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northwest hydraulic consultants ltd

NHC Ref. No. 1005694

September 29, 2023

Drumheller Flood Resiliency Program
702 Premier Way
Drumheller, Alberta T0J 0Y4

Attention: **Deighen Blakely**
Flood Resiliency Project Director

Re: **Effect of Midland Rail Bridge on Red Deer River Flood Levels in Nacmine**

Dear Deighen:

The Drumheller Flood Resiliency Program office recently received feedback from residents in Nacmine regarding the existing Midland Rail Bridge and planned Nacmine Berm to be located approximately 1.0 to 2.6 km upstream of the bridge. It was suggested that removal of the Midland Rail Bridge may substantially lower water levels and eliminate the need to build the Nacmine Berm.

Northwest Hydraulic Consultants Ltd. (NHC) evaluated the hydraulic effects of the Midland Rail Bridge by:

- removing it from the numerical model developed for the provincial flood mapping study; and
- comparing water levels with and without the bridge for a 100-year flood event.

In the numerical model, the planned Nacmine Berm begins at river station 47,010 and ends just upstream of river station 45,410. The Midland Rail Bridge is located at river station 44,430. Model results show that removal of the bridge with the berm in place yields a water level that is up to 0.22 m lower through the planned berm section. The 100-year flood levels with and without the bridge are listed in **Table 1** and shown in **Figure 1** (below).

Table 1 100-year Water Surface Elevation Comparison through the Planned Nacmine Berm Section

River Station (m)	Water Surface Elevation with Midland Rail Bridge (m)	Water Surface Elevation without Midland Rail Bridge (m)	Water Surface Elevation Difference (m)
47,010	686.22	686.05	0.17
46,672	686.03	685.84	0.19
46,395	685.96	685.78	0.18
46,221	685.92	685.73	0.19
46,039	685.79	685.59	0.20
45,748	685.71	685.49	0.22

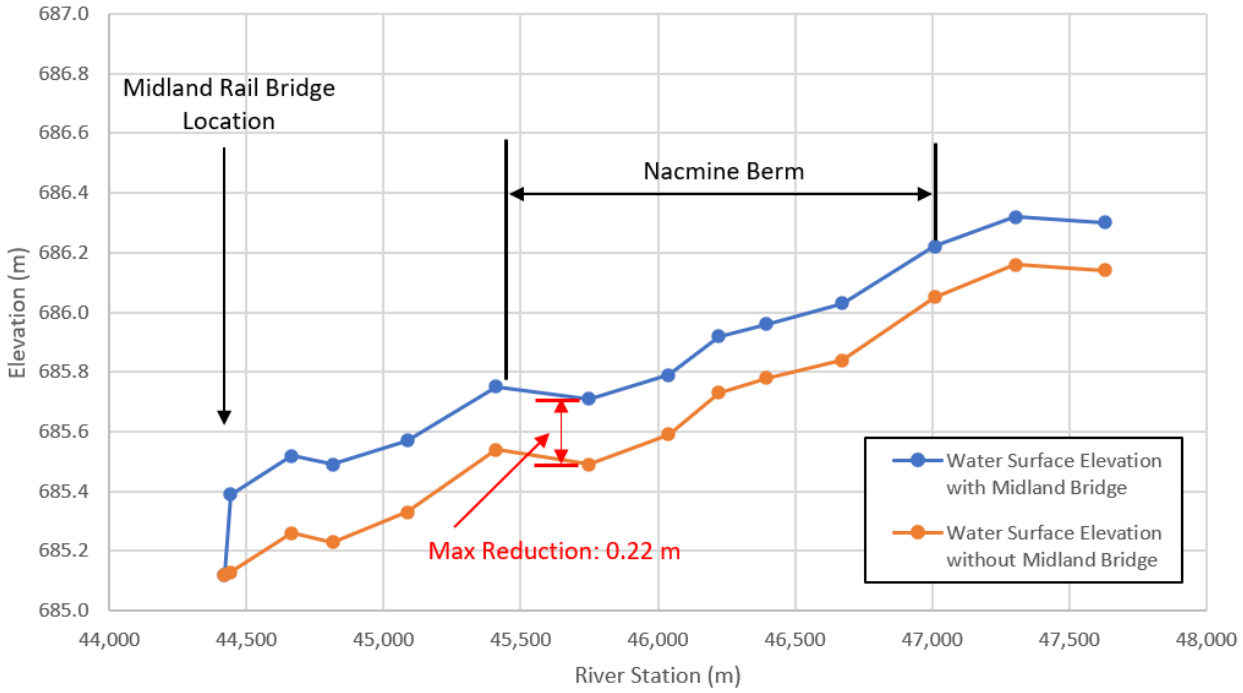


Figure 1 100-year Water Surface Elevation Comparison through the Planned Nacmine Berm Section

Flooding begins in Nacmine when water levels at river station 47,010 and 45,748 reach 684.58 and 684.10 m, respectively. The 100-year water levels without the Midland Rail Bridge are approximately 1.4 m above these flood initiating water levels. Despite the removal of the Midland Rail Bridge reducing water levels by approximately 0.2 m, there continues to be a need to build the Nacmine Berm for flood protection.

We hope that this information will assist you with addressing the residents' suggestions. Please feel free to contact Robyn Andrishak by email (randrishak@nhcweb.com) or phone (587-759-7517) if any additional information or clarification is required.

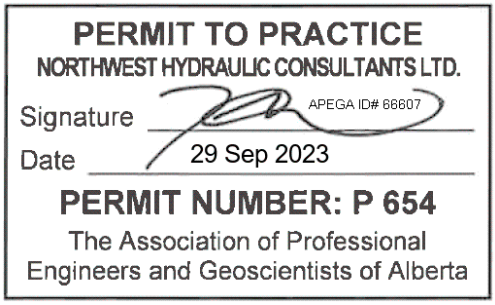
Sincerely,

Northwest Hydraulic Consultants Ltd.

Prepared by:

2023-09-29
Agata Hall, M.Sc., P.Eng.
Associate

Reviewed by:



Robyn Andrishak, M.Sc., P.Eng.
Principal