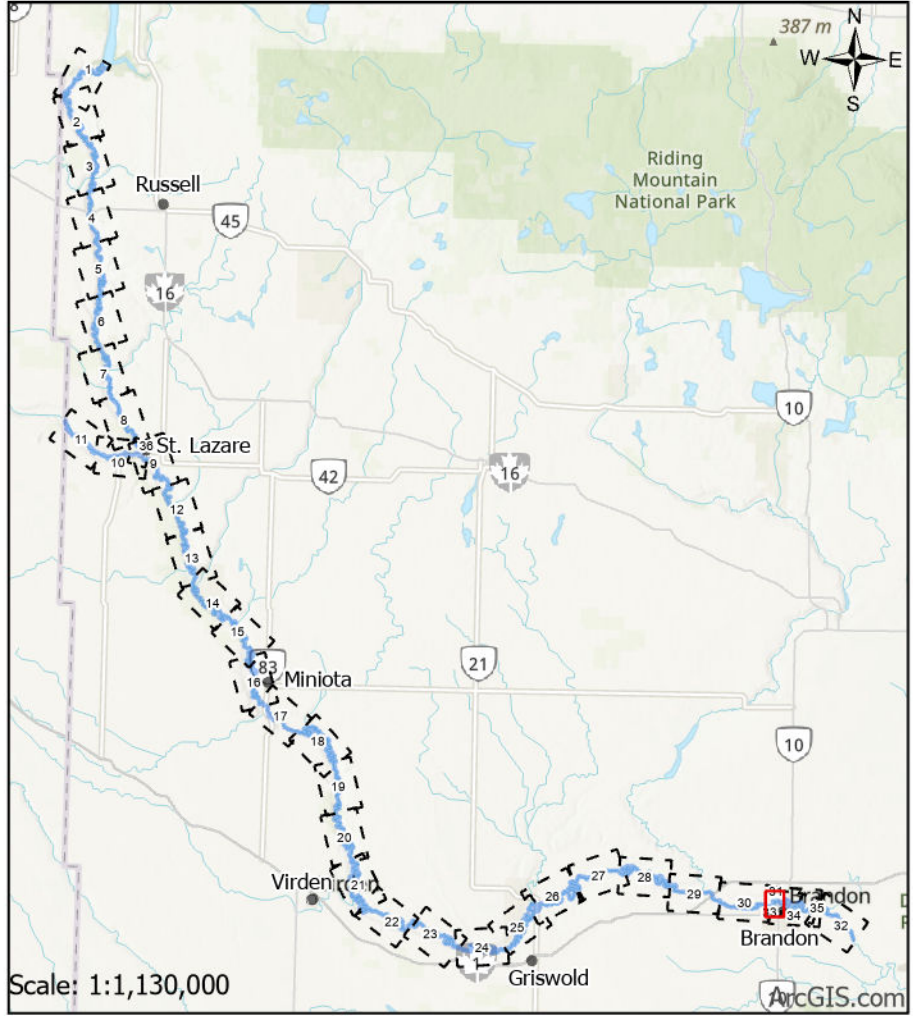
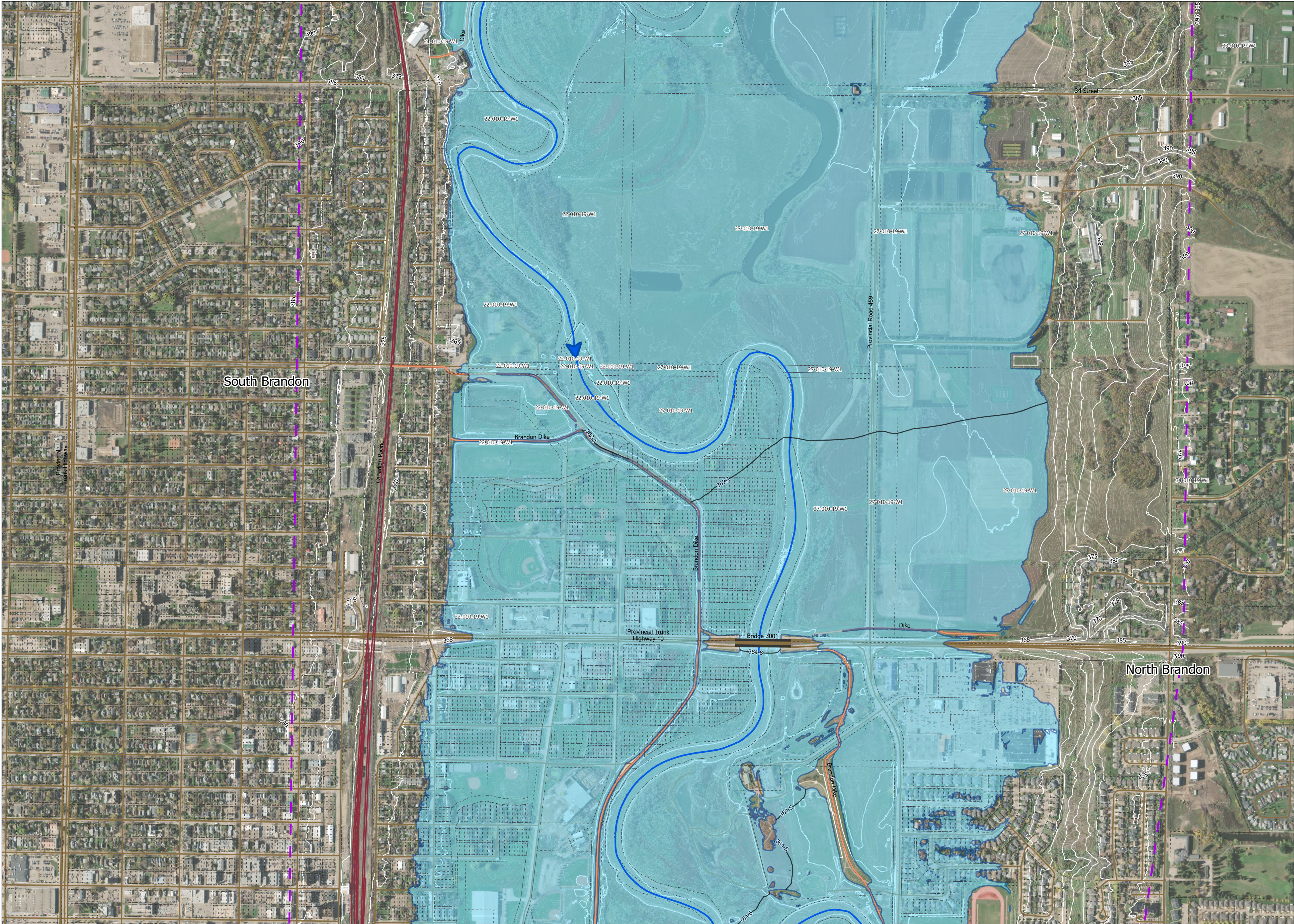




ABOUT THIS FLOOD HAZARD MAP
This flood hazard map identifies the portions from Shelmouth Dam to City of Brandon at risk of flooding during a 1:200-year (0.5%) open water flood of the Assiniboine River. The map was prepared based on hydrologic analysis and hydraulic modelling undertaken in 2023 and 2024.

TOPOGRAPHIC INFORMATION
The topographic information on this map is presented in 0.5 meter contours in urban areas, and 1 meter contours in rural areas. These contours were produced based on a digital elevation model (DEM) derived from LiDAR data captured in 2007, and sonar bathymetric data captured in 2023. The topographic elevation information presented on this map represents ground elevation, and does not include buildings or vegetation cover.

The topographic information on this map was accurate as of 2007. Changes to topography since 2007 are not reflected on the map.

All elevations are referenced to the Canadian Geodetic Vertical Datum of 1928.

BACKGROUND IMAGERY
The background imagery was obtained from World Imagery in ArcGIS Pro and was captured in 2023 with a resolution of 0.3-0.5 meter.

FLOOD WATER LEVELS
Water levels for the 1:200-year (0.5%) flood were determined by a hydraulic study conducted in 2023 and 2024. The study results are documented in the report "Hydrodynamic Modelling and Flood Mapping Study for the Upper Assiniboine River: Shelmouth Dam to Brandon" (AECOM, March 2024). This Report also includes the flood levels for 1:200-year (5%), 1:50-year (2%), 1:100-year (1%), 1:200-year (0.5%), 1:300-year (0.33%) and 1:500-year (0.2%) floods. A copy of the report will be available to the public.

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1:200-year (0.5%) water level means the peak water level that has a 0.5% chance of being equaled or exceeded in any given year. Statistically, the 1:200-year water level would be expected to occur once in a 200-year period. The 1:200-year water level should not however be interpreted as the peak water level that will only occur once in a two-hundred year period. That is because the occurrence of a rare flood event does not reduce the chances of another rare flood event occurring within a short period of time. The probability of a 1:200-year water level occurring in any particular year is 0.5%.

LIMITATIONS, RISK AND LIABILITY
This flood hazard map was prepared using river flow data, water level data and topographic data available in 2023 and 2024. This flood hazard map identifies potential over land flooding from the Assiniboine River. This map does not identify flooding along tributaries of the Assiniboine River, nor flooding due to localized drainage problems, ponding or inundation from major rain events.

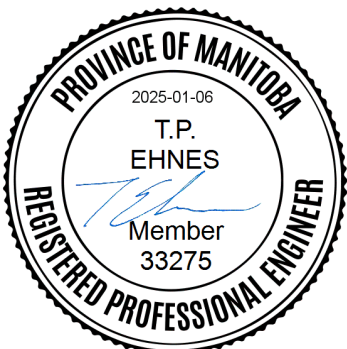
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Winnipeg, MB R3C 0R8
(204) 945-2121
MITWaterReview@gov.mb.ca



Coordinate System: NAD 1983 UTM Zone 14N
Vertical Datum: CGVD 1928

ASSINIBOINE RIVER FLOOD HAZARD MAP

ESTIMATED FLOOD EXTENT FOR THE ASSINIBOINE RIVER 200-YEAR FLOOD

Scale: 1:5,000 WEST BRANDON Map 33 of 36

Legend

Model Boundary

River Centerline & Direction of Flow

1:200 Year (0.5%) Flood Extent

Cadastral Polygons

Dikes

Roads

Railways

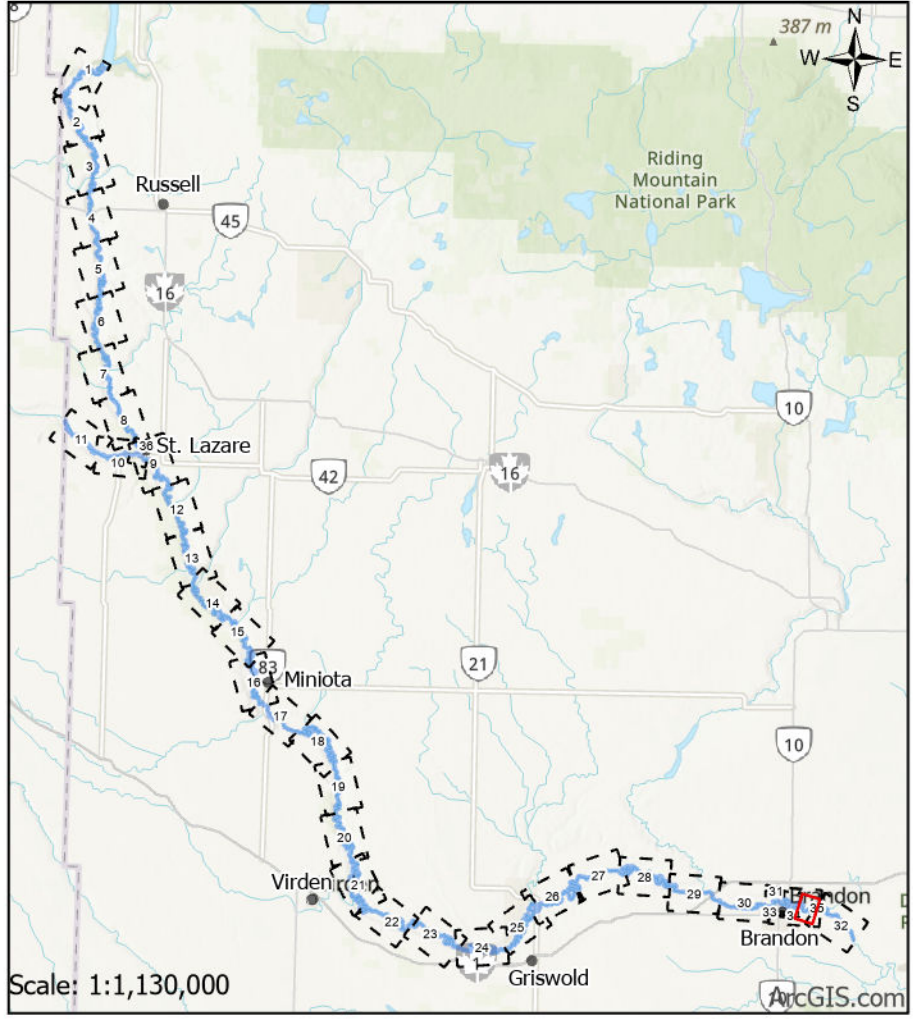
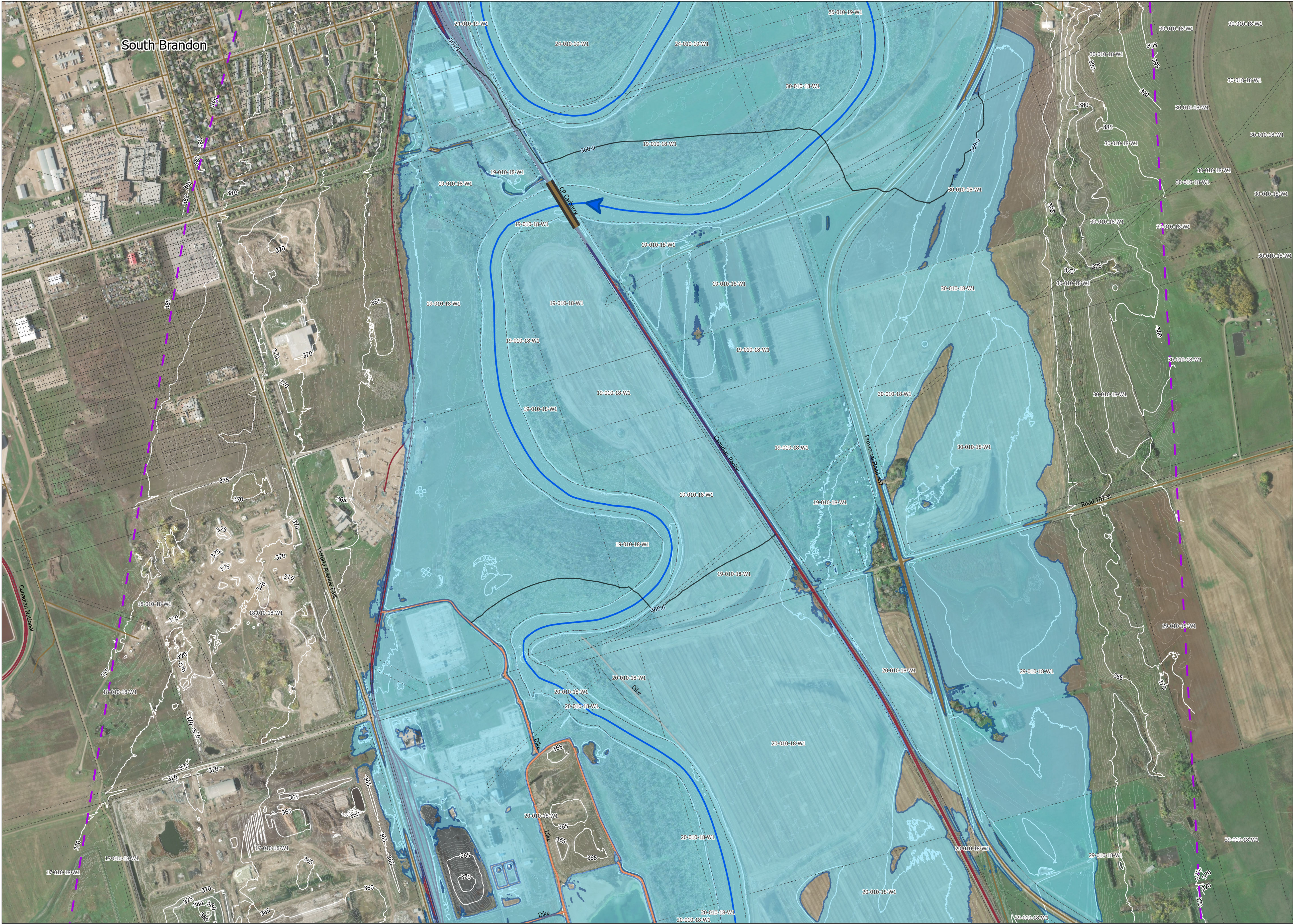
5 Meters Contours

0.5 Meter Contours

Bridges

Water Surface Elevations





ABOUT THIS FLOOD HAZARD MAP

This flood hazard map identifies the portions from Shellmouth Dam to City of Brandon at risk of flooding during a 1:200-year (0.5%) open water flood of the Assiniboine River. The map was prepared based on hydrologic analysis and hydraulic modelling undertaken in 2023 and 2024.

TOPOGRAPHIC INFORMATION

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BACKGROUND IMAGERY

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FLOOD WATER LEVELS

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LIMITATIONS, RISK AND LIABILITY

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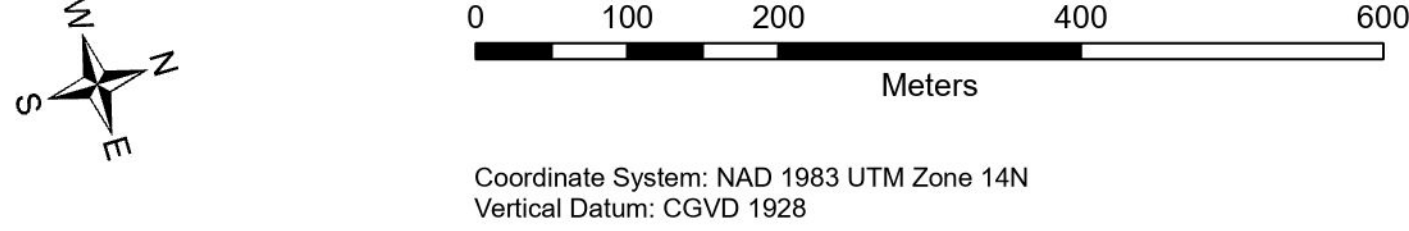
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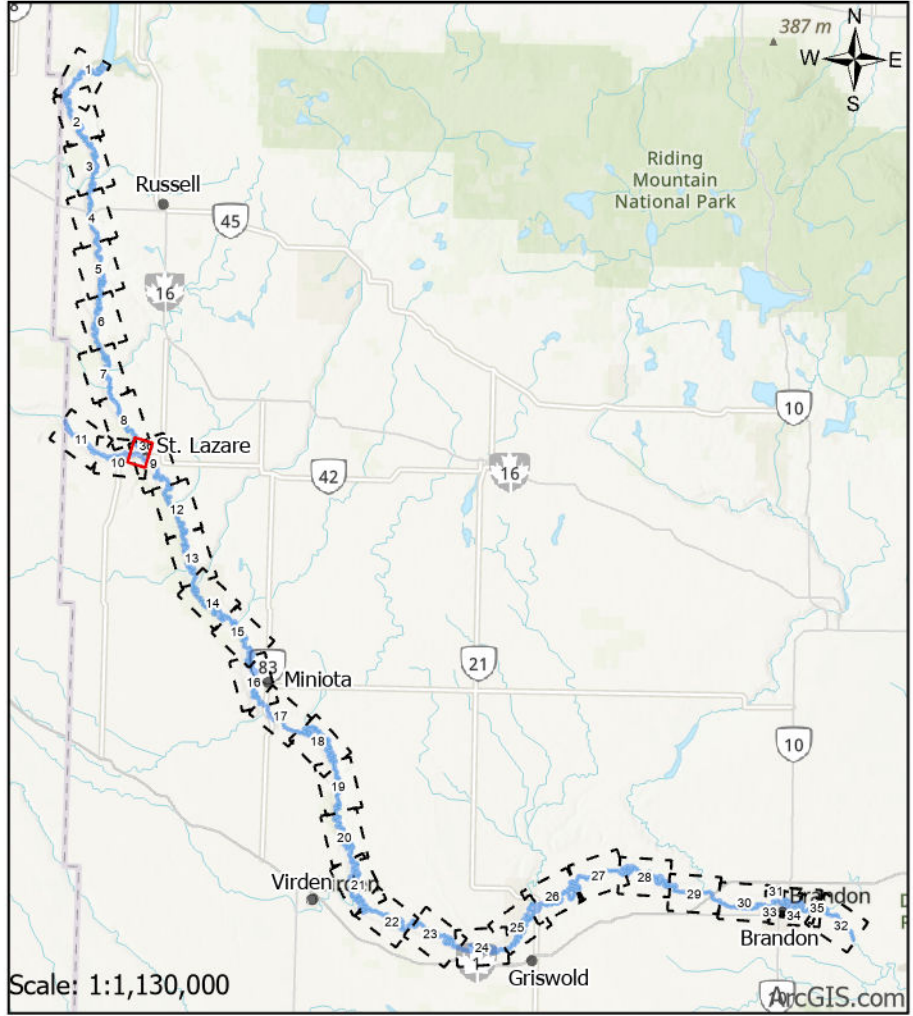
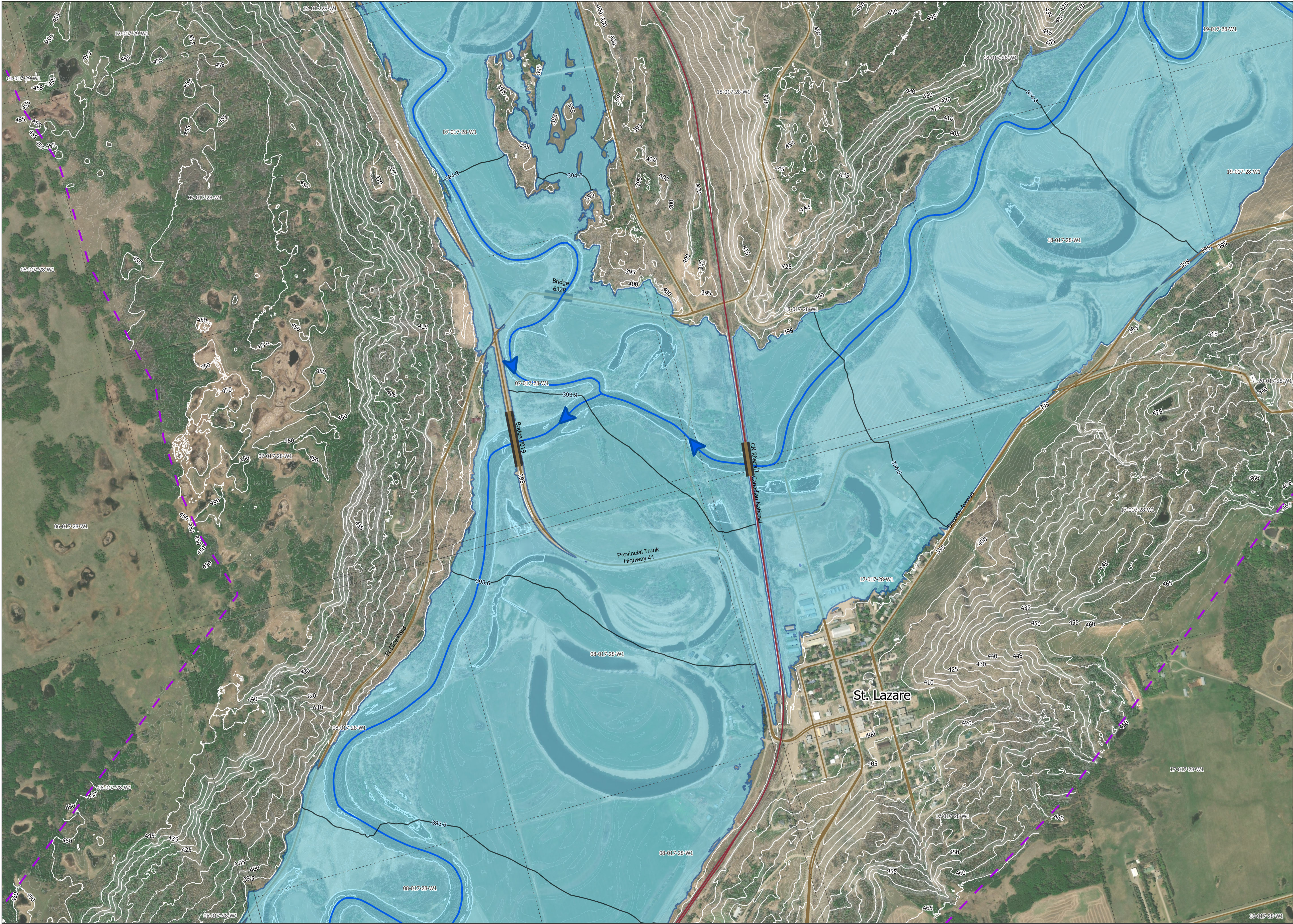
ASSINIBOINE RIVER FLOOD HAZARD MAP

ESTIMATED FLOOD EXTENT FOR THE ASSINIBOINE RIVER 200-YEAR FLOOD

Scale: 1:5,000 EAST BRANDON Map 35 of 36

Legend

- Model Boundary
- 1:200 Year (0.5%) Flood Extent
- Water Surface Elevations
- Cadastral Polygons
- River Centerline & Direction of Flow
- 1:200 Year (0.5%) Water Surface Elevations
- Bridges
- Dikes
- Roads
- Railways
- 5 Meters Contours
- 0.5 Meter Contours



ABOUT THIS FLOOD HAZARD MAP
This flood hazard map identifies the portions from Shellmouth Dam to City of Brandon at risk of flooding during a 1:200-year (0.5%) open water flood of the Assiniboine River. The map was prepared based on hydrologic analysis and hydraulic modelling undertaken in 2023 and 2024.

TOPOGRAPHIC INFORMATION
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BACKGROUND IMAGERY
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FLOOD WATER LEVELS
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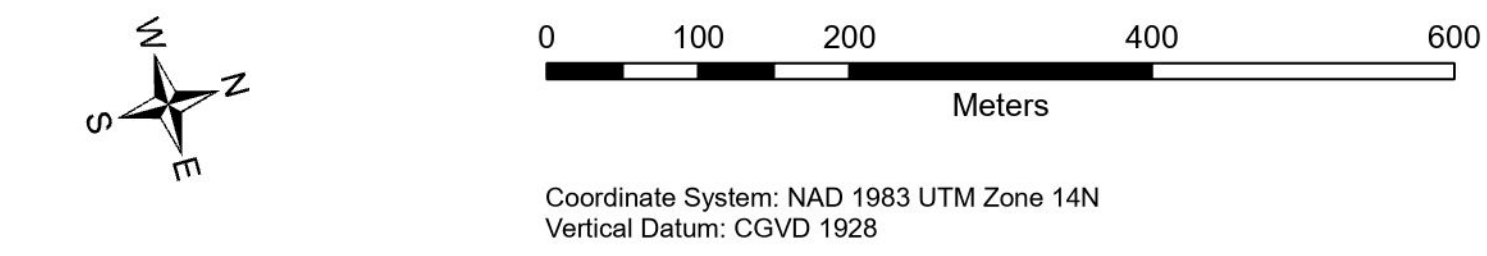
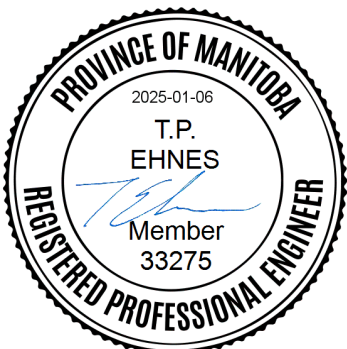
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ASSINIBOINE RIVER FLOOD HAZARD MAP

ESTIMATED FLOOD EXTENT FOR THE ASSINIBOINE RIVER 200-YEAR FLOOD

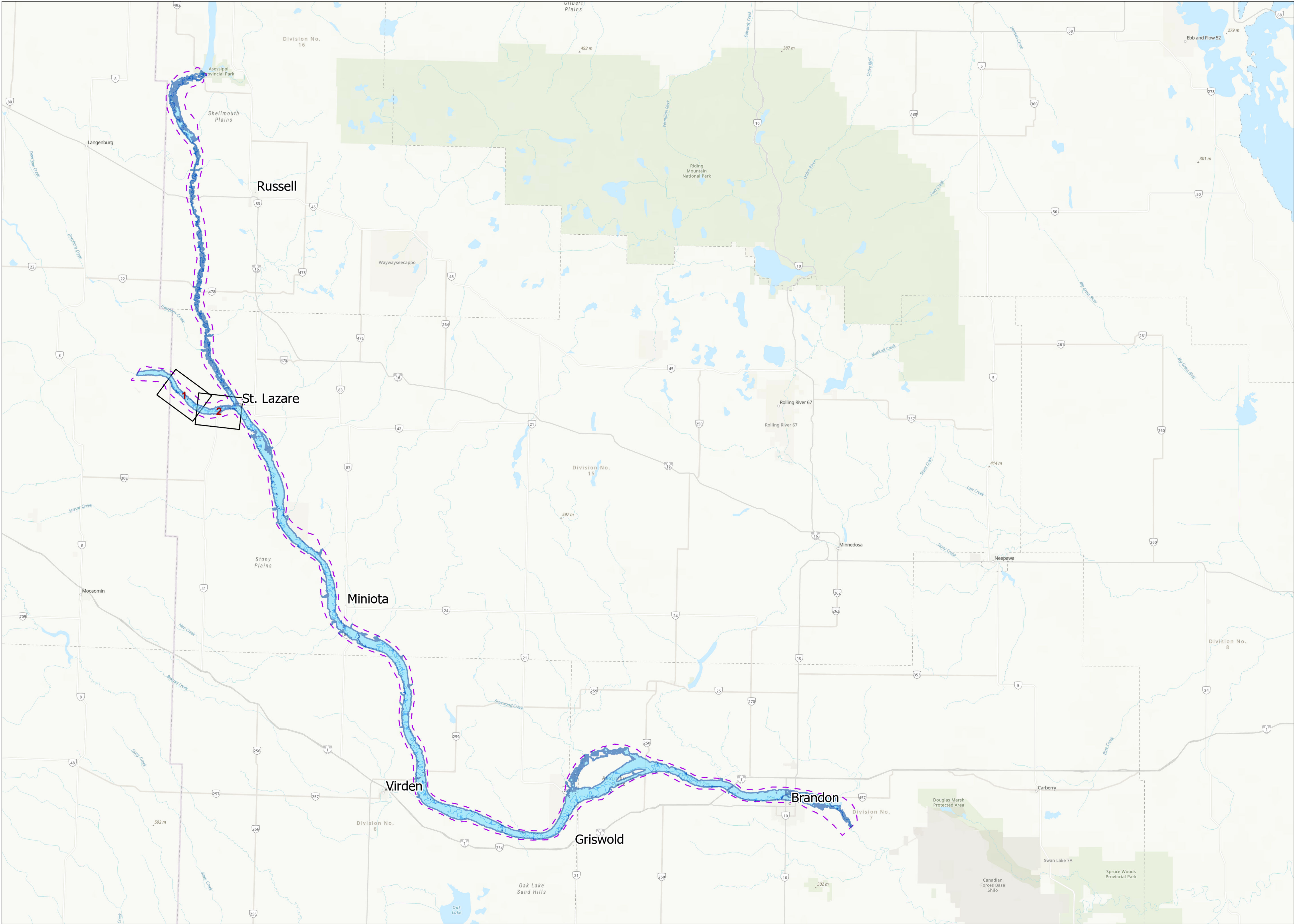
Scale: 1:5,000 ST. LAZARE Map 36 of 36

Legend

- Model Boundary
- 1:200 Year (0.5%) Flood Extent
- Cadastral Polygons
- River Centerline & Direction of Flow
- 1:200 Year (0.5%) Water Surface Elevations
- Bridges
- Dikes
- Roads
- Railways
- 5 Meters Contours
- 0.5 Meter Contours

Appendix E – Qu’Appelle River Flood Hazard Map

A thick, dark green curved line that starts from the left edge of the page, dips down, and then rises to curve upwards towards the right edge, creating a decorative border at the bottom of the page.



ABOUT THIS FLOOD HAZARD MAP

This flood hazard map identifies the portions from Saskatchewan-Manitoba border to St. Lazare at risk of flooding during a 1:200-year (0.5%) open water flood of the Qu'Appelle River. The map was prepared based on hydrologic analysis and hydraulic modelling undertaken in 2023 and 2024.

TOPOGRAPHIC INFORMATION

The topographic information on this map is presented in 1 meter contours. These contours were produced based on a digital elevation model (DEM) derived from LIDAR data captured in 2007, and sonar bathymetric data captured in 2023. The topographic elevation information presented on this map represents ground elevation, and does not include buildings or vegetation cover.

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BACKGROUND IMAGERY

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FLOOD WATER LEVELS

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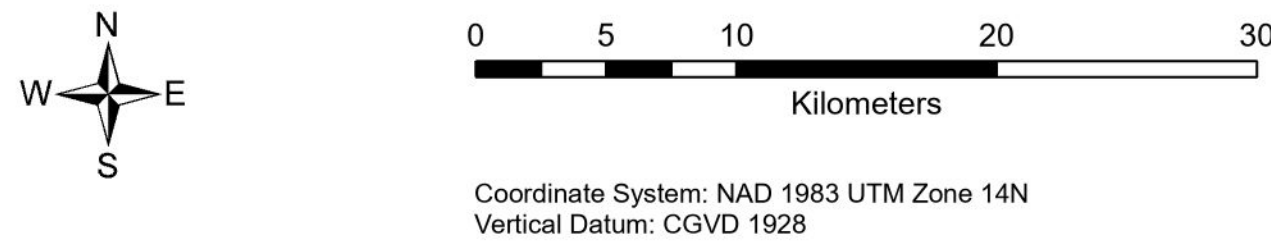
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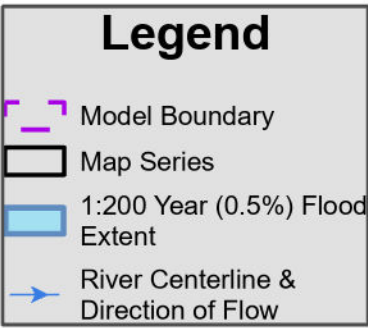


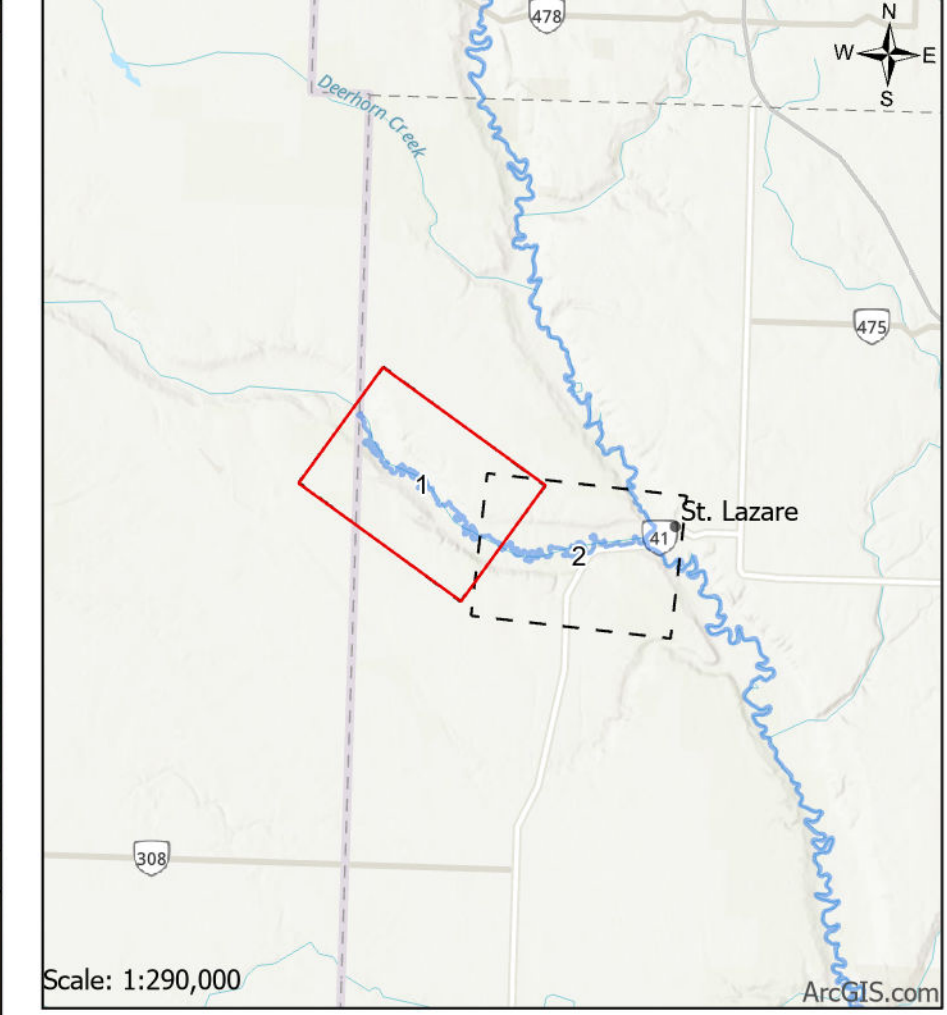
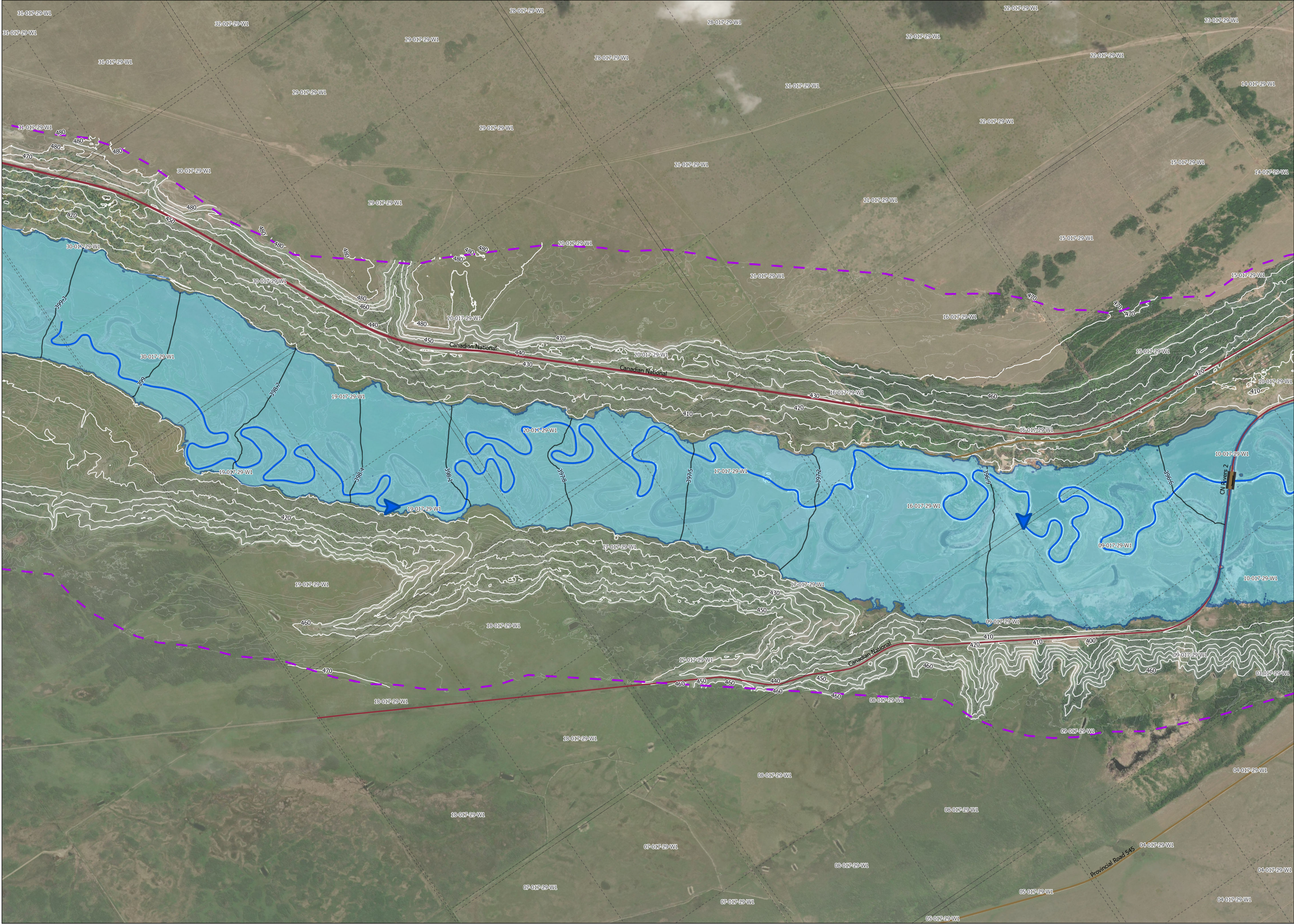
QU'APPELLE RIVER FLOOD HAZARD MAP

ESTIMATED FLOOD EXTENT FOR THE QU'APPELLE RIVER 200 YEAR FLOOD

Scale: 1:290,500

INDEX MAP





ABOUT THIS FLOOD HAZARD MAP

This flood hazard map identifies the portions from Saskatchewan-Manitoba border to St. Lazare at risk of flooding during a 1:200-year (0.5%) open water flood of the Qu'Appelle River. The map was prepared based on hydrologic analysis and hydraulic modelling undertaken in 2023 and 2024.

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BACKGROUND IMAGERY

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FLOOD WATER LEVELS

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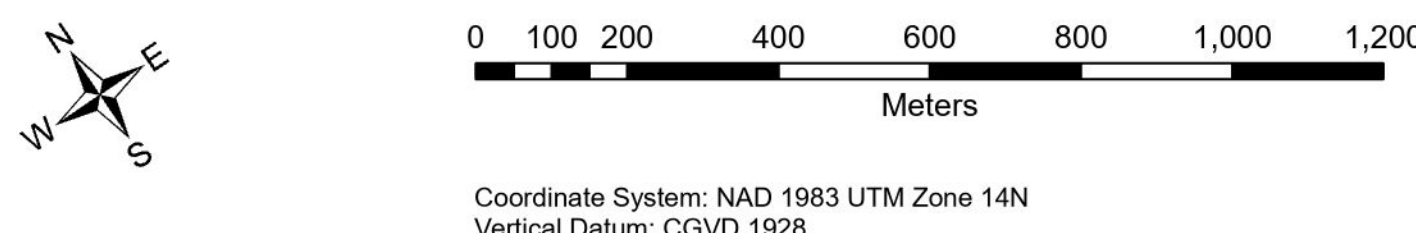
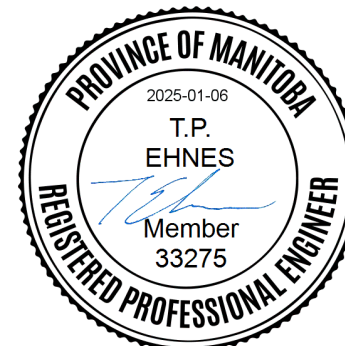
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Coordinate System: NAD 1983 UTM Zone 14N
Vertical Datum: CGVD 1928

QU'APPELLE RIVER FLOOD HAZARD MAP

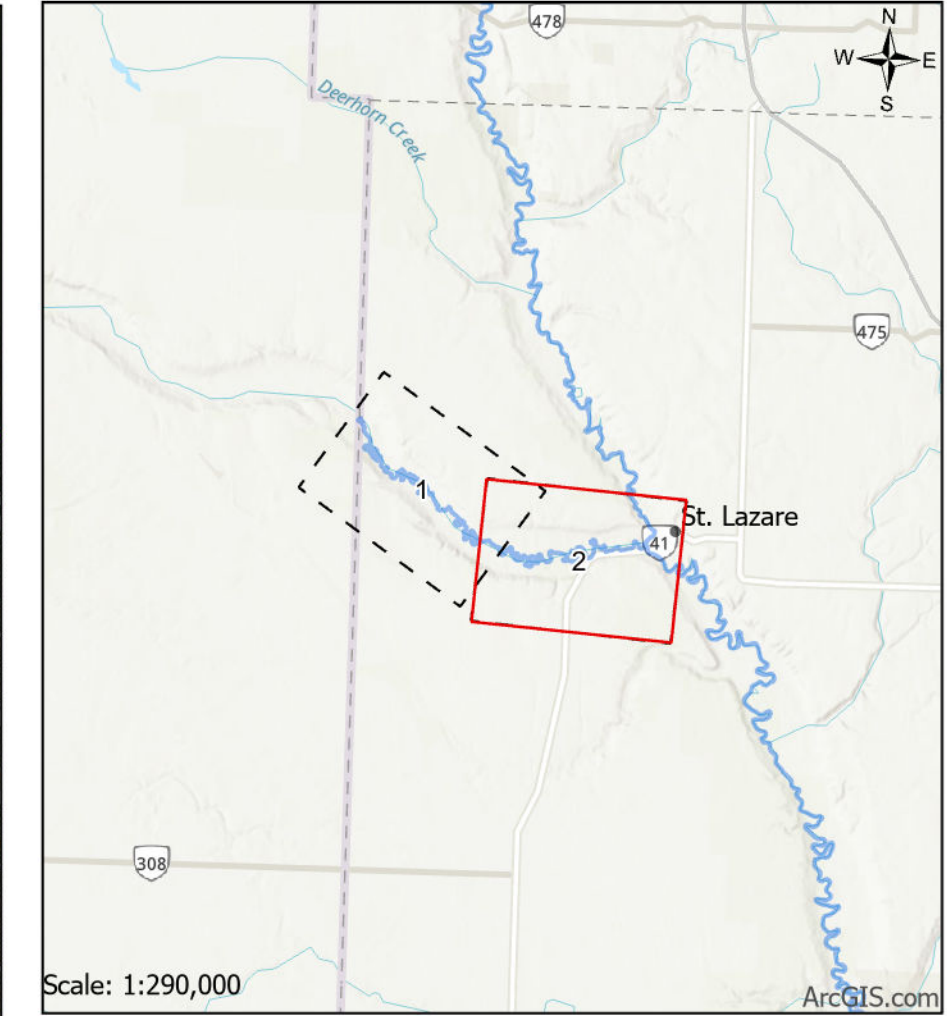
ESTIMATED FLOOD EXTENT FOR THE QU'APPELLE RIVER 200 YEAR FLOOD

Scale: 1:10,000

Map 1 of 2

Legend

- Model Boundary
- 1:200 Year (0.5%) Flood Extent
- Cadastral Polygons
- River Centerline & Direction of Flow
- 1:200 Year (0.5%) Water Surface Elevations
- Bridges
- Roads
- Railways
- 10 Meters Contours
- 1 Meter Contours



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Although considerable effort was made to produce error-free and complete data, errors can occur. Additionally, all geographic information has limitations due to the scale, resolution, age and interpretation of the original source materials. The data sets used to produce this map may be subject to periodic updating, without prior notification. **The areas identified as being at risk of flooding are subject to change as the data sets are updated.**

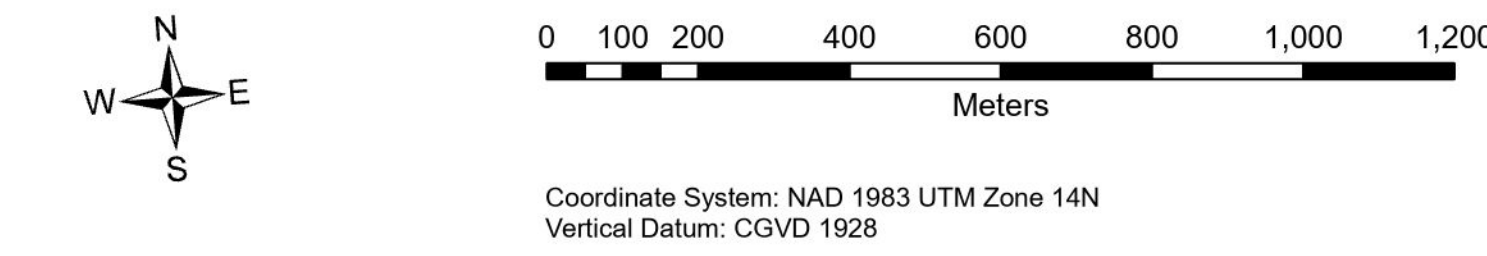
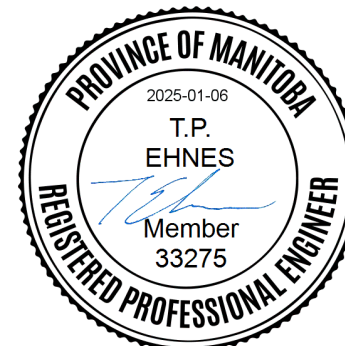
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FOR MORE INFORMATION

More information on this map and the hydraulic modelling/flood mapping study can be obtained by contacting:

Water Management, Planning and Standards Section
Hydrologic Forecasting and Water Management Branch
Engineering and Technical Services Division
Manitoba Transportation and Infrastructure
Second Floor, 280 Broadway
Winnipeg, MB R3C 0R8
(204) 945-2121
MITWaterReview@gov.mb.ca



QU'APPELLE RIVER FLOOD HAZARD MAP

ESTIMATED FLOOD EXTENT FOR THE QU'APPELLE RIVER 200 YEAR FLOOD

Scale: 1:10,000

Map 2 of 2

Legend

Model Boundary

1:200 Year (0.5%) Flood Extent

Cadastral Polygons

River Centerline & Direction of Flow

1:200 Year (0.5%) Water Surface Elevations

Bridges

Roads

Railways

10 Meters Contours

1 Meter Contours

Appendix F – Report on 2014 Artificial Flooding due to Operation of the Shellmouth Dam

A thick, dark green curved line that starts from the left edge of the page, dips down, and then rises to curve upwards towards the right edge, creating a decorative border at the bottom of the page.

Report on 2014 Artificial Flooding due to Operation of the Shellmouth Dam

July 7, 2015

**STEADY GROWTH
GOOD JOBS** >

Manitoba 

Report on 2014 Artificial Flooding due to Operation of the Shellmouth Dam

Manitoba Infrastructure and Transportation

7/7/2015

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Introduction

Legislative Background

In 2008, the Manitoba government amended *The Water Resources Administration Act* to establish compensation for damages due to artificial flooding caused by the operation of designated water control works. More specifically, the amendments establish the Shellmouth Dam as a designated water control work, define artificial flooding and other key terms, establish a requirement for Manitoba to report on artificial flooding that causes damages and establish eligibility for compensation. Regulations under the act stipulate the information that must be included in the artificial flood report and outline how compensation is to be administered. The amended act came into force in February 2011.

The following definitions from the act are pertinent to this report:

"artificial flooding", in relation to a given event, means flooding of a water body

- (a) that is caused by the operation of a designated water control work, or the operation of a designated water control work and one or more other water control works, and
- (b) whereby the water body exceeds its unregulated level at the time of the event;

"designated water control work" means

- (a) the Shellmouth Dam, or
- (b) any other water control work designated in the regulations for the purpose of this definition, not including the "floodway" as defined in *The Red River Floodway Act* insofar as it relates to "spring flooding" as defined in that Act;

"unregulated level", in relation to artificial flooding, means the scientifically demonstrable level that would be expected in the water body at a given time

- (a) in the absence of the designated water control work, or
- (b) if specified by regulation in respect of the water body, in the absence of the designated water control work and one or more other specified water control works;

Put more simply, artificial flooding in the Assiniboine River valley downstream of the Shellmouth Dam occurs when the regulated water level is above flood stage and is higher than the unregulated water level. Regulated water levels are those that did occur, and which were influenced by the operation of the Shellmouth Dam. Unregulated water levels are those that would have occurred if the Shellmouth Dam did not exist.

The Water Resources Administration Act stipulates that once it is determined that damage to eligible property or economic loss has occurred as a result of artificial flooding on the Assiniboine River caused by the operation of the Shellmouth Dam, a report must be prepared on the artificial flooding. The report must include:

- a statement of the period reported on
- a statement that the minister responsible for *The Water Resources Administration Act* has determined that damages due to the artificial flooding have occurred
- for the regulated and the unregulated conditions, charts of the discharges from the Shellmouth Dam and river water levels at relevant hydrometric monitoring stations
- charts showing the dates that artificial flooding began and ended
- a description of how the regulated and unregulated levels were determined
- a description of all dam operations and any technical issues that arose
- a description of how the operation did or did not conform to the operating guidelines
- a tabulation of the dam gate adjustments, including the dates and times of the adjustments, the reservoir levels and volume stored at each adjustment, and the flows resulting from each adjustment

Within this report, all flows and levels are discussed in imperial units. Flows can be converted from cubic feet per second (cfs) to cubic metres per second (cms) by dividing by 35.3148. River levels can be converted from feet to metres by dividing by a factor of 3.28084. Hydrographs showing flows and water levels in metric and imperial units can be found at the end of the report. All data in this report is real-time data with quality control provided by the Hydrologic Forecasting and Water Management Branch of Manitoba Infrastructure and Transportation (MIT).

Background

Following the disastrous Winnipeg flood of 1950, a Royal Commission on Flood Cost Benefit was formed to review the landscape and flood threat in southern Manitoba. The Royal Commission recommended a system of water control infrastructure to protect the City of Winnipeg and the Province of Manitoba from future flood events, specifically the Red River Floodway, the Portage Diversion and the Shellmouth Dam and Reservoir. The Shellmouth Dam was constructed in a deep, wide portion of the Assiniboine Valley (See Figure 1) located approximately 24 km (15 miles) northwest of Russell. The reservoir created by the dam is known as the Lake of the Prairies and is approximately 56 km (35 miles) in length.

Construction of the dam began in 1964, the dam came into full operation including filling of the reservoir in the summer of 1971, with construction completed in 1972 at a cost of \$10.8 million. Operation of the dam was initially the responsibility of the Prairie Farm Rehabilitation Administration (PFRA), but ownership of the dam and operational responsibility were transferred to the Province of Manitoba in 1975. The dam was designed to provide both flood protection and water supply benefits to communities along the Assiniboine River. Since its construction, additional considerations such as ecosystem requirements on both the river and the reservoir, and recreational interests on the Shellmouth Reservoir, are included in the management regime for the structure.



Figure 1: An aerial view of Shellmouth Dam and Reservoir (Lake of the Prairies) looking upstream. Upper right is the Shell River. The outlet is on the right hand side of the photo and the spillway is on the left hand side of the photo.

The dam is approximately 70 feet (21.3 m) high and has a crest length (length) of 4,166 feet (1,270 m). The facility includes a 15 feet (4.6 m) diameter reinforced concrete conduit for releasing flow from the reservoir and an ungated concrete chute spillway designed to spill water when reservoir levels are high.

The reservoir is capable of storing approximately 387,000 acre feet (477,365 dam³) of water at the spillway crest elevation of 1,408.5 feet (429.31 m) (see Figure 2).



Figure 2: Shellmouth Reservoir operating levels

The dam provides a flood reduction benefit by storing water from upstream and reducing flows on the river during periods of high flow, for example, during spring runoff. The water retained by the dam can also be released during drier periods to help augment low flows on the river downstream. Downstream water supply is used for irrigation, industrial, municipal and domestic uses. During periods of low flow, stored water may also be released to help maintain flows on the river to support a healthy aquatic ecosystem. The operation of the Shellmouth Dam and Reservoir can be complex due to a relatively small reservoir storage capacity, the management of multiple objectives, which are sometimes at odds, and the uncertainty associated with forecasting inflows and downstream tributary flows. Therefore, Manitoba Infrastructure and Transportation (MIT) utilizes operating guidelines (see Table 2), applied knowledge of past and present climatic events, as well as hydrological conditions in the basin, upstream and downstream tributary flow conditions, and hydrologic models to make operating decisions about the dam in order to deal with flooding and drought situations.

Following a large flood event in 1996, the Shellmouth Reservoir Regulation Liaison Committee was created in order to assist with operating decisions. MIT has continued to hold regular meetings with the committee. There is a broad range of stakeholders represented on the committee and their representatives provide information about local conditions, feedback and recommendations on operation of the dam, and also serve to communicate dam operations to their respective stakeholder communities. Membership is based on major interest groups along the river with consideration for regional representation. Membership is as follows:

- Assiniboine Valley Producers Association (Shellmouth to St. Lazare)
- Assiniboine Valley Producers Association (St. Lazare to Brandon)
- Association of Irrigators of Manitoba
- Rural Municipality of Russell-Binscarth
- Rural Municipality of Riding Mountain West
- Rural Municipality of Hillsburg-Roblin-Shell River
- Shellmouth Assiniboine Valley Economic Development
- Lake of The Prairies Conservation District
- Upper Assiniboine Conservation District
- Little Saskatchewan River Conservation District
- Assiniboine Hills Conservation District
- La Salle-Redboine Conservation District
- Manitoba Infrastructure and Transportation (Chair)
- Manitoba Agriculture, Food and Rural Development
- City of Winnipeg
- City of Brandon

Over the past 15 to 20 years, Manitoba watersheds, and in particular the Assiniboine River watershed has been experiencing a wet cycle. Through this wet cycle the Shellmouth Dam and Reservoir has significantly reduced peak flood flows on the Assiniboine River, benefitting downstream communities such as Brandon, as well as agricultural producers and other interests in the valley. Figure 3 illustrates the reduction in peak flows provided by Shellmouth Dam, at the location of the dam, with the recorded peak flow shown in blue and the peak flow that would have occurred in the absence of the dam shown in green. The dam has also reduced peak flows further downstream at the Portage Reservoir.

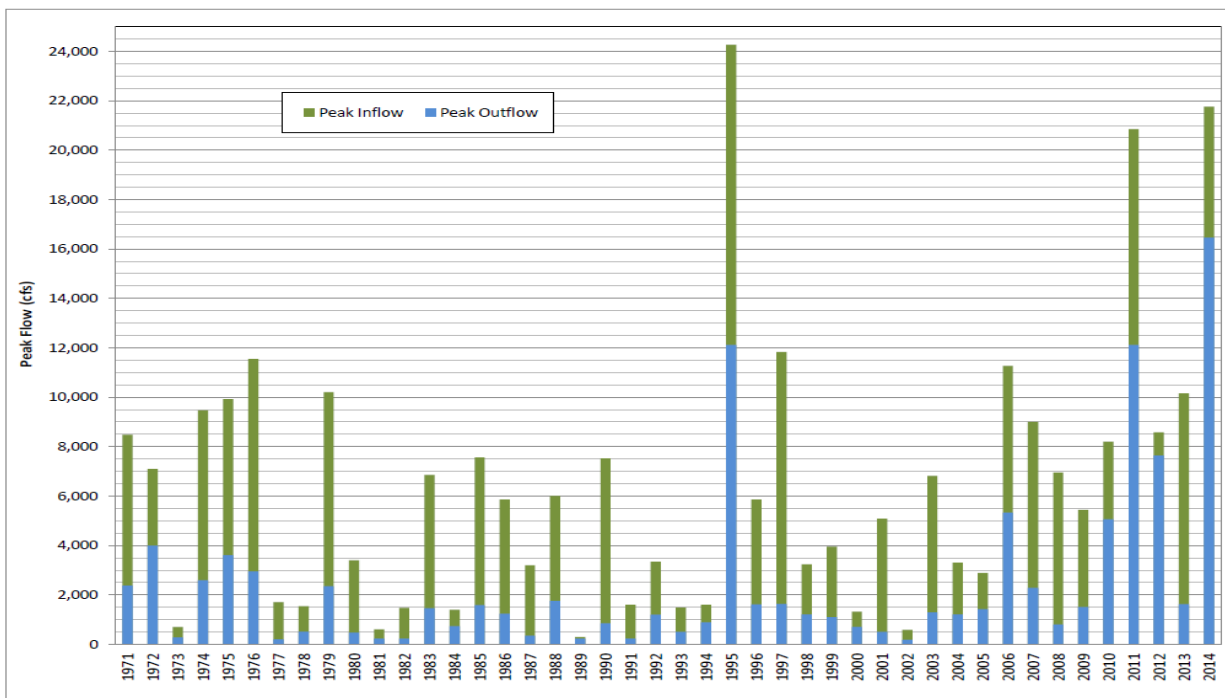


Figure 3: Shellmouth Reservoir annual peak inflows and outflow

Benefits of Shellmouth Dam Operation and the Nature of Artificial Flooding

Operation of the Shellmouth Dam provides a significant flood reduction benefit to communities, agricultural producers and other interests downstream of the dam in most years. In such years, operation of the dam results in a reduction in the peak flows downstream on the Assiniboine River, and therefore reduces the extent and height of flooding experienced, and generally provides a reduction in the net length of flooding. In some years, operation of the Shellmouth Dam does not completely eliminate flooding downstream of the dam but it does reduce the height of flood waters (usually by a significant amount) and often reduces the total duration of flooding. The conceptual hydrograph in Figure 4 illustrates the reduction in peak flow (A), the duration of flooding under unregulated flow conditions (B), the duration of flooding under regulated flow conditions (C), and the reduction in the duration of flooding (difference in the lengths of lines B and C).

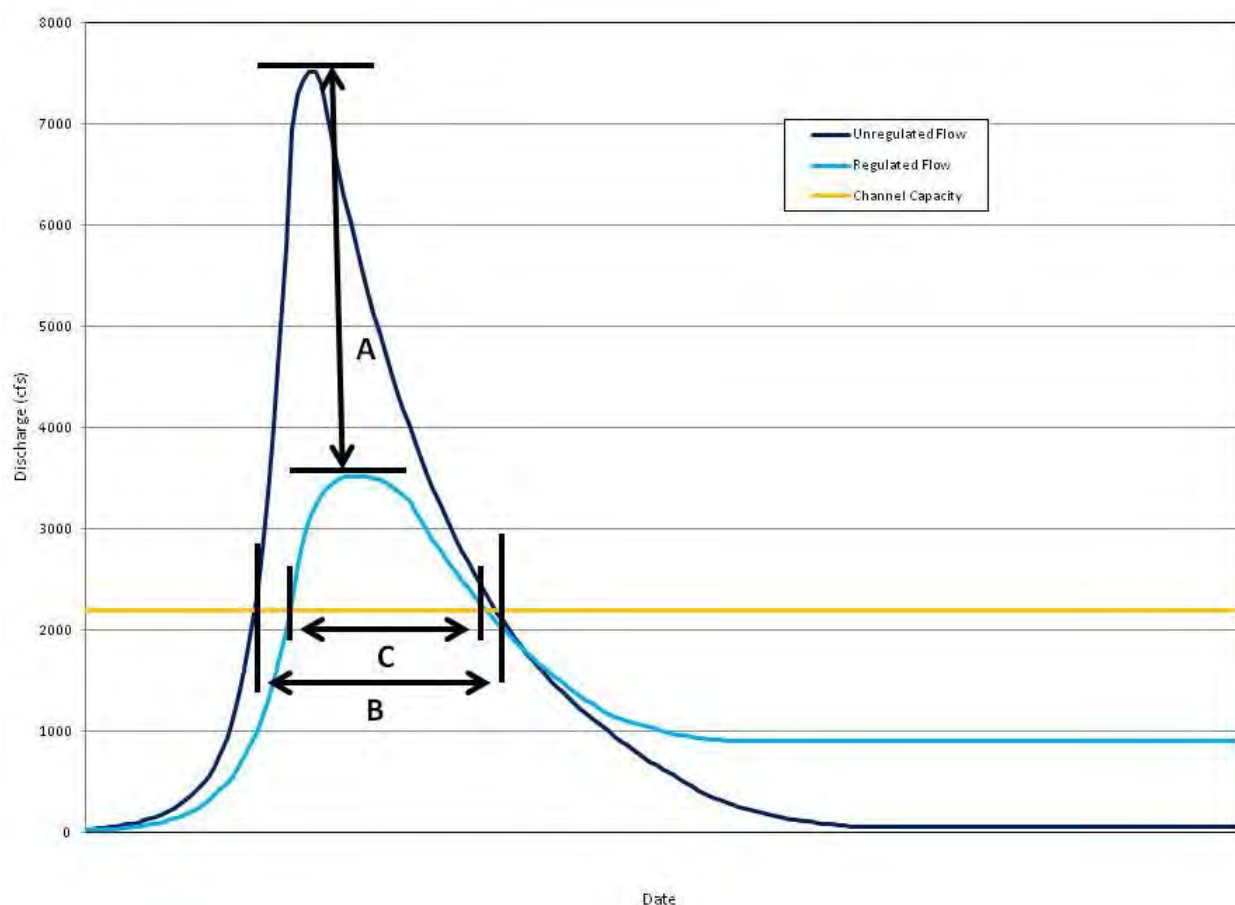


Figure 4: Conceptual hydrograph showing the reduction in peak flow (A) and reduction in duration of flooding (B-C)

Unfortunately, the Shellmouth Dam and Reservoir have a finite water storage capacity, just like all dams and reservoirs. In some years the inflows into the reservoir can cause the water level to rise above the spillway elevation, resulting in uncontrolled flows over the spillway that increase as the level of the reservoir rises. Reservoir levels generally only rise above the spillway elevation as a result of significant snowmelt runoff and rainfall events that cause high reservoir inflow volumes. The reservoir level will only begin to fall when total outflows exceed inflows, and it is generally under these conditions that artificial flooding may occur. Once inflows into the reservoir begin to fall, uncontrolled flows over the