

MTI

SANFORD DAM REPLACEMENT PROJECT

June 22, 2022



- The Sanford Dam was built in 1941 on the La Salle River in the Town of Sanford, MB
- The dam provides upstream water storage for the Rural Municipality of Macdonald's water supply
- Water supply demand in the RM of Macdonald is expected to increase over the years
- Engineering inspection reports have indicated that the current dam structure is at the end of its service life and should be replaced

Scope and Objectives

- Manitoba Transportation & Infrastructure selected AECOM to undertake a preliminary design for replacement of the Sanford Dam
- The project objectives are to design and construct a structure that has a lifespan of a minimum 50 years, while balancing the interest of stakeholders, and improving the performance of the structure in a way that is sustainable and environmentally responsible
- Several options were developed and evaluated for the replacement dam structure looking at the following criteria:
 - Stakeholder Impacts (RM, Adjacent Landowners, Public)
 - Public and Worker Safety
 - Environmental Impacts (Aquatic and Terrestrial)
 - Water Level Changes (Increased Water Supply and Flooded Area)
 - Riverbank Impacts
 - Recreation
 - Property Acquisition / Easements
 - Design (Geotechnical, Hydrotechnical, and Structural) and Construction
 - Operations / Maintenance
 - Cost



Project Alternatives

Four alternatives were considered:

Alternative 1:

- 1A) Original Location and the same dam crest elevation
- 1B) Original Location and increased dam crest elevation by approximately 20 cm (8 inches)

Alternative 2:

- 2A) Location at Mandan Dr. (old bridge location) and same dam crest elevation
- 2B) Location at Mandan Dr. (as above) and increased dam crest elevation by approximately 20 cm (8 inches)



ALTERNATIVE 1 - ORIGINAL LOCATION

ALTERNATIVE 2 - MANDAN DRIVE LOCATION

Water Level Impacts - Spring

- The typical spring water level (1 in 2-year events) and higher flood events **are nominally influenced** by the dam (regardless of alternative) because the dam will be completely submerged
- The dam (regardless of alternative) only affects a small portion of the natural flood plain because high water levels are influenced by the natural channel restrictions downstream



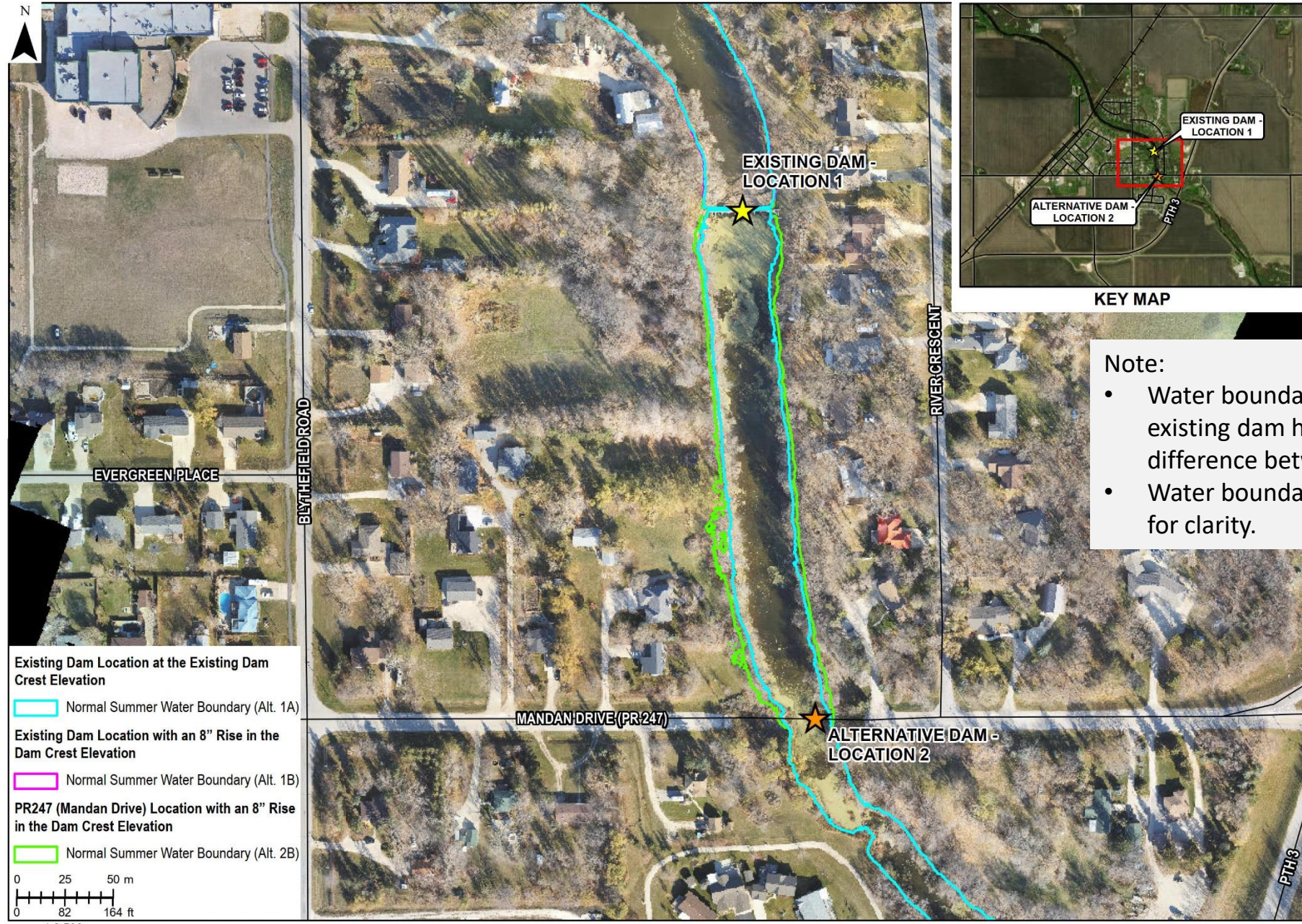
COMPARISON OF TYPICAL SPRING WATER LEVEL INUNDATION AREA (ALTERNATIVE 1A, 1B, AND 2B)



Water Level Impacts - Summer

- Alternative 1B (raised crest): The typical summer water level has minimal change upstream of the existing dam with raising the crest 20 cm. The water's edge would be ~0.7 m (~2.5 ft) wider in most upstream locations within Sanford.
- Alternative 2B: Downstream of the existing dam the water's edge would be typically be ~2 to 4 m (~6.5 to 13 ft) wider in most locations.

COMPARISON OF NORMAL SUMMER WATER LEVEL INUNDATION AREA (ALTERNATIVE 1A, 1B, AND 2B)

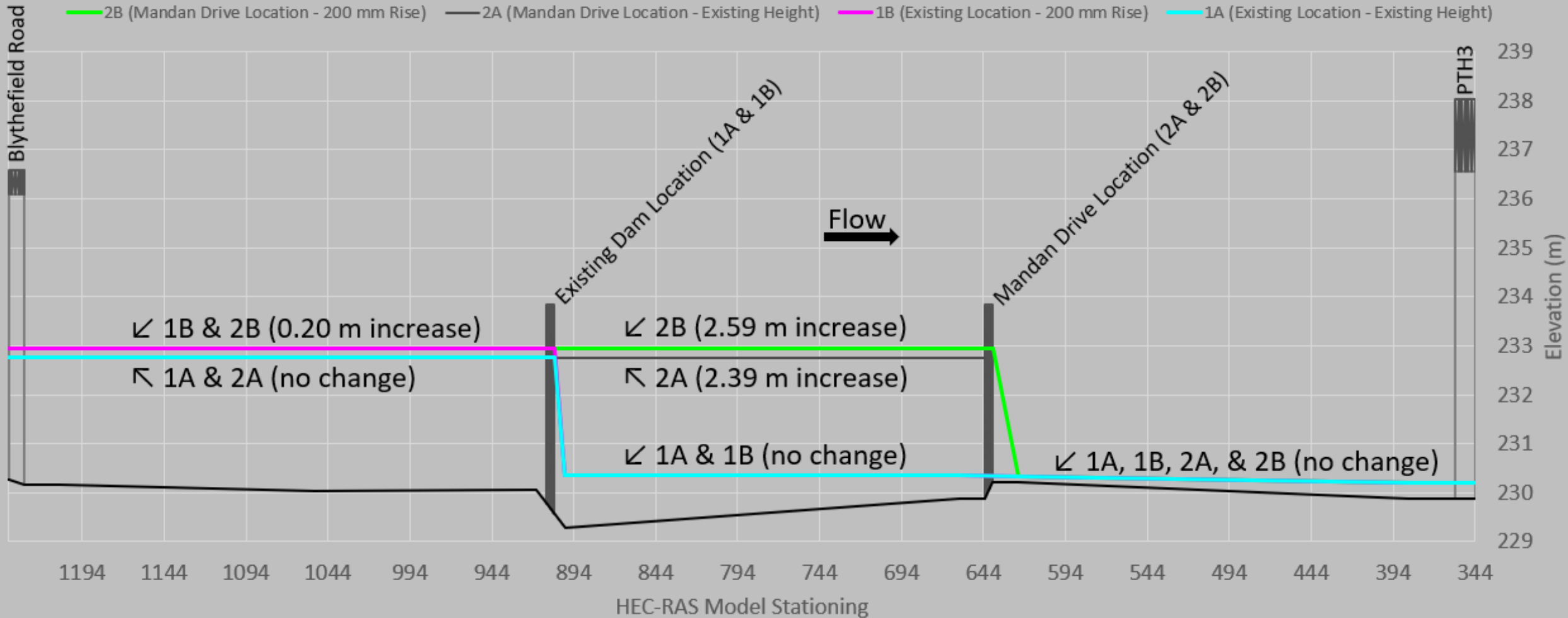


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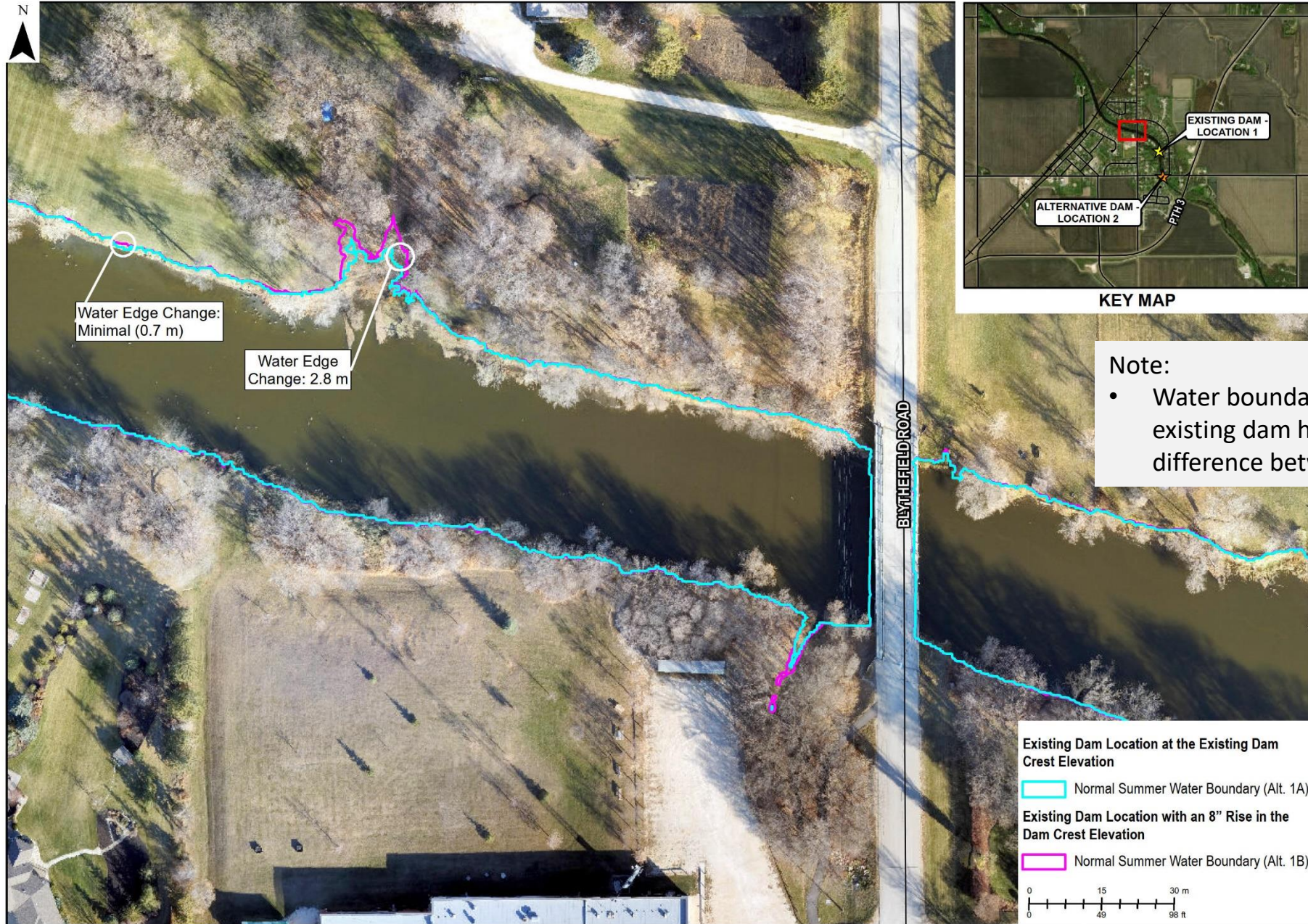
- Water boundaries upstream of existing dam have minimal difference between each alternative.
- Water boundary for 2A is not shown for clarity.

Water Level Impacts – Summer Alternatives 1A, 1B, 2A & 2B

La Salle River Profile (Blythefield Road to PTH3)



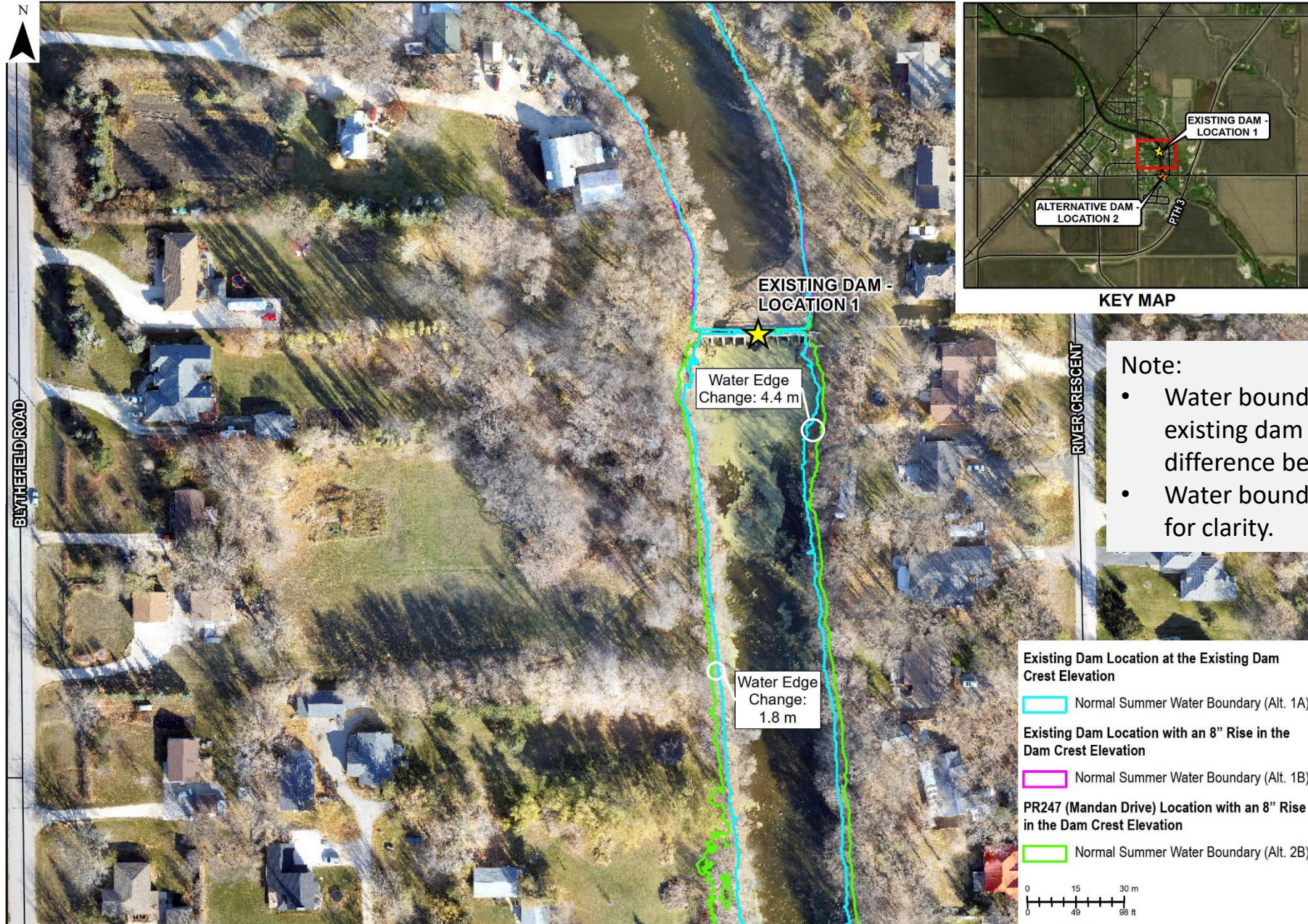
COMPARISON OF NORMAL SUMMER WATER LEVEL INUNDATION AREA (ALTERNATIVE 1A AND 1B) AT BLYTHEFIELD ROAD BRIDGE



Note:

- Water boundaries upstream of existing dam have minimal difference between each alternative.

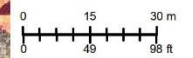
COMPARISON OF NORMAL SUMMER WATER LEVEL INUNDATION AREA (ALTERNATIVE 1A, 1B, AND 2B) AT EXISTING SANFORD DAM



Note:

- Water boundaries upstream of existing dam have minimal difference between each alternative.
- Water boundary for 2A is not shown for clarity.

- Existing Dam Location at the Existing Dam Crest Elevation
- Normal Summer Water Boundary (Alt. 1A)
- Existing Dam Location with an 8" Rise in the Dam Crest Elevation
- Normal Summer Water Boundary (Alt. 1B)
- PR247 (Mandan Drive) Location with an 8" Rise in the Dam Crest Elevation
- Normal Summer Water Boundary (Alt. 2B)



COMPARISON OF NORMAL SUMMER WATER LEVEL INUNDATION AREA (ALTERNATIVE 1A AND 2B) AT MANDAN DRIVE



Water Changes - Storage Capacity

Alternative	Description	Storage Volume	Increased Storage	Percent Increase
1A	Existing Location & Same Crest	512,200 m ³	-	-
1B	Existing Location & Raised Crest	579,700 m ³	67,500 m ³	13%
2A	Downstream Location & Same Crest	532,100 m ³	19,900 m ³	4%
2B	Downstream Location & Raised Crest	601,600 m ³	89,400 m ³	17%

Riverbank Slope Stability

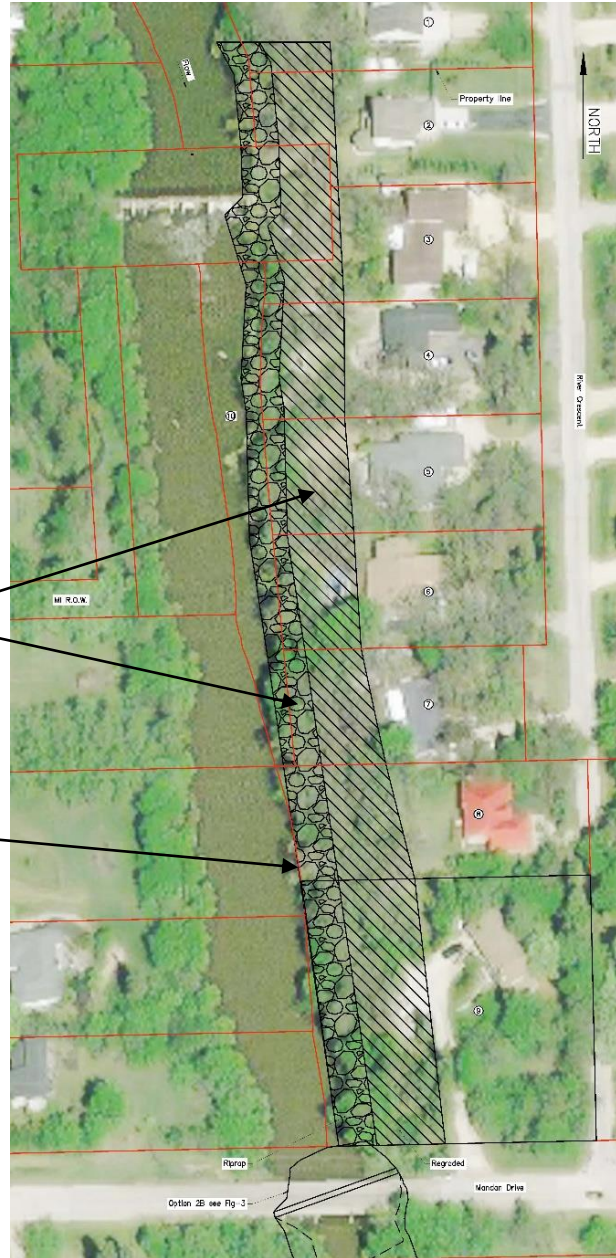
- The results of the slope stability analysis indicated that the east riverbank would require erosion protection measures including rockfill riprap protection and regrading work if the dam was relocated to the downstream location (Alternative 2A and 2B).
- This regrading work would have a significant impact to residential backyards downstream of the existing dam on the east side (Alternative 2A and 2B).
- If the dam remains at the current location (Alternative 1A and 1B) the downstream riverbank will not require modifications. Erosion protection (riprap) and some minor riverbank regrading will be required within the vicinity of the new structure.



Riverbank Impacts Associated with Alternative 2A and 2B

REGRADING

ROCKFILL RIP RAP



- Nine or more properties would be impacted along the higher east riverbank as a result of the required erosion protection and regrading works.
- The required extents of the riverbank regrading would significantly impact residential property and would require property acquisition.
- Rockfill riprap placement and regrading would require removal of many mature trees on the east riverbank, reducing the aesthetic value to homeowners.
- If regrading and riprap placement is not undertaken the increased water level along this section of the river will still cause mature trees on the riverbank to die, increasing the risk of riverbank instability.

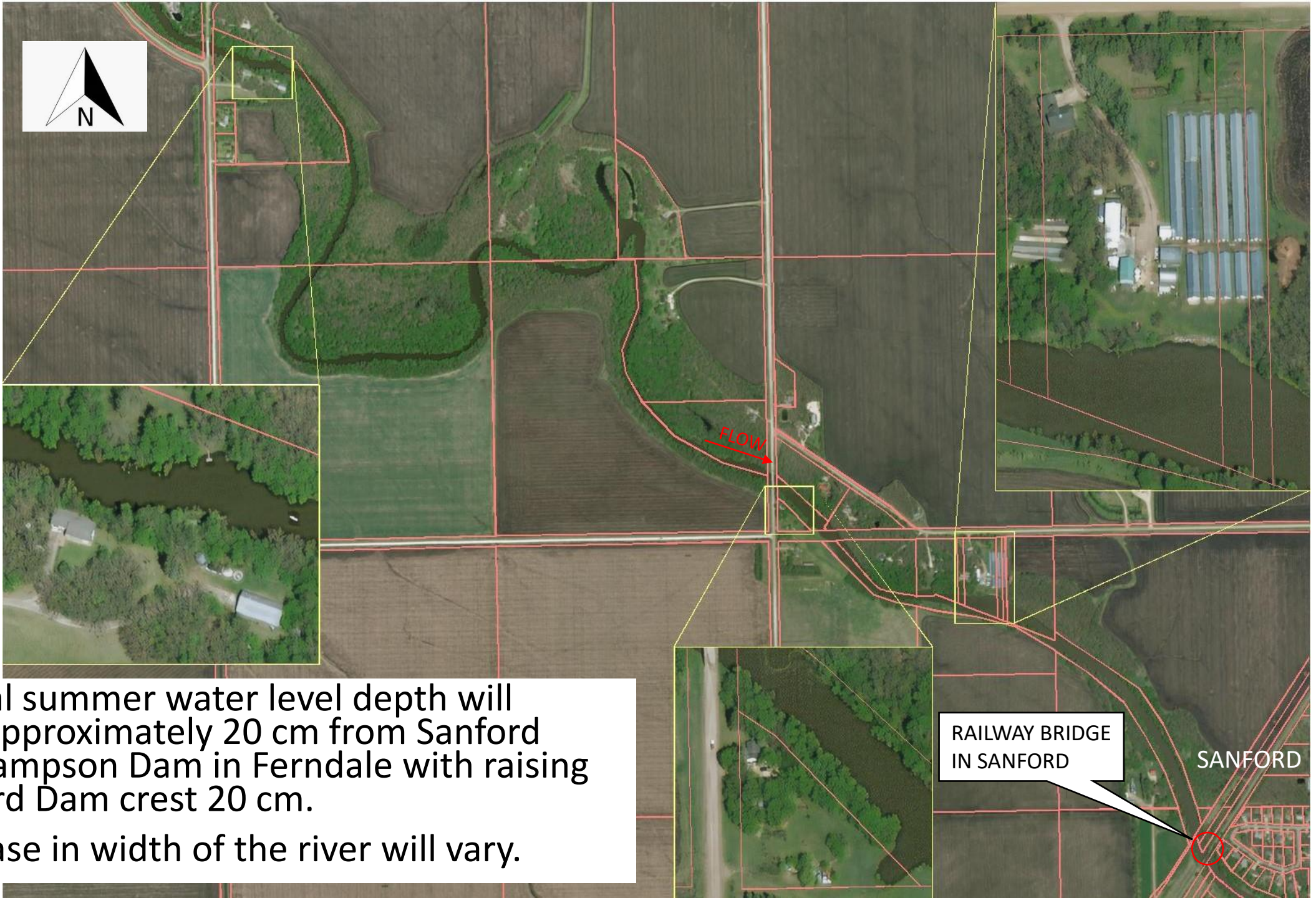


Upstream Property Impacts due to Alternatives 1B and 2B

- Impact to vegetation is minimal
- Minor water level increase extends upstream to Hampson Dam
- Edge of property location varies.

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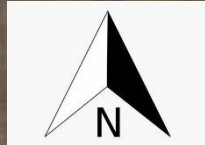




- The typical summer water level depth will increase approximately 20 cm from Sanford Dam to Hampson Dam in Ferndale with raising the Sanford Dam crest 20 cm.
- The increase in width of the river will vary.

The logo for MTI, consisting of the letters 'MTI' in white on a dark blue square background.

FERNDALE



FLOW

HAMPSON DAM

- The typical summer water level depth will increase approximately 20 cm from Sanford Dam to Hampson Dam in Ferndale with raising the Sanford Dam crest 20 cm.
- The increase in width of the river will vary.

Comparison of Alternatives: Stakeholders

Alternative	Adjacent Property Normal Summer Water Level	RM of Macdonald Water Supply Volume*	Recreational Impact (e.g., Boating; Fishing) within Town of Sanford
1A) Original Location and the same dam crest elevation	No change	No change	No change**
1B) Original Location and increased dam crest elevation by 20 cm (8 inches)	Very small change on most properties	More volume for water storage (67,500 m ³)	Negligible change (approximately 1% increase in reservoir surface area)
2A) Location at Mandan Dr. and same dam crest elevation	Normal water surface area widens by approximately 2 to 4 m on each side between existing dam and new dam	More volume for water storage (~19,900 m ³), but only between the original dam location and this new dam location	Approximately 33% more reservoir area for recreational activities between existing rail bridge and new dam
2B) Location at Mandan Dr. (as above) and increased dam crest elevation by 20 cm (8 inches)	Small increase from Alternative 2A	More volume for water storage (~89,400 m ³)	Approximately 35% more reservoir area for recreational activities between existing rail bridge and new dam

*Under normal summer water levels in river reach between existing Sanford Dam to 10.7 km upstream to Hampson Dam

**Temporary effects during construction (e.g., cofferdam for work in the dry will alter boating area temporarily)

Comparison of Alternatives: Environmental

Alternative	Riverbank Trees	Fish Habitat*	Permitting Timeline
1A) Original Location and the same dam crest elevation	No Change	No Change**	Approximately 6 months (i.e., DFO review and approval)
1B) Original Location and increased dam crest elevation by 20 cm (8 inches)	Limited flooding and death of some upstream riverbank trees due to increased reservoir levels	Increase of approximately 13% more than Alternative 1A	Approximately 6 months (i.e., DFO review and approval)
2A) Location at Mandan Dr. and same dam crest elevation	Flooding and death of riverbank trees between existing and new dam location due to increased reservoir levels/grading	Increase of approximately 4% more than Alternative 1A	MB Environment Act Licence required. Approximately 12 - 18 months.
2B) Location at Mandan Dr. (as above) and increased dam crest elevation by 20 cm (8 inches)	Flooding and death of riverbank trees between existing and new dam location (slightly more than Alternative #2A) due to increased reservoir levels/grading	Increase of approximately 17% more than Alternative 1A	MB Environment Act Licence required. Approximately 12 - 18 months.

*Under normal summer water levels in river reach between existing Sanford Dam to 10.7 km upstream to Hampson Dam

**Temporary effects during construction (e.g., cofferdam to allow work in the dry will alter fish habitat temporarily)

Public Safety Considerations

The downstream location (Alternative 2A and 2B) is a concern for Public Safety, as the location is more accessible, and is expected to attract more visits from the public.

Regardless of the Alternative selected, the following safety items will be considered for inclusion in the design:

- Safety Boom
- Safety Signage
- Restricted access to the dam structure (fence/gate)
- Other safety considerations as may be determined





Public Safety Considerations



Comparison of Alternatives: Design/Construction

Alternative	Construction Access	Construction Timeline	Cost
1A) Original Location and the same dam crest elevation	Via Crown land access adjacent to private property west of the dam	June to March (8 - 9 months)	Slightly lower than 1B
1B) Original Location and increased dam crest elevation by 20 cm (8 inches)	Via Crown land access adjacent to private property west of the dam	June to March (8 - 9 months)	Depends on selected structure type Approx. \$3M to \$4.5M
2A) Location at Mandan Dr. and same dam crest elevation	Via ends of Mandan Dr. at La Salle River for dam. Access also required to east riverbank for regrading	June to March (8 - 9 months)	Slightly lower than 2B
2B) Location at Mandan Dr. (as above) and increased dam crest elevation by 20 cm (8 inches)	Via ends of Mandan Dr. at La Salle River for dam. Access also required to east riverbank for regrading	June to March (8 - 9 months)	Depends on selected structure type. Assumes significant regrading and property acquisition Approx. \$3.5M to \$5.5M

Recommended Alternative

- **Alternative 1B**, the Original Location and Raised Crest is considered the highest ranked option given the evaluation based on:
 - Raised crest provides significant water storage
 - Minimal property acquisition
 - Least disruption to adjacent land owners
 - Minimal environmental impacts
 - Reduced public safety concerns
- Further assessment will be undertaken to determine whether the crest elevation can be increased beyond 20 cm with minimal impacts

Summary of Recommended Alternative - Impacts to Adjacent Landowners

■ **Upstream of Existing Dam:**

- Water level raised 20 cm (8 inches) , and water extends typically 0.7 m (~2.5 ft) further towards yards within Sanford. This will vary from one property to the next.
- During typical summer conditions the water level will be raised ~20 cm from Sanford to the Hampson Dam at Ferndale. The river width will vary.
- Properties adjacent to the dam at the existing location may require erosion protection of the riverbank.
- No change to spring flood levels

■ **Downstream of Existing Dam:**

- No change to existing water level conditions
- Properties adjacent to the dam at the existing location may require erosion protection of the riverbank.

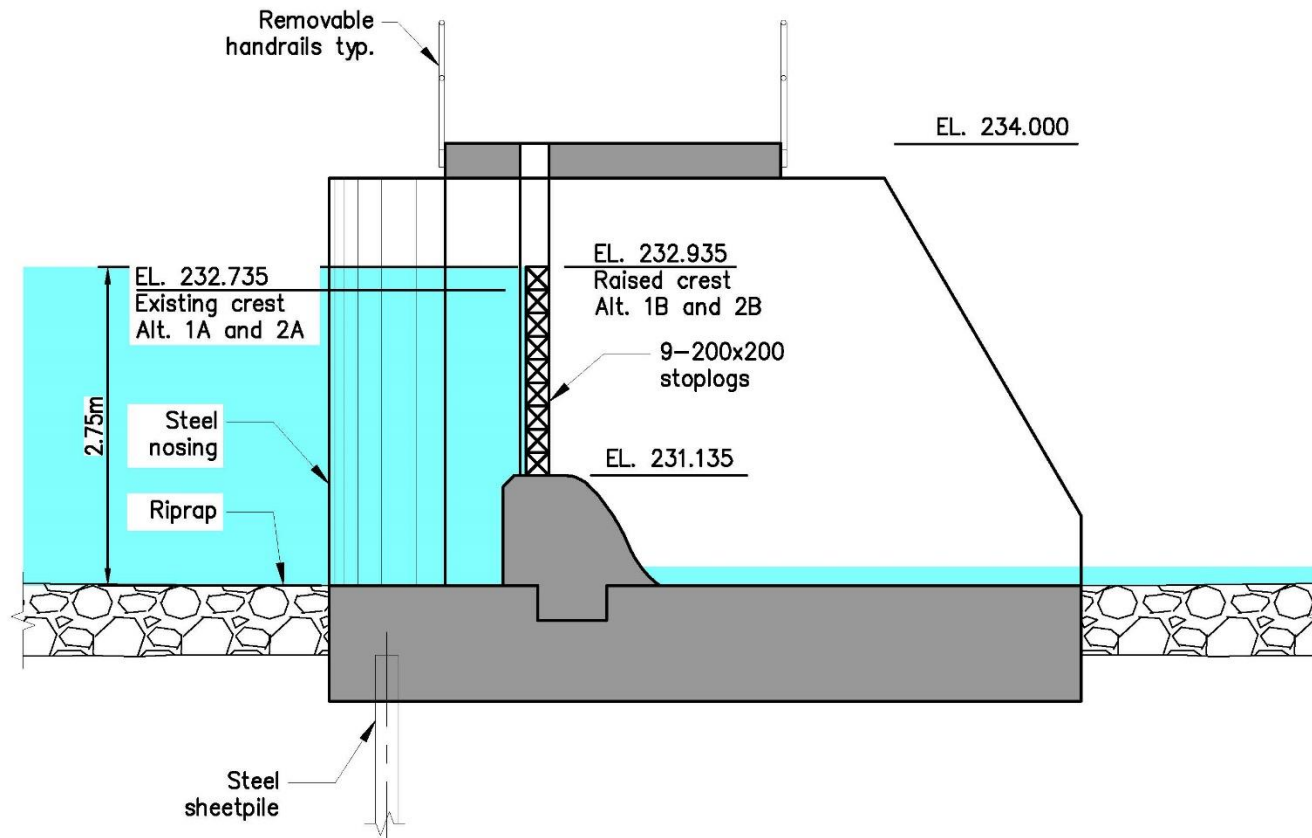
Structure Types for Consideration

Three structure types are under consideration:

1. Stoplog Controlled Concrete Dam
2. Fixed Concrete Weir
3. Rockfill Dam



Stoplog Controlled Concrete Dam

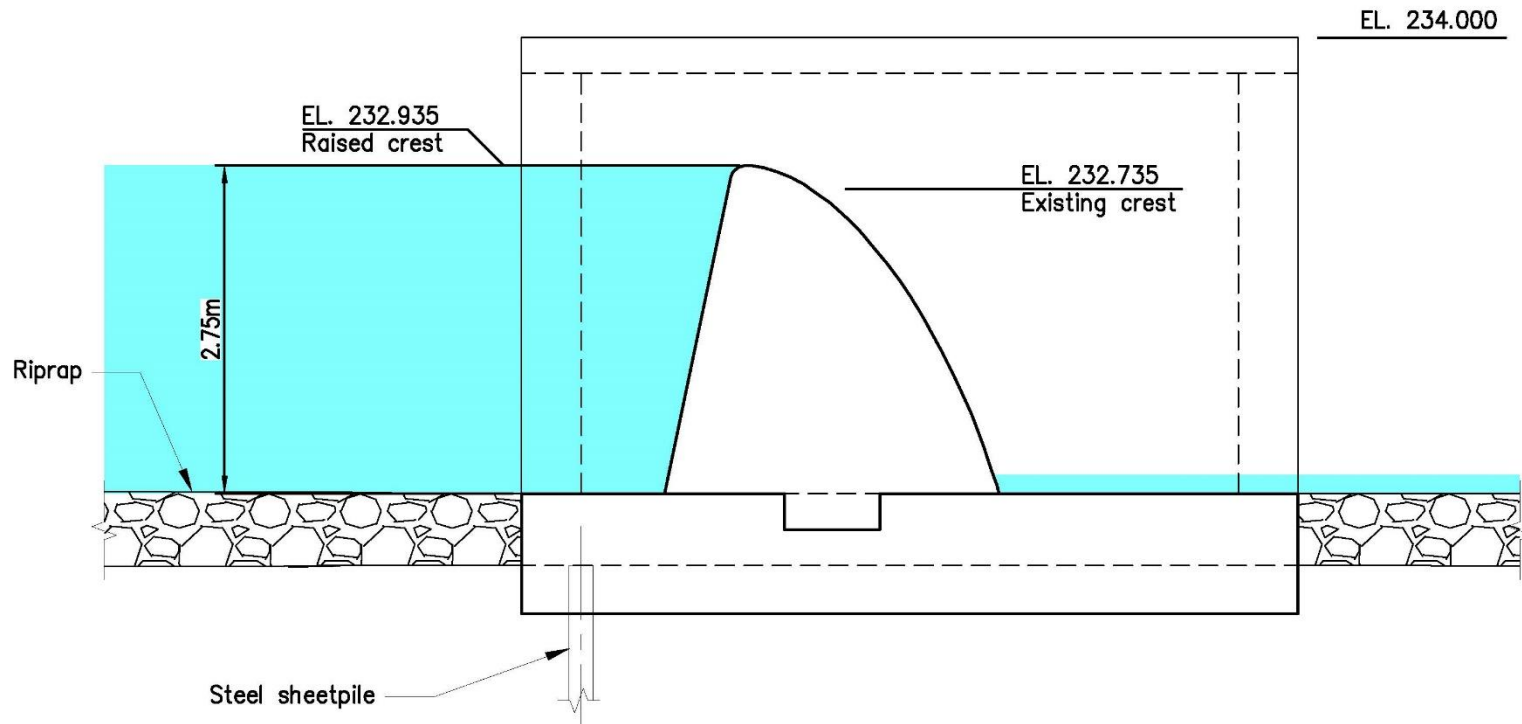


Note:

- For illustration purposes. The structure type and details have not been determined.



Fixed Concrete Weir



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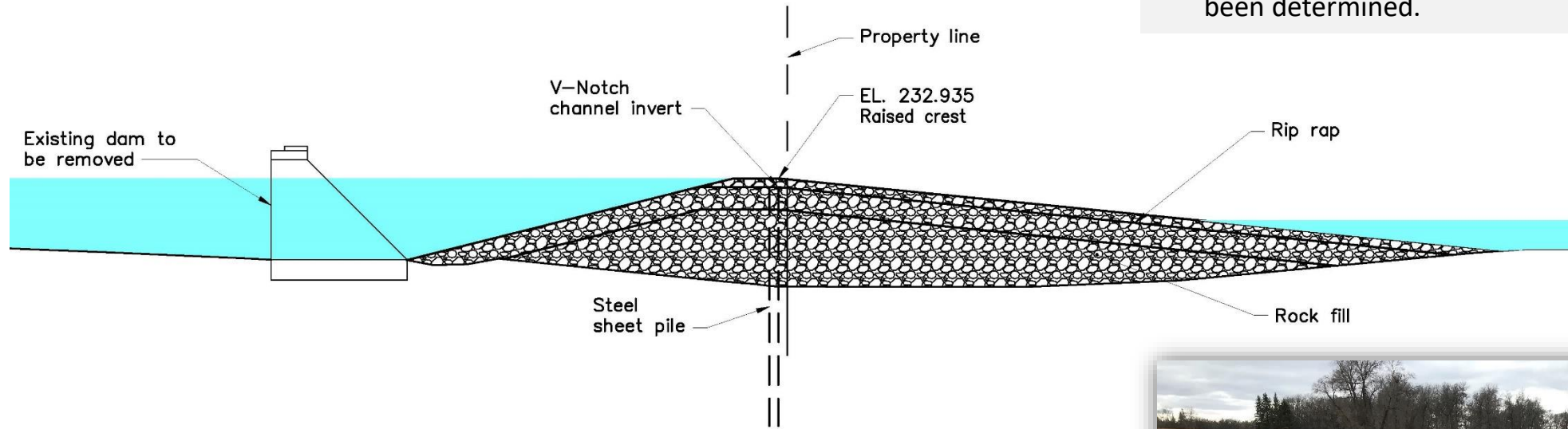
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Rockfill Dam

Note:

- For illustration purposes. The structure type and details have not been determined.





Next Steps

- Optimize new crest elevation and finalize structure type
- Complete Preliminary Design – end of summer 2022
- Detailed Design complete – 2023
- Construction complete - 2024