

Memo

Date: Friday, November 12, 2021

Project: Klondike Clean Water Retention Project #11

To: Dan Money, Administrator

Two Rivers Watershed District

From: Jacob Huwe, PE

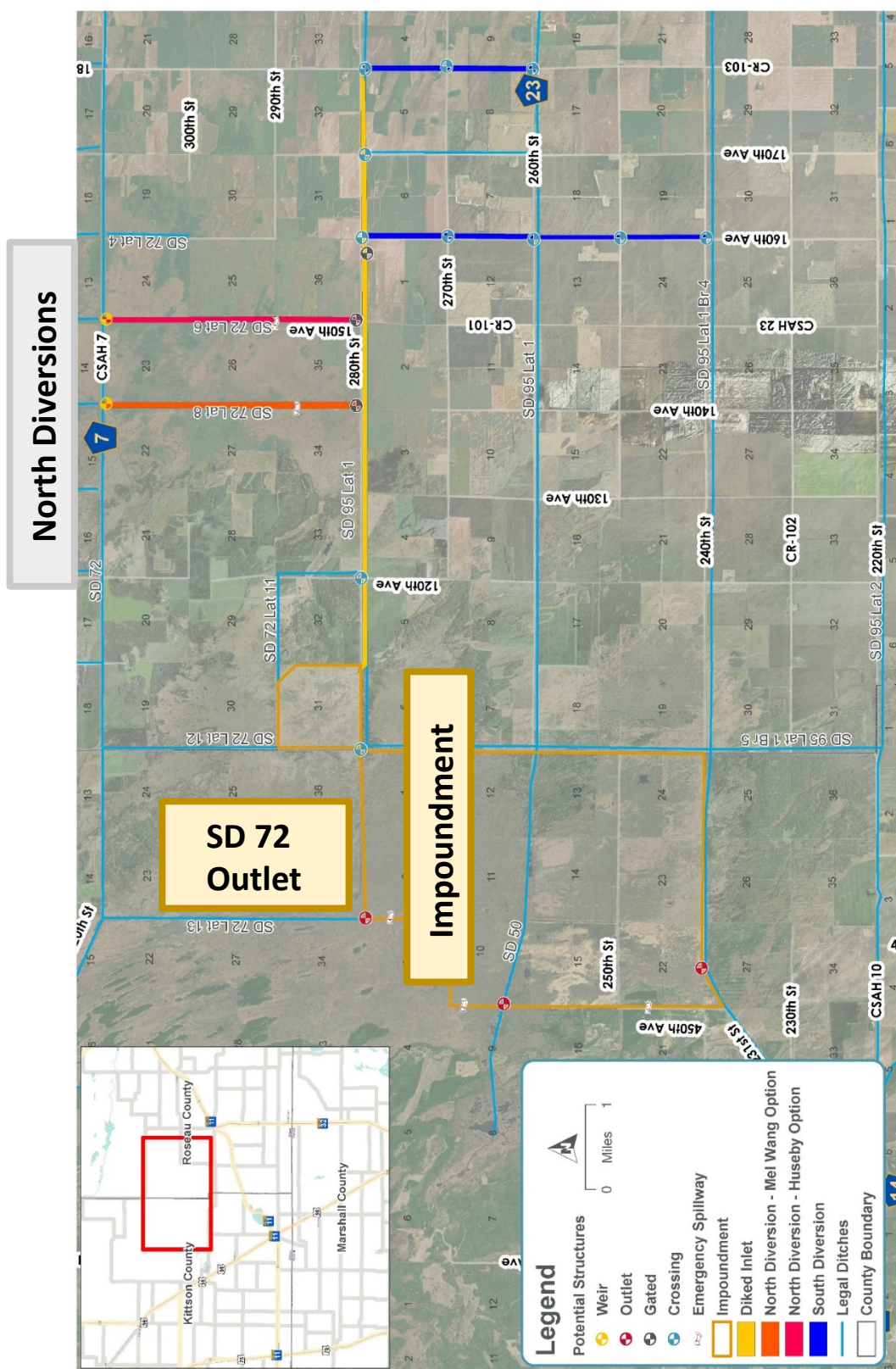
Subject: RE: Design Information for North Diversions, Impoundment Alignment, and SD 72 Outlet Options

Introduction

In support of the wetland permitting for the Klondike Clean Water Retention Project #11 (Project), previously dismissed design options must be presented as they have been crucial in avoiding and minimizing potential wetland impacts. In this memo, information will be summarized from previous Engineering Reports and presentations regarding the following Project features (also shown on Figure 1):

- North Diversions
 - o Two three-mile-long diversion channels (on existing legal ditches) designed to convey inflows to the Project from State Ditch 72 (SD 72)
- Main Impoundment
 - o The alignment of the Project's embankments has been analyzed in several locations and adjusted to avoid wetland impacts
- SD 72 Outlet
 - o An option for a gated outlet structure and associated exterior drainage was designed to return water back to SD 72 (Multiple locations considered but dismissed)

Figure 1. Project Overview (Obsolete, dated 2019)



North Diversion Details

Existing State Ditch 72 Lateral 6 (aka Huseby Ditch) and State Ditch 72 Lateral 8 (aka Mel Wang Ditch) have structures that connect them to State Ditch 95 Lateral 1. Two diversion channels and associated structures were designed to provide inflows to the Project through the Diked Inlet. These diversions added 55.1 square miles of drainage area to the Project, while also providing a potential relief valve for Roseau River flooding events that cross into the SD 72 system. The figures below provide the existing cross sections and proposed features at the north end of each diversion. The proposed diversion channels have a 25-foot bottom width, 5:1 (Horizontal:Vertical) side slopes, and engineered spoil bank profiles. Since each of these existing ditches are situated to adjacent wetland areas and state-owned lands, the potential impacts were identified as a concern. Ultimately, the North Diversion alternatives have been dismissed, effectively avoiding 6 linear miles of wetland impacts.

Figure 2. Cross Section of Existing SD 72 Lateral 6 (HDR Survey, 2015)

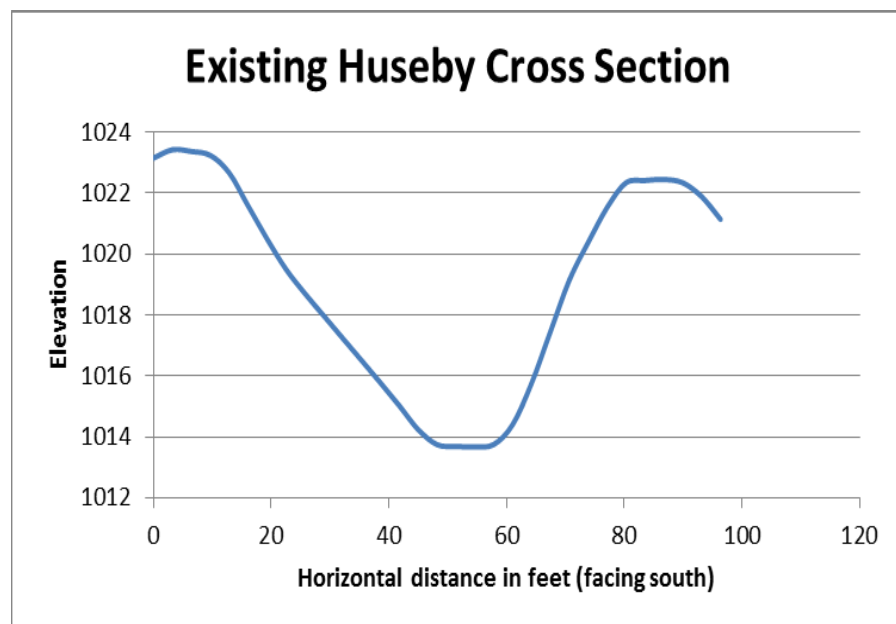


Figure 3. Proposed SD 72 Lateral 6 North Diversion (HDR, 2017)

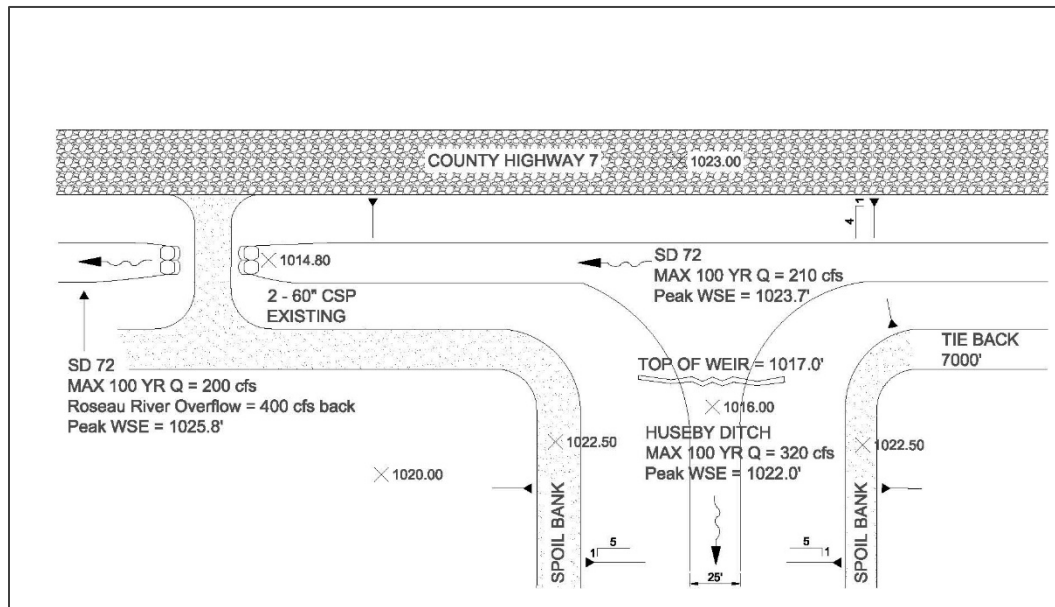


Figure 4. Cross Section of Existing SD 72 Lateral 8 (HDR, 2015)

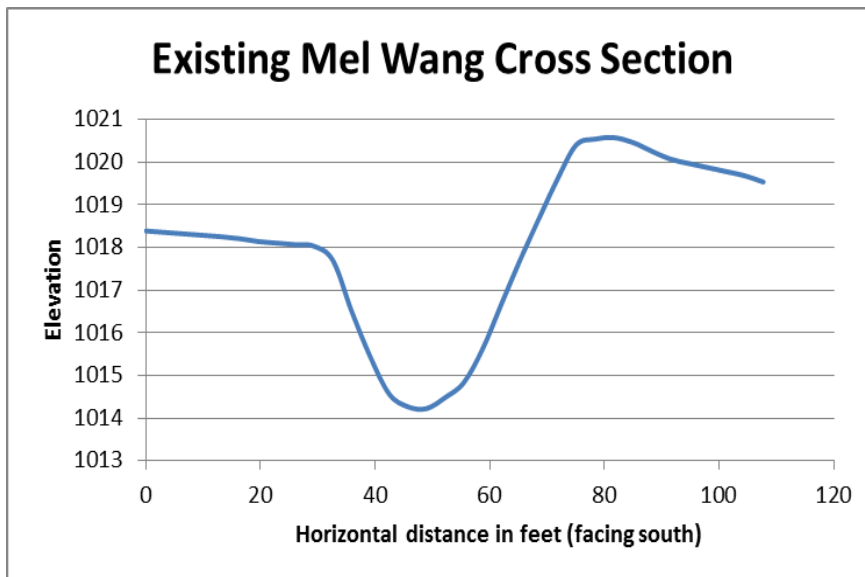
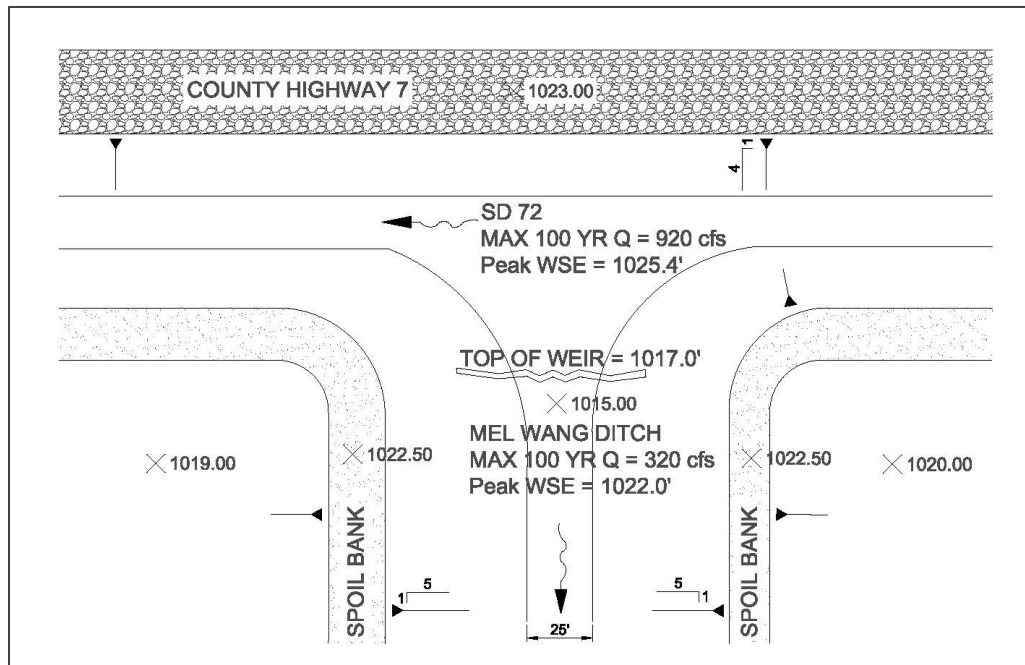


Figure 5. Proposed SD 72 Lateral 8 North Diversion (HDR, 2017)



Main Impoundment Alternatives

A technical fen management sub-committee was formed in 2017 from the Big Swamp Project Work Team to evaluate potential impacts and enhancements to the prairie rich fen in the Project area. The resulting fen management plan was required by legislation related to land exchange within the footprint of the impoundment. Impoundment alternatives are shown in Figure 6 below. Portions of section 2 and 11 (Klondike Township) were identified as high-quality prairie rich fen (Beaches Lake Area Fen Management Plan, 2018). By re-aligning the Project's embankment in this area, the high-quality fen was taken out of the Project's impoundment footprint. This reduces the overall storage capacity of the Project and the potential for flood damage reduction benefits, in favor of less potential impacts to the prairie rich fen. This decision led to another analysis regarding the proposed outlet structure to SD 72.

SD 72 Outlet Alternatives

Also shown on Figure 6 are the options considered to outlet the Project back to SD 72 through existing laterals. While laterals 12, 13, and 14 are part of the legal ditch system, concerns about their effects on the adjacent wetlands have been raised. For the Project to outlet into either lateral 13 or 14, there would be newly excavated ditches needed to connect them to the Project's outlet. The potential impacts of this work led to a decision to dismiss an outlet structure to SD 72.

Figure 6. Project Alternatives (HDR, 2019)

