AECON

Marten Beach Flood Mitigation

# Dec 3 Discussion

Stantec

# Background

2018 Flooding – Marten Beach

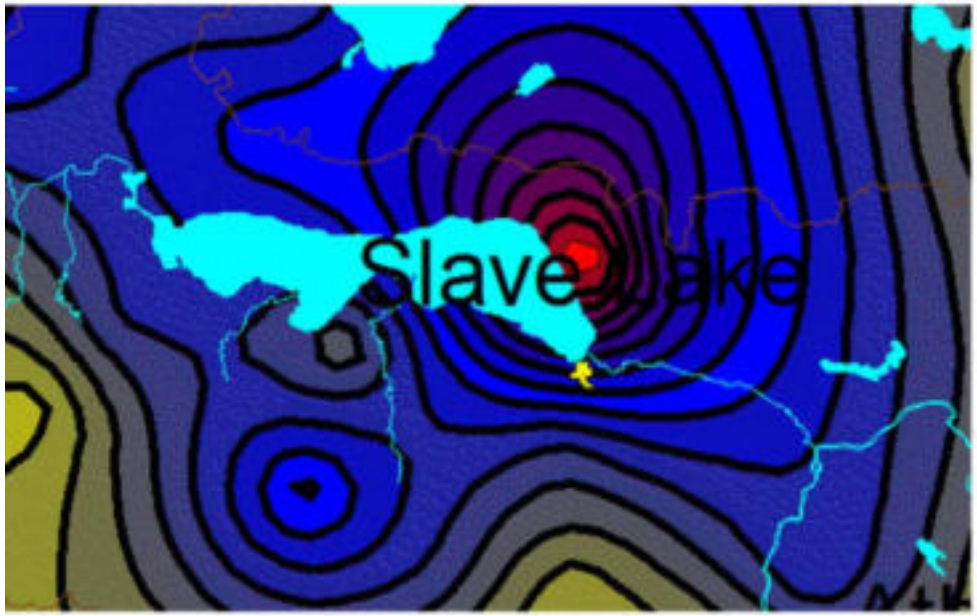
# Background

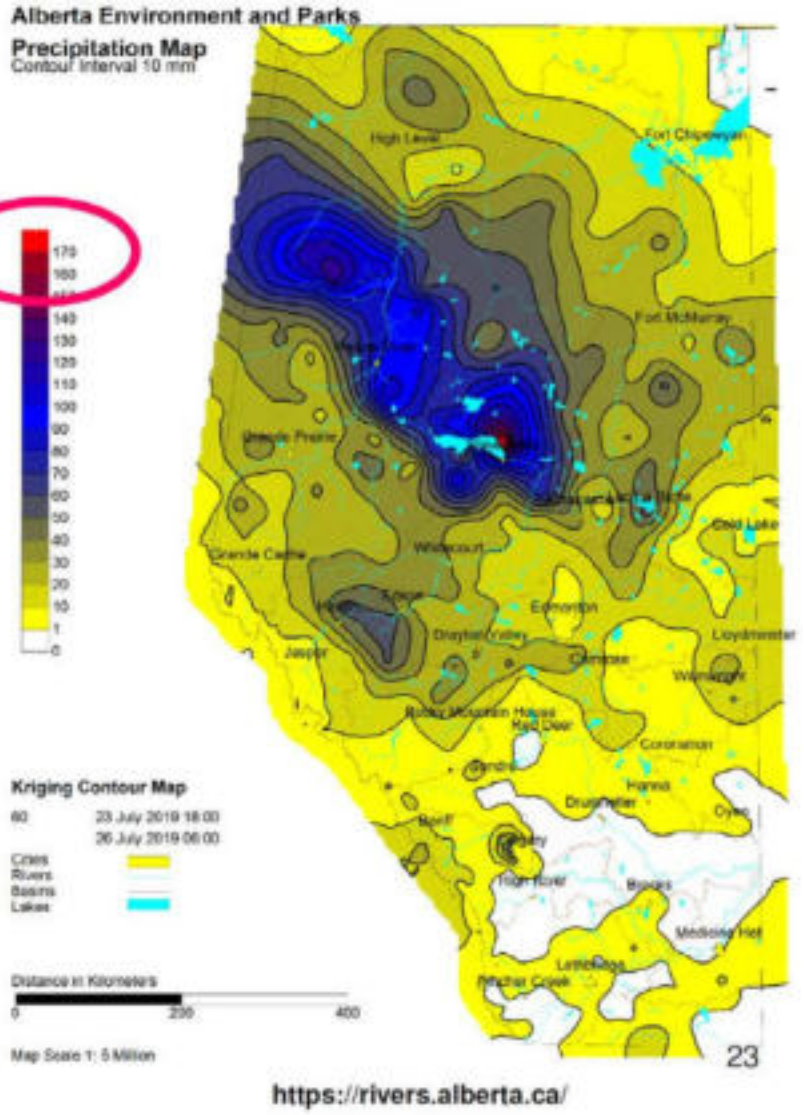
2019 Flooding – Marten Beach

# Background

2019 Flooding – Marten Beach

# Hydrology – 2019 Flood Event




https://rivers.alberta.ca/

# Hydrology

- In the past 32 years, the area has experienced three 20-year floods and potentially two 100-year floods or greater

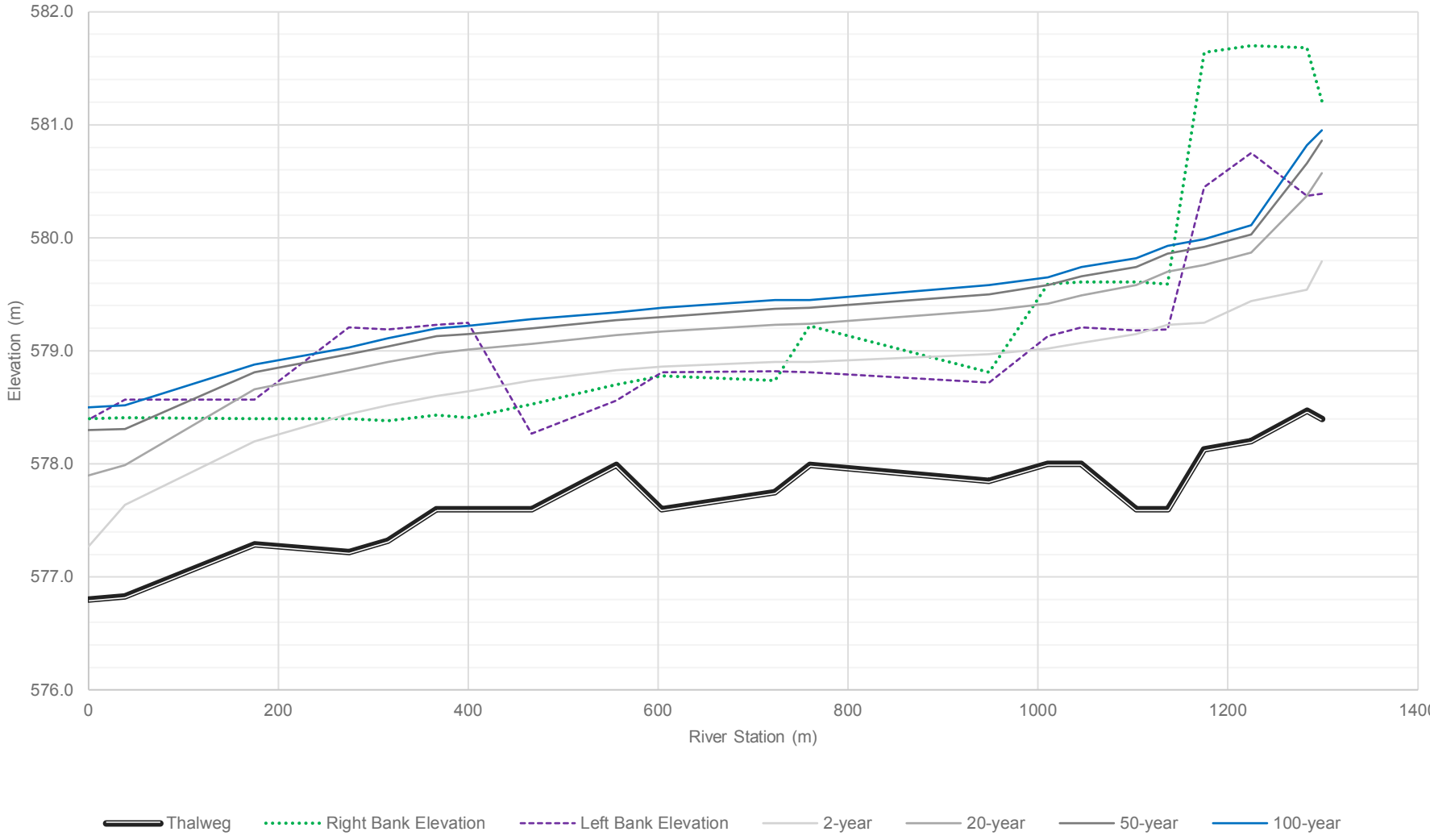
- The 2019 storm was localized to the Marten Beach Area. AEP estimated it to be 273.5 $m^3/s$.

| Flood Event | Marten River at Marten Beach Discharge |
|---|---|
| 2-year | 52 $m^3/s$ |
| 20-year | 160 $m^3/s$ |
| 50-year | 219 $m^3/s$ |
| 100-year | 255 $m^3/s$ |

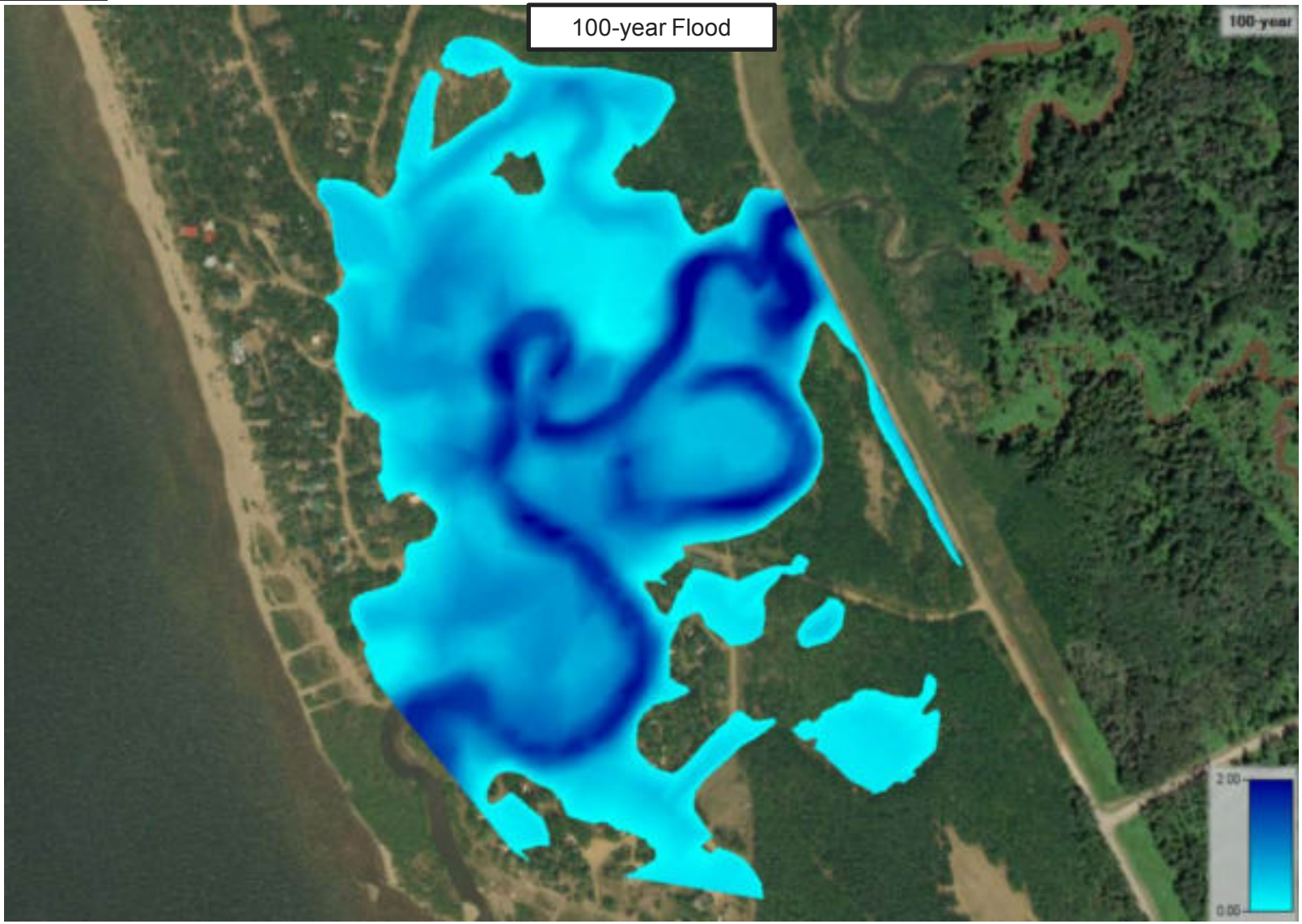
# Hydraulics

- 1-Dimensional HEC-RAS Model
- Uses LiDAR Data only
- No flow records and limited highwater mark data therefore calibration was not possible.

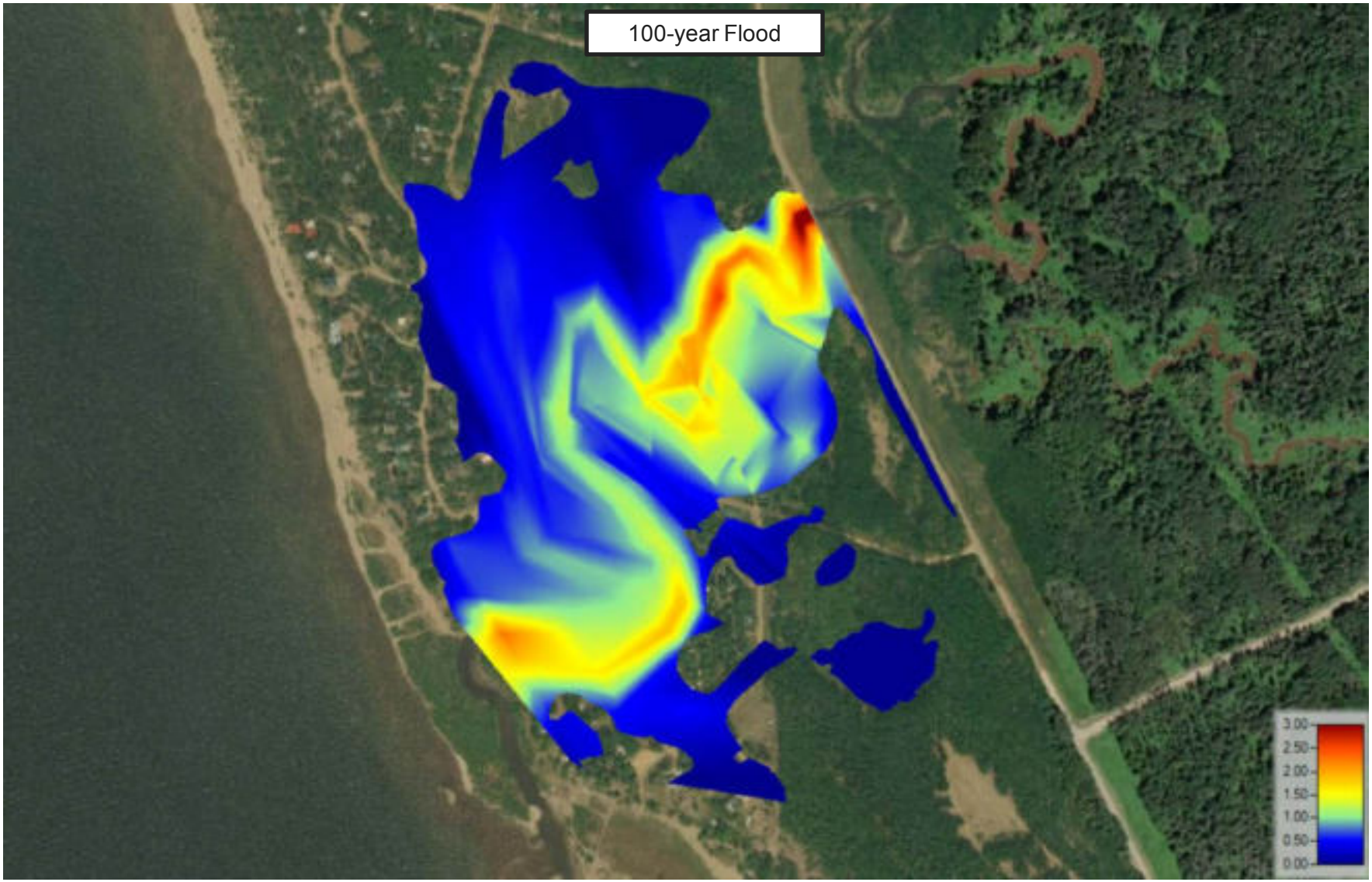
# Hydraulics


582.0
581.0
580.0
579.0
578.0
577.0
576.0
Elevation (m)
0
200
400
600
800
1000
1200
1400
River Station (m)
Thalweg
Right Bank Elevation
Left Bank Elevation
2-year
20-year
50-year
100-year

# Hydraulics



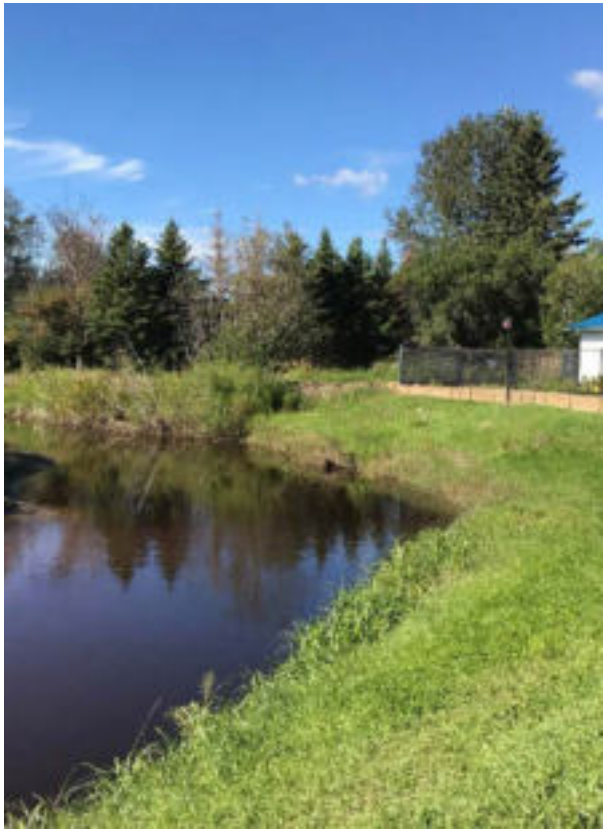
# Hydraulics



# Flood Mitigation Design Challenges

- Low banks Wide, flat floodplain
- Nowhere for the water to go
- Existing infrastructure close to top of banks
- Narrow footprint available for mitigations
- Mitigations will affect flood levels
- Bank erosion risk

# Flood Mitigation Design Challenges

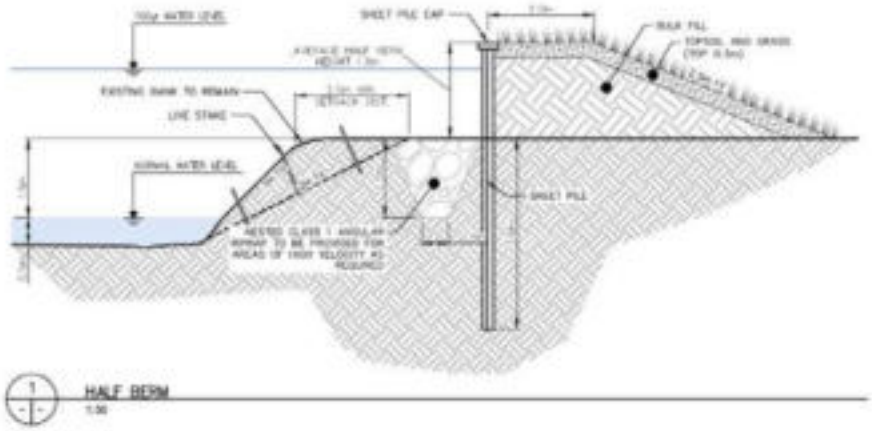


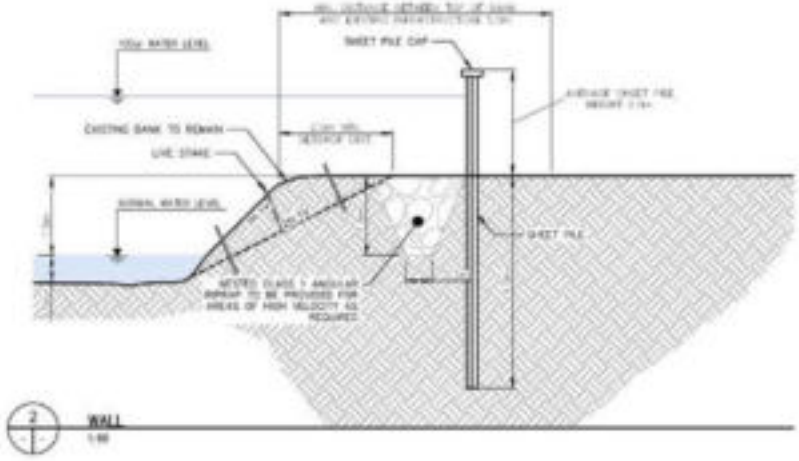
# Flood Mitigation Design

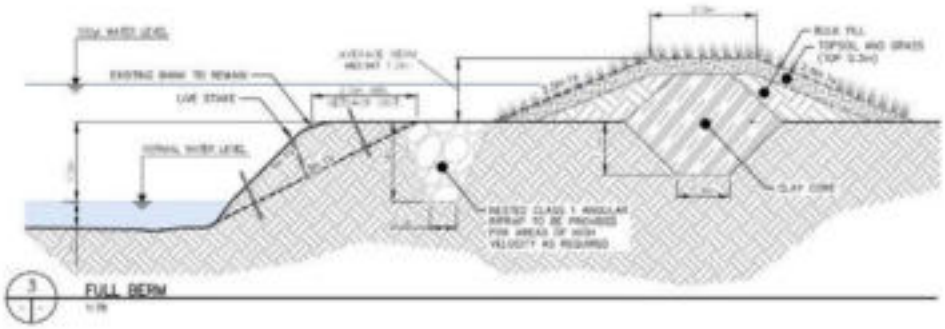
- Design Flood = 100-year Event
- Freeboard = 0.5 m
- Combination of berm, half berm and sheet pile wall

- North Protection
  - Avg. height = 1.4 m
  - Max Height = 2.1 m

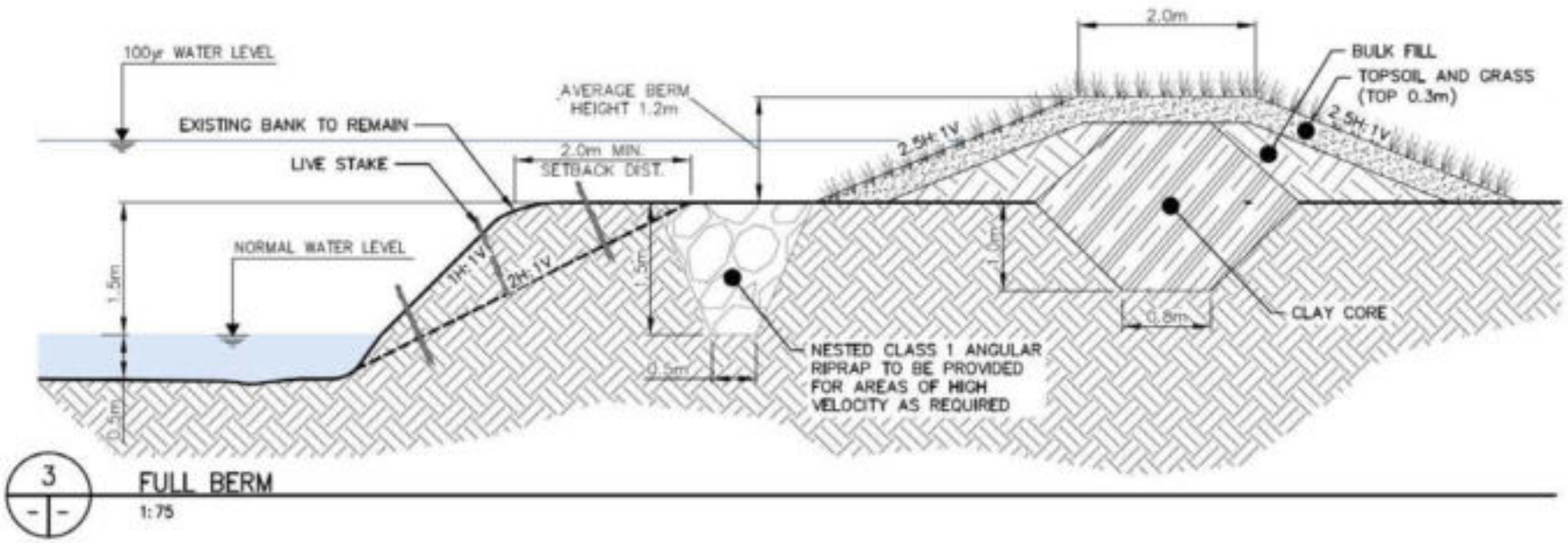
- South Protection
  - Avg. height = 0.9 m
  - Max Height = 1.3 m



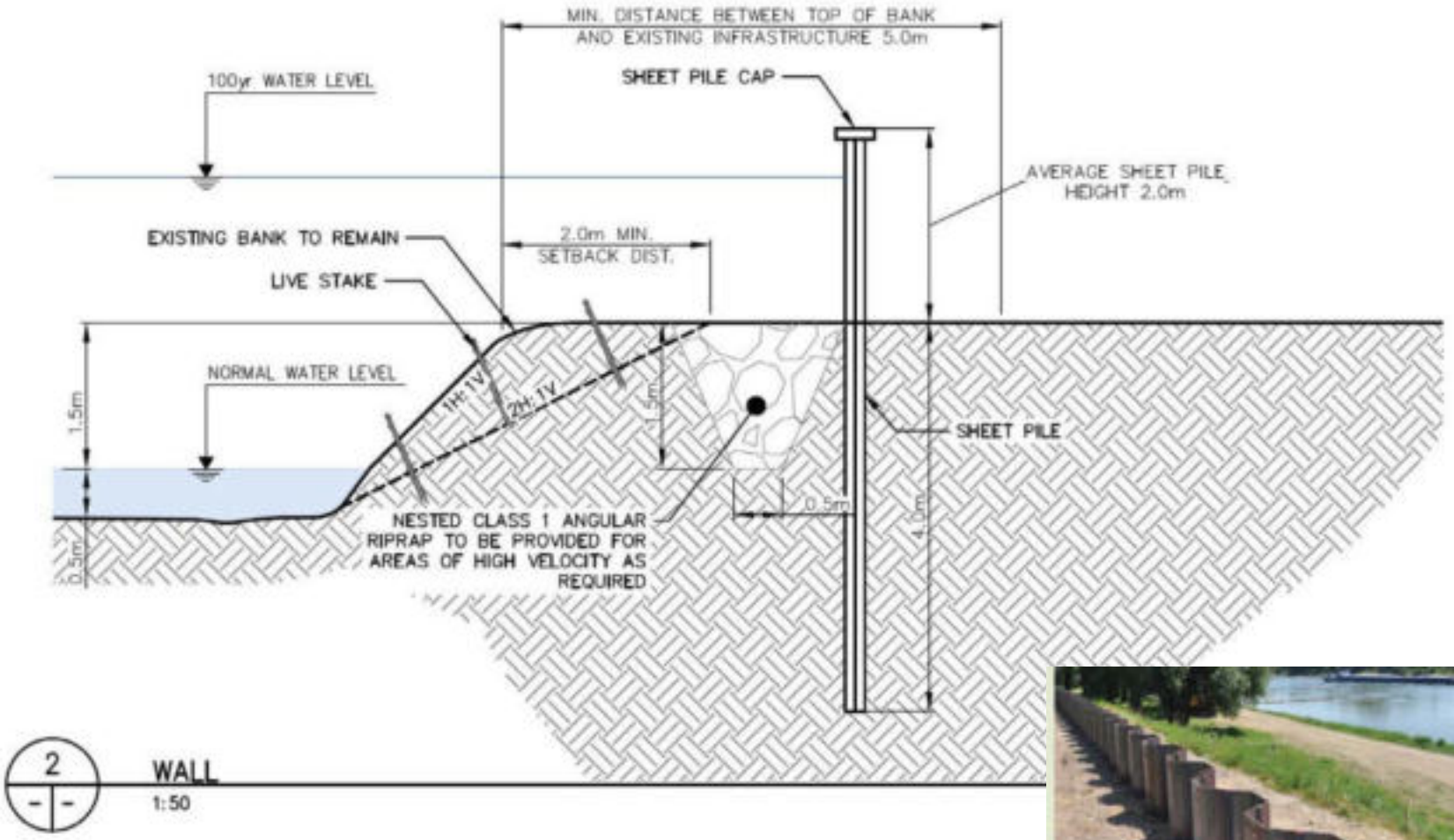



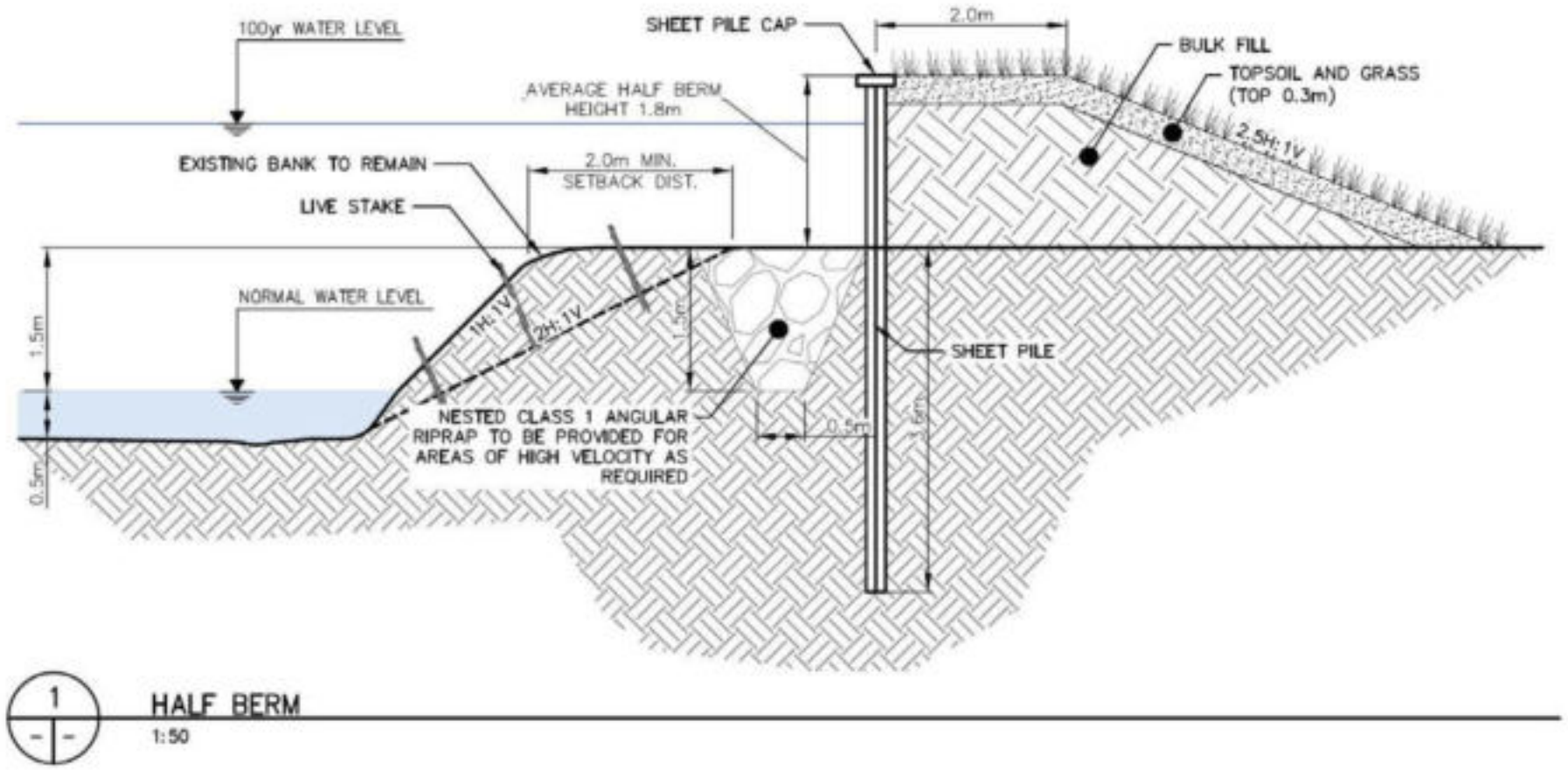
# Flood Mitigation Design



# Flood Mitigation Design



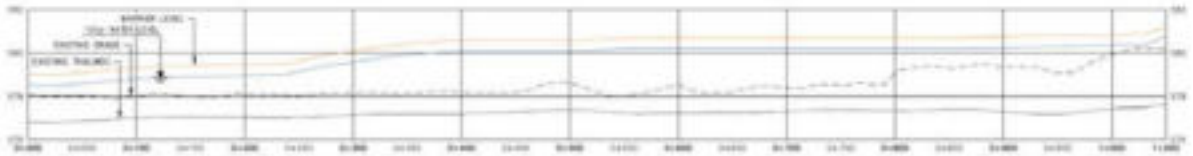

# Flood Mitigation Design



# Flood Mitigation Design

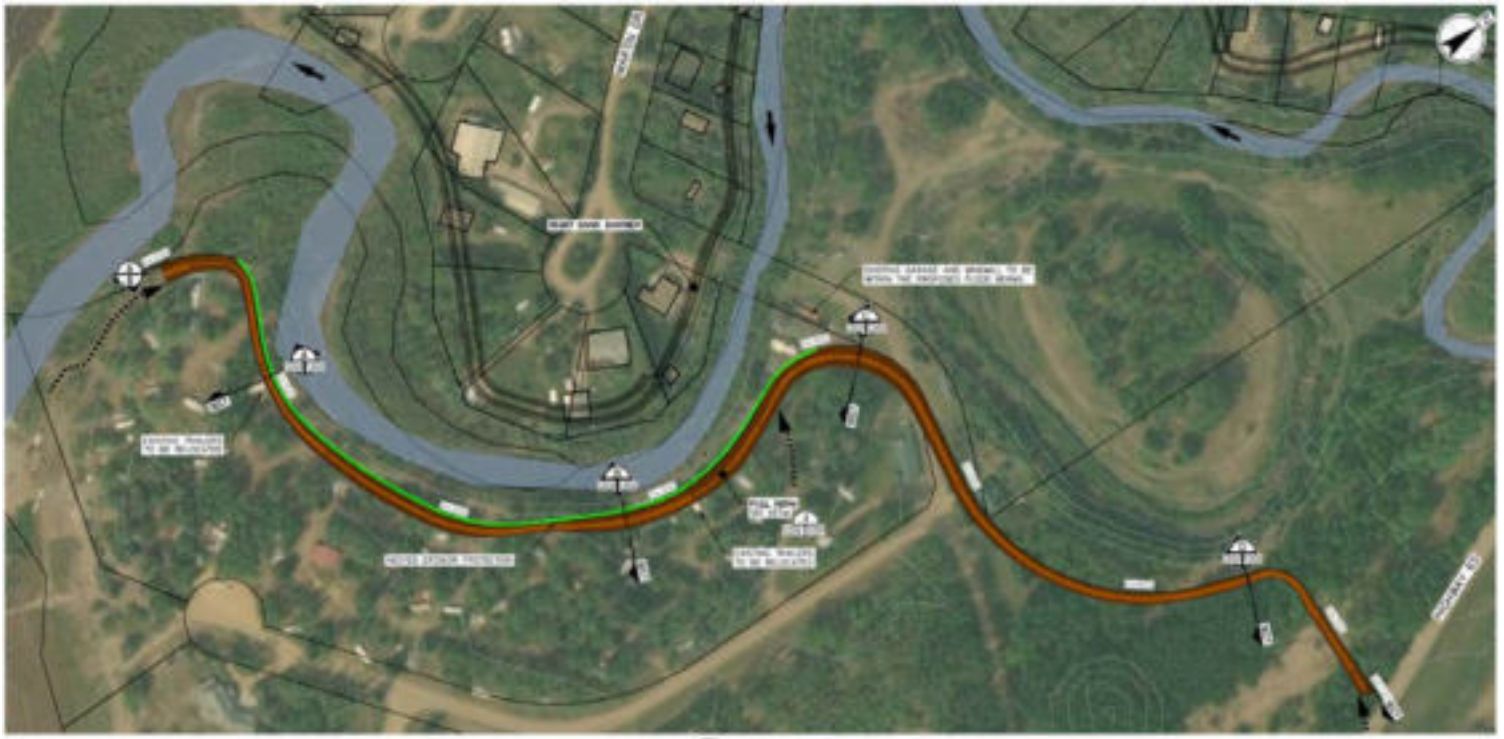
# Flood Mitigation Design

RIGHT BANK BARRIER

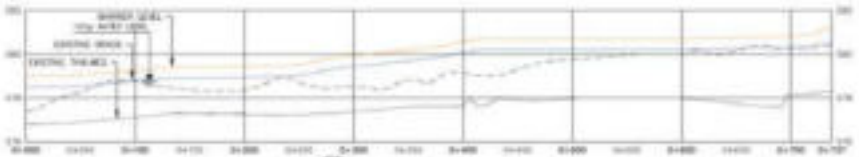


RIGHT BANK BARRIER PROFILE

# Flood Mitigation Design



LEFT BANK BARRIER



LEFT BANK BARRIER PROFILE

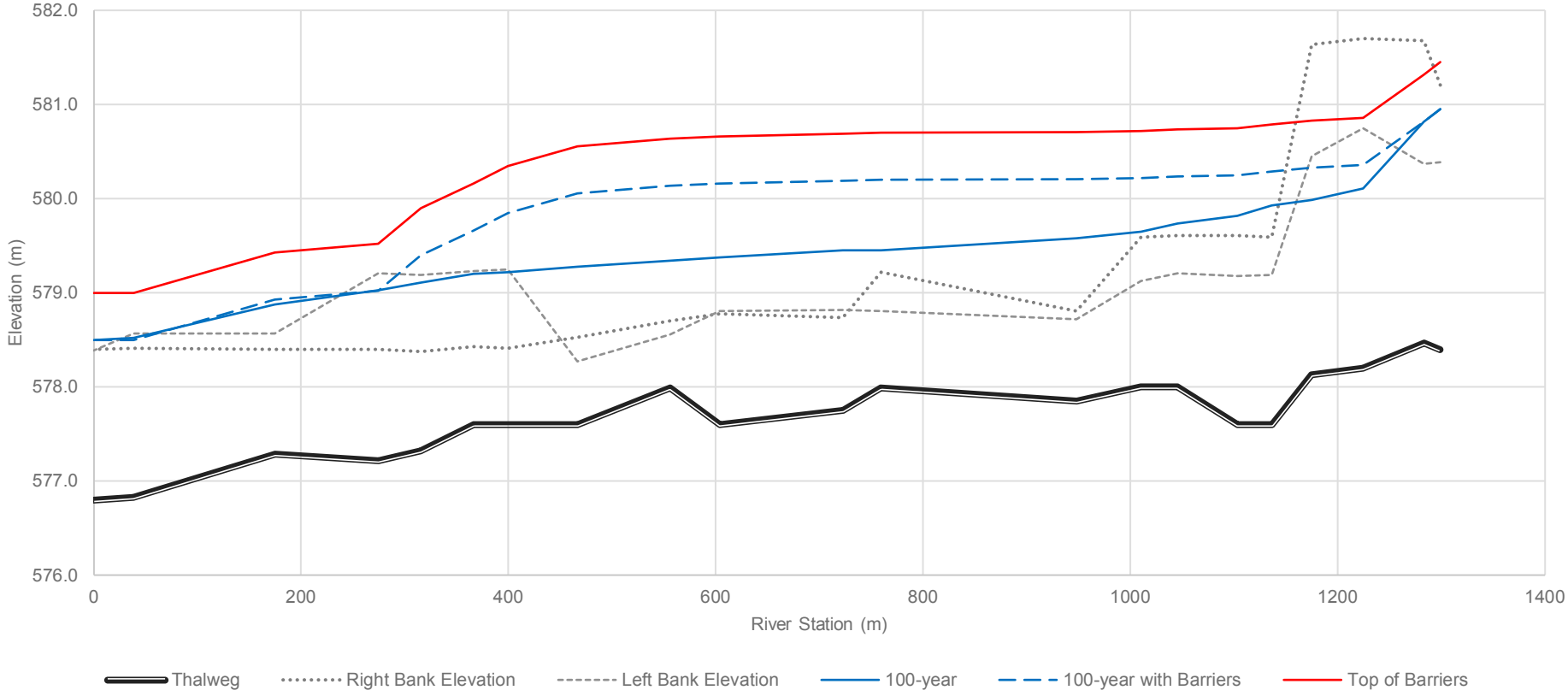
# Flood Mitigation Design

| North Mitigation | | | |
|---|---|---|---|
| **Barrier Type** | **Full Berm** | **Half Berm** | **Sheet Pile** |
| Approximate Barrier Total Length (m) | 570 | 300 | 200 |
| Barrier Average Height (m) | 1.2 | 1.8 | 2.0 |
| Avg Barrier Width (m) | 8 | 7 | 1 |
| Longitudinal Length of Sheet Pile (m) | 0 | 300 | 200 |

| South Mitigation | |
|---|---|
| **Barrier Type** | **Full Berm** |
| Approximate Barrier Total Length (m) | 740 |
| Barrier Average Height (m) | 0.9 |
| Avg Barrier Width (m) | 6.6 |

# Flood Mitigation Design – Hydraulic Impacts

| Hydraulic Impacts of Mitigation Design | | | | |
|---|---|---|---|---|
| **Flood Event** | 2-year | 20-year | 50-year | 100-year |
| **Average Water Level Increase (m)** | 0.1 | 0.3 | 0.4 | 0.4 |
| **Maximum Water Level Increase (m)** | 0.1 | 0.6 | 0.7 | 0.8 |



# Next Steps

- Detailed geotechnical analysis to confirm and validate the design.
- Hydrogeological analyses to assess groundwater conditions
- A detailed topographic and bathymetric survey
- Refine the hydraulic model
- Preparation of regulatory applications and relevant documentation including stakeholder approval letters, wildlife assessments, biophysical impact assessments, fish habitat assessments.
- Construction for Q3/Q4 2021