Lower Minnesota River Watershed District

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Gentlemen:

The Lower Minnesota River Watershed District ("the District") welcomes the opportunity to comment on the comprehensive watershed management plan for the Yellow Medicine River. This plan is of particular importance as the outcome of a pilot project to inaugurate One Watershed/One Plan in Minnesota. As such, it is likely to serve as an example to local units of government which are planning to participate in One Watershed/One Plan. The District has a huge stake in the success of the watershed approach as it is implemented in the Minnesota River basin. The vast majority of pollutants that impact the Minnesota River in its final 32 miles (the District's jurisdiction) originate upstream in the Minnesota River basin. Our particular concerns are today's significantly higher stream flows and the tremendous loads of sediment and phosphorus which they carry downstream.

There is much to like about the comprehensive watershed plan. It is well organized and well written. The plan is grounded in quantitative goals for water quality and quantity. The goals were derived from the Yellow Medicine River Watershed Restoration and Protection Strategies (WRAPS) report, as intended by the Legislature. The state's Nutrient Reduction Strategy and Minnesota River Basin Sediment Reduction Strategy were considered along with local input to finalize the goals. Water quality standards for sediment and nutrients drove the calculation of pollutant reduction goals at the mouth of the main stem and for impaired tributaries.

The implementation section includes aggressive objectives, such as 100 percent compliance with the state's new riparian buffer requirements. The stated intention of counties, soil and water conservation districts, and the Yellow Medicine Watershed District (page 69) to establish

and implement soil erosion and soil loss programs holds the potential for significant reductions in sediment loading to surface water. Just as important is the stated intention to implement regulatory controls on agricultural drainage. Your plan to start by examining existing standards, gaps and irregularities among counties, watershed districts and drainage systems makes good sense. A small change in drainage coefficient, if adopted by most of the scores of drainage authorities in the watershed, could have a significant effect on hydrology. In short, the plan's provisions for implementing regulatory controls (pages 67-69) are most encouraging. Local leadership in plan development, and coordination with Area II Minnesota River Basin Projects, should help to navigate the complicated terrain of drainage law and other regulations affecting agriculture.

The District does, however, have concerns and suggestions which we hope you will consider in finalizing the plan. The bulk of our concerns have to do with prioritization and targeting, and watershed modeling.

Prioritization and Targeting

Prioritization and targeting are strongly emphasized in the state's watershed approach (Minn. Statutes 103B.801, Subd. 4). In the context of watershed planning, we understand prioritization to mean the ranking of sub-watersheds or ecoregions according to their impact on water quality or quantity. The closely related idea of targeting refers to determining the optimal placement of Best Management Practices (BMPs) within priority areas. Generally, we find the plan does not sufficiently prioritize those parts of the Yellow Medicine watershed requiring the most attention. Nor does the plan identify where specific types or combinations of BMPs are suitable within priority areas. At a small scale, such as a catchment or field, the plan understandably suggests how targeting may be done (Section 5.3) rather than attempting to identify specific targets.

The comprehensive watershed plan makes a beginning at geographic prioritization by delineating four landscape management zones: The Coteau, an undulating plateau, covers the upper watershed. The Flatlands, at a much lower elevation than the Coteau, is heavily drained and intensively farmed with row crops and large feedlots. The Transition Zone features steep terrain and relatively straight and parallel stream channels. It connects the Coteau and the Flatlands. The fourth and smallest landscape zone is the Minnesota River Valley, where the Flatlands abruptly gives way to steep slopes and rapidly flowing streams which fan out on the floodplain before discharging to the Minnesota River. The management zones, displayed in Figure 2-3, were identified using a detailed watershed model and professional judgment. We wonder why simpler means, such as topographic and soils maps, were not judged sufficient to delineate them.

The management zones were defined presumably because different implementation strategies and practices apply to each type, based on its distinct landscape characteristics and land uses. Surprisingly, however, the plan does not vary implementation components by management zone. At the very least, broad distinctions could have been drawn between practices suitable

for sharply different landscapes such as the Coteau and the Flatlands. For example, one would expect that surface storage of water through wetland restoration might be concentrated high up in the watershed, in the Coteau, in order to prevent channel scouring in the Transition Zone and flooding in the Flatlands. Likewise, conservation drainage might be concentrated in the poorly drained, heavily tiled Flatlands, in order to desynchronize drainage discharge and reduce peak flows and channel instability downstream in the Minnesota River Valley. Further refinements could be made within management zones by identifying and ranking higher-potential pollutant sources such as ravines destabilized by tile flow discharges, stream bank erosion zones, drainage systems with inadequate outlets ready for the redefinition of benefits process, smaller, unpermitted feedlots with runoff potential, and so on.

The plan identifies six priority sub-watersheds (pages 31-32, Figure 2-4), which were selected by the watershed model (Hydrologic Simulation Program FORTRAN or HSPF) supplemented with the Scenario Application Manager (SAM), a site-selection routine based on GIS and a BMP database. Each priority sub-watershed is described as being a priority area within one of the management zones. However, three of the sub-watersheds located highest up in the Yellow Medicine watershed are not contained within their assigned management zone (Figure 4-2). They appear to occupy two zones about equally. The reader is left wondering if entire sub-watersheds are meant as priority areas, or if only those portions within their assigned management zone should be considered priority areas.

The plan does not include targeting, as defined above, within priority sub-watersheds. In the implementation tables (Table 4-1) the same BMPs are distributed among the six priority watersheds in equal proportions. BMPs are “targeted” only in the trivial sense that larger sub-watersheds are allotted more BMPs, while the areal density of each BMP category remains the same across the six sub-watersheds. Under the first priority concern (Mitigate Altered Hydrology and Minimize Flooding), for example, each priority area is assigned the same five kinds of mitigation in the exact same spatial densities. The plan suggests that in priority sub-watersheds which local governments choose to emphasize, implementation targets in the plan can be scaled up in multiples of BMP numbers in the plan.

The assignment of the same BMPs in identical aerial densities to all six priority sub-watersheds across a widely variable landscape zones is baffling, given the stated importance of targeting. We wonder if local resource managers who reviewed the plan (written by a consultant) decided to attempt no targeting at any scale until more detailed analysis could be conducted. Or, perhaps they were advised that targeting should be conducted only at a very small scale, such as a field or catchment. Such advice would be inconsistent with the discussion of targeting in the WRAPS report (page 50): “Targeting refers to the process of strategically selecting locations on the land (within a priority area) to implement strategies to meet water quality, environmental or other concerns (that were identified in the prioritization process). The WRAPS report is intended to help target practices as part of the larger Watershed Approach, and should empower local partners in the 1W1P process to target practices that satisfy local

needs." Targeting seems to be a highly regarded ideal that gets pushed into the future with the writing of each new watershed plan.

Modeling Issues

The comprehensive watershed management plan has made considerable use of the MPCA's HSPF-SAM modeling system. The firm contracted to write the plan, RESPEC, used the model to help delineate management zones, select priority sub-watersheds, identify suitable BMPs for priority areas, estimate the cost of implementation scenarios as well as progress toward water quality goals to be expected from implementation of recommended practices. The accuracy of the HSPF model therefore is of vital importance to the plan's integrity. In reviewing the present plan, the WRAPS report and technical memos on MPCA's web site, the District has discovered apparent discrepancies and mistakes that warrant concern.

The plan states (Table 5-4) that achieving 100 percent stream buffer compliance in the Yellow Medicine Watershed would result in a sediment load reduction of 25 percent. This exceeds both the 10-year goal for sediment reduction (10 percent) and the ultimate goal (20 percent) of the plan. If only it were that easy! A technical memo dated March 11, 2015, from Tetra Tech to the MPCA addressed HSPF modeling scenarios on the Yellow Medicine watershed. To start with, the memo cites MPCA staff as estimating that 70 percent of streams in the Yellow Medicine Watershed already have 50-foot vegetated buffers – an important detail we didn't find in the comprehensive watershed plan. An HSPF modeling scenario of 80 percent compliance, described in the memo, thus represented only a 10 percentage point increase over baseline. In addition, the memo correctly stated that grass buffers are effective only against non-concentrated flow from adjacent fields. For these reasons, the model estimated that 80 percent compliance with the 50-foot buffer requirement would result in a sediment load reduction of only four percent. If these same factors were applied to the HSPF analysis of 100 percent compliance for this plan, it seems likely that the sediment reduction estimate would have been closer to 4 percent than to 25 percent.

Another concern with HSPF modeling is indicated in Appendix 4.11 of the WRAPS report. It involves partitioning of the sediment load into two categories: surface runoff from cropland, and near-channel (bluff, bank and ravine) erosion. To summarize, two empirical studies funded by the MPCA estimated that about 70 percent of sediment comes from stream channel sources, and the remaining 30 percent from surface runoff. The HSPF model predicted the reverse: the majority (79 percent) of sediment came from cropland runoff, and a minor share (nine percent) was attributed to stream channel erosion.

To explore possible reasons for this major discrepancy, we perused a technical memo dated September 30, 2014, from RESPEC to MPCA, regarding HSPF model development in the Minnesota River basin. We learned that the surface runoff category includes cropland erosion plus tile line discharges to surface water. Tile line flows are implicitly represented in HSPF as interflow. The RESPEC memo wrongly assumes that tile drainage water transports significant

quantities of sediment. The assumption is contrary to the common observations of farmers and drainage professionals such as Jeff Strock, University of Minnesota Extension ag drainage specialist at Lamberton. Tile lines without surface intakes normally discharge clear water. It is incorrect to assign a total suspended solids concentration to tile drainage water.

Incorrect assumptions used to estimate "detached sediment storage" or DETS likely lead to exaggerated estimates of cropland erosion. DETS is the amount of sediment available to wash off the land. The RESPEC memo states that the value assigned to DETS was increased on four days of the year to account for soil disturbance from plowing, planting, cultivating and harvesting. Several decades ago, it was common practice for farmers to moldboard plow, plant the crop in 30 to 42 inch rows, and cultivate for mechanical weed control, usually in June, before canopy closure. Plowing and cultivation greatly increased erosion potential in the past, but today most farmers use less aggressive primary tillage and rely on chemical weed control instead of cultivation. Farmers plant corn and soybeans in narrower rows that "close canopy" earlier, reducing the potential for soil particle detachment and runoff from rainfall. The representation of DETS in HSPF, based on agricultural practices of a previous generation, likely contributes to its over-estimation of surface sediment loading to surface water.

In summary, evidence suggests that HSPF over-estimates surface sediment loading due to a bogus tile-line sediment routine and use of outdated farming methods in its simulations. Near-channel erosion is underestimated. Unless these issues were corrected as this plan was written, the model's estimate of sediment yield, used in selecting priority sub-watersheds, also is suspect. The District urges BWSR and Area II to engage MPCA in addressing the modeling-related questions we have raised.

To repeat, there is much to like in this watershed plan. The District remains optimistic about the state's Watershed Approach. We hope that this plan's memorandum of agreement is sufficiently robust to prompt continuing collaboration among planning partners, and full implementation of water quality strategies and BMPs. The District offers these comments in the hope they may contribute to the improvement of models and methods used to develop not only the present plan, but also future comprehensive watershed management plans in the Minnesota River Basin.

Sincerely,

Yvonne Shirk, President