

Hydraulics and Hydrology Appendix D

1 OVERVIEW OF CHANGES SINCE FEASIBILITY

Following completion of the Final Feasibility Report and Environmental Impact Statement (FEIS) for the Fargo-Moorhead Metropolitan (FMM) Area Flood Risk Management Project (Project), a Value Engineering (VE) study was conducted which identified potential cost savings if the tie-back embankment was moved north (Value Engineering Proposal Number 13 (VE13)). In addition to this VE study, the Corps, the non-Federal sponsors, and local technical consultants met in a series of workshops with the Local Sponsor, Local Consultant Technical Team (LSLCTT). The intent of these workshops was to continue to improve the Project. While the basic project features have not changed since the FEIS, there have been a number of important changes that affect the hydraulic performance of the Project. The important changes are:

- Increasing flow through the flood risk management area for events up through the 1-percent chance event
- Realignment of the tieback embankment
- Adding gates to the diversion inlet control structure
- Adjustments to the diversion channel alignment
- Modifications to the diversion channel cross-section

1.1 Flow through Flood Risk Management Area

The 1-percent chance event target stage at the Fargo gage was 30.8 feet in the FEIS. To achieve this target, the Project would begin operating once the combined flow of the Red River and the Wild Rice River exceeded 9600 cfs, which is about the 28-percent chance (3.6-year) event at Fargo. For a number of reasons, including the desire to reduce flood risk sooner and to reduce the need for fish passage at the Red River and Wild Rice River control structures, the concept of allowing more flow through the risk management area was investigated. Ultimately this investigation recommended targeting a stage of 35 instead of 30.8 for the 1-percent chance event. Some levees would be required within the risk management area to achieve this target, but this higher target stage reduces the frequency of project operation and reduces the duration of staging area flooding caused by the Project.

The frequency of project operation is reduced with a target stage of 35 since this allows the combined flow of the Red River and the Wild Rice River to be 17,000 cfs before project operation is required. With 17,000 cfs being the 10-percent chance (10-year) event at Fargo, the need for fish passage mitigation features at the Red River and Wild Rice River control structures is eliminated. This also reduces the risk of project operation during the late spring and summer, thereby reducing the risk of crop damage.

While allowing 17,000 cfs instead of 9600 cfs through the flood risk management area does little to reduce the peak stage for infrequent flooding, it does reduce the duration of staging area flooding because the staging area can be emptied somewhat faster. At Oxbow, the duration of flooding for the 2-percent (50-year), 1-percent (100-year), and 0.2-percent (500-year) chance events is reduced by approximately 4 days, 7 days, and 3 days, respectively with 17,000 cfs instead of 9600 cfs allowed through the flood risk management area. The change from 9600 cfs to 17,000 cfs has the greatest effect on the 1-percent chance event, not the 0.2-percent chance event, since the target stage is 40 feet for both the LPP as described in the FEIS and the proposed plan.

1.2 Tieback Embankment Alignment

Figure 1 shows the project features. The tieback embankment defining the northern limit of the staging area at the upstream end of the Project has been adjusted from the northern boundary of the gray line to the green line. During the feasibility phase there appeared to be some benefit in having a storage area (Storage Area 1) separate from the rest of the staging area, but since the feasibility phase, modeling has shown that it would be very difficult and relatively expensive to realize the benefit of a separate storage area for the wide variety of potential flood scenarios that could threaten the Fargo-Moorhead metropolitan area. The revised tieback embankment follows a more direct east-west path which trades storage volume lost from Storage Area 1 with storage volume gained by crossing the Wild Rice River and Red River north of the FEIS alignment. The shift north at the Red River eliminates the need for a separate control structure for Wolverton Creek. The tieback embankment would be constructed to meet Corps of Engineers dam safety standards.

The revised tieback embankment alignment in conjunction with the addition of gates to the diversion inlet, discussed in the next section, results in changes to the extent of the staging area, the expected staging area elevations, and the required additional storage to mitigate for downstream stage impacts. The red line on Figure 1 delineates the revised staging area. Table 1 presents a comparison of the model results for the FEIS plan and the current proposed alternative, which is known as the “VE13A-Bundled” alternative (“VE13” is defined above; “A” comes from the proposed alignment, option A; “Bundled” means it includes the diversion inlet gates).

Table 1 Upstream Staging Area Elevation Comparison

Event	FEIS (ft)	VE13A-Bundled (ft)	Difference (ft)
10-percent chance	916.29	908.83	-7.46
2-percent chance	920.86	921.52	0.66
1-percent chance	922.88	922.22	-0.66
0.2-percent chance	922.44	922.24	-0.20
103 kcfs	925.40	923.70	-1.70
PMF	926.11	924.90	-1.21

The increase for the 2-percent chance event is due to model updates in addition to the tieback embankment alignment modification that has affected how water fills the staging area, especially for events in the 10-percent chance to 2-percent change range. The additional storage required to mitigate downstream stage impacts has been reduced to approximately 150,000 acre-feet.

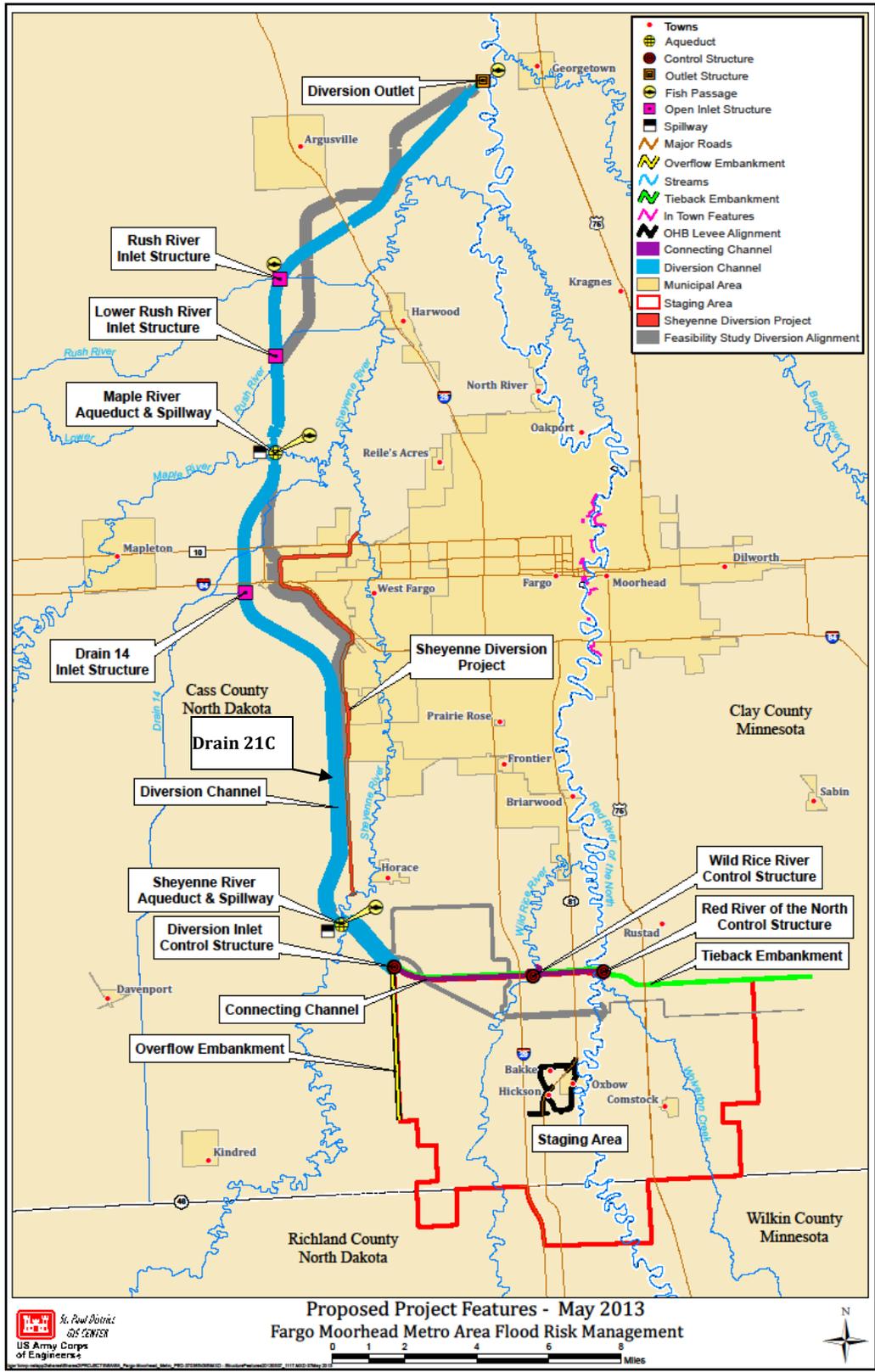


Figure 1 Proposed Project Features