Black Gut Creek Ecosystem Sampling Work Plan

Brunner Island Steam Electric Station York Haven, PA

January 31, 2020 (Final 4-2-2020)

Prepared for:

Talen Energy Supply, LLC
600 Hamilton St., Suite 600
Allentown, Pennsylvania 17110

The Mahfood Group LLC
1061 Waterdam Plaza Drive, Suite 201
McMurray, Pennsylvania 15317

Prepared by:

Stantec Consulting Services Inc.
810 Gleneagles Court, Suite 300
Baltimore, Maryland 21286

Revised by:

Normandeau Environmental Consultants
1921 River Road,
Drumore, PA 17518

FINAL - Revised

Table of Contents

Table of Contents

1.0 Introduction

1.1 PROJECT BACKGROUND

Brunner Island Steam Electric Station (BISES) is a generation facility located in East Manchester Township, York County Pennsylvania. BISES is owned by Talen Energy Corporation and Brunner Island LLC, a subsidiary of Talen Energy Corporation and a limited liability corporation. The facility area covers approximately 766 acres with the Susquehanna River to the east and the tributaries Black Gut Creek and Conewago Creek to the west (see **Figure 1**). Three generation units are present within the facility, which since 2017 can fire on coal, natural gas or a combination. The use of these units has resulted in the generation of residual waste in forms of fly ash and bottom ash, which were deposited into eight facilities within the site comprised of seven unlined impoundments and one lined landfill. Only the landfill is continuing to receive any ash, and all the basins are either closed or undergoing closure.

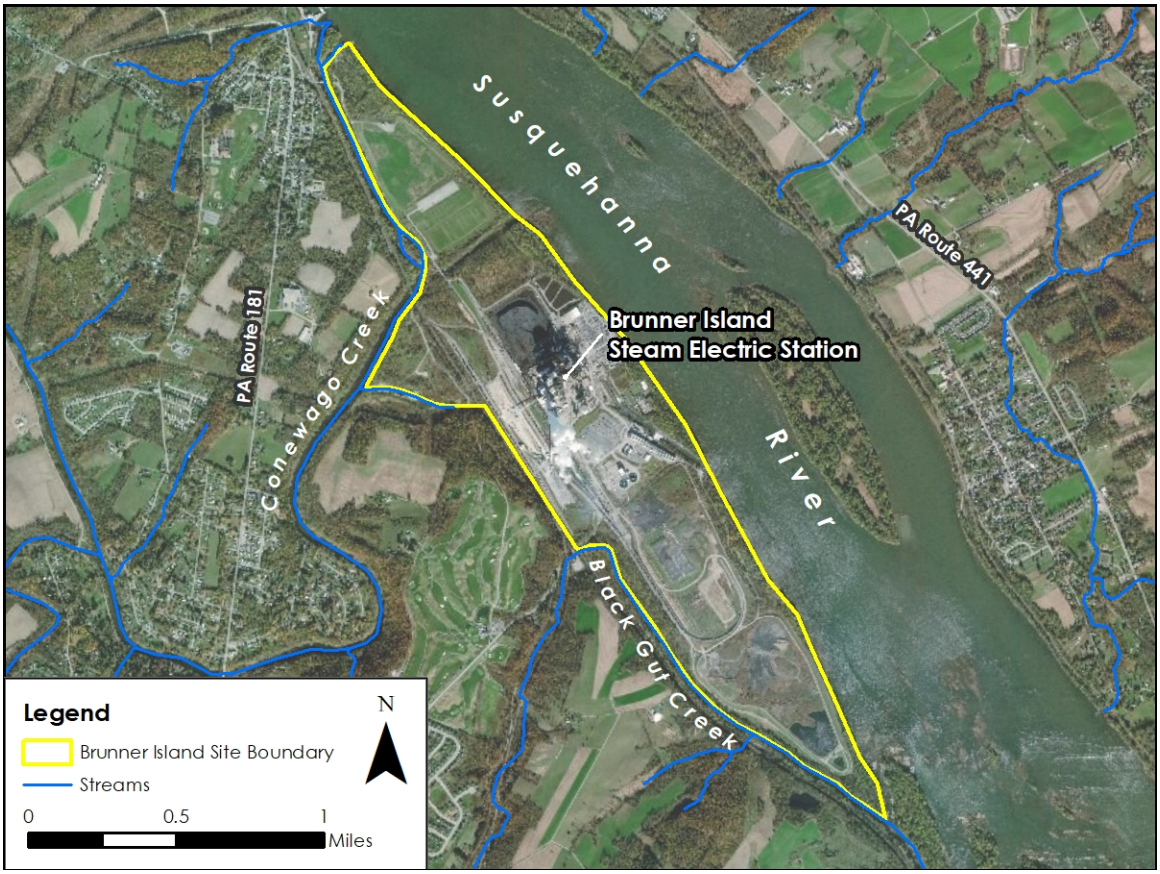

Figure 1: Brunner Island Site Location

On July 31, 2019, a Consent Decree (CD) was lodged with the United States District Court for the Middle District of Pennsylvania, memorializing a settlement among Brunner Island LLC (Brunner), Talen Energy Corporation (Talen), the Pennsylvania Department of Environmental Protection (PADEP), and three Citizens Groups (the Citizens). The CD was approved and entered by the Court on November 8, 2019.

The CD in Paragraph 37 states that environmental monitoring of Black Gut Creek is to be conducted two times a year (once in spring and once in the fall as defined by PADEP protocols). A qualified environmental group (Contractor) will be retained by Brunner to conduct this work in accordance with the CD. Environmental monitoring will include surface water sampling and macroinvertebrate sampling in adherence to protocols described in PADEP's *Water Quality Monitoring Protocols for Streams and Rivers* (PADEP, 2018a).

1.2 SCOPE OF THIS PLAN

This Black Gut Creek Ecosystem Sampling Work Plan (the Plan) describes the locations, equipment, methodologies, and data management protocols that will be used by the Contractor to gather surface water and macroinvertebrate data for Black Gut Creek and outlines responsibilities of each party, the procedures to be followed, and the timeframe for events. Sampling results will enable the Contractor to provide a Monitoring and Assessment Report with findings and recommendations for follow-up actions, if warranted. The discussion in this Plan includes:

- The methodologies for sampling;
- Protocols for sample collection and management;
- Sample analyses to be performed; and
- Reporting procedures.

2.0 Surface Water Quality and Macroinvertebrate Sampling Program

2.1 PROGRAM ORGANIZATION

The Contractor will designate a person as the Sampling Coordinator for the sampling program. The Sampling Coordinator will be present in the field during all sampling events. The Contractor will also organize a field team to be deployed for each sampling event. Sampling will be performed along Black Gut Creek using dedicated teams made up of two to three field personnel.

Prior to sampling, the Contractor will identify a field station and staging area for sampling events. Directions to the field station and a map showing its location will be provided to field team members prior to the implementation of the sampling program. The Sampling Coordinator will coordinate the sampling effort from the field station. The station will be used for organization, preservation and packaging of samples prior to delivery to the laboratories.

The Sampling Coordinator is responsible for communication with the field team throughout the sampling events. All members of the field team will carry cellphones to stay in communication. The field team is responsible for relaying important information, potential issues, and questions to the Sampling Coordinator. The Contractor will provide a list of pertinent phone numbers and contacts to the Sampling Coordinator and field team prior to the initiation of the sampling program.

2.2 SAMPLING SCHEDULE

Surface water sampling and macroinvertebrate collection is planned for 2020 and 2021. The CD specifies that sampling will be conducted two (2) times per year, once in spring and once in fall. As per *Water*

Quality Monitoring Protocols for Streams and Rivers (PADEP, 2018a), spring sampling will occur between March 1 and April 30, and fall sampling will occur in November. It is estimated that each sampling event will require one to two days at the site by a three-person field team to complete.

For safety and water quality sampling purposes, sampling will not occur within 24 hours of a rain event and/or until the stream flows have returned to similar base flow conditions and visibility in the stream is present. In accordance with the CD, surface water sampling results will be provided to PADEP and the Citizens within 90 days of each sampling event. Furthermore, a Monitoring and Assessment Report will be provided to PADEP and the Citizens within six months of completing the two-year study. **Table 1** provides the proposed work schedule for sampling and reporting as required by the CD.

Table 1: Work Schedule for Ecosystem Sampling and Reporting

Year	Months	Action Items
2020	March/April	Year 1 spring sampling – surface water and macroinvertebrates.
	June/July	Spring surface water sampling results and map/coordinates of established sampling locations provided to PADEP and the Citizens (within 90 days of sampling event).
	November	Year 1 fall sampling – surface water and macroinvertebrates.
2021	February	Fall surface water sampling results provided to PADEP and the Citizens (within 90 days of sampling event).
	March/April	Year 2 spring sampling – surface water and macroinvertebrates.
	June/July	Spring surface water sampling results provided to PADEP and the Citizens (within 90 days of sampling event).
	November	Year 2 fall sampling – surface water and macroinvertebrates.
2022	February	Fall surface water sampling results provided to PADEP and the Citizens (within 90 days of sampling event).
	May	Monitoring and Assessment Report provided to PADEP and the Citizens (within 6 months of completing the two-year study).

2.3 SAMPLING LOCATIONS

According to PADEP's *Water Quality Monitoring Protocols for Streams and Rivers* (PADEP, 2018a), targeted sampling design is preferred for the assessment of specific water segments or reaches. The targeted or "judgement-based" sampling design relies on professional judgement rather than randomization to identify sample locations. A preliminary review of information is performed, and sampling locations are positioned to account for changes in water quality due to influences such as tributaries, point and nonpoint source discharges, changes in land use, and other factors.

For this ecosystem sampling program, three stream reaches were identified in consideration of the existing landscape, site history, and proposed actions (see **Figure 2**). A total of six (6) surface water and macroinvertebrate samples will be collected among the three reaches. Additional surface water samples will be collected per monitoring event for quality assurance/quality control (QA/QC) purposes.

Either prior to or during the first sampling event, the field team will assess the entire extent of the sampling area (i.e., the three identified reaches) to identify the specific sample locations that will be adopted and maintained throughout each of the four sampling events under this program. Portions of the reaches that provide the best available habitat will be targeted for sampling. Samples will be located at a distance from point sources such as outfalls and seeps, and locations will be targeted at a point of complete mix, where water quality and other instream conditions are homogenous across a transect. As practicable, samples will be located downstream from potentially impacted areas. Once the sample locations have been affirmed, coordinate information for each location will be obtained via Global Positioning System (GPS) field instrumentation.

Reach 1 – Reach 1 extends for approximately 1,576 meters along Black Gut Creek. The Reach was primarily identified for its adjacency to Basin 6. The upstream limit of the reach is marked by an unnamed tributary that enters Black Gut Creek from the southwest, and a side channel (formerly Middle Gut Creek) that enters from the northeast. The downstream limit of the reach is the confluence of Black Gut Creek and the Susquehanna River. Three surface water/macroinvertebrate samples will be collected within Reach 1 per sampling event to characterize water quality along Basin 6.

Reach 2 – Reach 2 extends for approximately 824 meters along Black Gut Creek. The reach is situated along the western limits of Basin 5, which was closed in 1988. At the upstream limit of the reach, Black Gut Creek is carried beneath Gut Road. Downstream limits are marked by an unnamed tributary from the southwest and side channel from the northeast (top of Reach 1). Two surface water/macroinvertebrate samples will be collected within Reach 2 per sampling event to characterize water quality along Basin 5.

Reach 3 (Reference Reach) – Reach 3 is upstream from Black Gut Creek along Hartman Run. Because the reach is upstream from BISES and likely unaffected by discharges from the various basins, Reach 3 is expected to provide baseline data for comparison with Reaches 1 and 2. The upstream end of the reach is located at the intersection of a powerline corridor. The reach continues for 923 meters to a bridge carrying Gut Road over the stream. Only one surface water/macroinvertebrate sample is needed per sampling event from Reach 3 to provide baseline data.

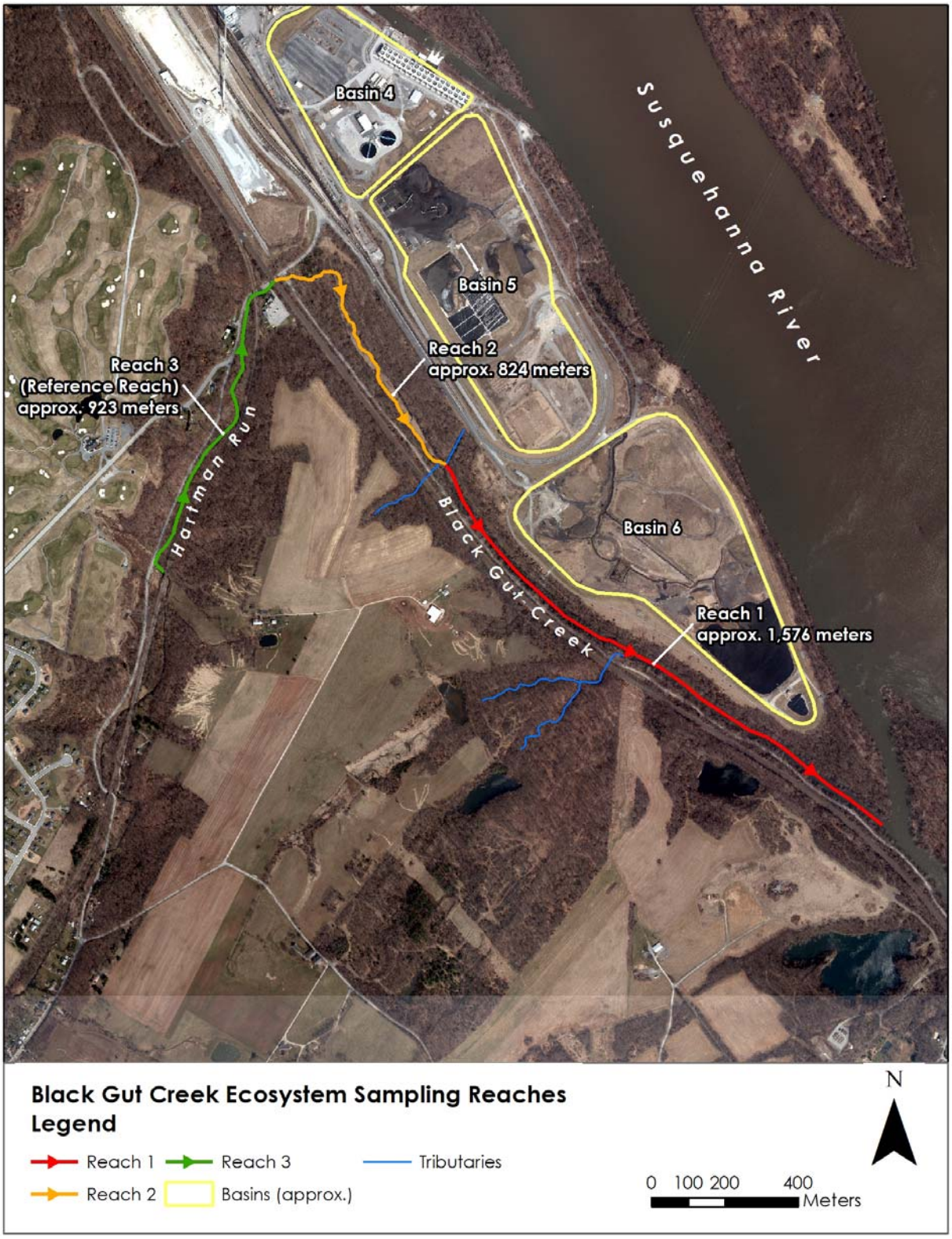

Figure 2: Black Gut Creek Stream Reaches

2.4 SAMPLING EQUIPMENT SPECIFICATIONS

The following equipment will be used for surface water sampling:

- Water quality meters to measure pH, temperature, conductivity, dissolved oxygen and turbidity (may include multiparameter meters);
- Nitrile gloves;
- Sample jars (sizes, bottle materials, and preservatives will be dependent upon analysis);
- Deionized water to rinse meters; and
- Coolers and ice.

The following equipment will be used for macroinvertebrate sampling:

- 500 µm mesh D-frame kick net;
- Tweezers;
- Two 5-gallon plastic buckets to wash detritus and netting;
- Sample jars (500 ml plastic bottles or comparable); and
- Composited samples are preserved with an ethanol solution (at least 70% ethanol) in the field.

2.5 SAMPLING METHODOLOGY

2.5.1 Surface Water Sampling

Surface water samples will be manually collected in accordance with PADEP's Discrete Water Chemistry Data Collection Protocols (PADEP, 2018a). An instantaneous "grab" sampling method will be used to collect samples. Water sampling will be conducted prior to macroinvertebrate collection to avoid disturbances to the water column. New, sterile, nitrile powder-free surgical gloves will be worn by sampling personnel at all times during sampling. Sampling gloves will be changed between sampling locations. Samples will be collected in the following order using the procedures outlined as follows:

- Face upstream and into the flow of the river.
- Orient the capped sample container with the opening toward the flow and in front of the sampler.
- Collection bottles will be inserted into the water column vertically, facing down to avoid inadvertently collecting surface debris/film.
- All bottles will be rinsed three times instream before filling the bottle.
- Remove the lid from sampling bottle and partially fill the bottle under water.
- Remove from water, cap and vigorously shake. Then uncap and discard rinsing waste downstream of the collector. Do this a total of three times.
- Collect the sample by filling the rinsed sample bottle and cap immediately after removing from the water.
- Label in accordance with Section 2.6.1 of this Plan, and place in a cooler with ice. Note sample time and other details on the Sampling Event Summary Sheet (see **Attachment A**). Repeat the sampling process with the remaining containers. For sample bottles which contain a preservative, a clean unpreserved bottle will be used to collect the sample aliquot from the stream, and the contents will then be poured into the preserved bottle.
- When laboratory sample collection is complete, lower the field probe(s) to the sampling depth. Temperature, pH, dissolved oxygen, specific conductance, and turbidity will be recorded. Instruments will be calibrated following the manufacturers' recommendations prior to each

sampling event.

- Allow meter readings to stabilize, then record field parameter measurements on the Sampling Event Summary Sheet.

If the exterior of a sample bottle becomes soiled during sample collection due to highly turbid surface water, the exterior of the bottles will be rinsed with deionized water before placing the sample container in the cooler. Samples will be delivered to the laboratory within 24 hours upon completion of the sampling event.

2.5.2 Macroinvertebrate Sampling

2.5.2.1 Multihabitat Stream Macroinvertebrate Assessment Protocol

Recent ecosystem studies were reviewed to identify appropriate procedures for macroinvertebrate sampling at Black Gut Creek. Results provided in the *2009 Hartman Run/Black Gut Creek Brunner Island Steam Electric Station Benthic Macroinvertebrate Survey Report* (Mountain State Biosurveys, 2009) indicate that Reaches 1 and 2 are dominated by low-gradient stream habitat. As a result, the PADEP Multihabitat Stream Assessment Protocol (PADEP, 2018a) will be used to assess Reaches 1 and 2. A 100-meter reach along the stream where the best available representation of low-gradient habitat is present will be sampled. Within the reach, sampling will include ten (10) D-frame net jabs, distributed relatively equally between available habitats. If there are not equal numbers of each habitat available, the remaining jabs will be distributed among the most abundant habitat type(s) in the reach. Each jab will consist of a 30-inch-long sweep of a 0.3-meter-wide area using the D-frame net. The sampling will be conducted from downstream to upstream locations. Once collected the material will be transferred to a wash bucket to remove large detritus. Once a small amount of detritus remains, the samples will be composited into one sample jar. Organisms are also picked from the net using tweezers. The samples will be preserved with at least 70% ethanol (95% preferred) in the field. Sample jars should only be filled 2/3 full to allow for proper sample preservation.

2.5.2.2 Wadeable Riffle-Run Stream Macroinvertebrate Assessment Protocol

Based on the *2009 Hartman Run/Black Gut Creek Brunner Island Steam Electric Station Benthic Macroinvertebrate Survey Report* (Mountain State Biosurveys, 2009), Reach 3 is dominated by high gradient stream habitat. Therefore, the PADEP Wadeable Riffle-Run Stream Assessment Protocol (PADEP, 2018a) will be used to assess this reach. A 100-meter segment along the stream where the best available representation of riffle-run habitat is present will be sampled. Within the reach, six (6) one-minute kicks will be completed immediately upstream of the D-frame net. Sample kicks are intended to dislodge organisms by aggressively disturbing the stream substrate. The sampler shuffles their feet to disturb riffle-run habitat within about 8 centimeters (cm) of the substrate surface. Each sample kick will disturb about 1 square meter (m^2) of habitat upstream of the net. The sampling will be conducted from downstream to upstream locations. The kicks need to be distributed throughout the 100-meter reach and representative of the variety of riffle-run habitats present. Once collected the material will be transferred to a wash bucket to remove large detritus. Once a small amount of detritus remains, the samples will be composited into one sample jar. Organisms are also picked from the net using tweezers. The samples will be preserved with at least 70% ethanol (95% preferred) in the field. Sample jars should only be filled 2/3 full to allow for proper sample preservation.

2.5.3 Quality Assurance/Quality Control Samples

Quality assurance/quality control samples which are associated with the surface water sampling program shall be collected during each sampling event. It is proposed that approximately three (3) QA/QC samples will be collected during each sampling event, as follows:

- Duplicate - Duplicate samples will be collected in the field by filling two sets of sample bottles at a chosen sample location. Ideally a location should be chosen that is suspected to have a presence of the constituents which are being analyzed by the laboratory for this project. Both sets of containers will be submitted for analysis with one set designated as an "original sample," and the other designated as a "duplicate." The Sample ID will be coded such that the laboratory is not aware as to which original sample the duplicate is associated with (see Section 2.6). Upon receipt of the analytical results, the Contractor will compare the original and duplicate sample data for uniformity/repeatability of the sample collection and laboratory analysis procedures.

- Equipment Blank - Equipment blanks will be collected to evaluate the effectiveness of the equipment decontamination procedures (if applicable); or more commonly if impurities may be introduced with the disposable sampling devices being used for the sample collection process. For this project, it is not anticipated that equipment blanks will be applicable since the sample aliquots are being collected directly into the sample containers without the use of other sampling devices. The process for collecting an equipment blank (if applicable) begins by rinsing the sampling device (decontaminated or new) with organic-free water. The rinse water will then be collected and submitted to the laboratory for analyses of all constituents for which the investigative samples collected with that piece of equipment are being analyzed.

- Matrix Spike/Matrix Spike Duplicate - MS/MSD samples are intended as a quality check on the laboratory analysis procedures and should be collected from a location expected to be relatively free from contamination. The MS/MSD samples will be collected by filling three sets of sample bottles at a chosen sample location. The MS/MSD samples are not treated/coded differently from the associated investigative sample (see Section 2.6) and should be clearly identified as such on the Chain-Of-Custody form. The suite of analysis for the MS/MSD samples will include each of the constituents for the investigative samples of this project, as determined applicable by the laboratory.

It is proposed that one of each type of QA/QC sample identified above will be collected during each sampling event. If the total investigative sample count exceeds twenty (20) in any given sampling event, one additional QA/QC sample of each type shall be collected [and continued for each set of twenty (20) samples collected in a single event].

2.6 FIELD DOCUMENTATION

2.6.1 Sample Identification

Each surface water and macroinvertebrate sample will be identified with a unique identification code (Sample ID) which will include the date of sample collection in numeric format (yymmdd). The Sample ID will also include the stream name (“BGC” for Black Gut Creek and “HMR” for Hartman Run) followed by the sampling event number (“01” for spring 2020, “02” for fall 2020, “03” for spring 2021, and “04” for fall 2021), then the actual sample number per that specific sampling event (01-09). For QA/QC samples,

three-digit alpha codes will replace the stream name for duplicate samples (DUP) and equipment blanks (EQB). MS/MSD samples do not require a separate, intrinsic Sample ID; rather, triple volume will be collected for a specific sample during each event and associated notation will be included on the sample chain-of-custody form to clearly inform the laboratory.

For example, for a spring sampling event occurring on April 1, 2020, the first surface water samples taken at Black Gut Creek would be labeled as:

200401-BGC01-01

The next samples taken during this sample event would be labeled 200401-BGC01-02, 200401-BGC01-03, etc. Multiple bottles from the same sample location will be labeled with the same Sample ID.

Six (6) macroinvertebrate samples will be collected during each sampling event. Macroinvertebrate samples will be identified in a similar manner to the Sample ID format described above including the date, stream name, sampling event number, and actual sample number for the event. If more than one bottle is needed for a sample location then the label will include a sequential number (e.g., 1 of 2).

2.6.2 Sample Labeling

Sample labels for surface water samples will be filled out by the field team to the extent possible prior to sampling. In order to prevent permanent marker from rubbing off the labels, the labeled bottles will be wrapped in clear packing tape. A log of all samples collected will be completed and will contain the information that is labeled on the sample bottles.

Labels will be applied to macroinvertebrate sample bottles in a similar manner, using clear packing tape to protect writing on the outside of the bottles. Internal labels will also be provided, as recommended in the PADEP protocols. Waterproof paper tags will be labeled with the information listed above using indelible ink or pencil and placed inside the sample jars as a backup.

2.6.3 Field Datasheets

A Sampling Event Summary Sheet (see **Attachment A**) will be completed at each surface water sample location. Instantaneous water quality data to include pH, temperature (˚C), dissolved oxygen (mg/L), specific conductance (µS/cm), and turbidity (NTU) is recorded on the sheet. General information (time, date, weather conditions) is also provided. Any additional comments to describe environmental conditions at the time of sampling will be noted.

In accordance with *Water Quality Monitoring Protocols for Streams and Rivers* (PADEP, 2018a) macroinvertebrate sampling events will include completion of several datasheets. Flowing Waterbody Field Data Forms will be completed with each macroinvertebrate sample to document stream conditions at the time of sampling. The forms provide information describing the sample location, surrounding land use, canopy cover, water appearance, potential impairments, and any other concerns. In addition, Physical Habitat Evaluation Forms will be completed. In general, the purpose of physical habitat evaluation is to identify limitations that are due to existing conditions. Instream conditions listed on the forms are rated as excellent, good, fair, or poor using numeric values, and values are tallied for a total habitat score. Data forms specific to low-gradient and high-gradient streams will be used. **Attachment A**

provides copies of the data forms to be completed during macroinvertebrate sampling.

Datasheets will be submitted to the Sampling Coordinator upon completion of each sampling event. Each sampling team will also be equipped with a field book to record additional comments and observations at the time the samples are taken.

2.7 SAMPLE SHIPPING AND CHAIN OF CUSTODY

The following guidelines present a method for chain-of-custody procedures to track sample shipments, to minimize loss or misidentification of samples, and to discourage unauthorized persons from tampering with collected samples. Surface water samples will be shipped to a designated laboratory for analysis (see Section 2.9 and 3.1). Shipping to the laboratory will be in accordance with the following procedure:

1. Fill out the sample chain-of-custody form completely (an example is provided in **Attachment B**) with all relevant information (the original sheet goes with the samples and should be placed in a "Ziploc" plastic bag and taped inside the sample cooler lid; and secondary sheets or copies should be retained by the sampler).

2. Mark liquid volume levels on the water sample bottles with a grease pencil.

3. Place about 3 inches of inert cushioning material such as Styrofoam peanuts or bubble pack in the bottom of the cooler. Place sample bottles in the center of the cooler.

4. Cover water sample bottles with ice in "Ziploc" plastic bags. As needed, pack the cooler with blue ice and additional cushioning material.

5. Tape the cooler drain shut and wrap the cooler completely with strapping tape to secure the lid.

Place the laboratory address on top of the cooler. To protect coolers against tampering during shipment, cooler lids will be taped to cooler bodies. A chain-of-custody seal will be placed over the tape. A broken seal will indicate that the contents may have been tampered with. Surface water samples will be transported immediately upon collection and packing. The Contractor may elect to transport the samples via overnight courier, hand-off to a laboratory courier, or drop-off directly at the laboratory facility.

Macroinvertebrate samples will be processed by a taxonomic expert. A chain-of-custody form for macroinvertebrates (included in **Attachment B**) will be completed to document shipping and receiving if necessary. Sample bottles would be packed in coolers with cushioning material, as described in the procedures for surface water samples. However, ice would not be used for macroinvertebrate sample preservation. Coolers will be secured with packing tape prior to shipment with chain-of-custody seals placed over the tape.

2.8 EQUIPMENT DECONTAMINATION

No decontamination of sample bottles is required, since all sample bottles used in the field for sampling will be newly prepared. Sampling meter probes will be rinsed with deionized water after sampling at each location and prior to additional sample collection.

2.9 SUBMISSION OF SAMPLES TO LABORATORIES

Surface water samples will be delivered to a designated laboratory, and macroinvertebrate samples will be delivered to a taxonomic expert if necessary. The following key points regarding sample submission will be addressed by all parties:

- All surface water samples will be submitted in bottles provided by the designated laboratory. For discrete samples, the chain-of-custodies will be completed immediately upon collection of the samples by the Contractor.
- The Contractor will prepare bottles with ethanol solution to be used for macroinvertebrate sample collection.
- All surface water samples must be submitted for analysis within 24 hours of collection.
- Macroinvertebrates in ethanol solution are not subject to holding times. Macroinvertebrate samples will be delivered concurrent with surface water samples.
- All surface water samples must be packed in coolers with ice after collection.
- The Contractor is responsible for coordinating pick-up and/or delivery of all samples. The Contractor will ensure that the designated laboratory has made appropriate arrangements to receive or take custody of the samples out-of-hours as required by the date and time of occurrence of the sampling event. The field teams are responsible for transporting all samples to the field station/staging area and submitting all samples in appropriate containers with appropriate labeling and chain-of-custody forms to the designated laboratory immediately after the event.
- The Contractor is responsible for record keeping and for coordinating with the designated laboratory/taxonomic expert for the sample analysis.
- Sample results will be provided by the designated laboratory/taxonomic expert to the Contractor in a format specified by the Contractor.

Section 2.7 contains the sample shipping procedures that will be followed by the Contractor, and **Attachment B** presents example chain-of-custody forms.

2.10 EQUIPMENT CALIBRATION AND MAINTENANCE PROTOCOLS

All equipment will be programmed to the clocks of cellphones of the field team. As part of the pre-sampling staging before a sampling event, all meter probes carried into the field by the field team will be checked for calibration following the manufacturers' recommendations.

3.0 Laboratory Analysis

3.1 DESIGNATED LABORATORIES

The Contractor will designate a laboratory for surface water sample analysis prior to initiation of the sampling program. The laboratory will be accredited by the Pennsylvania Laboratory Accreditation Program. The laboratory's list of certifications will be checked to ensure that the required analyses can be completed.

Macroinvertebrate sample identification and analysis will be performed by a taxonomic expert designated by the Contractor prior to the start of the sampling program. The Contractor will provide proof of expertise for the taxonomic expert (training, experience, etc.) in the Monitoring and Assessment Report.

3.2 ANALYTICAL METHODS

3.2.1 Surface Water Sampling

Table 2 details the parameters and the associated analytical methods that will be applied for the surface water sample analyses. Analytical methods and holding times may vary based on the techniques employed by the designated laboratory.

Table 2: Surface Water Sample Analysis

Parameter	Method	Holding Time
Constituents of Concern [(1)]		
pH	SM4500H+B	Immediate
total dissolved solids (TDS)	SM2450C	7 Days
chloride	EPA 300.0	28 Days
fluoride	EPA 300.0	28 Days
sulfate	EPA 300.0	28 Days
hardness	E200.7/SM2340B	6 Months
aluminum	EPA 200.7	6 Months
antimony	EPA 200.8	6 Months
arsenic	EPA 200.8	6 Months
barium	EPA 200.8	6 Months
beryllium	EPA 200.8	6 Months
boron	EPA 200.7	6 Months
cadmium	EPA 200.8	6 Months
calcium	EPA 200.7	6 Months
chromium	EPA 200.8	6 Months
cobalt	EPA 200.8	6 Months
iron	EPA 200.7	6 Months
lead	EPA 200.8	6 Months
lithium	EPA 200.7	6 Months
manganese	EPA 200.8	6 Months
mercury	EPA 245.1	28 Days
molybdenum	EPA 200.7	6 Months
nickel	EPA 200.8	6 Months
potassium	EPA 200.7	6 Months
selenium	EPA 200.8	6 Months
sodium	EPA 200.7	6 Months
thallium	EPA 200.8	6 Months

Parameter	Method	Holding Time
Additional Parameters		
temperature	SM2550B	Immediate
dissolved oxygen	SM4500-O G	Immediate
specific conductance	SM2510B	28 days

(1) Complete list of "Constituents of Concern" as defined in Section VII of the CD.

For the metal constituents, testing and reporting shall include "total" and "dissolved" concentrations. It is proposed that the requisite filtering process for the dissolved analysis be performed by the designated laboratory; however, the Contractor may elect to perform this step in the field during the sample preparation process.

3.2.2 Macroinvertebrate Sampling

Organisms will be sorted and counted under microscope. All organisms will be identified to the lowest practical taxonomic level (genus) except *Chironomidae*, which will be identified to the family level. Once the raw biological data is available, analysis is performed to characterize habitat quality across the site. Following the procedures described in PADEP's *Assessment Methodology for Rivers and Streams* (PADEP 2018b), sample data is reduced to the following metrics:

Wadeable Riffle-Run Stream Macroinvertebrate Assessment Method

1. Taxa Richness - The total number of unique taxa in the sample. Metric values decrease as water quality and habitat quality decrease.
2. % Ephemeroptera, Plecoptera and Trichoptera (EPT) Abundance [Pollution Tolerance Values (PTVs) 0-4 only] - The percent of organisms in the sample that are EPTs with PTVs of 0 – 4, excluding the most tolerant mayfly and caddisfly. Metric values decrease as water quality and habitat quality decrease.
3. Beck's Index (Version 3) - A taxonomic richness and tolerance metric that is a weighted count of taxa with pollution tolerance values of 0, 1, or 2. Metric values are expected to decrease in value with increasing anthropogenic stress.
4. Shannon Diversity - A community composition metric that measures taxonomic richness and evenness of individuals across taxa of a sub-sample. Metric values are expected to decrease in value with increasing anthropogenic stress.
5. Hilsenhoff Biotic Index (HBI) - A tolerance value is given to each genus and summed for the assemblage using the following equation:

$$\mathbf{HBI = x_i t_i / n}$$

where:

x_i = number of individuals within genera i

t_i = tolerance values for genera i

n = total number of organisms in the sample

Metric values increase as organic pollution increases.

6. % Sensitive Individuals (Pollution Tolerance Values 0-3 only) - A community composition and tolerance metric that is the percentage of individuals with pollution tolerance values of 0 - 3. Expected to decrease in value with increasing anthropogenic stress.

Wadeable Multihabitat Stream Macroinvertebrate Assessment Method

1. EPT - The total number of unique taxa in the Ephemeroptera, Plecoptera and Trichoptera orders. Metric values decrease as water quality and habitat quality decrease.
2. Taxa Richness - The total number of unique taxa in the sample. Metric values decrease as water quality and habitat quality decrease.
3. Beck 4 - A pollution weighted taxa richness measure, based off HBI. Taxa with an HBI score of 0 or 1 are given 2 points and HBI scores of 2, 3, or 4 are given 1 point. In the tables, scores of 0 and 1 are highlighted in blue and scores of 2, 3, and 4 are highlighted in purple.
4. Shannon Diversity - A community composition metric that measures taxonomic richness and evenness of individuals across taxa of a sub-sample. Metric values are expected to decrease in value with increasing anthropogenic stress.
5. Number of Mayfly Taxa - A sum of the number of Mayfly taxa present.
6. Number of Caddisfly Taxa - A sum of the number of Caddisfly taxa present.

Aquatic life use attainment is determined from comparing the use attainment benchmark to the total biological score. The total biological score is calculated from the six metrics listed above. If the scores are below this threshold then the stream is impaired. If the score is greater than or equal to the benchmark, then the stream is attaining. The aquatic life use benchmark for multihabitat streams (low gradient) is 55 (10^{th} percentile). The aquatic life use benchmarks for riffle-run streams (high gradient) are divided into four categories. Aquatic life use above 80 are high quality, 63 - 80 is attaining, 62 – 50 is a gray zone, and below 50 is considered impaired.

3.3 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL

All quality control sample analytical results will be reported on standard forms in conjunction with data acceptance criteria. The designated laboratory will submit a detailed Quality Assurance Project Plan (QAPP) for review by the Contractor prior to initiation of the sampling program.

For the Macroinvertebrate samples, Quality Assurance/Quality Control will be applied to selected samples for both the matrix processing and taxonomic identification phases of the analysis. One sample in ten will be re-processed and re-analyzed. For processing, randomly selected samples will be independently re-sorted to determine the efficiency of both taxa and specimen removal. The results are considered acceptable if standards of 90 percent are attained. For taxonomy, selected samples are re-analyzed by a second SFS Certified Biologist to determine the accuracy of the identifications. The results are considered acceptable if 90 percent or more of the original identifications are confirmed.

4.0 Data Submission and Reporting

4.1 SAMPLING EVENT DATA

Following each sampling event, the surface water sample data will be submitted to PADEP and the

Citizens within 90 days of sampling. Surface water quality data will be provided in raw format, as received from the designated laboratory. No analysis of the data or reporting is planned as part of the regulatory submission process following each sampling event.

4.2 MONITORING AND ASSESSMENT REPORT

Upon completion of the two-year monitoring period (2020 to 2021), a comprehensive Monitoring and Assessment Report will be prepared. Information in the report will include data and analysis results for macroinvertebrates, surface water sampling of constituents of concern (COC), and water quality parameters identified in the PADEP *Water Quality Monitoring Protocols for Streams and Rivers* (PADEP, 2018a) as outlined in Section 3.2 of this Plan. The report will summarize and compare the information collected for each of the sampling events as well as provide an overarching analysis of the data trends and recommendations for further actions, as applicable.

The Monitoring and Assessment Report will be provided to PADEP and the Citizens within six (6) months of the final sampling event (estimated for November 2021), with an anticipated submittal in May 2022. The report will be submitted in electronic format (PDF) and, if requested, hard copy format. The PDF may be shared via FTP or another similar secured document sharing method.

5.0 Contractor Responsibilities

The Contractor is responsible for:

- Development and implementation of a health and safety plan (HASP) for use during the 2-year ecosystem sampling program;
- Providing staff and equipment for the field sampling team as defined in this Plan;
- Acquiring all sampling equipment, including sampling bottles, buckets, field books, probes, preservatives, shipping materials, etc.;
- Providing a Sampling Coordinator to coordinate sampling activities from the staging area;
- Notification to the Sampling Coordinator should conditions warrant, field equipment malfunction or other issues arise that may affect the sampling effort;
- Equipment decontamination between sampling locations and events;
- Maintenance and calibration of equipment;
- Proper labeling of all samples;
- Record keeping for the sampling event and sample submission, inclusive of chain-of-custody records;
- Coordinating pickup and/or delivery of samples with the laboratories;
- Compilation of surface water and macroinvertebrate analytical data;
- Providing surface water analytical data to PADEP and the Citizens within 90 days of sample events; and
- Preparation of a Monitoring and Assessment Report and submission to PADEP and the Citizens within six (6) months of completing the 2-year ecosystem sampling activities.

5.1 VARIATIONS FROM THE PLAN

During implementation of this Plan, should the location of any sampling point require to be altered due to unanticipated conditions in the field, or similar circumstances occur which require a variance to the

procedures presented in this Plan, the Sampling Coordinator will be notified as soon as practical. Depending upon the nature of the variance, the Sampling Coordinator will make a field determination or consult with Talen and Brunner representatives (and/or their designated affiliates). Additionally, representatives of PADEP and the Citizens will be contacted as the circumstances warrant.

6.0 Health and Safety

The Contractor must be committed to conducting business in a way that is proactive about protecting the health and safety of its employees, subcontractors, clients, and the community. The Contractor will operate on the premise that all accidents and injuries are preventable. The goal is to implement the work plan with no harm to people and no damage to the environment. The Contractor will ensure that all field team members conduct the work safely and will prepare and implement a HASP to govern the safe execution of the work scope presented in this Plan.

6.1 TRAINING AND QUALIFICATIONS

To minimize potential health and safety risks, members of the field team must be physically able to conduct fieldwork under demanding conditions and be well prepared to handle contingencies or emergencies. Suggested requirements for field team members include a recent physical examination, cardiopulmonary resuscitation (CPR) certification, and Red Cross First Aid Training.

6.2 RESPONSIBILITIES OF THE FIELD TEAM

The Sampling Coordinator is responsible for ensuring that the field team follows safe work practices. Recommended responsibilities of the Sampling Coordinator include:

- Instructing and supervising the field team such that travel to, and sampling at a given site are done in a manner that minimizes health and safety risks;
- Ensuring that vehicles and sampling equipment are in safe operating condition prior to and during sampling events;
- Ensuring that all team members are fully aware of any potentially hazardous materials used as a part of sampling (e.g., preservatives for surface water sample containers);
- Determining whether sampling conditions are safe and appropriate;
- Informing the field team of any situation-specific dangers involved at a given site; and
- Ensuring that samples and sampling equipment are safely stored.

The field team should be aware of potential risks involved with sampling. When unsafe conditions are observed, team members should inform the Sampling Coordinator at the earliest opportunity. Also, team members should notify the Sampling Coordinator if, for any reason, they are unable to perform an assigned task in a safe manner. Examples include sickness, physical limitations, or uncertainty about the proper operation of the sampling equipment. Field team members should also inform the Sampling Coordinator of any allergies, special medications, or special needs.

7.0 References

Mountain State Biosurveys, LLC. Benthic Macroinvertebrate Survey Report Hartman Run/Black Gut Brunner Island Steam Electric Station. 2009. 37 pages with appendices.

Pennsylvania Department of Environmental Protection (PADEP). 2018a. *Water Quality Monitoring Protocols for Streams and Rivers*. Office of Water Programs, Bureau of Clean Water. 2-3, 3-2 to 3-7, and 3-13 to 3-18.

Pennsylvania Department of Environmental Protection (PADEP). 2018b. *Assessment Methodology for Rivers and Streams*. Office of Water Programs, Bureau of Clean Water. 2-2 to 2-24, and 2-36 to 2-44.

Attachment A

Field Datasheets

Sampling Event Summary Sheet
Initials:
Project:
Sampling Team:
Date:
Weather:
Temperature:

Sampling Location	Time	Field Parameter	Measurement	Physical Observations	Comments
		DO (mg/L)		Grease	
		Temperature (˚C)		Floatables	
		conductivity (µS/cm)		Odors	
		pH			
		Turbidity (NTU)			
		DO (mg/L)		Grease	
		Temperature (˚C)		Floatables	
		conductivity (µS/cm)		Odors	
		pH			
		Turbidity (NTU)			
		DO (mg/L)		Grease	
		Temperature (˚C)		Floatables	
		Conductivity (µS/cm)		Odors	
		pH			
		Turbidity (NTU)			

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

FLOWING WATERBODY FIELD DATA FORM

(Information and comments for fields boxed in double lines are required database entries. Other fields are optional for personal use.)

Date-Time-Initials* Example 20040212-0312-XYZ	- - Date Time Initials	**Watershed Code (HUC)**	**Stream Code**	**Ch. 93 Use**
Secondary Station ID		Surveyed by:		

*Date as YYYYMMDD, time as military time, and your initials uniquely identify the stream reach.

SWP Watershed

Survey Type

(1) Basin Survey, (2) Cause / Effect, (3) Fish Tissue, (4) Instream Comprehensive Evaluation [ICE], (5) Point-of-First-Use, (6) SERA, (7) Antidegradation [Special Protection], (8) Toxics, (10) Use Attainability, (11) WQN, (12) Limestone, (13) Low-gradient [Multihabitat]

Location

County:		**Municipality:**		**Topo Quad:**	

Location Description:

Landuse

Residential:	%	Commercial:	%	Industrial:	%	Cropland:	%	Pasture:	%
Abd. Mining:	%	Old Fields:	%	Forest:	%	Other:	%		

Landuse Comments:

Canopy cover: open partly shaded mostly shaded fully shaded

Water Quality

	Collector-sequence #	Field Meter Readings: Temp (^{0}C)	DO (mg/L)	pH	SPC (umhos)	Alkalinity mg/l	Bottle Notes (N-normal, MNF-metals non-filtered, MF-metals filtered, B-bac't, Others: indicate)
1.							
2.							
3.							

Water Appearance/Odor Comments: (^see bottom of back for common descriptors)

Findings

Not Impaired:	☐	Impaired biology?	☐	Impaired habitat?	☐	Is impact localized?	☐	Reevaluate designated use?	☐

Decision comments. Describe the rationale for your "Not Impaired" or "Impaired" decision; reach locations for use designation reevaluations; special condition comments; etc.:

IBI Score:		**Total Habitat Score:**	

Macroinvertebrate sampling
Sampling method: Std. kick screen: ☐ D-frame: ☐ Other: ☐ method?: _____
Comments/Abundance Notes:

Habitat Impairment Thresholds	Metric Score
#3 Riff/Run: embeddedness *or* #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or less *(20 or less for warm water, low gradient streams)*	
#9 Condition of Banks + #10 Bank Vegetation = 24 or less *(20 or less for warm water, low gradient streams*	
Total habitat score 140 or less for forested, cold water, high gradient streams *(120 or less for warm water, low gradient streams)*	
Habitat Comments:	

Special Condition
Use this block to describe conditions that justify attainment/impairment of stations with IBI score <63 and >53.

^Common descriptors: Water Odors - none normal sewage petroleum chemical other; **Water Surface Oils -** none slick sheen globs flecks; **Turbidity -** clear slight turbid opaque; **NPS Pollution** - no evidence some potential obvious; **Sediment Odors -** none normal sewage petroleum chemical anaerobic; **Sediment Oils -** absent slight moderate profuse; **Deposits –** none sludge sawdust paper fiber sand relict shells other. **Are the undersides of stones deeply embedded black?**

Physical Habitat Evaluation Form for Low Gradient (Pool/Glide) Streams

Waterbody Name:	GIS Key (YYYYMMDD-hhmm-User):
Location:	
Investigators:	Completed By:

Parameter	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale)	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	20 19 18 17 16	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	20 19 18 17 16	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 18 17 16	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
5. Channel Flow Status	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 18 17 16	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**

Parameter	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
	20 19 18 17 16	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
7. Condition of Banks	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly sealed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	20 19 18 17 16	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
8. Bank Vegetative Protection	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in stubble height.
_____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
9. Riparian Vegetative Zone	Width or riparian zone >18 meters; human activities (i.e. parking lots, roadbeds, clear-cuts, lawns or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
_____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**

Physical Habitat Evaluation Form for Riffle/Run Prevalence

Waterbody Name:	GIS Key (YYYYMMDD-hhmm-User):
Location:	
Investigators:	Completed By:

Parameter	Optimal	Suboptimal	Marginal	Poor
1. Instream Cover (Fish)	Greater than 50% mix of boulder, cobble, submerged logs, undercut banks, or other stable habitat.	30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.	10-30% mix of boulder, cobble, or other stable habitat; habitat availability less than desirable.	Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is obvious.
_____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
2. Epifaunal Substrate	Well-developed riffle and run; riffle is as wide as stream and length extends two times the width of stream; abundance of cobble.	Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common.	Run area may be lacking; riffle not as wide as stream and its length is less than 2 times the stream width; gravel or large boulders and bedrock prevalent; some cobble present.	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.
_____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
3. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
_____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
4. Velocity/Depth Regimes	All four velocity/depth regimes present (slow-deep, slow shallow, fast-deep, fast shallow)	Only 3 of the 4 regimes present if fast-shallow is missing, score lower than if missing other regimes.)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes).	Dominated by 1 velocity/depth regime (usually slow-deep).
_____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
5. Channel Alteration	No channelization or dredging present.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e. dredging (greater than 20 yr.) may be present, but recent channelization is not present.	New embankments present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement over 80% of the stream reach channelized and disrupted.
_____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
6. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar information, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel coarse sand on old and new bars; 30-50% of the bottom affected; sediment deposits at obstruction, construction and bends, moderate depositions of pools prevalent.	Heavy deposits of fine material increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
_____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**

Parameter	Optimal	Suboptimal	Marginal	Poor
7. Riffle Frequency	Occurrence of riffles relatively frequent;; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream equals 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is >25.
_____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
8. Channel Flow Status	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
_____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
9. Condition of Banks	Banks stable; no evidence of erosion or bank failure.	Moderately stable; infrequent, small areas of erosion mostly healed over.	Moderately unstable; up to 60% of banks in reach have areas of erosion.	Unstable; many eroded areas; “raw” areas frequent along straight sections and bends; on side slopes, 60-100% of bank has erosional scars.
_____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
10. Bank Vegetative Protection	More than 90% of the stream bank surfaces covered by vegetation.	70-90% of the stream bank surfaces covered by vegetation.	50-70% of the stream bank surfaces covered by vegetation.	Less than 50% of the stream bank surfaces covered by vegetation.
_____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
11. Grazing or Other Disruptive Pressure	Vegetative disruption through grazing or mowing is minimal or not evident; almost all plants allowed to grow naturally.	Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	Disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Disruption of stream bank vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
_____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
12. Riparian Vegetative Zone	Width or riparian zone >18 meters; human activities (i.e. parking lots, roadbeds, clear-cuts, lawns or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
_____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**

TOTAL _____

Attachment B

Example Chain of Custody Forms

Environmental Analysis Request/Chain of Custody

eurofins | Lancaster Laboratories Environmental

Acct. # ______________ Group # ____________________ Sample # ____________________________

Client:		Matrix				Analyses Requested	For Lab Use Only
Project Name/#:	Site ID #:					Preservation and Filtration Codes	SF #: ___________
Project Manager:	P.O. #:						SCR #: ___________
Sampler:	PWSID #:						
Phone #:	Quote #:						
State where samples were collected: ____	For Compliance: Yes ☐ No ☐						

Sample Identification	Collection Date	Collection Time	Grab	Composite	☐ Soil ☐ Sediment ☐ Tissue	Water: ☐ Potable ☐ NPDES ☐ Ground ☐ Surface	Other:	Total # of Containers											Remarks

Preservation Codes

H = HCl	T = Thiosulfate
N = HNO_3	B = NaOH
S = H_2SO_4	P = H_3PO_4
F = Field Filtered	O = Other

Turnaround Time Requested (TAT) (please check): Standard ☐ Rush ☐

(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed:

Rush results requested by (please check): E-Mail ☐ Phone ☐

E-mail Address:

Phone:

Data Package Options (please check if required)

Type I (Validation/non-CLP)	☐	MA MCP	☐
Type III (Reduced non-CLP)	☐	CT RCP	☐
Type VI (Raw Data Only)	☐	TX TRRP-13	☐
NJ DKQP	☐	NYSDEC Category	☐ A or ☐ B

EDD Required? Yes ☐ No ☐ If yes, format: _____________

Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

Relinquished by Commercial Carrier:

UPS _______ FedEx _______ Other ____________

Temperature upon receipt ____________ °C

Benthic Macroinvertebrate Sample Chain-of-Custody Sheet

Site ID	Collector (Print)	Collection Date (DD/MM/YY)	Date Delivered to Office for ID (DD/MM/YY)	Relinquished By (Print)	Received By (Print)

Comments:

_____

_____

_____