MEMORANDUM

TO: U.S. Army Corps of Engineers, Baltimore District and Maryland Department of the Environment
DATE: October 9, 2019
FROM: JMT
RE: Eccleston Mitigation Site
Additional Stream Restoration Justification

Background and Data Collection:

On September 26, 2019, JMT met with the U.S. Army Corps of Engineers (USACE) and the Maryland Department of the Environment to discuss establishing the Eccleston Mitigation Site as a permittee-responsible stream and wetland mitigation site. Pursuant to a request made by USACE at this meeting, JMT is providing additional information and justification for stream channel restoration at this site, to be considered by the agencies while evaluating proposed mitigation credit ratios.

The Eccleston restoration plan, as presented in the August 2019 Compensatory Mitigation Plan for the I-95 Phase II ETL Northbound Extension project, includes multiple first order tributaries proposed for restoration within the floodplain of the Jones Falls. Additionally, significant second- and third-order tributaries are proposed for restoration, with increased sinuosity and relocation of channels to more closely reflect a pre-settlement condition. All proposed channels would be sinuous C4 Rosgen stream types, low gradient, with gravel bed and facet feature development. Preliminary design of the minor tributaries estimates these features as approximately 2 feet wide and approximately 0.5 feet deep in riffles, with geometry varying in width and depth at pool facet features. Larger second- and third-order tributaries follow similar design as the mainstem but scaled to size. All of the proposed channels would be situated in the basal gravel layer of the valley, in contact with the groundwater table as modeled through trenching and soil investigation performed in the summer of 2018.

Proposed Channel Morphology and Habitat Elements

The proposed channels are designed to be jurisdictional, perennial stream channels with defined bed and banks, as well as a defined baseflow. These channels are anticipated to have varied base and storm flows contributed to by precipitation as well as seasonal groundwater discharge. Woody debris and living plant matter would be key habitat and structural elements in these channels, fostering not only diverse bed forms but also overhead cover, shading, and flow diversity.

Basis for Restoration

JMT anticipates that the proposed channels will fulfil vital functions in the watershed, based on the following evidence:

- The existing channels have been severely altered since pre-settlement conditions by historic damming, straightening, and legacy sediment impacts. Trenching analysis performed in the Eccleston floodplain as well as within similar nearby piedmont floodplains shows evidence of a pre-settlement floodplain surface and basal gravel layer with a bumpy, hummocked and diverse landscape which held multiple water features, including oxbows, braided channels, and small side tributary channels. The proposed design would recreate many of these features.
- Prior to European settlement, a cold-water freestone stream in the piedmont would have likely been a native brook trout (*Salvelinus fontinalis*) fishery. Brown trout (*Salmo trutta*), being a more tolerant species, have replaced the native species in the contemporary era. Both species require a diverse gravel and cold-water system, including not only mainstem large-scale habitats (e.g., deep pools, overhead cover, flow diversity and similar habitats) for mature fish, but also other habitats for rearing and refugia for juvenile fish. This is supported by analysis of the Eccleston fish shocking data, where small fish were found attempting to utilize small tributaries connected to spawning grounds as well as pockets of the stream with suitable temperatures. Although a very small number of fish was observed utilizing these areas, this data is important in characterizing potential tributary value at the site. Suitable tributary trout habitat is no longer common, having been heavily altered by agricultural conversion and related drainage impacts throughout the Chesapeake Bay watershed; the proposed restoration would provide an increase in such habitat.
- The tributaries located within the Eccleston site provide an opportunity to observe side channel habitats with hydrologic sources distinct from the mainstem of Jones Falls. Such reaches can be used for comparison of biological and physiochemical data in catchments which are completely under the control of the mitigation conservation easement, providing opportunity for scientific research and discovery.
- Such tributaries, being strongly groundwater-connected, provide resiliency opportunities for the fishery, including continual cold-water input to the mainstem of the Jones Falls, refugia from high flows on the Jones Falls or potential pollution events within the mainstem, and other buffering potential for unfavorable water quality events.
- These small-scale systems will be monitored for thermal, biological, and geomorphic conditions. While it is expected that their conditions will be favorable following restoration, they are expected to have different properties than the mainstem of the Jones Falls or the larger tributaries, exhibiting different functions and values.
- The significant tributaries to the Jones Falls have suffered agricultural drainage and conversion impacts similar to that experienced by Jones Falls, including trenching and straightening for optimal drainage and capacity. Under the proposed design, these tributaries would be lengthened by increasing sinuosity, and their confluence with the Jones Falls would be moved downstream slightly to provide a transitional reach in the Jones Falls floodplain for refugia, sheltering, and habitat reasoning.
- Restoration of all tributary and mainstem streams has been designed using sinuosity reflective of natural reference trout streams located within an approximately 30-mile radius of the site. Therefore, their lengths are justifiable within the conventional design precedents of Rosgen Natural Channel design, which has been a mainstay of stream mitigation in this USACE district since the 1990s.

- The following is design justification for specific tributaries identified by the USACE:

    - The proposed location of SR-2 re-establishes the historic downstream connection to the Jones Falls mainstem. Historic aerial photographs demonstrate that the current channel position has resulted from straightening and shortening of the reach.

    - The proposed design of the SR-4B(1-3) threaded channels re-locates the channel confluence further upstream than the position shown in the JD. This results in a loss of length of the existing braided area, but provides for braided features as well as functions of sediment sorting and routing. Credit would be calculated using only the most sustainable/dominant channels. These credits should provide suitable compensation for impacts to similar small order perennial stream systems due to the enhanced functions and values they provide.

    - SR-5A is proposed as an intermittent stream which will receive groundwater baseflow from the quarry seasonally. It will also receive some stormwater/runoff discharge from upland areas; however, this will result in only minor fluctuations in flow, due to the small catchment area. It will provide additional seasonal flow to SR-5B. This system is proposed as compensation for impacts to intermittent resources. It is unlikely to provide fish passage into the quarry, allowing that semi-isolated wetland system to retain its functional qualities.

Monitoring and Assurances of Stream Restoration

- All of the smaller created channels will be monitored per the special conditions of the permit, and expected to perform with similar, though different, biological compositions reflective of their differing properties.
- Biological, thermal, and geomorphic monitoring are proposed for all of the smaller created channels, similar to any other restored jurisdictional Waters of the U.S.
- Shading of all stream channels in the restoration is a long-term goal. The smallest of these channels can be shaded with herbaceous cover alone; however, trees and shrubs are proposed throughout the systems to ensure the long-term goal of reforestation and canopy coverage is met.

Impacted Streams and Stream Quality

The creation, restoration and preservation of streams and wetlands proposed at the Eccleston site will result in higher quality resources than the ones being impacted by Phase II of the I-95 ETL Northbound Extension project. The quality of impacted resources is summarized below.

- Of the 13,213 linear feet of stream impacts requiring compensatory mitigation, 7,155 linear feet are intermittent and 6,058 linear feet are perennial.
- The impacted systems were classified with respect to quality as either low, moderate or high. The breakdown for intermittent and perennial streams by quality is as follows:
    - Intermittent low quality = 3,779 linear feet (27.1%)
    - Intermittent moderate quality = 3,614 linear feet (27.1%)
    - Perennial low quality = 2,202 linear feet (16.7%)

  - Perennial moderate quality = 3,327 linear feet (24.6%)
  - Perennial high quality = 601 linear feet (4.5%)
- Based on the above 43.8% of the impacted streams are low quality, 51.7% of the impacted streams are moderate quality and 4.5% of the impacted streams are high quality.

Required Wetland Mitigation

The wetland creation amounts required to satisfy No Net Loss are summarized below. Any wetland creation amounts for emergent or scrub-shrub systems not satisfied by in-kind creation will be mitigated for using a higher quality type of system (i.e., PFO).

PEM = 31,038 square feet (0.71 acre)
PSS = 15,126 square feet (0.35 acre)
PFO = 267,558 square feet (6.14 acres)
PFO/PEM = 4,596 square feet (0.11 acre)

Conclusion

The proposed creation, restoration and preservation of stream reaches and wetlands being proposed at the Eccleston site will result in resources of higher quality than those being impacted by Phase II of the I-95 ETL Northbound Extension project. Therefore, based on the above justification, JMT proposes that the Eccleston stream and wetland mitigation should receive credit at the following ratios:

- Stream mitigation:
  - Perennial stream preservation: 10:1 ratio yielding 146 linear feet of stream credit
  - Intermittent stream creation: 1.25:1 ratio yielding 112 linear feet of stream credit
  - Perennial stream restoration and/or creation: 1:1 ratio yielding 7,957 linear feet of stream credit
  - Intermittent and perennial stream buffer enhancement and preservation: 4:1 ratio yielding 2,389 linear feet of stream credit (credit ratio based on guidance received from USACE and MDE); 9,555 linear feet of preserved and restored stream would be buffered by an average of 150 feet.

- Wetland mitigation:
  - PEM preservation: 10:1 ratio yielding 5,227 square feet (0.12 acres)
  - PEM enhancement: 3:1 ratio yielding 4,792 square feet (0.11 acres)
  - PFO preservation: 10:1 ratio yielding 19,602 square feet (0.45 acres)
  - PFO enhancement: 3:1 ratio yielding 43,560 square feet (1.00 acres)
  - PFO restoration: 1:1 ratio yielding 568,458 square feet (13.05 acres)
  - Wetland removal: 1:1 ratio yielding -9,583 square feet (-0.22 acres)

Using the credit ratios above, the Eccleston site will produce 10,605 linear feet of stream credit and 14.5 acres of wetland credit to offset stream impacts from the I-95 ETL Northbound Extension Project.