Minnesota Board of Water & Soil Resources

February 28, 2017

Board of Managers
Heron Lake Watershed District
1008 3rd Ave.
P.O. Box 345
Heron Lake, MN 56137

Chuck Brandel, PE
Project Engineer
ISG
115 East Hickory Street, Suite 300
Mankato, MN 56001

Re: BWSR Advisory Report for the Final Engineering Report and Amendment #1, County Ditch No. 3 Improvement, Jackson County, Minnesota

Dear Managers and Project Engineer,

On behalf of the Board of Water and Soil Resources, I offer the following advisory report for the referenced project, in accordance with Minnesota Statutes, Section 103D.711, Subdivision 5. As indicated in Subdivision 5, the BWSR report shall include:

1) a statement about the completeness of the report in relation to statutory requirements,
2) a statement as to whether or not the report presents a practical plan,
3) recommendations for changes, if considered advisable, and
4) a recommendation as to whether a soil survey appears advisable.

General Comments

It was difficult to interpret some aspects of the proposed plan in the written text and on the drawings in the Final Engineering Report, as indicated by specific comments below. The plan involves relatively high drainage coefficients and associated high costs. The report is weak in relation to statutory requirements, as identified by the following comments and recommendations. The updated Minnesota Public Drainage Manual includes applicable information and examples in Chapters 3 and 6 about the scope and detail of drainage engineers' reports. The subject report does not reference the source of soils information, which presumably was the Natural Resources Conservation Service (NRCS) Web Soil Survey. It would be helpful to include the project petition in the report and describe the problems and needs that were presumably outlined in the petition.

Specific Comments

Page 1, Location and Watershed: The referenced map of the CD-3 watershed in Appendix A (Sheet 1) excludes JD-84 from the drainage area of CD-3 without explanation. It seems that JD-84 is part of the CD-3 watershed, albeit tributary for only about the first 1,600 ft. of CD-3. The Potential Best Management Practice map (unnumbered) in Appendix A shows this better than Sheet 1. This report section indicates a total drainage area of 9,909 acres, while Tables 4 and 5 indicate 13,434 acres at Sta. 0+00.

Page 1, Existing Conditions:

- This section does not clearly describe the existing conditions of the Main Ditch (26,400 ft.), Branch 1 (4,570 ft.), and Branch 2 (16,550 ft.), including ditch dimensions (original and existing), the condition and stability of the ditches, and the reasons for cleaning / improving. Table 4 includes existing ditch bottom width and side slope information at various stations, but doesn't clarify the reach for which the numbers apply and how these compare to original design.
- The reference to drainage coefficients recommended by NRCS is oversimplified and potentially

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misleading, because it does not include information about mineral soils vs. organic soils, field crops vs. truck crops, light mineral soil vs. heavy mineral soil, and with or without surface inlets, as indicated on pages 4-7 to 4-9 of the NRCS 1984 Minnesota Drainage Guide. Note also the information on page 4-8 about potentially reducing design drainage coefficients for heavy soils.

- The variability of existing ditch side slopes and bottom widths listed in Table 4 raises a question about the reasons for that variability. It's not clear what the original design ditch bottom widths and side slopes were compared to the existing conditions. This would help understand the associated project plans and separable repairs.

Pages 2-5, Proposed Improvement:

- The numbers of tile branches and sub-branches in the first and second sentence are not the same.
- The proposed cleaning and improvement of the Main Ditch (8 ft. bottom width, 3:1 side slopes, per Table 5) are not discussed in the text, and the side slopes are not defined on the plan and profile drawings in Appendix E.
- The proposed 2-stage ditch in Branch 1 and cleanout of Branch 2 do not have bottom widths and side slopes defined in the text, in Table 5, or on the plan and profile drawings. It's not clear how a 2-stage ditch would require less excavation than a regular trapezoidal channel cross section. Reference to Appendix E, Sheet 73, Details would help. The report does not indicate if CD-3 has continuous low flow, which is where a 2-stage ditch is most applicable. The report does not describe how a 2-stage ditch would improve water quality, or by how much. Storage in the 2-stage ditch is mentioned on page 6, but there is no description of flow controls to create and manage storage.
- The reference to Table 4 is incorrect.
- The meaning of the footnote under Table 4 is unclear.
- It's not clear that, or how, water levels in Option 1, including the proposed 7-acre pond, and Option 2, would be controlled in the ditches to create storage and reduce peak flows.
- Required 16.5 ft. buffer strips are not mentioned, but I see them in Appendix E, Sheet 73, Details.
- Side inlet controls along ditches are not mentioned in the text, or shown on the drawings. Is this a missed opportunity for erosion control and metering of flow into the ditches?
- No mention in the text or on the drawings about erosion control at the outlets of proposed tile lines.
- The report text does not explain why many of the proposed tiles are to be installed as deep as they are shown on the plan and profile drawings in Appendix E. Some of these proposed tiles outlet at the bottom of the improved or cleaned open ditches, which is not wise design if it can be avoided to prevent blockage by sediment.

Page 6, Proposed Improvement – Connection of Existing Lines: While connecting existing tile lines to the new tile lines makes some sense, it runs the risk of existing open inlets and/or failing old tile allowing debris and sediment into the new tile.

Page 6, Proposed Improvement – Abandonment of Existing Tile: It would be helpful to indicate that the proposal is for partial abandonment by the drainage system, in accordance with Section 103E.806.

Page 6, Design/Hydrology/Hydraulics/Outlet Adequacy and Appendix B: HydroCAD Summary:

- This section does not include a statement about whether the outlet of improved CD 3 is adequate, which is a determination that the drainage authority must make, in accordance with Section 103E.015, Subd. 1(4) and Section 103E.245, Subd. 4(3). The description of hydrologic analyses and data in Appendix B seem to indicate that the increased capacity of the improved Main Ditch with an 8 ft. bottom width and 3:1 side slopes and Branch 1 2-stage ditch with 11.5 ft. bottom width and 2:1 side slopes will not increase peak flows for the 5-yr. and 10-yr. events. However, the text does not explain if, or how, this is true.
- Note that "controlled subsurface drainage" is also called "drainage water management" by the NRCS.

Pages 7 and 8, Practicality and Feasibility and Table 12 Cost Estimate Summary: It would help to label "Net Cost" as "Net Improvement Cost", because the total costs include large separable repair costs.

Page 8, Best Management Practices:

- The third paragraph is unclear in regard to sediment and nutrient reduction / treatment in drainage water entering CD-3 ditches to protect water quality. Some treatment practices include Controlled Subsurface Drainage / Drainage Water Management, Denitrifying Bioreactor (typically woodchip), Saturated Buffer, Created Treatment Wetland, and Storage and Treatment Wetland Restoration.
- It seems that EQIP funding discussed in the fifth paragraph would better fit under "Potential Funding for Water Quality". EQIP is one of a number of "External Sources of Funding" that should be investigated, in accordance with Section 103E.015. Subd 1a.

Page 9 – Potential Funding for Water Quality:
The Clean Water Fund (CWF), Targeted Drainage Water Management Grant Program funding was one-time, and funding that might have been available in Jackson County through the Greater Blue Earth River Basin Alliance (GBERBA) was completely spent by the end of CY2016. That program did not include 2-stage ditches as an eligible activity. GBERBA was awarded a FY2017 CWF Multipurpose Drainage Management (MDM) Grant that might provide an external source of funding for some of the propose BMPs. However, 2-stage ditches are not eligible under the MDM program. The CWF Community Partners Grant Program is focused on LGU partnerships with faith organizations, lake and river associations, boy/girl scout troops, and other civic groups. Therefore, it is not a likely external source of funding for the types of practices envisioned for the CD-3 improvement project.

Pages 9-11 – Environmental and Land Use Criteria (M.S. 103E.015, Subd. 1 and 1a):
The engineer's comments regarding the Section 103E.015, Subd. 1 considerations criteria are minimal and do not address these criteria very well for drainage authority consideration. Chapter 3, Section I.B. of the Minnesota Public Drainage Manual discusses this section of drainage law and provides recommendations about addressing the Subd. 1 criteria. The adequacy of the outlet for this drainage improvement project should also be addressed here for criteria 4. There is no explanation of investigations to consider any wetlands that might be affected.

Appendix A:

- Sheet 1, Overall Options: The title seems incomplete. The Main Ditch, Branch 1 and Branch 2 are not identified. The legend is incomplete with regard to symbols used for existing open ditch and tile, and the green color used for proposed tile alignments. Option 1 and Option 2 colors in the legend do not correspond to the descriptions of these options in the report text. The JD-84 contributing watershed is not shown.
- Sheet 2, Overall Options: Option 1 and Option 2 colors in the legend do not correspond to the descriptions of these options in the report text.
- Sheet 3, Option 1: Option 1 and Option 2 colors in the legend do not correspond to the descriptions of these options in the report text.
- Sheet 4, Option 2: Option 1 and Option 2 colors in the legend do not correspond to the descriptions of these options in the report text. It's not clear why the proposed structure is located where it is, and there was no explanation in the report text.

Appendix B: Flowrate units are not indicated. It would be helpful to label the Pond Storage Option tables as Option 1 and Ditch Storage Option tables as Option 2, to correspond to the report text. It's not clear what the HydroCAD flowrate and elevation tables on the third page are for.

Appendix E: Preliminary Construction Plans

- Sheet 1, Title: Suggest reducing the boiler plate legend to the items that are on the sheet. It would be helpful to identify Okabena Creek at the outlet of CD-3.

- Sheet 2, Existing Conditions: This sheet needs a legend to help interpret the map. The upstream end of the Main Ditch and beginning of the Branch 1 Ditch is not clear.
- Sheet 3, Proposed Improvement: The Main Ditch, Branch 1 Ditch and Branch 2 Ditch are not identified. The recommendations in the report text indicate that the 7-acre pond is proposed, but it does not show up on this sheet.
- All Plan and Profile Sheets: It would be helpful to have the applicable stations identified in the title blocks. Legends should indicate what is on the sheet. Lines and structures should be listed in the legend the way they are shown on the sheet, including color where it is used and proposed drop inlet symbols on the sheets for tile branches.
- Sheets 16-20, Branch 1 Plan and Profile: It would be helpful to add "Tile" in the title block after "Branch 1".
- Sheets 16-69: The horizontal locations of many of the drop inlets in road ditches don't appear to fall at the bottom of the road ditch. It's not clear why many of the proposed tiles are as deep as they are.

Amendment #1 for: County Ditch No. 3, Jackson County, Minnesota. (Received by BWSR on 2-24-17.)
See comments above about stationing on title blocks.

If you have any questions, please contact one of us via phone or email.

Sincerely,

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