June 25, 2018

Board of Managers
Buffalo-Red River Watershed District
PO Box 341
Barnesville, MN 56514

Subject: Glyndon East Tributary – Existing Conditions Review
Section 27, T138N, R48W (Kurtz Township), Clay County
H.E. Project No. 1915_0256

Dear Managers:

On March 27, 2018 an informational meeting was held for landowners along a unnamed waterway which we have called “East Tributary” passing along the east side of the City of Glyndon. The purpose of the meeting was to discuss ongoing drainage problems in the area. At the meeting, the group discussed conducting a survey and drone flyover of the channel as a starting point for a possible future project. The Watershed District Board of Managers authorized this survey at the April 9, 2018, Board meeting.

Introduction

We have completed a drone field review and field survey along this waterway. The waterway flows northwesterly through Sections 1, 2, and 12, T139N, R47W (Glyndon Township), Section 7, T139N, R46W (Riverton Township), and Section 35, T140N, R47W (Moland Township), Clay County. The drone flight was completed on May 3, 2018 and the field survey was recently completed on June 21, 2018. Survey work started near the north-south quarterline of Section 12 Glyndon Township (northeast of the City sanitary lagoons) and proceeded northwesterly downstream. Survey consisted of channel profile, sediment test pits, and culvert elevations and sizes along the waterway. In addition, any channel blockages were also surveyed, such as beaver dams. In total, approximately 3.5 miles of channel was surveyed. A series of beaver dams were identified along the channel. The lowest elevation surveyed over field crossings and beaver dams is provided on the plans to identify the elevation to which the crossing or beaver dam restricts flow. Sediment test pits indicate that there is at least one foot of sediment in the channel with many areas having several feet of sediment. Enclosed are a copy of the plans assembled using the survey data.

With the exception of the BNSF Railway’s bridge (approx. Station 265+50), all remaining crossings of the channel are culverted in the surveyed reach and are as follows:
<table>
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<tr>
<th>Station</th>
<th>Culvert Crossing Description</th>
<th>Waterway Area</th>
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| 127+00 | 15th Avenue N  
3 Lines of 12'x8' RCB culvert | 282 sq.ft. |
| 173+00 | Field Crossing  
24"CMP | 3.14 sq.ft. |
| 242+20 | US Highway 10  
2 lines of 10' x 6' RCB culvert | 116 sq.ft. |
| 245+00 | Field Crossing  
15" PVC | 1.23 sq.ft. |
| 253+50 | Field Crossing  
15" RCP culvert and 24" RCP culvert | 4.37 sq.ft. |

**Findings**

There are significant blockages and flow impedances along the waterway. Based on the sediment test pits taken along the waterway, a "Potential Restoration Flowline" was drawn on the profile view of the enclosed plans. The flowline shows that many areas of the channel are adequately deep at this time (generally Stations 112+00 to 197+00), however there are stretches that could use some sediment removal and several individual high points in the channel, mainly related to beaver activity that could be removed to reestablish the flowline. The flowline is not excessive and is relatively flat with the longest stretch between Highway 10 and 15th Avenue North at approximately a 0.03% slope.

Road crossing (15th Avenue North, and US Highway 10) culverts as noted above appear adequate; however, most other culverted crossings are severely undersized for the waterway. Several beaver dams cross the waterway as well. In particular, beaver dams at approximate Stations 109+00, 188+00, and 202+00 are significant impedances to flow. The beaver dam at Station 202+00, which exceeds five feet in height, backs water up nearly to the City's lagoons. The water discharged from the City's wastewater lagoons enters the East Tributary between Stations 171+00 and 172+00.

**Recommendations**

We recommend that the information discussed above and the enclosed information be shared with the BRRWD Project Team. Once discussed with the BRRWD Project Team, potential solutions could be brought back to the area landowners. A landowner informational meeting could then be held to determine the next steps for this project.

Clearly, there are some solutions to the issues that were brought up at the March 27, 2018 landowner informational meeting. Sediment in the channel and other blockages in the channel could be removed and undersized crossings could be improved to provide better conveyance. Controlling the amount of sediment entering the channel should also be considered through a more comprehensive watershed planning effort.
If the project moves forward, additional field survey may be required. No channel cross-sections were taken and depth of the water as a result of blockages made surveying difficult. Additional blockages could exist that were below the water surface at the time of the survey work.

If you have any questions or comments, please feel free to give me a call at 701-499-2055.

Sincerely,

HOUSTON ENGINEERING, INC.

[Signature]

Erik S. Jones, P.E.

ESJ: