September 11, 2015

Nicole Zacharda, MDEQ Water Resources Division, Enforcement Specialist

From: Will Harman, PG, Stream Mechanics, PLLC
Richard Baron, Esq. Foley, Baron, Metzger, & Juip, PLLC

Re: SEP Proposal: Letter Report and Recommendations for a Supplemental Environmental Project

The following letter report is submitted to meet the requirements of the Scope of Work (SOW) submitted on April 7, 2015 and attached to this report as Appendix 1. The letter report follows the format of the SOW and includes the following sections: 1. Review Existing Information, 2. Qualitative River Assessment, 3. Meeting with Plaintiff’s Experts and Member of the Implementation Team (IT), and 4. Recommendations for River Enhancement.

The purpose of this letter report is to determine if project reaches along the Boardman River could benefit from river enhancement work. If so, a SEP would be proposed to the MDEQ as part of the ongoing enforcement action in which the State is seeking to have the City enter into an Administrative Consent Order to conduct work and for monetary compensation. The Study Reach for this report is defined in a Settlement Agreement between the plaintiffs and the City as the distance from the former dam location on Brown Bridge Pond to the downstream end of the Downer property.

This letter report will conclude in Section 4 that river enhancement work and a SEP would benefit river function. This may seem contrary to the conclusions in the Boardman River Assessment report, written by Stream Mechanics and published in March, 2015, which reported that the Boardman River was recovering from the temporary dewatering structure failure. The report recommended that the City not be required to conduct restoration activities because the river was sufficiently transporting the sediment load and maintaining an overall riffle-pool sequence. However, the report also noted that recreational management of the river for paddling had removed significant quantities of large wood. The large woody debris assessment showed that wood levels in the Study Reach were much lower than upstream, un-managed sections and that bed form diversity was lacking in long riffles as a result. Finally, the report showed that homeowners along the river removed riparian vegetation, creating lawn conditions to the river’s edge. This can create bank instability in localized cases. Therefore, this effort tried to find areas that could benefit from the addition of wood and bank stabilization efforts in managed lawns to expedite river recovery. The effort also looked for long riffles that could benefit from wood placement and improved bed form diversity. Section 4 will show potential enhancement locations and a conceptual plan.
1: Review Existing Information

The Boardman River Assessment includes a detailed geomorphology assessment completed by Stream Mechanics and members of the IT. The report also includes a summary of benthic macroinvertebrate, temperature and fish assessments that were provided in other reports. At the time this report was published, the 2014 fish sampling results by the Michigan Department of Natural Resources (DNR) had not been published. The 2014 report has since been published and the results are summarized below.

The DNR sampled fish at the Brown Bridge Road crossing in August of 2014 (Hettinger, 2015). Results showed a 367% increase in brook trout populations from before the dam was removed in 2010 to 2014. There were six brook trout sampled in 2010, 58 in 2013, and 28 in 2014. The increase in brook trout numbers is attributed to dam removal and the resulting lower water temperatures. The report cited Rouse and Largent (2013), which showed that temperature downstream of the dam went from being 4-7°F warmer than upstream conditions, to 1-3°F cooler. No explanation is provided about why brook trout numbers were almost 52% lower in 2014 than in 2013.

Brown trout showed an opposite trend than brook trout with an 80% reduction in abundance from upstream to downstream of the former impoundment. The 2014 count was 70 brown trout. Some of this loss is attributed by Hettinger (2015) to the brook trout out competing brown trout and some to the 2012 fish kill associated with the temporary dewatering structure breach. In addition to fish abundance, the report showed that the density in pounds per acre of brown trout was down 85% from 2010 to 2014. Conversely, the density of brook trout went up 370% from 2010 to 2014.

2. Qualitative River Assessment

On June 3, 2015, the following people paddled the Boardman River from the former Brown Bridge Dam to just downstream of the Boardman Plains: Will Harman (Stream Mechanics, PLLC), Richard Baron (Foley, Baron, Metzger, and Juip, PLLC), Lauren Trible-Laucht (City of Traverse City), Brett Fessell (Grand Traverse Band of Ottawa and Chippewa Indians), Frank Dituri (Grand Traverse Band of Ottawa and Chippewa Indians), and Nate Winkler (Conservation Resource Alliance). The purpose of the trip was to look for reaches that could benefit from bank stabilization and fish habitat enhancement work (with large wood) and be included as candidates for a SEP. Specific selection criteria included reaches that were overly wide, exhibited short stretches of poor bedform diversity (e.g., long riffles created from wood removal), and/or had excessive bank erosion due to riparian vegetation removal. The reach also needed easy access to a main road to minimize equipment mobilization costs, damage to existing riparian vegetation, and cleanup costs.

Appendix 2 includes the aerial photographs used during the assessment trip and Appendix 3 includes photographs and field notes of seven sites that were investigated as river enhancement/SEP candidates. Of the seven sites, the following four met the selection criteria: Sites 1, 3, 5, and 7 (See Appendix 3). The results from the tour were presented to Chris Grobbel and Doug Workman, plaintiff’s experts, on June 4, 2015. The results of that meeting are provided below.
3. Meeting with Plaintiff’s Experts and Members of IT

On June 4, 2015, Will Harman, Richard Baron, Lauren Trible-Laucht, Frank Dituri, Chris Grobbel, and Doug Workman met to review the field assessment and discuss which sites might be suitable for river enhancement work to satisfy the Settlement Agreement and for a possible SEP. After some discussion, the group agreed on the following areas as meeting the requirements of a viable project reach, based on the criteria listed above. The candidate projects are listed in priority order (refer to Appendix 3 for site photos and field notes). The conceptual design for the final selection is provided in Section 4.

1. Site 1, Trigilio/Plasman Reach. This site was ranked the highest because it could benefit from bedform diversity, more LWD and riparian vegetation. It is located within the DEQ identified Impact Reach and the Study Reach. The site also has landowners who are willing to participate in the project and have expressed an interest in selling the land to the Paradise Township. If land ownership is transferred, the structures could potentially be removed and the entire parcel re-vegetated with native vegetation.

2. Site 5, Shumsky Reach. This site was ranked second because it lacks bed form diversity, large woody debris, and has public access.

3. Site 3, Private property upstream of Riser. This site has the most severe bank erosion of all the sites and is easy to access. Note, since the assessment, this site has been stabilized by the conservation district and therefore will be removed from the final site selection list discussed in Section 4.

4. Site 7, Former Downer Property (now the Wells Property). This site was recommended by the Downers and approved by the Wells. It was a previous bank stabilization project, but a tree has fallen into the river. The tree could easily be removed and the bank planted with woody vegetation.

Site 7, number four above, was identified as part of the meeting with Grobbel and Workman. During the meeting, Grobbel suggested that Harman and Dituri meet with Dave and Sally Downer to see if their property would meet the selection criteria and to hear their concerns about river health and stability. This meeting also occurred on June 4th during which Mr. Downer expressed the most concern about a project reach just upstream from the former Brown Bridge impoundment. Harman and Dituri were both familiar with this reach and agreed that bank erosion in this section was worse than the sites identified in Appendix 2. However, they are outside of the Impact Reach identified by DEQ and the Study Reach identified by the Settlement Agreement. For this reason, Grobbel and Kristyn Houle, plaintiff’s attorney, recommended that we not consider this reach.

The Downers also recommended that Harman and Dituri visit their former home in the Boardman Plains. This is Site 7 shown on Appendix 3. It is within the Study Reach and meets the site selection criteria.
4. SEP Proposal: Recommendations for Bank Stabilization and Aquatic Habitat Enhancement Work in Lieu of $130,000 of Proposed Fines, Penalties and State Staff Time Reimbursement Against City of Traverse City

Based on the qualitative assessment and meeting with the plaintiff’s experts, the following sites are recommended for enhancement work. This work is conditional on the State accepting this work in lieu of all existing proposed fines and penalties and any existing or future State staff time reimbursement charges so long as those charges were not related to failure of the City to implement the SEPs as set for in an Administrative Order on Consent.

In priority order the SEP sites include: Site 1-Trigilio/Plassman Reach; Site 5-Shumsky Reach; and, Site 7-Former Downer Property/Wells Property. Site 3-Private property upstream of Riser was removed from the final selection because stabilization work has already occurred. If MDEQ approves the proposed SEP at all of these sites as set forth in this proposal, the following next steps are required to implement the SEP.

A. Landowner coordination is required for the Shumsky Reach. Much of this land is owned by the state, but formal permission will still be required. Based on the final design, some private landowners will need to be contacted. The Wells, Trigilios and Plassmans have all agreed to participate in the project.

B. Ingress and egress agreements will be required for all participating property owners.

C. Design drawings will be prepared and sealed by a Professional Engineer licensed in Michigan.

D. An experienced contractor will be contacted to provide a final construction budget.

E. The design drawings and this Proposal will form a part of an Administrative Order and the City will contract with an entity who can implement the SEP.

In the following section, a conceptual design is provided for each site based on a total budget of $160,000 and the following assumptions.

A. One permit will be required by DEQ under the Minor Projects Category for streambank stabilization and fish habitat enhancement. The permit will allow habitat improvement structures to be constructed with heavy equipment working within the channel.

B. A no-rise certification / flood study will not be required for any of the sites. If a flood study is required, that site will be removed from SEP consideration due to cost.

C. A local sediment and erosion control permit will not require rock/gravel construction entrances or excessive measures. Silt fence and planting will be used to provide erosion control.

D. Design plans for inclusion in the Administrative Order on Consent will include typical structure details with work locations shown on aerial photographs. A topographic basemap with cross sections and profiles is not proposed. One plan set will be provided for all sites. The site will be re-vegetated with native plants. More details are provided below under the Conceptual Design.
E. For the Shumsky Reach, the canoe access will be used as an equipment access. The canoe access will be reconstructed to the conditions that currently exist on site.

**Conceptual Design**

Design concepts are provided in Appendix 4 including aerial plan views showing the location and type of treatment, bank stabilization, and habitat enhancement structures. A description of the design is provided below for each site.

**Site 1: Trigilio and Plassman Reach**

This project would include the introduction of large woody debris and possibly boulder clusters to create velocity and depth variability to improve trout habitat. The project also would include planting riparian vegetation and converting a previously manicured lawn into a riparian corridor with native, woody vegetation. Grobbel and Houle reported that these properties might be sold to the Paradise Township. If this happened, the structures may be removed. This would allow for a wider riparian corridor to be established, improving function in the stream channel and on the floodplain. While the sale of these properties and removal of structures would be a beneficial addition to this project, this work is not contingent on that sale. Furthermore, this river enhancement project does not include landowner coordination for the purpose of transferring ownership or removing structures.

More specifically, this site includes approximately 170 feet of streambank stabilization and aquatic habitat improvement. Toe wood and log vanes are proposed to rebuild the streambank that was reported by Grobbel to have eroded during past flood events. Erosion rates are currently very low; however, the river could benefit from a streambank with more wood and vegetation. Two log vanes are proposed to be attached to the upstream and downstream ends of the toe wood structure. The vanes will encourage deposition near the bank and scour in the thalweg. Boulders will be used to anchor the log vanes and for boulder clusters to create flow diversity and scour in the pool. The boulders will be placed below the baseflow elevation for aesthetic purposes. Shrub and herbaceous transplants will be placed over the toe wood to help hold the wood in place and to provide immediate vegetative cover. A 20 foot buffer will be planted on the Plassman property using native vegetation. If the structures are removed and the land sold at a later date, it is recommended that the entire floodplain be revegetated with native species. No aspect of structure removal or property ownership is included in this proposed project.

**Site 3: Shumsky River Access**

This project would include the introduction of large woody debris in the form of vanes and possibly boulder clusters to create velocity and depth variability to improve trout habitat. The project would not include riparian re-vegetation because woody vegetation is already present for most of the project reach. The canoe access would be used to access the river and re-constructed once the project has been completed.
Log vanes and boulder clusters are proposed in this 275 foot reach to increase bed form diversity and narrow the baseflow width. Log vanes will be placed along both sides of the river to increase deposition along the streambanks and promote a deeper, coarser thalweg. The specific locations will depend on landowner participation and therefore may deviate from what is shown in Appendix 4. Large woody debris will be anchored to the vanes to provide fish habitat. Boulder clusters will be added to further promote scour in the center of the channel, velocity variability, and resting areas for fish. These boulders will remain below the baseflow elevation for aesthetic purposes.

**Site 4: Former Downer Property**

Live staking and the removal of one tree is proposed along this 60-foot reach. The tree will be removed rather than incorporated into a vane because large equipment cannot access the river without disturbing bank vegetation. The tree will be removed by hand and with equipment working from the top of the streambank. Live stakes will be used to accelerate the growth of vegetation along the streambank, which was graded as part of a former project. A buffer will be planted using native vegetation.

**Design Plans and Permitting**

The above work will be incorporated into a plan set that shows the project location, ingress and egress, typical details of bank stabilization techniques (toe wood and riparian vegetation) and habitat improvement structures (vanes with LWD and boulder clusters). A surveyed basemap with existing cross sections and profiles will not be provided so that more funds can be spent on construction rather than design. The designer will be onsite during a portion of the construction time to layout the structures. The plan set will be sealed by a Professional Engineer licensed in Michigan.

**References**

Appendix 1: Supplemental Environmental Project

Scope of Work

Submitted By:
Stream Mechanics, PLLC
April 7, 2015

The purposes of this scope of work (SOW) are to review existing stream health data, perform a qualitative assessment to supplement the existing quantitative assessment, and to make recommendations about a Supplemental Environmental Project (SEP). The work will be performed from the former Brown Bridge Pond to the downstream end of Plaintiff David and Sally Downer’s Property, this area is referred to as the Study Reach. The following tasks will be completed.

Task 1: Review Existing Information

Stream Mechanics will review existing stream assessment information to better understand the aquatic health of the Boardman throughout the Study Reach. This information will come from the Boardman River web page, Implementation Team (IT), and as supplied by plaintiff’s experts as set forth in the River Settlement Agreement.

Task 2: Qualitative River Assessment

This SOW assumes that the Study Reach functions similarly to the reaches assessed in the Boardman River Assessment report submitted by Stream Mechanics to the Michigan Department of Environmental Quality (MDEQ) in March, 2015. Therefore, additional quantitative assessments are not proposed. Instead, this SOW includes a visual assessment of the study reach using canoes and windshield surveys. Photographs of eroding streambanks, overly wide reaches, reaches that lack woody vegetation, or reaches devoid of wood will be photographed and located on an aerial photograph for further evaluation. Notes will be recorded about the potential of these areas to cause instability or functional loss problems.

Task 3: Meeting with Plaintiff’s Experts and Members of IT

During the river assessment trip (scheduled for the week of June 1st), Will Harman will meet with plaintiff’s experts and select members from the IT to discuss findings from tasks 1 and 2. If needed, the meeting will include field visits to potential problem areas discovered during task 2 or areas previously deemed as a problem by the IT or plaintiff’s experts. The goal of the meeting is to find common ground as to whether there are areas/reaches that would be appropriate to include in a SEP to be presented to the MDEQ.
Task 4: Letter Report

Stream Mechanics will prepare a brief letter report summarizing the results from tasks 1 through 3. Recommendations will be made showing areas where stream enhancements should be made, if appropriate, and conceptual ideas about enhancement techniques. This letter report will not include engineering design or construction plans.

Schedule and Budget

This SOW will be performed for a lump sum budget of $20,000.00. Invoices will be submitted monthly to Richard Baron with Foley, Baron, Metzger, and Juip, PLLC on a percent complete basis. Each task will be completed according to the following schedule, assuming that notice to proceed is received by May 1, 2015 and the field work/meeting can occur on June 2-4, 2015.

- Task 1: Review Existing Information – June 1, 2015
- Task 2: Qualitative River Assessment and Task 3: Meeting with Plaintiff’s Experts and Members of IT—July 30, 2015
- Task 4: Letter Report – August 30, 2015

Submitted By:

[Signature]

William A. Harman III, PG
Principal
Appendix 2: Aerial Photos
FIGURE 1
BOARDMAN RIVER
QUALITATIVE ASSESSMENT
GRAND TRAVERSE COUNTY, MI

PREPARED BY:
ECOSYSTEM PLANNING & RESTORATION
DATE:
MAY 2015
BOARDMAN RIVER
QUALITATIVE ASSESSMENT

GRAND TRAVERSE COUNTY, MI

FIGURE 4

PREPARED BY:
ECOSYSTEM PLANNING & RESTORATION

DATE:
MAY 2015
Appendix 3
Qualitative River Assessment

Field Photos and Notes
From the June 3, 2015 Float.
Site 1: Trigilio/Plassman

Notes:

No major erosion noted, but bank is vertical. This property is located on the right bank of a long riffle that lacks pools.
Site 2: Former Wetland Restoration Site

Notes:

No major erosion noted, but channel is overly wide. The pool is absent in the meander bend as shown on top photo. However, access to this site is limited, could cause damage to wetland project, and would be expensive.
Site 3: Upstream from Riser

Notes:
Bank erosion is prevalent in this bend and there is a lack of woody vegetation. Sediment supply could be reduced by adding toe wood and transplants. Site access appears good. Site is located on private property and not a plaintiff. Permission will need to be obtained.
Notes:
This is a relocated stream reach to build River Road. The old meander bend is visible on the opposite side. The reach has a well-vegetated island and no signs of problem bank erosion; however, the veg is mowed through the power line crossing. The reach is a long riffle that could benefit from more pools; however, access would be very difficult and expensive.
Site 5: Shumsky Public Access

Notes:
There is some bank erosion upstream of this site, but it’s not bad enough to warrant stabilization work. This reach doesn’t have bank erosion, but it is a long riffle with few pools. Large wood and boulders could be used to improve bed form diversity. Access is easy, assuming the parking area could be used as a staging area.
Notes:
There is mild erosion along right bank. The erosion is likely caused by a high bank height and lack of woody vegetation. The site would benefit from live staking; however, a power line crosses at this location, so it would be difficult to maintain a woody riparian area.
Site 7: Former Downer Property

Notes:
There is moderate erosion along the right bank caused by a large tree that has fallen into the river. The bank has been sloped and stabilized from past efforts. The site has easy access and could benefit from turning the tree into a vane and live staking the bank.
Appendix 4 Concept Designs
Trigilio and Plassman Reach

Install Toe Wood and Two Log Vanes
Shumsky Public Access Reach

Install Log Vanes with LWD and boulder clusters.
Former Downer Reach

Remove fallen tree.
Live stake bank.
Typical Bank Stabilization and
Fish Habitat Improvement Structure Details
TOE WOOD

Transplants shall be included the entire length of structure.

Bottom layer: 10'-15' diameter trees, 10'-12' long. End with root mass shall be buried in the bank.

Middle layer: small branches and live cuttings.

See riparian vegetation species.

Boulder cluster (optional)

See log vane detail.

Toe of bank

Bankfull

PLAN VIEW

SECTION VIEW

TOE WOOD
LOG VANE

LOG VANE SPECIFICATIONS

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>SPECIFICATIONS</th>
<th>NOTES FOR LOG VANE STRUCTURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOULDER</td>
<td>TYPE: HARWOOD</td>
<td>1. LOGS SHOULD BE STRAIGHT, HARDWOOD, AND NOT ROTTEN.</td>
</tr>
<tr>
<td></td>
<td>SIZE: 40 FT LONG, 12 INCH Ø MIN</td>
<td>2. BOULDERS MUST BE OF SUFFICIENT SIZE TO ANCHOR LOGS.</td>
</tr>
<tr>
<td></td>
<td>NUMBER OF HEADER LOGS: 1</td>
<td>3. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOGS.</td>
</tr>
<tr>
<td></td>
<td>NUMBER OF FOOTER LOGS: 1</td>
<td>4. BOULDER SHOULD BE PLACED ON TOP OF HEADER LOG FOR ANCHORING.</td>
</tr>
<tr>
<td></td>
<td>LARGE WOODY DEBRIS: 2</td>
<td>5. ROOTWADS OR TOSSED WOOD CAN BE USED INSTEAD OF TRANSPLANTS, PER DIRECTION OF ENGINEER.</td>
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</tbody>
</table>

PLAN VIEW

PROFILE VIEW A - A'

SECTION B - B'
NOTES:
1. BOULDERS SHALL BE PLACED BELOW BASEFLOW ELEVATION
   TO MAINTAIN CANOE PASSAGE. ALL BOULDERS INCLUDE FOOTER BOULDER.
2. MAJORITY OF VANE WILL BE BELOW BASEFLOW ELEVATION
   BOULDER SIZE 4' X 3' X 2'
Riparian Planting List