	Diptera	Chironomidae	*Corynoneura sp*	3	3			1	
83051	Diptera	Chironomidae	*Dicrotendipes simpsoni*	10	10			1	
83000	Diptera	Chironomidae	*Dicrotendipes sp*	12	12				small, poorly cleared or othewise damaged
85400	Diptera	Chironomidae	*Micropsectra sp*	51	51		1	1	
77001	Diptera	Chironomidae	Tanypodinae	4	4				poorly cleared and immature
79100	Diptera	Chironomidae	*Thienemannimyia group*	5	5			1	
79300	Diptera	Chironomidae	*Trissopelopia ogemawi*	2	2			1	
71900	Diptera	Tipulidae	*Tipula sp*	0			1	1	
96900	Gastropoda	Ancylidae	*Ferrissia sp*	1		1		1	
95100	Gastropoda	Physidae	*Physella sp*	1	1			1	
94000	Gastropoda	Pleuroceridae	*Leptoxis sp*	9	9		6	1	
04935	Hirudinida	Erpobdellidae	*Erpobdella punctata punctata*	0			2	1	
04662	Hirudinida	Glossiphoniidae	*Helobdella fusca*	27	17	10		1	
04666	Hirudinida	Glossiphoniidae	*Helobdella papillata*	2	2			1	
04664	Hirudinida	Glossiphoniidae	*Helobdella stagnalis*	4	4		9	1	
05501	Isopoda		Isopoda	102	34	68			tiny specimens, likely *Caecidotea*
05800	Isopoda	Asellidae	*Caecidotea sp*	106	106		22	1	
47600	Megaloptera	Sialidae	*Sialis sp*	1	1			1	
02000	Nematoda		Nematoda	1		1		1	
22001	Odonata	Coenagrionidae	Coenagrionidae	7	5	2	1	1	tiny
03600	Oligochaeta		Oligochaeta	118	82	36	1	1	
01801	Turbellaria		Turbellaria	95	95		78	1	
Total:				603	466	137	129		

General Sample Notes:

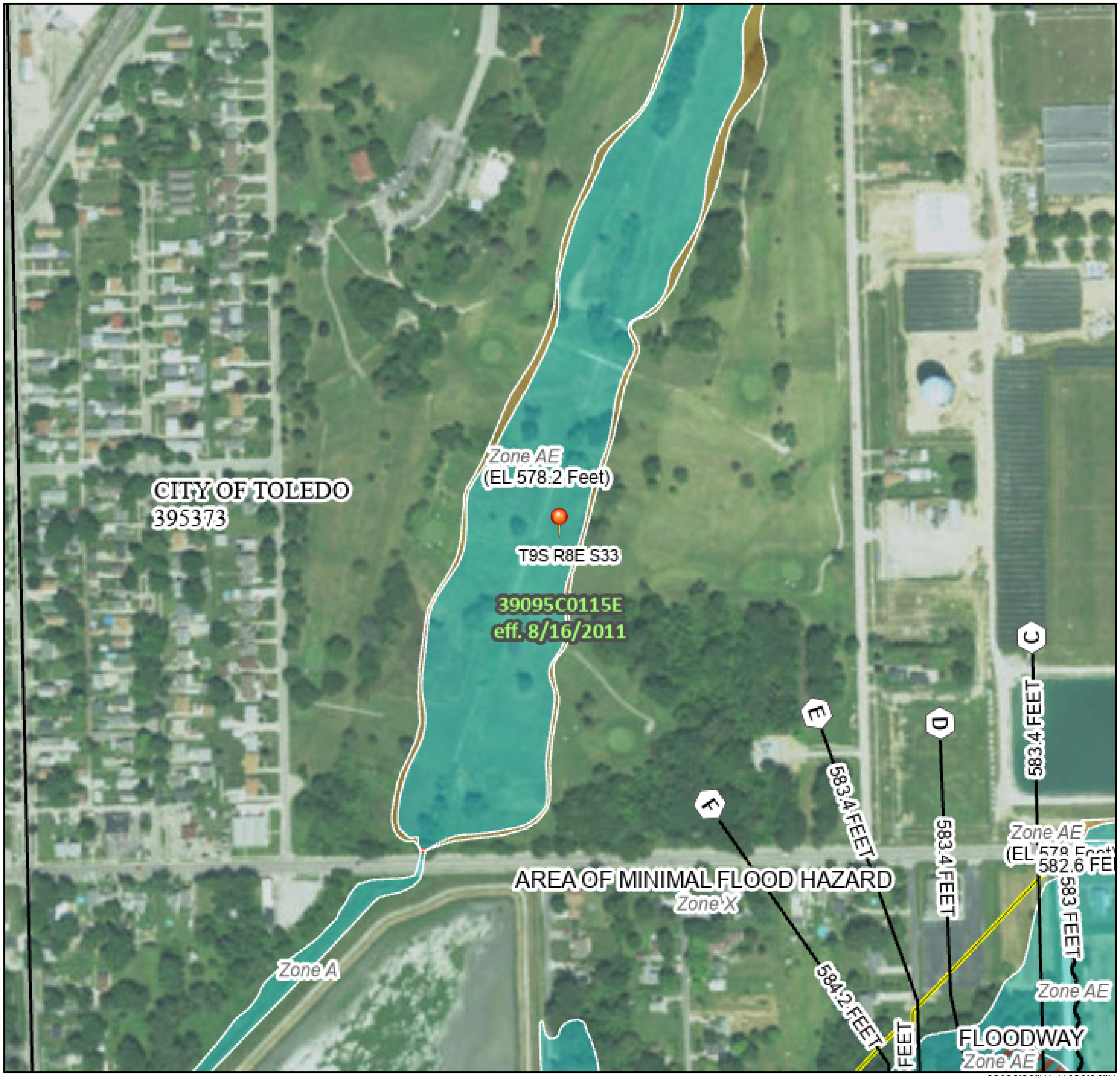
	Metric	Result	Scoring Category
1	Total Quantitative Taxa	22	2
2	Number Mayfly Taxa	0	0
3	Number Caddisfly Taxa	0	0
4	Number Dipteran Taxa	13	2
5	Percent Mayfly	0.00%	0
6	Percent Caddisfly	0.00%	0
7	Percent Tanytarsini	8.46%	2
8	% Other Dips and Non-Insect	91.54%	0
9	Percent Tolerant	21.56%	2
10	Number Qual EPT Taxa	0	0
		ICI Score	8

Appendix F

National Flood Hazard Layer FIRMette

FEMA

83°29'15"W 41°39'53"N



83°28'38"W 41°39'26"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/15/2022 at 10:33 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

The updated Lake Erie stillwater elevations were used to determine the flood elevations for Reno Side Cut Ditch, Tank Ditch, Ward Canal, and Wilhelm Ditch. The flood elevations for Duck Creek were determined from the stillwater elevations for Maumee Bay (Reference 1).

The stillwater elevations for the 10-, 2-, 1-, and 0.2-percent-annual-chance flood events for the flooding sources studied in detail are shown in TABLE 9 (References 1 and 43).

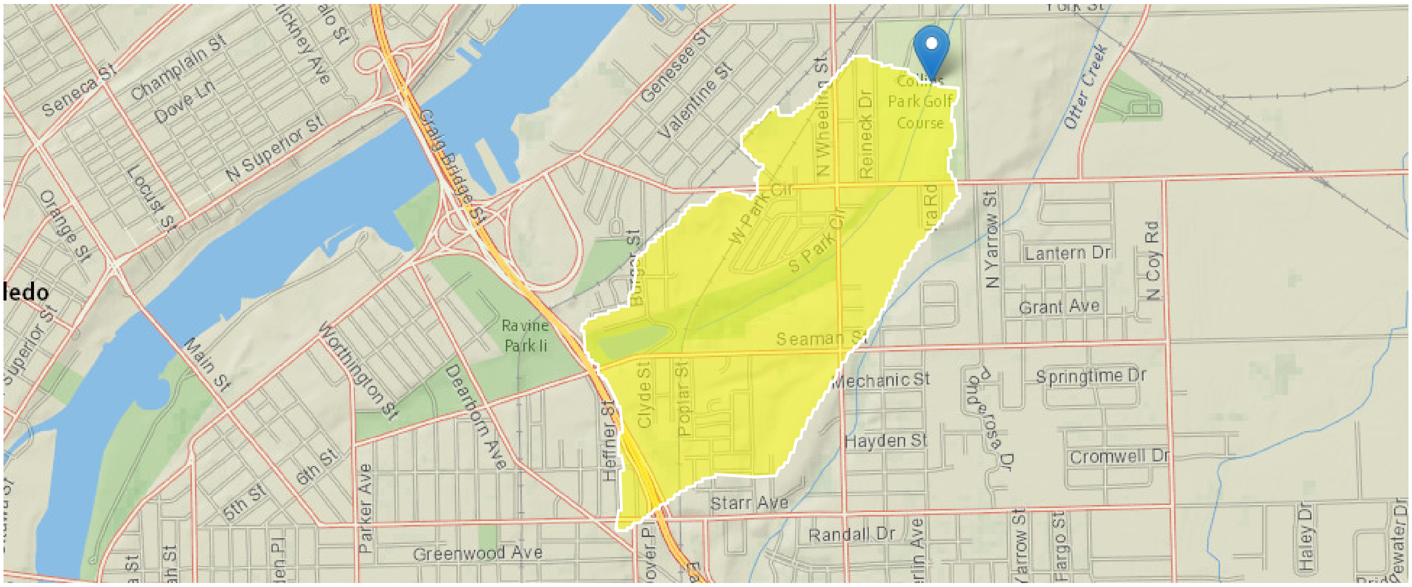
TABLE 9 – Summary of Stillwater Elevations

	Peak Elevation (feet NAVD88)			
Flooding Source and Location	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Duck Creek				
Cities of Oregon and Toledo	577.4	578.5	579.0	579.9
Lake Erie				
East of Cedar Point	576.3	577.4	577.9	578.8
West of Cedar Point	576.6	577.7	578.2	579.1
Maumee Bay				
Entire shoreline	576.6	577.7	578.2	579.1
Reno Side Cut Ditch				
Lucas County (Unincorporated Areas)	576.3	577.4	577.9	578.8
Pond 1	*	*	667.2	667.8
Pond 2	*	*	667.2	667.8
Tank Ditch				
Lucas County (Unincorporated Areas)	576.3	577.4	577.9	578.8
Ward Canal				
Lucas County (Unincorporated Areas)	576.3	577.4	577.9	578.8
Wilhelm Ditch				
Lucas County (Unincorporated Areas)	576.3	577.4	577.9	578.8

* Data not available

StreamStats Report

Region ID: OH
Workspace ID: OH20230821173529697000
Clicked Point (Latitude, Longitude): 41.66307, -83.48163
Time: 2023-08-21 13:36:07 -0400



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CSL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	18	feet per mi
DRNAREA	Area that drains to a point on a stream	0.86	square miles
FOREST	Percentage of area covered by forest	8.31	percent
LAT_CENT	Latitude of Basin Centroid	41.6542	decimal degrees
LC92STOR	Percentage of water bodies and wetlands determined from the NLCD	3.34	percent
LONG_CENT	Longitude Basin Centroid	83.4911	decimal degrees
OHREGA	Ohio Region A Indicator	0	dimensionless
OHREGC	Ohio Region C Indicator	0	dimensionless
PRECIPCENT	Mean Annual Precip at Basin Centroid	31.2	inches
STREAM_VARG	Streamflow variability index as defined in WRIR 02-4068, computed from regional grid	0.57	dimensionless

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Peak Flow Full Model Reg B SIR2019 5018]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.86	square miles	0.04	6309
OHREGC	Ohio Region C Indicator 1 if in C else 0	0	dimensionless	0	1
OHREGA	Ohio Region A Indicator 1 if in A else 0	0	dimensionless	0	1
CSL1085LFP	Stream Slope 10 and 85 Longest Flow Path	18	feet per mi	1.21	457
LC92STOR	Percent Storage from NLCD1992	3.34	percent	0	7.1

Peak-Flow Statistics Flow Report [Peak Flow Full Model Reg B SIR2019 5018]

PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PIl	PIu	ASEp
50-percent AEP flood	54.7	ft^3/s	28.5	105	40.1
20-percent AEP flood	86.7	ft^3/s	47.3	159	37.2
10-percent AEP flood	110	ft^3/s	59.6	203	37.6
4-percent AEP flood	141	ft^3/s	75.8	262	38.1
2-percent AEP flood	166	ft^3/s	88.2	313	37.8
1-percent AEP flood	191	ft^3/s	100	364	39.6
0.2-percent AEP flood	253	ft^3/s	131	488	40.3

Peak-Flow Statistics Citations

Koltun, G.F.,2019, Flood-frequency estimates for Ohio streamgages based on data through water year 2015 and techniques for estimating flood-frequency characteristics of rural, unregulated Ohio streams: U.S. Geological Survey Scientific Investigations Report 2019–5018, 25 p. (https://dx.doi.org/10.3133/sir20195018)

Low-Flow Statistics

Low-Flow Statistics Parameters [Low Flow Region A 2012 5138]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.86	square miles	1	1250
STREAM_VARG	Streamflow Variability Index from Grid	0.57	dimensionless	0.24	1.12

Low-Flow Statistics Disclaimers [Low Flow Region A 2012 5138]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Low-Flow Statistics Flow Report [Low Flow Region A 2012 5138]

Statistic	Value	Unit
1 Day 10 Year Low Flow	0.0102	ft^3/s
7 Day 10 Year Low Flow	0.0132	ft^3/s
30 Day 10 Year Low Flow	0.021	ft^3/s
90 Day 10 Year Low Flow	0.0339	ft^3/s

Low-Flow Statistics Citations

Koltun, G.F., and Kula, S.P.,2013, Methods for estimating selected low-flow statistics and development of annual flow-duration statistics for Ohio: U.S. Geological Survey Scientific Investigations Report 2012–5138, 195 p. (http://pubs.usgs.gov/sir/2012/5138/)

Flow-Duration Statistics

Flow-Duration Statistics Parameters [Low Flow Region A 2012 5138]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.86	square miles	1	1250
STREAM_VARG	Streamflow Variability Index from Grid	0.57	dimensionless	0.24	1.12

Flow-Duration Statistics Disclaimers [Low Flow Region A 2012 5138]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Flow-Duration Statistics Flow Report [Low Flow Region A 2012 5138]

Statistic	Value	Unit
80 Percent Duration	0.073	ft^3/s

Flow-Duration Statistics Citations

Koltun, G.F., and Kula, S.P.,2013, Methods for estimating selected low-flow statistics and development of annual flow-duration statistics for Ohio: U.S. Geological Survey Scientific Investigations Report 2012–5138, 195 p. (http://pubs.usgs.gov/sir/2012/5138/)

Annual Flow Statistics

Annual Flow Statistics Parameters [Low Flow LatGT 41.2 wri02 4068]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.86	square miles	0.12	7422
LAT_CENT	Latitude of Basin Centroid	41.6542	decimal degrees	41.2	41.59
PRECIPCENT	Mean Annual Precip at Basin Centroid	31.2	inches	34	43.2

Annual Flow Statistics Disclaimers [Low Flow LatGT 41.2 wri02 4068]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Annual Flow Statistics Flow Report [Low Flow LatGT 41.2 wri02 4068]

Statistic	Value	Unit
Mean Annual Flow	0.53	ft^3/s

Annual Flow Statistics Citations

Koltun, G. F., and Whitehead, M. T.,2002, Techniques for Estimating Selected Streamflow Characteristics of Rural, Unregulated Streams in Ohio: U. S. Geological Survey Water-Resources Investigations Report 02-4068, 50 p (https://pubs.er.usgs.gov/publication/wri024068)

Monthly Flow Statistics

Monthly Flow Statistics Parameters [Low Flow LatGT 41.2 wri02 4068]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.86	square miles	0.12	7422
LC92STOR	Percent Storage from NLCD1992	3.34	percent	0	19
PRECIPCENT	Mean Annual Precip at Basin Centroid	31.2	inches	34	43.2
FOREST	Percent Forest	8.31	percent	0	99.1
LAT_CENT	Latitude of Basin Centroid	41.6542	decimal degrees	41.2	41.59
STREAM_VARG	Streamflow Variability Index from Grid	0.57	dimensionless	0.25	1.13

Monthly Flow Statistics Disclaimers [Low Flow LatGT 41.2 wri02 4068]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Monthly Flow Statistics Flow Report [Low Flow LatGT 41.2 wri02 4068]

Statistic	Value	Unit
January Mean Flow	0.788	ft^3/s
February Mean Flow	1.18	ft^3/s
March Mean Flow	1.37	ft^3/s
April Mean Flow	1.13	ft^3/s
May Mean Flow	1	ft^3/s
June Mean Flow	0.567	ft^3/s
July Mean Flow	0.343	ft^3/s
August Mean Flow	0.108	ft^3/s
September Mean Flow	0.0644	ft^3/s
October Mean Flow	0.436	ft^3/s
November Mean Flow	0.552	ft^3/s
December Mean Flow	0.893	ft^3/s

Monthly Flow Statistics Citations

Koltun, G. F., and Whitehead, M. T.,2002, Techniques for Estimating Selected Streamflow Characteristics of Rural, Unregulated Streams in Ohio: U. S. Geological Survey Water-Resources Investigations Report 02-4068, 50 p (https://pubs.er.usgs.gov/publication/wri024068)

General Flow Statistics

General Flow Statistics Parameters [Low Flow LatGT 41.2 wri02 4068]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.86	square miles	0.12	7422
LC92STOR	Percent Storage from NLCD1992	3.34	percent	0	19
STREAM_VARG	Streamflow Variability Index from Grid	0.57	dimensionless	0.25	1.13
LAT_CENT	Latitude of Basin Centroid	41.6542	decimal degrees	41.2	41.59

General Flow Statistics Disclaimers [Low Flow LatGT 41.2 wri02 4068]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

General Flow Statistics Flow Report [Low Flow LatGT 41.2 wri02 4068]

Statistic	Value	Unit
Harmonic Mean Streamflow	0.102	ft^3/s

General Flow Statistics Citations

Koltun, G. F., and Whitehead, M. T.,2002, Techniques for Estimating Selected Streamflow Characteristics of Rural, Unregulated Streams in Ohio: U. S. Geological Survey Water-Resources Investigations Report 02-4068, 50 p (https://pubs.er.usgs.gov/publication/wri024068)

Flow Percentile Statistics

Flow Percentile Statistics Parameters [Low Flow LatGT 41.2 wri02 4068]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.86	square miles	0.12	7422
LC92STOR	Percent Storage from NLCD1992	3.34	percent	0	19
STREAM_VARG	Streamflow Variability Index from Grid	0.57	dimensionless	0.25	1.13
LAT_CENT	Latitude of Basin Centroid	41.6542	decimal degrees	41.2	41.59
LONG_CENT	Longitude of Basin Centroid	83.4911	decimal degrees	80.53	84.6

Flow Percentile Statistics Disclaimers [Low Flow LatGT 41.2 wri02 4068]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Flow Percentile Statistics Flow Report [Low Flow LatGT 41.2 wri02 4068]

Statistic	Value	Unit
25th Percentile Flow	0.164	ft^3/s
50th Percentile Flow Median	0.309	ft^3/s
75th Percentile Flow	0.742	ft^3/s

Flow Percentile Statistics Citations

Koltun, G. F., and Whitehead, M. T.,2002, Techniques for Estimating Selected Streamflow Characteristics of Rural, Unregulated Streams in Ohio: U. S. Geological Survey Water-Resources Investigations Report 02-4068, 50 p (https://pubs.er.usgs.gov/publication/wri024068)

Bankfull Statistics

Bankfull Statistics Parameters [Interior Plains D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.86	square miles	0.19305	59927.7393

Bankfull Statistics Parameters [Central Lowland P Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.86	square miles	0.200772	59927.66594

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.86	square miles	0.07722	59927.7393

Bankfull Statistics Flow Report [Interior Plains D Bieger 2015]

Statistic	Value	Unit
Bieger_D_channel_width	11.1	ft
Bieger_D_channel_depth	1.45	ft
Bieger_D_channel_cross_sectional_area	20.1	ft^2

Bankfull Statistics Flow Report [Central Lowland P Bieger 2015]

Statistic	Value	Unit
Bieger_P_channel_width	12.8	ft
Bieger_P_channel_depth	1.8	ft
Bieger_P_channel_cross_sectional_area	19.4	ft^2

Bankfull Statistics Flow Report [USA Bieger 2015]

Statistic	Value	Unit
Bieger_USA_channel_width	11.7	ft
Bieger_USA_channel_depth	1.17	ft
Bieger_USA_channel_cross_sectional_area	15.8	ft^2

Bankfull Statistics Flow Report [Area-Averaged]

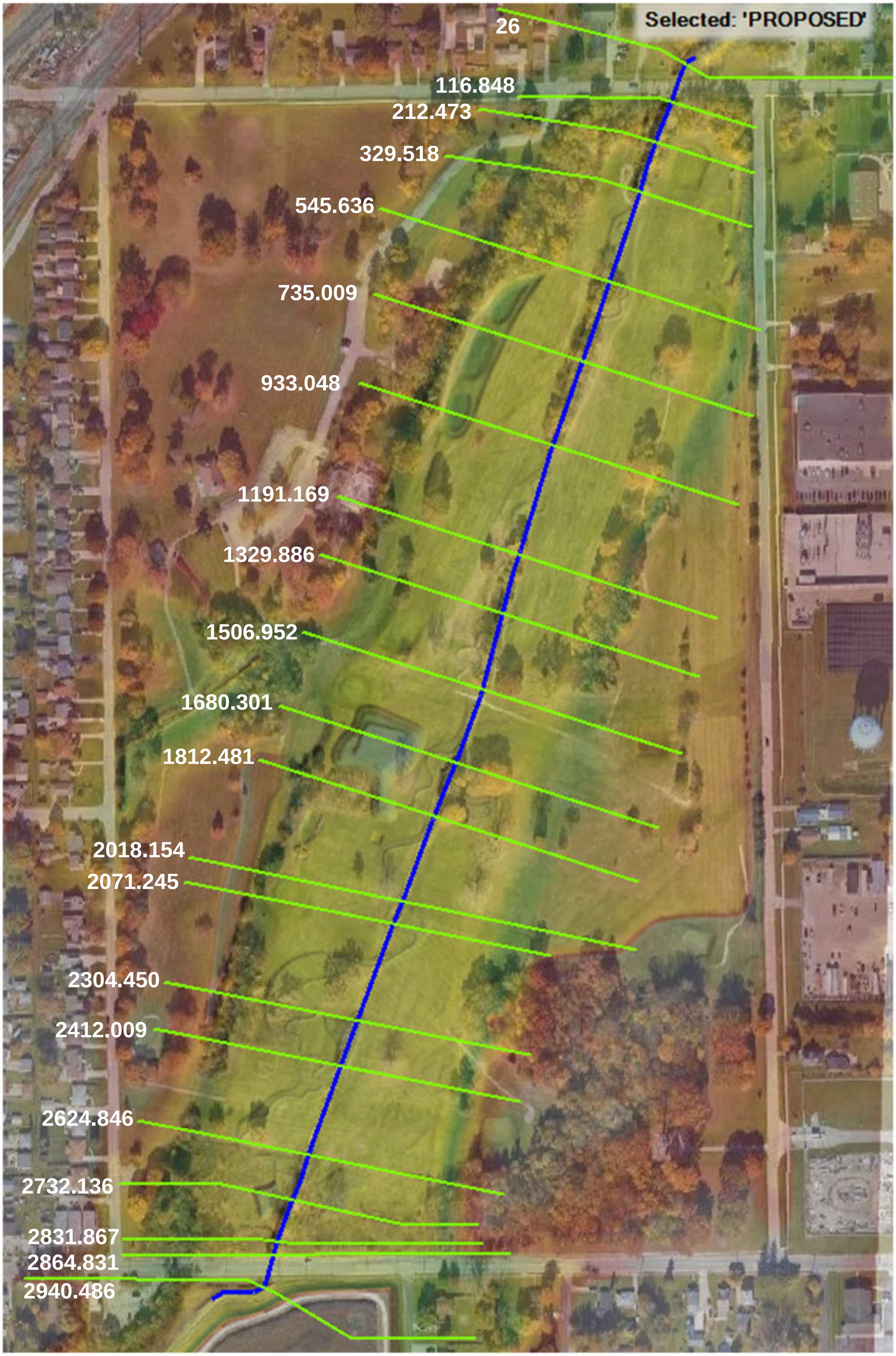
Statistic	Value	Unit
Bieger_D_channel_width	11.1	ft
Bieger_D_channel_depth	1.45	ft
Bieger_D_channel_cross_sectional_area	20.1	ft^2
Bieger_P_channel_width	12.8	ft
Bieger_P_channel_depth	1.8	ft
Bieger_P_channel_cross_sectional_area	19.4	ft^2
Bieger_USA_channel_width	11.7	ft
Bieger_USA_channel_depth	1.17	ft
Bieger_USA_channel_cross_sectional_area	15.8	ft^2

Bankfull Statistics Citations

Bieger, Katrin; Rathjens, Hendrik; Allen, Peter M.; and Arnold, Jeffrey G.,2015, Development and Evaluation of Bankfull Hydraulic Geometry Relationships for the Physiographic Regions of the United States, Publications from USDA-ARS / UNL Faculty, 17p. (https://digitalcommons.unl.edu/usdaarsfacpub/1515?utm_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1515&utm_medium=PDF&utm_campaign=PDFCoverPages)

Application Version: 4.16.1
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

Appendix G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1191.169
1329.886
1506.952
1680.301
1812.481
2018.154
2071.245
2304.450
2412.009
2624.846
2732.136
2831.867
2864.831
2940.486

HEC-RAS River: River 1 Reach: Reach 1 Profile: 1%

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	2940.486	1%	PROPOSED	143.00	573.91	580.38	575.83	580.40	0.000217	1.13	126.48	34.93	0.10
Reach 1	2940.486	1%	EXISTING	143.00	573.91	580.38	575.83	580.40	0.000216	1.13	126.50	34.94	0.10
Reach 1	2902.65			Culvert									
Reach 1	2864.831	1%	PROPOSED	143.00	574.03	579.55	575.86	579.58	0.000335	1.39	103.18	90.41	0.12
Reach 1	2864.831	1%	EXISTING	143.00	574.03	579.56	575.86	579.59	0.000333	1.39	103.32	90.71	0.12
Reach 1	2831.867	1%	PROPOSED	143.00	573.71	579.57	575.06	579.57	0.000034	0.53	535.21	422.66	0.04
Reach 1	2831.867	1%	EXISTING	143.00	573.71	579.57		579.58	0.000034	0.53	537.38	423.03	0.04
Reach 1	2732.136	1%	PROPOSED	143.00	576.05	579.57	577.18	579.57	0.000007	0.25	758.86	448.08	0.03
Reach 1	2732.136	1%	EXISTING	143.00	572.30	579.57		579.57	0.000023	0.45	609.67	448.19	0.03
Reach 1	2624.846	1%	PROPOSED	143.00	575.94	579.57	577.88	579.57	0.000008	0.27	803.24	473.51	0.03
Reach 1	2624.846	1%	EXISTING	143.00	573.08	579.57	575.20	579.57	0.000011	0.27	685.61	473.57	0.02
Reach 1	2412.009	1%	PROPOSED	143.00	575.90	579.57	577.35	579.57	0.000007	0.27	793.91	453.76	0.03
Reach 1	2412.009	1%	EXISTING	143.00	572.16	579.57		579.57	0.000007	0.26	764.05	453.86	0.02
Reach 1	2304.450	1%	PROPOSED	143.00	575.85	579.57	577.74	579.57	0.000007	0.27	864.28	435.11	0.03
Reach 1	2304.450	1%	EXISTING	143.00	572.02	579.57	573.86	579.57	0.000008	0.28	713.99	434.02	0.02
Reach 1	2071.245	1%	PROPOSED	143.00	575.77	579.56	577.63	579.56	0.000015	0.40	604.24	396.31	0.04
Reach 1	2071.245	1%	EXISTING	143.00	571.91	579.57		579.57	0.000010	0.30	652.80	396.59	0.02
Reach 1	2018.154	1%	PROPOSED	143.00	575.79	579.56	577.78	579.56	0.000020	0.45	546.20	396.60	0.04
Reach 1	2018.154	1%	EXISTING	143.00	573.66	579.57	576.48	579.57	0.000019	0.32	543.91	396.78	0.03
Reach 1	1837			Culvert									
Reach 1	1812.481	1%	PROPOSED	143.00	575.73	579.56	577.34	579.56	0.000005	0.23	896.82	412.65	0.02
Reach 1	1812.481	1%	EXISTING	143.00	572.30	579.57		579.57	0.000007	0.27	732.67	412.78	0.02
Reach 1	1680.301	1%	PROPOSED	143.00	575.70	579.56	577.09	579.56	0.000000	0.06	2059.96	394.88	0.01
Reach 1	1680.301	1%	EXISTING	143.00	572.17	579.57	574.25	579.57	0.000013	0.35	589.55	395.00	0.03
Reach 1	1506.952	1%	PROPOSED	143.00	575.60	579.56	577.51	579.56	0.000023	0.50	512.36	369.49	0.05
Reach 1	1506.952	1%	EXISTING	143.00	574.25	579.56		579.56	0.000021	0.38	511.71	369.47	0.03
Reach 1	1329.886	1%	PROPOSED	143.00	575.61	579.56	577.01	579.56	0.000007	0.29	774.56	400.77	0.03
Reach 1	1329.886	1%	EXISTING	143.00	574.22	579.56		579.56	0.000006	0.23	772.72	400.82	0.02

HEC-RAS River: River 1 Reach: Reach 1 Profile: 1% (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1191.169	1%	PROPOSED	143.00	575.59	579.56		579.56	0.000008	0.29	752.28	405.19	0.03
Reach 1	1191.169	1%	EXISTING	143.00	573.35	579.56	575.37	579.56	0.000006	0.21	801.61	405.41	0.02
Reach 1	933.0484	1%	PROPOSED	143.00	575.43	579.55		579.55	0.000021	0.49	513.46	380.48	0.05
Reach 1	933.0484	1%	EXISTING	143.00	574.01	579.56		579.56	0.000013	0.33	585.43	380.50	0.03
Reach 1	735.0094	1%	PROPOSED	143.00	575.44	579.55		579.55	0.000030	0.59	447.03	343.20	0.06
Reach 1	735.0094	1%	EXISTING	143.00	574.06	579.55		579.55	0.000019	0.41	488.23	343.45	0.03
Reach 1	545.6368	1%	PROPOSED	143.00	575.34	579.54	577.36	579.54	0.000038	0.68	399.33	282.84	0.06
Reach 1	545.6368	1%	EXISTING	143.00	573.61	579.55	575.21	579.55	0.000039	0.52	382.70	282.92	0.04
Reach 1	361.08			Culvert									
Reach 1	329.5189	1%	PROPOSED	143.00	573.70	579.54	575.14	579.54	0.000043	0.68	343.61	220.48	0.06
Reach 1	329.5189	1%	EXISTING	143.00	571.49	579.54	573.48	579.55	0.000028	0.50	384.15	229.95	0.04
Reach 1	212.4732	1%	PROPOSED	143.00	571.06	579.53	573.02	579.54	0.000019	0.67	276.53	216.63	0.05
Reach 1	212.4732	1%	EXISTING	143.00	571.06	579.54	573.02	579.54	0.000036	0.62	277.14	220.48	0.04
Reach 1	116.8487	1%	PROPOSED	143.00	574.06	579.38	577.05	579.52	0.001081	3.00	47.74	15.18	0.30
Reach 1	116.8487	1%	EXISTING	143.00	574.06	579.38	577.05	579.52	0.002432	3.00	47.74	15.18	0.30
Reach 1	71.43			Culvert									
Reach 1	26	1%	PROPOSED	143.00	574.25	579.32	575.79	579.33	0.000200	1.03	139.08	42.86	0.10
Reach 1	26	1%	EXISTING	143.00	574.25	579.32	575.79	579.33	0.000200	1.03	139.08	42.86	0.10

HEC-RAS River: River 1 Reach: Reach 1 Profile: 2%

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	2940.486	2%	PROPOSED	124.00	573.91	579.83	575.69	579.85	0.000244	1.14	108.64	30.01	0.11
Reach 1	2940.486	2%	EXISTING	124.00	573.91	579.82	575.69	579.84	0.000244	1.14	108.62	30.00	0.11
Reach 1	2902.65			Culvert									
Reach 1	2864.831	2%	PROPOSED	124.00	574.03	579.20	575.70	579.22	0.000342	1.33	93.35	32.97	0.12
Reach 1	2864.831	2%	EXISTING	124.00	574.03	579.19	575.70	579.22	0.000342	1.33	93.32	32.91	0.12
Reach 1	2831.867	2%	PROPOSED	124.00	573.71	579.21	574.96	579.21	0.000052	0.62	388.71	385.78	0.05
Reach 1	2831.867	2%	EXISTING	124.00	573.71	579.21		579.21	0.000052	0.63	388.38	385.74	0.05
Reach 1	2732.136	2%	PROPOSED	124.00	576.05	579.21	577.18	579.21	0.000009	0.27	601.09	426.12	0.03
Reach 1	2732.136	2%	EXISTING	124.00	572.30	579.20		579.21	0.000034	0.52	448.64	425.82	0.04
Reach 1	2624.846	2%	PROPOSED	124.00	575.94	579.21	577.84	579.21	0.000013	0.32	634.01	463.74	0.03
Reach 1	2624.846	2%	EXISTING	124.00	573.08	579.20	575.03	579.20	0.000019	0.34	512.75	461.57	0.03
Reach 1	2412.009	2%	PROPOSED	124.00	575.90	579.21	577.35	579.21	0.000011	0.30	631.34	446.12	0.03
Reach 1	2412.009	2%	EXISTING	124.00	572.16	579.20		579.20	0.000011	0.31	597.26	445.92	0.02
Reach 1	2304.450	2%	PROPOSED	124.00	575.85	579.20	577.71	579.20	0.000009	0.28	712.76	398.44	0.03
Reach 1	2304.450	2%	EXISTING	124.00	572.02	579.20	573.74	579.20	0.000012	0.31	559.85	392.64	0.02
Reach 1	2071.245	2%	PROPOSED	124.00	575.77	579.20	577.60	579.20	0.000024	0.47	466.00	370.64	0.05
Reach 1	2071.245	2%	EXISTING	124.00	571.91	579.20		579.20	0.000014	0.35	511.32	370.80	0.03
Reach 1	2018.154	2%	PROPOSED	124.00	575.79	579.20	577.75	579.20	0.000038	0.57	405.36	378.64	0.06
Reach 1	2018.154	2%	EXISTING	124.00	573.66	579.20	576.29	579.20	0.000037	0.42	400.02	378.55	0.04
Reach 1	1837			Culvert									
Reach 1	1812.481	2%	PROPOSED	124.00	575.73	579.20	577.29	579.20	0.000006	0.24	748.42	398.52	0.02
Reach 1	1812.481	2%	EXISTING	124.00	572.30	579.19		579.20	0.000010	0.31	581.60	398.49	0.02
Reach 1	1680.301	2%	PROPOSED	124.00	575.70	579.20	577.09	579.20	0.000000	0.05	1918.92	377.74	0.01
Reach 1	1680.301	2%	EXISTING	124.00	572.17	579.19	574.11	579.19	0.000022	0.43	444.74	381.49	0.03
Reach 1	1506.952	2%	PROPOSED	124.00	575.60	579.19	577.46	579.20	0.000040	0.61	381.42	350.24	0.06
Reach 1	1506.952	2%	EXISTING	124.00	574.25	579.19		579.19	0.000036	0.48	378.41	350.14	0.04
Reach 1	1329.886	2%	PROPOSED	124.00	575.61	579.19	577.01	579.19	0.000011	0.32	628.86	390.90	0.03
Reach 1	1329.886	2%	EXISTING	124.00	574.22	579.19		579.19	0.000009	0.26	624.45	390.79	0.02

HEC-RAS River: River 1 Reach: Reach 1 Profile: 2% (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1191.169	2%	PROPOSED	124.00	575.59	579.19		579.19	0.000012	0.33	605.77	391.34	0.03
Reach 1	1191.169	2%	EXISTING	124.00	573.35	579.19	575.21	579.19	0.000008	0.23	652.64	391.17	0.02
Reach 1	933.0484	2%	PROPOSED	124.00	575.43	579.18		579.18	0.000041	0.63	373.90	372.82	0.06
Reach 1	933.0484	2%	EXISTING	124.00	574.01	579.18		579.18	0.000021	0.40	445.24	372.83	0.03
Reach 1	735.0094	2%	PROPOSED	124.00	575.44	579.17		579.18	0.000050	0.70	330.39	281.12	0.07
Reach 1	735.0094	2%	EXISTING	124.00	574.06	579.18		579.18	0.000028	0.47	371.53	281.96	0.04
Reach 1	545.6368	2%	PROPOSED	124.00	575.34	579.16	577.31	579.17	0.000063	0.81	294.17	271.76	0.08
Reach 1	545.6368	2%	EXISTING	124.00	573.61	579.17	575.09	579.17	0.000067	0.64	277.92	271.12	0.06
Reach 1	361.08			Culvert									
Reach 1	329.5189	2%	PROPOSED	124.00	573.70	579.16	574.93	579.16	0.000066	0.78	264.41	203.10	0.08
Reach 1	329.5189	2%	EXISTING	124.00	571.49	579.16	573.35	579.17	0.000038	0.55	305.10	207.61	0.04
Reach 1	212.4732	2%	PROPOSED	124.00	571.06	579.15	572.86	579.16	0.000019	0.65	239.47	196.12	0.05
Reach 1	212.4732	2%	EXISTING	124.00	571.06	579.16	572.86	579.16	0.000038	0.61	240.04	200.63	0.04
Reach 1	116.8487	2%	PROPOSED	124.00	574.06	579.00	576.86	579.14	0.001129	2.94	42.23	14.37	0.30
Reach 1	116.8487	2%	EXISTING	124.00	574.06	579.00	576.86	579.14	0.002540	2.94	42.23	14.37	0.30
Reach 1	71.43			Culvert									
Reach 1	26	2%	PROPOSED	124.00	574.25	578.99	575.69	579.00	0.000200	0.99	125.50	39.94	0.10
Reach 1	26	2%	EXISTING	124.00	574.25	578.99	575.69	579.00	0.000200	0.99	125.50	39.94	0.10

HEC-RAS River: River 1 Reach: Reach 1 Profile: 4%

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	2940.486	4%	PROPOSED	105.00	573.91	579.31	575.54	579.33	0.000253	1.12	93.91	27.43	0.11
Reach 1	2940.486	4%	EXISTING	105.00	573.91	579.30	575.54	579.32	0.000256	1.12	93.59	27.39	0.11
Reach 1	2902.65			Culvert									
Reach 1	2864.831	4%	PROPOSED	105.00	574.03	578.82	575.56	578.84	0.000331	1.25	83.68	27.70	0.12
Reach 1	2864.831	4%	EXISTING	105.00	574.03	578.80	575.56	578.83	0.000334	1.26	83.34	27.61	0.12
Reach 1	2831.867	4%	PROPOSED	105.00	573.71	578.83	574.83	578.83	0.000076	0.71	255.32	296.79	0.06
Reach 1	2831.867	4%	EXISTING	105.00	573.71	578.81		578.82	0.000078	0.72	251.30	295.24	0.06
Reach 1	2732.136	4%	PROPOSED	105.00	576.05	578.83	577.18	578.83	0.000012	0.27	452.67	325.30	0.03
Reach 1	2732.136	4%	EXISTING	105.00	572.30	578.81		578.81	0.000050	0.60	295.91	321.50	0.05
Reach 1	2624.846	4%	PROPOSED	105.00	575.94	578.83	577.80	578.83	0.000023	0.38	464.81	418.82	0.04
Reach 1	2624.846	4%	EXISTING	105.00	573.08	578.80	574.86	578.81	0.000037	0.44	341.21	383.67	0.04
Reach 1	2412.009	4%	PROPOSED	105.00	575.90	578.82	577.34	578.82	0.000016	0.33	466.82	386.38	0.04
Reach 1	2412.009	4%	EXISTING	105.00	572.16	578.80		578.80	0.000016	0.36	428.21	379.55	0.03
Reach 1	2304.450	4%	PROPOSED	105.00	575.85	578.82	577.67	578.82	0.000013	0.30	567.21	359.08	0.03
Reach 1	2304.450	4%	EXISTING	105.00	572.02	578.80	573.61	578.80	0.000017	0.36	415.17	328.83	0.03
Reach 1	2071.245	4%	PROPOSED	105.00	575.77	578.81	577.55	578.82	0.000044	0.57	333.06	316.51	0.06
Reach 1	2071.245	4%	EXISTING	105.00	571.91	578.80		578.80	0.000022	0.40	374.77	315.35	0.03
Reach 1	2018.154	4%	PROPOSED	105.00	575.79	578.81	577.73	578.81	0.000081	0.76	268.85	310.59	0.09
Reach 1	2018.154	4%	EXISTING	105.00	573.66	578.80	576.09	578.80	0.000083	0.57	260.38	309.85	0.06
Reach 1	1837			Culvert									
Reach 1	1812.481	4%	PROPOSED	105.00	575.73	578.81	577.25	578.81	0.000008	0.24	600.61	357.23	0.03
Reach 1	1812.481	4%	EXISTING	105.00	572.30	578.80		578.80	0.000016	0.36	429.00	355.94	0.03
Reach 1	1680.301	4%	PROPOSED	105.00	575.70	578.81	577.09	578.81	0.000000	0.04	1777.32	353.54	0.00
Reach 1	1680.301	4%	EXISTING	105.00	572.17	578.79	573.96	578.79	0.000029	0.47	318.07	256.49	0.04
Reach 1	1506.952	4%	PROPOSED	105.00	575.60	578.81	577.41	578.81	0.000070	0.73	260.16	250.87	0.08
Reach 1	1506.952	4%	EXISTING	105.00	574.25	578.79		578.79	0.000059	0.57	254.88	244.88	0.05
Reach 1	1329.886	4%	PROPOSED	105.00	575.61	578.80	577.01	578.80	0.000018	0.37	479.46	374.20	0.04
Reach 1	1329.886	4%	EXISTING	105.00	574.22	578.78		578.79	0.000014	0.32	470.00	373.46	0.03

HEC-RAS River: River 1 Reach: Reach 1 Profile: 4% (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1191.169	4%	PROPOSED	105.00	575.59	578.80		578.80	0.000020	0.38	458.48	359.11	0.04
Reach 1	1191.169	4%	EXISTING	105.00	573.35	578.78	575.04	578.78	0.000012	0.27	500.68	358.53	0.02
Reach 1	933.0484	4%	PROPOSED	105.00	575.43	578.79		578.79	0.000085	0.83	244.98	273.34	0.09
Reach 1	933.0484	4%	EXISTING	105.00	574.01	578.78		578.78	0.000032	0.46	314.38	272.80	0.04
Reach 1	735.0094	4%	PROPOSED	105.00	575.44	578.77		578.77	0.000079	0.81	231.47	202.16	0.09
Reach 1	735.0094	4%	EXISTING	105.00	574.06	578.77		578.78	0.000037	0.51	271.93	202.19	0.04
Reach 1	545.6368	4%	PROPOSED	105.00	575.34	578.75	577.26	578.76	0.000110	0.97	198.45	195.97	0.10
Reach 1	545.6368	4%	EXISTING	105.00	573.61	578.76	574.94	578.76	0.000112	0.77	181.81	196.29	0.07
Reach 1	361.08			Culvert									
Reach 1	329.5189	4%	PROPOSED	105.00	573.70	578.75	574.71	578.75	0.000117	0.95	182.74	194.43	0.10
Reach 1	329.5189	4%	EXISTING	105.00	571.49	578.75	573.20	578.76	0.000053	0.62	223.61	194.59	0.05
Reach 1	212.4732	4%	PROPOSED	105.00	571.06	578.74	572.70	578.75	0.000019	0.62	206.35	142.61	0.05
Reach 1	212.4732	4%	EXISTING	105.00	571.06	578.75	572.70	578.75	0.000039	0.59	206.85	145.45	0.04
Reach 1	116.8487	4%	PROPOSED	105.00	574.06	578.60	576.64	578.73	0.001186	2.87	36.63	13.48	0.31
Reach 1	116.8487	4%	EXISTING	105.00	574.06	578.60	576.64	578.73	0.002669	2.87	36.63	13.48	0.31
Reach 1	71.43			Culvert									
Reach 1	26	4%	PROPOSED	105.00	574.25	578.62	575.58	578.64	0.000200	0.94	111.49	36.76	0.10
Reach 1	26	4%	EXISTING	105.00	574.25	578.62	575.58	578.64	0.000200	0.94	111.49	36.76	0.10

HEC-RAS River: River 1 Reach: Reach 1 Profile: 10%

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	2940.486	10%	PROPOSED	82.00	573.91	578.74	575.34	578.75	0.000240	1.04	78.95	24.75	0.10
Reach 1	2940.486	10%	EXISTING	82.00	573.91	578.70	575.34	578.71	0.000249	1.05	77.97	24.61	0.10
Reach 1	2902.65			Culvert									
Reach 1	2864.831	10%	PROPOSED	82.00	574.03	578.39	575.36	578.41	0.000292	1.12	73.23	24.98	0.11
Reach 1	2864.831	10%	EXISTING	82.00	574.03	578.34	575.36	578.36	0.000305	1.14	72.13	24.70	0.11
Reach 1	2831.867	10%	PROPOSED	82.00	573.71	578.39	574.68	578.40	0.000105	0.78	117.18	215.48	0.07
Reach 1	2831.867	10%	EXISTING	82.00	573.71	578.34		578.35	0.000107	0.78	134.15	211.49	0.07
Reach 1	2732.136	10%	PROPOSED	82.00	576.05	578.39	577.18	578.39	0.000013	0.25	327.43	250.73	0.03
Reach 1	2732.136	10%	EXISTING	82.00	572.30	578.34		578.34	0.000060	0.61	171.81	179.99	0.05
Reach 1	2624.846	10%	PROPOSED	82.00	575.94	578.38	577.75	578.39	0.000370	1.31	119.56	371.78	0.17
Reach 1	2624.846	10%	EXISTING	82.00	573.08	578.33	574.63	578.33	0.000093	0.62	185.91	247.65	0.06
Reach 1	2412.009	10%	PROPOSED	82.00	575.90	578.37	577.34	578.37	0.000023	0.34	320.59	256.79	0.04
Reach 1	2412.009	10%	EXISTING	82.00	572.16	578.33		578.33	0.000023	0.40	278.45	246.09	0.03
Reach 1	2304.450	10%	PROPOSED	82.00	575.85	578.37	577.62	578.37	0.000022	0.33	409.31	341.84	0.04
Reach 1	2304.450	10%	EXISTING	82.00	572.02	578.33	573.43	578.33	0.000026	0.41	273.04	259.16	0.04
Reach 1	2071.245	10%	PROPOSED	82.00	575.77	578.36	577.50	578.36	0.000113	0.79	200.63	257.84	0.10
Reach 1	2071.245	10%	EXISTING	82.00	571.91	578.32		578.33	0.000033	0.46	240.12	238.92	0.04
Reach 1	2018.154	10%	PROPOSED	82.00	575.79	578.34	577.62	578.35	0.000275	1.22	139.38	240.12	0.15
Reach 1	2018.154	10%	EXISTING	82.00	573.66	578.31	575.81	578.32	0.000288	0.93	128.02	233.07	0.11
Reach 1	1837			Culvert									
Reach 1	1812.481	10%	PROPOSED	82.00	575.73	578.35	577.20	578.35	0.000009	0.23	447.78	253.08	0.03
Reach 1	1812.481	10%	EXISTING	82.00	572.30	578.31		578.32	0.000022	0.40	273.92	224.68	0.03
Reach 1	1680.301	10%	PROPOSED	82.00	575.70	578.35	577.08	578.35	0.000000	0.03	1618.39	325.37	0.00
Reach 1	1680.301	10%	EXISTING	82.00	572.17	578.31	573.76	578.31	0.000041	0.52	207.18	174.65	0.04
Reach 1	1506.952	10%	PROPOSED	82.00	575.60	578.34	577.35	578.35	0.000143	0.91	162.08	170.41	0.11
Reach 1	1506.952	10%	EXISTING	82.00	574.25	578.30		578.31	0.000109	0.70	154.26	167.60	0.07
Reach 1	1329.886	10%	PROPOSED	82.00	575.61	578.33	577.00	578.33	0.000031	0.44	317.15	299.50	0.05
Reach 1	1329.886	10%	EXISTING	82.00	574.22	578.30		578.30	0.000024	0.37	303.69	293.59	0.03

HEC-RAS River: River 1 Reach: Reach 1 Profile: 10% (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1191.169	10%	PROPOSED	82.00	575.59	578.33		578.33	0.000043	0.49	298.40	310.82	0.06
Reach 1	1191.169	10%	EXISTING	82.00	573.35	578.29	574.82	578.30	0.000021	0.33	336.33	302.93	0.03
Reach 1	933.0484	10%	PROPOSED	82.00	575.43	578.30		578.31	0.000259	1.27	126.95	191.19	0.15
Reach 1	933.0484	10%	EXISTING	82.00	574.01	578.29		578.29	0.000049	0.53	197.00	187.49	0.05
Reach 1	735.0094	10%	PROPOSED	82.00	575.44	578.25		578.26	0.000194	1.10	138.50	153.63	0.13
Reach 1	735.0094	10%	EXISTING	82.00	574.06	578.28		578.28	0.000056	0.58	182.53	153.26	0.05
Reach 1	545.6368	10%	PROPOSED	82.00	575.34	578.21	577.18	578.22	0.000206	1.15	121.16	87.38	0.14
Reach 1	545.6368	10%	EXISTING	82.00	573.61	578.25	574.77	578.27	0.000164	0.84	107.19	88.78	0.09
Reach 1	361.08			Culvert									
Reach 1	329.5189	10%	PROPOSED	82.00	573.70	578.21	574.40	578.22	0.000203	1.08	99.59	89.89	0.13
Reach 1	329.5189	10%	EXISTING	82.00	571.49	578.22	573.00	578.22	0.000066	0.63	139.84	91.09	0.06
Reach 1	212.4732	10%	PROPOSED	82.00	571.06	578.21	572.48	578.21	0.000019	0.57	164.91	75.80	0.05
Reach 1	212.4732	10%	EXISTING	82.00	571.06	578.21	572.48	578.22	0.000040	0.56	165.40	75.84	0.04
Reach 1	116.8487	10%	PROPOSED	82.00	574.06	578.08	576.35	578.19	0.001247	2.75	29.86	12.23	0.31
Reach 1	116.8487	10%	EXISTING	82.00	574.06	578.08	576.35	578.19	0.002807	2.75	29.86	12.23	0.31
Reach 1	71.43			Culvert									
Reach 1	26	10%	PROPOSED	82.00	574.25	578.13	575.43	578.14	0.000200	0.87	93.80	34.73	0.09
Reach 1	26	10%	EXISTING	82.00	574.25	578.13	575.43	578.14	0.000200	0.87	93.80	34.73	0.09

HEC-RAS River: River 1 Reach: Reach 1 Profile: 20%

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	2940.486	20%	PROPOSED	65.00	573.91	578.35	575.18	578.37	0.000213	0.93	69.69	23.53	0.10
Reach 1	2940.486	20%	EXISTING	65.00	573.91	578.32	575.18	578.33	0.000220	0.94	68.86	23.41	0.10
Reach 1	2902.65			Culvert									
Reach 1	2864.831	20%	PROPOSED	65.00	574.03	578.10	575.19	578.12	0.000239	0.98	66.64	22.96	0.10
Reach 1	2864.831	20%	EXISTING	65.00	574.03	578.06	575.19	578.08	0.000249	0.99	65.71	22.86	0.10
Reach 1	2831.867	20%	PROPOSED	65.00	573.71	578.10	574.55	578.11	0.000090	0.68	99.71	79.28	0.06
Reach 1	2831.867	20%	EXISTING	65.00	573.71	578.06		578.07	0.000093	0.69	99.02	67.40	0.07
Reach 1	2732.136	20%	PROPOSED	65.00	576.05	578.11	577.18	578.11	0.000012	0.21	272.88	157.63	0.03
Reach 1	2732.136	20%	EXISTING	65.00	572.30	578.06		578.06	0.000052	0.54	136.97	99.66	0.05
Reach 1	2624.846	20%	PROPOSED	65.00	575.94	578.09	577.70	578.10	0.000679	1.58	84.37	332.90	0.23
Reach 1	2624.846	20%	EXISTING	65.00	573.08	578.05	574.44	578.06	0.000133	0.70	122.40	204.62	0.07
Reach 1	2412.009	20%	PROPOSED	65.00	575.90	578.08	577.34	578.08	0.000026	0.32	255.43	214.41	0.05
Reach 1	2412.009	20%	EXISTING	65.00	572.16	578.04		578.04	0.000024	0.39	218.30	199.19	0.03
Reach 1	2304.450	20%	PROPOSED	65.00	575.85	578.08	577.57	578.08	0.000029	0.35	313.91	312.07	0.05
Reach 1	2304.450	20%	EXISTING	65.00	572.02	578.04	573.27	578.04	0.000025	0.38	210.00	176.17	0.03
Reach 1	2071.245	20%	PROPOSED	65.00	575.77	578.06	577.48	578.06	0.000213	0.97	129.45	214.20	0.13
Reach 1	2071.245	20%	EXISTING	65.00	571.91	578.03		578.03	0.000034	0.44	178.54	170.03	0.04
Reach 1	2018.154	20%	PROPOSED	65.00	575.79	578.03	577.55	578.05	0.000550	1.53	83.39	138.11	0.21
Reach 1	2018.154	20%	EXISTING	65.00	573.66	578.01	575.58	578.02	0.000481	1.10	77.02	129.61	0.14
Reach 1	1837			Culvert									
Reach 1	1812.481	20%	PROPOSED	65.00	575.73	578.04	577.19	578.04	0.000009	0.21	378.38	219.87	0.03
Reach 1	1812.481	20%	EXISTING	65.00	572.30	578.00		578.00	0.000024	0.40	209.56	186.54	0.03
Reach 1	1680.301	20%	PROPOSED	65.00	575.70	578.04	577.08	578.04	0.000000	0.02	1521.80	315.20	0.00
Reach 1	1680.301	20%	EXISTING	65.00	572.17	577.99	573.60	577.99	0.000046	0.52	157.62	148.72	0.05
Reach 1	1506.952	20%	PROPOSED	65.00	575.60	578.03	577.29	578.04	0.000224	1.02	115.35	144.12	0.14
Reach 1	1506.952	20%	EXISTING	65.00	574.25	577.98		577.99	0.000145	0.75	106.45	137.50	0.08
Reach 1	1329.886	20%	PROPOSED	65.00	575.61	578.02	577.00	578.02	0.000043	0.46	236.60	243.83	0.06
Reach 1	1329.886	20%	EXISTING	65.00	574.22	577.97		577.98	0.000033	0.41	221.78	241.61	0.04

HEC-RAS River: River 1 Reach: Reach 1 Profile: 20% (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1191.169	20%	PROPOSED	65.00	575.59	578.01		578.02	0.000077	0.59	207.29	277.83	0.08
Reach 1	1191.169	20%	EXISTING	65.00	573.35	577.97	574.64	577.97	0.000031	0.38	243.04	273.67	0.04
Reach 1	933.0484	20%	PROPOSED	65.00	575.43	577.95		577.97	0.000533	1.62	76.31	130.64	0.21
Reach 1	933.0484	20%	EXISTING	65.00	574.01	577.97		577.97	0.000052	0.51	149.06	131.69	0.05
Reach 1	735.0094	20%	PROPOSED	65.00	575.44	577.85		577.87	0.000496	1.54	80.69	133.52	0.20
Reach 1	735.0094	20%	EXISTING	65.00	574.06	577.95		577.96	0.000064	0.58	135.23	134.20	0.06
Reach 1	545.6368	20%	PROPOSED	65.00	575.34	577.77	577.12	577.79	0.000399	1.38	83.70	83.49	0.18
Reach 1	545.6368	20%	EXISTING	65.00	573.61	577.93	574.61	577.94	0.000161	0.77	85.74	49.63	0.08
Reach 1	361.08			Culvert									
Reach 1	329.5189	20%	PROPOSED	65.00	573.70	577.77	574.11	577.78	0.000242	1.04	73.58	31.41	0.13
Reach 1	329.5189	20%	EXISTING	65.00	571.49	577.78	572.84	577.79	0.000062	0.58	112.99	31.68	0.05
Reach 1	212.4732	20%	PROPOSED	65.00	571.06	577.77	572.30	577.78	0.000017	0.51	133.15	66.93	0.04
Reach 1	212.4732	20%	EXISTING	65.00	571.06	577.78	572.30	577.78	0.000038	0.51	133.56	68.05	0.04
Reach 1	116.8487	20%	PROPOSED	65.00	574.06	577.65	576.10	577.76	0.001280	2.61	24.88	11.28	0.31
Reach 1	116.8487	20%	EXISTING	65.00	574.06	577.65	576.10	577.76	0.002881	2.61	24.88	11.28	0.31
Reach 1	71.43			Culvert									
Reach 1	26	20%	PROPOSED	65.00	574.25	577.72	575.30	577.73	0.000200	0.81	79.83	33.01	0.09
Reach 1	26	20%	EXISTING	65.00	574.25	577.72	575.30	577.73	0.000200	0.81	79.83	33.01	0.09

HEC-RAS River: River 1 Reach: Reach 1 Profile: 50%

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	2940.486	50%	PROPOSED	41.00	573.91	578.00	574.91	578.00	0.000119	0.67	61.49	22.36	0.07
Reach 1	2940.486	50%	EXISTING	41.00	573.91	577.82	574.91	577.82	0.000143	0.71	57.52	21.76	0.08
Reach 1	2902.65			Culvert									
Reach 1	2864.831	50%	PROPOSED	41.00	574.03	577.89	574.93	577.89	0.000119	0.66	61.68	22.41	0.07
Reach 1	2864.831	50%	EXISTING	41.00	574.03	577.69	574.93	577.70	0.000145	0.71	57.41	21.93	0.08
Reach 1	2831.867	50%	PROPOSED	41.00	573.71	577.89	574.35	577.89	0.000045	0.46	90.54	37.09	0.04
Reach 1	2831.867	50%	EXISTING	41.00	573.71	577.69		577.70	0.000054	0.49	83.95	31.37	0.05
Reach 1	2732.136	50%	PROPOSED	41.00	576.05	577.89	577.17	577.89	0.000006	0.13	241.52	132.66	0.02
Reach 1	2732.136	50%	EXISTING	41.00	572.30	577.69		577.69	0.000028	0.39	109.41	46.73	0.04
Reach 1	2624.846	50%	PROPOSED	41.00	575.94	577.87	577.63	577.88	0.000821	1.57	58.03	244.11	0.24
Reach 1	2624.846	50%	EXISTING	41.00	573.08	577.68	574.12	577.69	0.000106	0.61	73.97	82.72	0.07
Reach 1	2412.009	50%	PROPOSED	41.00	575.90	577.87	577.34	577.87	0.000017	0.24	210.03	207.59	0.04
Reach 1	2412.009	50%	EXISTING	41.00	572.16	577.59		577.60	0.000020	0.33	141.79	135.89	0.03
Reach 1	2304.450	50%	PROPOSED	41.00	575.85	577.86	577.49	577.87	0.000022	0.27	251.28	274.11	0.04
Reach 1	2304.450	50%	EXISTING	41.00	572.02	577.59	573.01	577.59	0.000020	0.31	148.01	113.33	0.03
Reach 1	2071.245	50%	PROPOSED	41.00	575.77	577.79	577.38	577.79	0.000274	0.98	82.52	144.54	0.15
Reach 1	2071.245	50%	EXISTING	41.00	571.91	577.58		577.58	0.000026	0.35	126.48	91.93	0.03
Reach 1	2018.154	50%	PROPOSED	41.00	575.79	577.75	577.44	577.77	0.000843	1.67	49.19	103.64	0.25
Reach 1	2018.154	50%	EXISTING	41.00	573.66	577.56	575.20	577.58	0.000660	1.18	36.00	35.50	0.15
Reach 1	1837			Culvert									
Reach 1	1812.481	50%	PROPOSED	41.00	575.73	577.77	577.19	577.77	0.000006	0.14	320.09	191.94	0.02
Reach 1	1812.481	50%	EXISTING	41.00	572.30	577.44		577.44	0.000021	0.34	132.34	100.97	0.03
Reach 1	1680.301	50%	PROPOSED	41.00	575.70	577.76	577.08	577.76	0.000084	0.53	118.50	294.40	0.08
Reach 1	1680.301	50%	EXISTING	41.00	572.17	577.44	573.31	577.44	0.000042	0.45	97.69	64.48	0.04
Reach 1	1506.952	50%	PROPOSED	41.00	575.60	577.73	577.19	577.74	0.000276	0.99	75.68	117.21	0.15
Reach 1	1506.952	50%	EXISTING	41.00	574.25	577.28		577.28	0.000190	0.73	56.36	27.35	0.09
Reach 1	1329.886	50%	PROPOSED	41.00	575.61	577.72	577.00	577.72	0.000046	0.42	165.53	205.07	0.06
Reach 1	1329.886	50%	EXISTING	41.00	574.22	577.26		577.26	0.000066	0.50	92.06	79.77	0.05

HEC-RAS River: River 1 Reach: Reach 1 Profile: 50% (Continued)

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1191.169	50%	PROPOSED	41.00	575.59	577.71		577.71	0.000121	0.65	127.49	238.68	0.10
Reach 1	1191.169	50%	EXISTING	41.00	573.35	577.25	574.35	577.25	0.000106	0.59	91.02	139.78	0.07
Reach 1	933.0484	50%	PROPOSED	41.00	575.43	577.62		577.64	0.000791	1.73	42.41	73.26	0.25
Reach 1	933.0484	50%	EXISTING	41.00	574.01	577.24		577.24	0.000058	0.46	91.46	50.50	0.05
Reach 1	735.0094	50%	PROPOSED	41.00	575.44	577.45		577.48	0.000894	1.74	43.35	65.14	0.26
Reach 1	735.0094	50%	EXISTING	41.00	574.06	577.23		577.23	0.000069	0.52	80.27	35.35	0.05
Reach 1	545.6368	50%	PROPOSED	41.00	575.34	577.04	577.01	577.15	0.004100	3.07	24.57	78.88	0.54
Reach 1	545.6368	50%	EXISTING	41.00	573.61	577.21	574.37	577.21	0.000117	0.64	63.99	24.79	0.07
Reach 1	361.08			Culvert									
Reach 1	329.5189	50%	PROPOSED	41.00	573.70	577.05	573.63	577.06	0.000228	0.86	53.78	25.33	0.12
Reach 1	329.5189	50%	EXISTING	41.00	571.49	577.06	572.57	577.06	0.000037	0.44	93.02	25.38	0.04
Reach 1	212.4732	50%	PROPOSED	41.00	571.06	577.05	572.01	577.05	0.000013	0.39	105.38	31.72	0.04
Reach 1	212.4732	50%	EXISTING	41.00	571.06	577.06	572.01	577.06	0.000028	0.39	105.54	31.77	0.04
Reach 1	116.8487	50%	PROPOSED	41.00	574.06	576.96	575.67	577.04	0.001311	2.33	17.57	9.77	0.31
Reach 1	116.8487	50%	EXISTING	41.00	574.06	576.96	575.67	577.04	0.002950	2.33	17.57	9.77	0.31
Reach 1	71.43			Culvert									
Reach 1	26	50%	PROPOSED	41.00	574.25	577.02	575.07	577.03	0.000200	0.71	58.07	29.88	0.09
Reach 1	26	50%	EXISTING	41.00	574.25	577.02	575.07	577.03	0.000200	0.71	58.07	29.88	0.09

HEC-RAS River: River 1 Reach: Reach 1 Profile: PF 7

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	2940.486	PF 7	PROPOSED	15.00	573.91	577.59	574.52	577.59	0.000024	0.28	52.67	20.86	0.03
Reach 1	2940.486	PF 7	EXISTING	15.00	573.91	576.33	574.52	576.34	0.000126	0.51	29.16	16.66	0.07
Reach 1	2902.65			Culvert									
Reach 1	2864.831	PF 7	PROPOSED	15.00	574.03	577.57	574.57	577.57	0.000022	0.27	54.75	21.63	0.03
Reach 1	2864.831	PF 7	EXISTING	15.00	574.03	576.28	574.57	576.28	0.000139	0.52	29.04	18.00	0.07
Reach 1	2831.867	PF 7	PROPOSED	15.00	573.71	577.57	574.06	577.57	0.000008	0.19	80.29	28.55	0.02
Reach 1	2831.867	PF 7	EXISTING	15.00	573.71	576.28		576.28	0.000034	0.31	48.97	22.40	0.04
Reach 1	2732.136	PF 7	PROPOSED	15.00	576.05	577.57	577.01	577.57	0.000022	0.21	44.33	92.11	0.04
Reach 1	2732.136	PF 7	EXISTING	15.00	572.30	576.28		576.28	0.000012	0.22	68.01	23.72	0.02
Reach 1	2624.846	PF 7	PROPOSED	15.00	575.94	577.51	577.02	577.56	0.002045	1.99	15.63	169.83	0.36
Reach 1	2624.846	PF 7	EXISTING	15.00	573.08	576.27	573.67	576.27	0.000065	0.41	36.30	17.12	0.05
Reach 1	2412.009	PF 7	PROPOSED	15.00	575.90	577.54	576.79	577.54	0.000005	0.11	146.11	176.79	0.02
Reach 1	2412.009	PF 7	EXISTING	15.00	572.16	576.22		576.22	0.000010	0.20	76.09	26.82	0.02
Reach 1	2304.450	PF 7	PROPOSED	15.00	575.85	577.52	576.88	577.53	0.000481	1.06	33.54	123.54	0.18
Reach 1	2304.450	PF 7	EXISTING	15.00	572.02	576.22	572.60	576.22	0.000009	0.19	77.41	27.64	0.02
Reach 1	2071.245	PF 7	PROPOSED	15.00	575.77	577.41	576.64	577.42	0.000477	1.04	27.62	118.44	0.18
Reach 1	2071.245	PF 7	EXISTING	15.00	571.91	576.18		576.18	0.000011	0.21	70.55	24.41	0.02
Reach 1	2018.154	PF 7	PROPOSED	15.00	575.79	577.34	576.80	577.38	0.001507	1.77	15.03	65.75	0.32
Reach 1	2018.154	PF 7	EXISTING	15.00	573.66	576.16	574.61	576.17	0.000562	0.95	15.78	10.35	0.14
Reach 1	1837			Culvert									
Reach 1	1812.481	PF 7	PROPOSED	15.00	575.73	577.37	576.64	577.37	0.000127	0.54	51.04	156.36	0.09
Reach 1	1812.481	PF 7	EXISTING	15.00	572.30	576.14		576.14	0.000009	0.19	78.02	26.27	0.02
Reach 1	1680.301	PF 7	PROPOSED	15.00	575.70	577.36	576.67	577.36	0.000044	0.30	75.94	265.49	0.06
Reach 1	1680.301	PF 7	EXISTING	15.00	572.17	576.14	572.88	576.14	0.000021	0.27	56.15	21.73	0.03
Reach 1	1506.952	PF 7	PROPOSED	15.00	575.60	577.34	576.55	577.34	0.000266	0.78	36.28	92.66	0.14
Reach 1	1506.952	PF 7	EXISTING	15.00	574.25	576.09		576.10	0.000182	0.54	27.88	20.31	0.08
Reach 1	1329.886	PF 7	PROPOSED	15.00	575.61	577.33	576.59	577.33	0.000026	0.26	97.13	141.16	0.04
Reach 1	1329.886	PF 7	EXISTING	15.00	574.22	576.07		576.08	0.000072	0.37	40.92	26.46	0.05

HEC-RAS River: River 1 Reach: Reach 1 Profile: PF 7 (Continued)

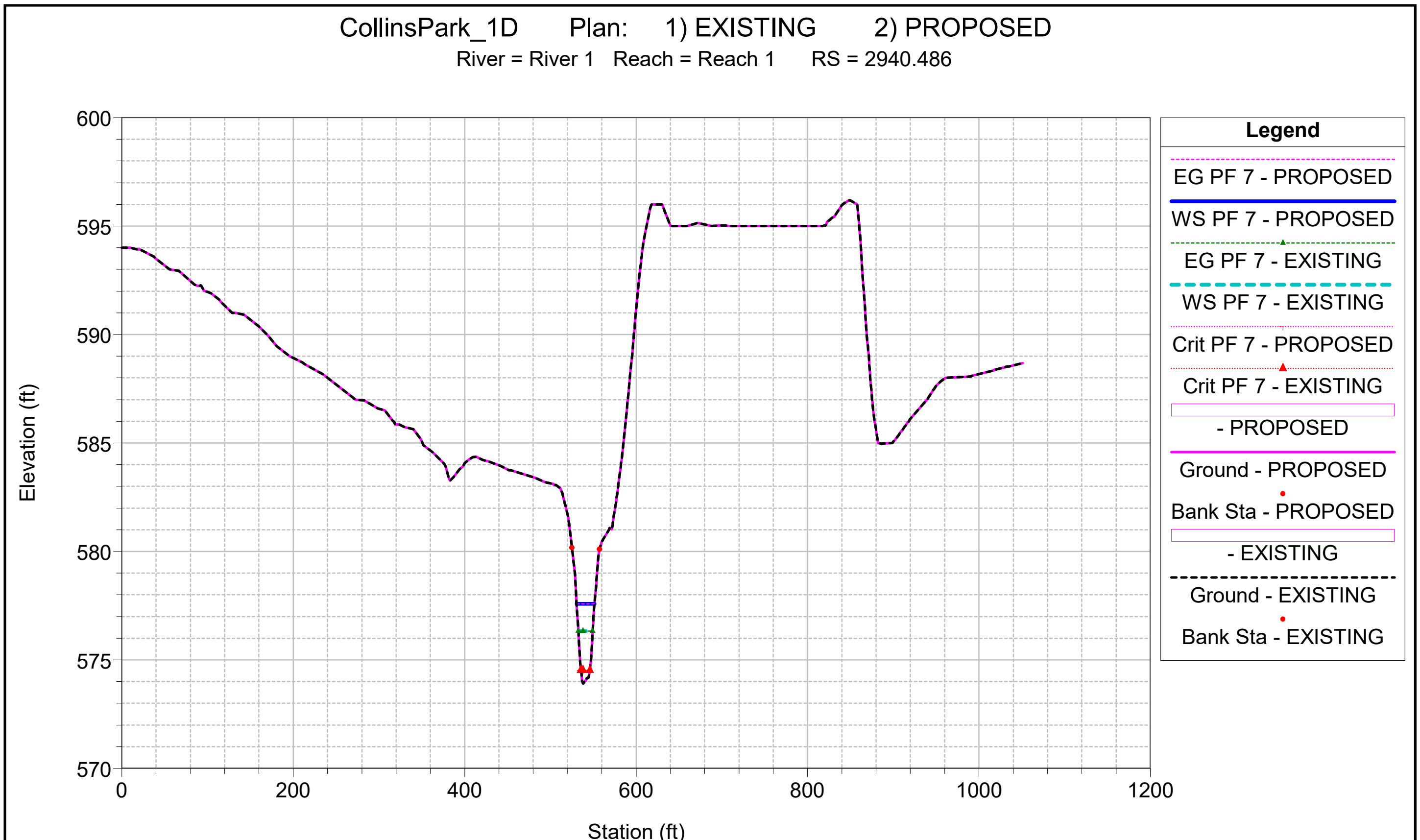
Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1191.169	PF 7	PROPOSED	15.00	575.59	577.32		577.32	0.000166	0.62	53.48	155.11	0.11
Reach 1	1191.169	PF 7	EXISTING	15.00	573.35	576.06	573.93	576.06	0.000115	0.50	30.17	16.43	0.06
Reach 1	933.0484	PF 7	PROPOSED	15.00	575.43	577.23		577.24	0.000650	1.28	19.65	50.02	0.21
Reach 1	933.0484	PF 7	EXISTING	15.00	574.01	576.04		576.04	0.000040	0.30	50.50	28.81	0.04
Reach 1	735.0094	PF 7	PROPOSED	15.00	575.44	577.06	576.45	577.09	0.000982	1.46	18.81	62.00	0.26
Reach 1	735.0094	PF 7	EXISTING	15.00	574.06	576.03		576.03	0.000050	0.33	45.49	25.64	0.04
Reach 1	545.6368	PF 7	PROPOSED	15.00	575.34	576.29	576.29	576.57	0.017425	4.26	3.52	6.34	1.01
Reach 1	545.6368	PF 7	EXISTING	15.00	573.61	576.02	574.04	576.02	0.000069	0.40	37.47	20.14	0.05
Reach 1	361.08			Culvert									
Reach 1	329.5189	PF 7	PROPOSED	15.00	573.70	575.99	572.95	575.99	0.000135	0.43	30.81	18.13	0.08
Reach 1	329.5189	PF 7	EXISTING	15.00	571.49	575.99	572.18	576.00	0.000011	0.22	68.07	21.70	0.02
Reach 1	212.4732	PF 7	PROPOSED	15.00	571.06	575.99	571.59	575.99	0.000004	0.20	76.53	24.40	0.02
Reach 1	212.4732	PF 7	EXISTING	15.00	571.06	575.99	571.59	575.99	0.000009	0.20	76.57	24.41	0.02
Reach 1	116.8487	PF 7	PROPOSED	15.00	574.06	575.94	575.03	575.99	0.001148	1.70	8.84	7.42	0.27
Reach 1	116.8487	PF 7	EXISTING	15.00	574.06	575.94	575.03	575.99	0.002583	1.70	8.84	7.42	0.27
Reach 1	71.43			Culvert									
Reach 1	26	PF 7	PROPOSED	15.00	574.25	575.98	574.70	575.99	0.000200	0.51	29.48	25.02	0.08
Reach 1	26	PF 7	EXISTING	15.00	574.25	575.98	574.70	575.99	0.000200	0.51	29.48	25.02	0.08

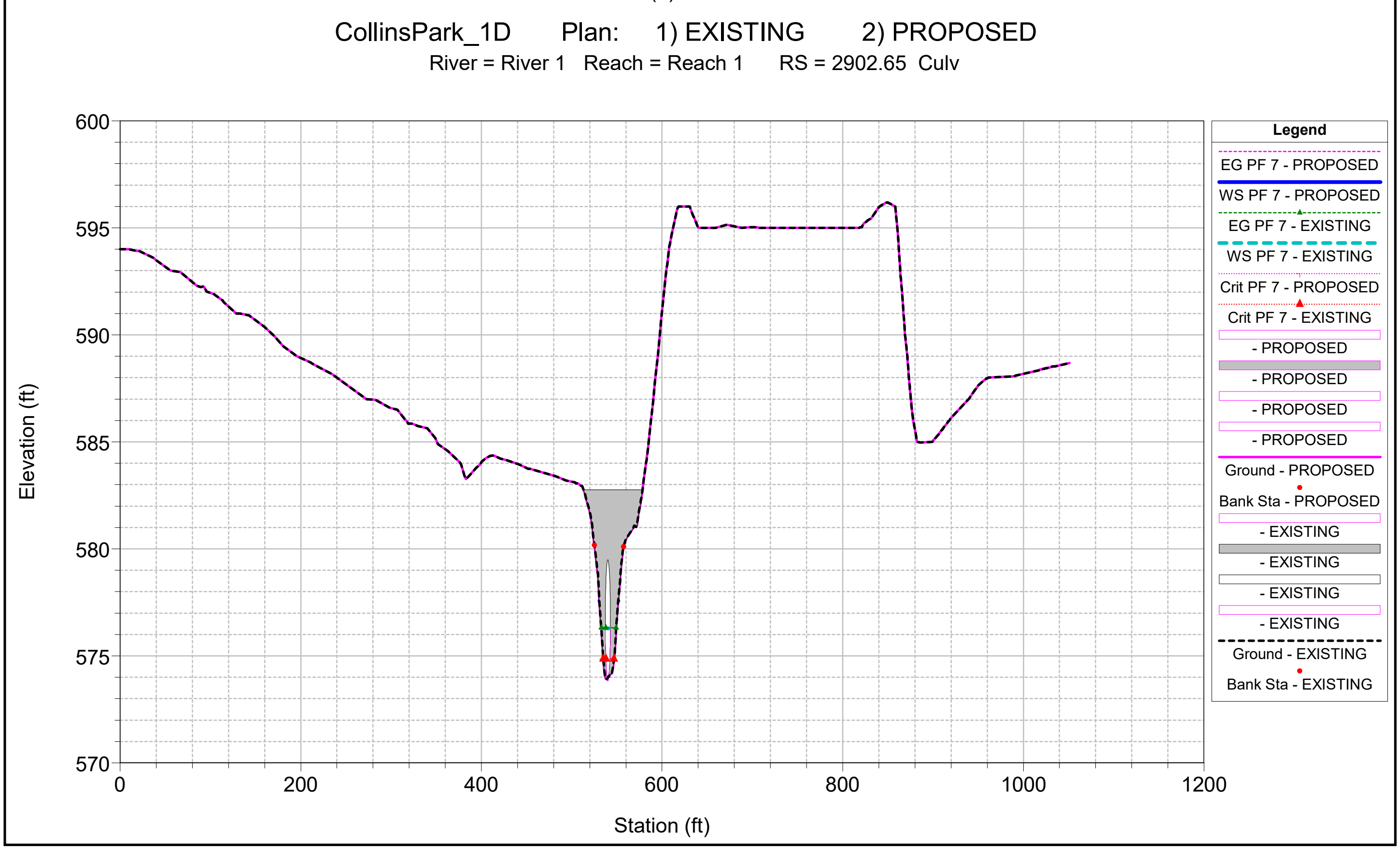
HEC-RAS River: River 1 Reach: Reach 1 Profile: PF 8

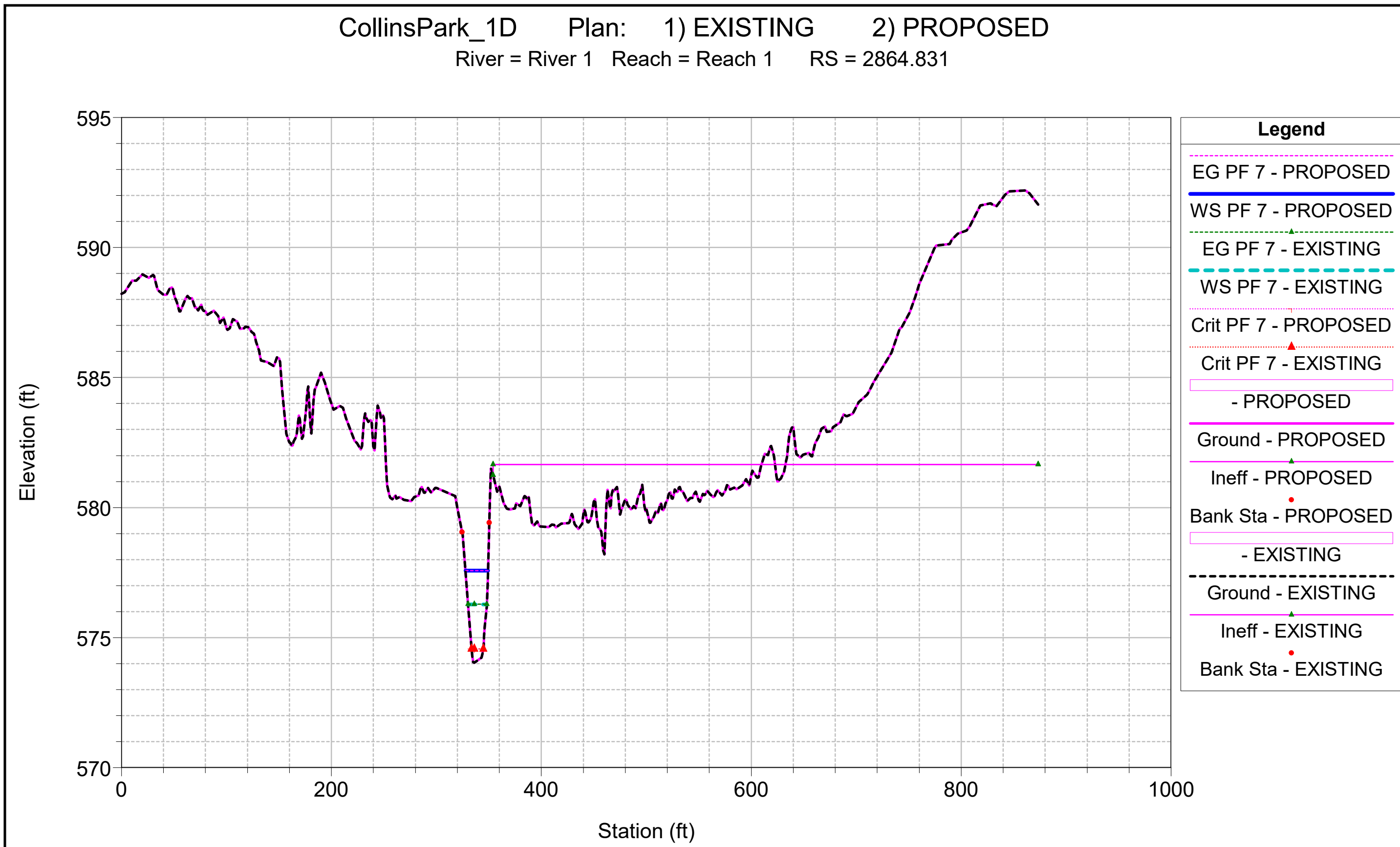
Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	2940.486	PF 8	PROPOSED	5.00	573.91	577.35	574.29	577.35	0.000003	0.10	47.89	19.94	0.01
Reach 1	2940.486	PF 8	EXISTING	5.00	573.91	575.42	574.29	575.42	0.000094	0.33	15.17	13.94	0.06
Reach 1	2902.65			Culvert									
Reach 1	2864.831	PF 8	PROPOSED	5.00	574.03	577.35	574.33	577.35	0.000003	0.10	50.08	21.08	0.01
Reach 1	2864.831	PF 8	EXISTING	5.00	574.03	575.40	574.33	575.40	0.000104	0.34	14.81	14.14	0.06
Reach 1	2831.867	PF 8	PROPOSED	5.00	573.71	577.35	573.89	577.35	0.000001	0.07	74.48	25.35	0.01
Reach 1	2831.867	PF 8	EXISTING	5.00	573.71	575.40		575.40	0.000016	0.17	30.04	20.60	0.02
Reach 1	2732.136	PF 8	PROPOSED	5.00	576.05	577.35	576.63	577.35	0.000003	0.07	37.98	68.80	0.01
Reach 1	2732.136	PF 8	EXISTING	5.00	572.30	575.39		575.40	0.000004	0.10	48.09	21.62	0.01
Reach 1	2624.846	PF 8	PROPOSED	5.00	575.94	577.33	576.61	577.35	0.000597	1.00	4.99	27.53	0.19
Reach 1	2624.846	PF 8	EXISTING	5.00	573.08	575.39	573.39	575.39	0.000025	0.22	22.76	13.75	0.03
Reach 1	2412.009	PF 8	PROPOSED	5.00	575.90	577.25	576.46	577.26	0.000311	0.72	6.91	75.35	0.14
Reach 1	2412.009	PF 8	EXISTING	5.00	572.16	575.38		575.38	0.000003	0.09	54.62	24.21	0.01
Reach 1	2304.450	PF 8	PROPOSED	5.00	575.85	577.20	576.49	577.21	0.000560	0.95	5.26	6.56	0.19
Reach 1	2304.450	PF 8	EXISTING	5.00	572.02	575.38	572.35	575.38	0.000003	0.09	55.44	24.50	0.01
Reach 1	2071.245	PF 8	PROPOSED	5.00	575.77	577.12	576.32	577.13	0.000258	0.68	7.39	18.33	0.13
Reach 1	2071.245	PF 8	EXISTING	5.00	571.91	575.37		575.37	0.000003	0.10	51.87	22.00	0.01
Reach 1	2018.154	PF 8	PROPOSED	5.00	575.79	577.09	576.40	577.10	0.000637	0.99	5.07	6.63	0.20
Reach 1	2018.154	PF 8	EXISTING	5.00	573.66	575.36	574.23	575.37	0.000335	0.59	8.51	7.94	0.10
Reach 1	1837			Culvert									
Reach 1	1812.481	PF 8	PROPOSED	5.00	575.73	577.10	576.28	577.10	0.000343	0.73	6.84	89.71	0.15
Reach 1	1812.481	PF 8	EXISTING	5.00	572.30	575.36		575.36	0.000002	0.09	58.41	24.30	0.01
Reach 1	1680.301	PF 8	PROPOSED	5.00	575.70	577.10	576.27	577.10	0.000017	0.16	50.31	254.45	0.03
Reach 1	1680.301	PF 8	EXISTING	5.00	572.17	575.36	572.59	575.36	0.000006	0.12	40.38	18.95	0.01
Reach 1	1506.952	PF 8	PROPOSED	5.00	575.60	577.04	576.21	577.05	0.000273	0.63	7.96	39.67	0.13
Reach 1	1506.952	PF 8	EXISTING	5.00	574.25	575.35		575.35	0.000149	0.35	14.14	16.80	0.07
Reach 1	1329.886	PF 8	PROPOSED	5.00	575.61	576.97	576.19	576.98	0.000466	0.87	5.75	31.70	0.17
Reach 1	1329.886	PF 8	EXISTING	5.00	574.22	575.33		575.33	0.000049	0.22	22.42	23.41	0.04

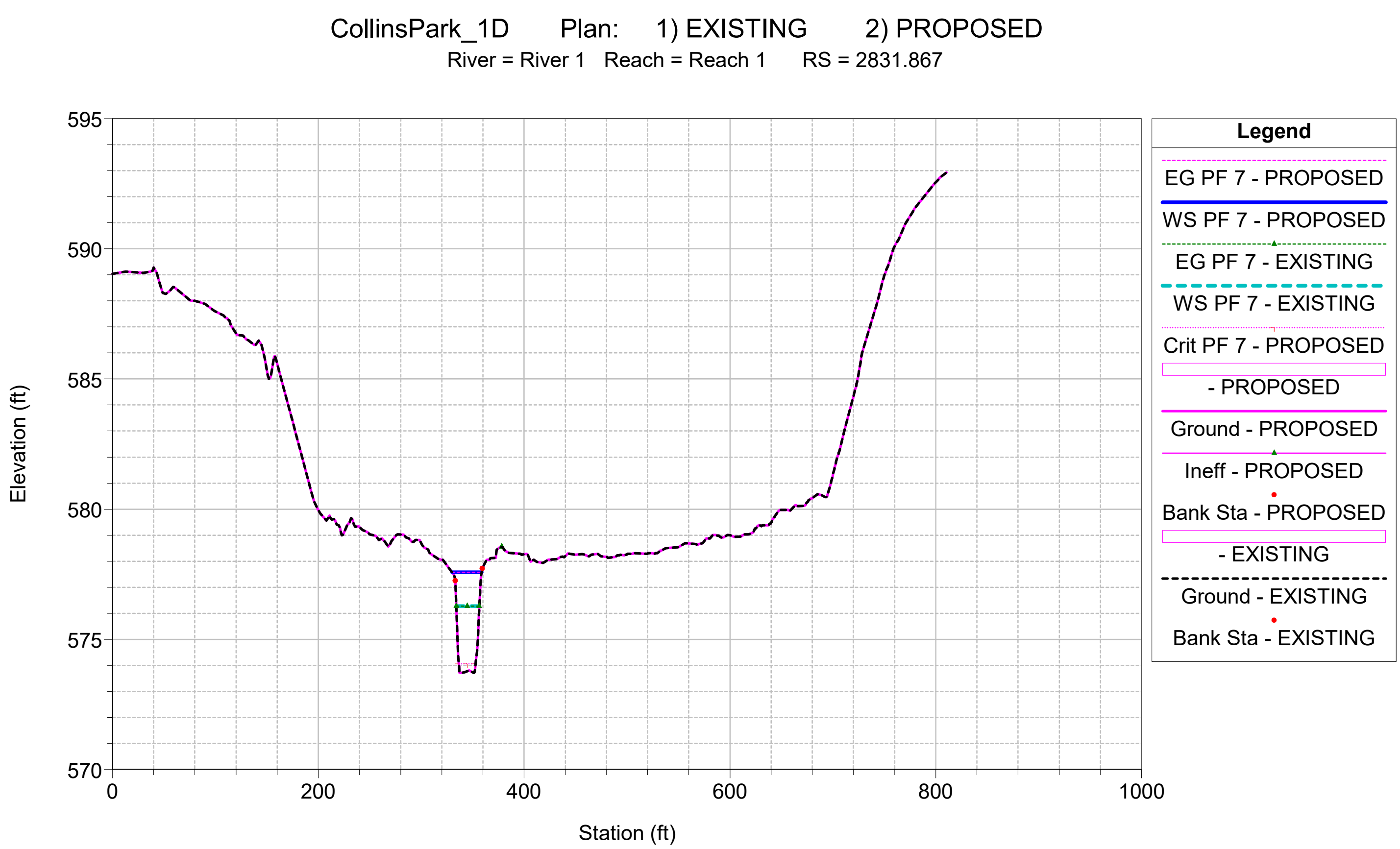
HEC-RAS River: River 1 Reach: Reach 1 Profile: PF 8 (Continued)

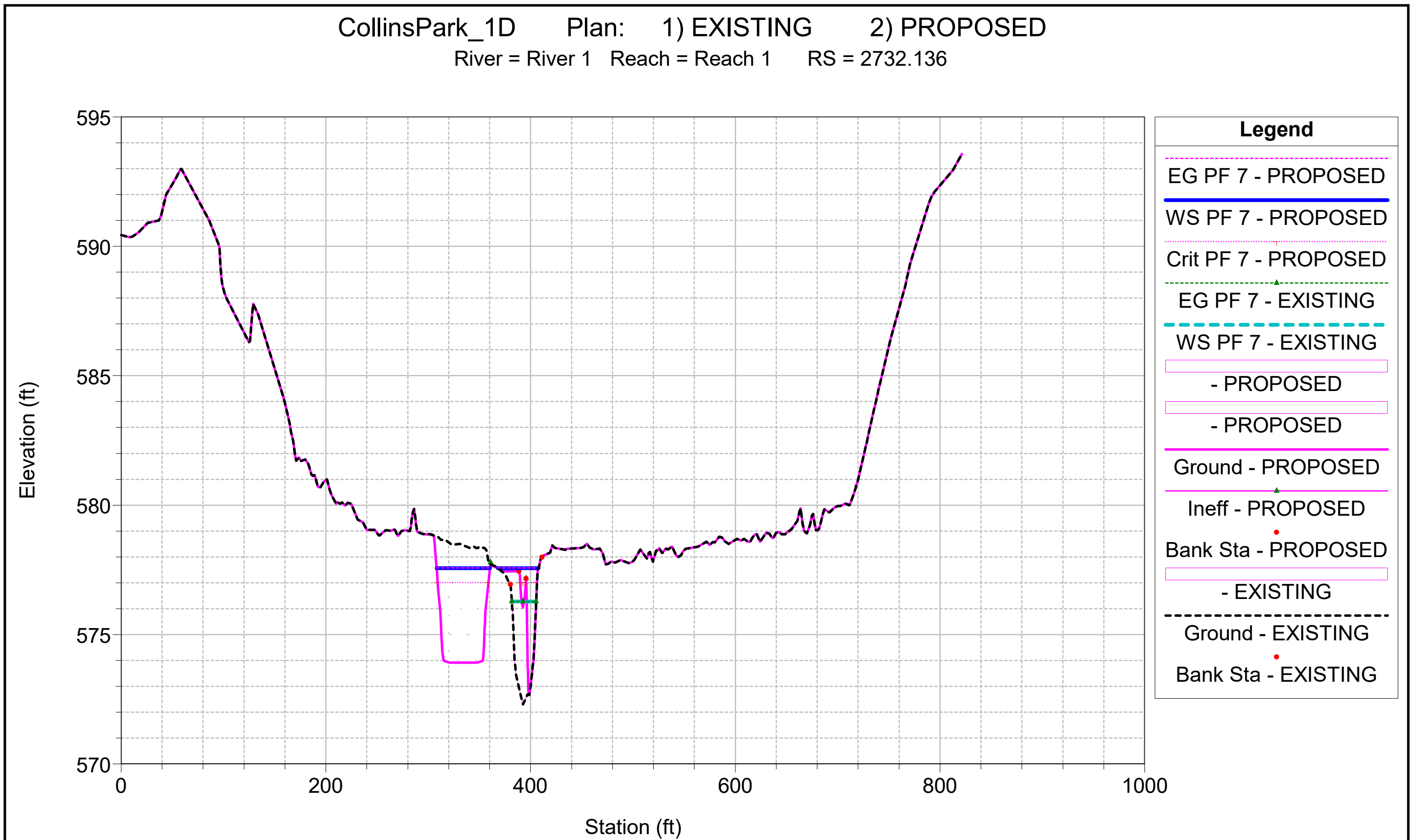
Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1191.169	PF 8	PROPOSED	5.00	575.59	576.95		576.97	0.000850	1.07	5.43	46.23	0.22
Reach 1	1191.169	PF 8	EXISTING	5.00	573.35	575.33	573.69	575.33	0.000039	0.26	19.57	12.97	0.04
Reach 1	933.0484	PF 8	PROPOSED	5.00	575.43	576.77		576.78	0.000602	1.00	5.00	6.03	0.19
Reach 1	933.0484	PF 8	EXISTING	5.00	574.01	575.32		575.32	0.000020	0.16	30.89	26.11	0.03
Reach 1	735.0094	PF 8	PROPOSED	5.00	575.44	576.61	576.04	576.63	0.001011	1.20	4.18	5.75	0.25
Reach 1	735.0094	PF 8	EXISTING	5.00	574.06	575.32		575.32	0.000025	0.18	27.94	24.06	0.03
Reach 1	545.6368	PF 8	PROPOSED	5.00	575.34	575.94	575.94	576.10	0.020141	3.21	1.56	4.90	1.00
Reach 1	545.6368	PF 8	EXISTING	5.00	573.61	575.31	573.84	575.31	0.000028	0.21	24.17	17.81	0.03
Reach 1	361.08			Culvert									
Reach 1	329.5189	PF 8	PROPOSED	5.00	573.70	575.31	572.49	575.31	0.000037	0.22	20.79	10.94	0.04
Reach 1	329.5189	PF 8	EXISTING	5.00	571.49	575.31	571.93	575.31	0.000002	0.09	53.92	19.85	0.01
Reach 1	212.4732	PF 8	PROPOSED	5.00	571.06	575.31	571.37	575.31	0.000001	0.08	60.73	21.99	0.01
Reach 1	212.4732	PF 8	EXISTING	5.00	571.06	575.31	571.37	575.31	0.000002	0.08	60.74	22.00	0.01
Reach 1	116.8487	PF 8	PROPOSED	5.00	574.06	575.29	574.61	575.31	0.000744	1.09	4.61	5.60	0.21
Reach 1	116.8487	PF 8	EXISTING	5.00	574.06	575.29	574.61	575.31	0.001675	1.09	4.61	5.60	0.21
Reach 1	71.43			Culvert									
Reach 1	26	PF 8	PROPOSED	5.00	574.25	575.31	574.49	575.31	0.000200	0.36	13.80	19.69	0.08
Reach 1	26	PF 8	EXISTING	5.00	574.25	575.31	574.49	575.31	0.000200	0.36	13.80	19.69	0.08


CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2940.486
Elevation (ft)
Station (ft)
600
595
590
585
580
575
570
0
200
400
600
800
1000
1200
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
Crit PF 7 - PROPOSED
Crit PF 7 - EXISTING
- PROPOSED
Ground - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

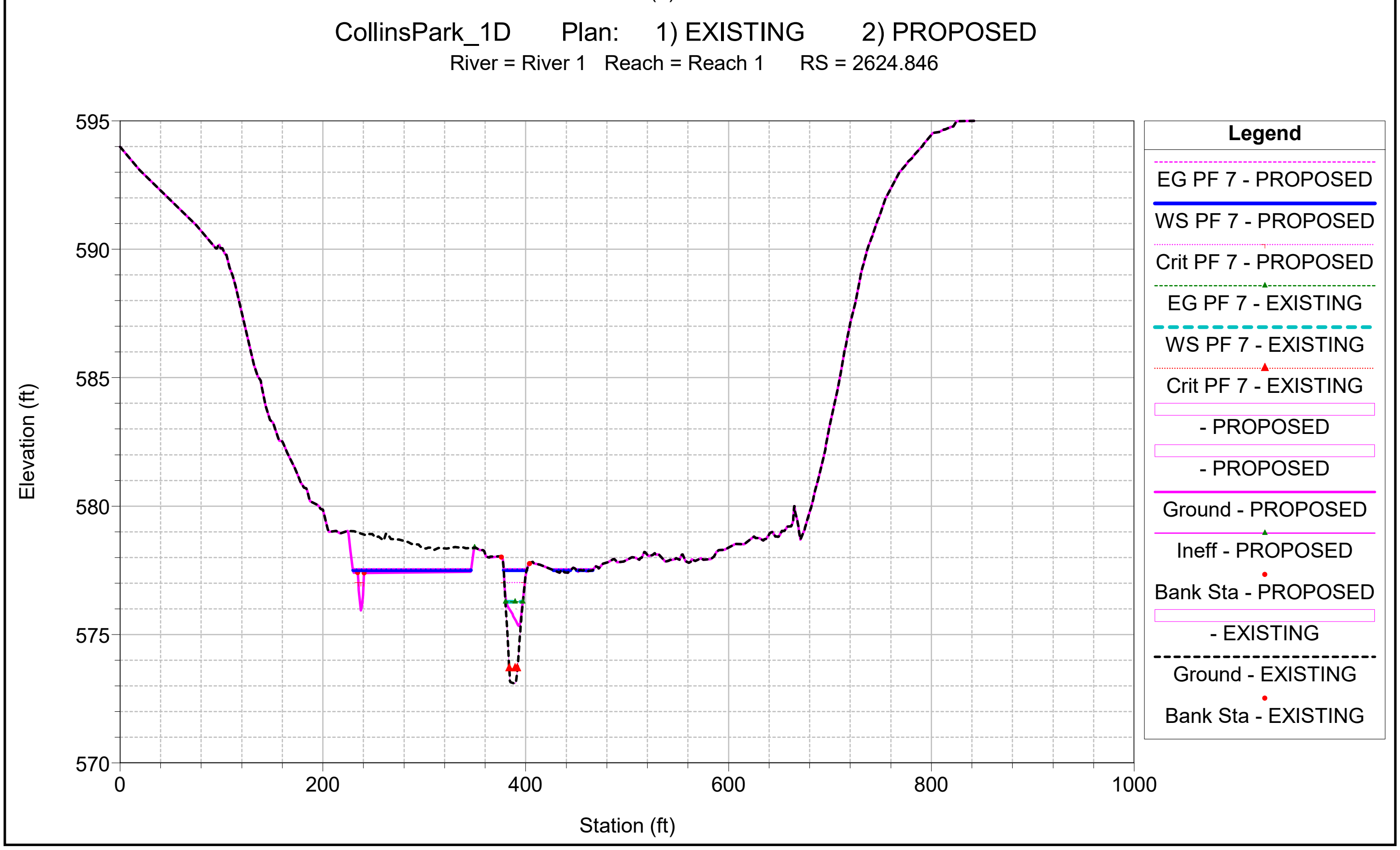

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2902.65 Culv
Elevation (ft)
Station (ft)
600
595
590
585
580
575
570
0
200
400
600
800
1000
1200
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
Crit PF 7 - PROPOSED
Crit PF 7 - EXISTING
- PROPOSED
- PROPOSED
- PROPOSED
- PROPOSED
Ground - PROPOSED
Bank Sta - PROPOSED
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING


CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2864.831
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
Crit PF 7 - PROPOSED
Crit PF 7 - EXISTING
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Ineff - EXISTING
Bank Sta - EXISTING

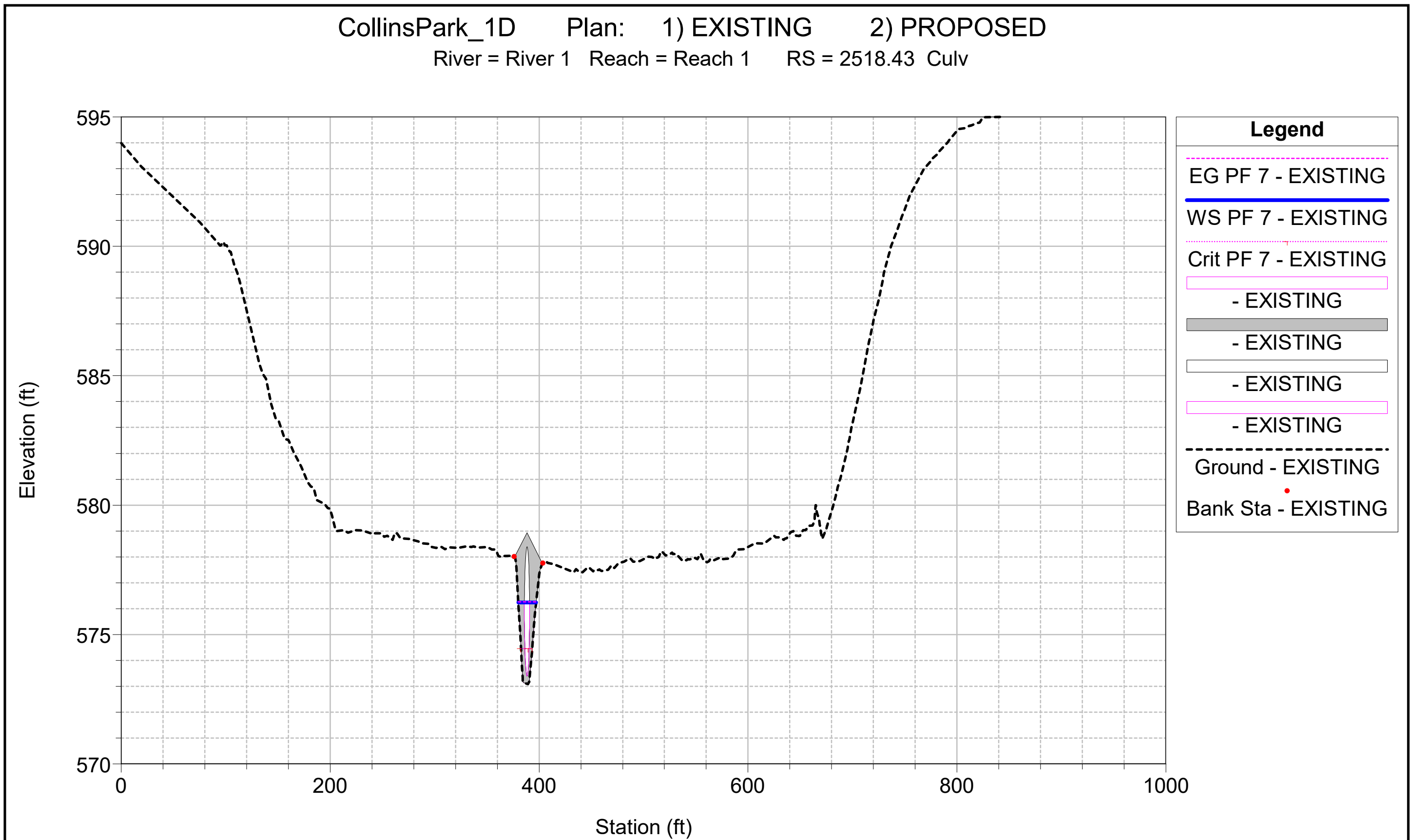

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2831.867
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
Crit PF 7 - PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING



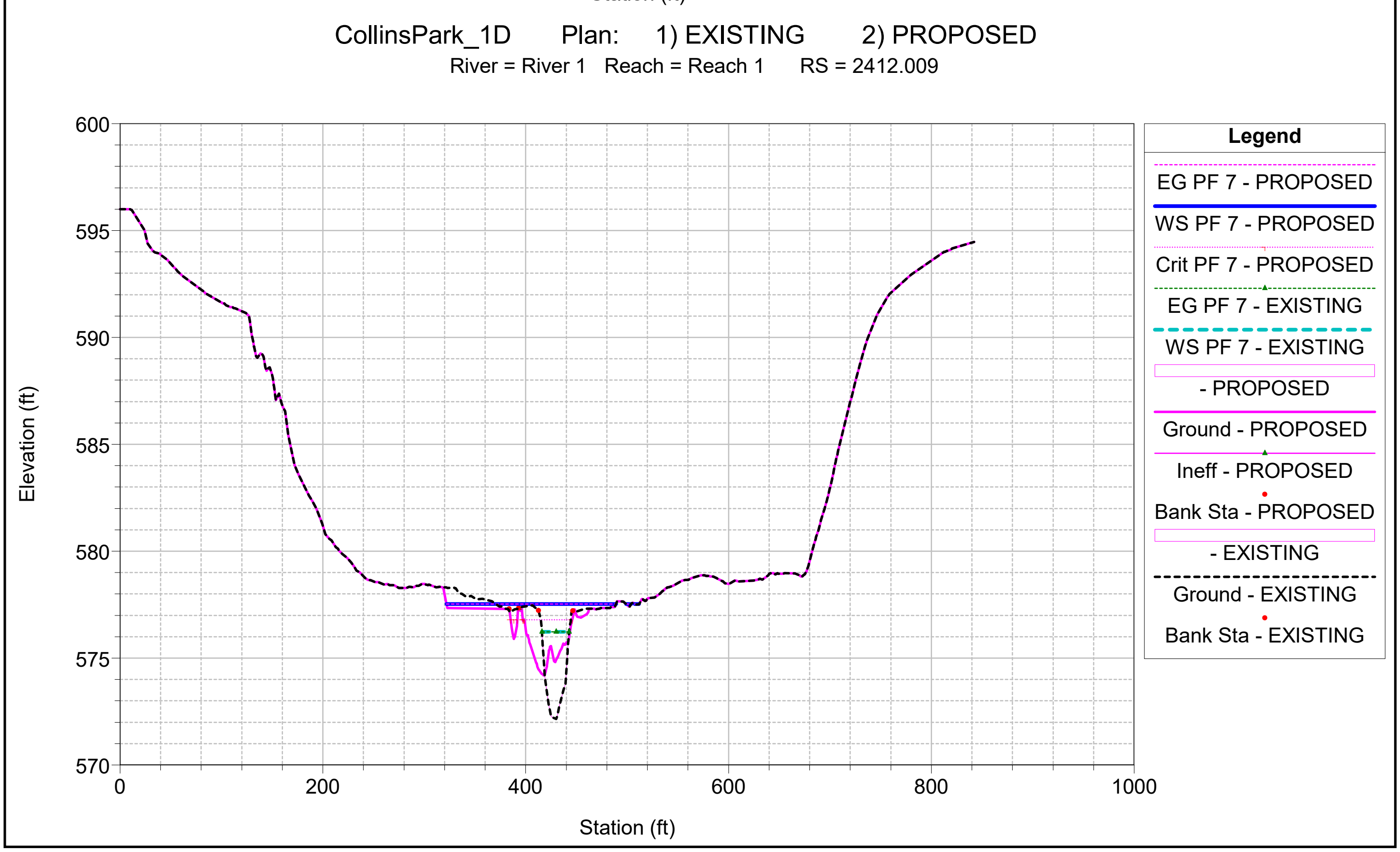
CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2732.136
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
- PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING



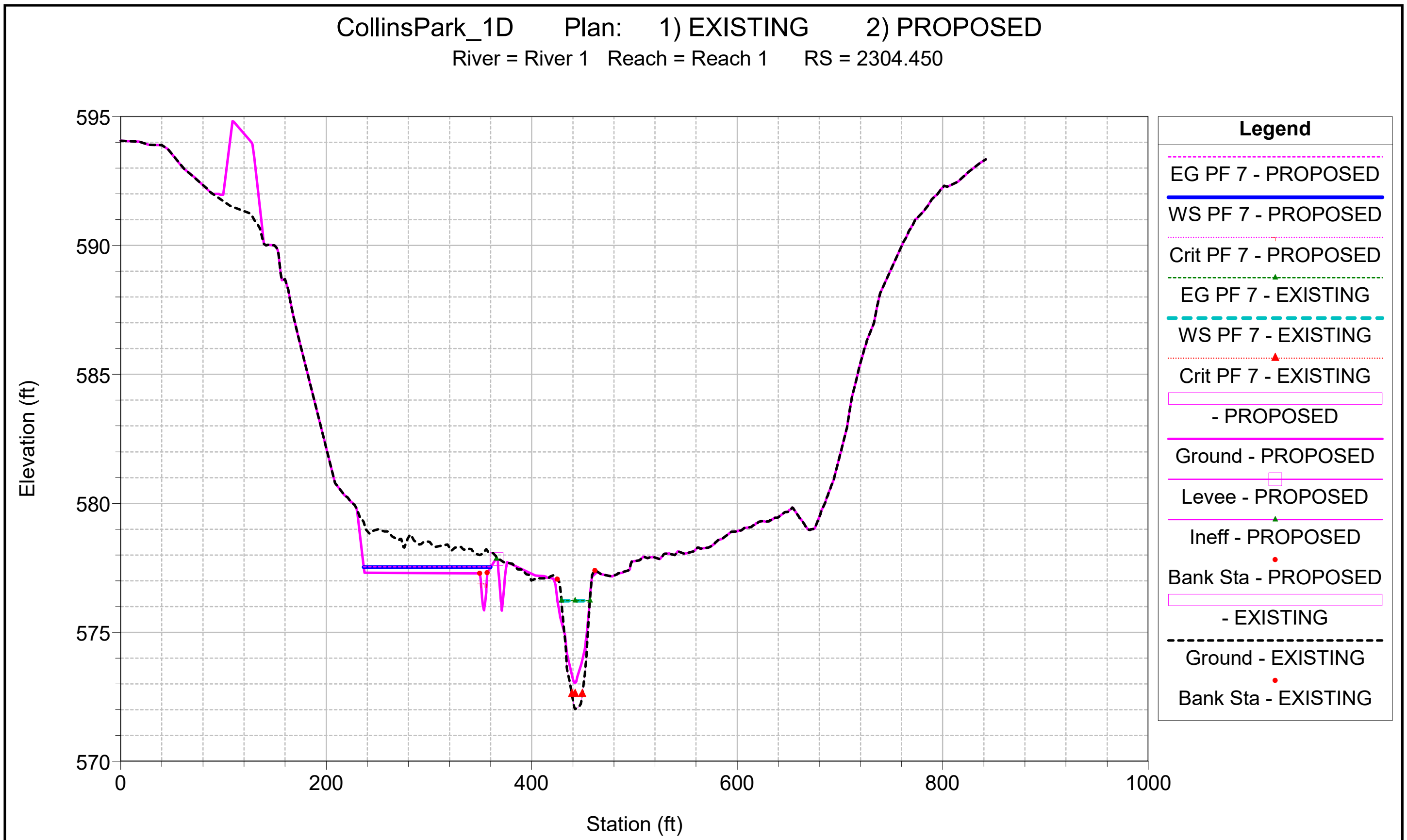
CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2624.846
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
Crit PF 7 - EXISTING
- PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

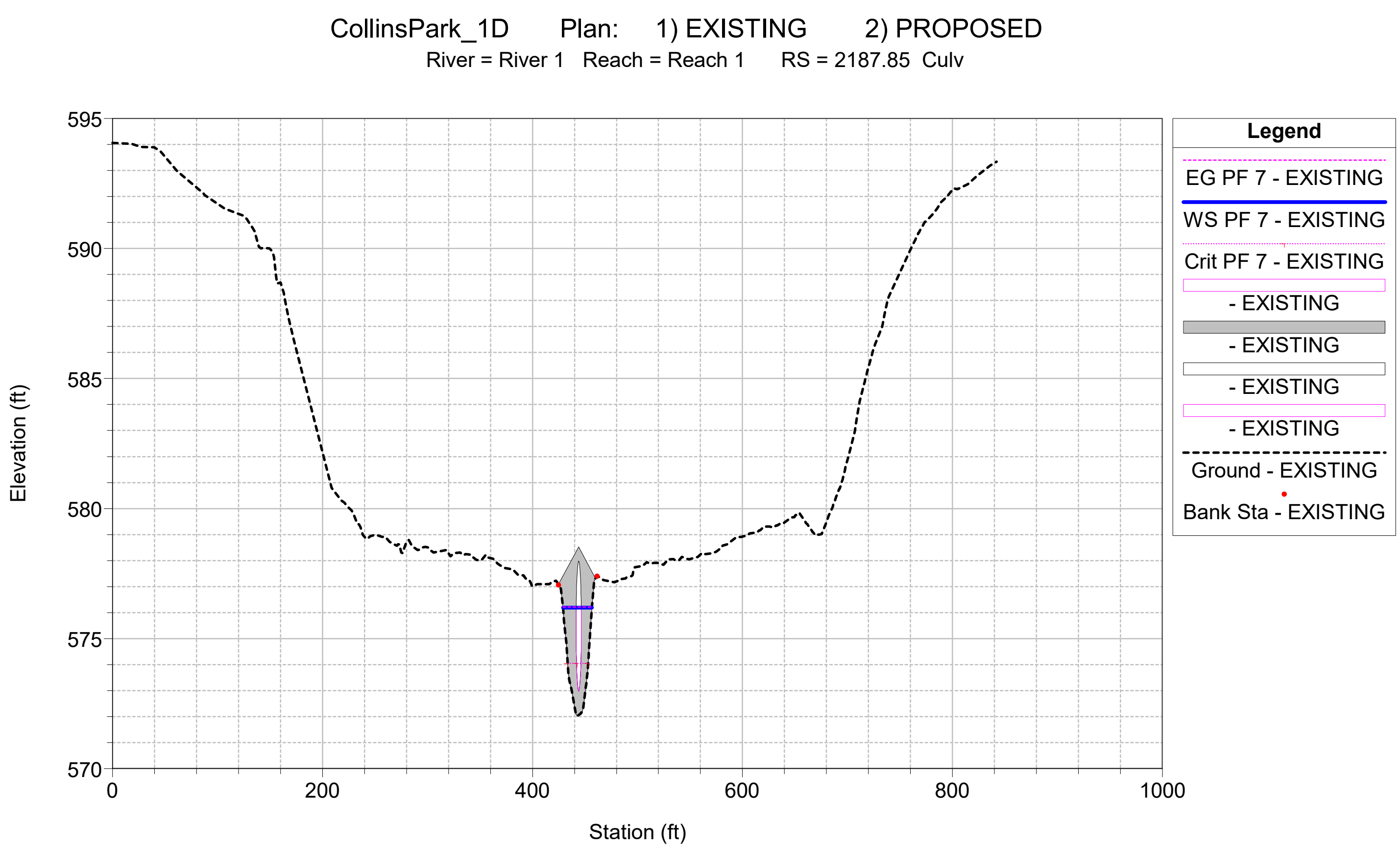


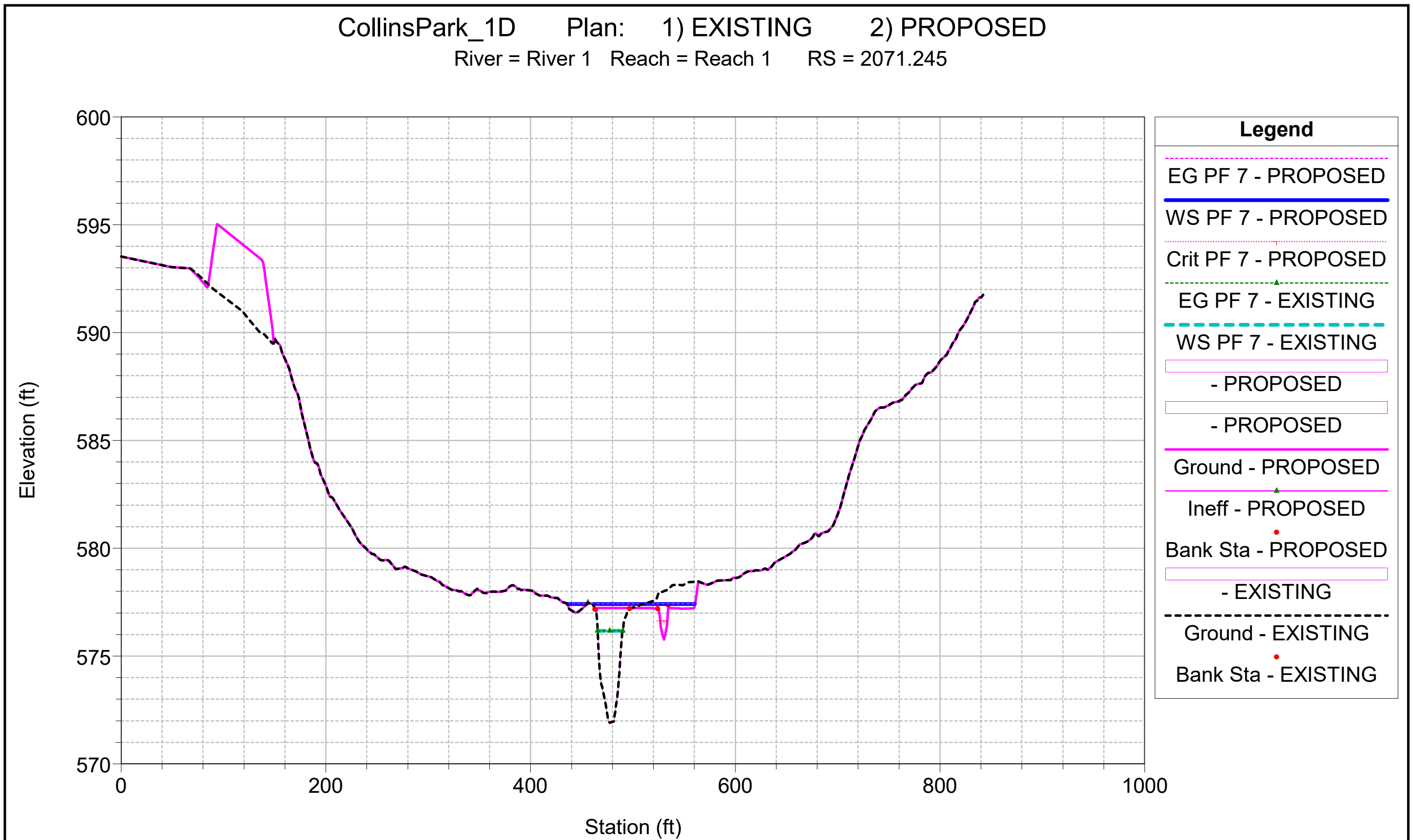
CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2518.43 Culv
Legend
EG PF 7 - EXISTING
WS PF 7 - EXISTING
Crit PF 7 - EXISTING
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000

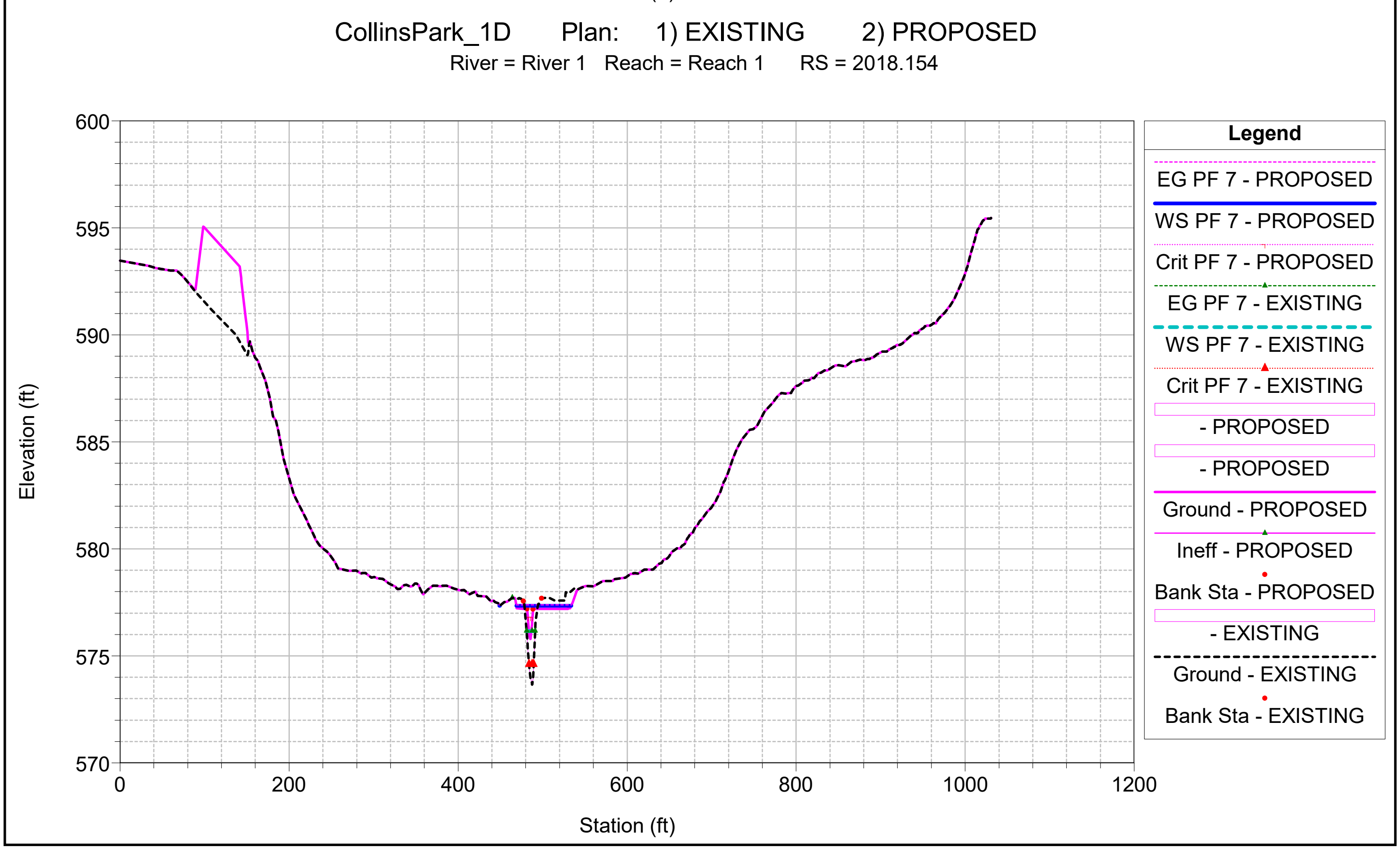


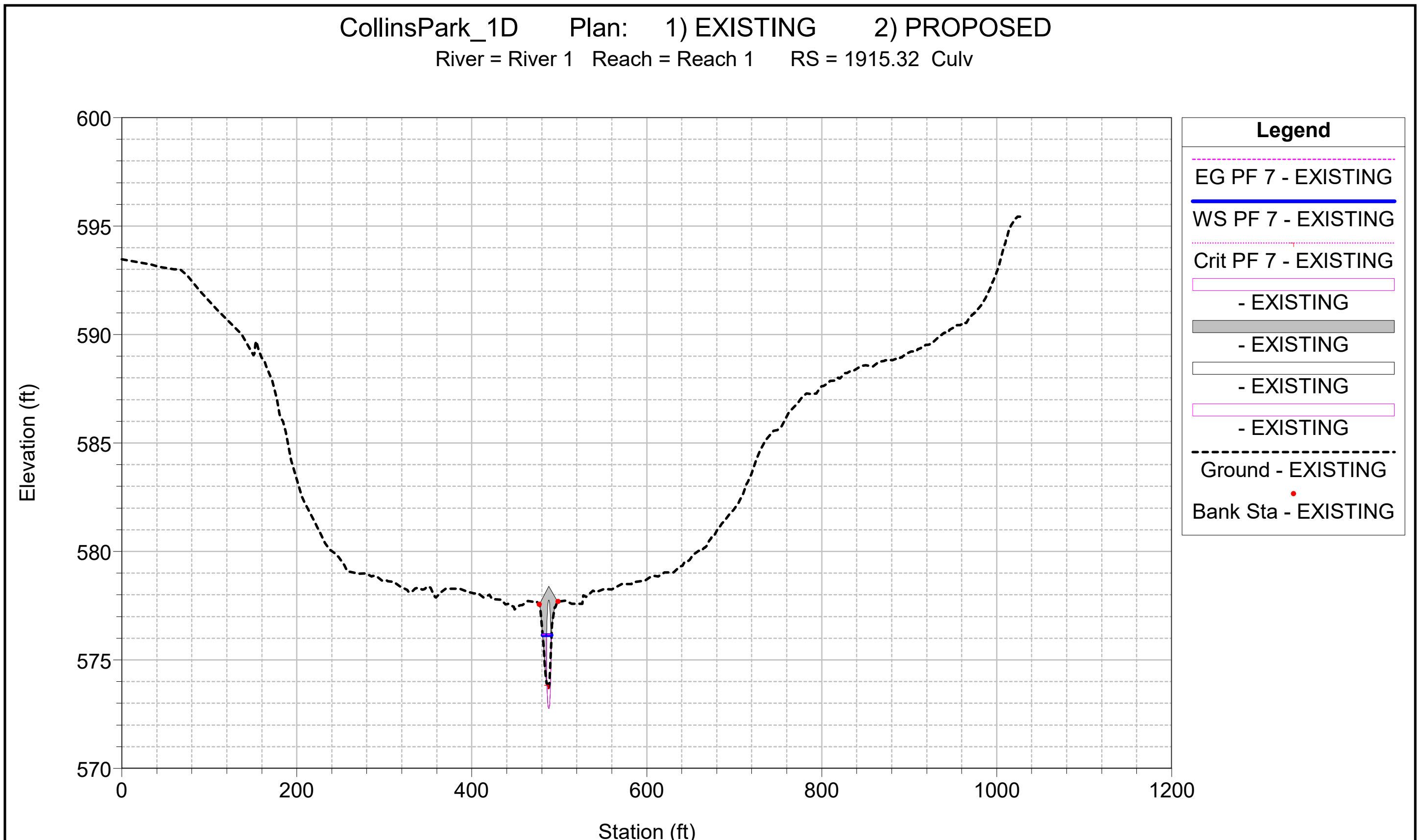
CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2412.009
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING
Elevation (ft)
Station (ft)
600
595
590
585
580
575
570
0
200
400
600
800
1000


CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2304.450
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
Crit PF 7 - EXISTING
- PROPOSED
Ground - PROPOSED
Levee - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

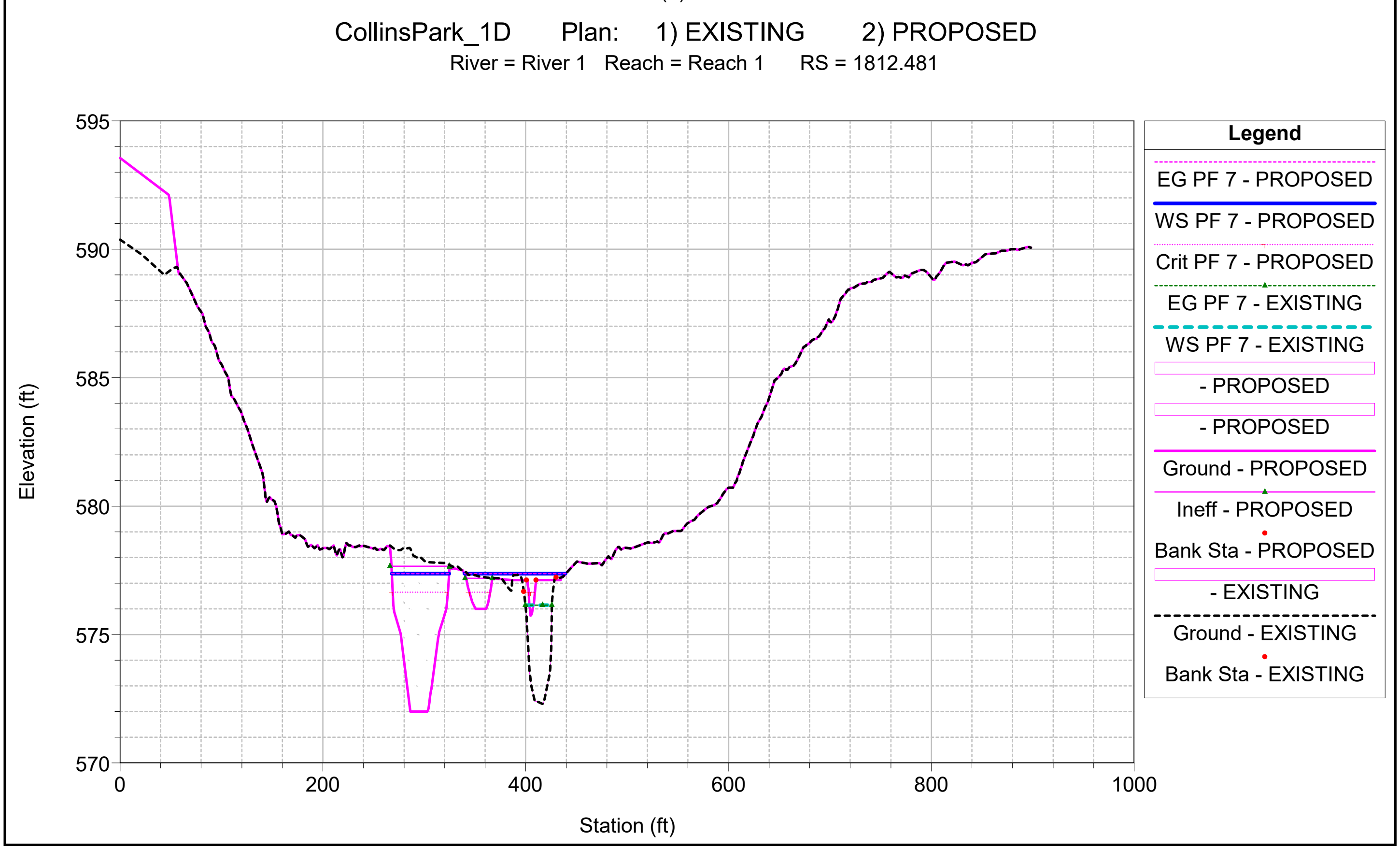

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2187.85 Culv
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG PF 7 - EXISTING
WS PF 7 - EXISTING
Crit PF 7 - EXISTING
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING


CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2071.245
Elevation (ft)
Station (ft)
600
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
- PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

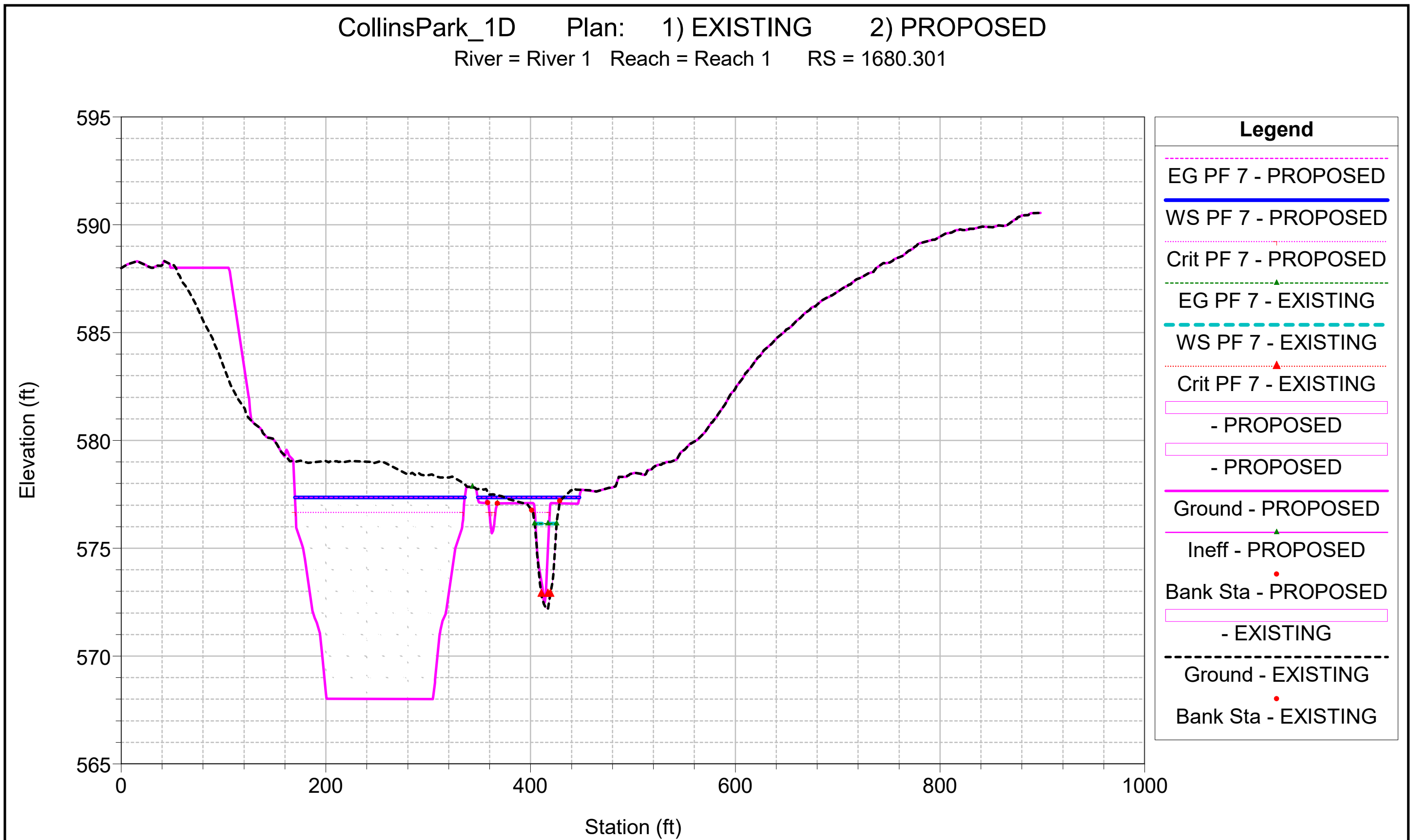

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2018.154
Elevation (ft)
Station (ft)
600
595
590
585
580
575
570
0
200
400
600
800
1000
1200
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
Crit PF 7 - EXISTING
- PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

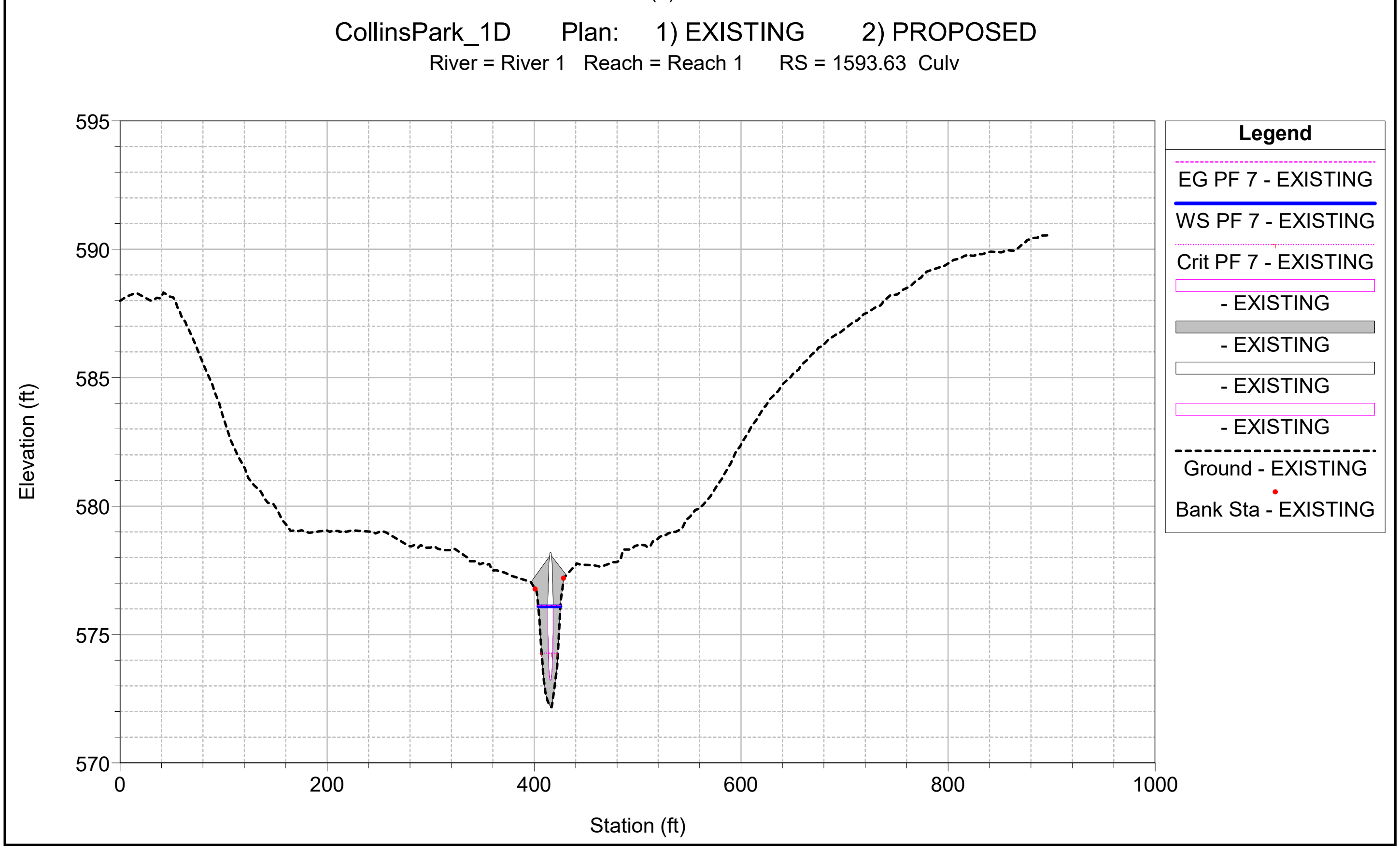


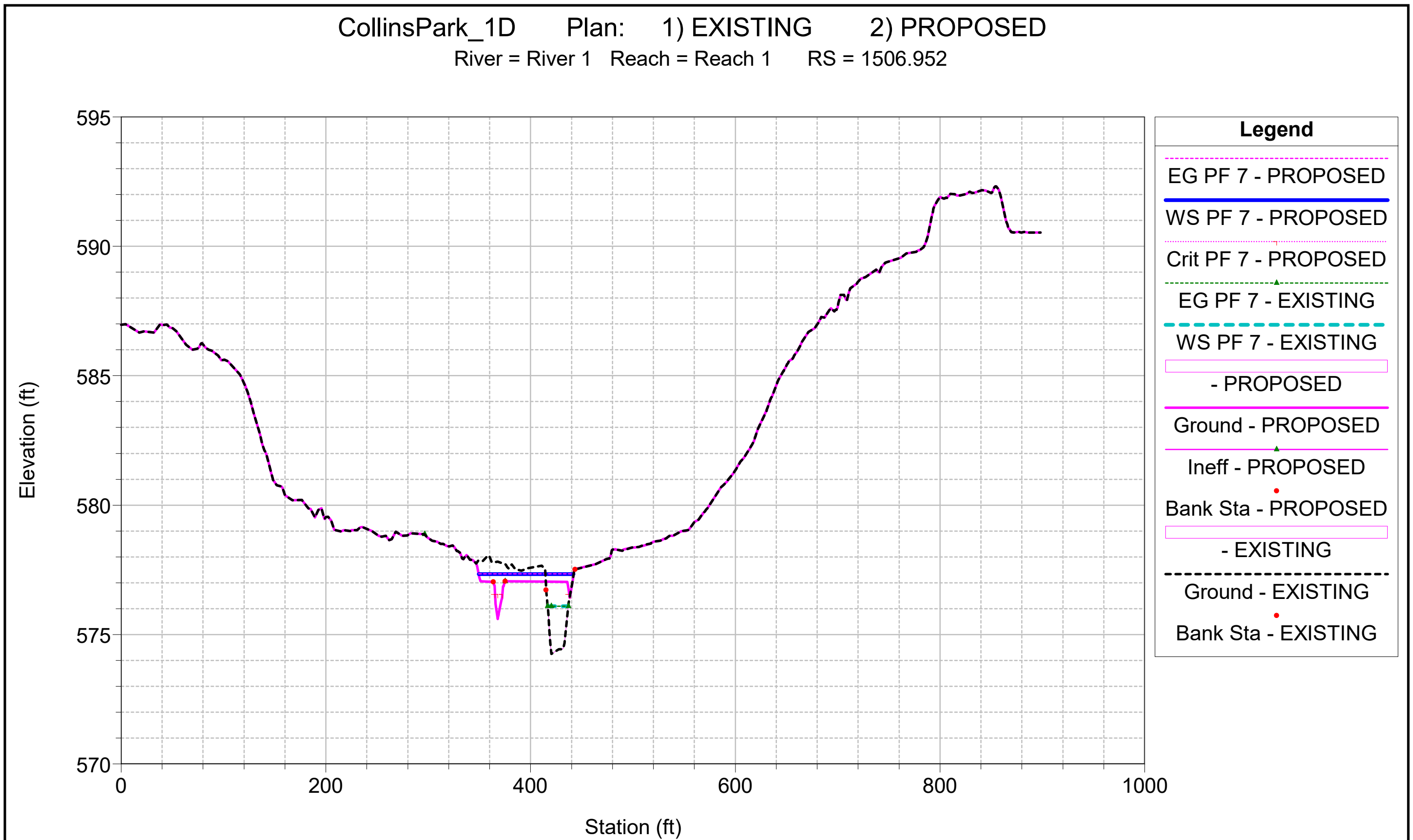
CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1915.32 Culv
Legend
EG PF 7 - EXISTING
WS PF 7 - EXISTING
Crit PF 7 - EXISTING
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING
Elevation (ft)
Station (ft)
600
595
590
585
580
575
570
0
200
400
600
800
1000
1200

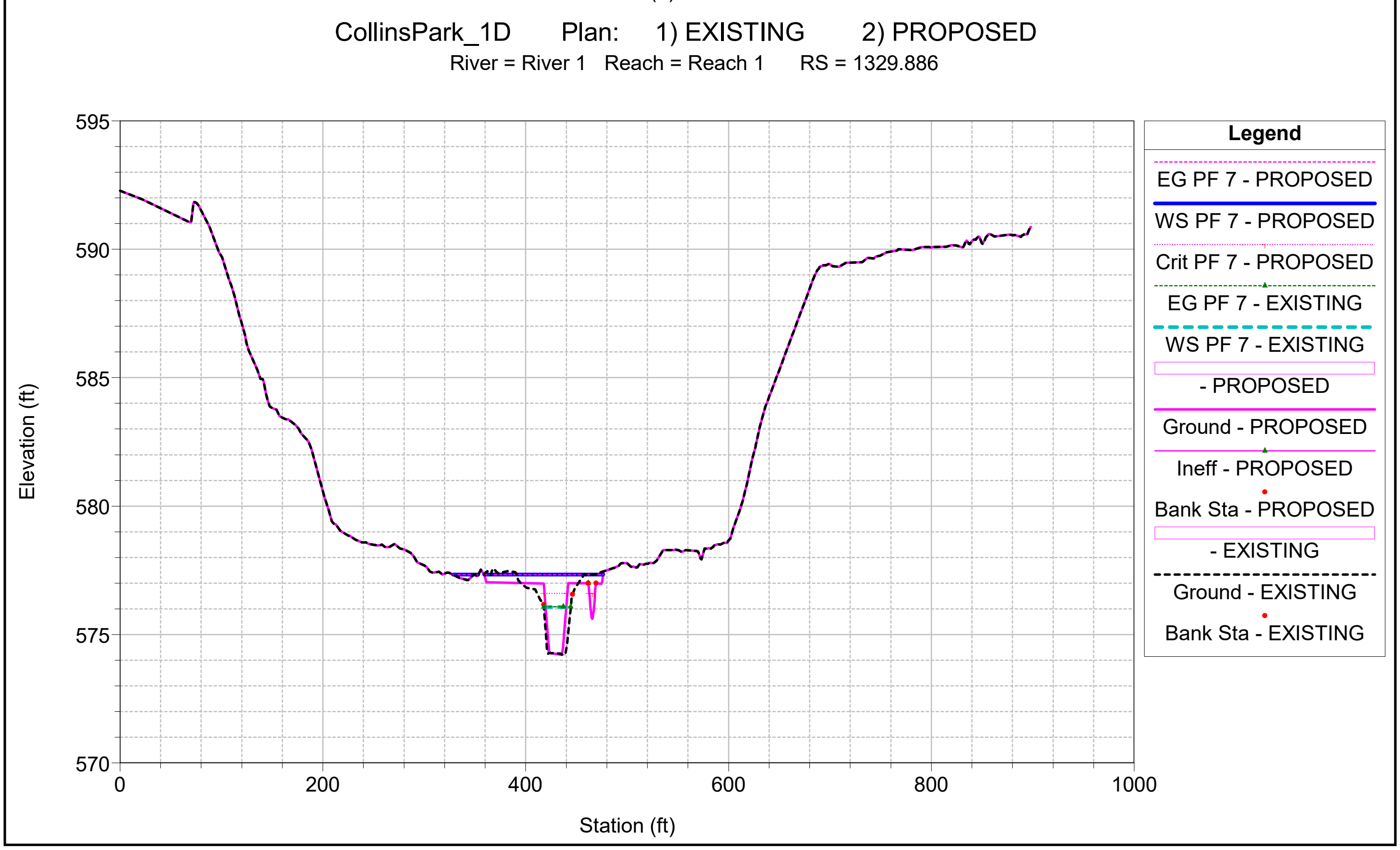


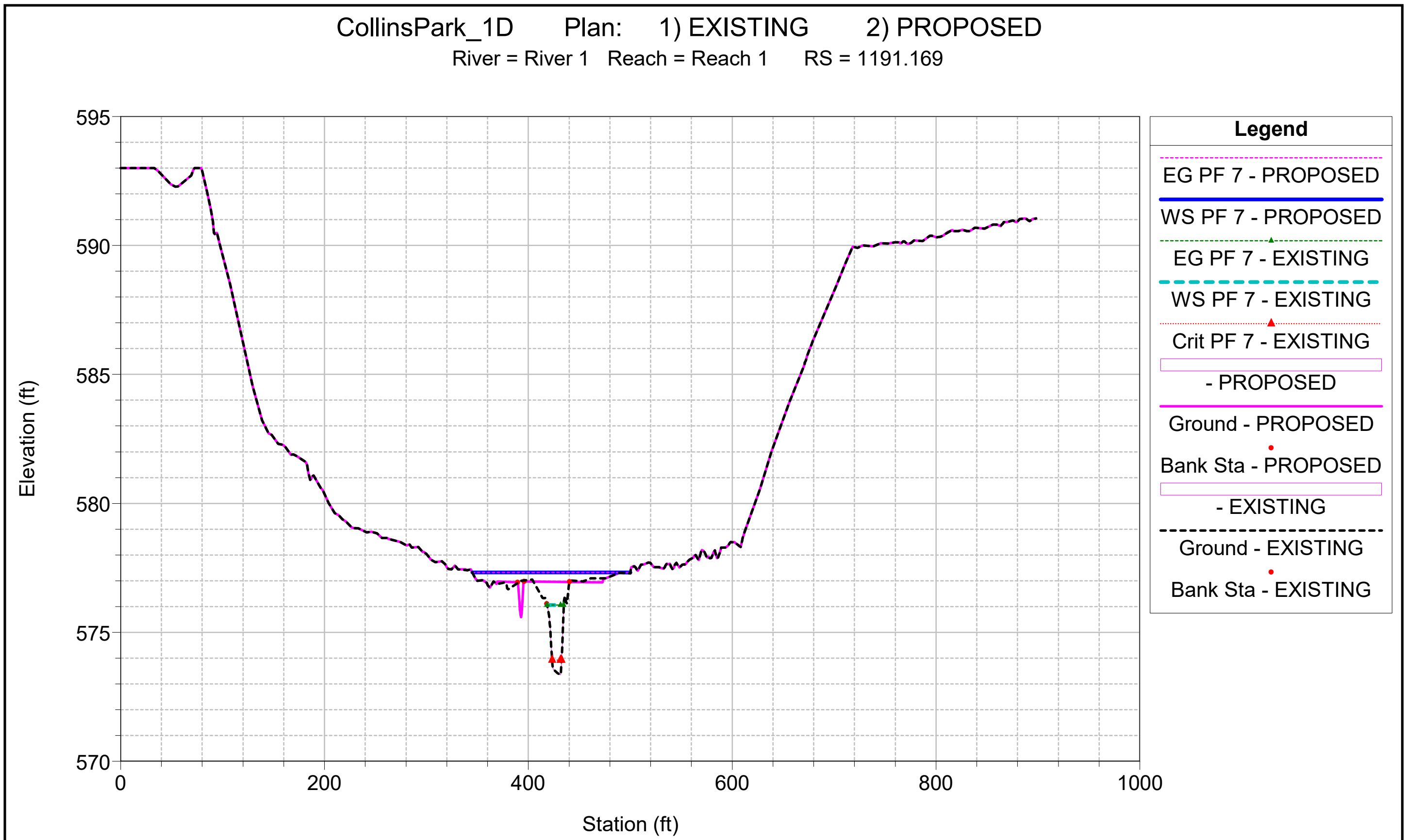
CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1812.481
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
- PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000

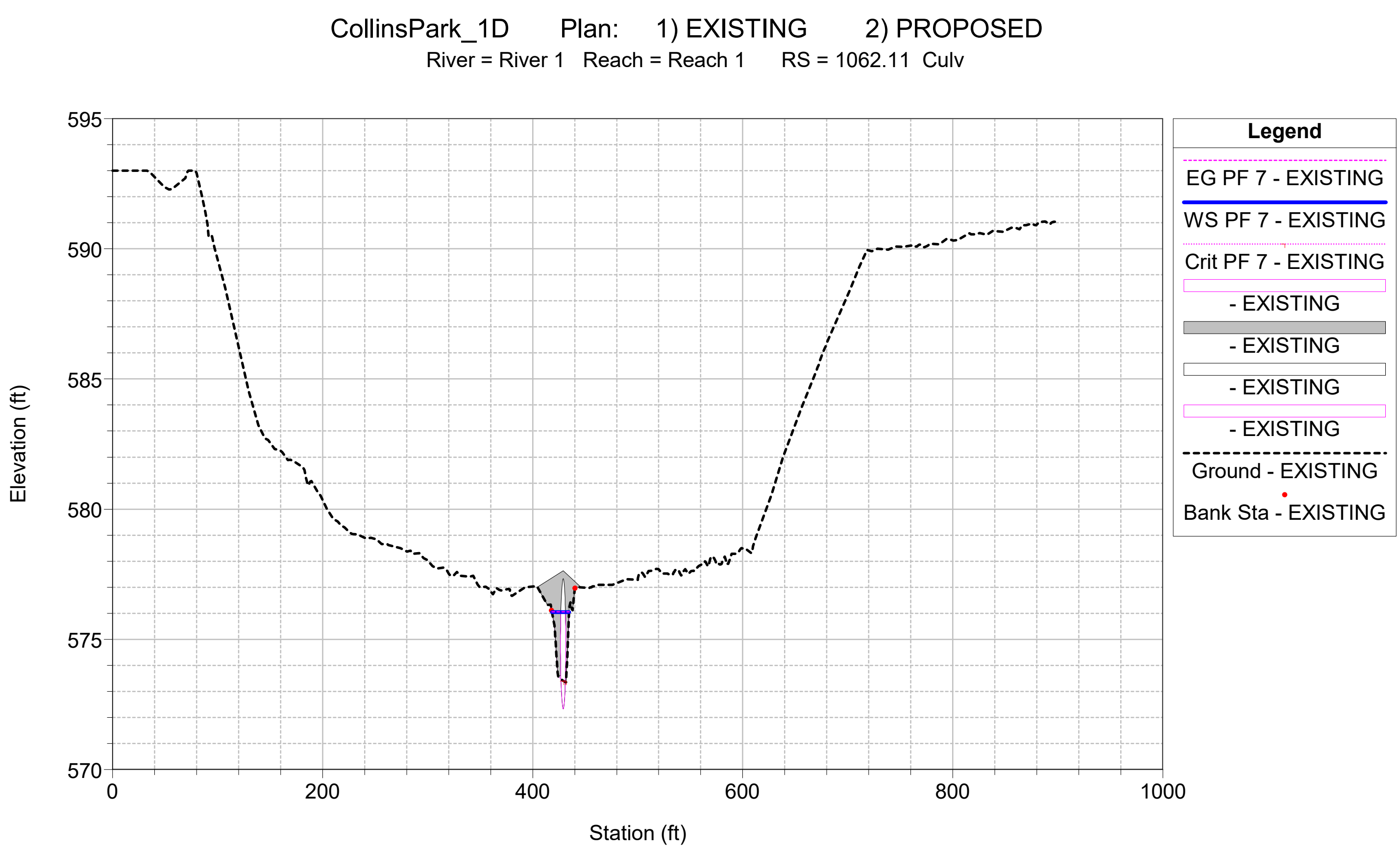

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1680.301
Elevation (ft)
Station (ft)
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
Crit PF 7 - EXISTING
- PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

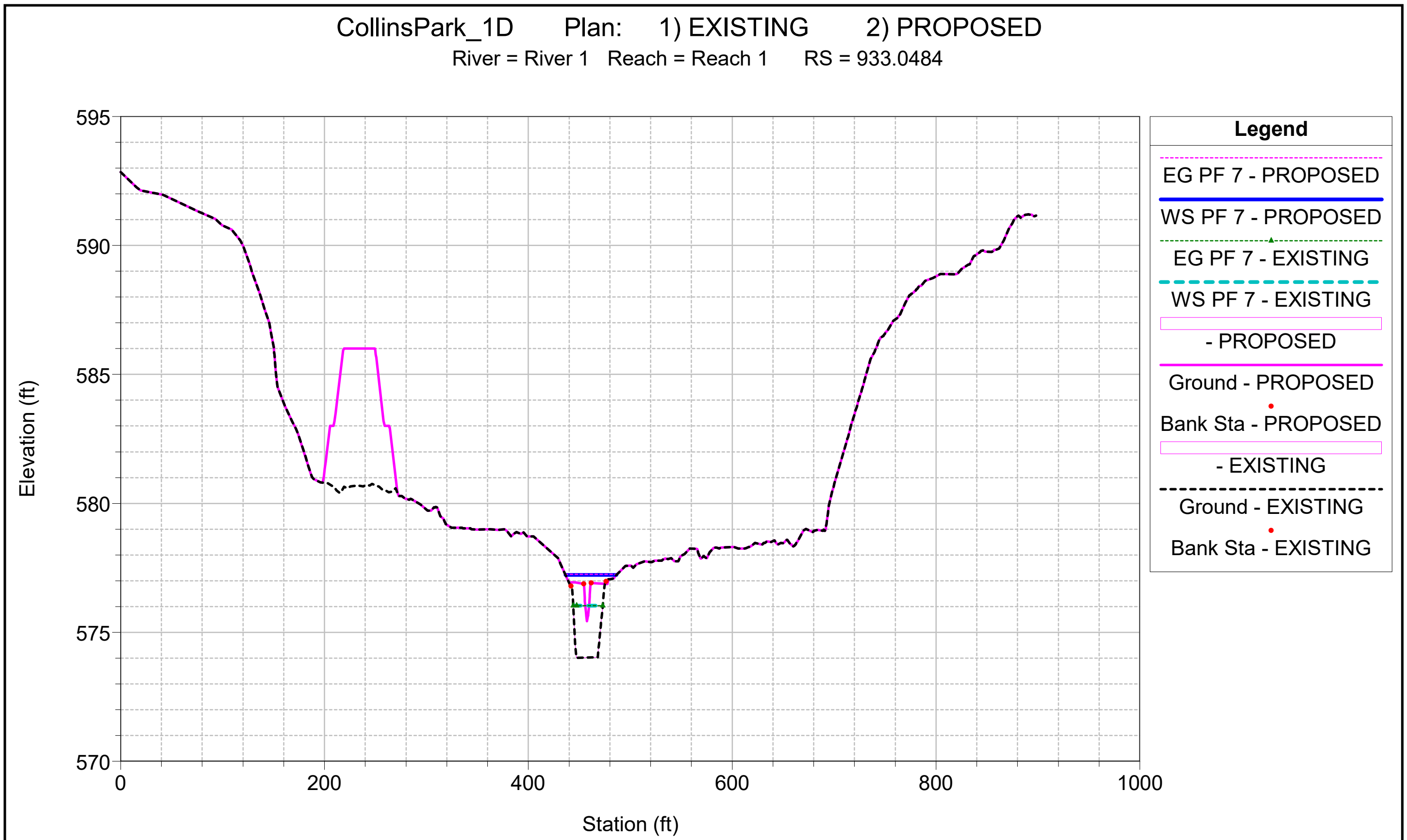

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1593.63 Culv
Elevation (ft)
Station (ft)
Legend
EG PF 7 - EXISTING
WS PF 7 - EXISTING
Crit PF 7 - EXISTING
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

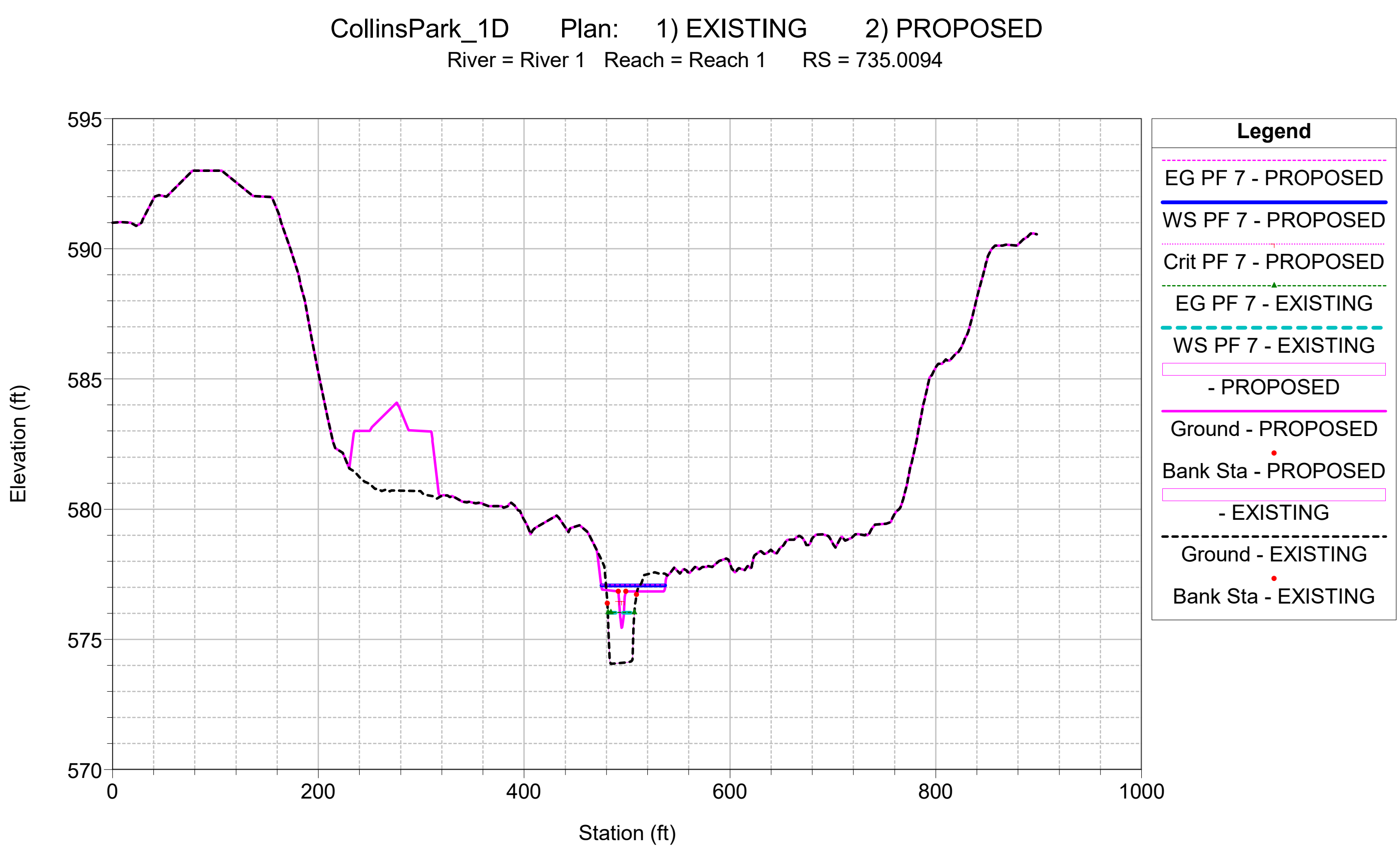

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1506.952
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

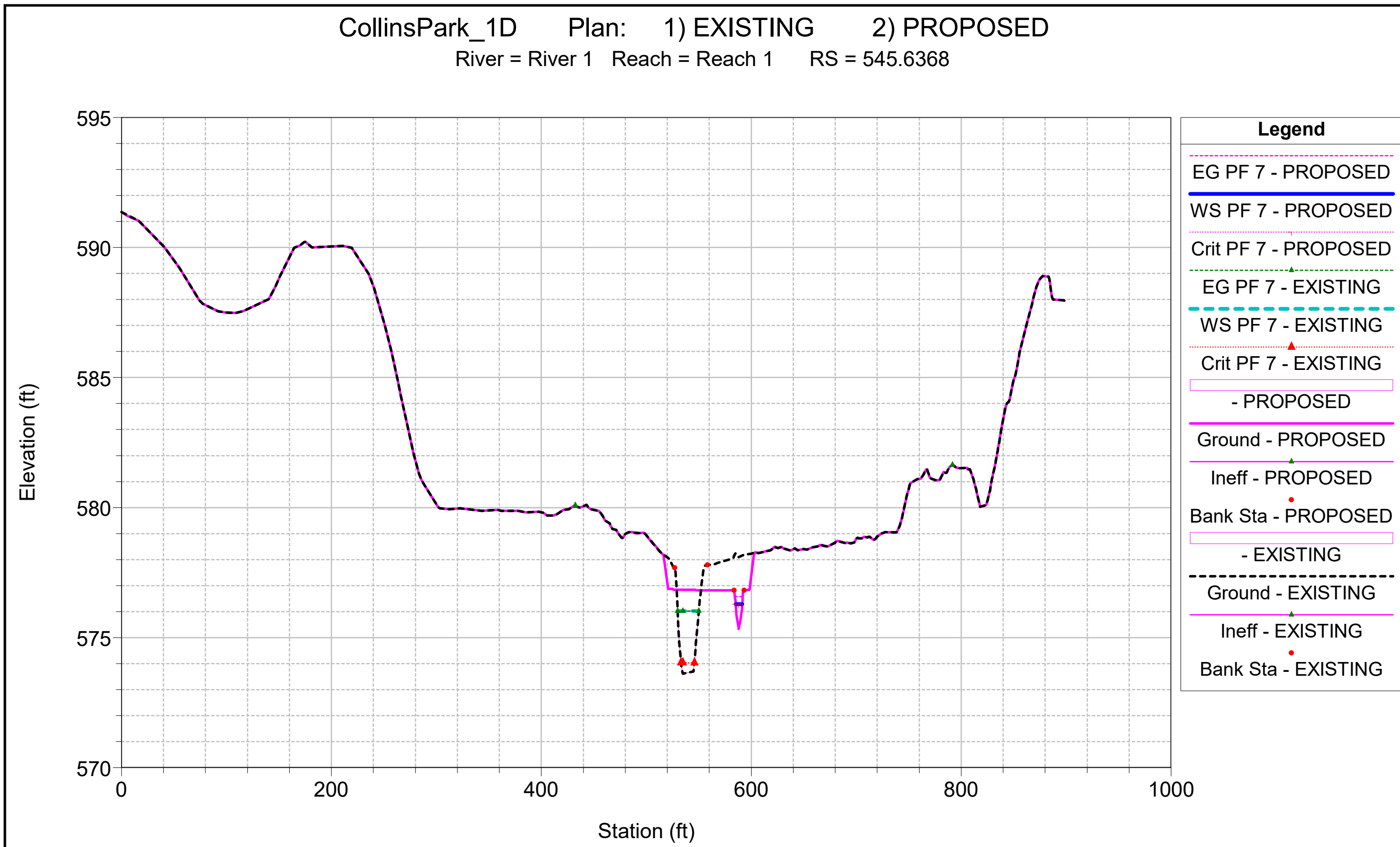

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1329.886
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING


CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1191.169
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
Crit PF 7 - EXISTING
- PROPOSED
Ground - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

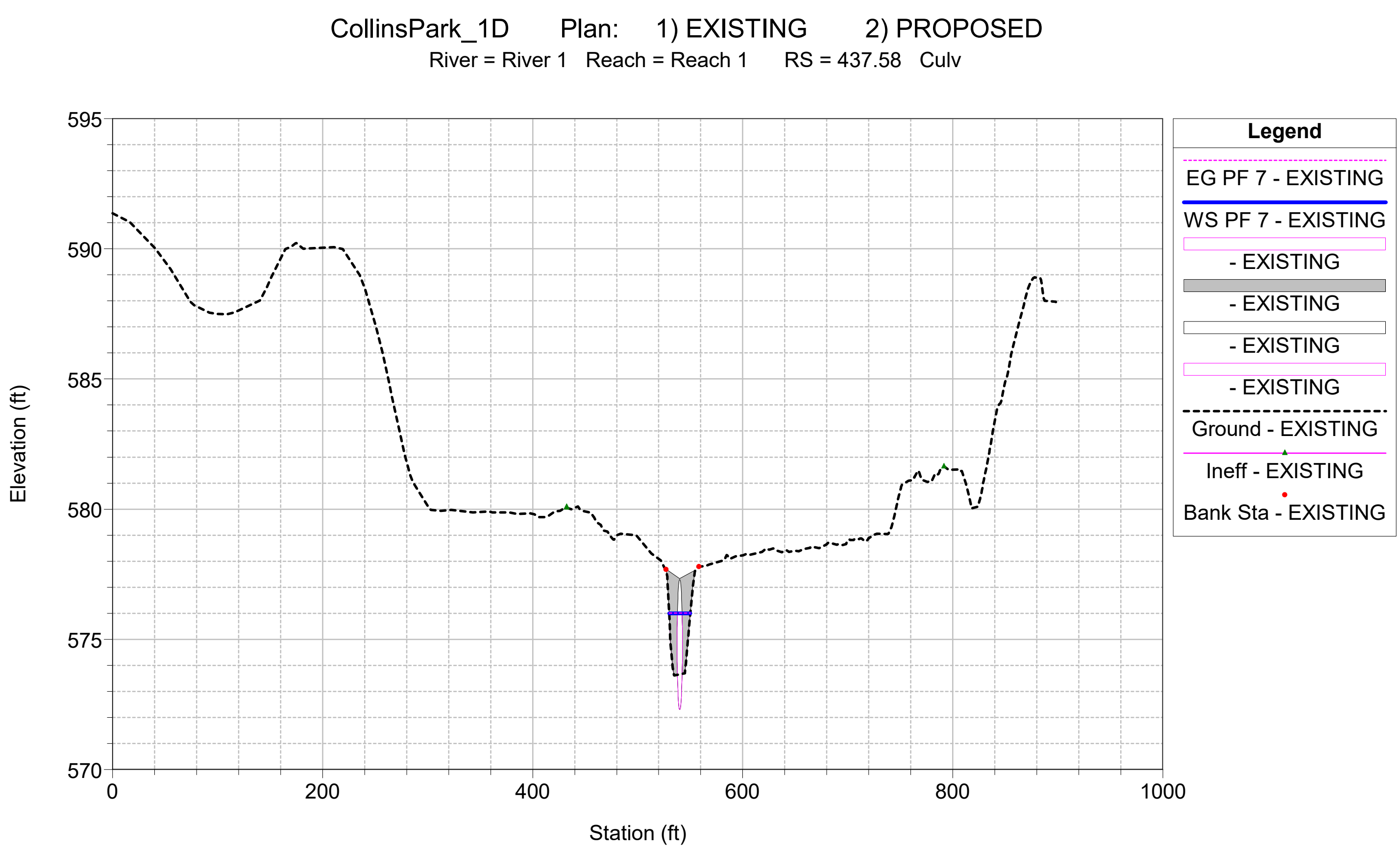

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1062.11 Culv
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG PF 7 - EXISTING
WS PF 7 - EXISTING
Crit PF 7 - EXISTING
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING


CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 933.0484
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
- PROPOSED
Ground - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

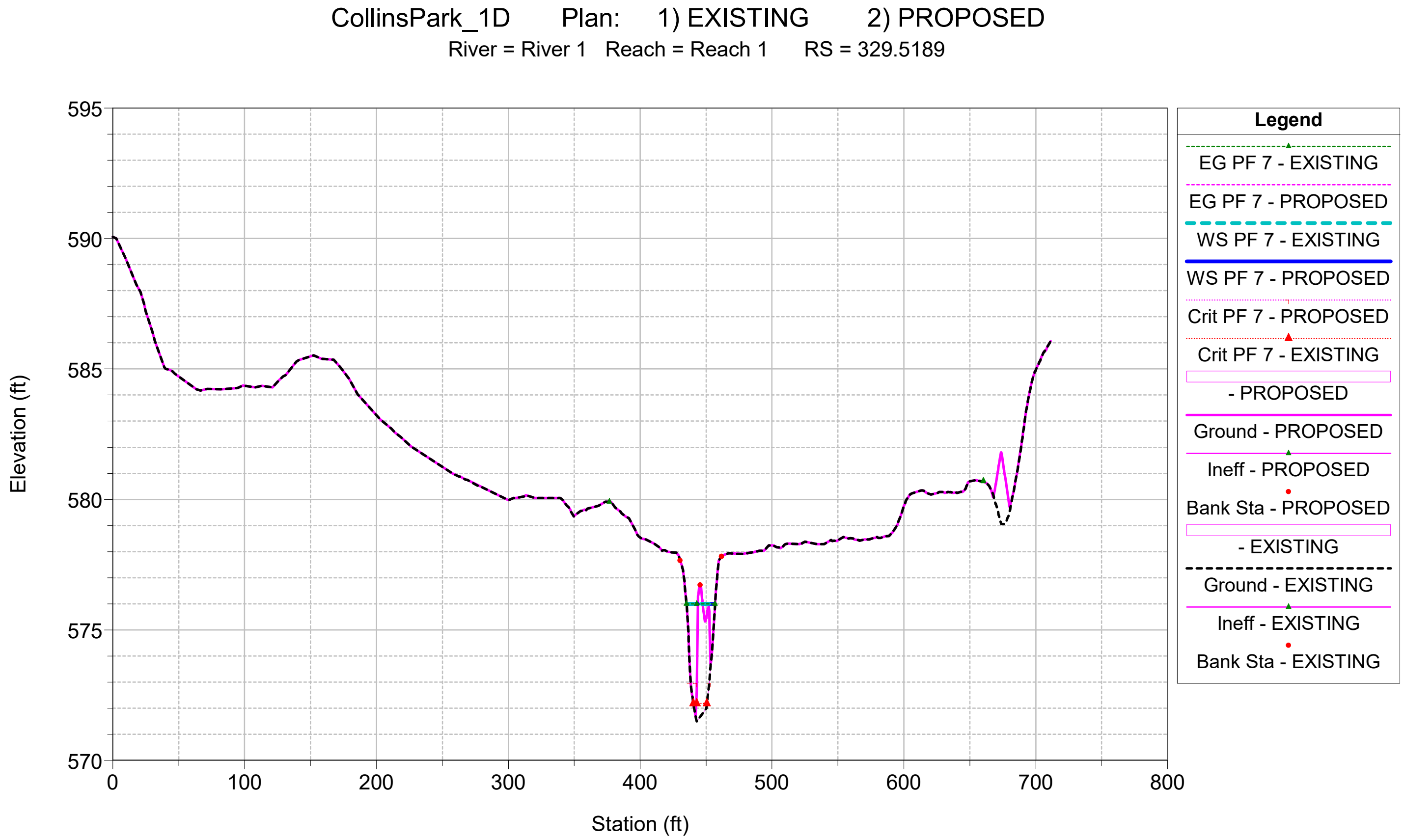

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 735.0094
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
- PROPOSED
Ground - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

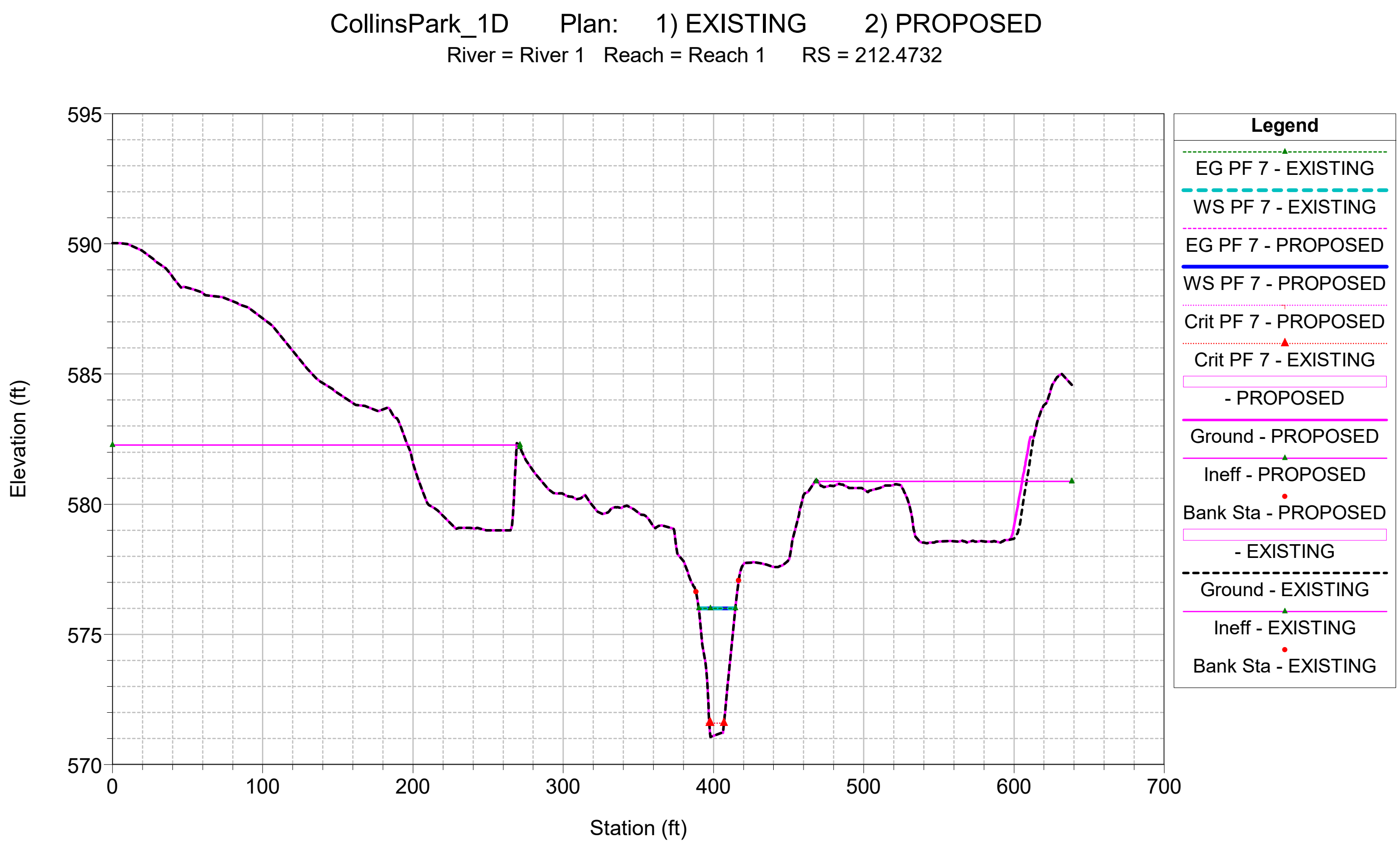


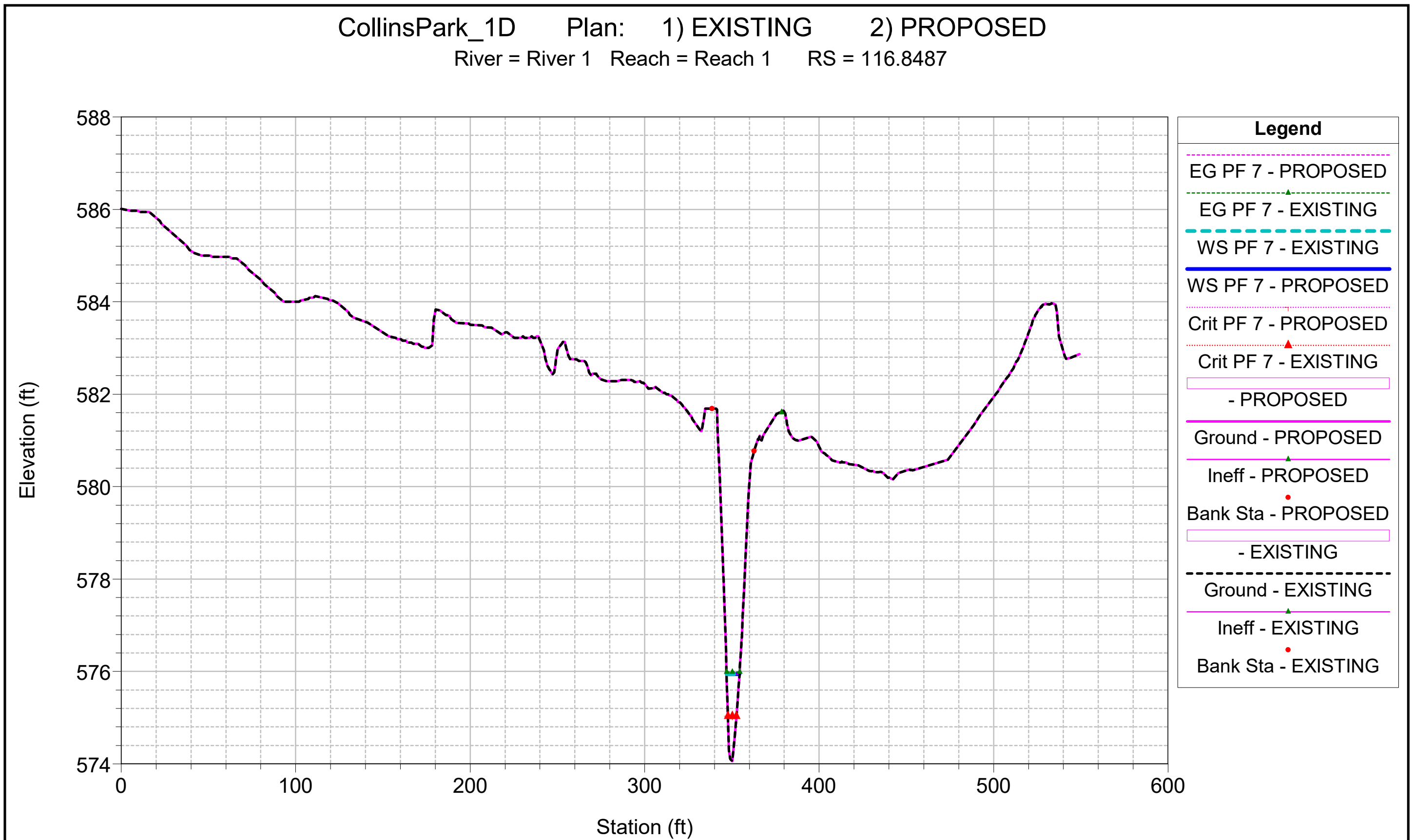
CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 545.6368
Legend
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
Crit PF 7 - EXISTING
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Ineff - EXISTING
Bank Sta - EXISTING
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000

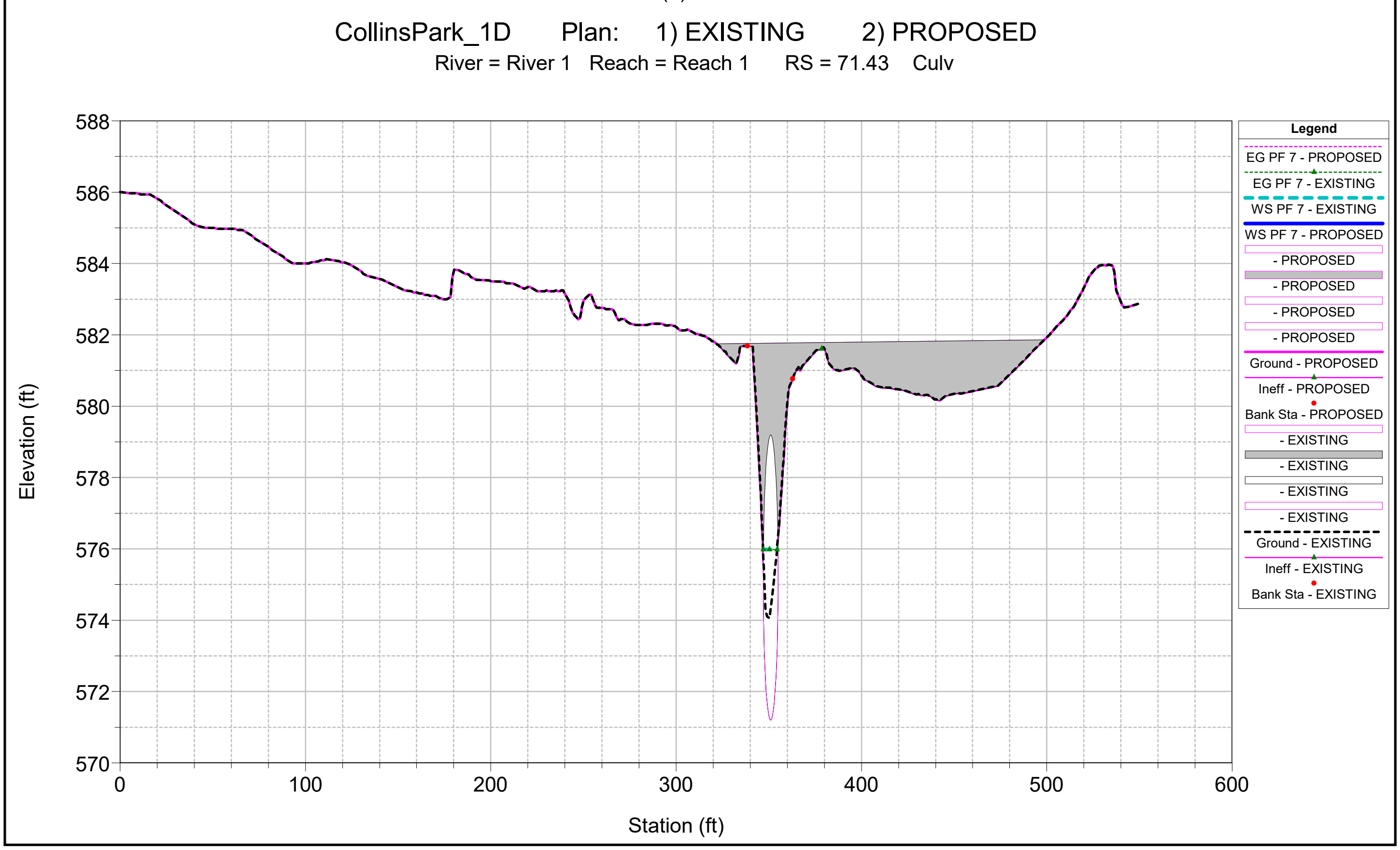


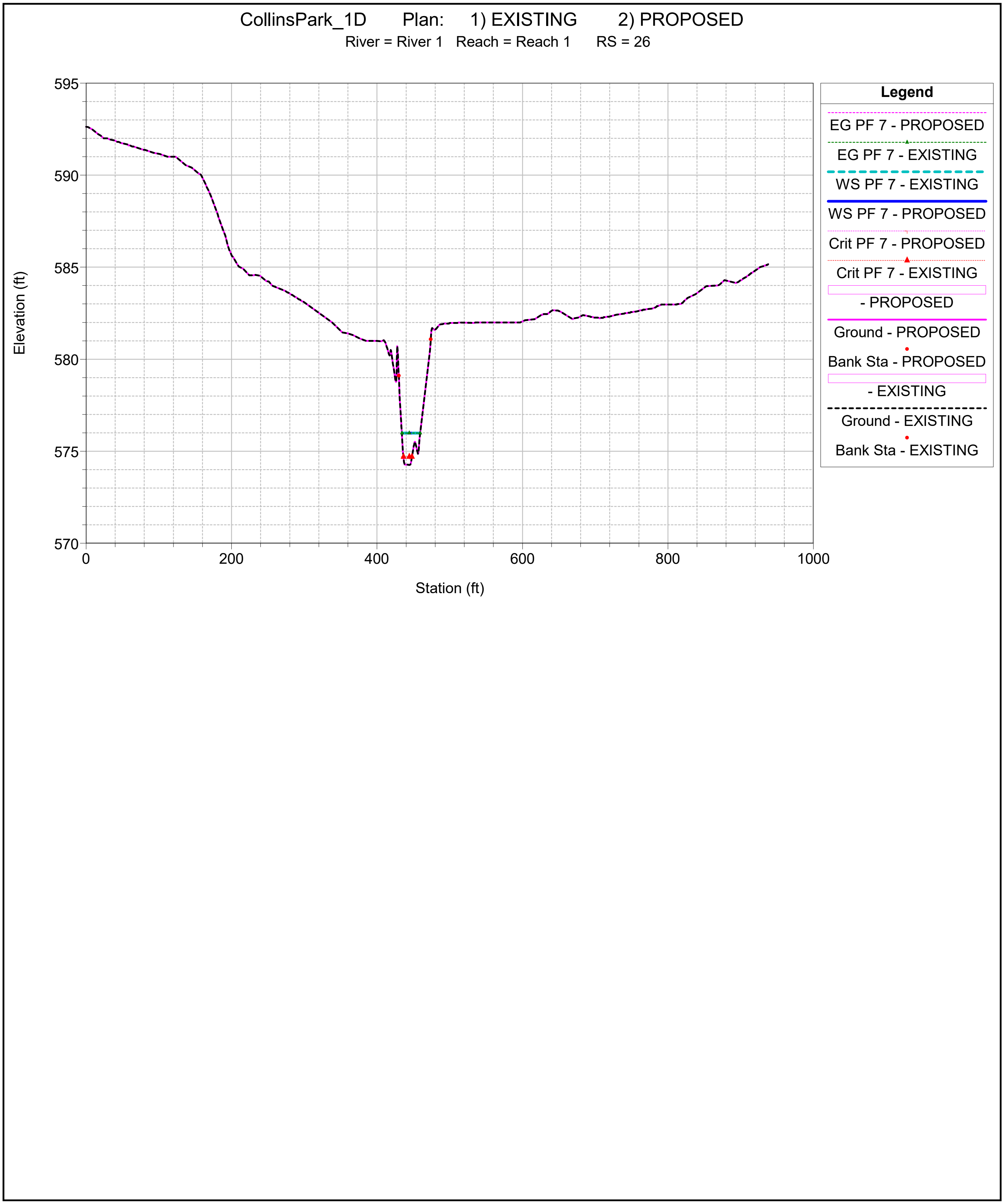
CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 437.58 Culv
Legend
EG PF 7 - EXISTING
WS PF 7 - EXISTING
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Ineff - EXISTING
Bank Sta - EXISTING
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000

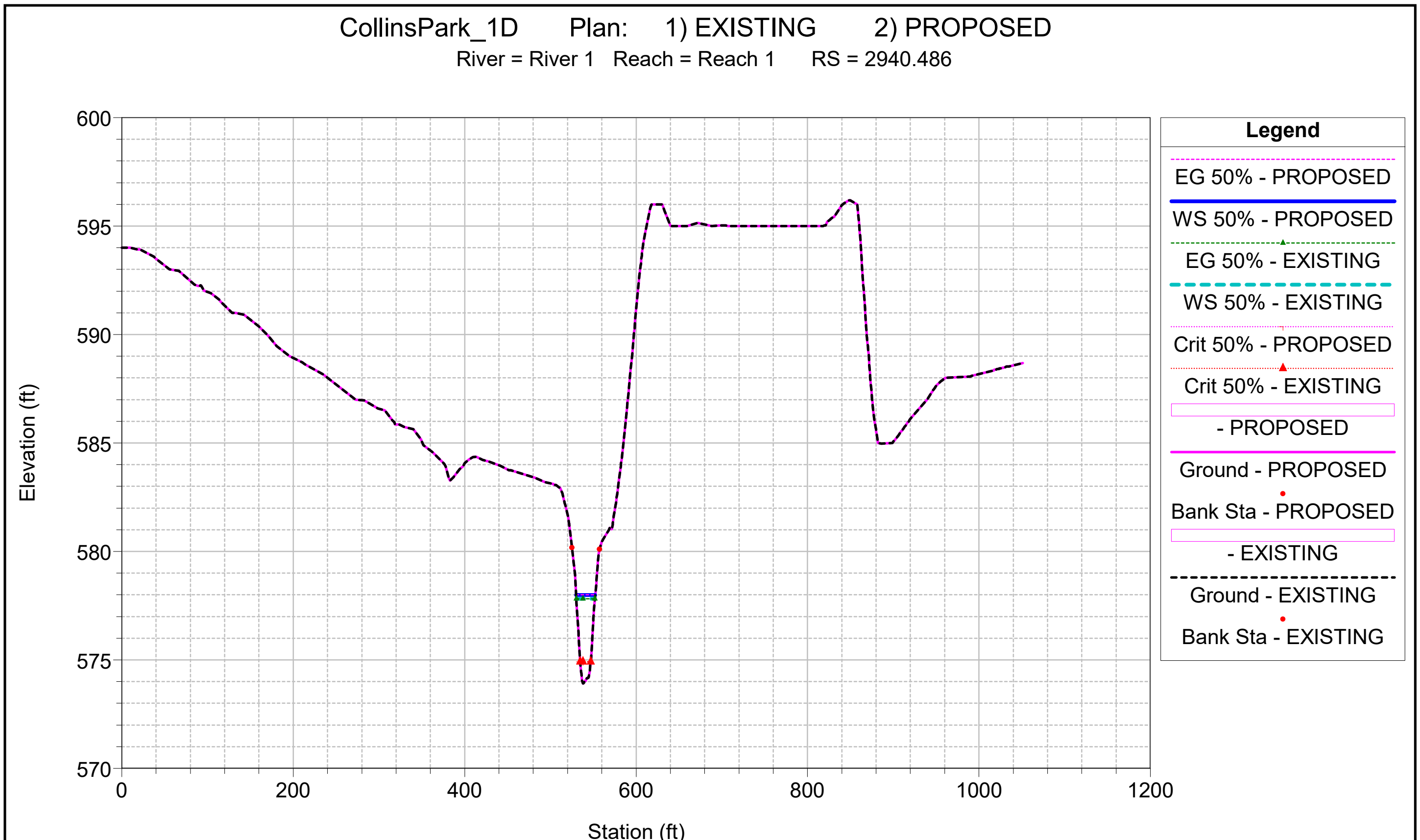

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 329.5189
Elevation (ft)
Station (ft)
Legend
EG PF 7 - EXISTING
EG PF 7 - PROPOSED
WS PF 7 - EXISTING
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
Crit PF 7 - EXISTING
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Ineff - EXISTING
Bank Sta - EXISTING


CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 212.4732
Elevation (ft)
Station (ft)
Legend
EG PF 7 - EXISTING
WS PF 7 - EXISTING
EG PF 7 - PROPOSED
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
Crit PF 7 - EXISTING
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Ineff - EXISTING
Bank Sta - EXISTING

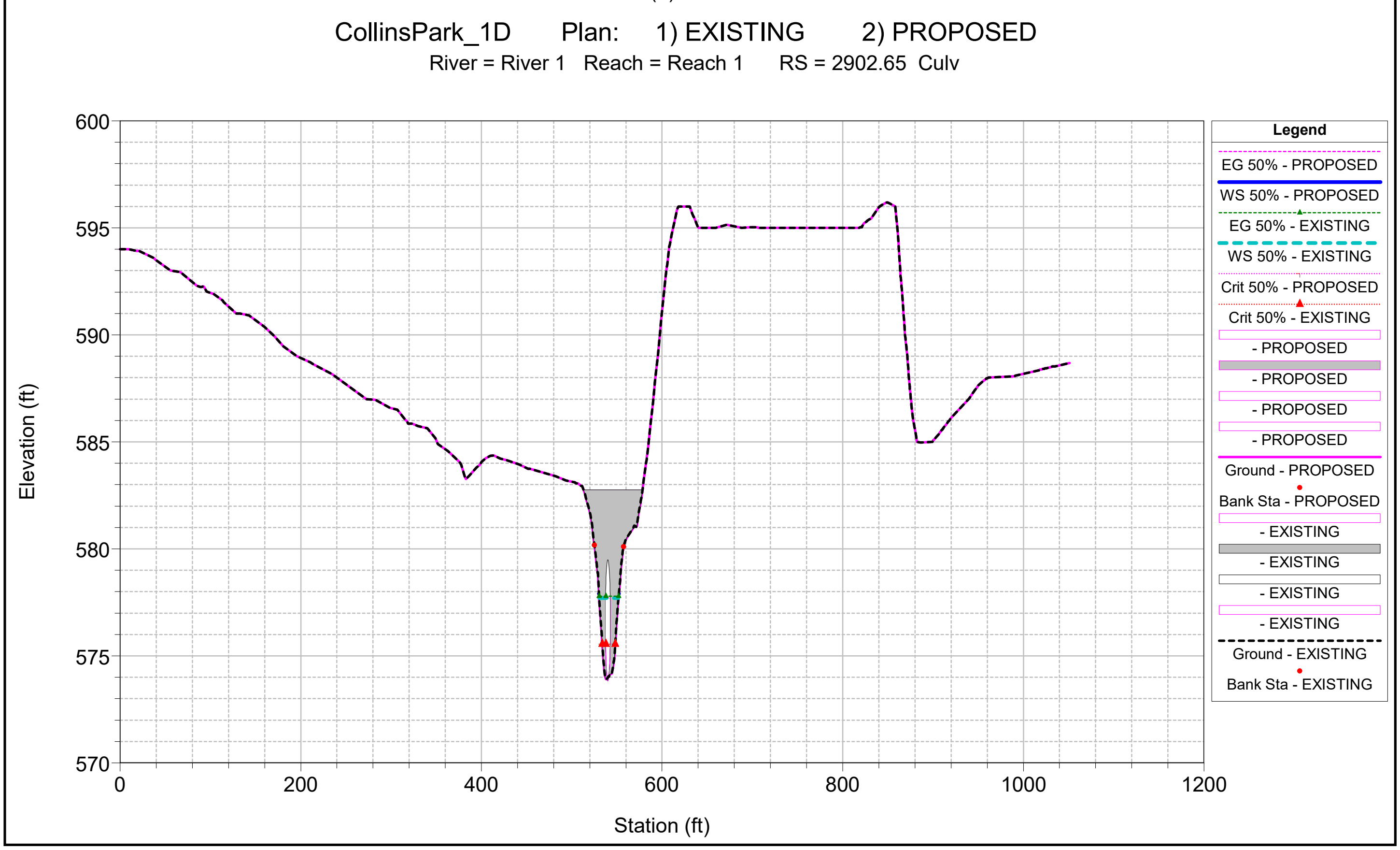

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 116.8487
Elevation (ft)
588
586
584
582
580
578
576
574
0
100
200
300
400
500
600
Station (ft)
Legend
EG PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
Crit PF 7 - EXISTING
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Ineff - EXISTING
Bank Sta - EXISTING


CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 71.43 Culv
Elevation (ft)
588
586
584
582
580
578
576
574
572
570
0
100
200
300
400
500
600
Station (ft)
Legend
EG PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
WS PF 7 - PROPOSED
- PROPOSED
- PROPOSED
- PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Ineff - EXISTING
Bank Sta - EXISTING

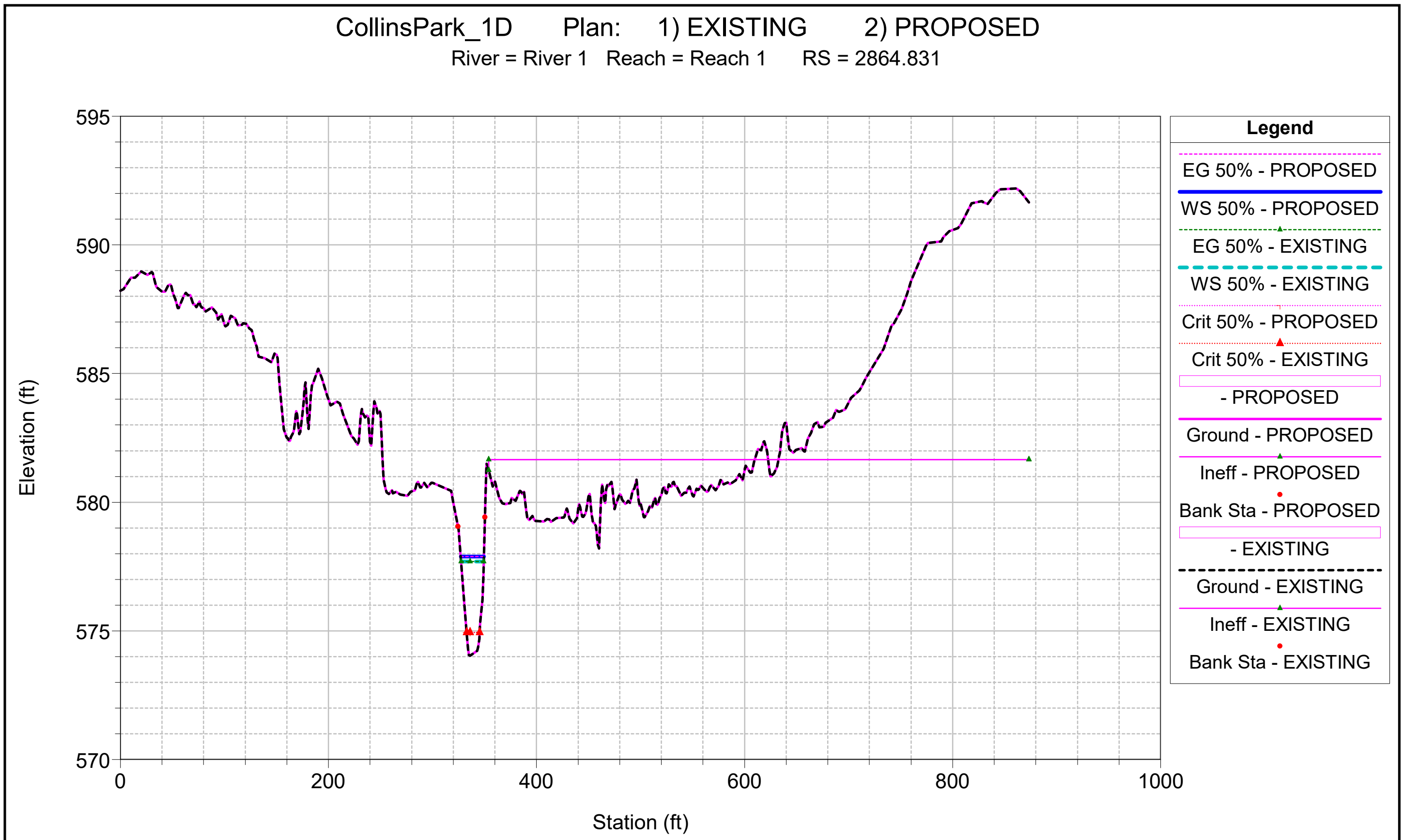

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 26
Legend
EG PF 7 - PROPOSED
EG PF 7 - EXISTING
WS PF 7 - EXISTING
WS PF 7 - PROPOSED
Crit PF 7 - PROPOSED
Crit PF 7 - EXISTING
- PROPOSED
Ground - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING
Elevation (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Station (ft)



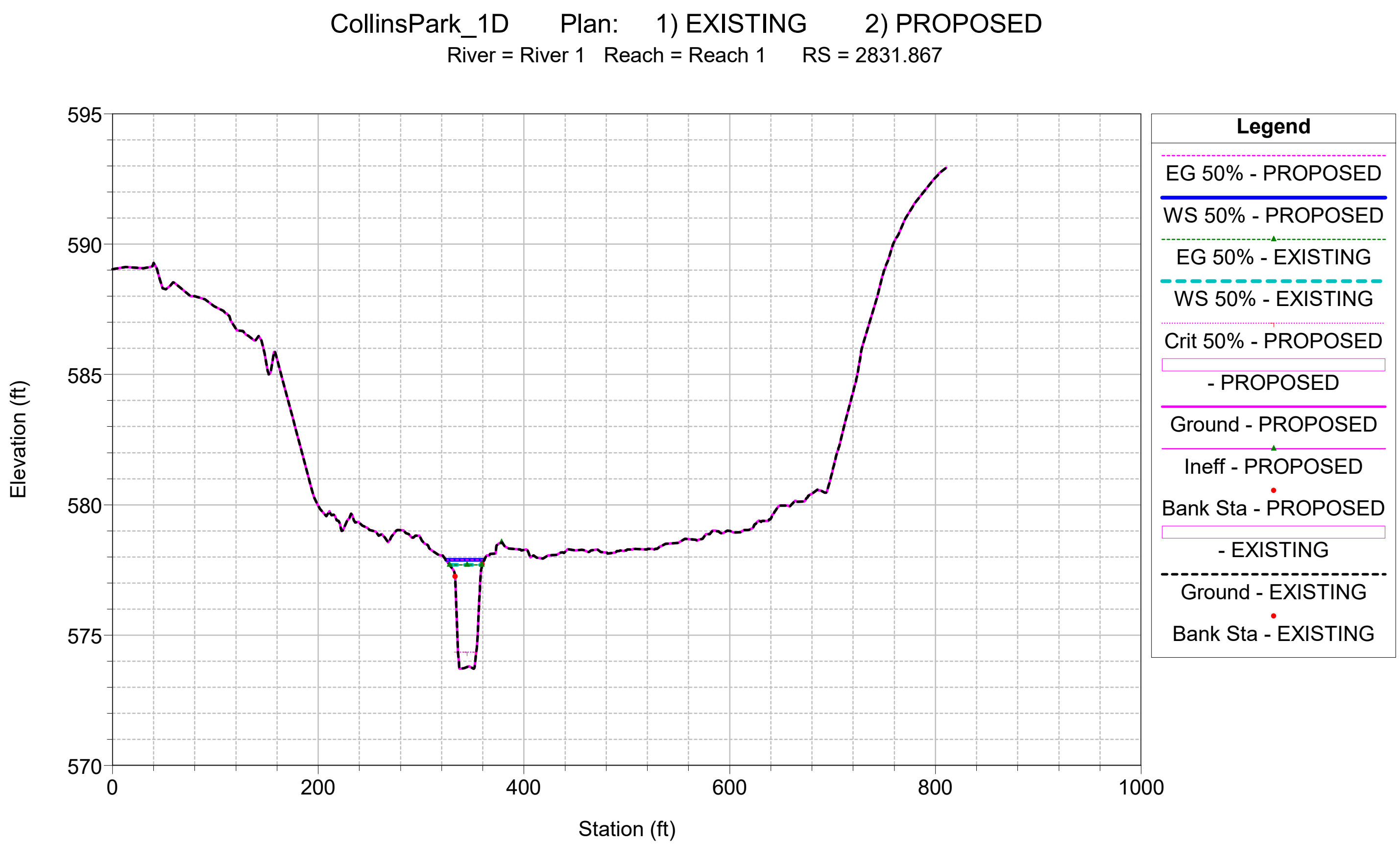
CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2940.486
Elevation (ft)
Station (ft)
600
595
590
585
580
575
570
0
200
400
600
800
1000
1200
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - PROPOSED
Crit 50% - EXISTING
- PROPOSED
Ground - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING



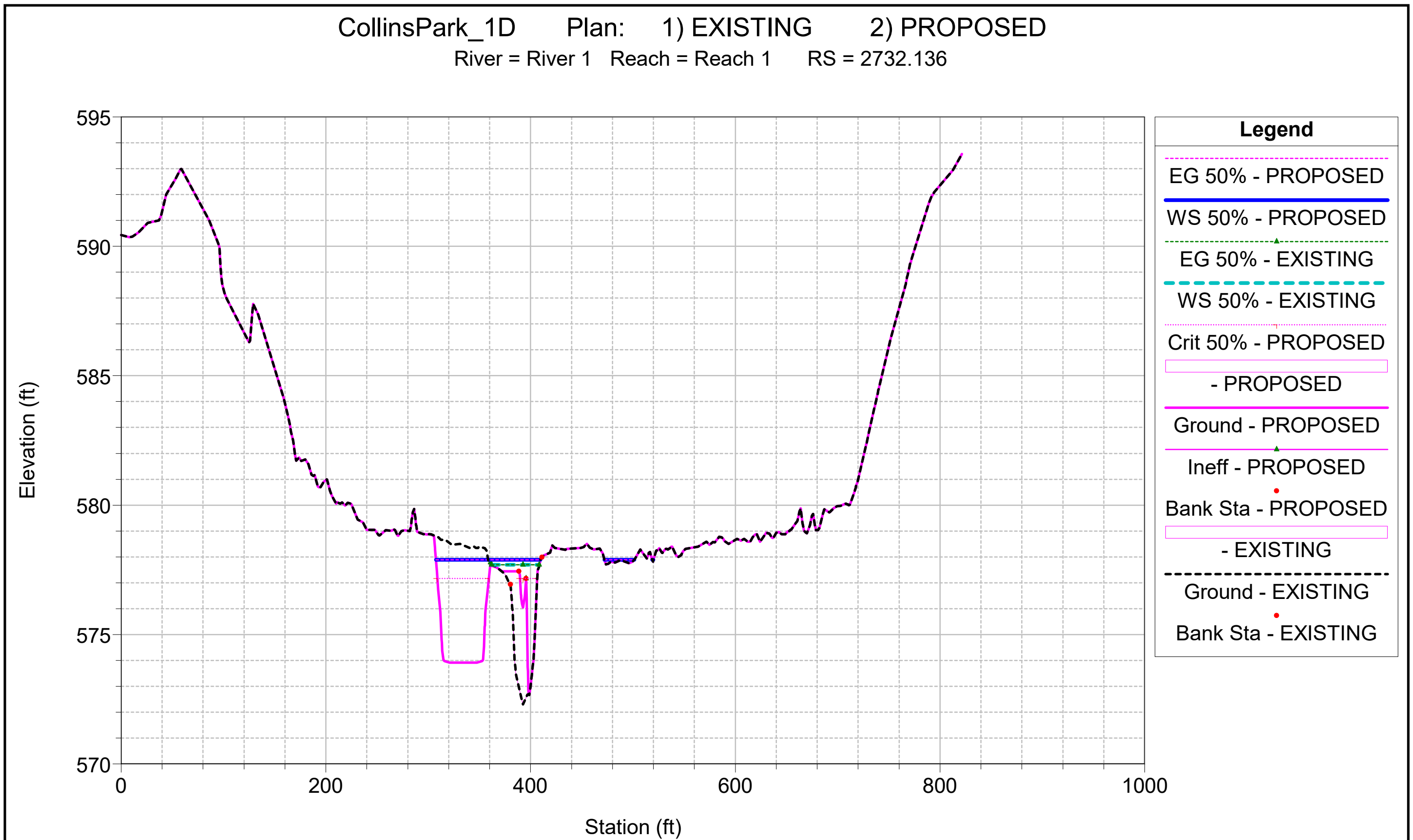
CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2902.65 Culv
Elevation (ft)
Station (ft)
600
595
590
585
580
575
570
0
200
400
600
800
1000
1200
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - PROPOSED
Crit 50% - EXISTING
- PROPOSED
- PROPOSED
- PROPOSED
- PROPOSED
Ground - PROPOSED
Bank Sta - PROPOSED
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

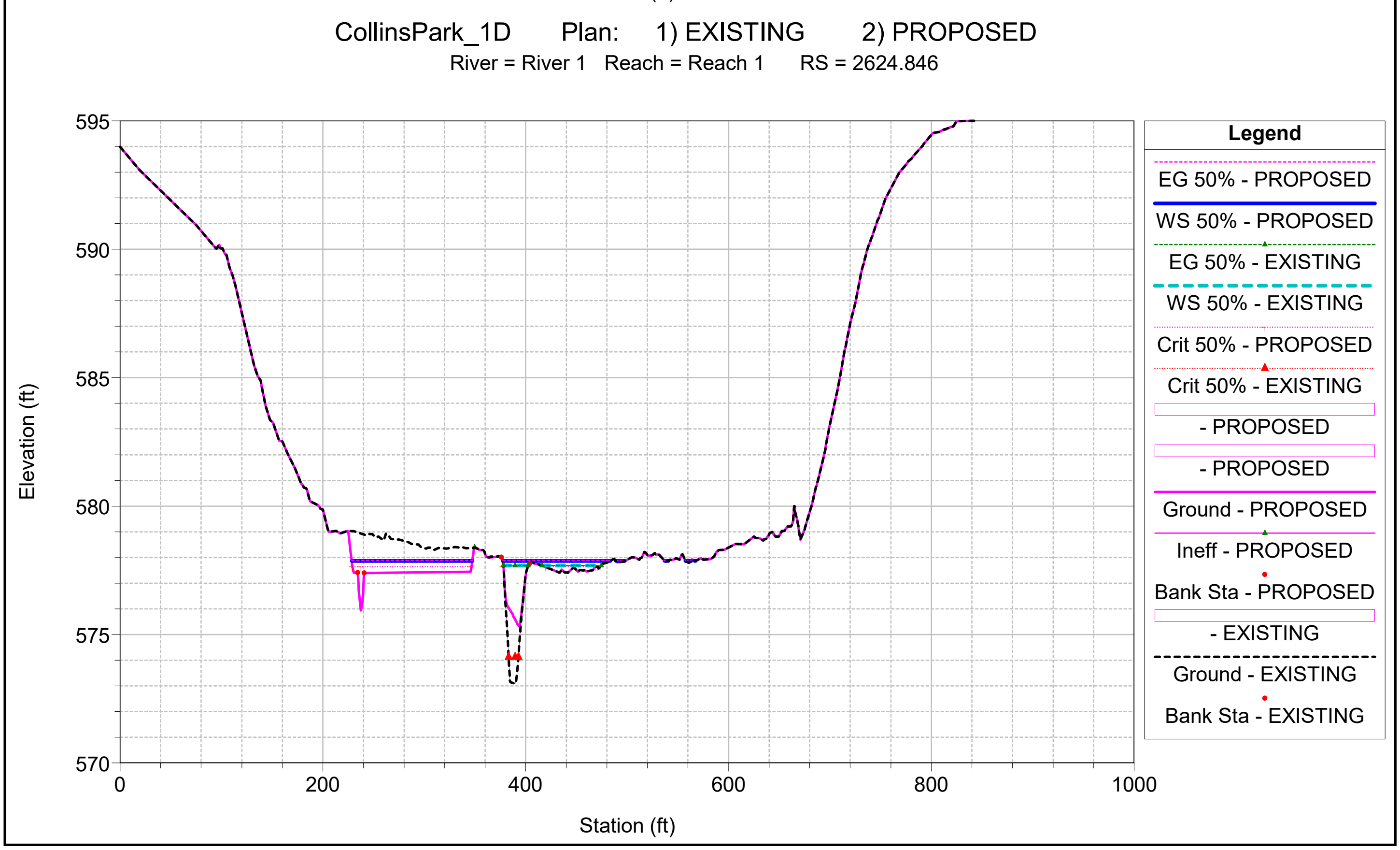


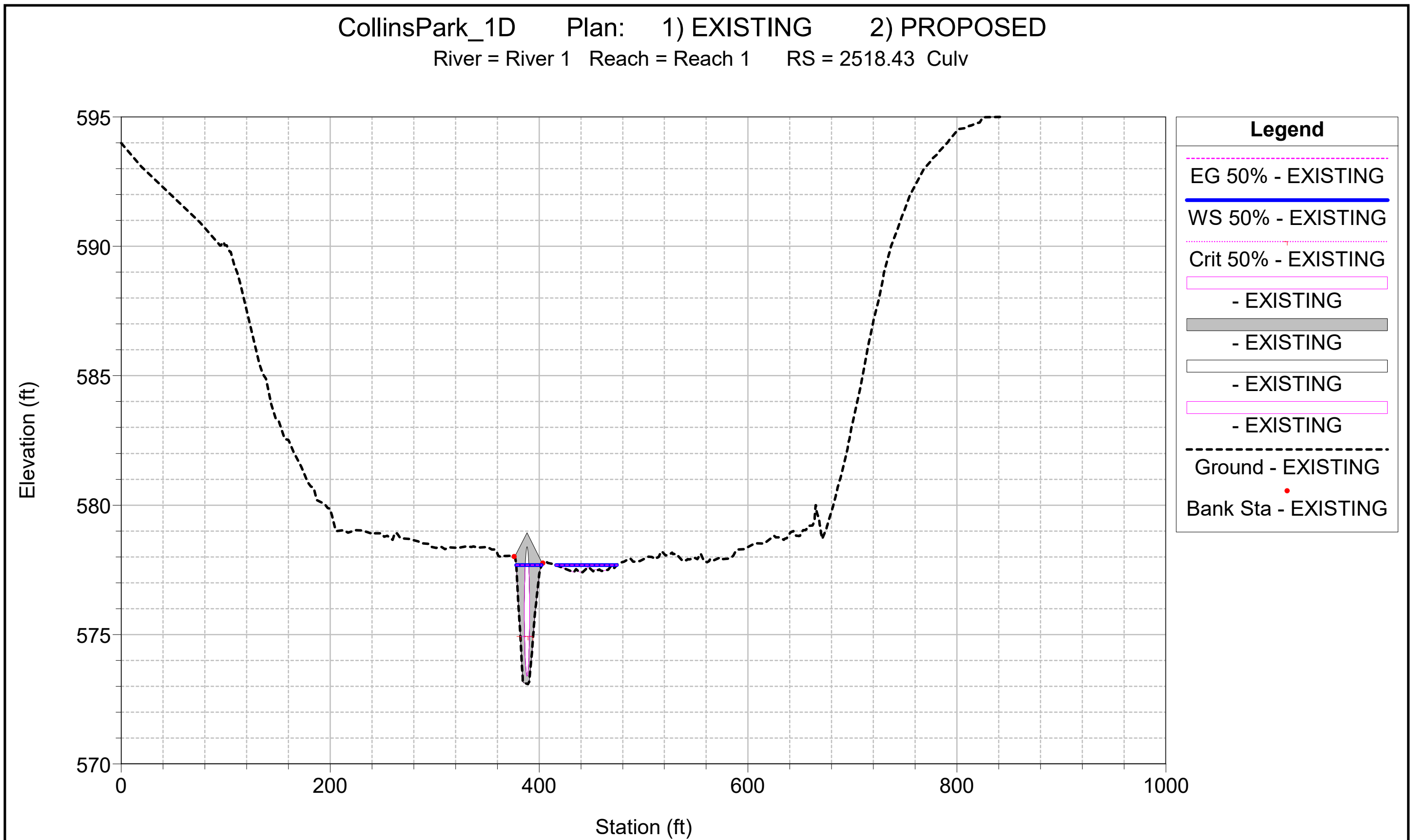
CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2864.831
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - PROPOSED
Crit 50% - EXISTING
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Ineff - EXISTING
Bank Sta - EXISTING

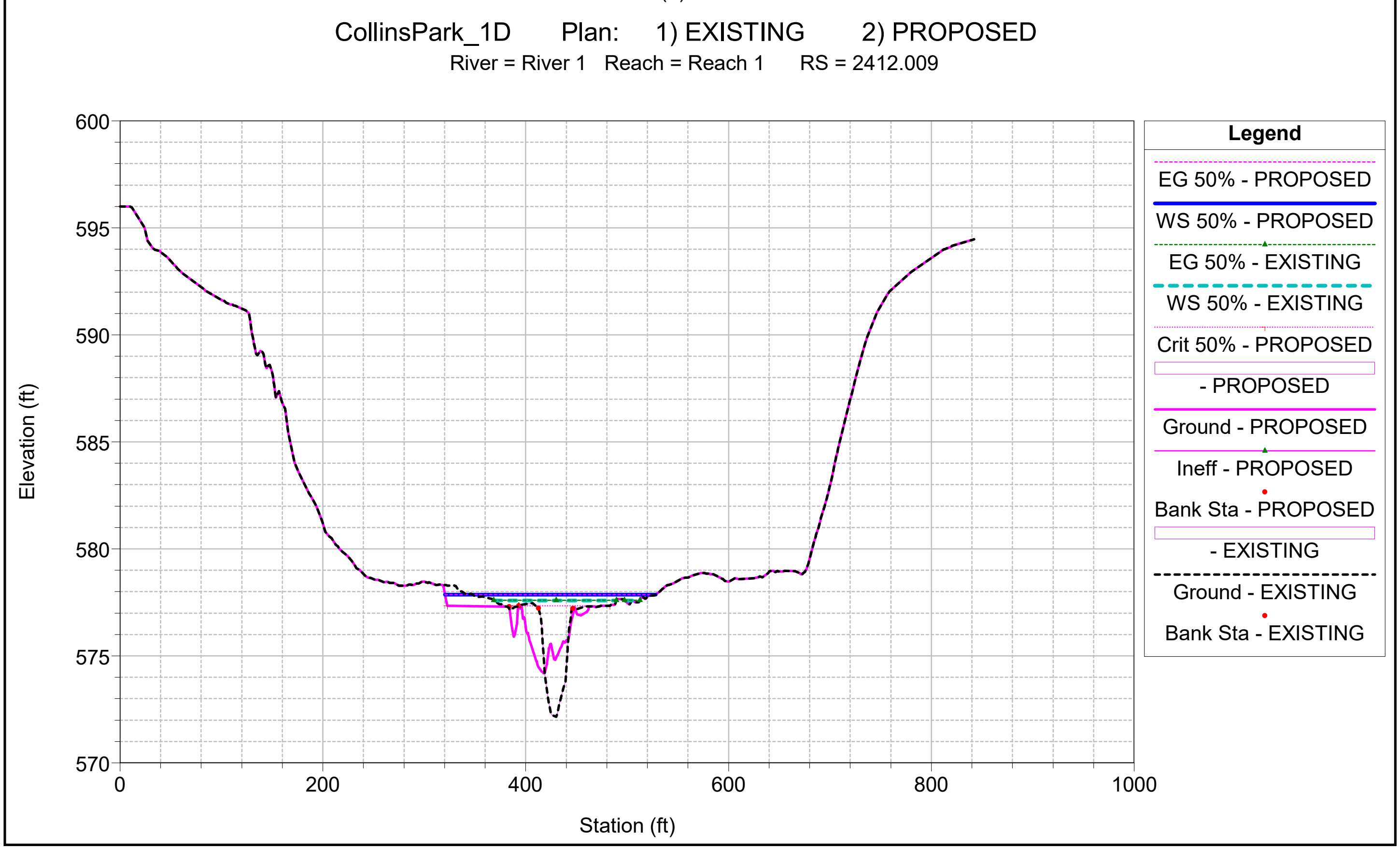


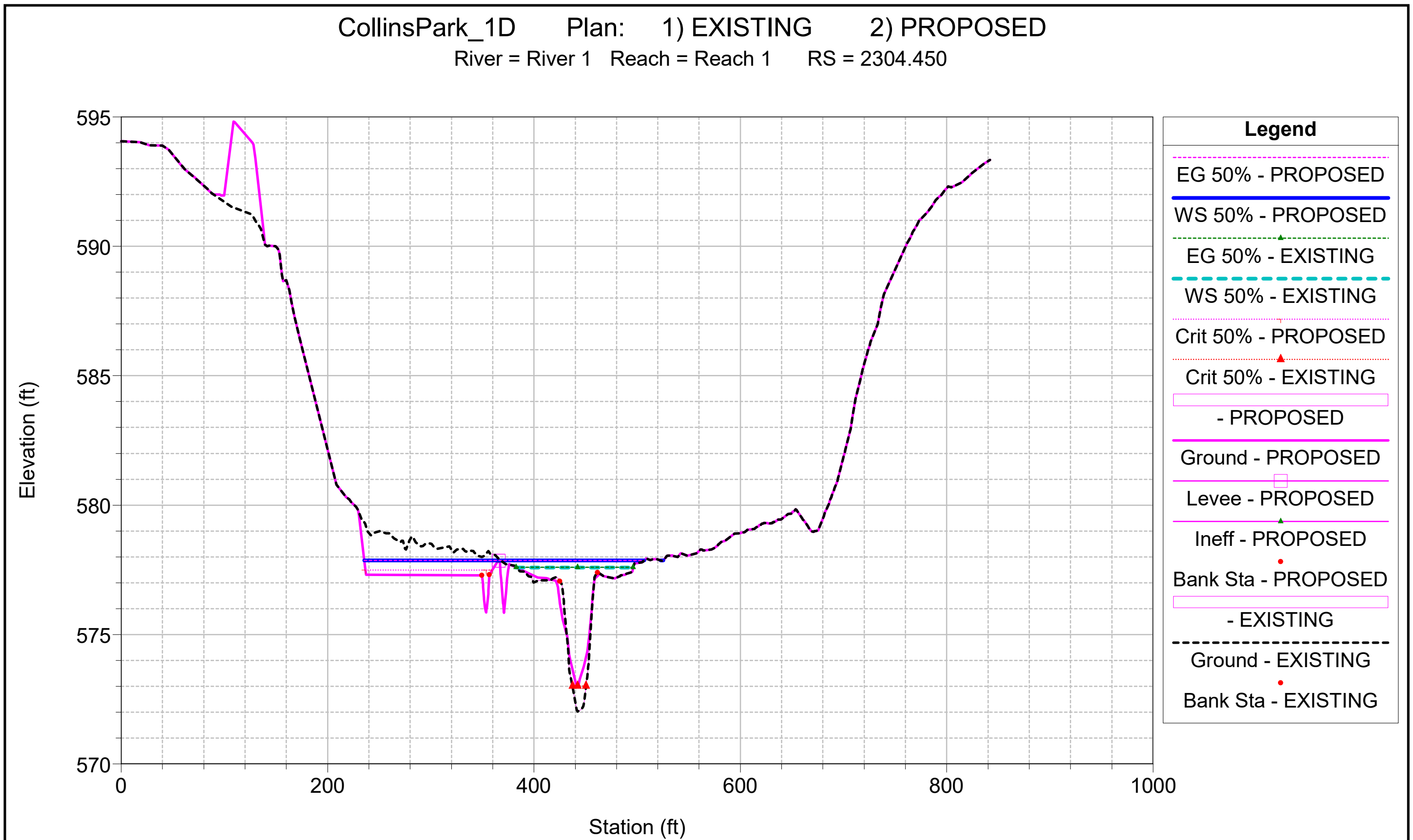
CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2831.867
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

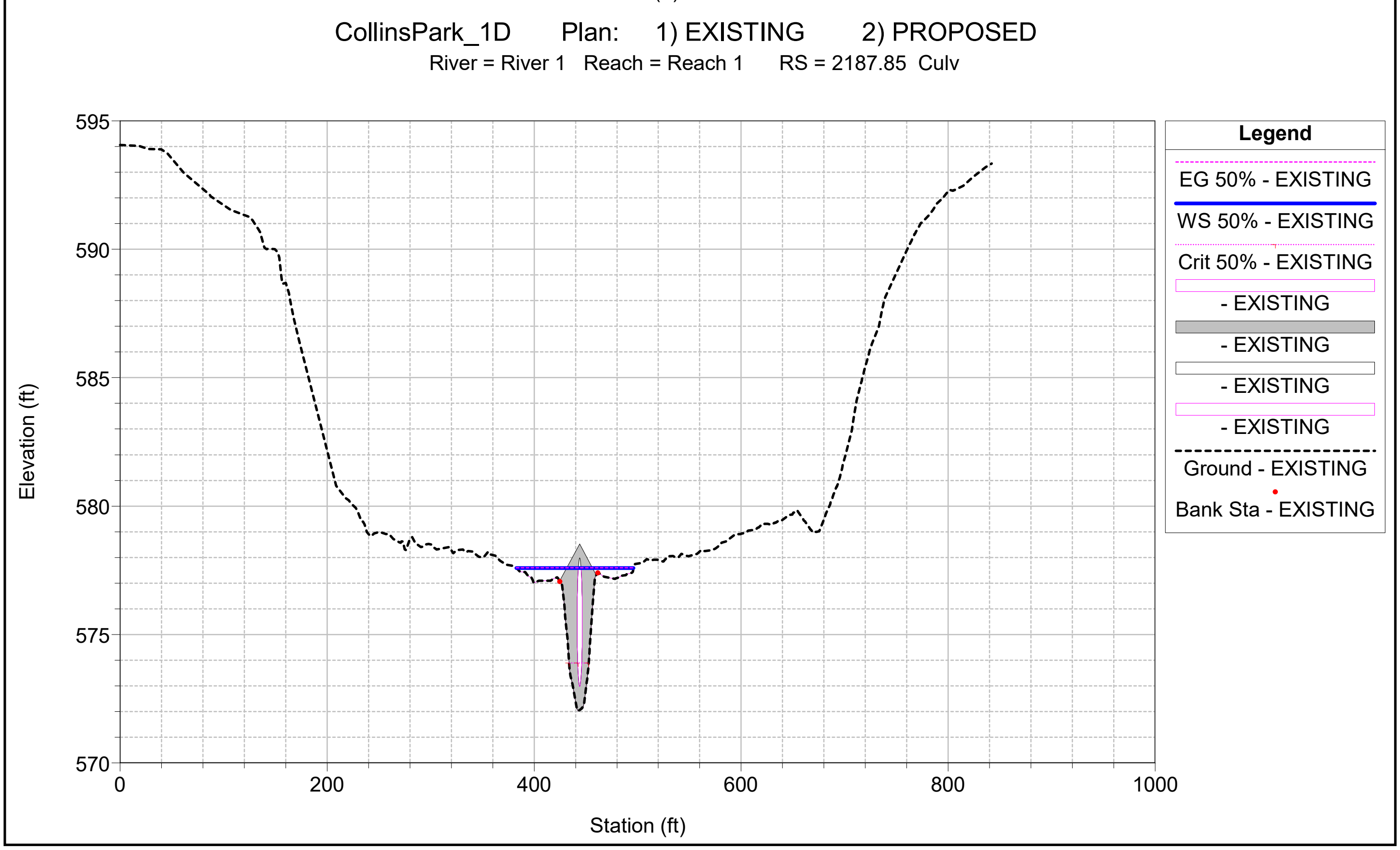

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2732.136
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

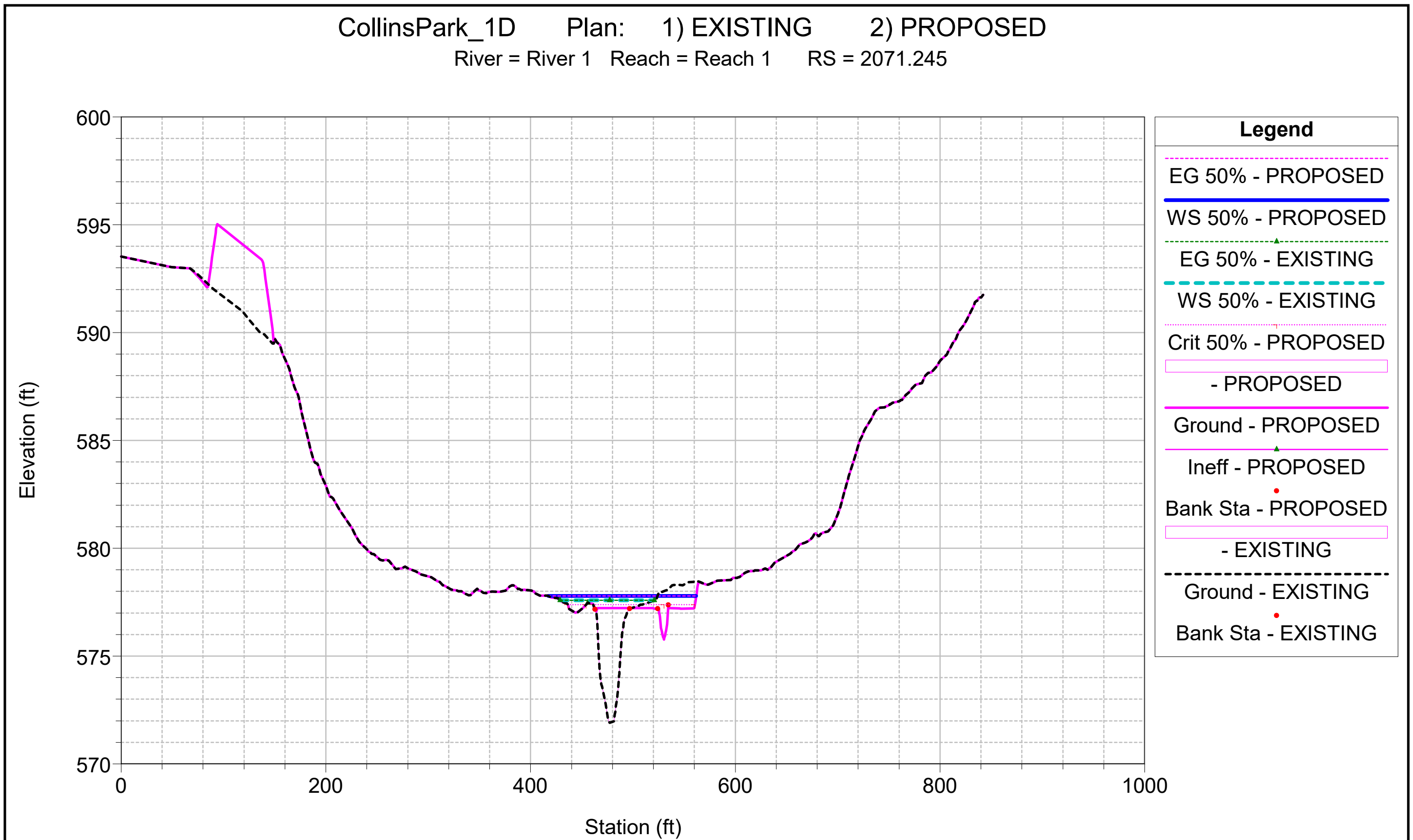

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2624.846
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - PROPOSED
Crit 50% - EXISTING
- PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

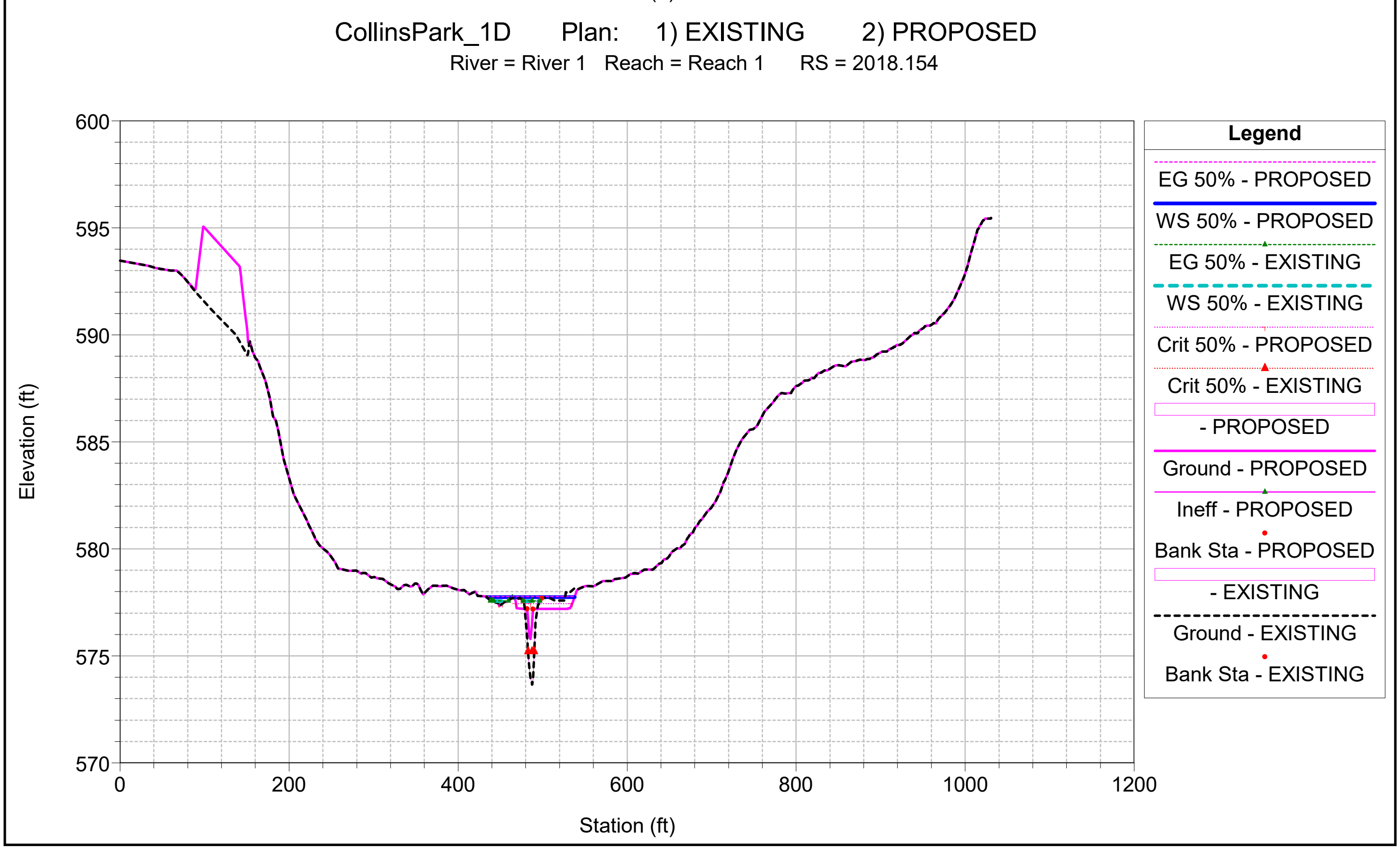

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2518.43 Culv
Legend
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - EXISTING
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000

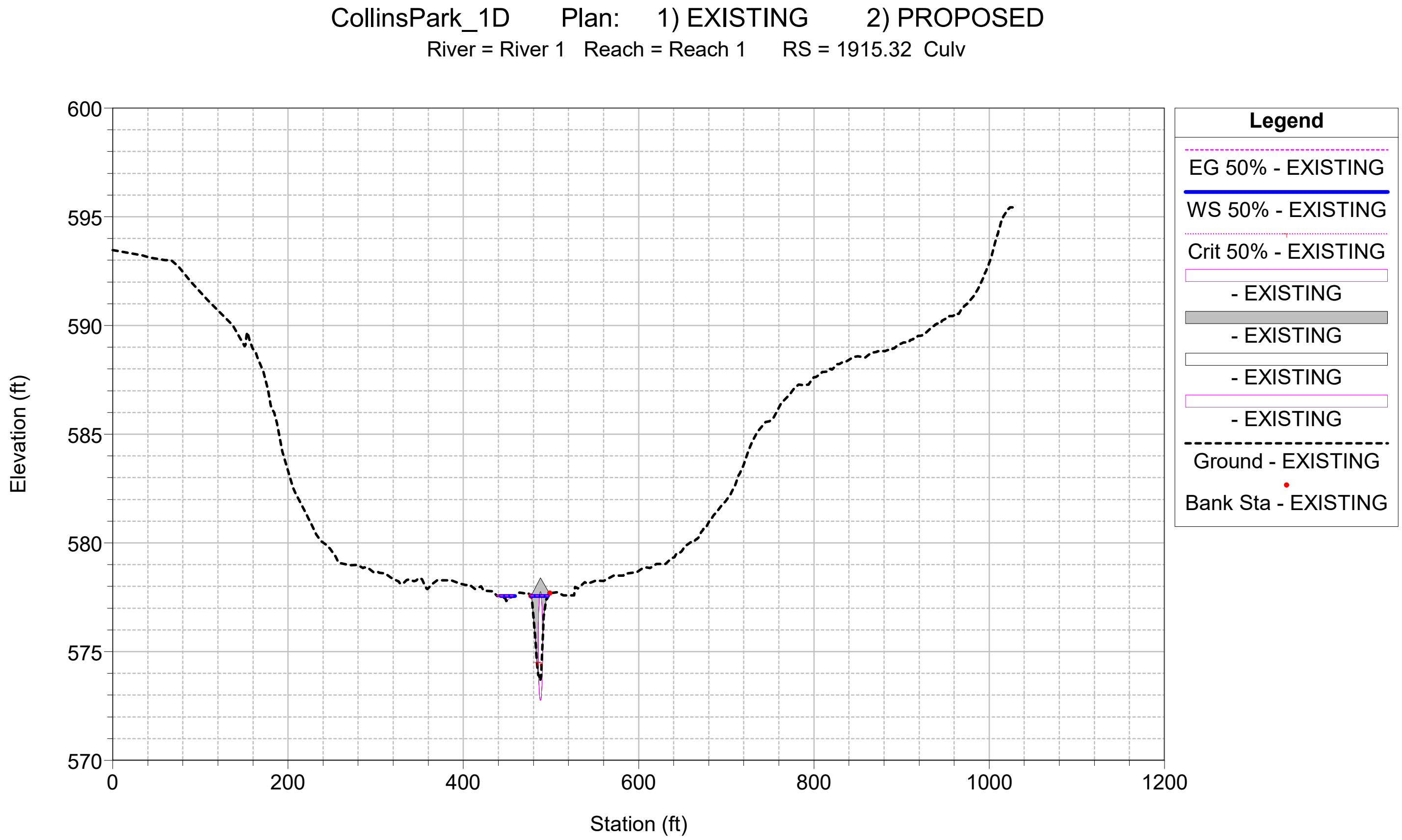

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2412.009
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING
Elevation (ft)
Station (ft)
600
595
590
585
580
575
570
0
200
400
600
800
1000

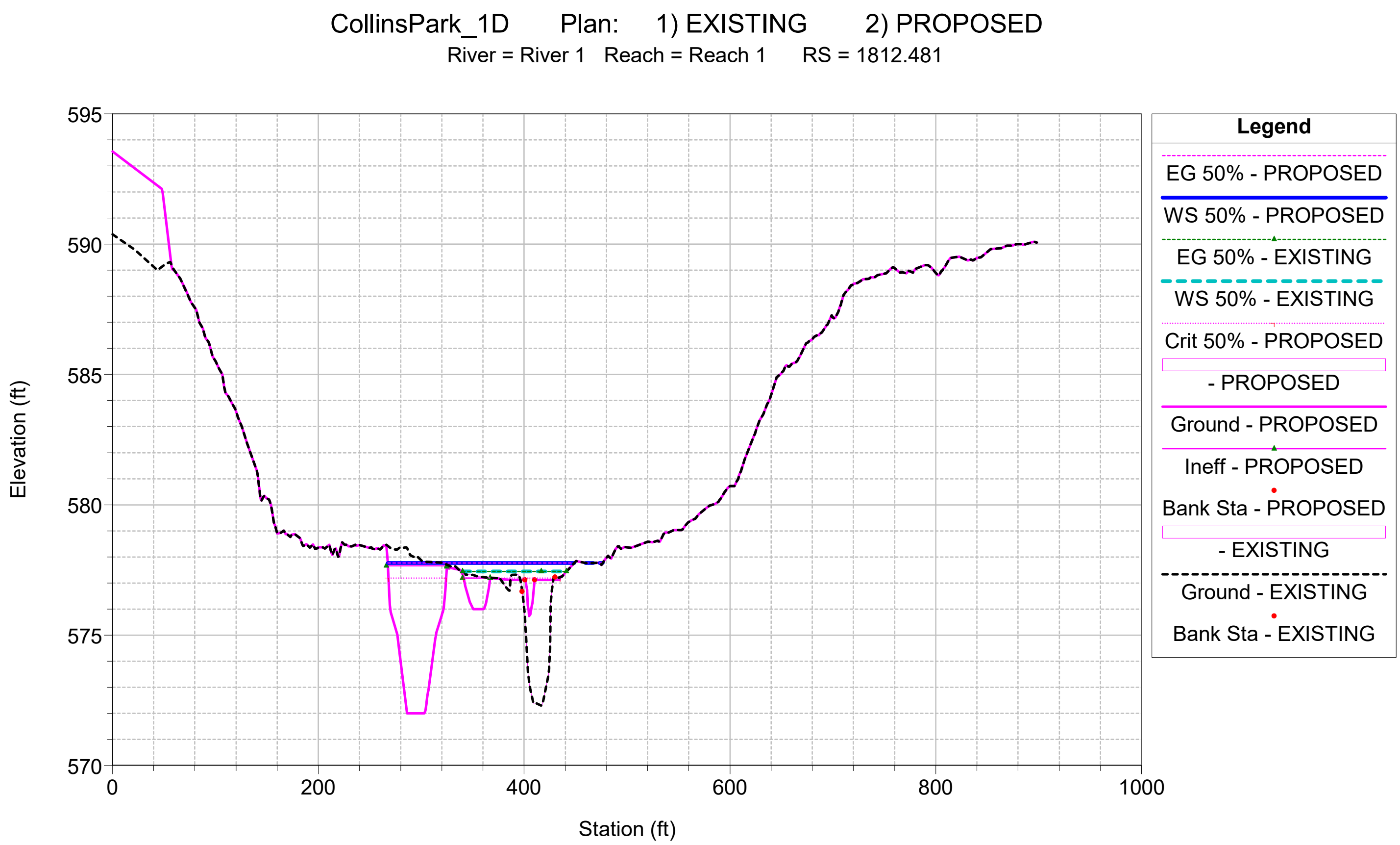

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2304.450
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - PROPOSED
Crit 50% - EXISTING
- PROPOSED
Ground - PROPOSED
Levee - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

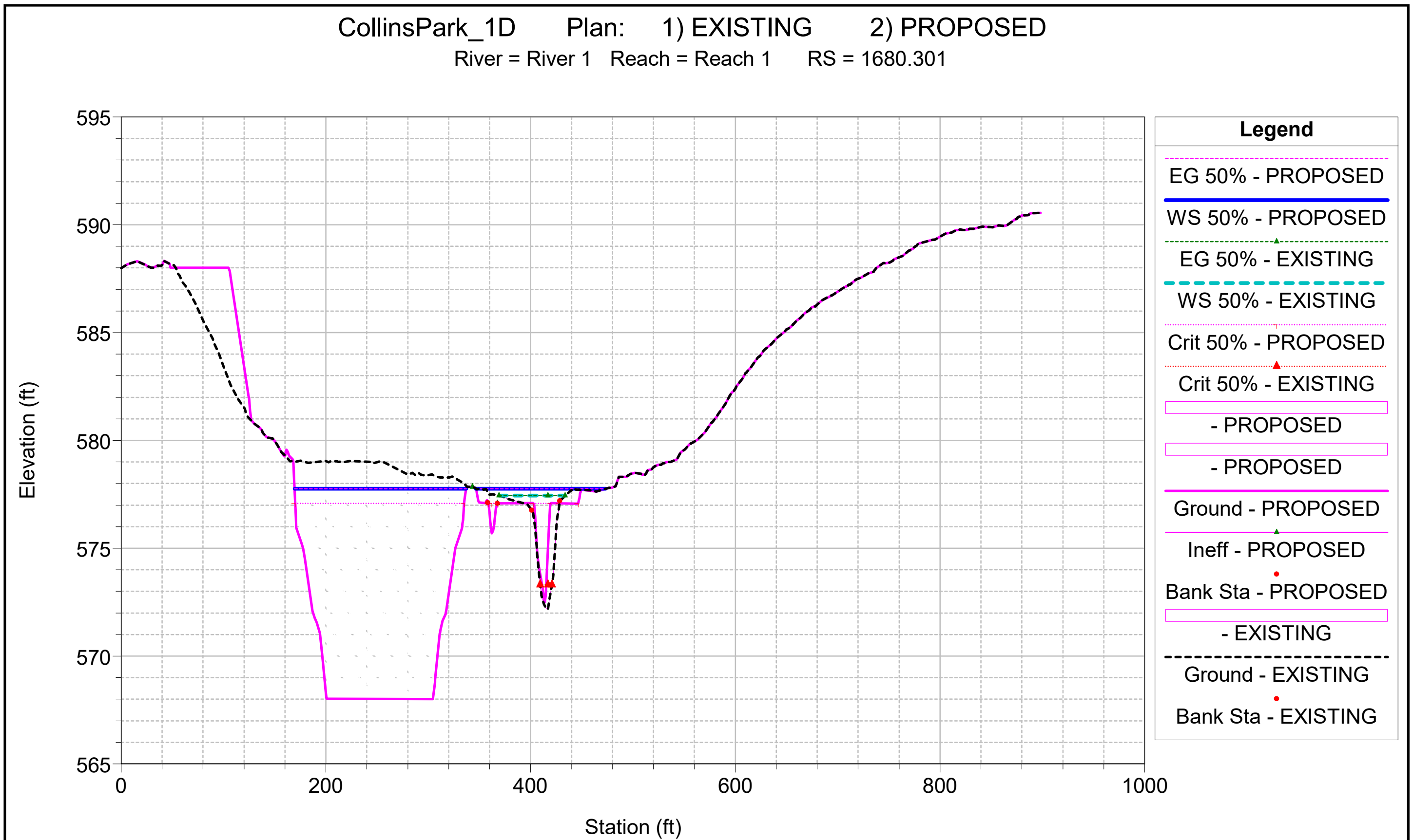

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2187.85 Culv
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - EXISTING
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

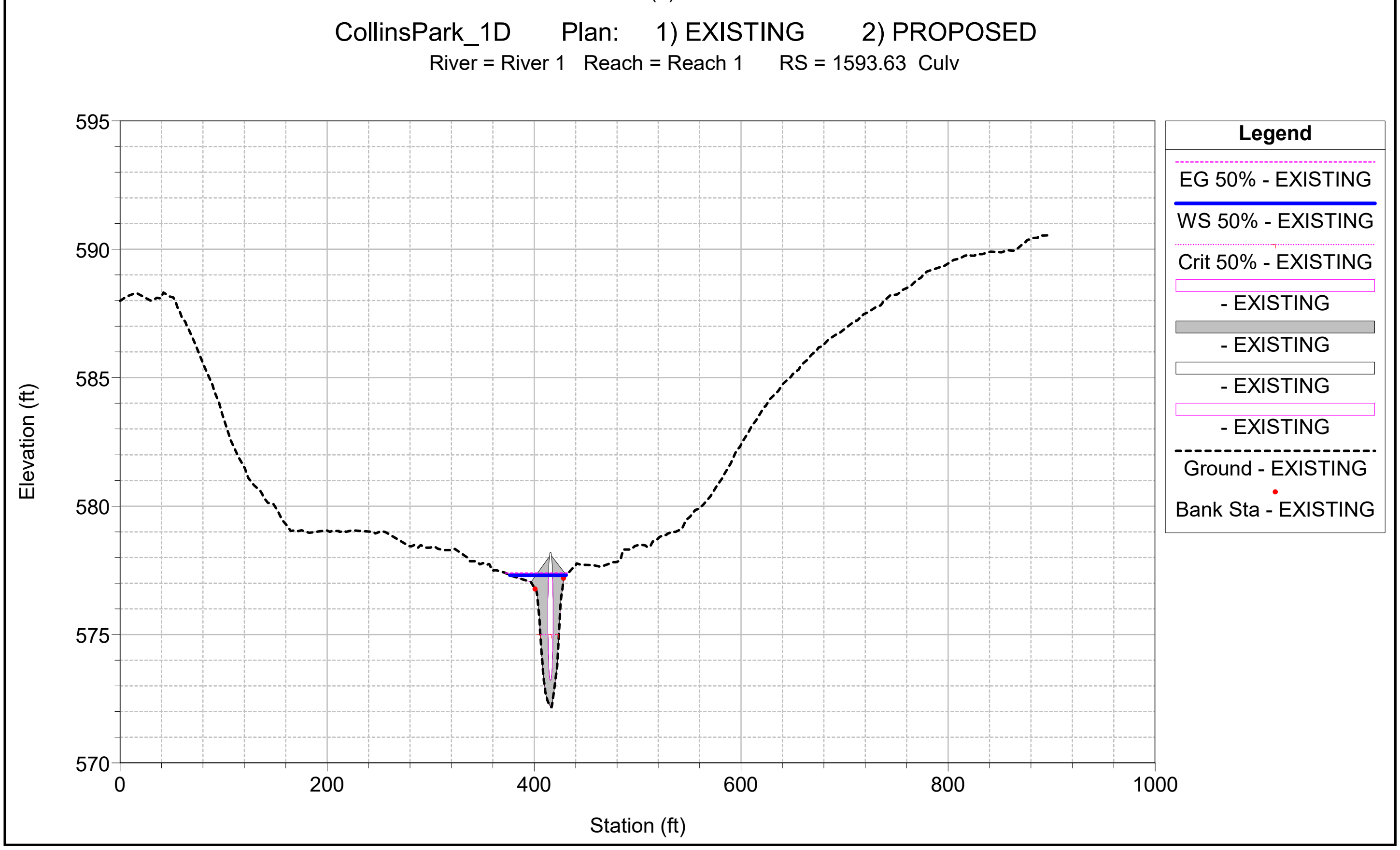

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2071.245
Elevation (ft)
Station (ft)
600
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

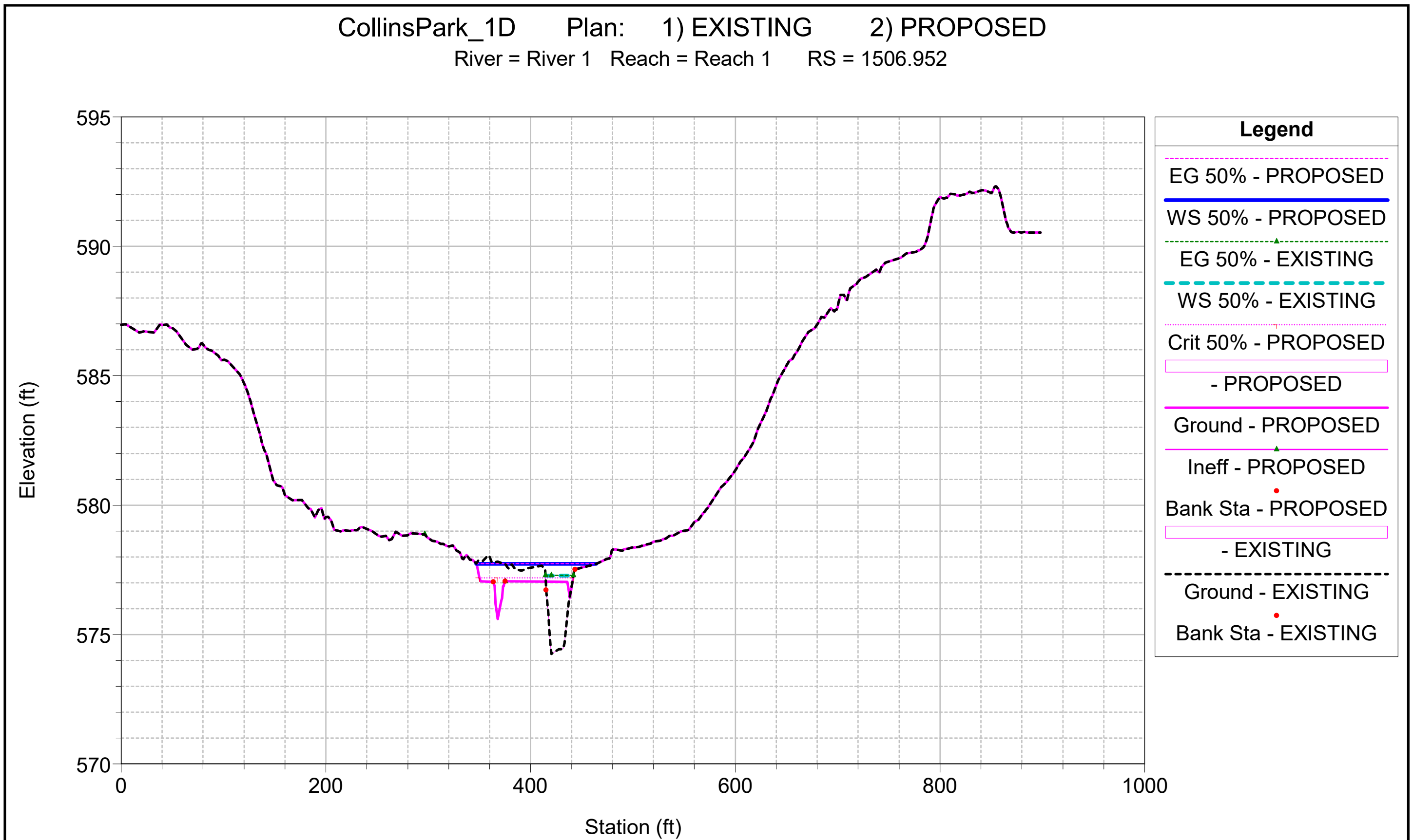

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 2018.154
Elevation (ft)
Station (ft)
600
595
590
585
580
575
570
0
200
400
600
800
1000
1200
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - PROPOSED
Crit 50% - EXISTING
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

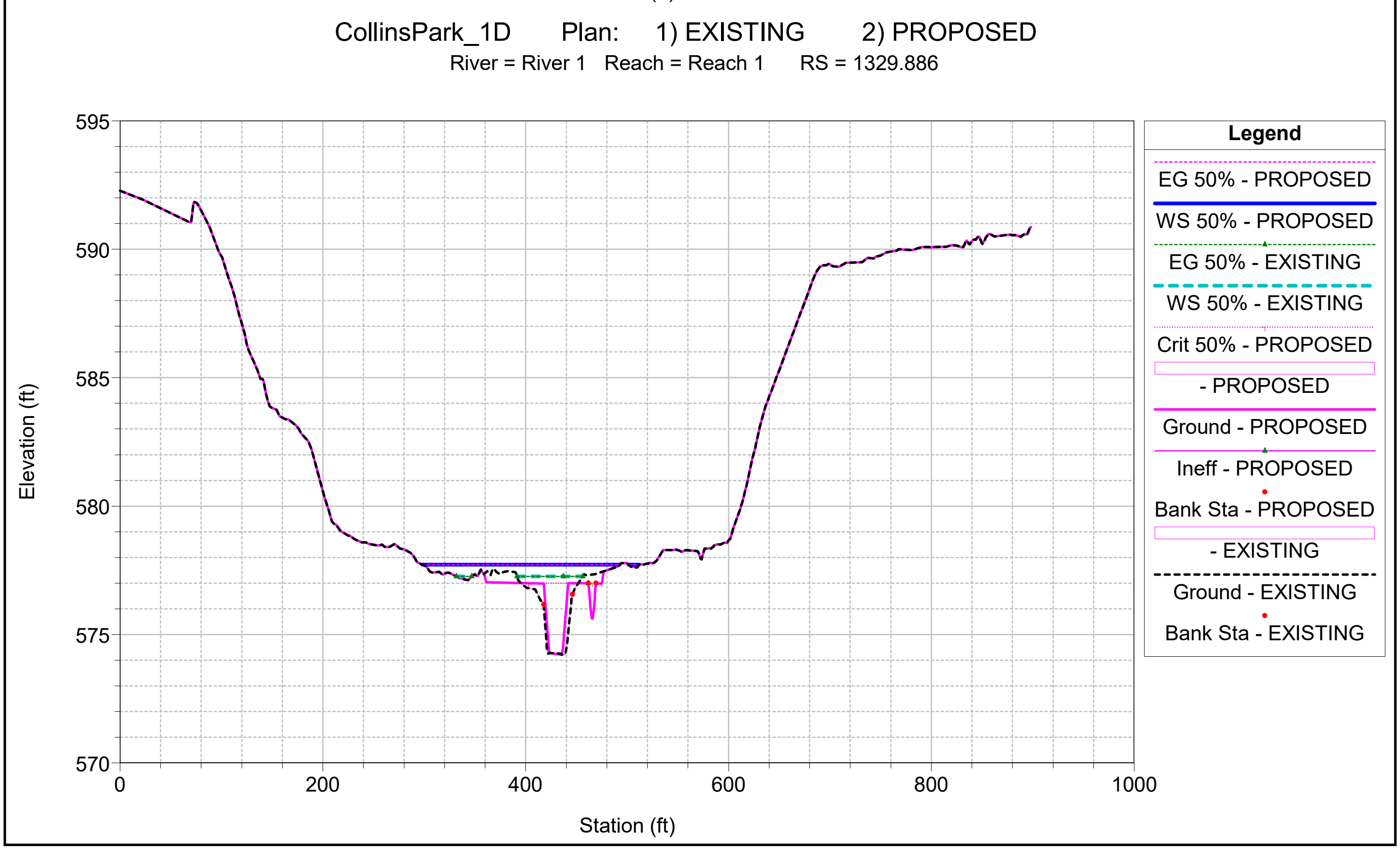

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1915.32 Culv
Elevation (ft)
600
595
590
585
580
575
570
0
200
400
600
800
1000
1200
Station (ft)
Legend
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - EXISTING
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

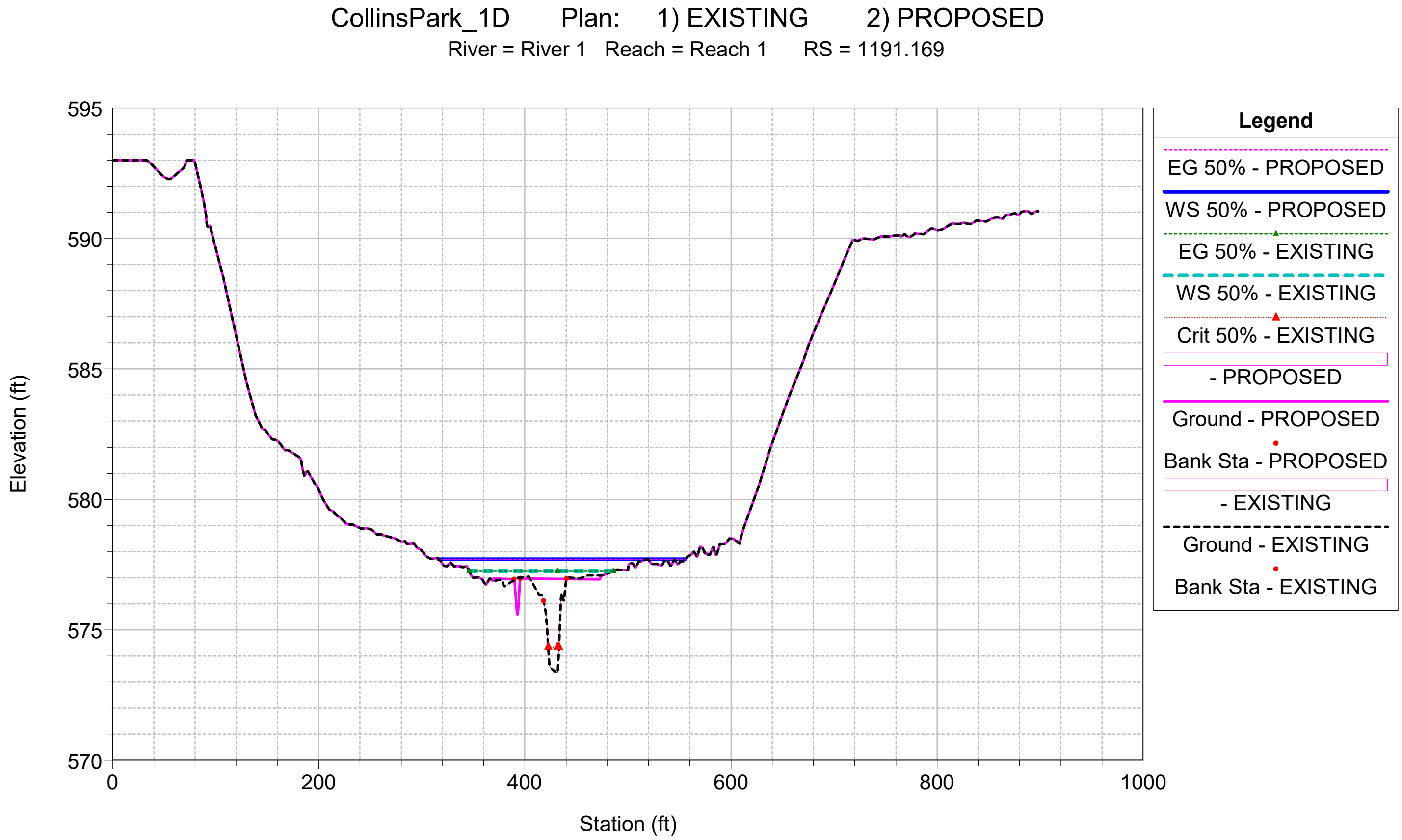

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1812.481
Elevation (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Station (ft)
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING


CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1680.301
Elevation (ft)
Station (ft)
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - PROPOSED
Crit 50% - EXISTING
- PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

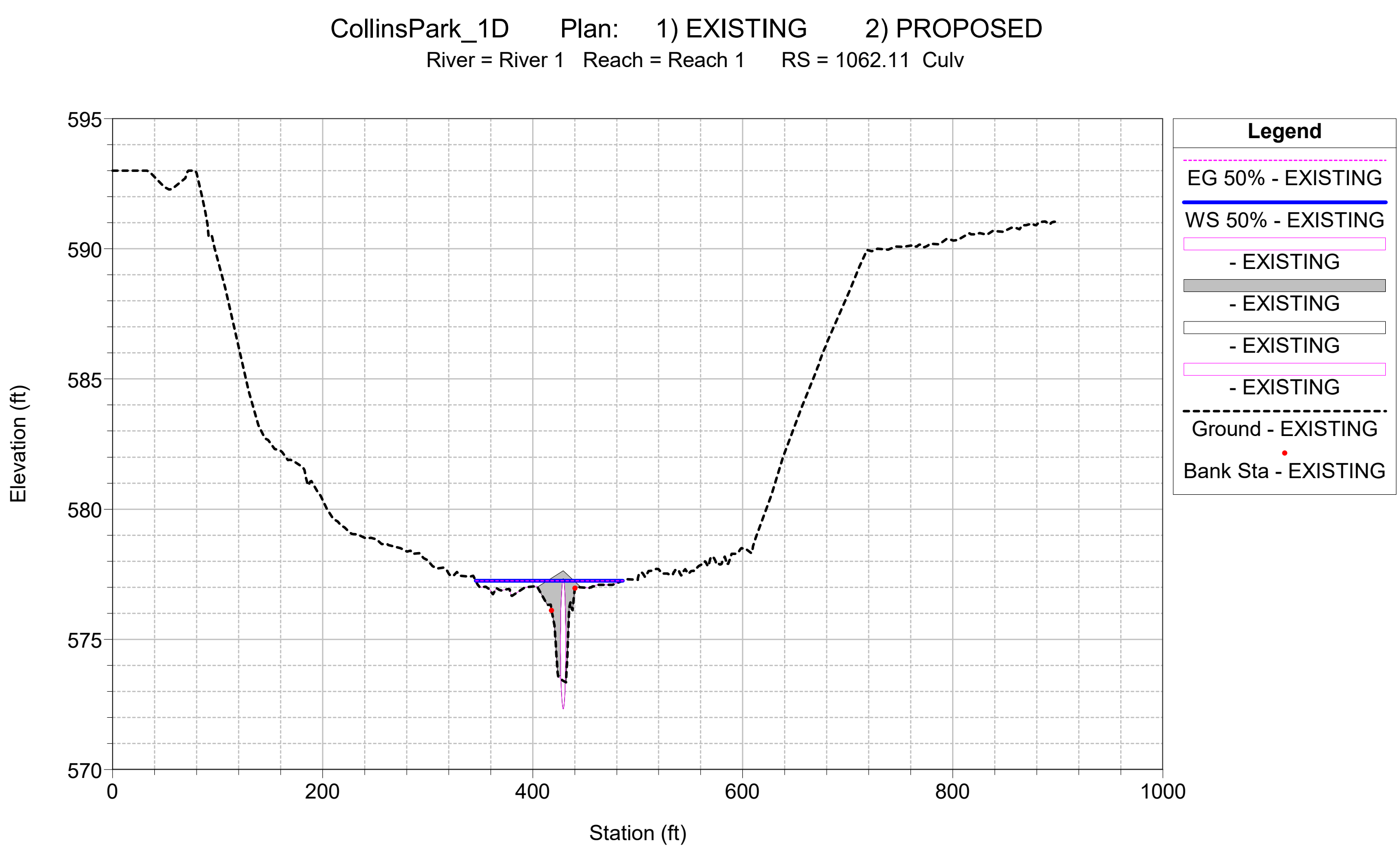

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1593.63 Culv
Elevation (ft)
Station (ft)
Legend
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - EXISTING
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING


CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1506.952
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

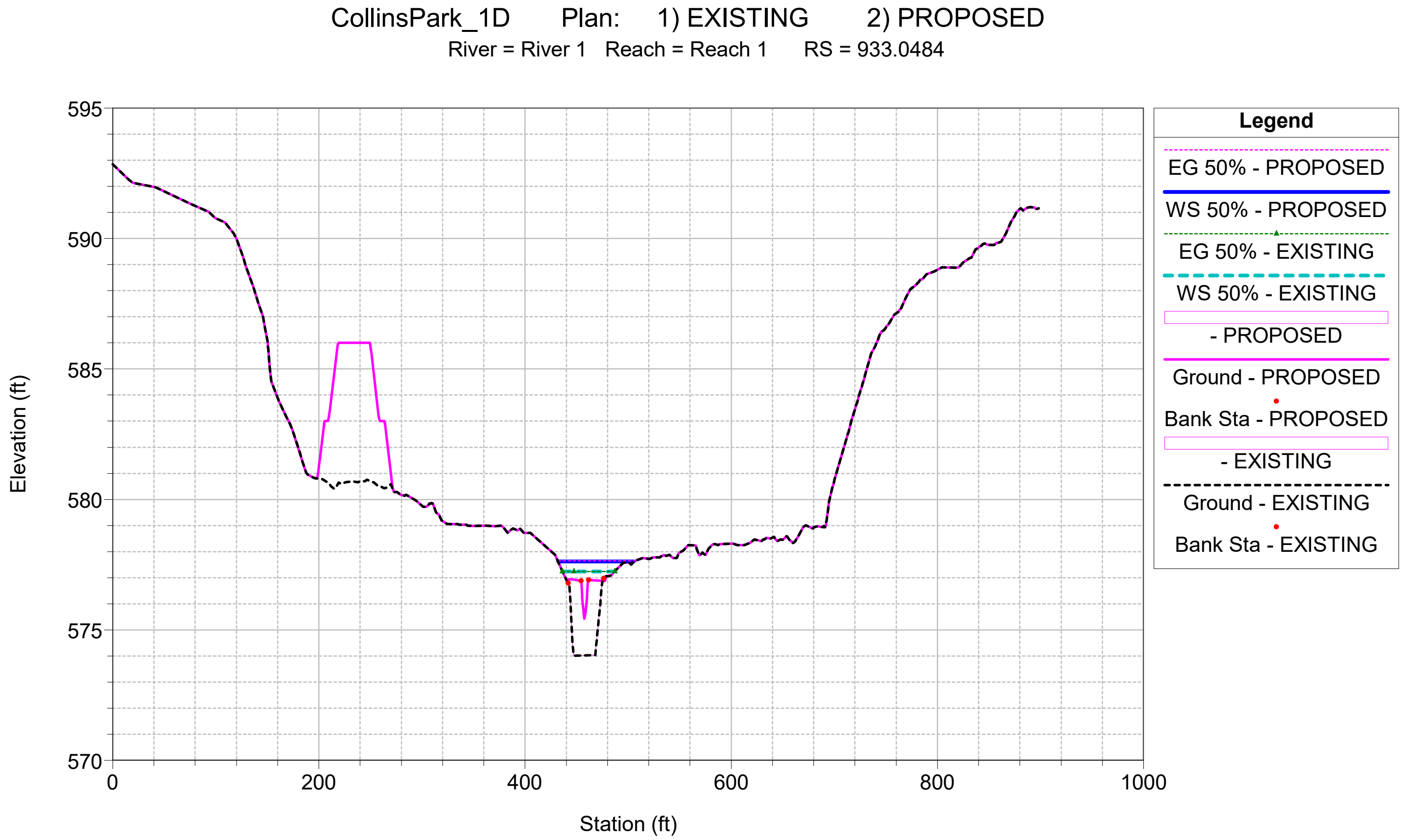

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1329.886
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

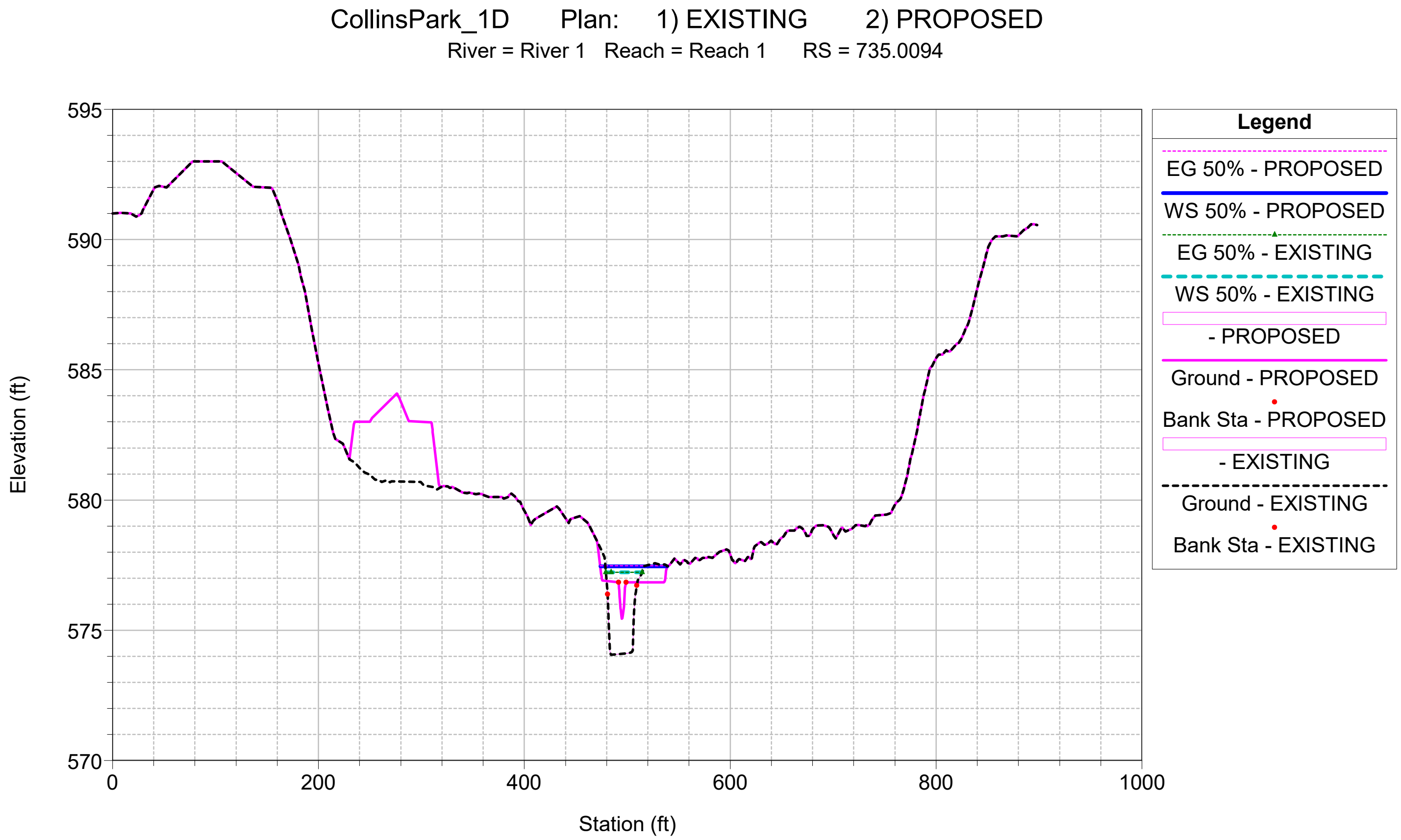


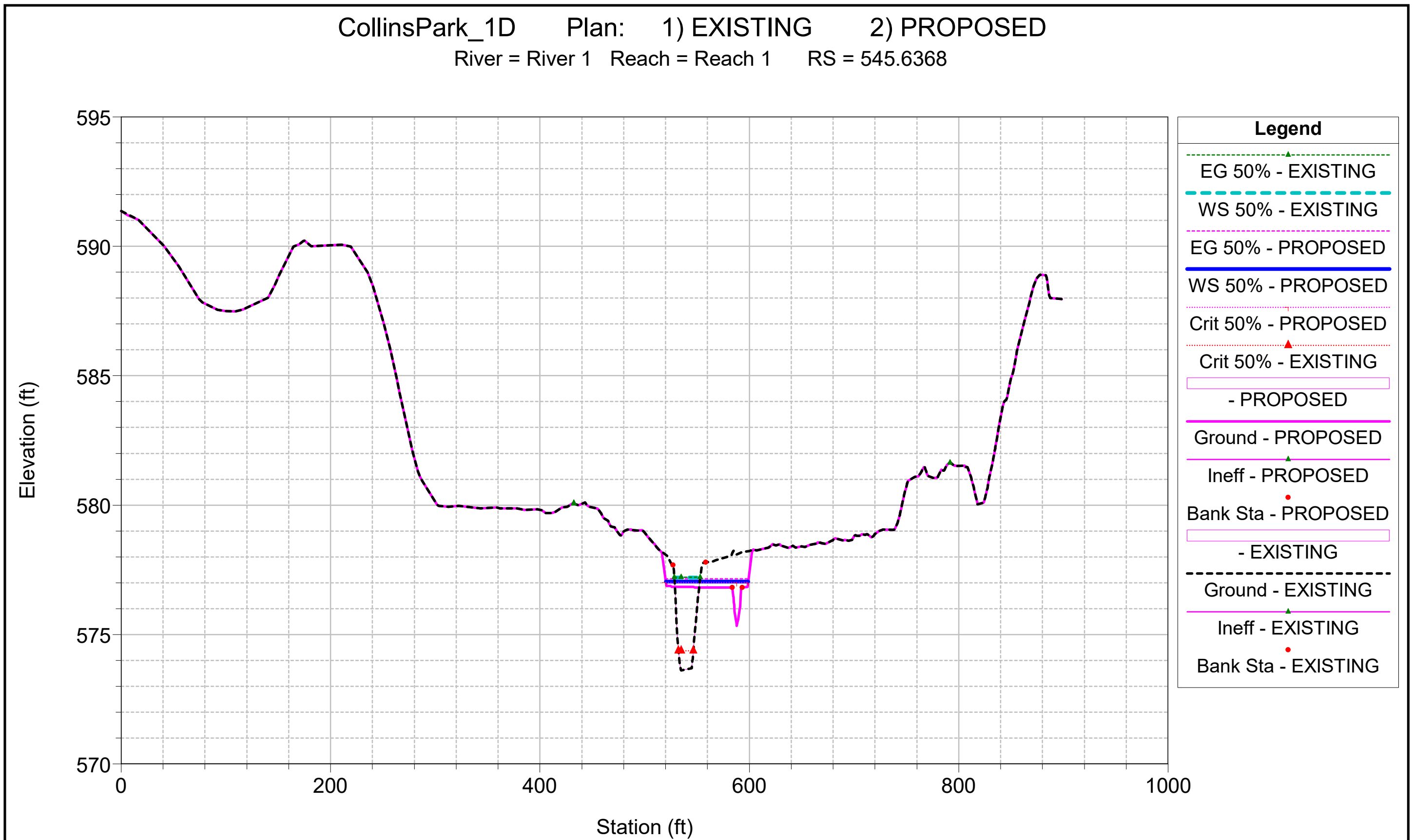
CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1191.169
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - EXISTING
- PROPOSED
Ground - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000

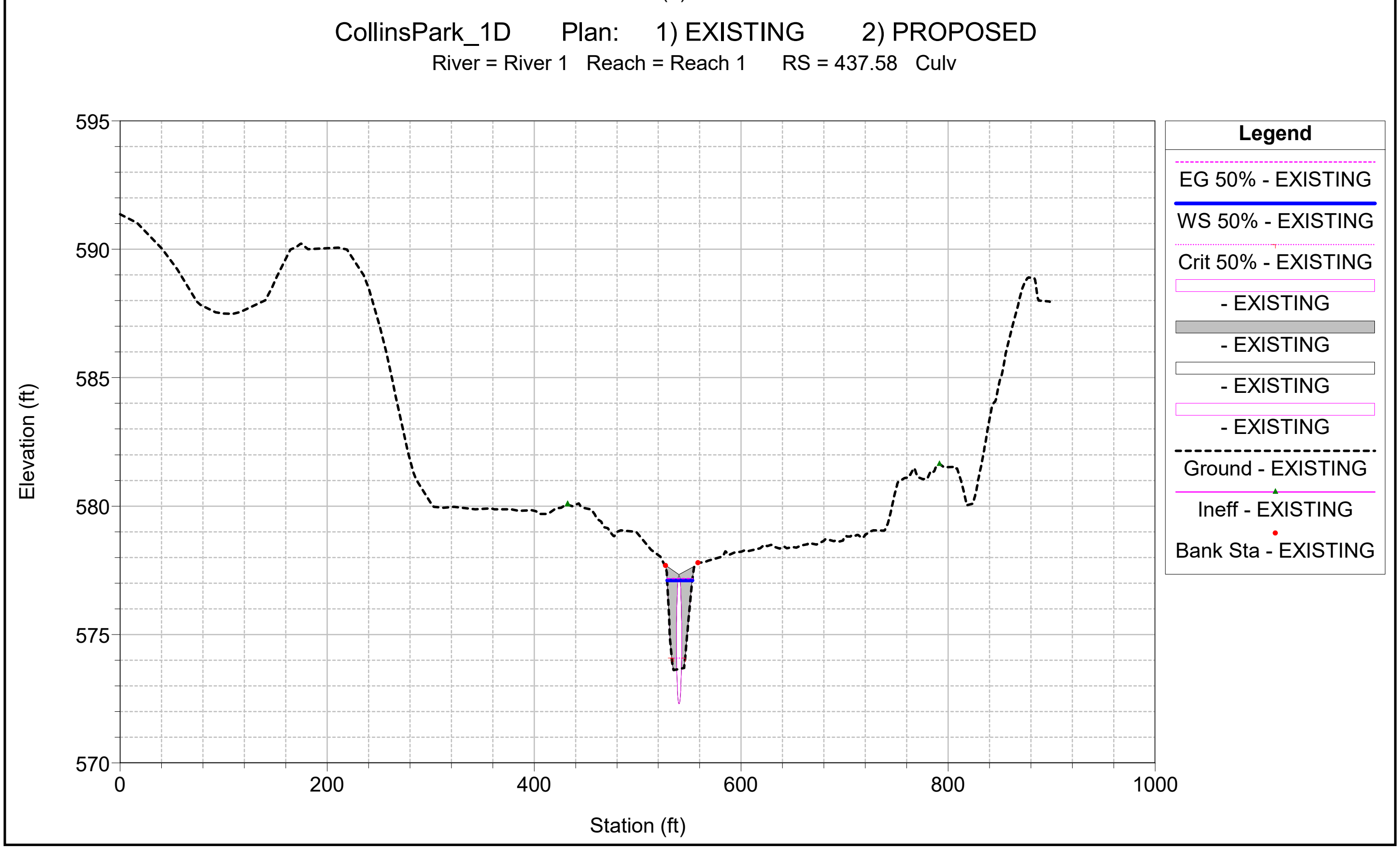


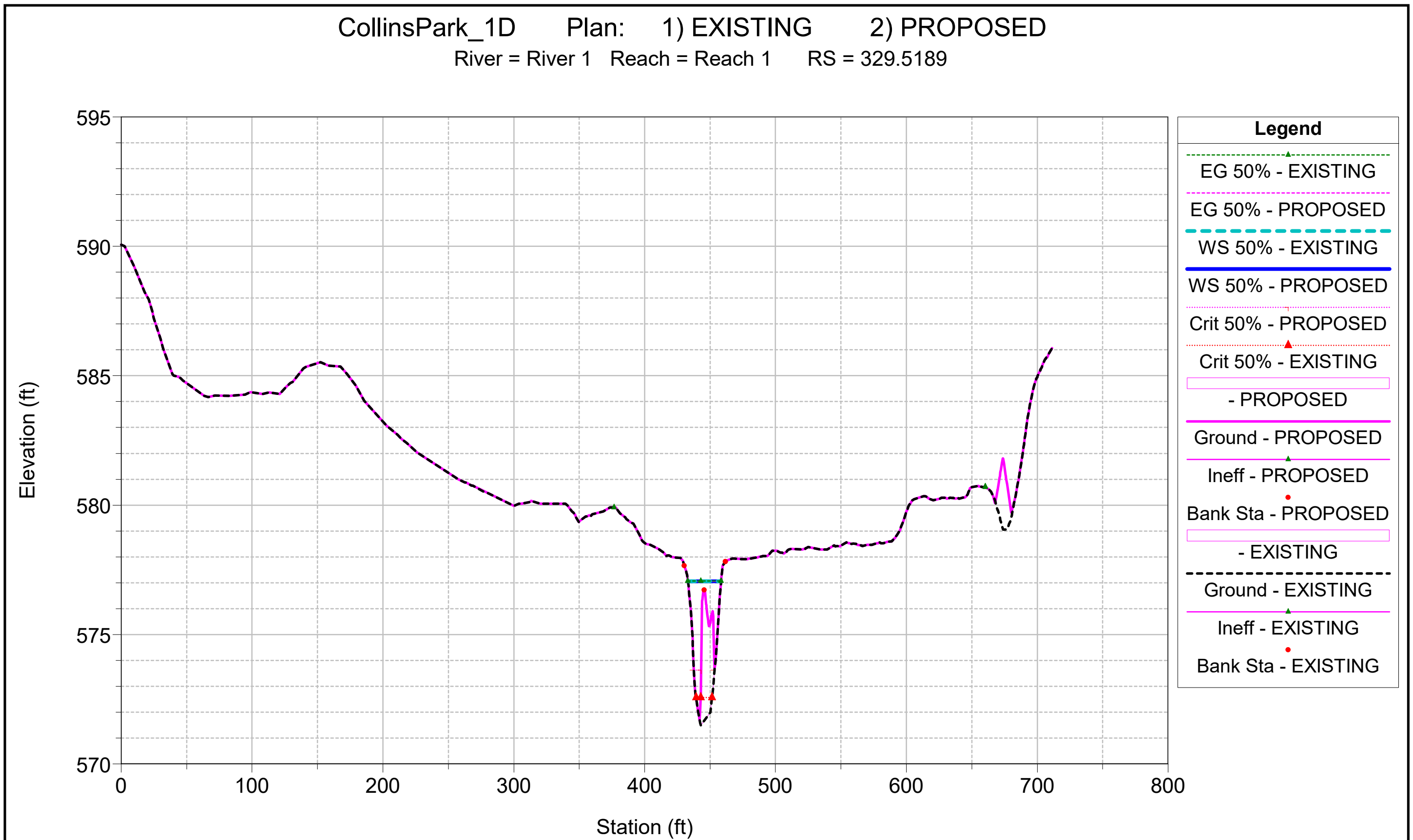
CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 1062.11 Culv
Legend
EG 50% - EXISTING
WS 50% - EXISTING
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000


CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 933.0484
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
- PROPOSED
Ground - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

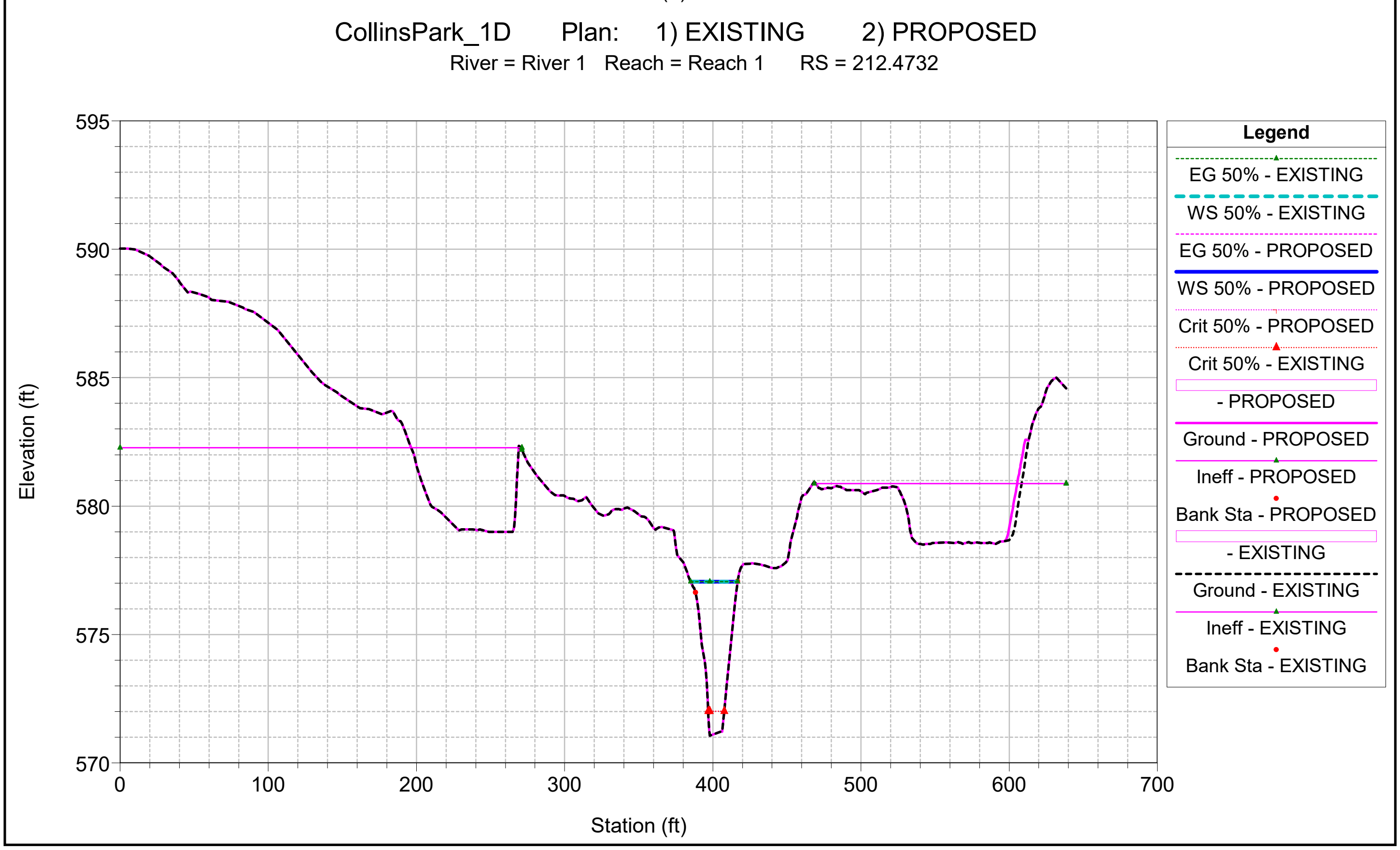

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 735.0094
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000
Legend
EG 50% - PROPOSED
WS 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
- PROPOSED
Ground - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING


CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 545.6368
Legend
EG 50% - EXISTING
WS 50% - EXISTING
EG 50% - PROPOSED
WS 50% - PROPOSED
Crit 50% - PROPOSED
Crit 50% - EXISTING
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Ineff - EXISTING
Bank Sta - EXISTING
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000

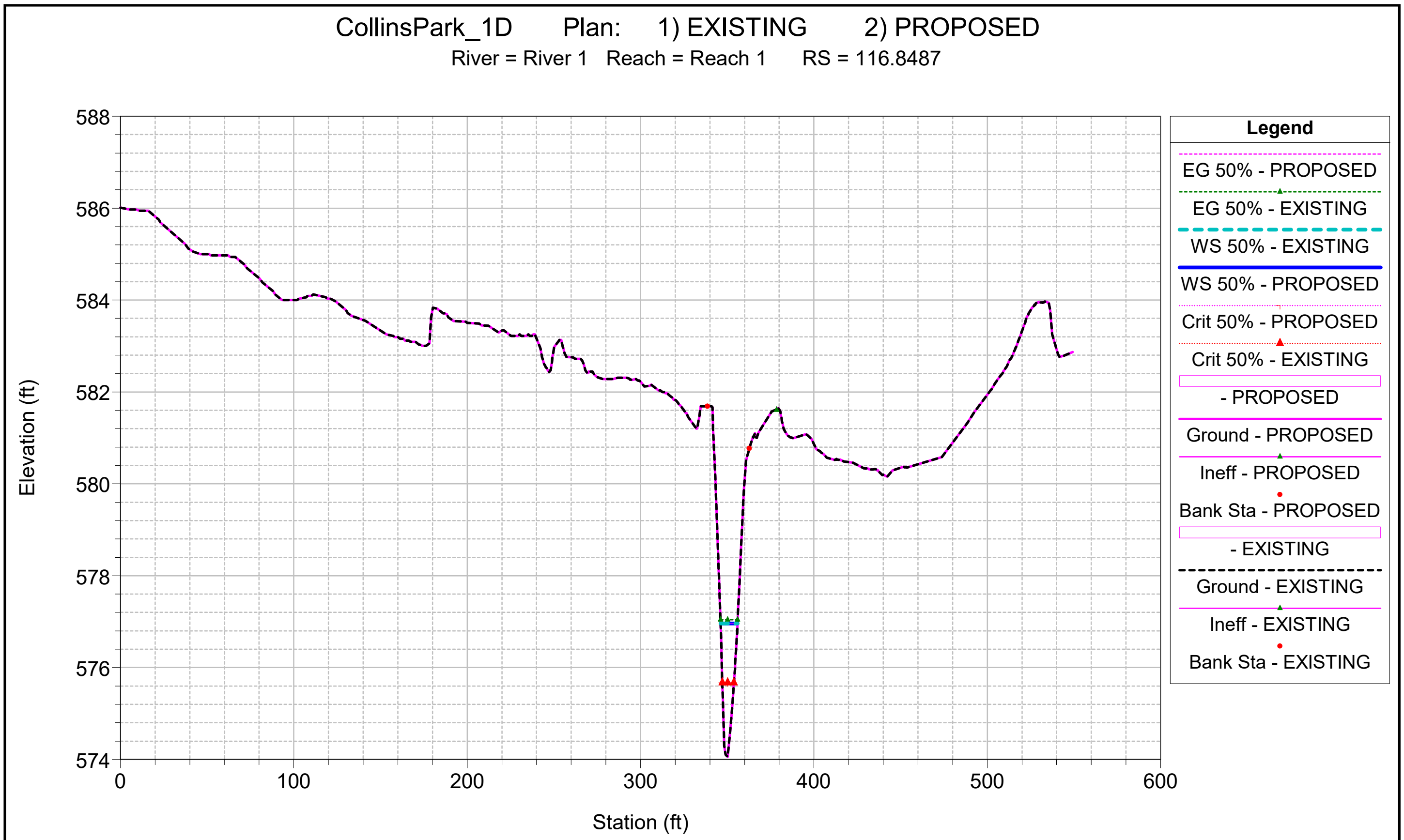

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 437.58 Culv
Legend
EG 50% - EXISTING
WS 50% - EXISTING
Crit 50% - EXISTING
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Ineff - EXISTING
Bank Sta - EXISTING
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
200
400
600
800
1000

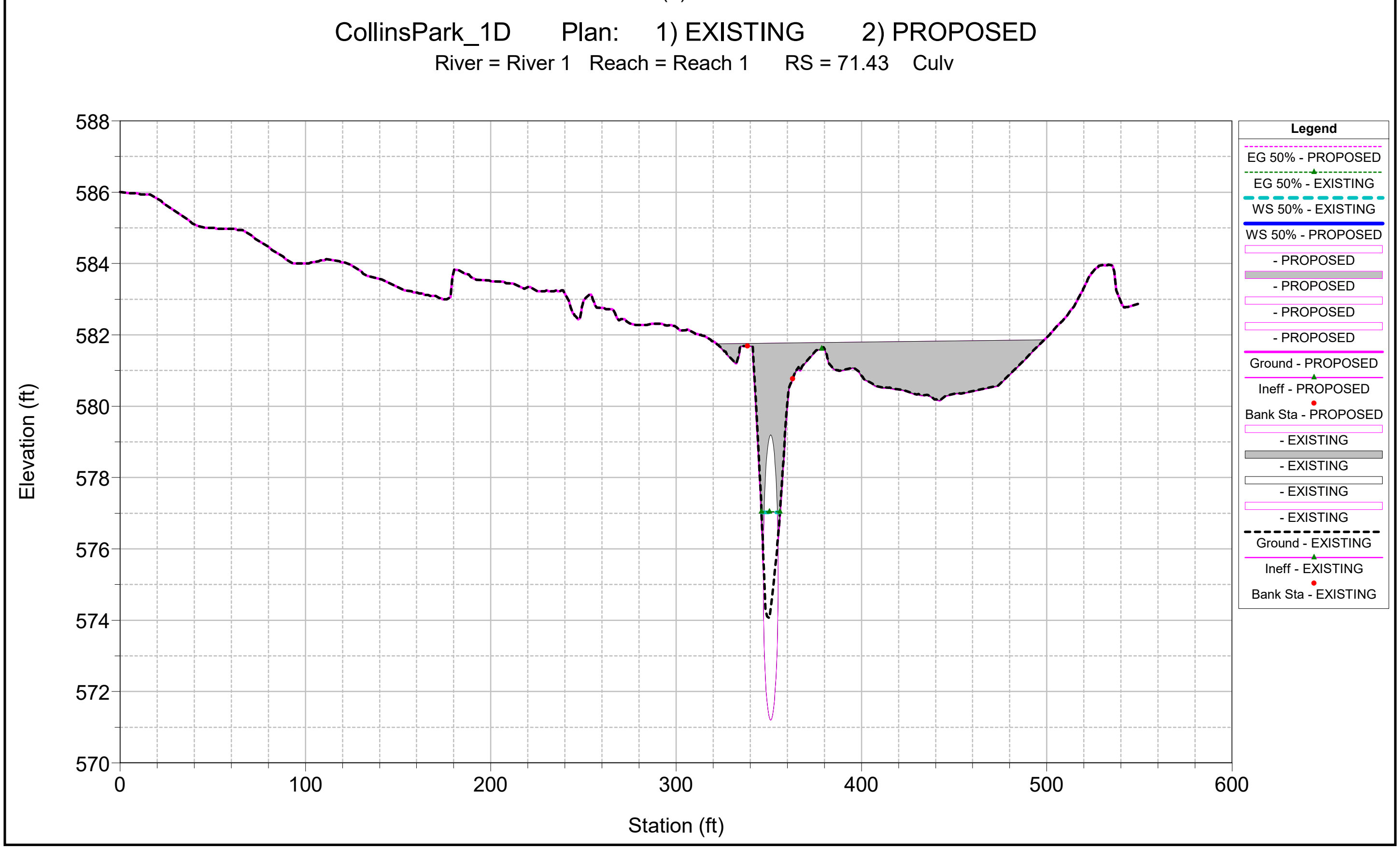


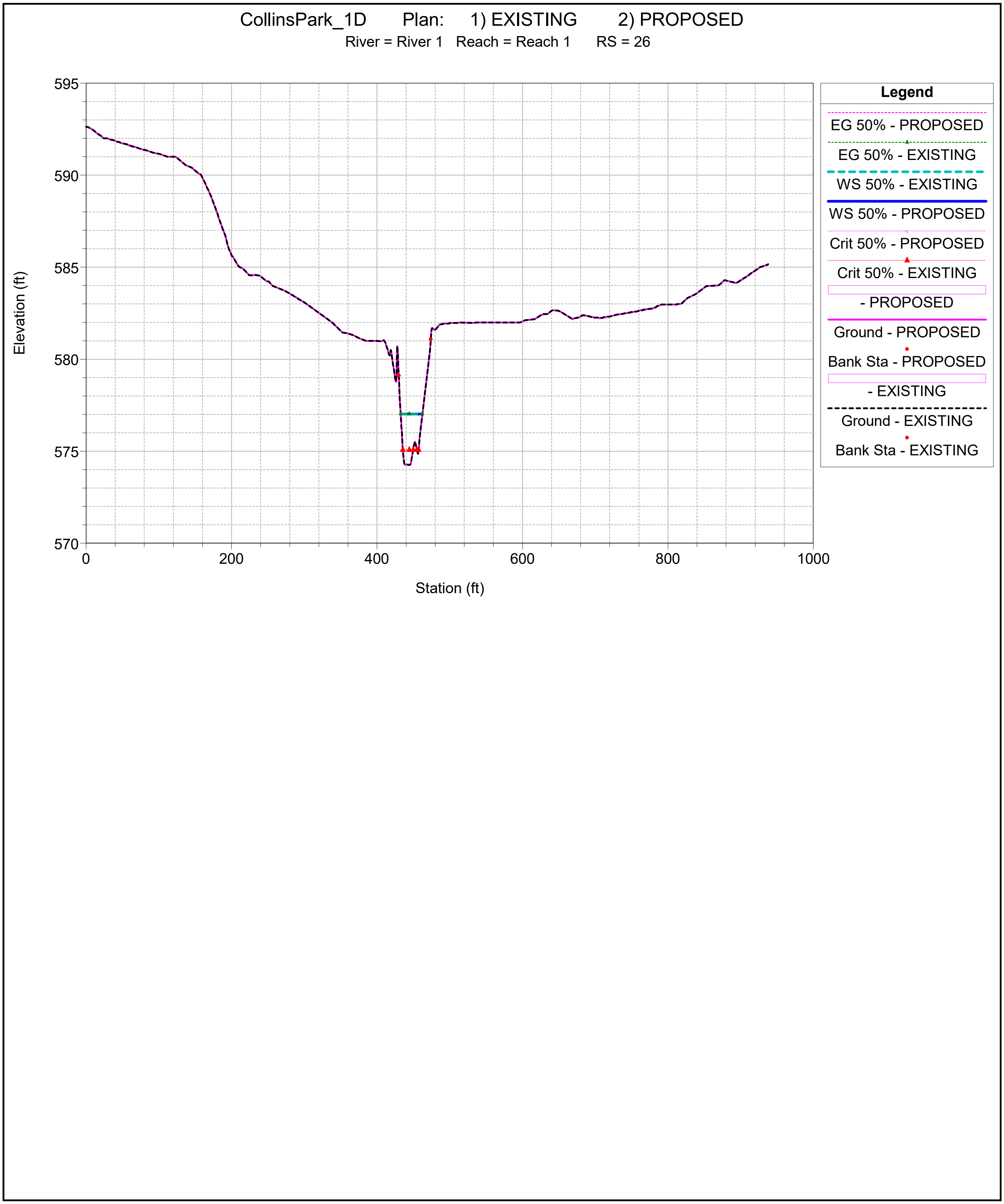
CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 329.5189
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
100
200
300
400
500
600
700
800
Legend
EG 50% - EXISTING
EG 50% - PROPOSED
WS 50% - EXISTING
WS 50% - PROPOSED
Crit 50% - PROPOSED
Crit 50% - EXISTING
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Ineff - EXISTING
Bank Sta - EXISTING



CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 212.4732
Elevation (ft)
Station (ft)
595
590
585
580
575
570
0
100
200
300
400
500
600
700
Legend
EG 50% - EXISTING
WS 50% - EXISTING
EG 50% - PROPOSED
WS 50% - PROPOSED
Crit 50% - PROPOSED
Crit 50% - EXISTING
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Ineff - EXISTING
Bank Sta - EXISTING

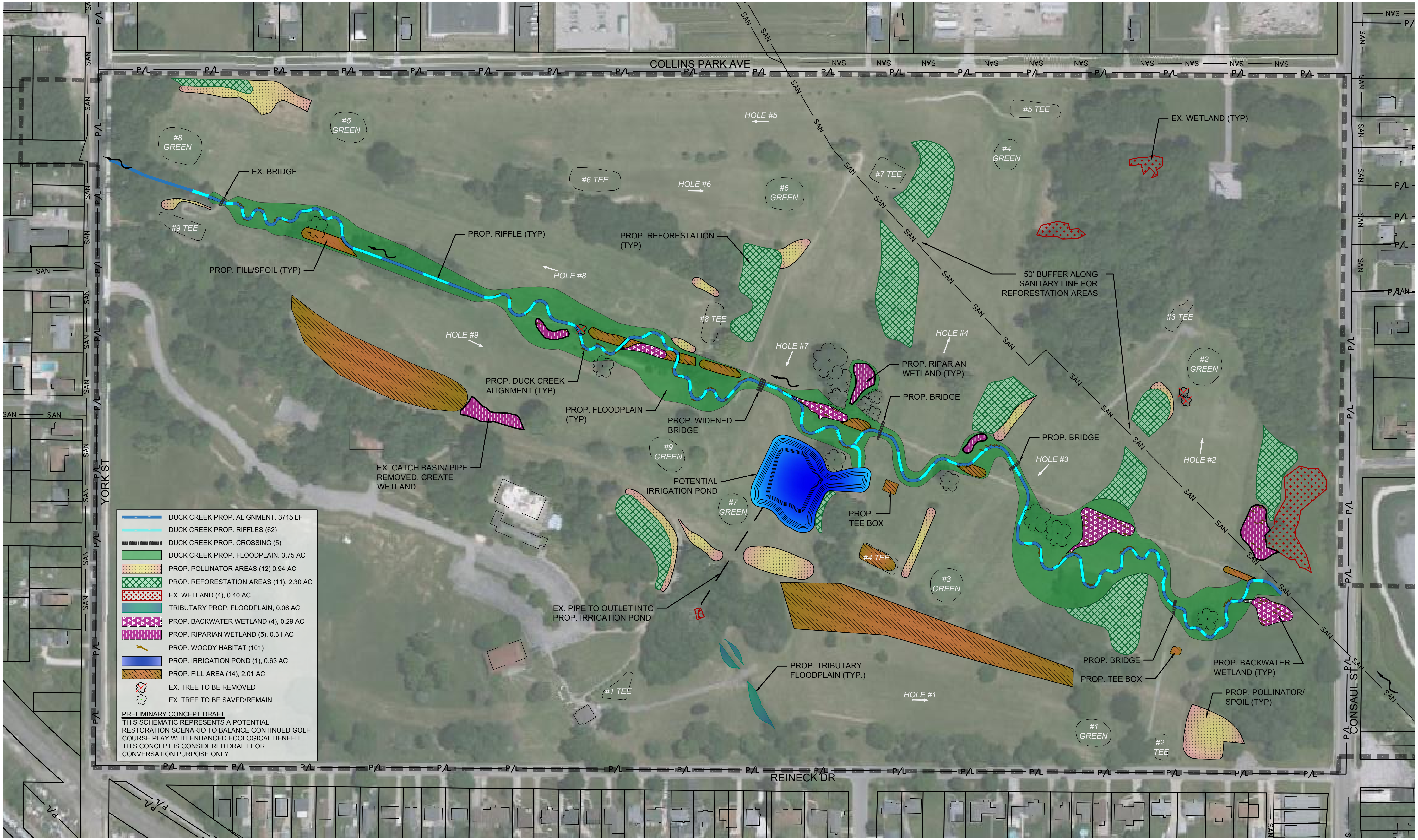

CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 116.8487
Legend
EG 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
WS 50% - PROPOSED
Crit 50% - PROPOSED
Crit 50% - EXISTING
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Ineff - EXISTING
Bank Sta - EXISTING
Elevation (ft)
Station (ft)


CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 71.43 Culv
Legend
EG 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
WS 50% - PROPOSED
- PROPOSED
- PROPOSED
- PROPOSED
- PROPOSED
Ground - PROPOSED
Ineff - PROPOSED
Bank Sta - PROPOSED
- EXISTING
- EXISTING
- EXISTING
- EXISTING
Ground - EXISTING
Ineff - EXISTING
Bank Sta - EXISTING
Elevation (ft)
Station (ft)



CollinsPark_1D Plan: 1) EXISTING 2) PROPOSED
River = River 1 Reach = Reach 1 RS = 26
595
590
585
580
575
570
Elevation (ft)
0
200
400
600
800
1000
Station (ft)
Legend
EG 50% - PROPOSED
EG 50% - EXISTING
WS 50% - EXISTING
WS 50% - PROPOSED
Crit 50% - PROPOSED
Crit 50% - EXISTING
- PROPOSED
Ground - PROPOSED
Bank Sta - PROPOSED
- EXISTING
Ground - EXISTING
Bank Sta - EXISTING

Appendix H



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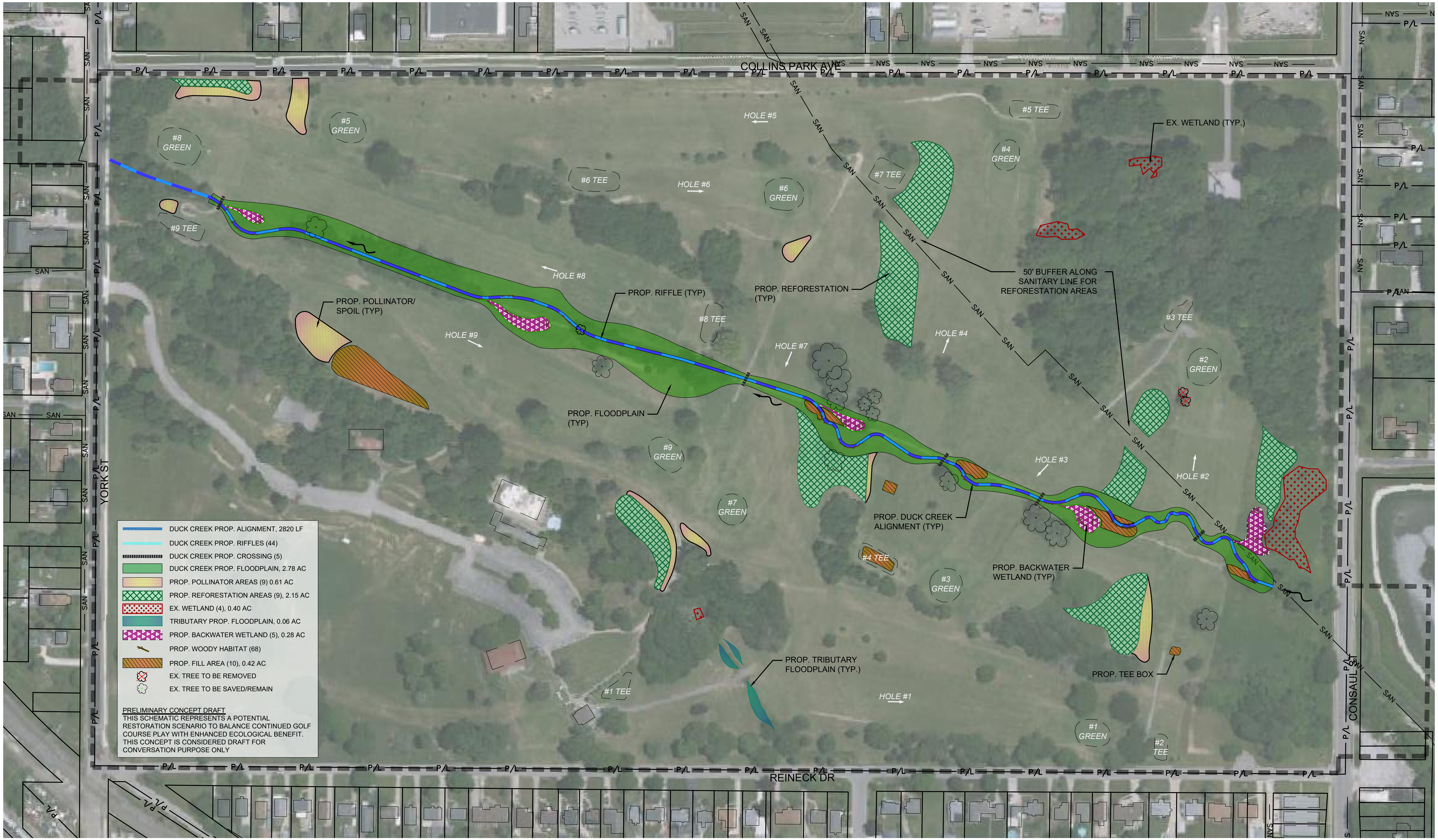
SHEET: 1 / 2

CONCEPTUAL PLAN - ALTERNATIVE A
COLLINS PARK FEASIBILITY STUDY
CITY OF TOLEDO

DRAWN BY: JB
CHECKED BY: AH
DATE: SEPT. 20, 2023
VERT. SCALE: NA
HORZ. SCALE: 1" = 200'

P:\10_PROJECTS\T\TOLEDO_CITY_OF_V430R\17005_COLLINS PARK STREAM RESTORATION FEASIBILITY PROJECT\RESTORATION DESIGN\PRELIMINARY_DESIGN\SHEETS\FIGURE.DWG — FIG ALT 3 — 11X17 — 9/21/2023 2:46:04 PM — ANGELINA HOTZ



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SHEET: 2 / 2

CONCEPTUAL PLAN - ALTERNATIVE B
COLLINS PARK FEASIBILITY STUDY
CITY OF TOLEDO

DRAWN BY: JB
CHECKED BY: AH
DATE: JULY 25, 2023
VERT. SCALE: NA
HORZ. SCALE: 1" = 200'

P:\10_PROJECTS\T\TOLEDO_CITY_OF\430R\17005_COLLINS PARK STREAM RESTORATION FEASIBILITY PROJECT\RESTORATION DESIGN\PRELIMINARY_DESIGN\SHEETS\FIGURE.DWG -- FIG ALT 2-11X17 -- 9/21/2023 2:48:04 PM -- ANGELINA HOTZ