Manitoba
Transportation and Infrastructure
Environmental Services Branch
1520 – 215 Garry Street, Winnipeg, Manitoba, Canada R3C 3P3
www.manitoba.ca

February 5, 2024

Agnes Wittman
Director, Environmental Approvals Branch
Environmental Stewardship Division
Manitoba Environment and Climate Change
Box 35, 14 Fultz Boulevard
Winnipeg MB R3Y 0L6

MTI Project No.: WMS-2020-018

SUBJECT: Manitoba Environment Act Proposal
Provincial Trunk Highway 5 Bridge Replacement and Flood Relief Bench

Manitoba Transportation and Infrastructure (MTI) is submitting this Environmental Act Proposal (EAP) with respect to the replacement of the bridge over the Assiniboine River on Provincial Trunk Highway (PTH) 5 and flood relief bench. As per the Classes of Development Regulation M.R. 169/88, this project is considered a Class 2 Development and will require a license under the *Environment Act*.

Enclosed within this document, please find the following:

- An electronic copy of the PTH 5 Bridge Replacement EAP with appendices
- EAP Form

An interbusiness transfer will follow and therefore payment is not included in this package.

For any questions, concerns, or additional information regarding this EAP, please do not hesitate to contact the Environmental Services Branch using the attached contact information below.

Sincerely,

Brian Moons, B.Sc., P.Biol.
Biologist, Environmental Services
Manitoba Transportation and Infrastructure
1520 – 215 Garry Street, Winnipeg MB R3C 3P3
[redacted]

Environment Act Proposal Form

Manitoba

Name of the development:
PTH Bridge Replacement and Flood Relief Bench

Type of development per Classes of Development Regulation (Manitoba Regulation 164/88):
Class 2

Legal name of the applicant:
Michael Foth

Mailing address of the applicant: 1520 - 215 Garry Street

Contact Person: Michael Foth

City: Winnipeg Province: Manitoba Postal Code:

Phone Number: (204) 391-5914 Fax: email: Michael.Foth@gov.mb.ca

Location of the development: Municipality of Glenboro - South Cypress

Contact Person: Michael Foth

Street Address: PTH 5 - 12 km north of Glenboro

Legal Description: NE/NW 14-8-14 W1

City/Town: Glenboro Province: Manitoba Postal Code:

Phone Number: (204) 391-5914 Fax: email: Michael.Foth@gov.mb.ca

Name of proponent contact person for purposes of the environmental assessment:
Brian Moons

Phone: (431) 275-4647 Fax:	Mailing address: 1520 - 215 Garry Street Winnipeg, MB R3C 3P3

Email address: Brian.Moons@gov.mb.ca

Webpage address:

Date: 2024-02-05	Signature of proponent, or corporate principal of corporate proponent: Printed name: Michael Foth

PRINT RESET

A complete **Environment Act Proposal (EAP)** consists of the following components:

- ☑ **Cover letter**
- ☑ **Environment Act Proposal Form**
- ☑ **Reports/plans supporting the EAP** (see "Information Bulletin - Environment Act Proposal Report Guidelines" for required information and number of copies)
- ☐ **Application fee** (Cheque, payable to Minister of Finance, for the appropriate fee)

Per Environment Act Fees Regulation (Manitoba Regulation 168/96):

Class 1 Developments	$1,000
Class 2 Developments	$7,500
Class 3 Developments:	
Transportation and Transmission Lines	$10,000
Water Developments	$60,000
Energy and Mining	$120,000

Submit the complete EAP to:
Director
Environmental Approvals Branch Manitoba
Environment and Climate
14 Fultz Boulevard
Winnipeg, Manitoba R3H 0W4

For more information:
Email: EABDirector@gov.mb.ca
Phone: (204) 945-8321
Fax: (204) 945-5229
https://www.gov.mb.ca/sd/permits_licenses_approvals/eal/licence/index.html

Internal Use Only
$1,000.....C1 B-02
$7,500.....C2 B-02
$10,000....TT B-02
$60,000.....WD B-02
$120,000...EM B-02

December 11, 2024

Brian Moons
Manitoba Transportation and Infrastructure
Environmental Services Branch

Re: Environment Act Proposal Report PTH 5 Assiniboine River Bridge Replacement Project

AAE Tech Services is pleased to submit our Environment Act Proposal Report as part of the Provincial Trunk Highway 5 bridge replacement project over the Assiniboine River, as required for the submission of our application for an Environment Act License to carry out this project. Disturbance and permanent alteration of existing aquatic habitat below the high-water mark at this site as part of flood mitigation designs associated with this project, which may affect fish mobility and fish habitat, qualify this project as a Class 2 Water Development and Control work under the *Environment Act*.

The following EAP report, in addition to all other documentation submitted with our application has been prepared for the purpose of obtaining *Environment Act* approval for this construction project.

Should you require additional information, please feel free to contact the undersigned at any time.

Best regards,

Mark Lowdon, M.Sc.
Owner and Environmental Biologist
AAE Tech Services Inc.
mlowdon@aaetechservices.ca

MANITOBA ENVIRONMENT ACT PROPOSAL REPORT

PTH 5 Assiniboine River Bridge Replacement and Relief Bench Construction Project

Prepared for

Manitoba Transportation and Infrastructure

For submission to

Manitoba Environment and Climate Change
Environmental Approvals Branch

October 2024

Prepared by

AAE
TECH SERVICES INC.

EXECUTIVE SUMMARY

The PTH 5 Bridge Replacement and Assiniboine River Relief Bench Project (the Project) is located on Provincial Trunk Highway 5 (PTH 5) at the Assiniboine River in Spruce Woods Provincial Park, north of Glenboro, MB. The existing structure is approaching the end of its projected life span and no longer meets the hydraulic requirements of the site; thus Manitoba Transportation and Infrastructure (MTI) has determined that complete replacement of the structure is required. As part of this project, MTI will also be modifying the riparian flood plain area upstream of the bridge along the right bank (facing downstream) to construct a relief bench as a flood mitigation measure at this site.

MTI considered a broad range of factors in its evaluation of potential environmental effects associated with the bridge replacement project. Primary factors for the review included physical/biophysical processes and select socio-economic components that may be affected by the work. An important consideration in the evaluation of potential project effects is that the area has been previously disturbed through construction of the existing bridge, subject to ongoing maintenance activity, and in the case of the relief bench a large proportion of the riparian vegetation cover was cleared in 2015, and terrain scarring, washout, and general disturbance to the habitat from repeated flooding at this site has occurred.

Activities with the highest potential for impact include those that may result in the deposition of debris or other deleterious substances into the water course, and an overall net loss of riparian habitat with the excavation of the relief bench and additional clearing and grubbing requirements at the site. Examples of such activities include bridge demolition, erosion/sedimentation from exposed soils, instream work, accidents and spills etc.). Considering the timing of the proposed work (i.e. winter bridge demolition, restricted activity windows for instream activities, restricted activity windows for vegetation clearing), in conjunction with the application of MTI's General Environmental Requirements (GERs), the potential risks associated with the project are well mitigated. There are some unknowns related to the potential occurrence of Mapleleaf mussels (protected federally and provincially) near the project site. The development/implementation of a mussel survey/relocation program is currently pending further project review by Fisheries and Oceans Canada. Northern Prairie Skink, listed under SARA/COSEWIC (Special Concern) and the Manitoba Endangered Species and Ecosystems Act (Endangered), was identified in the relief bench/guide bank portion of the work space, and management and mitigations for this species will be required as well. The work also has the potential to affect recreational navigation (boating) through the site for the duration of the bridge replacement project, and authorization through Transport Canada's Navigation Protection Program is in process and will ensure that all requirements are implemented to mitigate any public safety concerns for boating public.

The potential effects associated with the PTH 5 Bridge Replacement Project have been considered in conjunction with the application of mitigation measures and residual effects. A habitat offsetting plan, as required for DFO Authorization for the project, will be submitted and approved by DFO but is still pending. As a result, MTI feels that the work is well mitigated and that the potential environmental effects associated with the Project are considered to be not significant.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

BMP's	Best Management Practices
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Fisheries and Oceans Canada
EAP	Environment Act Proposal
ECCC	Environment and Climate Change Canada
EM	Environmental Monitor
FAA	*Fisheries Act* Authorization
GER	General Environmental Requirements
HRIA	Habitat Resources Impact Assessment
HRB	Habitat Resources Branch
MB	Manitoba
MBCC	*Migratory Bird Convention Act*
MBCDC	Manitoba Conservation Data Centre
MB ESEA	*Manitoba Endangered Species and Ecosystems Act*
MECC	Manitoba Environment and Climate Change
MTI	Manitoba Transportation and Infrastructure
NPP	Navigation Protection Program
OHWL	Ordinary High Water Level
PM	Project Manager
PTH	Provincial Trunk Highway
QEP	Qualified Environmental Professional
ROW	Right of Way
SARA	*Species at Risk Act*
TC	Transport Canada
m	Meters
km	Kilometres
m^2	Square meters

1. INTRODUCTION

As part of Manitoba Transportation and Infrastructure (MTI) Provincial Trunk Highway (PTH) 5 bridge replacement over the Assiniboine River (Site 352-10), AAE Tech Services has been tasked with supporting MTI in completing regulatory review and permitting requirements for the project. Preliminary design of the bridge replacement project includes several construction activities taking place at and below the normal high-water level of the Assiniboine River which may affect fish mobility and fish habitat. As such, it has been determined that this project represents a Class 2 Water Development and Control work under the *Environment Act* and is subject to review and authorization by the Manitoba Environmental Approvals Branch.

The following Environment Act Proposal Report has been prepared to provide all required background, construction plan specifications and scope of work, environmental impacts, environmental mitigations, and during- and post-construction monitoring plans, as required in Manitoba Licensing Procedures Regulation (Manitoba Regulation 163/88) and outlined in Environment Act Proposal Report Guidelines (Manitoba Information Bulletin – Environment Act Proposal Report Guidelines June 2023).

1.1. PROJECT BACKGROUND AND RATIONALE

The existing PTH 5 bridge structure over the Assiniboine River (Site 352-10, 14U 480833.36 5500930.45, Figure 1 and Figure 2), located 12.6 km north of Glenboro, MB, was built in 1964 is approaching the end of its useful service, and no longer meets the current hydraulic requirements of the site. During periods of high flow, the Assiniboine River surpasses its banks thereby flooding adjacent land, primarily along the south bank since the north bank is significantly higher. Recent flood events in 2011 and 2014 caused overland flooding and washouts of the highway adjacent to the structure as well as undermined the north abutment of the bridge and required that the highway, a major transportation link between PTH 2 and PTH 1 and providing access to Spruce Woods Provincial Park, be temporarily closed. A hydraulic assessment was undertaken to review crossing requirements at this site and recommends a larger 172m long replacement structure with local reshaping of the river channel and the construction of a relief bench and guide bank on the upstream side. Improved hydraulic capacity of the structure will reduce the likelihood of having to close the highway during future flood events.

In consideration of this hydraulic assessment, and to alleviate risks from flooding at this site and control the conveyance of flows through the crossing, KGS Group has developed a design for the replacement crossing flow area that allows river flows to pass under the bridge structure in a regime that meets MTI hydraulic design criteria and manages the amount of overland flooding. This includes a longer bridge, a higher deck elevation, and the implementation of an excavated bench and bank armoring on the south bank upstream of the bridge. The inclusion of the bench provides additional flow area within the channel upstream of the crossing which allows stream flow to approach the bridge crossing at a near 90-degree intersection with the bridge. Without the bench, velocities in the main portion of the river channel remain quite high while passage of flows in the flooded area are erratic and approach the bridge crossing from various directions. This varied pattern of flows reduces the efficiency of the bridge to convey the full flow and therefore results in an imbalance of forces across the bridge section. This can result in short- or long-term damage to the bridge structure and surrounding natural channel, the latter

of which can in-turn compromise the structural integrity of the bridge. An additional ~1400 m of shoreline along the east bank upstream of the bench cut will be regraded and armored with rip rap to the toe of bank to mitigate existing, significant bank erosion and provide a reinforced guide bank into the relief bench.

Bridge construction will take place within the existing MTI right of way alignment; expansion of the existing right of way to the east to accommodate the new bridge alignment has been completed by MTI. The area designated for construction of the relief bench is part of Spruce Woods Provincial Park.

Figure 1. PTH 5 at the Assiniboine River site map.

Figure 2. Existing PTH 5 bridge over the Assiniboine River (photo: KGS 2021).

1.2. EVALUATION OF ALTERNATIVES

A total of five (5) alternative designs for road alignment and structure replacement were developed, consistent with necessary river hydraulic needs and operational requirements, and based on consultation with local stakeholders to evaluate local needs and considerations which included limiting impacts on traffic during construction and accommodating high pedestrian and oversize vehicle volumes.

Design alternatives presented options for site configuration and traffic management during construction, including various realignment distances from the existing crossing, accounting for costs and requirements associated with highway widening, site shoring, traffic management, and property acquisition and ROW expansion requirements. Alternatives ranged from partial demolition of the existing bridge (single-lane, controlled traffic passage), to close realignment of the roadway (3 m between old and new bridge), to complete realignment of the highway to a new crossing site with reduced encroachment from construction on the existing highway.

Through consultation with MTI, close realignment alternatives, including a 3-span and 5-span bridge design, were selected for further realignment. Additional consultations and evaluation determined that a close alignment 3-span structure to be the preferred option, with fewer piers providing hydrological and environmental benefits that offset additional costs and grading requirements.

2. DESCRIPTION OF PROPOSED DEVELOPMENT

2.1. PROJECT SCOPE AND SCHEDULE

The following outlines the current proposed schedule for construction works at the PTH 5 bridge replacement site and the general scope of work for all project components, beginning with road works to upgrade the existing highway alignment in June 2025, and completed with removal of temporary works and site restoration in the fall of 2026. This schedule represents the current estimates for project timeline at the time of report submission, but may change as the planning and design phase progresses.

- End of October – mid November 2024: Tender documents finished, all reviews complete.
- End of December 2024: Contracts Tender review, advertisement, bid review and contract award (Note: contract awarded before the environmental permit is received, however it is stipulated that the construction can't commence before the permit is obtained. This option gives more time for girder fabrication).
- January – October (November) 2025: Girder fabrication (and delivery).
- April – May 2025: Mobilization.
- May 2025: start construction; construct approach grades and widen existing highway to accommodate use of existing structure during construction. Construct temporary access pads from north and south banks to construct river piers to an elevation approximately 0.5m above Q50% or the current water/ice elevation at the time, whichever is higher, with clean large diameter granular material. During construction, appropriate erosion control devices will used to prevent sediment and excavated material from entering watercourse or becoming frozen into the ice.
- Summer through September 2025: Substructure construction complete; construction of two river piers and two abutments. Pier construction will be within 4-sided steel sheet pile cofferdams approximately 21.5m x 6m in size (3m larger than proposed footing dimensions). Water from pumps used to de-water cofferdams will not be allowed to directly re-enter watercourse. Channel invert and banks will be reshaped and protected with class 350 rip rap for a distance of 10m upstream and downstream of new structure. Some of this work will be required to take place after demolition of existing structure in winter 2025.
    - Abutment construction (piling, concrete works): April - July 2025
    - In-water construction temporary works (access pads): June 15 - July 15 2025
    - Pier construction (piling, concrete works): June 20 - Sept 30 2025
- Summer 2026: Completion of channel shaping, relief bench, extended guide bank and rip rap armoring.
- Winter 2025/26: Girder erection; erect structural steel girders from access pads (after June 30) using cranes, remove access pads upon completion and prior to winter freeze-up.

  - Girder erection: November 2025 - March 2026 (Note: girder erection may be completed within one month, however contractor may choose to erect from the ice and in that case February-March 2026 would be more appropriate; girder fabrication may take longer than anticipated)

- Spring-Summer 2026: Superstructure construction; complete construction of reinforced concrete deck, multi-use path and barriers while working from ends of bridge temporary work platform supported from girders in place to prevent debris from falling into river.
  - Form and pour deck, barriers, approach slabs: March 2026 - July 2026
  - Deck waterproofing: July 2026
- Summer 2026: roadway completion and paving; completion and asphalt paving of roadway approaches waterproof membrane and paving of bridge deck.
  - Roadwork embankments, tie-in and paving: July-August 2026
- Fall 2026: open bridge transfer traffic to new structure.
- Fall 2026: decommission existing approach grades; removal of existing approach grades and restoration of area all disturbed areas not protected with rip rap will be seeded and protected with 100% biodegradable erosion control blanket.
- Fall 2026: demolish existing structure and complete channel work; access pads to be reconstructed similar to previous for new construction. Construction sequencing will be such that restriction to channel width is no greater than 50% of the wetted width. Access to center pier from one side only. Existing superstructure to be removed. Demolition procedures will require that all material is prevented from entering the river or freezing to the ice. Piers to be surrounded with clean large diameter material to allow demolition to be isolated from river. Existing piers to be demolished to either top of footing or 1m below proposed streambed elevation.
  - River training, channel works, erosion control works: June 15 - October 2026 (some work needs to be done after the existing bridge is demolished)
- Fall 2026: site restoration; final site restoration and re-vegetation work.
- End of construction: Mid November 2026

2.2. PROPERTY OWNERSHIP

The existing MTI right of way will be expanded to the east to accommodate the new bridge alignment. Land ownership of this eastern expansion area, as well as the area of the relief bench, belonged to Spruce Woods Provincial Park. Transfer of ownership of both sites to MTI has already been completed.

2.3. PROJECT FUNDING

Relief bench construction activities are being incorporated into PTH 5 Bridge Replacement works planned for this site and both project components will be funded by the Province of Manitoba.

2.4. PROJECT FOOTPRINT

The elevation of the proposed bench is set to 316.50 m. This falls approximately 1.0 m lower than the Ordinary High-Water Mark, or Q50% Flood, which is estimated to be 317.51 m and as such, may have an impact on fish and fish habitat. The proposed extent and shape of the bench is shown in Appendix C-2 and will have an approximate excavation area of 45,880 m^2. The toe of the slope at the river is to be graded to 12:1 and extend to the elevation of 316.50 m. Material above 316.50 m will be excavated for the extent of the area shown in Figure 4. This benched area will be revegetated with native grasses to mitigate the potential for erosion while inundated during large floods and allow the conveyance of flows. The toe of the slope and southern most portion of channel reshaping is to be blended into the naturally existing channel geometry. As mentioned, this bend of the river is routinely inundated with flood waters and as a result has left it scarred. Various aerial imagery shows evidence of this, as shown in Appendix A (Site Imagery) and Appendix D (Site photographs).

The right (east) bank of the river up to approximately 900 m upstream of the relief bench will be similarly regraded and armored with rip rap to mitigate continuing bank erosion issues that arise from flooding at this site; between 2013 and 2017, flooding caused this east bank to erode back approximately 35 m (Appendix A Figures 2 and 3). Bank modifications and armoring will be restricted to the slope above the normal winter ice scour level, and will not have impacts on overwintering/permanent aquatic habitat for fish and mussels (Figure 4 and Appendix C).

The proposed new bridge structure is to be constructed immediately downstream of the existing bridge structure. The existing bridge is approximately 128.4 m long and is supported by three in-stream piers. The proposed new structure will be built to a higher elevation, spanning 186.2 m long and supported by two in-stream piers. The following table details the footprint (m^2) of permanent infrastructure works at the bridge crossing site. Footprint areas are provided in reference to their impact below both the ordinary high-water mark (OHWM; 316.54 m asl), and the mean ice scour level (315.10 m asl). Shoreline and river bottom habitat that falls within this range (i.e. below OHWM and above the ice scour level) is generally avoided by and not considered suitable overwintering habitat for freshwater mussels, as it is subject to heavy disturbance/scouring by river ice that would displace or destroy any mussels.

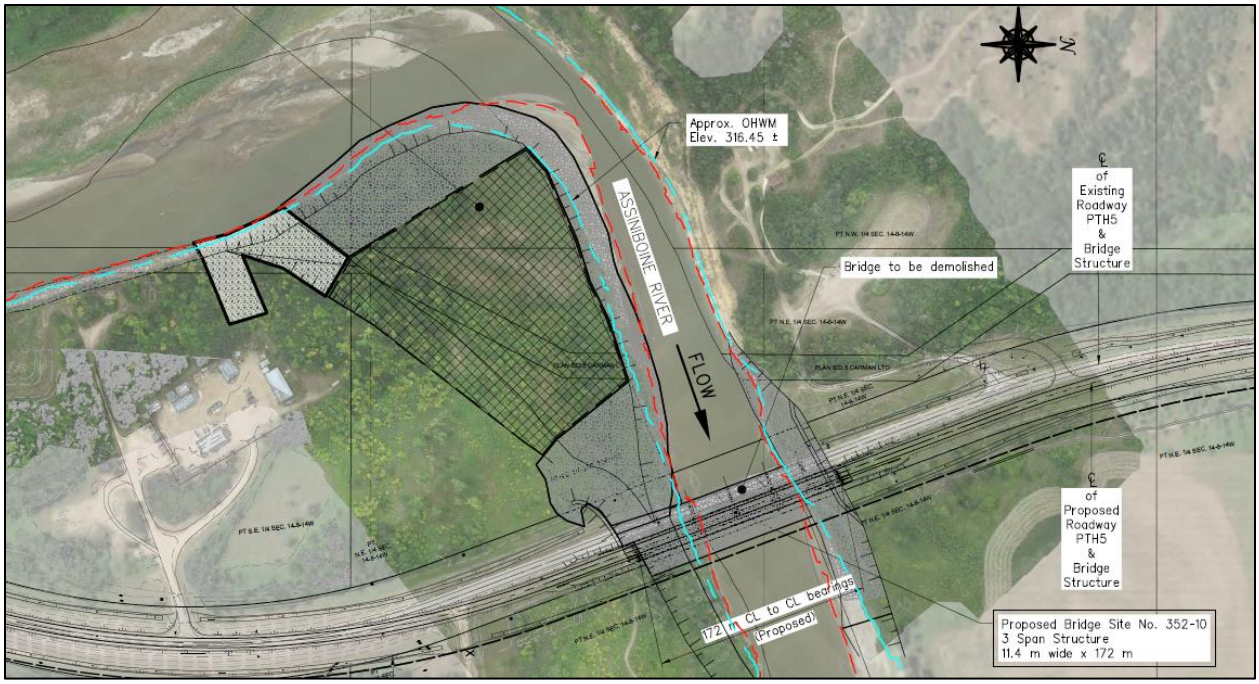


Figure 3. Environmental drawings of the PTH 5 bridge replacement and relief bench sites, showing the footprint of bank modifications and rip rap blanketing (grey).

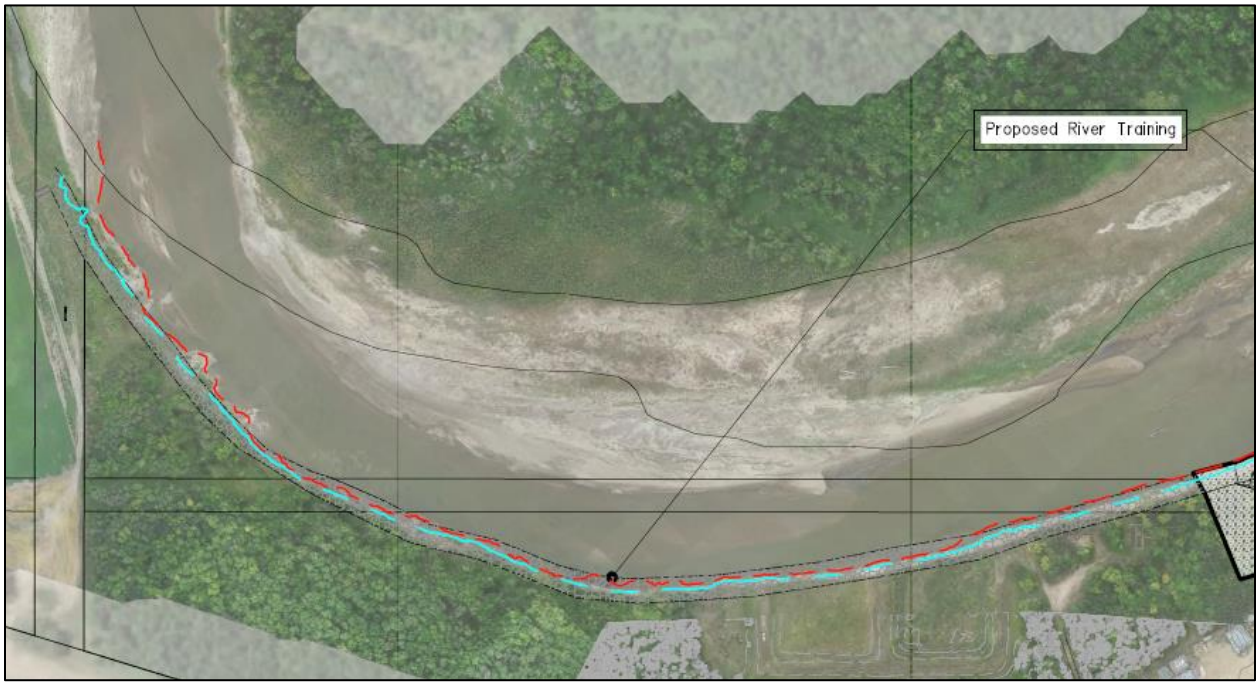


Figure 4. Environmental drawings of the relief bench alignment, showing the footprint of bank modifications and rip rap (black) in comparison to the Ordinary High Water Level (blue) and the normal winter ice scour level (red).

Table 1. Footprint dimensions for each permanent component of construction below the high-water level of the Assiniboine River.

Permanent footprint (m^2)			
Area	**Areas below the ordinary high-water mark**	**Areas below the ice scour line**	**Duration (months/weeks)**
North (left) Bank	1,884	425	permanent
South (right) Bank	13,086	3,625	permanent
Total	14,970	4,050	

As part of construction methods, construction of temporary instream features will be required. This includes construction of access pads extending from the north and south shorelines to the pier sites, to provide access to and facilitate construction of the support piers, and coffer dam installation for dewatering of the pier footprint for installation. The following table details the footprint (m^2) of temporary infrastructure works at the bridge crossing site. Footprint areas are provided in reference to their impact below both the ordinary high-water mark (316.54 m asl), and the ice scour line (315.10 m asl).

Table 2. Footprint dimensions for temporary constructions to be installed below the high water level of the Assiniboine River.

Temporary footprint (m^2)			
Types of work	**Areas below the ordinary high-water mark**	**Areas below the ice scour line**	**Duration (months/weeks)**
(+) South access pad for new pier	200	60	7 months
(+) North access pad for new pier	590	580	7 months
(+) South access pad to remove old pier	272	96	4 months
(+) North access pad to remove old piers	912	848	4 months
(+) Cofferdams for pier installation	258	258	4 months
Total	2,232	1,842	

Riparian vegetation clearing will be required, including both open grassland and deciduous forest habitat types, for both the relief bench area and for accessibility along the east bank for guide bank construction. The following table provides the fooprint (m^2) of permanent riparian habitat loss resulting from the project, including bridge realignment, relief bench construction, and guide bank construction.

Table 3. Footprint dimensions for anticipated riparian habitat clearing, defined as habitat within 50 m of the top of bank of the Assiniboine River.

Permanent footprint (m^2)			
Location	**Areas to be Cleared**	**Habitat Type**	**Duration (months/weeks)**
New bridge footprint	28,850	Open grassland/sparse trees	permanent
Relief bench	17,400	Open grass and shrubland	permanent
Relief bench	9,300	Deciduous Forest	permanent
Guide bank	5,400	Open grass	permanent
Guide bank	17,100	Deciduous Forest	permanent
Total	78,050		

2.5. CONSTRUCTION PLANS/DRAWINGS

Environmental regulatory drawings are provided in Appendix C-1. Sheet 1 outlines the location of the replacement structure, guide bank, and relief bench along the south shoreline of the Assiniboine River upstream of the bridge. Additionally, Appendix C-2 provides an additional drawing specifically of the relief bench and guide bank profile and grading plan and extent of rip rap blanketing.

2.6. OPERATION AND MAINTENANCE

Upon completion, the new PTH 5 bridge will become part of Manitoba's Provincial Highway Network. Regular and periodic maintenance activities will be necessary to ensure the new bridge performs in accordance with department standards to facilitate safe and reliable transportation for public use.

Regular and periodic maintenance activities associated with the bridge include:

- Ice control via application of road salt and/or sand and gravel as required.
- Snow clearing.
- Vegetation management which includes periodic mowing of grasses and brushing of woody vegetation within the ROW.
- Bridge sweeping and washing of substructure.
- Bridge deck sweeping.
- Bridge deck surface patching/crack repair.
- Periodic placement/replacement of rip rap along banks and at piers of stabilization and addressing potential erosion concerns.
- Debris removal deposited because of annual flooding.

2.7. PUBLIC STAKEHOLDER ENGAGEMENT

At present, the primary regional stakeholder to be impacted by construction activities and potential environmental effects of the project is Spruce Woods Provincial Park and the Municipality of Glenboro-

South Cypress. Representatives of the park have been and continue to be engaged as project design and planning progresses, and a permit/approval from Manitoba Provincial Parks Branch will be acquired for all components of the project. Once construction begins, Park contacts will receive periodic updates and information regarding the progress of the project, including works completed and any updates to the schedule for upcoming tasks, for review and comment.

Stakeholder engagement with both the Municipality and with Manitoba Conservation and Climate Change was completed in the preliminary design phase of the project, and included introduction of the project to the stakeholders, provide stakeholders with the ability to provide input and voice concerns regarding the project, and present updates and receive comments regarding design options for the project. Additional entities included in stakeholder engagement included Glenboro Agricultural Society, the Central Assiniboine Watershed District, and the office of MLA Cliff Cullen.

Through these discussions, considerations made to the project include providing a multi-use path on the bridge, widening the area dedicated to vehicles, and keeping the existing bridge operational throughout construction.

Public notices, press conferences, and bulletins will be issued by MTI and the Government of Manitoba prior to the project, and traffic management plans will be shared with local communities/municipalities as required. All necessary public notices and communications regarding impacts or alterations to navigation on the Assiniboine River at this site will be completed, as required by Transport Canada Navigation Protection Program authorization (application in progress).

2.8. INDIGENOUS GROUPS

The Project is located on Treaty 1 territory and the homeland of the Red River Métis people. MTI has identified three Indigenous groups/communities that require consultation for this project: Dakota Tipi First Nation, Swan Lake First Nation, and the Manitoba Metis Federation. Engagement with these Indigenous groups is ongoing.

There are no areas of Community Interest Zones within the vicinity of the project. According to a review of the Manitoba Mines Branch - Integrated Mining and Quarry System website, there are currently no Treaty Land Entitlement (TLE) claims within the project vicinity (Manitoba Mines Branch, n.d).

At the outset, the project is not expected to have any negative impacts on Indigenous communities, with no traditional land use or harvest areas being affected by instream or construction works at this site. Construction activities may require the temporary closure of a small reach of the Assiniboine River to recreational/traditional fishing, however as per Transport Canada regulations navigation through the project site by boat will be maintained and only the relatively small construction footprint at the PTH 5 bridge crossing site will be closed to access. As such, the project is not expected to have any significant impact on recreational or traditional fishing practices and availability in this area. In addition, site assessment did not identify any access points or other public use areas or infrastructure (e.g. boat

launches, rest areas) that would result in impacts or interference with recreation or traditional resource user accessibility at this site.

Subsequent to issuance of this EAP report, Swan Lake First Nation has informed the project-team from MTI that the area is not only a part of its traditional territory; over time it has been much used and traveled by the members of the Swan Lake First Nation (and other community members from other First Nations). The proposed changes to the detailed design include plans to expand into new ground, which may lead to new discoveries with respect to spiritual artefacts and possible burial sites. The First Nation has expressed all work be undertaken with caution and sensitivity. Accordingly, Swan Lake First Nation has expressed that it would like to be actively engaged via in-person presence at the project-site(s). The First Nation has indicated strongly that it wishes to have its own community-based monitors at the project-site (and accompanying areas) as necessary during relevant phases in construction of the project. This would allow for it to oversee and provide the necessary input to account for its position and sensitivity that has been so expressed.

More immediately, concerning logistical details to the project traffic management plans for this project at present do not require the complete closure of PTH 5 at any point during construction, and no significant interruption to travelers or accessibility for local residents and First Nation communities or their business ventures (i.e. agricultural farming practices) is expected.

3. EXISTING ENVIRONMENTAL CHARACTERISTICS AND CONDITIONS

3.1. REGIONAL SETTING

The existing bridge structure over the Assiniboine River on PTH 5 at Spruce Woods Provincial Park is in the Aspen Parkland Ecoregion (Stockton Ecodistrict) of the Prairie Ecozone. It is part of the Transitional Grassland Ecoclimatic Region, which is characterized by a continental climate marked by short, warm summers and long, cold winters. The natural vegetation within this region varies, with trembling aspen groves in moist locations, grassland habitat on drier landscapes, and maple and ash commonly occurring on alluvial materials along the larger waterways. Within this ecodistrict along the Assiniboine River, soils are characterized as droughty Humic Regosols associated with a narrow band of sand dunes (Smith et al., 1998).

3.2. CLIMATE

The project site falls within the Transitional Grassland Ecoclimatic Region, which is characterized by a continental climate marked by short, warm summers and long, cold winters (Smith *et al.* 1998). The mean annual temperature is 2.4oC, the average growing season is 181 days and growing degree-days number about 1670. The mean annual precipitation is about 490 mm of which about one-quarter falls as snow. Precipitation varies greatly from year to year and is highest from late spring through summer. Average moisture deficit over the year is about 250 mm.

The ecodistrict has a cool, subhumid, Boreal soil climate. Climate data for this region is collected from the Brandon CDA and Cypress River climate stations (Atmospheric Environment Service, Environment Canada 2023).

3.3. PHYSICAL ENVIRONMENT

General stratigraphy of the site includes a thin layer of dark brown, moist, clayey topsoil underlain by complex and variable layers of alluvial material consisting of variable sand, clay, and silt consistencies overlying a thick layer of clay till (clay with gravel) which included an approximate 2.7 m thick layer of water bearing sand within the till. Analysis of groundwater characteristics at the site determined that groundwater inflows and soughing/squeezing are likely to occur with advancing excavations or drilled shafts through the sand and silt layers in the alluvium material particularly above the clay till layer, with a potential for localized groundwater inflow into an excavation through this layer.

The Assiniboine River Valley experiences a local relief of 30 to 60 m in elevation, characterized by locally steep valley walls and a strongly meandering sinuosity. The valley in this regio is trough-like, with some cut banks and terraces, including locally very steep valley walls in the Spruce Woods reach.

The project site is located on the Assiniboine River immediately adjacent to Spruce Woods Provincial Park. Park infrastructure in the vicinity includes Kiche Manitou Campground, a wastewater treatment facility with maintenance yard, and a variety of hiking trails and recreational areas. Local overland drainage includes two main corridors:

- Kiche Manitou Campground Drain: a wide meandering channel leading from Kiche Manitou Lake towards a culvert and a narrow channel downstream of the culvert connecting to the Assiniboine River downstream of the project site. Fish habitat upstream of the culvert was dominated by flat habitat with abundant instream vegetation and large woody debris over organic matter and fine silt substrate. Downstream, fish habitat was dominated by narrow run habitat with steep sand/grass covered banks and a silt/gravel/cobble substrate. The riparian area upstream consisted largely of grasses, deciduous trees and shrubs. Downstream, the riparian area consisted mainly of grasses and shrubs with some deciduous trees.
- Spirit Sands Drainage Ditch: draining overland flow from the north along the west side of PTH 5, habitat was consistent with a roadside ditch with grass covering the entire surface. A single culvert was located at the an approach crossing approximately 200north of the PTH 5 bridge with cobble and boulder armouring at each end.

3.4. TERRESTRIAL HABITAT

The anticipated footprint of the new structure will largely overlap with the existing bridge and highway ROW. Within this extent, grassy and herbaceous vegetation occupies the cleared ROW, and narrow

riparian habitat abuts the bridge structure as it crosses the Assiniboine River. The adjacent vegetation and plant communities vary across the project extent and include mature and young hardwood forests as well as grassland/shrubland habitat.

The riparian habitat surrounding the project site is characterized by relatively narrow and steep riverbanks dominated by flood tolerant and/or moisture loving plants, including both native and non-native species. On the north side of the bridge the riverbank has been armoured with limestone riprap which extends up to 15m either side of the bridge before transitioning back to a natural eroded riverbank condition. The vegetation established along the riprap blanket is characterized by a mixture of aggressive noxious and invasive weed species (Common Burdock (*Arctium minus*), Canada Thistle (*Cirsium arvense*), Leafy Spurge (*Euphorbia esula*), etc.) as well as native woody vegetation (willow sp., Manitoba Maple (*Acer negrundo*), and Red Osier Dogwood (*Cornus sericea*). Vegetation on all other riverbanks is a combination of herbaceous native and non-native species including Bulrush (Schoenoplectus sp.), Water Smartweed (*Persicaria amphibia*), Rough Horsetail (*Equisetum hyemale*), Water Plantain (*Alisma triviale*), and Reed Canary Grass (*Phalaris arundinacea*) as well as flood tolerant woody species, predominantly Sandbar Willow (*Salix exigua*). Exposed sand bars and benches exist on the riverbanks, which are typically sparsely vegetated with pioneering herbaceous and woody vegetation. Large mature trees and snags occupy adjacent upland habitat along much of the riparian corridor.

In 2015, portions of the proposed flood relief bench were cleared to accommodate a proposed flood relief breach plug south of the existing bridge that would allow for temporary passage of flood flow through an armoured weir section built into the foundation of PTH 5 (Figure 5). The breach plug was not constructed however the proposed breach channel was cleared of trees (~27,000 m^2).

Figure 5. Satellite imagery from April 2023 (WMTS-ESRI 2023). Highlighted area was cleared in 2015 as part of plans for a relief plug which was ultimately not constructed.

3.5. AQUATIC HABITAT

The Assiniboine River at the PTH 5 bridge crossing is classified as Type A habitat by DFO's Fish Community and Fish Habitat Inventory of Streams and Constructed Drains Throughout Agricultural Areas of Manitoba (2002-2006), which means it is complex habitat containing large-bodied fish species. A complete aquatic habitat assessment of the project site was completed in May 2021, including desktop and field investigations of the Assiniboine River PTH 5 bridge crossing site, and extending 800 m upstream and downstream of the crossing. The assessment included full habitat mapping of the site including depth and substrate assessment, fish and mussel surveys and fish and mussel habitat assessment, and a culvert drain assessment of the local drainage system that flows into the Assiniboine River at this site.

The Assiniboine River in the vicinity of the PTH 5 bridge consists predominantly of run habitat over coarse sand and gravel substrates with several areas of riffle over hard cobble/gravel (potential spawning habitat for Walleye and Sucker sp.). Some deeper holes of 2+ m depths were noted upstream and downstream of the bridge (potential overwintering habitat). Coarse woody debris and overhanging

banks along the north shoreline are present, and overall, the reach provides suitable habitat for various life stages of both forage and large bodied fish species, though no rare or sensitive habitat types were identified at this site, and aquatic habitat characteristics are readily available both further upstream and downstream of the site.

Aquatic habitat at this site provides year-round habitat for approximately 54 fish species, including a wide variety of fish trophic guilds including omnivorous and piscivorous species, and species that inhabit predominantly benthic or pelagic habitats. These include species important for recreational fishing such as Walleye (*Sander vitreus*), Sauger (*Sander canadensis*), Channel Catfish (*Ictalurus punctatus*), and Northern Pike (*Esox lucius*). In addition, two species inhabiting this reach of the Assiniboine River have been specially designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), including Lake Sturgeon (*Acipenser fulvescens*, Saskatchewan-Nelson Rivers population, Endangered), and Bigmouth Buffalo (*Ictiobus cyprinellus*, Special Concern). However, neither species is designated as a Schedule 1 protected species under the *Species at Risk Act* (SARA).

During shoreline surveys at the PTH 5 bridge site, large quantities of fresh and weathered mussel shells were observed on gravel bars both upstream and downstream of the bridge site, but no live mussels were discovered. Representatives of seven different species were identified on gravel bars and below the waterline within the survey area. The species identified included Threeridge (*Amblema plicata*), Wabash Pigtoe (*Fusconaia flava*), Plain Pocketbook (*Lampsilis cardium*), Fatmucket (*Lampsilis siliquoidea*), Black Sandshell (*Ligumia recta*), Mapleleaf (*Quadrula quadrula*) and White Heelsplitter (*Lasmigona complanata*). On the gravel bar immediately downstream of the bridge empty Black Sandshell, Wabash Pigtoe, Plain Pocketbook, Threeridge, and Mapleleaf were observed (Appendix B Figure 6 and Photos 50-54). Because coarser substrates (sand and gravel) were present throughout the survey area and numerous empty mussels were observed, the project area appears to provide suitable habitat for freshwater mussels including Mapleleaf Mussel (*Quadrula quadrula*, Saskatchewan-Nelson Rivers population), a Schedule 1 Threatened SARA (2019) species.

The complete aquatic habitat assessment report for the PTH 5 bridge replacement site has been provided for review with this EAP report as Appendix B (bridge and relief bench sites) and Appendix G (upstream guide bank alignment), and includes all applicable habitat maps and site photographs compiled during the assessment.

3.6. SPECIES AT RISK

At-risk species assessments were completed for both aquatic (Appendix B, 2021) and terrestrial (Appendix E, 2022) components of this project. The following presents at-risk species identified as occurring or potentially occurring within the project site based on these desktop and field assessments.

Review of existing information indicates that species of concern present within the Assiniboine River which have the potential to be present near the project area include Lake Sturgeon, Big Mouth Buffalo, and Mapleleaf Mussel. Field investigations identified large quantities of shell fragments of several freshwater mussel species including Mapleleaf Mussels, though no live specimens were discovered.

Terrestrial investigations identified four (4) amphibian and three (3) reptile species listed under SARA inhabiting the Aspen Parkland Region including Western tiger salamander (*Ambystoma mavortium*), Eastern tiger salamander (*Ambystoma tigrinum*), Great Plains toad (*Anaxyrus cognatus*), Northern leopard frog (*Lithobates pipiens*), Snapping turtle (*Chelydra serpentina*), Plains hognose snake (*Heterodon nasicus*), and Northern prairie skink (*Plestiodon septentrionalis*).

Considering the terrestrial habitat associated with the Project, the riparian environment and the adjacent uplands may provide suitable habitat for SARA listed species that include northern leopard frog, snapping turtle, plains hognose snake, and northern prairie skink. The project area overlaps with a Critical Habitat polygon identified in the recovery plan for northern prairie skinks (COSEWIC, 2017). In addition, one historic detection of Plains Hognose Snake was noted within 100 m of the existing bridge structure.

Field investigations of the upstream guide bank footprint along the right (east) bank Assiniboine River identified a Northern Prairie Skink in a clearing near the top of bank ridge within the expanded project footprint (see Appendix G). This species is known to be relatively sedentary and occupy a small home range, thus this observation confirms that Northern Prairie Skink are inhabiting this portion of the project site.

In addition, plant species of concern identified as potentially occurring within the Aspen Parkland Region include Rough Agalinis (*Agalinis aspera*), Buffalograss (*Bouteloua dactyloides*), Hackberry (*Celtis occidentalis*), Smooth goosefoot (*Chenopodium subglabrum*), Small white lady's slipper (*Cypridium candidum*), Hairy prairie-clover (*Dalea villosa var. villosa*), and Western spiderwort (*Tradenscantia occidentalis*).

Considering the habitat preferences of these SARA listed plant species in relation to the terrestrial habitat provided by the project site, hackberry may occur within the riparian hardwood forests adjacent to the existing ROW. The other species are not expected due to their preference for native prairie and sand dune habitat; however, these species have a high likelihood of presence within Spruce Woods Provincial Park and the nearby Spirit Sands sand dune complex.

Avian species investigations identified 24 species listed by SARA, ESEA, or COSEWIC as potentially occurring within the Aspen Parkland region. Considering the terrestrial habitat associated with the Project, adjacent uplands may provide suitable habitat for SARA listed species that include Short-eared Owl (*Asio flammeus*), Eastern Wood-pewee (*Contopus virens*), Loggerhead Shrike (*Lanius ludovicianus excubitorides*), Red-headed Woodpecker (*Melanerpes erythrocephalus*), Barn Swallow (*Hirundo rustica*) and Golden-winged Warbler (*Vermivora chrysoptera*). The nearby Spruce Woods Provincial Park provides habitat for many of the SARA listed species that associate with open native mixed grass prairie. The riparian environment may provide habitat for species that include Bank Swallow (*Riparia riparia*) and Piping Plover (*Charadrius melodus melodus*). The bank of the Assiniboine River at the project location is within the Critical Habitat Unit identified in the recovery plan for Bank Swallows (1233_MB_16 – Assiniboine River (A)) (ECCC, 2021).

3.7. LAND USE

Much of the region is cultivated for the production of spring wheat, other cereal grains, oil seeds and some hay. Current continuous cropping practices, reduced summer fallow and retention of crop residues as surface cover has greatly reduced the risk of wind erosion.

Locally, recreational land and resource use and ecotourism are prevalent in this area, both within Spruce Woods Provincial Park (including Kiche Manitou campground and day use areas to the southeast, and the Spirit Sands to the north) and from peripheral resource users, tourism operators, and Indigenous communities. This includes terrestrial (hiking, hunting, etc.) and aquatic (fishing, recreational boating) resource use.

4. ENVIRONMENTAL EFFECTS ANALYSIS

The following section presents the environmental effects analysis for the PTH 5 Assiniboine RIver Bridge Replacement and Relief Bench Project. The environmental effects analysis considers physical processes as well as relevant biophysical and socioeconomic attributes.

The environmental effects assessment considers potential impacts on relevant attributes in each category in conjunction with the application of mitigation measures, residual effects, determination of significance, and if necessary the need for any follow-up and/or monitoring. Potential environmental effects were assessed as being significant, not significant, or unknown. Table 4 below summarizes all predicted effects of the project to physical, biological, and socio-economic factors that may be impacted by the project, including anticipated effects at the construction and operation phases.

4.1. PHYSICAL PROCESSES

4.1.1. Air Quality and Greenhouse Gases

During the demolition/construction phases of the project potential effects on air quality and of greenhouse gases emissions relate primarily to the release of vehicle emissions associated with the use of heavy equipment and machinery (loaders, excavators, trucks, etc.). Work activities (hauling, jack hammering, excavating) may also result in the release of dust and particulate matter into the atmosphere. The release of dust/particulate is largely dependent on ambient environmental conditions (i.e. dry or windy). With preliminary design plans to construct a new bridge crossing adjacent to the existing bridge, no significant change to existing traffic flows are expected to occur.

During the operation and maintenance stages of the project activities minor emissions stemming from equipment use or raising or dust/particulate matter associated with bridge deck sweeping.

Mitigation measures to minimize effects on air quality and reduce greenhouse gas emissions are similar for both construction and operation and maintenance phases of the project. Mitigation measures employed will include adherence to MTI's stand standard environmental BMP's, ensuring all equipment and machinery used is maintained and serviced regularly to ensure optimal function and efficient combustion of fuel, application of dust control measures as required.

Despite regular maintenance and servicing, the release of some minor emissions including dust and particulate matter is still expected to occur during both the construction and operation phases of the project. However, in considering the application of mitigation measures the minor release of emissions is not likely to result in a significant adverse effect on air quality or in the release of significant greenhouse gasses. No monitoring of air quality is being proposed for this project.

4.1.2. Soils and Terrain

Potential effects on soils and terrain associated with the project are generally attributed to exposure, compaction, erosion, and mobilization of soils within the project area. Potential project related effects on soils and terrain are primarily associated with the construction phase of the bridge replacement project and include activities such as site preparation (stripping, grading, and compaction etc.), removal/replacement of the detour crossover lanes, and approach road works.

The existing bridge is located in an area that has been previously impacted through the construction of the existing bridge. As a result soils within the transportation corridor/ROW are already compacted to a degree. Any additional compaction of soils will be necessary for the construction of the new bridge and not likely to be substantially different from current conditions. Erosion and mobilization of exposed soils will be mitigated though design and application of MTI's standard environmental BMP's. Design mitigation measures include placement of appropriately sized rock rip rap underneath the new bridge and at the abutments. Placement of rock rip rap and revegetation of other exposed areas will form the permanent erosion protection for the bridge site and relief bench. During construction, temporary erosion control measures will also be employed (e.g. silt fence) along with the application of other techniques identified as part of MTI's environmental requirements (e.g. halting construction activities during heavy rains, maintenance of temporary erosion control measures to ensure proper function etc.).

Potential effects of the project on soils and terrain during the operation and maintenance phases of the project are limited. There may be a need for periodic grading or excavation from time to time depending on maintenance needs. Mitigation measures will include the application of temporary erosion control measures, revegetation (spot seeding) and the adherence to MTI's environmental requirements.

In considering the application of temporary and permanent measures to guard against erosion during the construction/operation and maintenance phases of the project significant adverse effects on soils and terrain are expected to occur. No monitoring of soils and terrain is being proposed.

4.1.3. Groundwater

Potential risks to groundwater resources associated with the bridge replacement project are primarily attributed to the infiltration of hydrocarbons stemming from equipment use and malfunctions (leaks and spills such as fuel, solvents etc.). Equipment use will be prevalent throughout various components of both the construction as well as operation and maintenance phases of the bridge replacement project. Key activities in the near shore area along the Assiniboine River involving the use of equipment and which have a high potential of effecting groundwater resources include site preparation, construction/removal of access roads/pads, and construction of new pile foundations. Common

activities identified during the operation and maintenance phase of the project are not expected to affect ground water resources.

Mitigation measure incorporated into the project to offset potential effects on ground water resources are primarily attributed to the implementation/adherence to MTI's environmental BMP's related to machinery, fuel storage and handling.

In considering the nature of the effects in conjunction with the application of mitigation measures, the project is not likely to result in any significant adverse effects on groundwater resources. No monitoring of groundwater is being proposed.

4.1.4. Surface Water

Potential risks to surface waters associated with the Project are generally limited to the demolition and construction phases of the project (construction of access roads, piers/pile foundations/abutments, site preparation etc.). Key effects on surface water quality can generally be attributed to the deposition of debris associated with bridge demolition activities and to other deleterious substances entering surface water stemming from the use of equipment. Negative effects are also caused by the deposition of sediments through erosion of exposed soils.

Mitigation measures that will be employed to offset effects on surface water quality during the demolition/construction phase of the project include the use of demolition catch platforms to ensure no debris enters the Assiniboine River watercourse. Additional mitigation measures will include the application/adherence to MTI's environmental BMP's such as temporary site isolation, erosion and sediment control, revegetation, placement of rock rip rap, as well as machinery and fuel handling and storage. Permanent erosion control for the new bridge has been integrated as part of the project design and includes the installation of rip rap along the channel and at the abutments.

During the operation and maintenance phases of the project potential risks to surface water quality include the deposition of deleterious substances associated with equipment use (accidents and malfunctions) and activities such as bridge deck sweeping/washing and debris removal.

Mitigation measures to offset potential impacts to surface water quality during the operation/maintenance phases of the project include adherence to MI environmental BMP's for fuel handling and storage, erosion and sediment control and accepted bridge maintenance procedures such as closing bridge deck drains during deck sweeping/washing activities.

In considering the potential effects on surface water quality in conjunction with the application of mitigation measures, no significant adverse effects on surface waters are expected to occur. Water quality monitoring for turbidity will be completed for access pad construction and removal at the PTH 5 bridge site.

4.2. BIOPHYSICAL ENVIRONMENT

4.2.1. Vegetation

The PTH 5 bridge site is a previously impacted area that is subject to regular disturbance through natural means (annual flooding) and regular and ongoing maintenance including mowing, placement of rock and

repairs. The area under the existing bridge has been armored with rock rip rap to protect the bridge against erosion and scour during annual flood and other annual high-water events. Areas within the bridge ROW not armored with rip rap do support vegetation growth. As well, some limited volunteer growth has occurred along some of the armored areas as a result of silt deposition along the near shore areas from annual flood events.

Vegetation cover at the relief bench area will be completely removed in advance of excavation and grading. Riparian habitat at this site has already experienced heavy disturbance from flooding and a large proportion of tree cover was cleared in 2015.

Vegetation present at the Project site is limited to flood tolerant grasses, smaller woody shrubs and some deciduous shrubs and trees in the relief bench area. Based on a review of available information no protected vegetation species were noted as being present within the vicinity of the Project area. Activities with the potential to impact existing vegetation are associated with site preparation activities such as stripping, site preparation, and excavation.

Mitigation measures will include ensuring that disturbed areas not covered in rock rip rap upon completion of the new bridge but instead will be revegetated with a seed mix designed in accordance with MTI's departmental standards. Some volunteer growth is expected to occur on areas that are armored with silt deposition from annual flooding similar to what currently exists. The loss of vegetation on unarmored areas is expected to be temporary and short-term and will return within 1-2 growing seasons. Permanent loss of tree cover over the relief bench is expected, as revegetation of the site upon completion of excavation and regrading will be limited to grass seeding, though some volunteer herbaceous and shrub species are expected.

During the operation and maintenance phases of the project some periodic minor excavation may be required for slope stabilization or other maintenance purposes. Any disturbed areas will be revegetated immediately upon completion of the work with a seed mix designed in accordance with MTI's departmental standards.

Considering the application of the proposed mitigation measures, project related effects on vegetation are considered minor, and predominantly short-term and temporary. As such no significant adverse effects on vegetation are expected to occur. Monitoring for revegetation success will be completed in the first year after project completion (see Section 13).

4.2.2. Wildlife

The PTH 5 bridge site is a previously impacted area that is subject to regular disturbance through natural means (annual flooding) and regular and ongoing maintenance (mowing, placement of rock, repairs etc.). Similarly, the relief bench site is subject to regular inundation and habitat scarring during flood events. Based on a review of available information no protected wildlife species were noted as being present near the project area. Key project related effects on wildlife include noise associated with

equipment use and various construction activities, and a temporary loss of available habitat (site preparation) within the bridge ROW.

During construction, noise and the temporary loss of habitat will likely cause smaller wildlife species such as mice, voles and moles present at the bridge, and potential furbearer and ungulate occupants of the relief bench site to vacate the area temporarily. Similarly, site reparation will result in a short-term temporary loss of available habitat. Upon completion of the project smaller wildlife species are expected to return to the area.

During the operation phases of the project smaller wildlife species may experience some minor disruption resulting from noise associated with equipment use during maintenance activities. The existing and proposed bridge is located within an active transportation corridor. Noise generated from equipment use during periodic maintenance activities is not expected to be substantially different than that associated with regular vehicle use. However, the application of MTI's environmental BMP's related to noise will be adhered to during maintenance activities to minimize any potential disruptions to the degree possible.

In considering potential project related effects on wildlife species in conjunction with the application of mitigation measures, potential impacts to one at-risk species, the Northern Prairie Skink

4.2.3. Bird Species

The replacement of the existing PTH 5 bridge structure will result in the temporary loss of use of some potential Swallow habitat for the duration of the project (approx. 2 years). Demolition of the existing bridge will occur during the winter months and will not affect any active nests at this location. Noise stemming from construction activities is not expected to be a concern for nesting at the existing structure, given that they nest under bridges within an active transportation corridor.

During operation equipment use may generate some additional noise to facilitate maintenance activities. However, given that the bridge is located within an existing transportation corridor, noise generated during periodic maintenance activities is not likely to be substantially different than that associated with regular vehicle use.

Mitigation measures to offset potential effects on wildlife species include limiting the bridge demolition activities to outside the migratory breeding bird window, as per the MBCC, and adherence to MTI environmental BMP's related to noise by ensuring equipment is well maintained and noise reduced to the degree possible.

In considering potential project related effects on wildlife species in conjunction with the application of mitigations no significant adverse environmental effects on swallows or other bird species are expected to occur. No avian species monitoring is being proposed.

4.2.4. Aquatic Species

Potential project related effects on aquatics species include habitat loss and alteration through installation of new bridge piers and removal of minor riparian vegetation and deposition of deleterious substances stemming from instream works, erosion and sedimentation, and leaks and spills associated

with equipment use. Additionally, potential effects of relief bench construction include potential for post-inundation fish stranding as flood waters recede.

Bridge design and channel modifications are not expected to result in significant alteration to fish passage capabilities or aquatic habitat characteristics. The shape of a typically configured bridge opening with sloping banks at the abutments provides lower velocity fringe zones to permit upstream fish passage.

Demolition of the existing bridge will include removal of its piers to a depth of 1 m below grade (riverbed). Construction of the new bridge will involve installation of new piers of a similar size; preliminary design selection will see a 3-span bridge constructed at this site, reducing the total number of piers present below the high-water level, and resulting in a net increase of instream habitat through restoration of the riverbed.

The deposition of deleterious substances can include a range of substances (or activities) typically related to potential accidents and malfunctions associated with the use of equipment and machinery (fuel/solvents etc.). Similarly, erosion of exposed soils and the subsequent deposition of sediments into the watercourse may also affect the health and wellbeing of aquatic species. Mitigation measures to address potential deposition of deleterious substances include the application of MTI's BMP's relating to fuel and machinery and the following:

- Restriction of instream work to periods outside the April 1 to June 30th timeframe in order to accommodate potential spring/summer spawning periods;
- Application of site isolation measures (cofferdams for pier construction) including the conducting fish salvage operations; and
- Installation of work platforms along the underside of the bridge and at piers in order to prevent debris from entering the watercourse.

The project site is not located within an Aquatic Invasive Species Control Zone.

During the operation phase of the project potential risk to aquatic species are limited to the deposition of deleterious substances (fuel/solvents and sediments etc.) stemming from periodic use of equipment, exposed soils (limited probability), and bridge deck cleaning (washing/sweeping) maintenance activities. Mitigation measures that will be employed during the operation phase of the project include adherence to MTI's environmental BMP's including Machinery, Fuel Handling and Storage, Erosion and Sediment Control, revegetation and maintenance procedures including ensuring bridge deck drains are closed during bridge deck sweeping/washing.

In considering potential impacts to aquatic species in conjunction with the application of mitigation measures, no significant adverse environmental effects are expected to occur as a result of the Project. FAA authorization is currently in process, and at this time, no monitoring or follow up is proposed and is pending the outcome of further regulatory review by DFO regarding the need for developing a mussel survey/relocation program.

Monitoring for fish strandings on the relief bench, as well as general assessment of operational functionality and success of the relief bench, will be completed during and after the first inundation

event at the site. The outcome of this monitoring may facilitate additional monitoring efforts at the site, if required.

4.2.5. Species at Risk

At-Risk Fish Species

Neither Lake Sturgeon nor Bigmouth Buffalo are expected to utilize or be otherwise directly impacted by construction activities at this site, and aquatic habitat affected by these works is not considered critical habitat for these species.

Mapleleaf Mussel

The Assiniboine River is inhabited by Mapleleaf Mussel (*Quadrula quadrula*) and substrate in the vicinity of the bridge project is considered suitable for several freshwater mussel species including Mapleleaf. During a cursory shoreline survey, no live mussels were located but numerous empty valves were present. In-water substrate at the project site is suitable for Mapleleaf and other freshwater mussel species but it is unknown if any live Mapleleaf or other mussel species are present at the project site. The project footprint (riprap blanket, bridge piers etc.) will permanently alter 1,704 m² of habitat below the winter ice scour mark (Ordinary Winter River Level [315.70 m asl] - ice thickness [0.6 m] = 315.10 m asl). Impacted habitat below this mark could be considered Mapleleaf habitat based on the substrate survey results. It should be noted that the entirety of the upstream guide bank footprint to be disturbed is above the ice scour level, and no mussel habitat will be affected by this component of the project.

All 4,125 m² of temporary and permanently altered areas below the OHWM will have a mussel salvage and relocation program completed to ensure no freshwater mussels, especially Mapleleaf, will be killed during the construction and demolition of the bridge.

MI has submitted the PTH 5 Bridge Replacement Project to DFO for review and FAA authorization is in process. Pending on authorization requirements, a mussel survey and relocation program may be developed and implemented prior to construction in order mitigate any potential impacts to Mapleleaf mussels and other bivalve species that may be present in the project location. A Live Fish Handling Permit will be obtained in the event that salvage efforts of native mussels, including Mapleleaf, is required.

MTI is also seeking an exemption under the ESEA for Mapleleaf Mussel salvage and relocation, with that application currently pending.

Northern Prairie Skink

The project footprint overlaps with the known range and a Critical habitat polygon identified in the recovery strategy for the Northern Prairie Skink (*Plestiodon septentrionalis*), a Schedule 1 species of Special Concern SARA and Endangered under the MBESEA. Field investigations of the expanded upstream guide bank footprint (Appendix G) identified one (1) individual Northern Prairie Skink in a clearing along the top of bank of the river, confirming their presence at this site.

With the confirmation of Northern Prairie Skins presence at this site, pre-construction capture and relocation efforts, and site isolation will be adopted for this project. Northern Prairie Skink salvage, which includes capture and relocation, will be completed in the early spring (late-April and early May),

to target individuals as they become active in the spring, but prior to their egg-laying window which is typically in June to early July. Capture and relocation methods have been outlined in a Northern Prairie Skink Management Plan currently in development by MTI for this project, and will include the deployment of cover boards to attract the skinks, then the capture and temporary holding of all individuals as they are processed and transported to a predetermined release point, expected to be north of the work site nearer the Spirit Sands region of Spruce Woods Park. Finalization of capture and release methods and locations will be done in consultation with the Manitoba Conservation Data Centre, and specialists from the Brandon University department of Biology.

Figure 6. Northern Prairie Skink identified along the top of bank in a clearing within the guide bank expanded footprint.

Western Tiger Salamander

Western Tiger Salamander (*Ambystoma mavortium*) is listed as Special Concern by SARA/COSEWIC. This species is widespread in Manitoba but vulnerable to habitat loss, contamination and fragmentation, and mortality due to increased vehicle traffic along roadways that bisect their habitat. This species inhabits a variety of terrestrial and aquatic habitats during their life cycle that include grasslands and cultivated areas as well as fishless waterbodies. Breeding begins after ice breakup between April and May with hatching beginning two to three weeks after lay date. Metamorphosis is typically completed between three and four months after hatching.

Plains Hognosed Snake

The Plains Hognosed Snake (*Heterodon nasicus*) is a Schedule 1 Threatened species under the *Manitoba Endangered Species and Ecosystems Act* (MB ESEA). This species occurs in grasslands on sandy soils, generally found in a variety of open-canopy communities ranging from drier habitats to damp lowlands; the snakes are often found in close proximity to water. Plains Hog-nosed Snake is usually a solitary hibernator, and it seems likely that the majority of hibernation sites are burrows, either excavated by the snakes or initially created by small mammals. Similarly, constructed burrows are also used for nesting and shelter.

The Manitoba Conservation Data Centre (MBCDC) has a recent record of an occurrence of this species within 100 m of the project site, indicating general habitat suitability. A ministerial exemption under the ESEA may be required for this project (application pending).

Snapping Turtle

Snapping Turtle (*Chelydra serpentina*) is listed as Special Concern by SARA/COSEWIC and is widespread but limited data are available on their population status. Snapping Turtles utilize a wide range of habitat, with preferred habitats encompassing waterbodies with slow moving water and dense vegetation with sand and gravel substrates typically utilized for egg laying. The breeding season begins in late-May to late-June when eggs are laid, and hatching occurs between 65-95 days after lay date. This period is considered a vulnerable time for this species, and mitigation measures and monitoring should be included in environmental management planning if their presence is observed (Environment and Climate Change Canada 2016).

Barn Swallow

Investigations of the existing bridge structure identified Cliff Swallow (*Petrochelidon pyrrhonota*) nesting colonies fixed to the underside of the structure (North/South 2017). While no Barn Swallow (*Hirundo rustica*) nesting was identified at the site, both species utilize the same structure types for nesting and are frequently observed together, and the potential for Barn Swallow nesting is high. Swallow nests are protected from destruction or disturbance while they are active under the *Migratory Birds Convention Act* (1994). Barn Swallows are not a Schedule 1 species under the Act, therefore nesting structures may be removed outside of the Breeding Bird restricted timing window (April 1 – August 31), without a permit.

Bank Swallow

Field investigations of the expanded upstream guide bank footprint (Appendix G) identified Bank Swallow (*riparia riparia*) nesting holes along the top of the steep cut east bank of the river, immediately below the decommissioned lagoon site south basin (Figure 7 and Appendix G). This species was listed in 2017 under SARA as a Schedule 1 Threatened species. Disturbance of active nesting sites is not permitted, with active nesting typical between late April and early August.

Figure 7. Bank swallow nest holes identified along the right bank below the decommissioned lagoon site.

Hackberry

Common Hackberry (*Celtis occidentalis*) is a Rank S1? Threatened species under the MB ESEA, though not listed under COSEWIC or SARA. It is most often detected in hardwood gallery, floodplain, or bottomland forests along streams and rivers throughout the Great Plains, and may occur within the riparian zone of new bridge construction, and/or within the relief bench construction area, though no detections of this species were recorded during field investigations (Appendix E).

4.3. SOCIO-ECONOMIC EFFECTS

4.3.1. Land Use

Areas acquired by MTI as part of ROW expansion, including for highway realignment and relief bench construction, are not currently subject to any land use practices that would be interrupted or changed by the project. The process of land acquisition of these areas is complete (see Section 2).

4.3.2. Parks and Protected Areas

The project site is adjacent to Spruce Woods Provincial Park. Following acquisition of land at the project site including for ROW expansion for highway realignment, and relief bench construction, no works will take place on Provincial Park property.

Monitoring and fish salvage plans to be implemented during and after first flooding event and operation of the relief bench.

4.3.3. Heritage Resources

A Heritage Resources Impact Assessment (HRIA) has already been completed for this project, and a heritage monitoring plan has been developed and approved by the Heritage Resources Branch (HRB). The project footprint has been delineated for Heritage Resources monitoring, as outlined in Figure 8. All construction activities taking place along the north and south banks of the river east of the existing bridge, as well as all relief bench construction activities, will require on-site heritage resource monitoring. In addition, any construction activities requiring ground disturbance along the north bank of the river west of the existing bridge crossing will require on-site heritage resource monitoring.

An additional HRIA has been conducted for the expanded upstream footprint where riprap armouring for scour protection is to take place, and HRB approval is pending, though it is anticipated that similar monitoring requirements will apply to this extended footprint.

Work shall immediately cease and be suspended at the location where archaeological or historic artifacts are encountered during construction activities. The discovery shall be reported to the Engineer and work at this location shall not resume unless otherwise authorized by the Engineer.

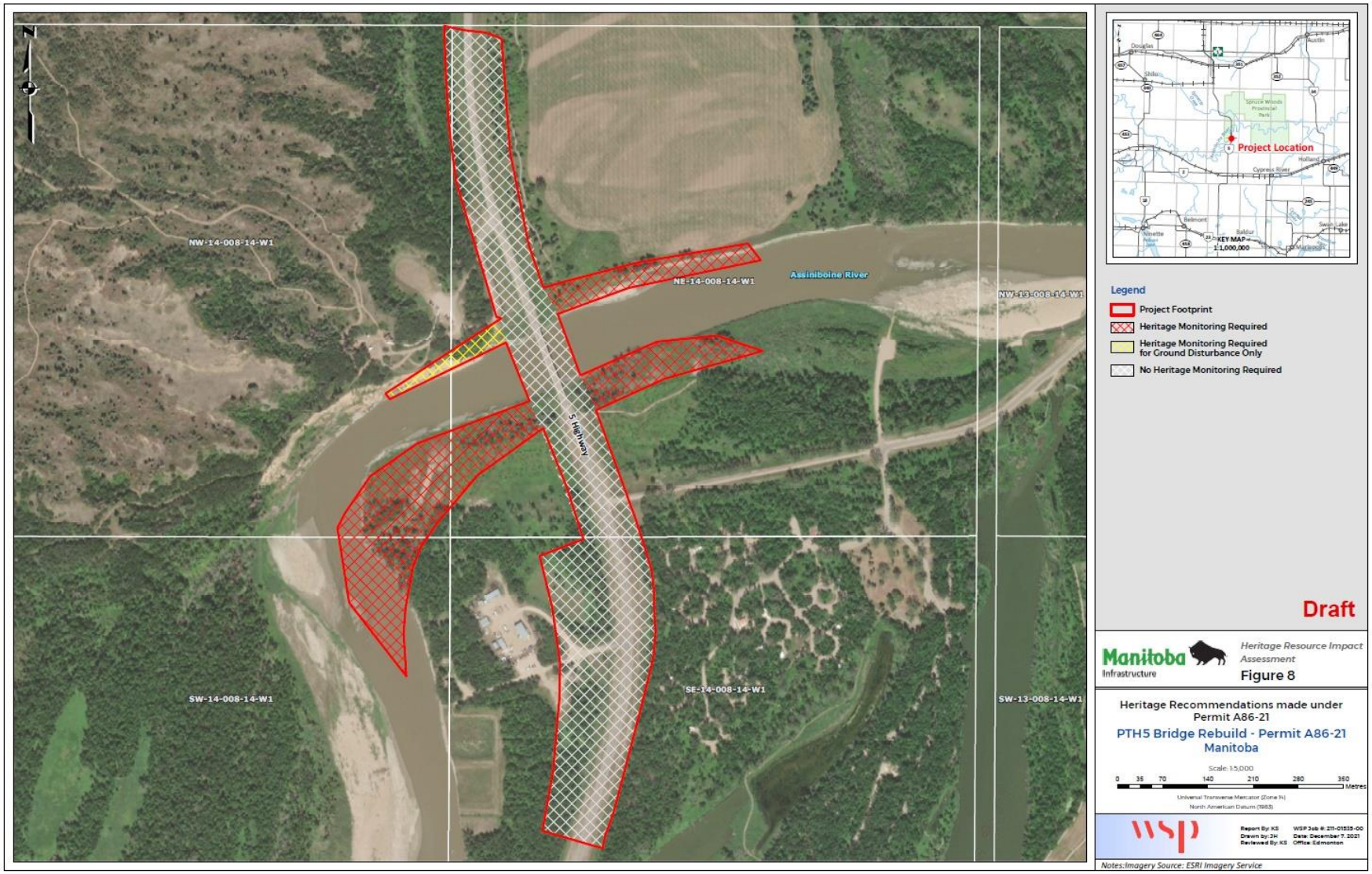


Figure 8. Heritage resource monitoring requirements, based on results of HRIA, and approved by HRB.

4.3.4. Public Health and Safety

Flood mitigation measures included in project designs at this site have been designed, in part, to address structural safety issues being experienced at the existing bridge structure under current hydraulic conditions. This includes impacts to human health and safety resulting from motorist use of the bridge crossing under flooding conditions and impacts to local residents and accessibility of health and safety services when the highway must be closed.

Potential risks to public health and safety associated with the Project relate primarily to the recreational use of the Assiniboine River by the boating public. MI is obtaining Authorization from Transport Canada's Navigation Protection Program for the project (File no. 2023-610685).

Potential project related effects on navigation are associated with bridge demolition/decommissioning activities and the use of temporary instream works which may create unseen hazards during periods of restricted visibility or through the introduction of debris into the watercourse. Site decommissioning will be completed in two phases. Decommissioning of the existing approach grades and highway will be completed in November-December 2024, and will site restoration. Demolition of the existing structure and completion of channel works will take place December 2025 – March 2025, scheduled to take place under frozen conditions. Demolition will be completed from work pads to mitigate potential for debris to fall into the water or freeze to the ice. The construction site will be clearly marked by snow fencing barriers and signage during the bridge demolition phase, including signal lighting in place at all times, to warn potential snowmobilers utilizing the river of the approaching works.

First Nation communities being consulted as part of this project include Dakota Tipi First Nation, Swan Lake First Nation, and the Manitoba Metis Federation. See Section 2.8.

Traffic management plans for this project at present do not require the complete closure of PTH 5 at any point during construction, and no significant interruption to travellers or accessibility for local residents, agriculture, and First Nation communities is expected.

During the operation and maintenance phases of the project instream works are rare, particularly given that the bridge is a new structure. The introduction of debris into the watercourse is unlikely to occur. Periodic maintenance activities may require access to piers which may require the use of cofferdams and access pads. Further instream maintenance activities are typically schedule during the late fall/winter months to capitalize on low water conditions further reducing any risk to the boating public.

Mitigation measures for potential health and safety risks to the boating public include:

- timing of bridge demolition activities will occur during the winter months outside the navigation season.
- signage along the river (upstream and downstream a minimum of 50 m) warning the boating public of construction activities; and
- Ensure that any temporary instream works will be marked with flashing lights during periods of restricted visibility.

- Adherence to MTI's environmental BMP's regarding materials handling and storage and restoration of the bed/banks of the watercourse following completion of the project.
- Pre- and post-construction bathymetric surveys will be completed of the river at this site, to confirm river depths and profiles conform to project designs and navigation requirements.

In considering the application of mitigation measures no significant adverse effects to the health and safety of the boating public is expected to occur. No monitoring or follow up is being proposed.

4.4. ENVIRONMENTAL MITIGATION MEASURES

All project activities will adhere to MTI general environmental requirements which include ensuring all works are completed with appropriate environmental mitigations in place. This includes adherence to restricted timing windows for both fish and wildlife, implementation of a site-specific erosion and sediment control plan including installation, maintenance, and monitoring of all ESC measures, limitations and mitigations for in-water works, clearing and grubbing practices, temporary access pad construction and decommission, revegetation planning, machinery and fuel storage and handling, emergency and spill response planning, dust and particular management, noise limitations, wildlife encounters, and heritage resources.

A full summary of all environmental mitigations and policies to be employed by MTI and all contractors engaged on this project is provided in Appendix F. Key site specific environmental mitigation measures for this project will include, but are not limited to:

4.4.1. Physical Environment

- Ensure that all equipment is maintained and serviced regularly.
- Application of BMP's for dust control measures
- Application of BMP's for noise limitations, and adherence to municipal regulations regarding work hours.
- Implementation/maintenance of temporary and permanent erosion and sediment control measures, revegetation, and application of MTI environmental BMP's.
- Adherence to MTI BMP's concerning the use of equipment/machinery fuel handling and storage.
- Adherence to all applicable regulatory requirements concerning the use of equipment and machinery, storage and transportation of fuels, and other hazardous substances.

4.4.2. Aquatic Habitat and Species

- Planning - work below the ordinary high-water level, including pier construction and installation of work platforms for girder installation, has been scheduled to take place in October 2024 outside of the restricted activity window for fish spawning, and under low flow conditions.
- Girder installation from access pads to mitigate debris and deleterious substance release into the river, and will be completed in Summer 2025 outside of the fish spawning window (after June 30).

- Erosion and Sediment Control - Effective sediment and erosion control measures shall be installed before starting work near water to prevent the entry of sediment into any water course or wetland. Final erosion protection measures shall be installed progressively during the project.
    - Effective sediment and erosion control measures shall be installed before starting work near water to prevent the entry of sediment into any water course or wetland. Final erosion protection measures shall be installed progressively during the project.
    - Erosion and sediment control measures shall be maintained until complete revegetation of all disturbed areas is achieved.
    - Spoil piles shall not be placed within 30m of the ordinary high-water mark or as directed by the Engineer. Spoil piles shall be positioned and maintained in a manner not to increase sediment into the watercourse.
- In-water Works – Works below the normal high-water mark will not occur during the restricted timing window for fish spawning (April 1 to June 30 in Southern Manitoba).
    - Where possible in-water works shall be conducted under low flow, frozen, or dry conditions to reduce impacts to fish and fish habitat.
    - If work must proceed under flowing water conditions, then the work site shall be isolated from the water while maintaining downstream flow around the isolated site unless otherwise directed by the engineer. Placement of clean rip rap does not need to be isolated.
    - Any isolated site shall be de-watered using an appropriately sized screened pipe or other suitable method to ensure fish do not become entrained in the pipe. Pump intakes shall be sized and adequately screened to prevent debris blockage and fish mortality in accordance with the DFO Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater (https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html).
- Rip Rap - Rock rip rap placement shall not damage the bed and/or banks of the watercourse. Clean rocks shall be placed by machinery operating from outside of the water. No rocks shall be obtained from below the ordinary high-water mark of any water body.
- Temporary Access Pads - Temporary in-water crossings, site access, and pads shall be completely removed prior to April 1st of any given year.
    - Temporary water crossings shall be constructed out of clean stone, rock, or crushed rock in accordance with the contract documents or as accepted by the Engineer.
    - The temporary crossings, site access and pads shall be removed in their entirety upon completion of the work.
- Deleterious Substances - Depositing deleterious substances in the river will be avoided; an emergency spill kit will be kept on site; work will be stopped and deleterious substances contained to prevent dispersal if spilled; spills of any oil, fuel or other deleterious material will be reported; spills will be cleaned-up and appropriately disposed; machinery on-site will be maintained in a clean condition and free of fluid leaks; washing, refueling and servicing of machinery and fuel storage will be a minimum of 100 m away from the river.

4.4.3. Terrestrial Habitat and Species

- Clearing and Grubbing - Clearing and grubbing shall NOT be undertaken between April 1 and August 31 of any year unless otherwise specified to avoid disturbance to nesting birds and other wildlife species.
    - There shall be no bulldozing of woody debris into standing timber.
    - Timber stockpile sites shall be located within existing clearings or areas of non-merchantable timber.
    - Stockpile sites shall not be located within 30 meters of a waterbody unless otherwise directed by the Engineer. All stockpiled material shall be removed by April 30 following clearing activities.
- Riparian Vegetation - Measures will be taken to maintain riparian habitat where possible. Areas of disturbed vegetation will be re-vegetated following construction.
- No terrestrial at-risk species were identified as occupying the project footprint during field investigations in 2022, however a Northern Prairie Skink was documented during expanded guide bank site assessment in July 2024 (Appendix G), thus confirming that the relief bench and guide bank areas provide habitat for this species. Salvage efforts will be required in April and early May including netting, cover board traps, or other methods as appropriate for the site and season.
    - Salvage will be completed by a qualified environmental professional (QEP) and all necessary handling and relocation permits, as required, will be acquired.
    - A Northern Prairie Skink management plan has been developed for this project; the plan is currently under review by MTI in consultation with the Manitoba Conservation Data Centre and skink specialists from Brandon University.
    - Exclusion fencing will be erected at the perimeter of the relief bench construction area, to prevent herptile species from accessing the site, with installation methods determined by the Project Manager and Environment QEP based on site conditions at the time of work.

4.4.4. Heritage Resources

- Heritage Resources - Work shall immediately cease and be suspended at the location where archaeological or historic artifacts are encountered during construction activities. The discovery shall be reported to the Engineer and work at this location shall not resume unless otherwise authorized by the Engineer.
- Work at the location shall be suspended until a Historic Resource Consultant can assess archaeological or historic artifacts that are encountered, and mitigation measures are confirmed with the Manitoba Historic Resources Branch.

4.4.5. Public Safety

- Installation of warning signage upstream and downstream to warn boating public of construction.

- Installation of flashing lights on temporary instream works to warn boaters of their location during periods of restricted visibility.
- Timing of bridge demolition to occur outside of navigation season (late fall/winter).
- Adherence to MTI BMP's concerning the use of equipment/machinery fuel handling and storage, and restoration of the river channel and banks.
- Transport Canada NPP Authorization (in progress).
- Pre- and post- construction bathymetric survey will be completed to ensure all demolished bridge components and temporary works are removed from the channel.

4.5. BRIDGE SITE RESTORATION PLAN

Both the north and south shorelines surrounding the bridge approach will be regraded including areas below the ordinary high-water mark (OHWM; 317.51 m asl). This will include placement of shoreline armouring material above and below the OHWM resulting in an alteration of existing habitat. New Pier structures will also be installed for the bridge as well as bridge approaches. To construct the new bridge and demolish the existing bridge temporary access platforms will be installed to facilitate the work. Portions of the temporary access pads overlap with the permanent riprap blanket. Existing bridge demolition and in-water construction will occur in the winter to mitigate any potential impacts to fish and fish habitat, but fish timing windows will be observed if in-water work continues into the spring/summer.

4.6. RELIEF BENCH RESTORATION PLAN

The relief bench along the right bank (facing downstream) of the Assiniboine River upstream of the bridge crossing will extend up to 170 m from the existing top of bank, and will require excavation to drop the bench to an elevation of 316.5 m asl, approximately 4 m lower than the existing ground level above top of bank (Figure 9).

Along the sloped upper and lower edges of the relief bench, the shoreline will be armoured with a 0.55 m thick layer of Class 350 riprap. The bench area will be covered with a base gravel layer (minimum rock size requirements are currently being assessed), and the excavated bench is to be fully vegetated with natural and native riparian plant species. The exact seed mix of this planting is currently under review, in consultation with Spruce Woods Provincial Park.

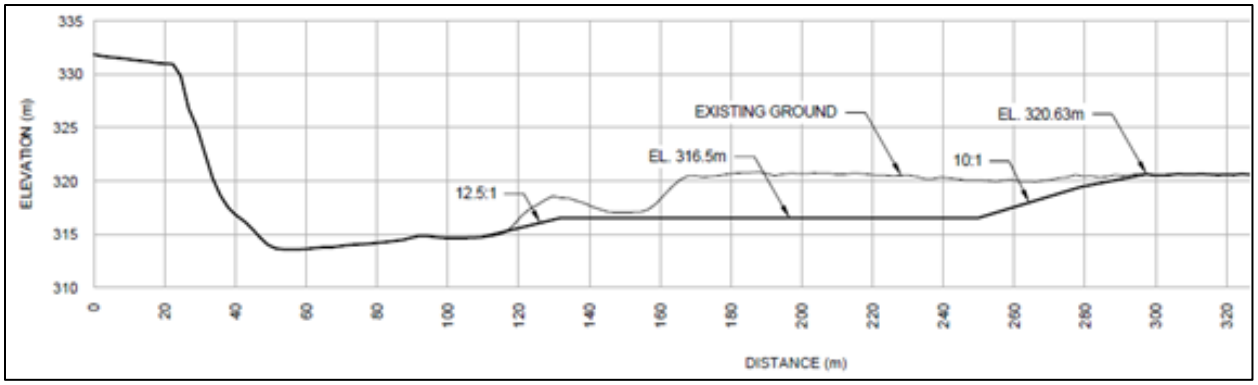


Figure 9. Cross section profile of the Assiniboine River, showing the planned construction specifications of the relief bench flood protection measure.

4.7. RESIDUAL ENVIRONMENTAL EFFECTS

Residual effects following the completion of instream works are expected to be minimal and short-term, and channel restoration will see the reconstruction of habitat characteristics similar to those of the existing crossing. Disturbance mitigation measures, including erosion and sediment control and shoreline stabilization, will ensure that impacts to water quality and aquatic habitat downstream of the site are minimized.

Residual effects of terrestrial habitat will include loss of riparian habitat where clearing is required; where the riparian zone will be replanted, a lag time between disturbance and recovery will exist. It is anticipated that, as part of requirements under the DFO FAA for this project, a habitat offsetting plan will be required to compensate for these environmental disturbances and lag periods to recovery. Through consultation with Spruce Woods Provincial Park and Manitoba Fisheries Branch, MTI will develop an offsetting plan that sees the initiation of additional riparian zone rehabilitation and/or other fish habitat enhancement efforts within the local watershed, yet to be determined and subject to DFO approval.

4.8. MONITORING AND REPORTING

Two types of monitoring will be conducted as part of the project environmental management plan:

1. Assurance monitoring during and immediately post-construction to ensure construction activities and environmental mitigation measures are carried out as designed and confirm that the environmental protection measures have been implemented as required.
    - This represents standard environmental inspection and monitoring to be completed by the project's Qualified Environmental Professional (QEP).
    - An environmental monitor (EM) will oversee construction of the offsets and guide implementation of site-specific environmental best practices, guidance, and mitigation measures. The EM will work under the supervision of a QEP, and will be responsible to document environmental effects resulting from offset construction, and confirm that contractors are compliant with regulatory requirements, including any construction-specific conditions of the *Environment Act* license.
    - This will include Compliance Monitoring of any construction requirements or guidelines set forth by this or any regulatory authorizations/licenses acquired for this project.
2. Post-construction habitat functional and effectiveness monitoring to assess whether all environmental engineering and impact mitigation measures are functioning as intended, or whether remedial or contingency measures are necessary.
    - This will include monitoring of the relief bench during and after the first event that causes the bench to become inundated. Investigations during and immediately following the flood event will assess for stability and erosion on the relief bench, and any potential impacts to fish and fish habitat. The outcome of this monitoring may facilitate additional monitoring during future inundation events.
    - Post-revegetation monitoring will be completed for the first year following project completion and will include assessment of the success of revegetation efforts during site restoration and identification of any areas where additional seeding/planting efforts may be required.

Table 4. Anticipated physical, biological, and socio-economic effects of PTH 5 bridge replacement and relief bench construction activities.

Variables	Attributes	Anticipated Effect	Potential Environmental Impact	Mitigation Measures	Residual Effects	Significance	Follow-up and Monitoring
Physical Processes	Air Quality	Minor emissions release from equipment and machinery operation as part of construction works Minor dust and particulate release expected, during excavation and existing structure demolition	Potential for minor amounts of emissions to be released from the operation of equipment used during maintenance activities.	Ensure that all equipment is maintained and serviced regularly. Application of GERs and dust control measures	Minor emissions escaping from operation of equipment and machinery	Not significant	None
	Soil and Terrain	Potential for compaction of soils within the bridge ROW, and access to the relief bench area. Potential for erosion from temporary exposed soils.	Potential for minor erosion from periodic exposed soils associated with various maintenance activities.	Implementation/maintenance of temporary and permanent erosion and sediment control measures, revegetation, and application of MTI GERs.	No residual effects	Not significant	None
	Groundwater	Potential infiltration of fuel and/or other hazardous materials into the groundwater table from equipment/machinery and storage/handling. Potential seepage of groundwater into isolated cofferdam aeras during pier construction.	Potential infiltration of fuel and/or other hazardous substances into the groundwater table stemming from the use of equipment/machinery, transportation/storage of fuel and other hazardous substances to facilitate periodic maintenance activities	Adherence to MTI GERs concerning the use of equipment/machinery fuel handling and storage. Adherence to all applicable regulatory requirements concerning the use of equipment and machinery, storage and transportation of fuels, and other hazardous substances.	None	Not significant	None

Variables	Attributes	Anticipated Effect	Potential Environmental Impact	Mitigation Measures	Residual Effects	Significance	Follow-up and Monitoring
	Surface Water	Potential for debris entering the watercourse from bridge demolition activities. Potential for deleterious substances to enter watercourse associated with equipment use and sediments from exposed soils. Potential for debris entering the watercourse from bank excavation and tree clearing within the relief bench area.	Potential for deleterious substances (fuel/solvents) to enter the watercourse from equipment use during operation/maintenance.	Timing - bridge demolition during winter months, under frozen conditions. Installation of work platforms to catch and contain debris during bridge demolition. Adherence to MTI GERs for use of equipment and fuel handling/storage. Adherence to regulatory requirements for the use of equipment and fuel storage and transport. Temporary site isolation for pier construction. Temporary erosion and sediment controls for the duration of all works. Permanent erosion and sediment controls (rip rap armouring) under the bridge and along relief bench slopes. Revegetation of disturbed areas not armoured, including relief bench.	Altered hydrological conditions upstream of the bridge, under flooding conditions.	Not significant	None

Variables	Attributes	Anticipated Effect	Potential Environmental Impact	Mitigation Measures	Residual Effects	Significance	Follow-up and Monitoring
Biological	Vegetation	Minor short-term and temporary removal of vegetation within bridge ROW Permanent loss of tree and shrub vegetation cover on the relief bench area and guide bank. Temporary removal of low vegetation on the relief bench area.	Potential "spot" removal of vegetation during periodic maintenance activities.	Revegetation of disturbed areas not armoured, in accordance with MTI GERs, and in consultation with Spruce Woods Park regarding seed mix selection. Minimize riparian clearing to the smallest footprint required to meet the objective. Includes clearing for rip rap blanketing, and for access along the guide bank south of the existing lagoon site.	Reduced species diversity at relief bench area (majority of relief bench has already been cleared and will be restored to existing conditions).	Low (relief bench area currently experiences heavy disturbance from flooding, including scarring and vegetation washout).	Monitor for revegetation success and prescribe additional reseeding, if required.
	Wildlife	Temporary loss of potential habitat for smaller wildlife species within the bridge ROW and relief bench area from construction activities. Potential disruption to smaller wildlife species from noise generated by equipment and machinery.	Potential short-term disruption to smaller wildlife species present within the bridge ROW from machinery noise (noise levels similar to standard vehicle use noise). Note that a large proportion of this habitat is subject to seasonal flooding disturbance under present conditions.	Application and adherence to MTI GERs regarding noise and revegetation planning (bridge and relief bench sites).	None	Not significant	None.
		Disturbance of confirmed Northern Prairie Skink habitat	Disturbance of Northern Prairie Skink habitat, which includes potential breeding/nesting sites (species has a small home range). MBESEA Endangered species and SARA Special Concern.	Salvage and relocation plan to be implemented in the early spring, prior to construction activities in the relief bench and guide bank work areas. Isolation barriers to be installed to prevent skinks from moving back into the site post-salvage.	Some permanent habitat loss at this site, though habitat representing a small proportion (<10%) of habitat availability at this site.	Low-Moderate with implementation of protection and management measures.	None

Variables	Attributes	Anticipated Effect	Potential Environmental Impact	Mitigation Measures	Residual Effects	Significance	Follow-up and Monitoring
	Birds	Potential swallow nesting habitat loss with destruction of existing bridge. Potential short-term temporary disruption to bird species within the new bridge ROW associated with construction activities and noise. Permanent loss of nesting habitat within the relief bench area.	Potential short-term disruption to bird species within the bridge ROW from machinery noise (noise levels similar to standard vehicle use noise).	Timing - bridge demolition to occur outside of the breeding bird restricted timing window. Timing - clearing and grubbing activities to take place outside of the breeding bird restricted timing window. Application and adherence to MTI GERs.	Loss of nesting tree cover over relief bench; (majority of relief bench has already been cleared and will be restored to existing conditions).	Low (relief bench area currently experiences heavy disturbance from flooding, including scarring and vegetation washout).	None.
	Aquatic Species	Potential for debris entering the watercourse during demolition and construction.	Potential for deleterious substances (fuel/solvents) to enter the watercourse from equipment use during operation/maintenance.	Timing restriction for instream works to avoid the spring and summer spawning window (April 1 – June 30).	Potential for fish stranding over the relief bench, after operation when flood waters recede.	Low-Moderate	Monitoring and fish salvage plans to be implemented during and after first flooding event and operation of the relief bench.
		Potential for deleterious substances to enter watercourse associated with equipment use and sediments from exposed soils.	Potential fish stranding over the relief bench as water levels recede	Installation of work platforms for bridge works to contain debris and conduct work in the dry. Water quality monitoring plan to monitoring turbidity levels during instream works including access pad construction.			Assessment of relief bench operation and implementation of modifications, if necessary, to address fish stranding

Variables	Attributes	Anticipated Effect	Potential Environmental Impact	Mitigation Measures	Residual Effects	Significance	Follow-up and Monitoring
		Potential impacts to fish spawning activities from instream work (access pads and coffer dams).		Adherence to MTI GERs concerning the use of equipment/machinery fuel handling and storage. Adherence to all applicable regulatory requirements concerning the use of equipment and machinery, storage and transportation of fuels, and other hazardous substances.			issues.
		Loss of riparian habitat from additional rip rap armouring of riverbanks.		Site isolation and dewatering plan for pier construction. Use and maintenance of temporary erosion and sediment controls (MTI best management practices) for the duration of work. Installation of rip rap permanent erosion and sediment control beneath the new bridge structure and along bench relief slopes. Revegetation of disturbed areas not armoured at the bridge and over the relief bench. Relief bench grading and compaction to limit potential for pooling and fish stranding after flood events.			

Variables	Attributes	Anticipated Effect	Potential Environmental Impact	Mitigation Measures	Residual Effects	Significance	Follow-up and Monitoring
	Species at Risk	Potential to affect Mapleleaf Mussels, including disturbance and/or temporary loss of habitat at the crossing site.	No anticipated post-construction effects to Mapleleaf Mussel habitat at the site.	Mapleleaf Mussel survey and salvage/relocation, as required by FAA, and MBESEA exemption.	None	Not significant	Salvage report documenting number of specimens removed and relocation site.
Socio-economic	Land Use	No potential effects on existing land use.	No potential effects on existing land use.	None	None	Not significant	None
	Parks and Protected Areas	No potential effects	No potential effects.	All Provincial Park properties have been purchased by and are now under ownership of MTI. Acquired property was not under active use (e.g., recreational use area) by the park.	None	Not significant	None
	Heritage Resources	Potential to encounter heritage resource artifacts during excavation and construction of new bridge site and relief bench.	Potential to encounter heritage resource artifacts during maintenance works.	A Heritage Resource Impact Assessment (HRIA) has already been completed for this site, and a heritage monitoring plan is in place and approved by the Historic Resources Branch. A Heritage Resource Protection Plan (HRPP) will be developed by the Contractor for this project.	None	Not significant	Heritage Specialist to investigate and report, if a heritage resource is encountered.

Variables	Attributes	Anticipated Effect	Potential Environmental Impact	Mitigation Measures	Residual Effects	Significance	Follow-up and Monitoring
	Public Safety and Health	Potential safety risks to the boating public/recreational river users during construction, including hazards to navigation and debris.	Limited risk to boating public during operation and maintenance.	Installation of warning signage upstream and downstream to warn boating public of construction. Installation of flashing lights on temporary instream works to warn boaters of their location during periods of restricted visibility. Timing of bridge demolition to occur outside of navigation season (late fall/winter). Adherence to MTI GERs concerning the use of equipment/machinery fuel handling and storage, and restoration of the river channel and banks. Transport Canada NPP Authorization is currently in progress, and mitigations may be updated as required for TC authorization. Pre- and post- construction bathymetric survey will be completed to ensure all demolished bridge components and temporary works are removed from the channel.	None	Not significant	None

5. ADDITIONAL REGULATORY REVIEW

In addition to seeking *Environment Act* authorization for this project, submissions for regulatory review and approval have been or will be completed to the following agencies:

- Manitoba's Heritage Resources Branch: AAS File #: AAS-21-17666
- Transport Canada's Navigation Protection Program, File # 2023-610685
- Department of Fisheries and Oceans Request for Review, File # 23-HCAA-00075.
- Department of Fisheries and Oceans *Fisheries Act* Authorization (including SARA authorization), File # 23-HCAA-00075.
- An application for exemption under the MB ESEA for Mapleleaf Mussel salvage and relocation was received March 18, 2024.
- Manitoba Provincial Parks Branch (Spruce Woods Provincial Park) authorization for works within park boundaries.
- A Manitoba Live Fish Handling Permit will be obtained for any fish and/or mussel salvage operations required as part of aquatic habitat isolation and dewatering plans.

6. CLOSURE

Construction at the PTH 5 crossing site is scheduled to begin in June 2024, with instream works expected to begin with the installation of temporary access pads in Fall 2024, and all works scheduled to be completed by Fall of 2026.

The potential physical, biological and socio-economical effects of the proposed Project have been evaluated, with consideration given to the application of mitigation measures, residual effects and the significance of potential adverse environmental effects. The proposed mitigation measures outlined in this Environment Act Proposal are expected to effectively prevent, avoid, or minimize potential effects. After consideration of avoidance and mitigation measures, residual effects identified as part of the analysis include altered hydrological conditions upstream of the bridge under flooding conditions (which while considered a residual effect is the intended goal of the relief bench design), and a temporary loss of riparian habitat from relief bench construction and a new bridge alignment as well as reduced habitat diversity over the relief bench.

While construction of a relief bench along the south bank upstream of the bridge represents a relatively large footprint of habitat modification, this bench will only be inundated under seasonal high flow conditions, and under normal mean flowing conditions aquatic habitat at this site will be largely unchanged. Riparian habitat at this site has already experienced heavy disturbance from flooding and has largely been cleared, and this project will also provide re-establishment and improved stabilization of riparian habitats at this site. As this project involves the replacement of an existing bridge structure, overall impacts to aquatic, riparian, and terrestrial habitat at the bridge crossing site are expected to be

minimal, with post-construction conditions similar to existing conditions at the site. Changes in instream flow characteristics at this site as part of flood protection measures are not expected to have any impact on fish habitat use and migration at this site.

With consideration of the benefits that the proposed bridge replacement and relief bench flood will provide in terms of improved safety for the traveling public along PTH 5 during flooding events, these residual effects are considered to be minor and limited within the broader environmental context in which the Project will occur. Based on the environmental review of the Project in conjunction with the application of mitigation measures, MTI has determined that no significant adverse environmental effects are expected.

7. REFERENCES

Adamson, B. and A. Harris. 1992. Sediment Control Plans: Reducing Sediment Concerns at Water Crossings. Northwestern Ontario Forest Technology Development Unit, Technical Notes TN-20, Thunder Bay. 7pp.

Chilibeck, B., G. Chislett and G. Norris. 1993. Land Development Guidelines for the Protection of Aquatic Habitat. Department of Fisheries and Oceans, Vancouver, and British Columbia Ministry of Environment, Lands and Parks, Victoria. 128 pp.

[COSEWIC] Committee on the Status of Endangered Wildlife in Canada 2006. COSEWIC assessment and status report on the Mapleleaf Mussel *Quadrula quadrula* (Saskatchewan-Nelson population and Great Lakes-Western St. Lawrence population) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 58 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

[COSEWIC] Committee on the Status of Endangered Wildlife in Canada. 2011. COSEWIC Assessment and Status Report on the Barn Swallow *Hirundo rustica* in Canada. Retrieved May 12, 2017 from http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_barn_swallow_0911_eng.pdf

[COSEWIC] Committee on the Status of Endangered Wildlife in Canada. 2019. COSEWIC assessment and status report on the Plains Hog-nosed Snake *Heterodon nasicus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 38 pp. (Species at risk public registry).

Department of Fisheries and Oceans. 1991. Policy for the Management of Fish Habitat DFO/4486. Minister of Supply & Services Canada, Department of Fisheries and Oceans, Ottawa. 28 pp.

Environment and Climate Change Canada. 2021. Recovery Strategy for the Bank Swallow (Riparia riparia) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. ix + 122 pp.

Manitoba Department of Natural Resources. 1984. Recommended Fish Protection Procedures for Stream Crossings in Manitoba. Manitoba Natural Resources, Fisheries Branch, Winnipeg. 46 pp.

Manitoba Environment and Climate Change. 2023. Information Bulletin – *Environment Act* Proposal Report Guidelines.

Scott, W.B. and E.J. Crossman. 1979. Freshwater Fish of Canada. Fisheries Research Board of Canada. Bulletin 184. 966 pp.

Smith, R.E., H. Veldhuis, G.F. Mills, R.G. Eilers, W.R. Fraser, and G.W. Lelyk. 1998. Terrestrial Ecozones, Ecoregions, and Ecodistricts, An Ecological Stratification of Manitoba's Landscapes. Technical Bulletin 98-9E. Land Resource Unit, Brandon Research Centre, Research Branch, Agriculture and Agri-Food Canada, Winnipeg, Manitoba.

Stewart, K. W.; and Watkinson, D.A. 2004. The Freshwater Fishes of Manitoba. University of Manitoba Press. Winnipeg, Manitoba.

WSP. 2022. Preliminary design of a new bridge over the Assiniboine River on PTH 5 (Bridge site no.352-10).

APPENDIX A – Satellite Imagery of the Project Site

Figure 1. GoogleEarth Image of Site and proposed Relief Bench during 2011 Assiniboine River Flood Event

Figure 2. GoogleEarth Image of Site and proposed Relief Bench from 2013

Figure 3. GoogleEarth Image from 2017 of Site and Proposed Relief Bench showing erosion and tree clearing completed for the relief plug which was not constructed

APPENDIX B – Aquatic Habitat Assessment

PTH 5 BRIDGE REPLACEMENT

ASSINIBOINE RIVER

AQUATIC HABITAT ASSESSMENT

May 2021

Prepared for

KGS Group

by

North/South Consultants Inc.
Aquatic Environment Specialists

83 Scurfield Blvd.
Winnipeg, Manitoba, R3Y 1G4
Website: www.nscons.ca

Tel.: (204) 284-3366
Fax: (204) 477-4173
E-mail: nscons@nscons.ca

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTOS

LIST OF APPENDICES

ACKNOWLEDGEMENTS

KGS Group is thanked for the opportunity to conduct this study.

STUDY TEAM

Data Collection

Duncan Burnett

Thomas Sutton

Data Analysis, Report Preparation, and Report Review

Duncan Burnett

Thomas Sutton

Kurt Mazur

1.0 INTRODUCTION

Manitoba Infrastructure (MI) requested preliminary design proposals for a new bridge over the Assiniboine River on PTH 5 (Site #352-10) north of Glenboro, MB. KGS Group was awarded the preliminary design contract and North/South Consultants Inc. (NSC) was contracted to provide services related to regulatory approval and submissions. An aquatic habitat assessment including bathymetry and substrate sampling was carried out by NSC as part of the regulatory approval process.

The Assiniboine River falls within the range of the threatened Mapleleaf mussel (*Quadrula quadrula*). Because of the potential occurrence of the Mapleleaf at the project site, NSC conducted an aquatic habitat assessment including a bathymetry and substrate sampling program. A brief description of fish habitat and potential fish use of the project area is also included.

This report provides results from the PTH 5 Bridge Replacement Project aquatic habitat assessment in the Assiniboine River.

2.0 METHODS

2.1 HABITAT MAPPING

A boat-based survey was conducted along an approximately 1,600 m reach of the Assiniboine River, 800 m upstream and 800 m downstream of the bridge crossing. The boat based aquatic habitat assessment was carried out on April 29, 2021. In this study, depth and bed elevation data were collected with a Seafloor SonarMite Bluetooth Depth Sounder survey grade single-beam 200 kHz sonar transducer with a 8° cone angle. Real-time corrected mapping data positions were recorded with a Trimble R10 Real-Time Kinematic (RTK) global navigation satellite system (GNSS) receiver using a virtual reference station (VRS) provided by the Can-Net VRS network. The Can-Net VRS network provides a real-time centimetre-grade positioning solution without the use of a local base station receiver. For this project, Can-Net VRS Station PRS53641171444 was used and is located approximately 12.3 km from the survey area in the town of Glenboro. The base station coordinates are: 479111.974m E, 5489084.848m N (UTM Zone 14 NAD83); and 385.549m CGVD28 (HTv2.0). The raw survey positioning data logged by Trimble Access software was corrected by the internal parameters entered into the software for vertical positional offsets related to transducer height above the R10 receiver. The Trimble receiver was mounted

directly above the SonarMite transducer to ensure that the positional accuracy of the hydroacoustic data was maximized to the extent possible. Substrate data was collected concurrently during the survey using a Lowrance® Elite7 FS sonar/GPS equipped with a TotalScan™ transducer (83/200 kHz traditional sonar beams, as well as 455/800 kHz Sidescan/Downscan beams). The Peak SV, E1 and E2 echos along with Sidescan imagery collected with the Lowrance sonar was used in interpreting substrate classifications. Survey transects were navigated in a grid-like fashion from a 14 ft boat with a 15 hp Yamaha outboard motor. Surveys were conducted at boat speeds of less than 10 km/hr.

Supplementary depth data was collected concurrently during the survey using a Lowrance® Elite7 FS sonar/GPS equipped with a TotalScan™ transducer (83/200 kHz traditional sonar beams, as well as 455/800 kHz Sidescan/Downscan beams.

In order to validate the acoustic data and assist in the development of a substrate type classification, the river bottom was sampled along transects throughout the survey area. Samples were collected using a Petite Ponar (0.023m^2 surface area) and photos of each sample were taken using a GPS-linked Nikon COOLPIX camera. Where a grab was not possible (i.e., hard substrates), validation was completed by probing with the Ponar for texture, hardness and sound of substrate. Primary, secondary and tertiary substrate types were identified at each validation site and classified according to a modified Wentworth size classification (Wentworth 1922 see below).

Modified Wentworth Scale (after Wentworth 1922):

Particle Size Range	Class Name
> 256 mm	Boulder
64-256 mm	Cobble
2-64 mm	Gravel
62.5 µm -2 mm	Sand
4-62.5 µm	Silt
< 4 µm	Clay

2.1.1 Data Analysis and Mapping

Data Processing

Hydroacoustic data collected with the SonarMite were processed with Trimble Access software produced by Trimble. Bottom depth is detected in the field based on a signal threshold decibel (dB) level. Data were re-analyzed in Trimble Access and ArcGIS10.7 software During the editing process, the acoustic data were checked for signal error, invalid depths, and acoustic waveform anomalies, erroneous data were filtered out. Data were exported to a .csv text format and imported into Microsoft® Excel. Acoustic data collected with the Lowrance Elite 7 echosounder were processed with Reefmaster software.

Bathymetric Modelling and Mapping

Spatial autocorrelation software was used to interpolate a continuous surface of depths or bed elevations given a set of known measurements. ArcGIS Spatial Analyst was used to develop a spatial interpolation depth model for the survey area. Using the Topo to Raster interpolation method in ESRI's ArcGIS 10.7 software, the corrected sonar data, along with an estimated vector shoreline (zero depth), were used to produce a 0.5 m resolution depth grid. The depth grid was used to create vector contouring at 0.5 m intervals for cartographic presentation. The depth grid was classed into 1.0 m intervals and symbolized using a light blue (shallow) to dark blue (deep) colour gradient.

2.1.1.1 Bottom Typing

Data Processing

Hydroacoustic data collected with the Lowrance Elite FS were analyzed using ReefMaster V2.0 software and ArcGIS 10.7. The software package uses a bottom composition module to classify the acoustic data based on the Peak SV, E1 and E2 echos that represent the substrate types occurring within the survey area. Substrate validation data and sidescan sonar imagery were examined to help determine the appropriate number of bottom-type classes into which the acoustic data were sorted.

Mapping

Bottom type maps were interpreted and digitized in ArcGIS 10.7 using a number of input data sets including the classified Lowrance Elite FS down scan acoustic track data and side scan data. After the polygons were created in the GIS, the areas were attributed according to their

corresponding substrate class. All classes were then symbolized and mapped for report presentation.

2.2 FISH AND HABITAT

A high level and qualitative description of the potential fish use of aquatic habitat within the project area was provided. As part of the aquatic survey, fish habitat features were noted, including flow pattern, cover and bank condition. Results of the aquatic habitat survey and available information describing fish occurrence and life history characteristics were used to provide the description.

2.3 MUSSELS

A cursory search for mussels was conducted (e.g., shoreline survey, visual in-water survey) in support of substrate mapping. Empty mussel shells are typically collected and identified to species. Live mussels found in the river are recorded and photographed but not removed from their location. The presence or absence of empty or live mussel shells is used to aid in the evaluation of habitat suitability within the survey area.

2.4 CULVERT DRAIN ASSESSMENTS

Aquatic habitat data was collected during field surveys conducted on April 30, 2021. The data was used to provide a physical description of fish habitat and assess potential fish use. Each drain was assigned a habitat condition and type based on 12 parameters outlined in Milani (2013). The twelve parameters included:

- Available Cover/Epifaunal Cover;
- Substrate Embeddedness;
- Velocity Depth Regime;
- Sediment Deposition;
- Channel Flow Status;
- Channel Alteration;
- Frequency of Riffles;
- Bank Stability;

- Bank Vegetative Protection;
- Riparian Vegetative Condition;
- Pool Substrate; and
- Pool Variability

For each drain, the 12 parameters were assigned a score out of 20 where 0 was low quality and 20 was high quality. The scores were then added together and used to assign a habitat score where between 0-60 was considered Poor Habitat, 61-120 Marginal Habitat, 121-180 Sub-Optimal Habitat and 180-240 Optimal Habitat (Milani 2013). In addition, each site was assigned a habitat type based on connectivity, simple/complex habitat and presence/absence of indicator species. The Habitat Types are as follows:

- Type A – direct, complex fish habitat with indicator species present
- Type B – direct, simple habitat with indicator species present
- Type C – direct, complex habitat with no indicator species present
- Type D – direct, simple habitat with no indicator species present
- Type E – Indirect fish habitat
- No Fish Habitat

3.0 RESULTS

3.1 AQUATIC HABITAT ASSESSMENT

3.1.1 Physical Environment

The south shoreline of the Assiniboine River in the survey area consisted of a gradually sloped silt/sand shoreline with pockets of exposed gravel at the shoreline/water interface (Photos 1-3), followed by a riparian area consisting of grasses within the first 1-10 m, transitioning into an area dominated by deciduous trees, shrubs and grasses (10-30 m; Photo 4). The north shoreline consisted of steep undercut eroding banks composed of a silt/sand mix with some areas of gravel at the shoreline/water interface (Photos 5-7). The riparian area on the north shoreline consisted of a mix of grasses, shrubs and some deciduous and coniferous trees before extending into a large grass land (Photo 7). Flow conditions were low consisting mainly of run habitat with several small sections of shallow riffle over cobble/gravel substrate.

Water level in the Assiniboine River at the time of the survey was low. The historical average river level on the Assiniboine River near Holland for April 29th was 294.299 masl, whereas the river level at the time of the survey was 293.111 masl (Station 05MH005, 2002-2020, Assiniboine River near Holland, Gov't of Canada 2021). The unregulated winter river level (UWRL) for the survey location is approximately 315.7 masl as determined by KGS Group. At the time of the survey the surface water elevation at the PTH 5 Bridge site was 315.0 masl, slightly below the estimated unregulated winter river level.

3.1.2 Habitat Mapping

The total aquatic area surveyed at the PTH 5 bridge was 97,284.38 m^2. Overall, the average water depth recorded was 0.92 m and the maximum recorded depth, 2.2 m, was observed near the bridge crossing. A bathymetric map of the survey area is presented in Figure 2.

Substrate was divided into seven different classes based on primary, secondary and tertiary substrates. The two most dominant substrate types in the study reach were Sand/Gravel and Gravel/Sand accounting for 35.6% and 34.5% of the survey area, respectively. The remaining 29.9% consisted of Gravel/Sand/Silt (6.8%), Cobble/Gravel/Sand (3.9%), Gravel/Sand/Clay (3.5%), Clay/Silt (1.9%), Sand/Gravel/Silt (1.8%) and unclassified (11.9%). A substrate map is presented in Figure 3 and the locations of validation grabs and survey transects is presented in Figure 4. Substrate validation results are presented in Table 1.

3.1.3 Fish and Habitat

The Assiniboine River within the vicinity of the PTH 5 Bridge provides year-round habitat for approximately 54 fish species (Table 2), including species that are sought after for recreational fishing such as Walleye (*Sander vitreus*), Sauger (*Sander canadensis*), Channel Catfish (*Ictalurus punctatus*) and Northern Pike (*Esox lucius*). The species assemblage includes a wide variety of fish trophic guilds, including omnivorous and piscivorous species, and species that inhabit predominantly benthic or pelagic habitats.

Two of the fish species inhabiting the Assiniboine River in the vicinity of the PTH 5 Bridge have been specially designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The Saskatchewan-Nelson River population of Lake Sturgeon was designated as "Endangered" in 2017 (COSEWIC 2017) but is not listed under the *Species at Risk Act* (SARA). Native populations of Lake Sturgeon in the Assiniboine River are assumed to have been extirpated since at least the 1970s. Stocking of Lake Sturgeon in the Assiniboine River has

resulted in reintroduction of the fish into the Assiniboine River, and it is believed Lake Sturgeon captured in the Assiniboine River by anglers is linked to these stocking events (COSEWIC 2017). The Bigmouth Buffalo (*Ictiobus cyprinellus*) was designated as "Special Concern" in 2009 and is currently listed as "Special Concern" under Schedule 1 of SARA. Neither species is designated as a species at risk (Endangered or Threatened) under Schedule 1; therefore, neither species is protected under SARA.

Habitat within the survey area consists predominantly of run habitat over course sand/gravel and gravel/sand with several areas of riffle over hard cobble/gravel. In-stream large woody debris and overhanging banks along the north shoreline may provide suitable cover for both small and large-bodied fish. Overall, the study area provides suitable habitat for various life stages of both forage and large bodied fish species. The habitat in the study area is not rare or limiting and is readily available both upstream and downstream of the site. It is expected that some fish species could use the study area for foraging throughout the open water season. Due to the substrate consisting mainly of course sand/gravel and gravel/sand, it is unlikely to be used for spawning by species such as Pike but may be adequate for Walleye and suckers. In addition, several deeper holes upstream and downstream of the bridge may provide adequate overwintering habitat for fish.

3.1.4 Mussels

The Assiniboine River provides habitat for a number of freshwater mussel species including the threatened Mapleleaf (Table 3). The Mapleleaf is listed as "Endangered" by *The Endangered Species and Ecosystems Act (*Manitoba) and "Threatened" by SARA. Mapleleaf are typically found in medium to large rivers, in substrates of firmly packed, coarse gravel and sand, and to a lesser extent firmly packed clay/mud (COSEWIC 2006; 2016; Watson et al. 1998). Areas with shifting substrates (i.e., active erosion or deposition) do not represent suitable habitat for mussels in general, including the Mapleleaf (Watson 2000).

During the cursory shoreline survey at the PTH 5 bridge site, large quantities of fresh and weathered shells were observed on gravel bars both upstream and downstream of the bridge site, but no live mussels were discovered. Representatives of seven different species were identified on gravel bars and below the waterline within the survey area. The species identified included Threeridge (*Amblema plicata*), Wabash Pigtoe (*Fusconaia flava*), Plain Pocketbook (*Lampsilis cardium*), Fatmucket (*Lampsilis siliquoidea*), Black Sandshell (*Ligumia recta*), Mapleleaf (*Quadrula quadrula*) and White Heelsplitter (*Lasmigona complanata*). The majority of the empty shells were found on three separate gravel bars with one located at the upstream extent of

the study area, one immediately downstream of the bridge crossing and one at the downstream extent of the study area (Figure 5). Empty White Heelsplitter, Fatmucket and Wabash Pigtoe were found on the most downstream gravel bar (Photos 47-49; Figure 5). On the gravel bar immediately downstream of the bridge empty Black Sandshell, Wabash Pigtoe, Plain Pocketbook, Threeridge, and Mapleleaf were observed (Photos 50-54; Figure 5). At the upstream extent of the study area Black Sandshell, Fatmucket, Wabash Pigtoe and Threeridge were identified (Photos 55-58; Figure 5). Because coarser substrates (sand and gravel) were present throughout the survey area and numerous empty mussels were observed, the project area appears to provide suitable habitat for freshwater mussels including Mapleleaf.

3.2 CULVERT DRAIN ASSESSMENTS

Aquatic habitat assessments were carried out at all three drainage culverts on April 30, 2021.

3.2.1 Kiche Manitou Campground Culvert

The habitat characteristics of the Kiche Manitou culvert consisted of a wide meandering channel leading from Kiche Manitou Lake towards the culvert and a narrow channel downstream of the culvert connecting to the Assiniboine River. Fish habitat upstream of the culvert was dominated by flat habitat with abundant instream vegetation and large woody debris over organic matter and fine silt substrate. Downstream, fish habitat was dominated by narrow run habitat with steep sand/grass covered banks and a silt/gravel/cobble substrate. The riparian area upstream consisted largely of grasses, deciduous trees and shrubs. Downstream, the riparian area consisted mainly of grasses and shrubs with some deciduous trees. At the time of the survey, the culvert gate was completely closed and there was no flow through the culvert.

Numerous small- and large-bodied fish species that inhabit the Assiniboine River utilize portions of small tributary habitat for some of their annual life cycle, and therefore the Kiche Manitou culvert crossing has the potential to support a large number of fish species. The gravel substrate downstream of the culvert may provide suitable spawning habitat for Walleye (*Sander vitreus*) and White Sucker (*Catostomus commersoni*) but likely only during high water years. Northern Pike (*Esox Lucius*) may be able to spawn upstream using flooded shoreline vegetation, however, connectivity to the Assiniboine River is restricted by a control gate on the upstream culvert which only allows for fish passage when open. Spawning, rearing and overwinter habitat for forage fish species such as Fathead Minnow (*Pimephales promelas*) and Brook Stickleback (*Culea inconstans*) exists throughout the upstream extent of the Kiche Manitou reach and into Kiche Manitou Lake (Stewart and Watkinson 2004; Milani 2013). The potential for large-bodied

fish species upstream of the crossing in Kiche Manitou Lake is high despite there being no record of a provincial stocking program in the lake (https://gov.mb.ca/fish-wildlife/fish/stocking/index.html). Recreational fishing does occur in the lake with incidental captures of Walleye, Northern Pike, Black Bullhead (*Ameiurus melas*) and Channel Catfish (*Ictalurus punctatus*) known to occur.

Based on the parameters outlined in Milani (2013) the Kiche Manitou Campground culvert is considered Marginal Habitat. The Kiche Manitou survey area provides direct, complex habitat particularly upstream of the culvert in Kiche Manitou Lake and due to the potential presence of indicator species it is identified as a Class A Habitat (Milani 2013). Details of the habitat assessment including site photos are provided in Appendix 1.

3.2.2 Marsh Lake Outlet Culvert

The habitat characteristics of the Marsh Lake Outlet culvert consisted of an oxbow lake upstream and a beaver dam impounded marsh downstream. Connectivity downstream to the Assiniboine River is restricted by a large beaver dam downstream of the culvert crossing. Additionally, the culvert inlet had a screen which would prevent the passage of large-bodied fish and the outlet on the downstream side appeared to be completely covered. However, according to Agriculture and Resource Development, Marsh Lake has been previously stocked with Northern Pike and Yellow Perch (1984, 2014 and 2015) and therefore is believed to contain indicator species as well as Black Bullhead (https://gov.mb.ca/fish-wildlife/fish/stocking/index.html).

Based on the parameters outlined in Milani (2013) the Marsh Lake Outlet culvert is considered Marginal Habitat. The Marsh Lake survey area provides direct, complex fish habitat with indicator species present and as a result is considered a Class A Habitat Type (Milani 2013). The habitat assessment booklet as well as site photos are provided in Appendix 2.

3.2.3 Spirit Sands Access Culvert

No water was present at the Spirit Sands Access culvert and there was no apparent connection to any fish bearing waterways. The habitat was consistent with a roadside ditch with grass covering the entire surface. A single culvert was located at the road crossing with cobble and boulder armouring at each end. Based on the parameters outlined in Milani (2013) the Spirit Sands Access culvert is considered Marginal Habitat but due to the absence of water and downstream connectivity to fish bearing waterways it is classified as No Fish Habitat. The detailed habitat assessment including site photos is provided in Appendix 3.

4.0 REFERENCES

CARNEY, J.P. 2003. Freshwater mussels (Mullosca: Unionidae) in the Assiniboine, Souris, and Pembina Rivers, Manitoba: Demographics, reproduction, and parasitism. Data report submitted to the Province of Manitoba Conservation Centre. 56 pp.

COSEWIC 2006. COSEWIC assessment and status report on the Mapleleaf Mussel *Quadrula quadrula* (Saskatchewan-Nelson population and Great Lakes-Western St. Lawrence population) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 58 pp.

COSEWIC 2016. COSEWIC assessment and status report on the Mapleleaf *Quadrula quadrula*, Great Leaks – Upper St. Lawrence population and Saskatchewan – Nelson Rivers population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 86 pp. (http://www.registrelepsararegistry.gc.ca/default.asp?lang=en&n=24F7211B-1).

COSEWIC. 2017. COSEWIC assessment and status report on the Lake Sturgeon *Acipenser fulvescens*, Western Hudson Bay populations, Saskatchewan-Nelson River populations, Southern Hudson Bay, James Bay populations and Great Lakes-Upper St. Lawrence populations in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxx + 153 pp.

MCCULLOCH, B.R, and W.G. FRANZIN. 1996. Fishes collected from the Canadian portion of the Assiniboine River drainage. Canadian Technical Report of Fisheries and Aquatic Sciences 2087. Central and Arctic Region, Department of Fisheries and Oceans. Winnipeg, Manitoba. 62 pp.

MILANI, D.W. 2013. Fish community and fish habitat inventory of streams and constructed drains throughout agricultural areas of Manitoba (2002-2006). Canadian Data Report of Fisheries and Aquatic Sciences. 1247: xvi + 6,153 p.

PRIES, B. 1992. Evaluation of an experimental clam harvest conducted on the Assiniboine River. A report prepared by Manitoba Fisheries Branch. 44 pp.

SCAIFE, B. and L. JANUSZ. 1992. A survey of freshwater mussels on the Assiniboine River, September 1992. Manuscript Report No. 92-02. Manitoba Natural Resources, Fisheries. 24 pp.

STEWART, K.W., and D.A. WATKINSON. 2004. The freshwater fishes of Manitoba. University of Manitoba Press. Winnipeg, Manitoba. 278 pp.

WATSON, E.T. 2000. Distribution and life history of the Unionidae (Bivalvia: Mollusca) in the Assiniboine River drainage in Manitoba, with special reference to *Anodontoides ferussacianus*. M.Sc. thesis. Department of Zoology, University of Manitoba, Winnipeg, Manitoba. 159 pp.

WATSON, E.T., L.C. GRAHAM, and W.G. FRANZIN. 1998. The distribution of Unionidae (Mollusca: Bivalvia) in the Assiniboine River drainage in Manitoba. Canadian Technical Report of Fisheries and Aquatic Sciences 2232: iv + 31 p.

WENTWORTH, C.K. 1922. A scale of grade and class terms for clastic sediments. The Journal of Geology. 30(5):377-392.

Table 1. Substrate validations from ponar grabs taken at the PTH 5 Bridge, Assiniboine River near Glenboro, Manitoba.

Site ID	Substrate			Substrate %			Photo #	UTM (14U)		Elevation
	1º	2º	3º	1º	2º	3º		Easting	Northing	
Site 1	Gravel	Sand	-	60	40	-	Photo 8	5501040.465	481222.362	314.691
Site 2	Gravel	Sand	-	80	20	-	Photo 9	5501066.596	481221.086	314.730
Site 4	Gravel	Sand	-	80	20	-	Photo 10	5501099.606	481235.002	314.694
Site 5	Sand	Gravel	-	95	5	-	Photo 11	5501099.766	481235.061	314.717
Site 6	Gravel	Sand	-	80	20	-	Photo 12	5501017.160	481155.669	314.713
Site 7	Gravel	Sand	-	70	30	-	Photo 13	5501039.243	481154.644	314.707
Site 8	Gravel	Sand	Silt	70	20	10	Photo 14	5501047.160	481148.056	314.776
Site 9	Sand	Gravel	-	60	40	-	Photo 15	5500998.072	481102.623	314.778
Site 10	Sand	Gravel	Silt	50	45	5	Photo 16	5501012.848	481101.567	314.721
Site 11	Gravel	Sand	-	50	50	-	Photo 17	5501027.886	481099.797	314.727
Site 12	Sand	Gravel	-	70	30	-	Photo 18	5500977.324	481045.372	314.810
Site 13	Sand	Gravel	-	60	40	-	Photo 19	5501001.136	481053.269	314.819
Site 14	Cobble	Gravel	Sand	60	30	10	Photo 20	5501017.261	481056.568	314.790
Site 15	Cobble	Gravel	Sand	60	30	10	Photo 20	5500986.316	481035.616	314.886
Site 16	Cobble	Gravel	Sand	60	30	10	Photo 20	5500985.224	481036.364	314.875
Site 17	Cobble	Gravel	Sand	60	30	10	Photo 20	5500980.353	481038.007	314.696
Site 18	Cobble	Gravel	Sand	60	30	10	Photo 20	5500970.680	480986.470	314.779
Site 19	Sand	Gravel	-	60	40	-	Photo 21	5500984.009	480987.260	314.911
Site 20	Gravel	Sand	-	70	30	-	Photo 22	5501001.264	480988.369	314.745
Site 21	Sand	-	-	100	-	-	Photo 23	5500934.486	480895.778	314.807
Site 22	Sand	Gravel	-	60	40	-	Photo 24	5500951.775	480890.065	314.829
Site 23	Sand	Gravel	Silt	40	40	20	Photo 25	5500975.410	480889.882	314.859
Site 24	Sand	Gravel	-	70	30	-	Photo 26	5500922.836	480842.164	314.824
Site 25	Gravel	Sand	Silt	50	40	10	Photo 27	5500941.541	480831.684	314.877
Site 26	Gravel	Sand	Silt	60	30	10	Photo 28	5500959.234	480825.000	314.835
Site 27	Sand	Gravel	Clay	40	40	20	Photo 29	5500950.073	480780.430	314.873
Site 28	Gravel	Sand	Silt	40	40	20	Photo 30	5500929.893	480796.156	314.855
Site 29	Sand	Gravel	Silt	50	40	10	Photo 31	5500912.518	480802.298	314.830
Site 30	Sand	Gravel	Clay	35	35	30	Photo 32	5500926.383	480715.609	314.878
Site 31	Sand	Gravel	-	70	30	-	Photo 33	5500911.654	480723.765	314.879
Site 32	Sand	Gravel	Silt	60	30	10	Photo 34	5500888.999	480729.516	314.816
Site 33	Clay	Gravel	Sand	45	45	10	Photo 35	5500847.977	480547.166	314.866
Site 34	Sand	Gravel	-	90	10	-	Photo 36	5500836.266	480549.977	314.931
Site 35	Clay	Silt	-	80	20	-	Photo 37	5500817.941	480549.915	314.845
Site 36	Sand	Gravel	-	80	20	-	Photo 38	5500736.453	480476.810	314.9
Site 37	Sand	Gravel	-	70	30	-	Photo 39	5500734.736	480470.314	314.917
Site 38	Sand	-	-	100	-	-	Photo 40	5500729.406	480457.536	314.907
Site 39	Gravel	Sand	-	60	40	-	Photo 41	5500600.311	480555.989	314.96
Site 40	Sand	Gravel	-	95	5	-	Photo 42	5500586.430	480549.671	315.065
Site 41	Sand	Gravel	-	70	30	-	Photo 43	5500580.151	480535.547	315.058
Site 42	Gravel	Sand	-	60	40	-	Photo 44	5500460.356	480623.909	315.081
Site 43	Gravel	Sand	-	80	20	-	Photo 45	5500460.068	480615.277	315.035
Site 44	Sand	Gravel	-	80	20	-	Photo 46	5500456.735	480598.419	315.006

Table 2. Potential fish species inhabiting the Assiniboine River near the PTH 5 Bridge near Glenboro, Manitoba[1].

Family	Scientific Name	Common Name
Petromyzontidae	*Icthyomyzon castaneus*	Chestnut Lamprey
	Ichthyomyzon unicuspis	Silver Lamprey
Acipenseridae	*Acipenser fulvescens*	Lake Sturgeon[2]
Hiodontidae	*Hiodon alosoides*	Goldeye
	Hiodon tergisus	Mooneye
Cyprinidae	*Carassius auratus*	Goldfish[2]
	Chrosomus neogaeus	Finescale Dace
	Cyprinella spiloptera	Spotfin Shiner
	Cyprinus carpio	Common Carp[2]
	Luxilus cornutus	Common Shiner
	Macrhybopsis storeriana	Silver Chub
	Notemigonus crysoleucas	Golden Shiner
	Notropis atherinoides	Emerald Shiner
	Notropis blennius	River Shiner
	Notropis heterodon	Blackchin Shiner
	Notropis heterolepsis	Blacknose Shiner
	Notropis hudsonius	Spottail Shiner
	Notropis stramineus	Sand Shiner
	Phoxinus eos	Northern Redbelly Dace
	Pimephales promelas	Fathead Minnow
	Platygobio gracilis	Flathead Chub
	Rhinichthys cataractae	Longnose Dace
	Rhinichthys obtusus	Western Blacknose Dace
	Semotilus atromaculatus	Creek Chub
Catostomidae	*Carpiodes cyprinus*	Quillback
	Catostomus commersoni	White Sucker
	Ictiobus cyprinellus	Bigmouth Buffalo
	Moxostoma anisurum	Silver Redhorse
	Moxostoma erythrurum	Golden Redhorse
	Moxostoma macrolepidotum	Shorthead Redhorse
Ictaluridae	*Ameiurus melas*	Black Bullhead
	Ameiurus nebulosus	Brown Bullhead
	Ictalurus punctatus	Channel Catfish
	Noturus flavus	Stonecat
	Notorus gyrinus	Tadpole Madtom
Esocidae	*Esox lucius*	Northern Pike
Umbridae	*Umbra limi*	Central Mudminnow
Salmonidae	*Coregonus clupeaformis*	Lake Whitefish
	Oncorhynchus mykiss	Rainbow Trout[2]
	Salmo trutta	Brown Trout
Percopsidae	*Percopsis omiscomaycus*	Trout-perch

Table 2. Cont'd

Family	Scientific Name	Common Name
Gadidae	*Lota lota*	Burbot
Gasterosteidae	*Culaea inconstans*	Brook Stickleback
	Pungitius pungitius	Ninespine Stickleback
Cottidae	*Cottus cognatus*	Slimy Sculpin
Centrarchidae	*Ambloplites rupestris*	Rock bass
Percidae	*Etheostoma exile*	Iowa Darter
	Etheostoma nigrum	Johnny Darter
	Perca flavescens	Yellow Perch
	Percina maculata	Blackside Darter
	Percina shumardi	River Darter
	Sander canadensis	Sauger
	Sander vitreus	Walleye
Sciaenidae	*Aplodinotus grunniens*	Freshwater Drum

[1] Stewart and Watkinson 2004; McCulloch and Franzin 1996

[2] Introduced

Table 3. Freshwater mussel species potentially inhabiting the Assiniboine River near the PTH 5 Bridge, Assiniboine River near Glenboro, Manitoba[1].

Sub-Family	Scientific Name	Common Name
Ambleminae	*Amblema plicata*	Threeridge
	Fusconaia flava	Wabash Pigtoe
	Lampsilis cardium	Plain Pocketbook[2]
	Lampsilis siliquoidea	Fatmucket
	Ligumia recta	Black Sandshell
	Potamilus alatus	Pink Heelsplitter
	Quadrula quadrula	Mapleleaf
Anodontinae	*Lasmigona complanata*	White Heelsplitter
	Lasmigona compressa	Creek Heelsplitter
	Pyganodon grandis	Giant Floater
	Strophitus undulatus	Creeper

1 – List compiled from: Carney 2003, Pries 1992, Scaife and Janusz 1992, Watson et al. 1998
2 – Assumed species historically identified as pocketbooks were Plain Pocketbooks as *Lampsilis cardium* and *L. ventricosa* and *L. ovata ventricosa* are considered synonyms

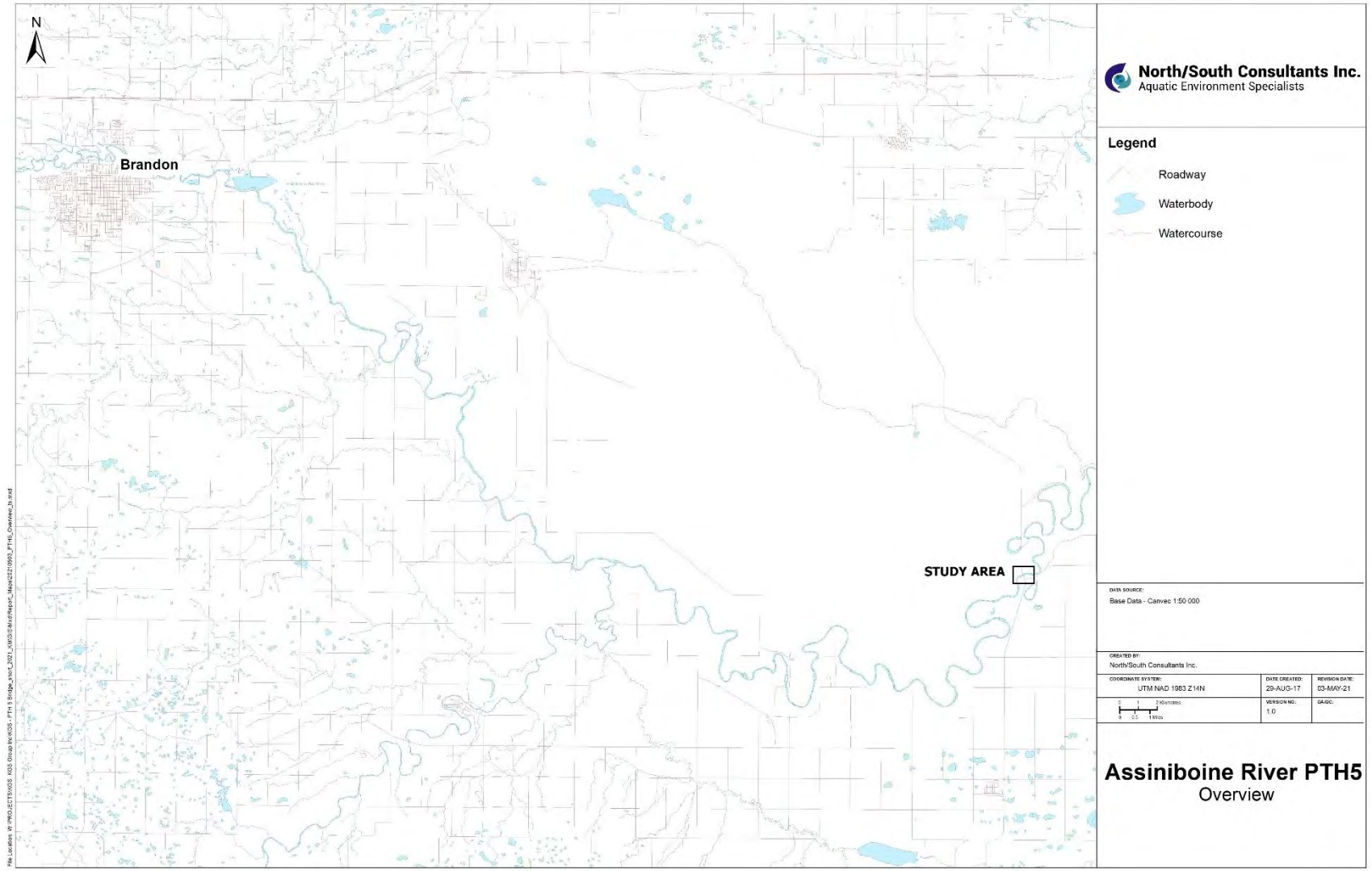


Figure 1. Assiniboine River – PTH 5 Bridge study area near Glenboro, Manitoba.

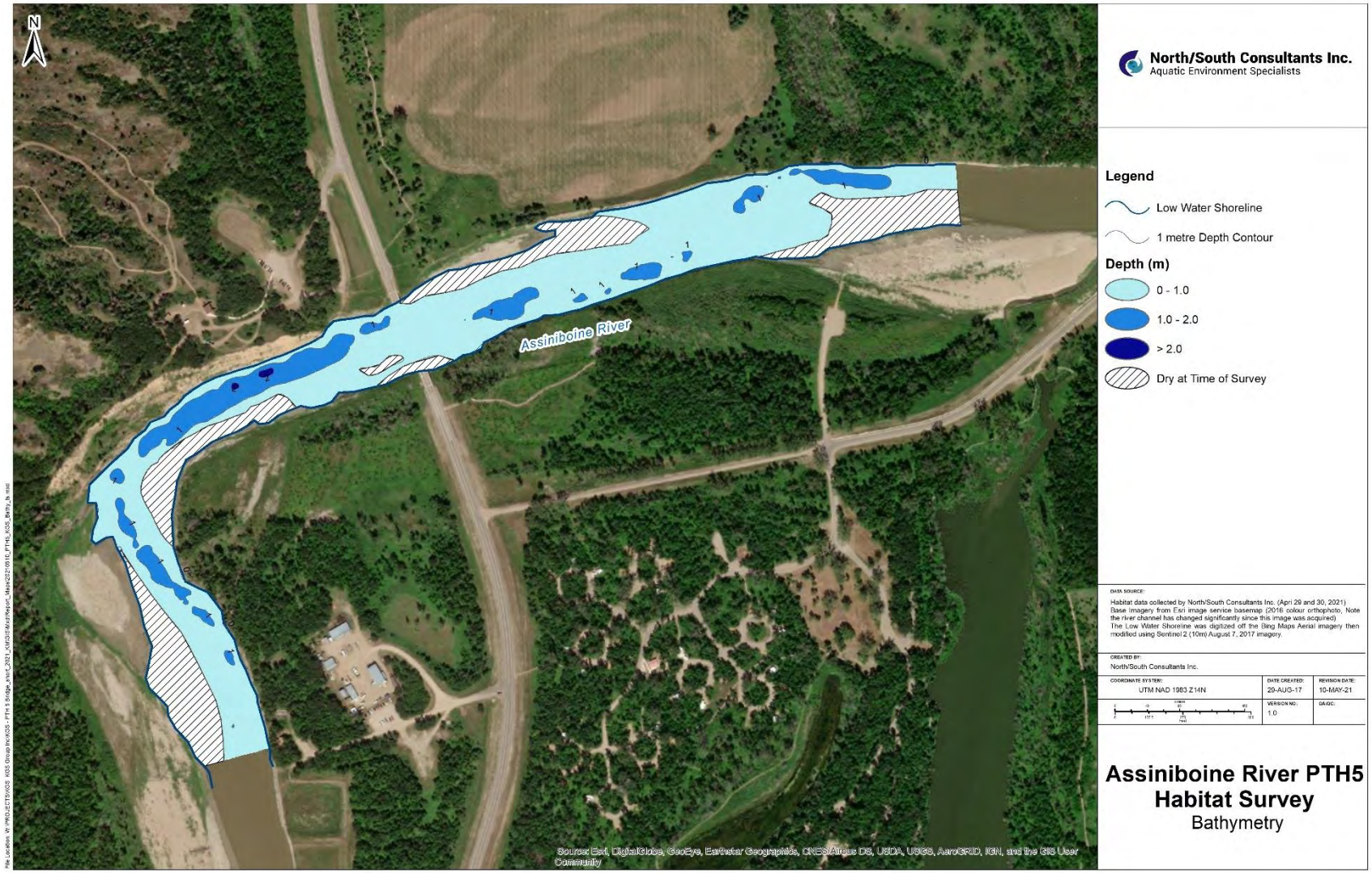


Figure 2. Bathymetric map of the PTH 5 Bridge survey area on the Assiniboine River near Glenboro, Manitoba.

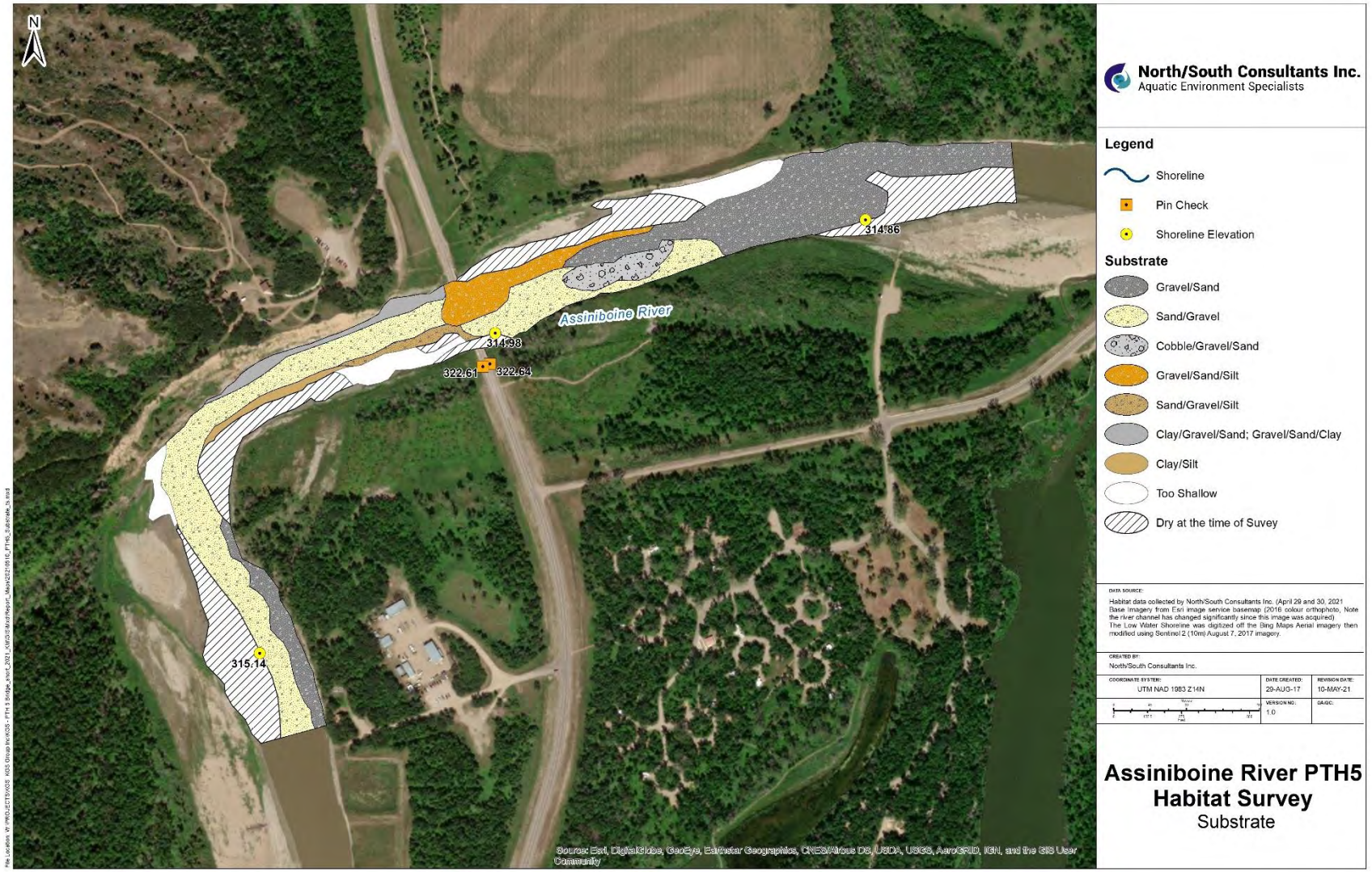


Figure 3. Substrate map of the PTH 5 Bridge survey area on the Assiniboine River near Glenboro, Manitoba.

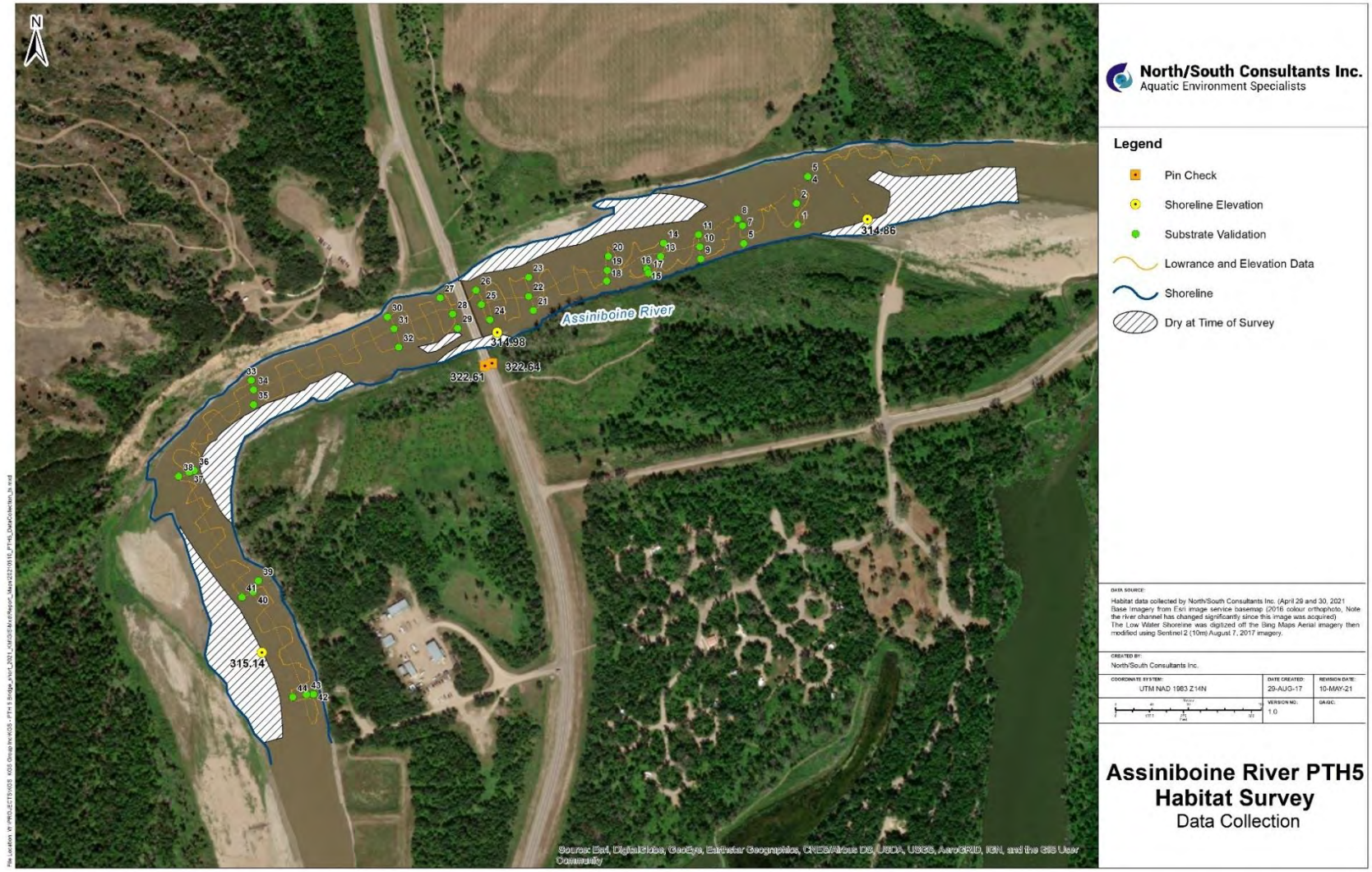


Figure 4. Substrate validation results showing substrate validation grab locations and GPS tracks at the PTH 5 Bridge survey area on the Assiniboine River near Glenboro, Manitoba.

Figure 5. Mussel Survey map showing locations of empty valves located at the PTH 5 Bridge survey area, Assiniboine River near Glenboro, MB.

Photo 1. Site photo taken looking towards the south shoreline downstream of the PTH 5 Bridge, Assiniboine River near Glenboro, Manitoba.

Photo 2. Site photo taken looking at the south shoreline upstream of the PTH 5 Bridge, Assiniboine River near Glenboro, Manitoba.

Photo 3. Site photo taken from the PTH 5 Bridge looking downstream at the south shoreline, Assiniboine River near Glenboro, Manitoba.

Photo 4. Site photo taken from the PTH 5 bridge showing the south shoreline riparian area (0-30 m), Assiniboine River near Glenboro, Manitoba.

Photo 5. Site photo of the north shoreline looking upstream towards the PTH 5 Bridge, Assiniboine River near Glenboro, Manitoba.

Photo 6. Site photo of the north shoreline upstream of the PTH 5 Bridge, Assiniboine River near Glenboro, Manitoba.

Photo 7. Site photo of the north shoreline taken from the PTH 5 bridge looking downstream, Assiniboine River, Manitoba.

Photo 8. Substrate validation from Site 1 at the PTH 5 bridge survey area, showing a gravel/sand substrate.

Photo 9. Substrate validation from Site 2 at the PTH 5 bridge survey area, showing a gravel/sand substrate.

Photo 10. Substrate validation from Site 4 at the PTH 5 bridge survey area, showing a gravel/sand substrate.

Photo 11. Substrate validation from Site 5 at the PTH 5 bridge survey area, showing a sand/gravel substrate.

Photo 12. Substrate validation from Site 6 at the PTH 5 bridge survey area, showing a gravel/sand substrate.

Photo 13. Substrate validation from Site 7 at the PTH 5 bridge survey area, showing a gravel/sand substrate.

Photo 14. Substrate validation from Site 8 at the PTH 5 bridge survey area, showing a gravel/sand/silt substrate.

Photo 15. Substrate validation from Site 9 at the PTH 5 bridge survey area, showing a sand/gravel substrate.

Photo 16. Substrate validation from Site 10 at the PTH 5 bridge survey area, showing a sand/gravel/silt substrate.

Photo 17. Substrate validation from Site 11 at the PTH 5 bridge survey area, showing a gravel/sand substrate.

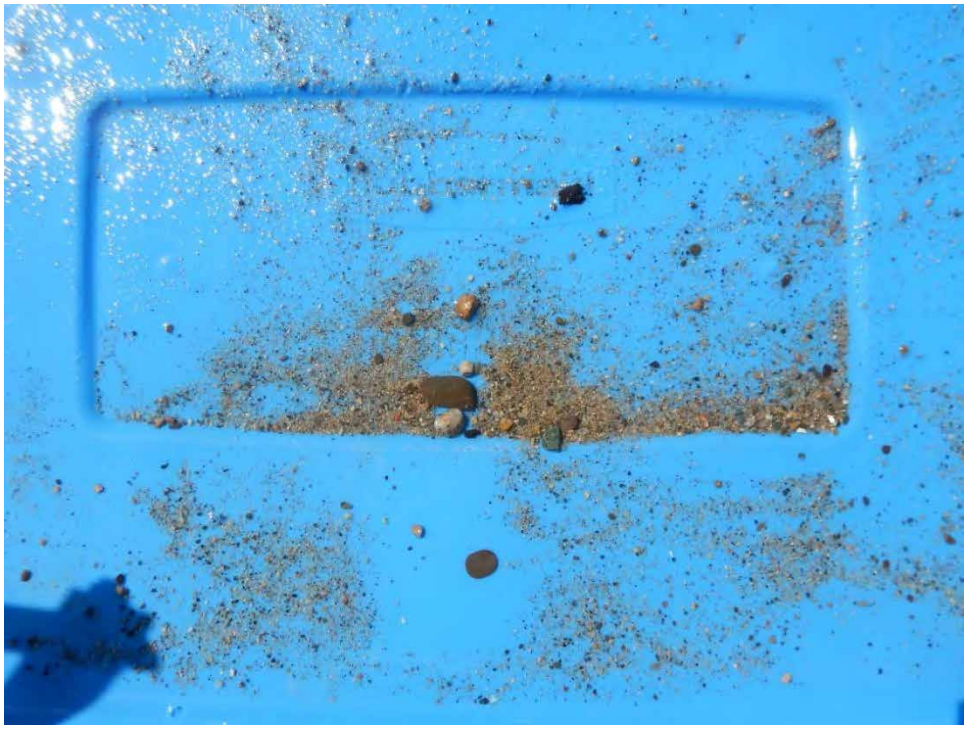


Photo 18. Substrate validation from Site 12 at the PTH 5 bridge survey area, showing a sand/gravel substrate.

Photo 19. Substrate validations from Sites 13 at the PTH 5 bridge survey area, showing a sand/gravel substrate.

Photo 20. Substrate validation from Sites 14-18 at the PTH 5 bridge survey area, showing a hard cobble/gravel/sand substrate.

Photo 21. Substrate validation from Site 19 at the PTH 5 bridge survey area, showing a sand/gravel substrate.

Photo 22. Substrate validation from Site 20 at the PTH 5 bridge survey area, showing a gravel/sand substrate.

Photo 23. Substrate validation from Site 21 at the PTH 5 bridge survey area, showing sand substrate.

Photo 24. Substrate validation from Site 22 at the PTH 5 bridge survey area, showing a sand/gravel substrate.

Photo 25. Substrate validation from Site 23 at the PTH 5 bridge survey area, showing a sand/gravel/silt substrate.

Photo 26. Substrate validation from Site 24 at the PTH 5 bridge survey area, showing a sand/gravel substrate.

Photo 27. Substrate validation from Site 25 at the PTH 5 bridge survey area, showing a gravel/sand/silt substrate.

Photo 28. Substrate validation from Site 26 at the PTH 5 bridge survey area, showing a gravel/sand/silt substrate.

Photo 29. Substrate validation from Site 27 at the PTH 5 bridge survey area, showing a sand/gravel/clay substrate.

Photo 30. Substrate validation from Site 28 at the PTH 5 bridge survey area, showing a gravel/sand/silt substrate.

Photo 31. Substrate validation from Site 29 at the PTH 5 bridge survey area, showing a sand/gravel/silt substrate.

Photo 32. Substrate validation from Site 30 at the PTH 5 bridge survey area, showing a sand/gravel/clay substrate.

Photo 33. Substrate validation from Site 31 at the PTH 5 bridge survey area, showing a sand/gravel substrate.

Photo 34. Substrate validation from Site 32 at the PTH 5 bridge survey area, showing a sand/gravel/silt substrate.

Photo 35. Substrate validation from Site 33 at the PTH 5 bridge survey area, showing a hard clay/gravel/sand substrate.

Photo 36. Substrate validation from Site 34 at the PTH 5 bridge survey area, showing a sand/gravel substrate.

Photo 37. Substrate validation from Site 35 at the PTH 5 bridge survey area, showing a soft clay/silt substrate.

Photo 38. Substrate validation from Site 36 at the PTH 5 bridge survey area, showing a sand/gravel substrate.

Photo 39. Substrate validation from Site 37 at the PTH 5 bridge survey area, showing a sand/gravel substrate.

Photo 40. Substrate validation from Site 38 at the PTH 5 bridge survey area, showing a sand/gravel substrate.

Photo 41. Substrate validation from Site 39 at the PTH 5 bridge survey area, showing a gravel/sand substrate.

Photo 42. Substrate validation from Site 40 at the PTH 5 bridge survey area, showing a sand/gravel substrate.

Photo 43. Substrate validation from Site 41 at the PTH 5 bridge survey area, showing a sand/gravel substrate.

Photo 44. Substrate validation from Site 42 at the PTH 5 bridge survey area, showing a gravel/sand substrate.

Photo 45. Substrate validation from Site 43 at the PTH 5 bridge survey area, showing a gravel/sand substrate.

Photo 46. Substrate validation from Site 44 at the PTH 5 bridge survey area, showing a sand/gravel substrate.

Photo 47. Empty White Heelsplitter (*Lasmigona complanata*) found on the furthest downstream gravel bar at the PTH 5 Bridge survey site, Assiniboine River, Manitoba.

Photo 48. Empty Fatmucket (*Lampsilis siliquoidea*) found on the furthest downstream gravel bar at the PTH 5 Bridge survey site, Assiniboine River, Manitoba.

Photo 49. Weathered Wabash Pigtoe (*Fusconaia flava*) found on the furthest downstream gravel bar at the PTH 5 Bridge survey site, Assiniboine River, Manitoba.

Photo 50. Weathered Black Sandshell (*Ligumia recta*) found on the gravel bar immediately downstream of the PTH 5 Bridge survey site, Assiniboine River, Manitoba.

Photo 51. Empty Wabash Pigtoe (*Fusconaia flava*) found on the gravel bar immediately downstream of the PTH 5 Bridge survey site, Assiniboine River, Manitoba.

Photo 52. Empty Plain Pocketbook (*Lampsilis cardium*) found on the gravel bar immediately downstream of the PTH 5 Bridge survey site, Assiniboine River, Manitoba.

Photo 53. Empty Threeridge (*Amblema plicata*) found on the gravel bar immediately downstream of the PTH 5 Bridge survey site, Assiniboine River, Manitoba.

Photo 54. Empty Mapleleaf (*Quadrula quadrula*) found on the gravel bar immediately downstream of the PTH 5 Bridge survey site, Assiniboine River, Manitoba.

Photo 55. Weathered empty Black Sandshell (*Ligumia recta*) found on the furthest upstream gravel bar at the PTH 5 Bridge survey site, Assiniboine River, Manitoba.

Photo 56. Empty weathered Fatmucket (*Lampsilis siliquoidea*) found on the furthest upstream gravel bar at the PTH 5 Bridge survey site, Assiniboine River, Manitoba.

Photo 57. Empty Wabash Pigtoe (*Fusconaia flava*) found on the furthest upstream gravel bar at the PTH 5 Bridge survey site, Assiniboine River, Manitoba.

Photo 58. Empty Threeridge (*Amblema plicata*) found on the furthest upstream gravel bar at the PTH 5 Bridge survey site, Assiniboine River, Manitoba.

Appendix 1. Kiche Manitou Campground Outlet Culvert Habitat Assessment Booklet

Kiche Manitou Campground Culvert

Location

Datum: NAD 83
UTM: 14 U 481566 5500921

General Morphology

Type:	Drainage Culvert
Pattern:	Sinuous
Channel Profile:	U-shaped
Sinuosity:	-
Confinement:	Confined
Flow Regime:	Intermittent

Site Conditions

Survey Date:	April 30, 2021
Discharge (m^3/s):	NM
Stage:	Low

+ Physical Channel Data

Transect	**1**	**2**	**3**	**4**	**5**
Distance from Crossing[a] (m)	100 U/S	5 U/S	5 D/S	100 D/S	-
Channel and Flow					
Channel Width (m)	19.8	11.8	6.90	8.70	-
Wetted Width (m)	19.1	10.8	5.80	1.10	-
Depth at 25% (m)	1.00	1.00	0.50	0.10	-
Depth at 50% (m)	1.10	1.20	0.80	0.20	-
Depth at 75% (m)	0.80	1.00	0.40	0.10	-
Maximum Depth (m)	1.10	1.20	0.80	0.20	-
Banks					
Left Bank Height (m)	1.00	0.50	7.00	7.00	-
Right Bank Height (m)	10.0	0.50	7.00	7.00	-
Left Bank Shape	vertical	vertical	vertical	vertical	-
Right Bank Shape	vertical	vertical	vertical	vertical	-
Left Bank Materials	GRA	GRA	GRA/DEC	GRA/SHR	-
Right Bank Materials	GRA/DEC/SHR	GRA	GRA/DEC	SHR	-
Left Bank Stability	H	H	H	H	-
Right Bank Stability	H	H	H	L	-
Substrate Type and Distribution (%)					
Organic Material	15	-	-	80	-
Fines	85	70	50	45	-
Small Gravel	-	-	-	-	-
Large Gravel	-	-	-	45	-
Cobble	-	25	-	-	-
Boulder	-	5	50	10	-

a – U/S = upstream from crossing; D/S = downstream from crossing; distance from crossing

Site Conditions Continued

+ Riparian Area/Floodplain

Transect	1	2	3	4	5
Floodplain Distance (m)					
Left Bank	-	-	-	-	-
Right Bank	-	-	-	-	-
Riparian Distance (m)					
Left Bank	-	-	-	-	-
Right Bank	-	-	-	-	-
Riparian Vegetation Type[a]	GRA DEC SHR	GRA DEC	GRA DEC	GRA SHR	-

+ Habitat Type

Transect	1	2	3	4	5
Flat	100	100	100	-	-
Pool	-	-	-	-	-
Rapid	-	-	-	-	-
Riffle	-	-	-	-	-
Run	-	-	-	100	-
Boulder Garden	-	-	-	-	-

+ Habitat Parameters

Parameters	Score	Comments[a]
Available Cover/Epifaunal Substrate	11	LWD present U/S and some gravel/boulder D/S
Substrate Embeddedness	5	All soft upstream with some gravel/boulder D/S
Velocity/Depth Regime	0	No observable flow (slow-deep)
Sediment Deposition	8	Soft fines U/S and harder substrate D/S
Channel Flow Status	10	No observable flow
Channel Alteration	18	Channel relatively unaltered
Frequency of Riffles	5	None present but possible during high water
Bank Stability		
Left Bank Stability	8	Stable
Right Bank Stability	5	Stable U/S but eroding D/S
Bank Vegetative Protection		
Left Bank Stability	7	High U/S but moderate D/S
Right Bank Stability	5	High U/S but low D/S
Riparian Vegetative Condition		
Left Bank Stability	7	Good growth U/S but patchy D/S
Right Bank Stability	7	Good growth U/S minimal D/S
Pool Substrate	12	Soft U/S but mix of hard and soft D/S
Pool Variability	10	Shallow pools more prevalent
Habitat Assessment Score	**118**	
Habitat Assessment Classification	**Marginal Habitat**	

a – U/S = upstream from crossing; D/S = downstream from crossing

Upstream view from T2, 5 m upstream of crossing

Downstream view from T2, 5 m upstream of crossing

Upstream view from T1, 100 m upstream of crossing

Downstream view from T1, 100 m upstream of crossing

Upstream view from T3, 5 m downstream of crossing

upstream view from T4, 100 m downstream of crossing

Fish Habitat

+ Cover

	US	DS
Total Cover Available (%)	25	15
Cover Composition (% of Total)		
Large Woody Debris	15	20
Overhanging Vegetation	10	-
Instream Vegetation	45	-
Pool	-	-
Boulder	15	80
Undercut Bank	-	-
Surface Turbulence	-	-
Turbidity	15	-

+ Fish Habitat Potential

Forage Fish	**US**	**DS**
Spawning	High	Low
Rearing	High	Low
Overwinter	High	Low
Migration	Low	Low
Large Bodied Fish		
Spawning	Med	Low
Rearing	Med	Low
Overwinter	Med	Low
Migration	Low	Low

Milani (2013) Habitat Classification

Class A:

Direct, complex habitat with indicator species likely present upstream of crossing

Appendix 2. Marsh Lake Outlet Culvert Habitat Assessment Booklet

Marsh Lake Outlet Culvert

Location

Datum: NAD 83
UTM: 14 U 480717 5502453

General Morphology

Type:	Drainage Culvert
Pattern:	Sinuous
Channel Profile:	U-shaped
Sinuosity:	-
Confinement:	Confined
Flow Regime:	Intermittent

Site Conditions

Survey Date:	April 30, 2021
Discharge (m^3/s):	NM
Stage:	Low

+ Physical Channel Data

Transect	**1**	**2**	**3**	**4**	**5**
Distance from Crossing (m)	-	-	-	-	-
Channel and Flow					
Channel Width (m)	-	-	-	-	-
Wetted Width (m)	-	-	-	-	-
Depth at 25% (m)	-	-	-	-	-
Depth at 50% (m)	-	-	-	-	-
Depth at 75% (m)	-	-	-	-	-
Maximum Depth (m)	-	-	-	-	-
Banks					
Left Bank Height (m)	-	-	-	-	-
Right Bank Height (m)	-	-	-	-	-
Left Bank Shape	-	-	-	-	-
Right Bank Shape	-	-	-	-	-
Left Bank Materials	GRA	-	-	-	-
Right Bank Materials	GRA	-	-	-	-
Left Bank Stability	H	-	-	-	-
Right Bank Stability	H	-	-	-	-
Substrate Type and Distribution (%)					
Organic Material	20	-	-	-	-
Fines	80	-	-	-	-
Small Gravel	-	-	-	-	-
Large Gravel	-	-	-	-	-
Cobble	-	-	-	-	-
Boulder	-	-	--	-	-

Site Conditions Continued

+ Riparian Area/Floodplain

Transect	1	2	3	4	5
Floodplain Distance (m)					
Left Bank	-	-	-	-	-
Right Bank	-	-	-	-	-
Riparian Distance (m)					
Left Bank	-	-	-	-	-
Right Bank	-	-	-	-	-
Riparian Vegetation Type[a]					
	GRA DEC SHR	-	-	-	-

+ Habitat Type

Transect	1	2	3	4	5
Flat	100	-	-	-	-
Pool	-	-	-	-	-
Rapid	-	-	-	-	-
Riffle	-	-	-	-	-
Run	-	-	-	-	-
Boulder Garden	-	-	-	-	-

+ Habitat Parameters

Parameters	Score	Comments
Available Cover/Epifaunal Substrate	5	mainly marsh with some LWD present
Substrate Embeddedness	2	All soft fines and organic material
Velocity/Depth Regime	0	No observable flow (slow-deep)
Sediment Deposition	5	Soft fines U/S and harder substrate D/S
Channel Flow Status	10	No observable flow
Channel Alteration	15	Channel relatively unaltered
Frequency of Riffles	0	None present but possible during high water
Bank Stability		
Left Bank Stability	8	Stable
Right Bank Stability	8	Stable U/S but eroding D/S
Bank Vegetative Protection		
Left Bank Stability	10	Good growth U/S but patchy D/S
Right Bank Stability	10	Good growth U/S minimal D/S
Riparian Vegetative Condition		
Left Bank Stability	10	Stable
Right Bank Stability	10	Stable
Pool Substrate	10	Soft, Organics
Pool Variability	5	
Habitat Assessment Score	**108**	
Habitat Assessment Classification	**Marginal Habitat**	

a – U/S = upstream from crossing; D/S = downstream from crossing; distance from crossing

Upstream view from the culvert crossing

Downstream view from the culvert crossing

View of the culvert inlet showing the screen cover

View of the likely buried culvert outlet

Large beaver dam downstream of culvert crossing

Downstream view showing no connectivity to the Assiniboine River

Fish Habitat

+ Cover

	U/S	D/S
Total Cover Available (%)	5	10
Cover Composition (% of Total)		
Large Woody Debris	40	60
Overhanging Vegetation	10	10
Instream Vegetation	40	20
Pool	-	-
Boulder	-	-
Undercut Bank	-	-
Surface Turbulence	-	-
Turbidity	10	10

+ Fish Habitat Potential

Forage Fish	**U/S**	**D/S**
Spawning	High	High
Rearing	High	High
Overwinter	High	High
Migration	High	High
Large Bodied Fish		
Spawning	Med	Low
Rearing	Med	Low
Overwinter	Med	Low
Migration	Low	Low

Milani (2013) Habitat Classification

Class A:

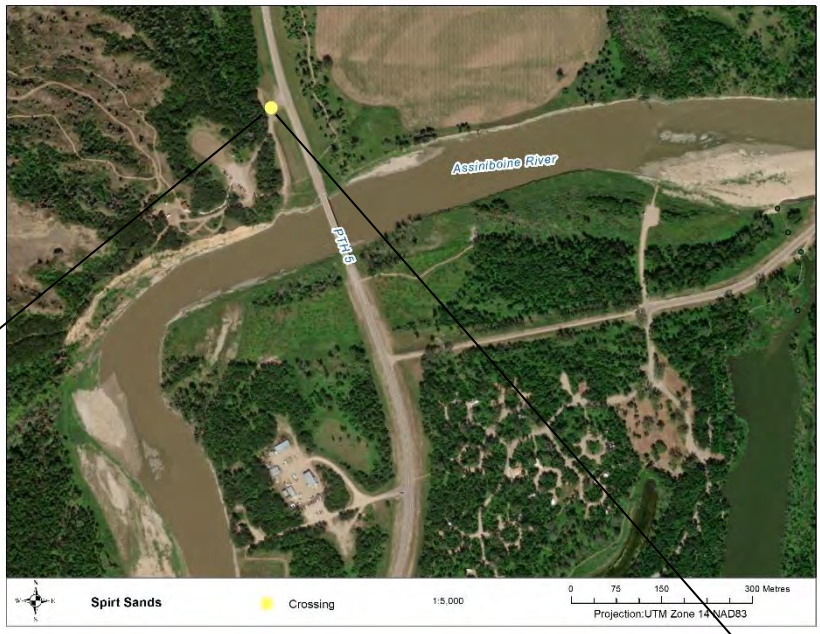
Direct, complex habitat with indicators species present upstream in Marsh Lake

Appendix 3. Spirit Sands Access Road Culvert Habitat Assessment Booklet

Spirit Sands Access Culvert

Location

Datum: NAD 83
UTM: 14 U 480710 5501127



General Morphology

Type:	Drainage Culvert
Pattern:	Straight
Channel Profile:	U-shaped
Sinuosity:	-
Confinement:	Confined
Flow Regime:	Ephemeral

Site Conditions

+ Riparian Area/Floodplain

Transect	1	2	3	4	5
Floodplain Distance (m)					
Left Bank	-	-	-	-	-
Right Bank	-	-	-	-	-
Riparian Distance (m)					
Left Bank	-	-	-	-	-
Right Bank	-	-	-	-	-
Riparian Vegetation Type					
GRA	-	-	-	-	-

+ Habitat Type

Transect	1	2	3	4	5
Flat	-	-	-	-	-
Pool	-	-	-	-	-
Rapid	-	-	-	-	-
Riffle	-	-	-	-	-
Run	-	-	-	-	-
Boulder Garden	-	-	-	-	-

+ Habitat Parameters

Parameters	Score	Comments[a]
Available Cover/Epifaunal Substrate	0	Lack of habitat
Substrate Embeddedness	0	No hard substrate, all grass
Velocity/Depth Regime	0	No water present
Sediment Deposition	0	N/A
Channel Flow Status	0	No observable water in channel
Channel Alteration	20	Channel relatively unaltered
Frequency of Riffles	0	None present but possible during high water
Bank Stability		
Left Bank Stability	10	Stable
Right Bank Stability	10	Stable
Bank Vegetative Protection		
Left Bank Stability	10	Good growth U/S but patchy D/S
Right Bank Stability	10	Good growth U/S minimal D/S
Riparian Vegetative Condition		
Left Bank Stability	10	Good, stable
Right Bank Stability	10	Good, stable
Pool Substrate	0	Dry ground
Pool Variability	0	Dry ground
Habitat Assessment Score	**80**	
Habitat Assessment Classification	**Marginal Habitat**	

a – U/S = upstream from crossing; D/S = downstream from crossing; distance from crossing

Downstream view from the culvert crossing

Upstream view from the culvert crossing

Fish Habitat

+ Cover

	U/S	D/S
Total Cover Available (%)	0	0
Cover Composition (% of Total)		
Large Woody Debris	-	-
Overhanging Vegetation	-	-
Instream Vegetation	-	-
Pool	-	-
Boulder	-	-
Undercut Bank	-	-
Surface Turbulence	-	-
Turbidity	-	-

+ Fish Habitat Potential

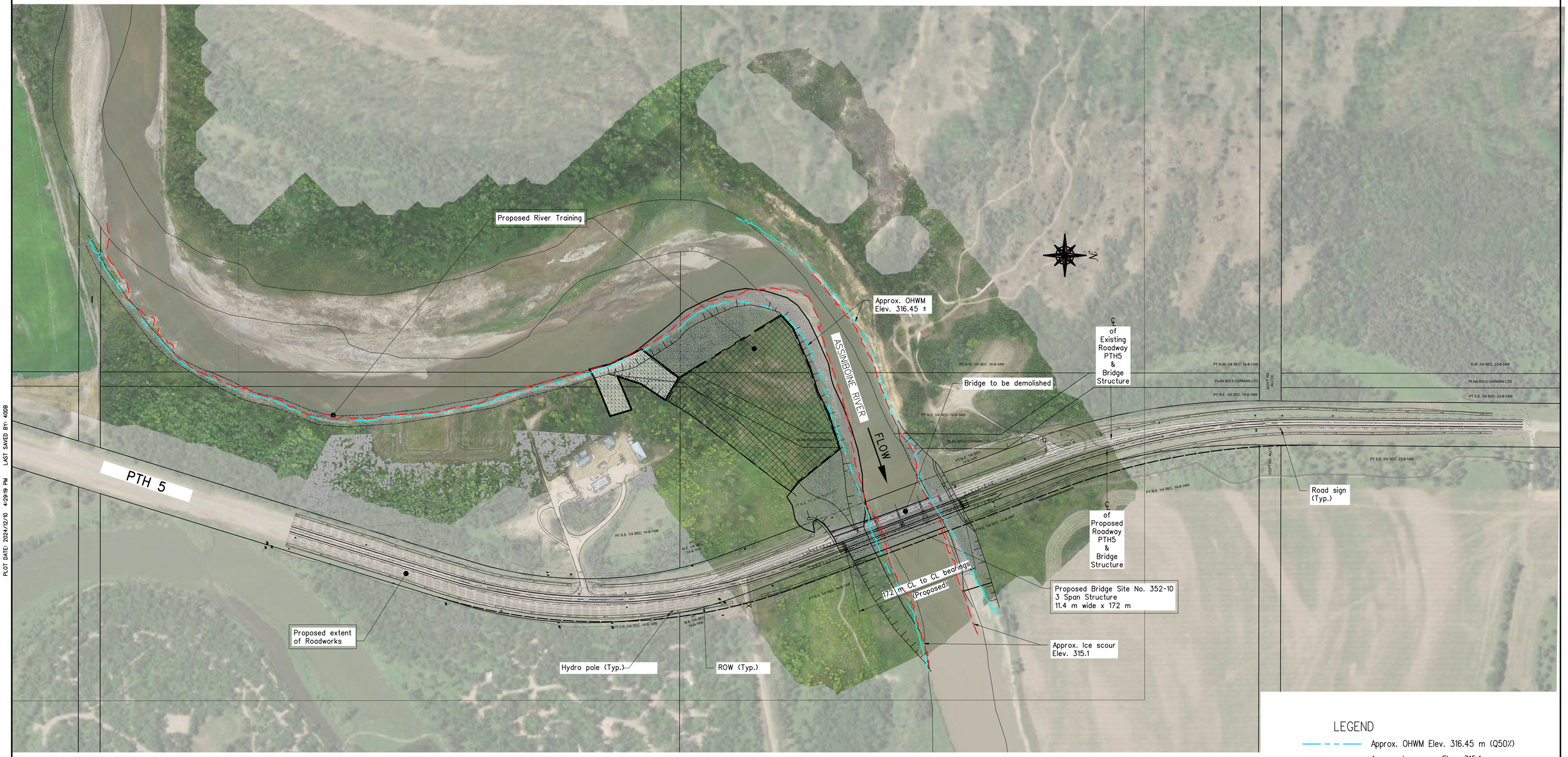
Forage Fish	U/S	D/S
Spawning	-	-
Rearing	-	-
Overwinter	-	-
Migration	-	-
Large Bodied Fish		
Spawning	-	-
Rearing	-	-
Overwinter	-	-
Migration	-	-

Milani (2013) Habitat Classification

No Fish Habitat:

No connection to fish habitat, no fish present

APPENDIX C – Environmental Regulatory Drawings including Relief Bench and Guide Bank



LEGEND

Approx. OHWM Elev. 316.45 m (Q50%)

Approx. Ice scour Elev. 315.1 m

NOTES:

1. For the proposed temporary access plan refer to Sheet Nos. 02 and ••.
2. For detailed description of Work activities refer to Sheet No. 03.
3. Contour lines shown are existing ground.

NAVIGATION:

1. The Assiniboine River is a scheduled waterway under the Canadian Navigable Waters Act.
2. MTI understands that same watercrafts (canoes and kayaks) may utilize the waterway, therefore the clearances within the bridge structure are assessed for navigability.
3. Vertical navigation clearance at Ordinary High Water Level Q50% is 5.1 m (approximate).

FISH PASSAGE:

Q_{3d2I0} = 809 m^3/s

V_{3d2I0} = 1.33 m/s

PURPOSE OF THE PROJECT:

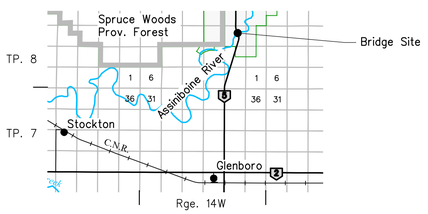
- Existing structure built in 1964 is approaching the end of its useful service and does not meet the current hydraulic requirements of the site.
- Recent flood events in 2011 and 2014 caused overland flooding and washouts of the highway adjacent to the structure, undermined the north bridge abutment resulting in a temporary closure of the PTH 5 highway that is a major transportation link between PTH 2 and PTH 1.
- Hydraulic assessment, which was undertaken, recommends a larger 172 m long replacement structure with local reshaping of the river channel and construction of the relief bench and guide bank on the upstream side of the proposed new structure.
- Improved hydraulic capacity of the structure will reduce the probability of the highway closure during future flood events.

CRITICAL DATES FOR IN-STREAM WORK:

1. No in-stream works will be completed from April 1 to June 15.
2. In-stream works are limited to proposed bridge piers installation (November 2025 - March 2026), channel reshaping and armoring (June-October 2026 and September-October 2027), existing bridge demolition (September-October 2027), relief bench shaping and armoring (June - October 2026), river training, slope reshaping and armoring upstream of the relief bench (June-October 2026).

SITE PLAN

Scale 1:2500



LOCATION PLAN

N.T.S.

LOCATION:

The crossing of PTH 5 over the Assiniboine River (Bridge Site 0352-10) is located approximately 11 km north of Glenboro at Spruce Woods Provincial Park, MB within the Rural Municipality of Glenboro-South Cypress.

UTM Coordinates ZONE 14U, 480823.55 E, 5500989.02 N
Latitude 49° 39' 40.08" N Longitude 99° 15' 56.57" W

REVISIONS		
24/12/10	RE	ISSUED FOR REGULATORY REVIEW-R1
24/12/03	RE	ISSUED FOR REGULATORY REVIEW
DATE	BY	DESCRIPTION

DESIGN SEAL | RECORD SEAL

FOR REGULATORY APPROVAL

DILLON CONSULTING

CONSULTANT PROJECT NO. 236533

BRIDGE REPLACEMENT PLAN SUBMITTED FOR NAVIGATIONAL & ENVIRONMENTAL REVIEW

FOR 172 000 LONG STEEL I-GIRDER BRIDGE
OVER ASSINIBOINE RIVER ON P.T.H. No. 5
11 400 ROADWAY WIDTH
IN N.E. 1/4 SEC. 14-08-14W

R.M. OF GLENBORO-SOUTH CYPRESS

Manitoba
Transportation and Infrastructure
Bridges and Highway Structures

RELEASED FOR CONSTRUCTION BY:

DIRECTOR OF BRIDGES AND HIGHWAY STRUCTURES

DATE

DESIGN BY: RE CHECKED:

DETAILS BY: DJB CHECKED:

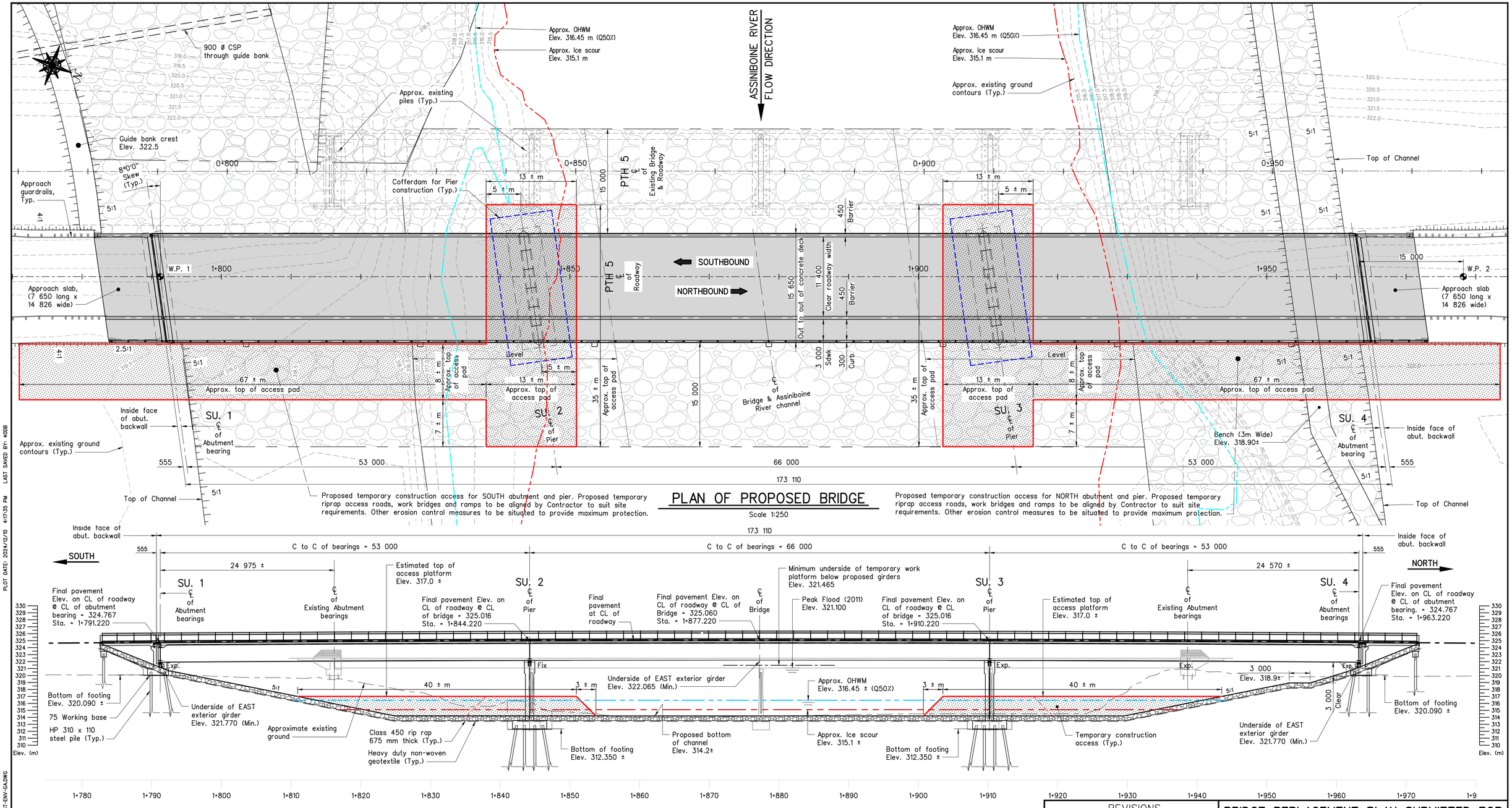
SCALE:

SHEET No. 01

SITE No. 0352-10

PLOT DATE: 2024/12/10 4:29:19 PM LAST SAVED BY: 400B

C:\PW WORKING DIRECTORY\PROJECTS 2023\DILLON_400B\DM53571\236533-ST-ENV-SITE.DWG



PLAN OF PROPOSED BRIDGE

Scale 1:250

ELEVATION OF PROPOSED BRIDGE

Scale 1:250
Showing EAST face of Structure

LEGEND

Approx. OHWM Elev. 316.45 m (Q50%)

Approx. Ice scour Elev. 315.1 m

REVISIONS		
24/12/10	RE	ISSUED FOR REGULATORY REVIEW-R1
24/12/03	RE	ISSUED FOR REGULATORY REVIEW
DATE	BY	DESCRIPTION

BRIDGE REPLACEMENT PLAN SUBMITTED FOR NAVIGATIONAL & ENVIRONMENTAL REVIEW

FOR 172 000 LONG STEEL I-GIRDER BRIDGE
OVER ASSINIBOINE RIVER ON P.T.H. No. 5
11 400 ROADWAY WIDTH
IN N.E. 1/4 SEC. 14-08-14W

R.M. OF GLENBORO-SOUTH CYPRESS

DILLON CONSULTING

CONSULTANT PROJECT NO. 236533

DESIGN SEAL | RECORD SEAL

FOR REGULATORY APPROVAL

Manitoba Transportation and Infrastructure
Bridges and Highway Structures

RELEASED FOR CONSTRUCTION BY:

DIRECTOR OF BRIDGES AND HIGHWAY STRUCTURES

DATE

DESIGN BY: RE CHECKED:

DETAILS BY: CGC CHECKED:

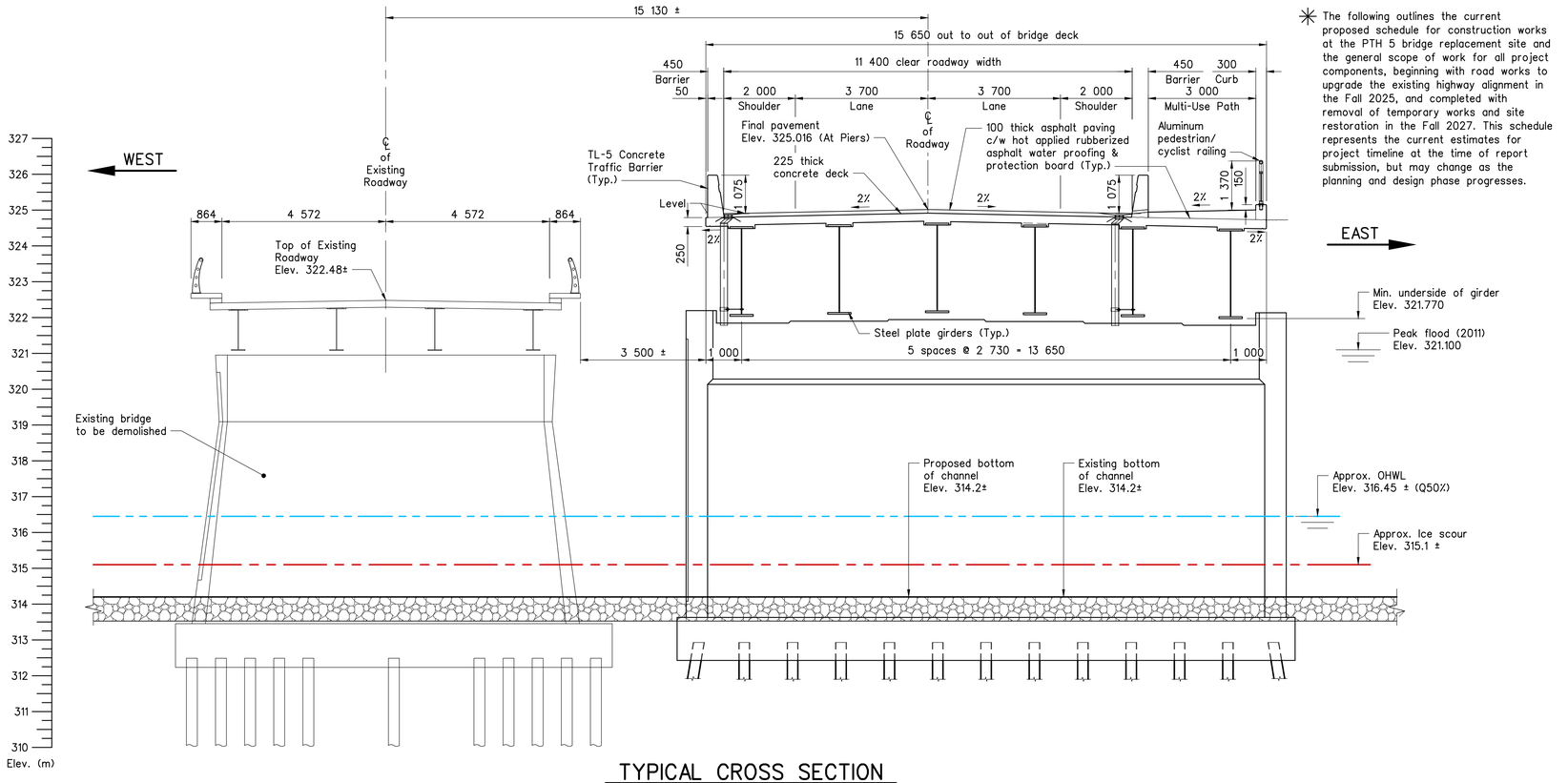
SCALE:

SHEET No. 02

SITE No. 0352-10

PLOT DATE: 2024/12/10 4:17:35 PM LAST SAVED BY: 400B

C:\PW WORKING DIRECTORY\PROJECTS 2023\DILLON_400B\DMS3571\236533-ST-ENV-GA.DWG



TYPICAL CROSS SECTION

Scale 1:75

✳ The following outlines the current proposed schedule for construction works at the PTH 5 bridge replacement site and the general scope of work for all project components, beginning with road works to upgrade the existing highway alignment in the Fall 2025, and completed with removal of temporary works and site restoration in the Fall 2027. This schedule represents the current estimates for project timeline at the time of report submission, but may change as the planning and design phase progresses.

PROPOSED WORKS SCHEDULE ✳

SCHEDULE	DESCRIPTION
NEW BRIDGE CONSTRUCTION AND DEMOLITION OF EXISTING BRIDGE:	
October / November 2025	Start Construction: Install erosion control measures. Construct approach grades and widen existing highway to accommodate use of existing structure during construction.
November 2025	Construct temporary access pads from north and south banks to construct river piers to an elevation approximately 0.5 m above Q50% or the current water/ice elevation at the time, whichever is higher, with clean large diameter granular material. Construction sequencing will be such that restriction to channel width is no greater than 50% of the wetted width. During construction, appropriate erosion control devices will used to prevent sediment and excavated material from entering watercourse or becoming frozen into the ice.
November 2025 to March 2026	Substructure construction: Complete installation of steel H pile foundation and construction of two river piers and two abutments. Pier construction will be within 4-sided steel sheet pile cofferdams approximately 23 m x 8 m in size (3 m larger than proposed footing dimensions). Water from pumps used to de-water cofferdams will not be allowed to directly re-enter watercourse. Removal of temporary construction access and work platforms. Some of this work will be required to take place after demolition of existing structure in the Fall/Winter 2027.
May to October 2026	Channel Works: Channel invert and banks will be reshaped and protected with class 350 rip rap for a distance of 15 m upstream and downstream of new structure. Rip rap will be placed under the bridge, on the riverbanks, head slopes and on side slopes. Disturbed areas not covered with rip rap will be seeded and protected with erosion and control blankets until vegetation is established. Completion of channel shaping, relief bench, extended guide bank and rip rap armoring. Completion of river erosion control works upstream of the relief bench. Some work needs to be done after the existing bridge is demolished.
January to February 2027	Girder erection: Erect structural steel girders from ice bridge (or access pads) using cranes
March to July 2027	Superstructure construction: Complete construction of reinforced concrete deck, multi-use path and barriers while working from bridge ends Temporary work platform supported from girders in place to prevent debris from falling into the river.
June to August 2027	Roadway completion and paving: Completion and asphalt paving of roadway approaches waterproof membrane and paving of bridge deck.
August 2027	Open new bridge to traffic.
August to October 2027	Decommission existing approach grades: removal of existing approach grades and restoration of area Completion of channel shaping, relief bench, guide bank and rip rap installation Completion of river erosion control works upstream of the relief bench All disturbed areas not protected with rip rap will be seeded and protected with 100% biodegradable erosion control blanket.
August to October 2027	Construct temporary access pads from north and south banks to construct river piers to an elevation approximately 0.5 m above Q50% or the current water/ice elevation at the time, whichever is higher, with clean large diameter granular material. Demolish existing structure and complete channel work: Construction sequencing will be such that restriction to channel width is no greater than 50% of the wetted width. Access to center pier from one side only. Existing superstructure to be removed. Demolition procedures will require that all material is prevented from entering the river or freezing to the ice. Piers to be surrounded with clean large diameter material to allow demolition to be isolated from river. Existing piers to be demolished to either top of footing or 1m below proposed streambed elevation. Removal of temporary construction access and work platforms upon completion and prior to winter freeze-up Complete rip rap armoring. Tie into existing within the limits of rip rap as indicated on the drawings.
October to November 2027 / Spring 2028	Site restoration. Final site restoration and re-vegetation work.

PHOTO 1

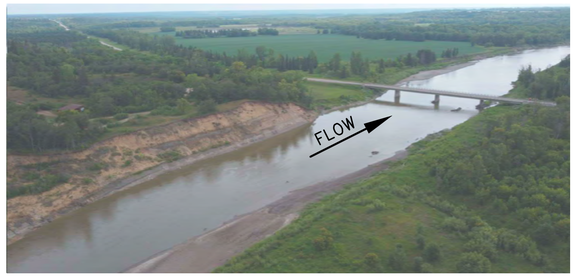


PHOTO 2

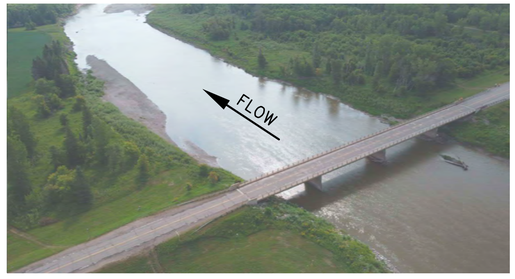


PHOTO 3

VIEWS LOOKING DOWNSTREAM

Scale NTS

PHOTO 4

PHOTO 5

PHOTO 6

VIEWS LOOKING UPSTREAM

Scale NTS

REVISIONS		
24/12/10	RE	ISSUED FOR REGULATORY REVIEW-R1
24/12/03	RE	ISSUED FOR REGULATORY REVIEW
DATE	BY	DESCRIPTION

DESIGN SEAL | RECORD SEAL

FOR REGULATORY APPROVAL

DILLON CONSULTING

CONSULTANT PROJECT NO. 236533

BRIDGE REPLACEMENT PLAN SUBMITTED FOR NAVIGATIONAL & ENVIRONMENTAL REVIEW

FOR 172 000 LONG STEEL I-GIRDER BRIDGE
OVER ASSINIBOINE RIVER ON P.T.H. No. 5
11 400 ROADWAY WIDTH
IN N.E. 1/4 SEC. 14-08-14W

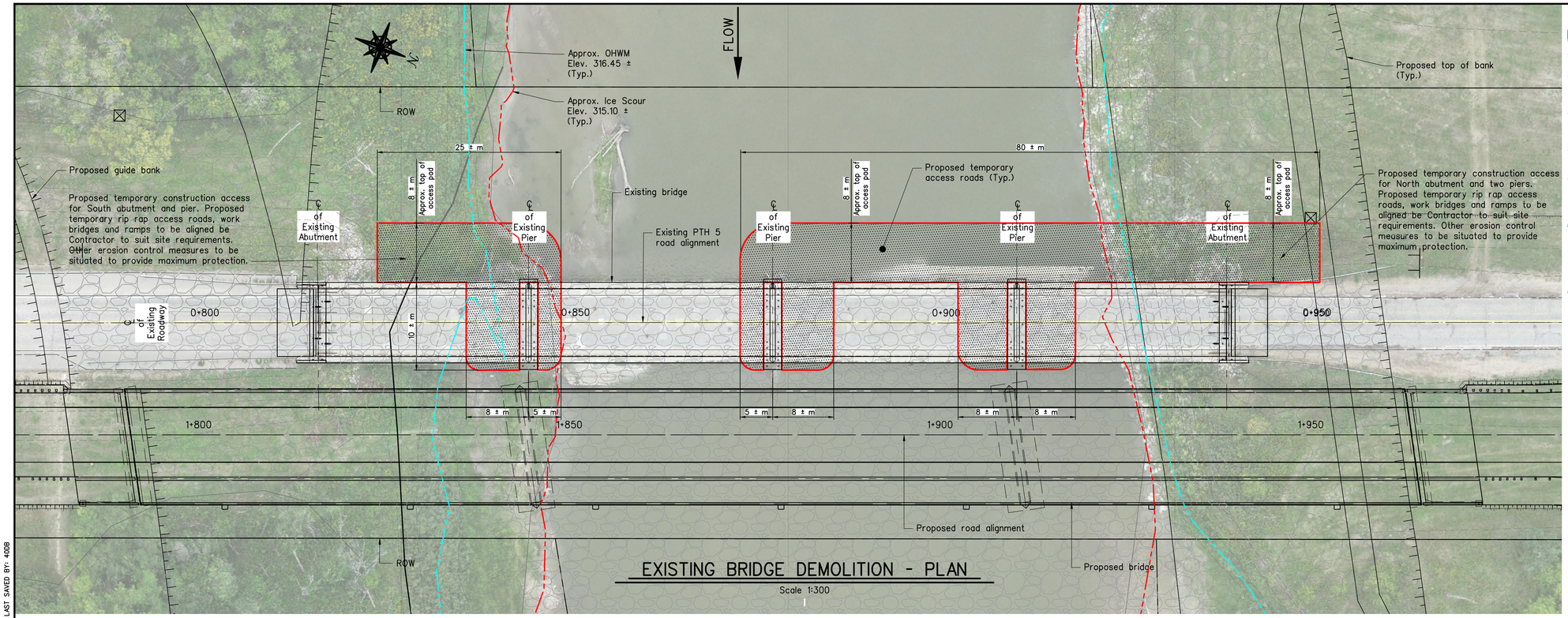
R.M. OF GLENBORO-SOUTH CYPRESS

Manitoba Transportation and Infrastructure
Bridges and Highway Structures

RELEASED FOR CONSTRUCTION BY: _____
DIRECTOR OF BRIDGES AND HIGHWAY STRUCTURES
DATE _____

DESIGN — BY: RE — CHECKED: _____
DETAILS — BY: CGC — CHECKED: _____

SCALE: _____
SHEET No. 03
SITE No. 0352-10



EXISTING BRIDGE DEMOLITION - PLAN

Scale 1:300

NOTES:

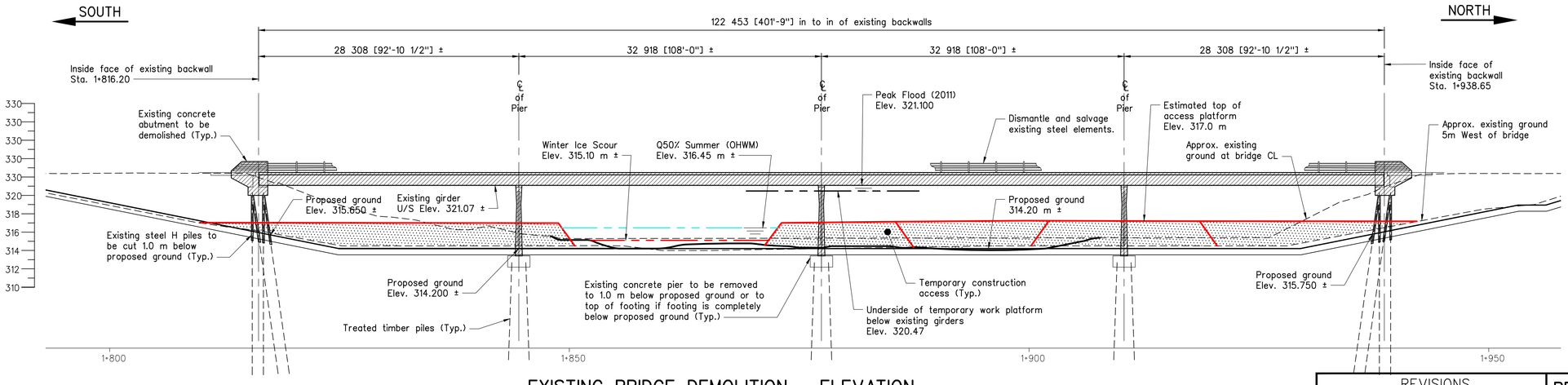
1. All existing structure dimensions are plus or minus (+/-).
2. The Contractor is responsible for verifying all dimensions of existing structures prior to demolition and the Engineer shall be notified of any discrepancies.
3. The Contractor is responsible for safety and integrity of the structures during demolition and shall submit an Engineered Demolition Procedure in accordance with the Special Provisions.
4. The existence, location and elevation of utilities and/or concealed structures at the project are not guaranteed.
5. The Contractor is responsible for determining the existence, location and elevation of all utilities and/or structure and is responsible for notifying the appropriate company, department or person(s) or its intention to carry out its operations.
6. For additional details of the existing structure the Contractor shall refer to the Existing Bridge Details in the Reference Drawings.
7. The Contractor shall notify the Engineer immediately if hazardous materials are identified and shall be removed in accordance with the applicable Provincial regulations.
8. The existing bridge will be open to traffic during construction of the new bridge.

DECOMMISSION OF EXISTING APPROACH GRADES:

1. Existing approach grades will be removed and areas will be restored
2. All disturbed areas, not protected with rip rap, will be seeded with 100% biodegradable erosion control blanket

DEMOLISHING OF EXISTING STRUCTURE AND COMPLETE CHANNEL WORK:

1. Access pads to be constructed. Construction sequencing will be such that restriction to channel width is minimized to no more than 50% of the channel width. Access to centre pier from one side only.
2. Existing bridge superstructure to be demolished.
3. Piers to be surrounded with clean large diameter material to allow demolition to be isolated from river.
4. The existing abutment structures shall be demolished and existing H-piles shall be removed to an elevation of 1.0 m below the proposed grade.
5. The existing concrete piers shall be removed to a minimum 1.0 m below the proposed grade or to top of existing pile cap if pile cap is below proposed ground.
6. All demolition debris shall be prevented from entering the river by reinforced silt barrier. All debris shall be removed from the banks.
7. Following demolition, complete channel shaping, relief bench, guidebank and rip rap installation.



EXISTING BRIDGE DEMOLITION - ELEVATION

Scale 1:250
Looking WEST

DEMOLITION LEGEND

Existing structure to be demolshed

REVISIONS		
24/12/10	RE	ISSUED FOR REGULATORY REVIEW-R1
24/12/03	RE	ISSUED FOR REGULATORY REVIEW
DATE	BY	DESCRIPTION

DESIGN SEAL | RECORD SEAL

FOR REGULATORY APPROVAL

DILLON CONSULTING

CONSULTANT PROJECT NO. 236533

BRIDGE REPLACEMENT PLAN SUBMITTED FOR NAVIGATIONAL & ENVIRONMENTAL REVIEW

FOR 172 000 LONG STEEL I-GIRDER BRIDGE
OVER ASSINIBOINE RIVER ON P.T.H. No. 5
11 400 ROADWAY WIDTH
IN N.E. 1/4 SEC. 14-08-14W

R.M. OF GLENBORO-SOUTH CYPRESS

Manitoba
Transportation and Infrastructure
Bridges and Highway Structures

RELEASED FOR CONSTRUCTION BY:

DIRECTOR OF BRIDGES AND HIGHWAY STRUCTURES

DATE

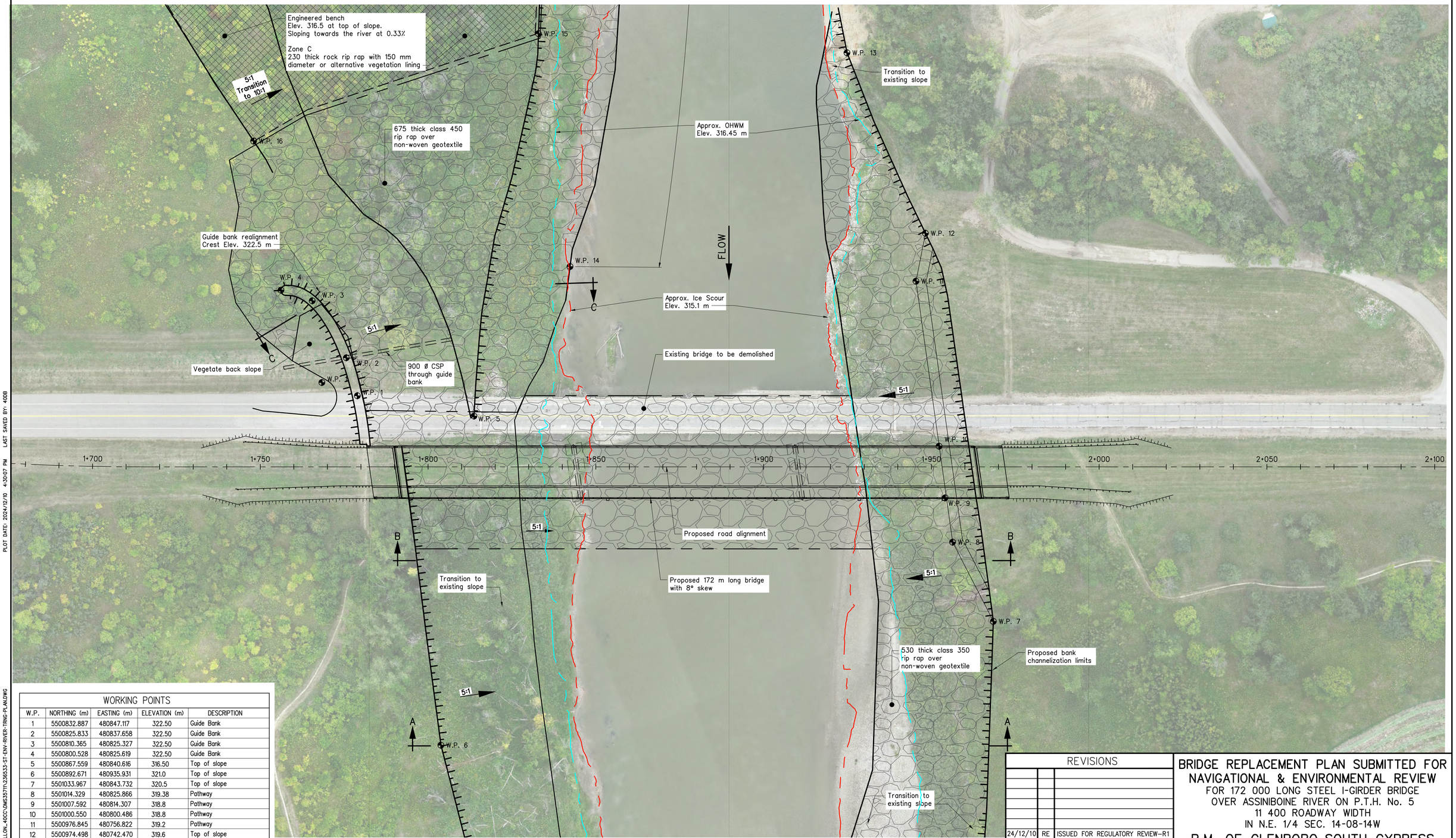
DESIGN BY: RE
CHECKED:

DETAILS BY: DJB
CHECKED:

SCALE:

SHEET No. 04

SITE No. 0352-10



WORKING POINTS				
W.P.	NORTHING (m)	EASTING (m)	ELEVATION (m)	DESCRIPTION
1	5500832.887	480847.117	322.50	Guide Bank
2	5500825.833	480837.658	322.50	Guide Bank
3	5500810.365	480825.327	322.50	Guide Bank
4	5500800.528	480825.619	322.50	Guide Bank
5	5500867.559	480840.616	316.50	Top of slope
6	5500892.671	480935.931	321.0	Top of slope
7	5501033.967	480843.732	320.5	Top of slope
8	5501014.329	480825.866	319.38	Pathway
9	5501007.592	480814.307	318.8	Pathway
10	5501000.550	480800.486	318.8	Pathway
11	5500976.845	480756.822	319.2	Pathway
12	5500974.498	480742.470	319.6	Top of slope
13	5500933.776	480700.268	316.0±	Top of slope
14	5500878.766	480788.866		End of bank curve dimen.
15	5500845.658	480727.132	316.0±	Engineered bench extent
16	5500777.334	480786.844	316.5±	Engineered bench extent

LEGEND

Approx. OHWM Elev. 316.54 m (Q50%)

Approx. Ice scour Elev. 315.1 m

REVISIONS		
24/12/10	RE	ISSUED FOR REGULATORY REVIEW-R1
24/12/03	RE	ISSUED FOR REGULATORY REVIEW
DATE	BY	DESCRIPTION

BRIDGE REPLACEMENT PLAN SUBMITTED FOR NAVIGATIONAL & ENVIRONMENTAL REVIEW

FOR 172 000 LONG STEEL I-GIRDER BRIDGE
OVER ASSINIBOINE RIVER ON P.T.H. No. 5
11 400 ROADWAY WIDTH
IN N.E. 1/4 SEC. 14-08-14W

R.M. OF GLENBORO-SOUTH CYPRESS

DILLON CONSULTING

CONSULTANT PROJECT NO. 236533

DESIGN SEAL | RECORD SEAL

FOR REGULATORY APPROVAL

Manitoba
Transportation and Infrastructure
Bridges and Highway Structures

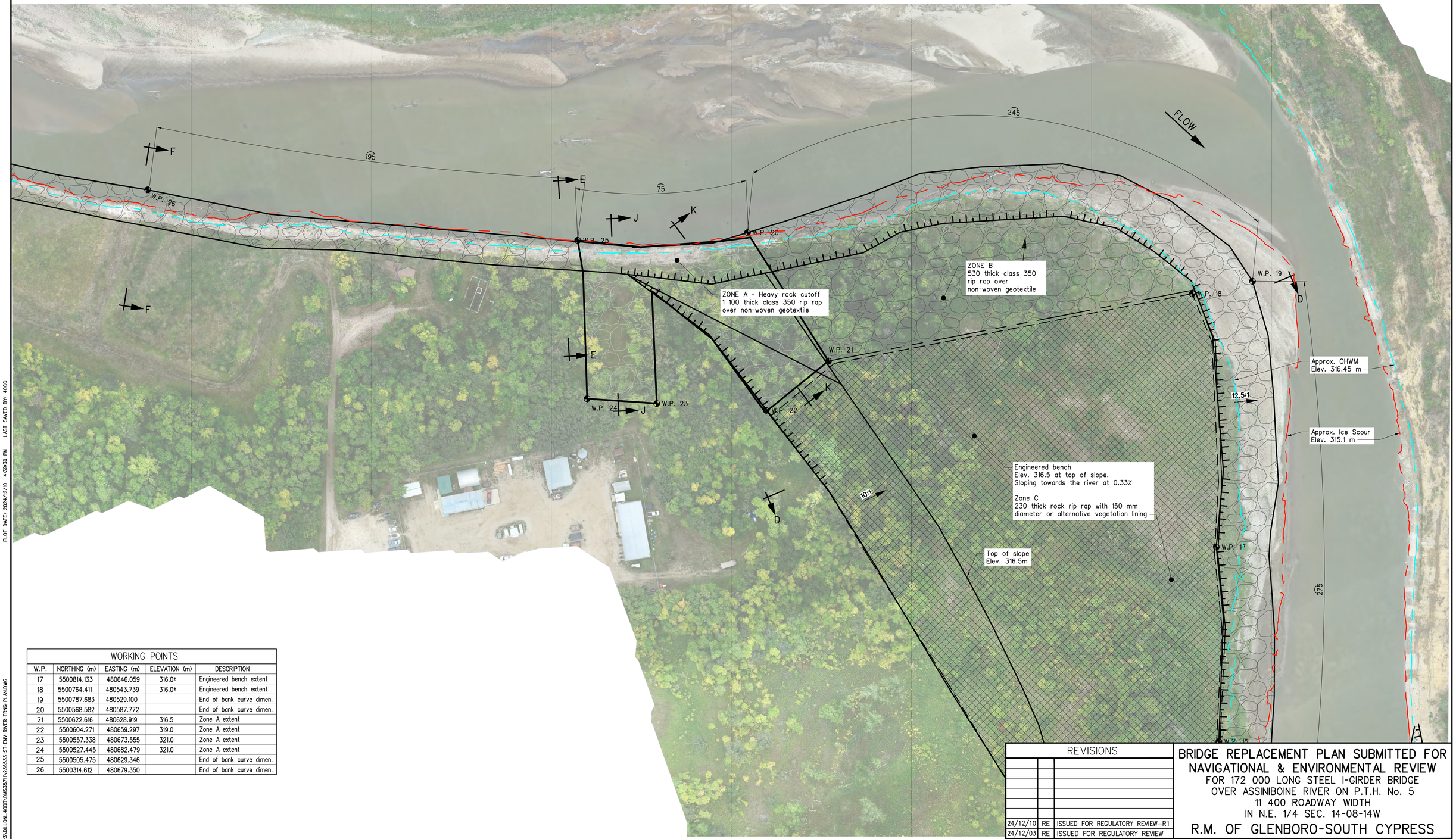
RELEASED FOR CONSTRUCTION BY:

DIRECTOR OF BRIDGES AND HIGHWAY STRUCTURES

DATE

DESIGN	BY: RE	SCALE:
	CHECKED:	SHEET No. 05
DETAILS	BY: DJB	
	CHECKED:	SITE No. 0352-10

C:\PW WORKING DIRECTORY\PROJECTS 2023\DILLON_400C\DWGS\71\Y236533-ST-ENV-RIVER-TRNG-PLAN.DWG
PLOT DATE: 2024/12/10 4:30:07 PM LAST SAVED BY: 400B



WORKING POINTS				
W.P.	NORTHING (m)	EASTING (m)	ELEVATION (m)	DESCRIPTION
17	5500814.133	480646.059	316.0±	Engineered bench extent
18	5500764.411	480543.739	316.0±	Engineered bench extent
19	5500787.683	480529.100		End of bank curve dimen.
20	5500568.582	480587.772		End of bank curve dimen.
21	5500622.616	480628.919	316.5	Zone A extent
22	5500604.271	480659.297	319.0	Zone A extent
23	5500557.338	480673.555	321.0	Zone A extent
24	5500527.445	480682.479	321.0	Zone A extent
25	5500505.475	480629.346		End of bank curve dimen.
26	5500314.612	480679.350		End of bank curve dimen.

LEGEND

Approx. OHWM Elev. 316.54 m (Q50⁄)

Approx. Ice scour Elev. 315.1 m

REVISIONS		
24/12/10	RE	ISSUED FOR REGULATORY REVIEW-R1
24/12/03	RE	ISSUED FOR REGULATORY REVIEW
DATE	BY	DESCRIPTION

DESIGN SEAL | RECORD SEAL

FOR REGULATORY APPROVAL

DILLON CONSULTING

CONSULTANT PROJECT NO. 236533

BRIDGE REPLACEMENT PLAN SUBMITTED FOR NAVIGATIONAL & ENVIRONMENTAL REVIEW

FOR 172 000 LONG STEEL I-GIRDER BRIDGE
OVER ASSINIBOINE RIVER ON P.T.H. No. 5
11 400 ROADWAY WIDTH
IN N.E. 1/4 SEC. 14-08-14W

R.M. OF GLENBORO-SOUTH CYPRESS

Manitoba
Transportation and Infrastructure
Bridges and Highway Structures

RELEASED FOR CONSTRUCTION
BY: _____
DIRECTOR OF BRIDGES AND HIGHWAY STRUCTURES
DATE _____

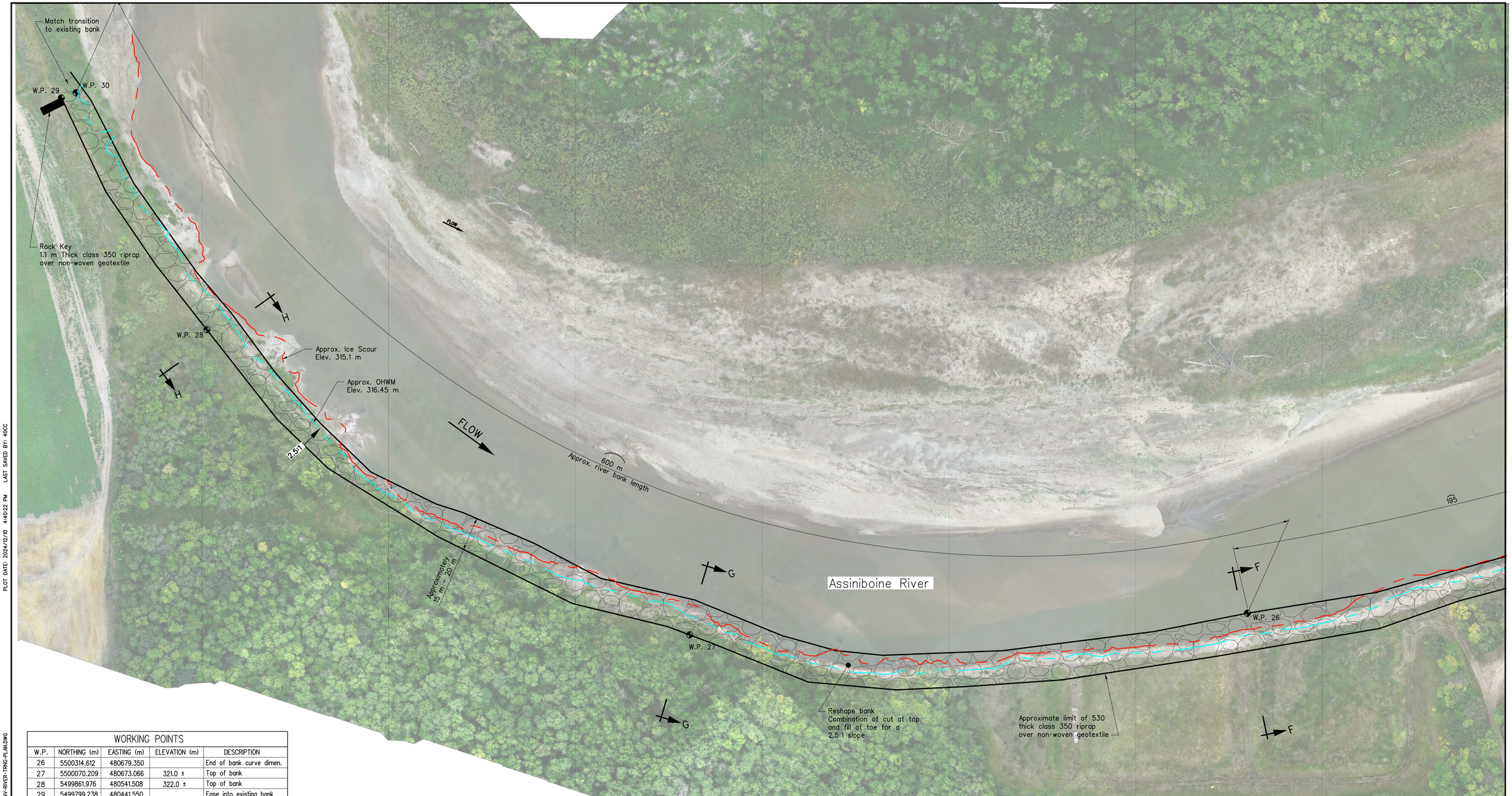
DESIGN BY: RE
CHECKED: _____

DETAILS BY: DJB
CHECKED: _____

SCALE: _____

SHEET No. 06

SITE No. 0352-10



WORKING POINTS				
W.P.	NORTHING (m)	EASTING (m)	ELEVATION (m)	DESCRIPTION
26	5500314.612	480679.350		End of bank curve dimen.
27	5500070.209	480673.066	321.0 ±	Top of bank
28	5499861.976	480541.508	322.0 ±	Top of bank
29	5499799.238	480441.550		Ease into existing bank
30	5499805.629	480439.339		End of bank curve dimen.

LEGEND

Approx. OHWM Elev. 316.54 m (Q50.0)

Approx. Ice scour Elev. 315.1 m

REVISIONS		
24/12/10	RE	ISSUED FOR REGULATORY REVIEW-R1
24/12/03	RE	ISSUED FOR REGULATORY REVIEW
DATE	BY	DESCRIPTION

BRIDGE REPLACEMENT PLAN SUBMITTED FOR NAVIGATIONAL & ENVIRONMENTAL REVIEW

FOR 172 000 LONG STEEL I-GIRDER BRIDGE
OVER ASSINIBOINE RIVER ON P.T.H. No. 5
11 400 ROADWAY WIDTH
IN N.E. 1/4 SEC. 14-08-14W

R.M. OF GLENBORO-SOUTH CYPRESS

DILLON CONSULTING

CONSULTANT PROJECT NO. 236533

DESIGN SEAL | RECORD SEAL

FOR REGULATORY APPROVAL

Manitoba Transportation and Infrastructure
Bridges and Highway Structures

RELEASED FOR CONSTRUCTION BY:

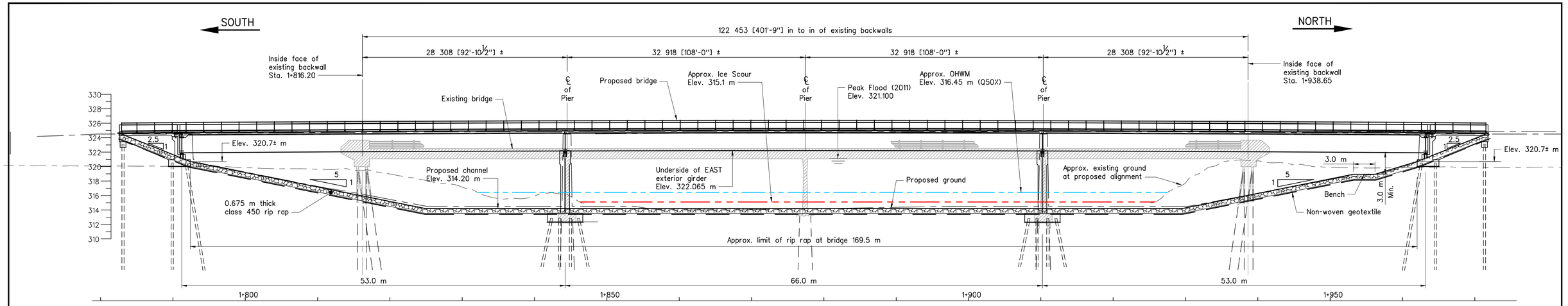
DIRECTOR OF BRIDGES AND HIGHWAY STRUCTURES

DATE

DESIGN	BY: RE	SCALE:
	CHECKED:	SHEET No. 07
DETAILS	BY: DJB	
	CHECKED:	SITE No. 0352-10

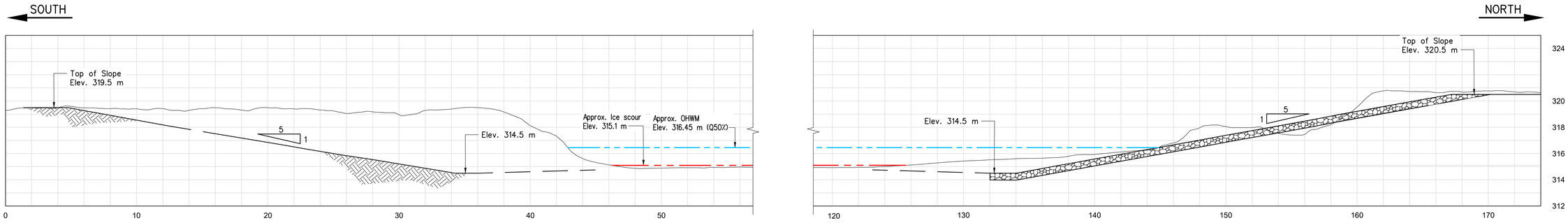
PLOT DATE: 2024/12/10 4:40:22 PM LAST SAVED BY: 40DC

C:\PW WORKING DIRECTORY\PROJECTS 2023\DILLON_40DB\DMS357\N\236533-ST-ENV-RIVER-TRNG-PLAN.DWG



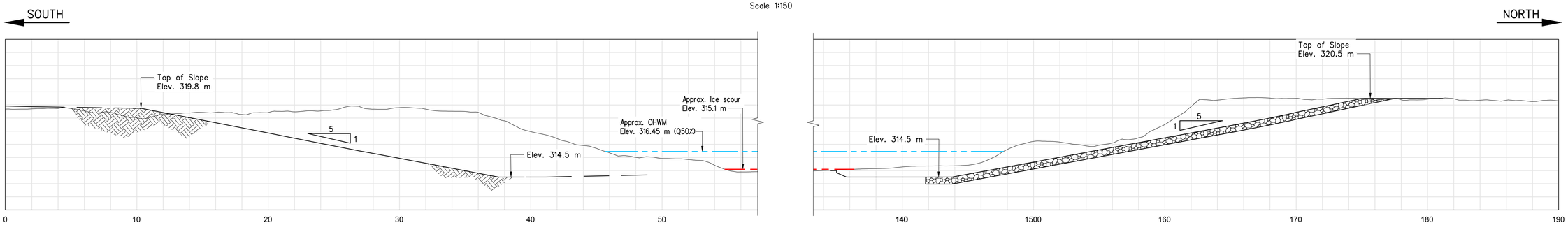
ELEVATION

Scale 1:250
Showing EAST face of Structure



SECTION A-A

Scale 1:150



SECTION B-B

Scale 1:150

REVISIONS		
24/12/10	RE	ISSUED FOR REGULATORY REVIEW-R1
24/12/03	RE	ISSUED FOR REGULATORY REVIEW
DATE	BY	DESCRIPTION

DESIGN SEAL | RECORD SEAL

FOR REGULATORY APPROVAL

DILLON CONSULTING

CONSULTANT PROJECT NO. 236533

BRIDGE REPLACEMENT PLAN SUBMITTED FOR NAVIGATIONAL & ENVIRONMENTAL REVIEW

FOR 172 000 LONG STEEL I-GIRDER BRIDGE
OVER ASSINIBOINE RIVER ON P.T.H. No. 5
11 400 ROADWAY WIDTH
IN N.E. 1/4 SEC. 14-08-14W

R.M. OF GLENBORO-SOUTH CYPRESS

Manitoba Transportation and Infrastructure
Bridges and Highway Structures

RELEASED FOR CONSTRUCTION BY: _____
DIRECTOR OF BRIDGES AND HIGHWAY STRUCTURES
DATE _____

DESIGN BY: RE
CHECKED: _____

DETAILS BY: DJB
CHECKED: _____

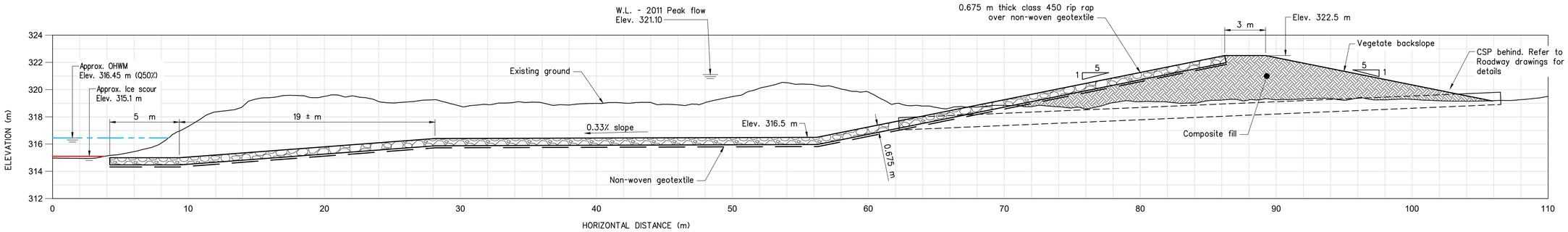
SCALE: _____

SHEET No. 08

SITE No. 0352-10

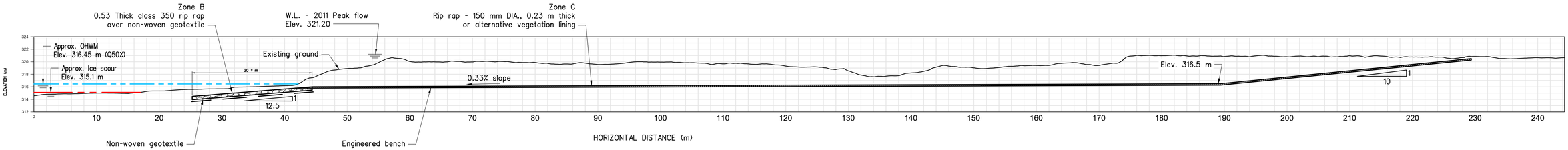
PLOT DATE: 2024/12/10 4:23:41 PM LAST SAVED BY: 400C

C:\PW WORKING DIRECTORY\PROJECTS 2023\DILLON_400C\DMS357\11\236533-ST-ENV-RIVER-TRNG.DWG



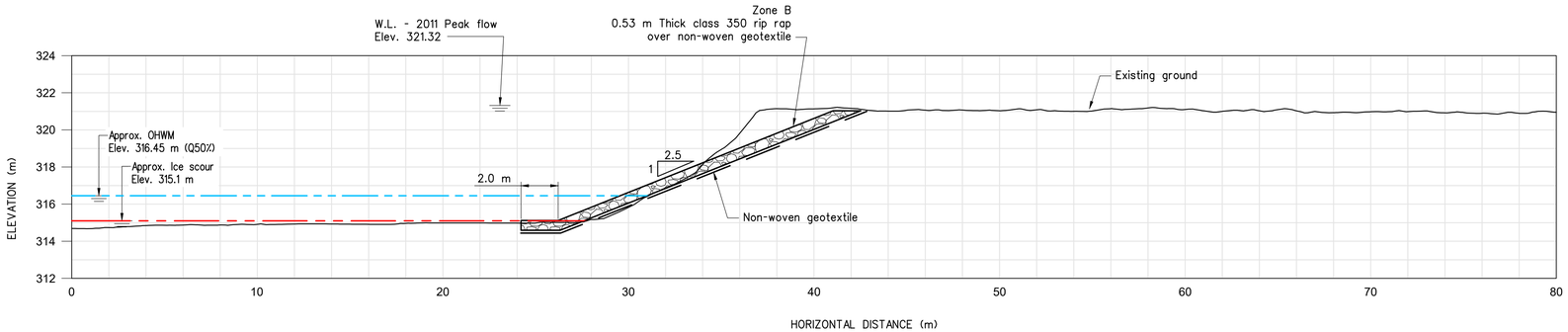
SECTION C-C

Scale 1:150



SECTION D-D

Scale 1:300



SECTION E-E

Scale 1:150

REVISIONS		
24/12/10	RE	ISSUED FOR REGULATORY REVIEW-R1
24/12/03	RE	ISSUED FOR REGULATORY REVIEW
DATE	BY	DESCRIPTION

DESIGN SEAL | RECORD SEAL

FOR REGULATORY APPROVAL

DILLON CONSULTING

CONSULTANT PROJECT NO. 236533

BRIDGE REPLACEMENT PLAN SUBMITTED FOR NAVIGATIONAL & ENVIRONMENTAL REVIEW

FOR 172 000 LONG STEEL I-GIRDER BRIDGE
OVER ASSINIBOINE RIVER ON P.T.H. No. 5
11 400 ROADWAY WIDTH
IN N.E. 1/4 SEC. 14-08-14W

R.M. OF GLENBORO-SOUTH CYPRESS

Manitoba
Transportation and Infrastructure
Bridges and Highway Structures

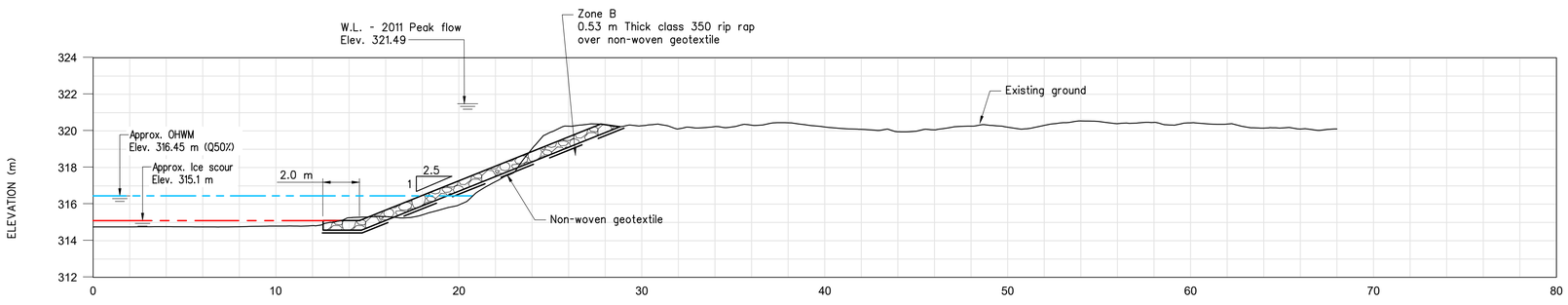
RELEASED FOR CONSTRUCTION
BY: _____
DIRECTOR OF BRIDGES AND HIGHWAY STRUCTURES

DESIGN — BY: RE — CHECKED: _____
DETAILS — BY: DJB — CHECKED: _____

DATE _____
SCALE: _____
SHEET No. 09
SITE No. 0352-10

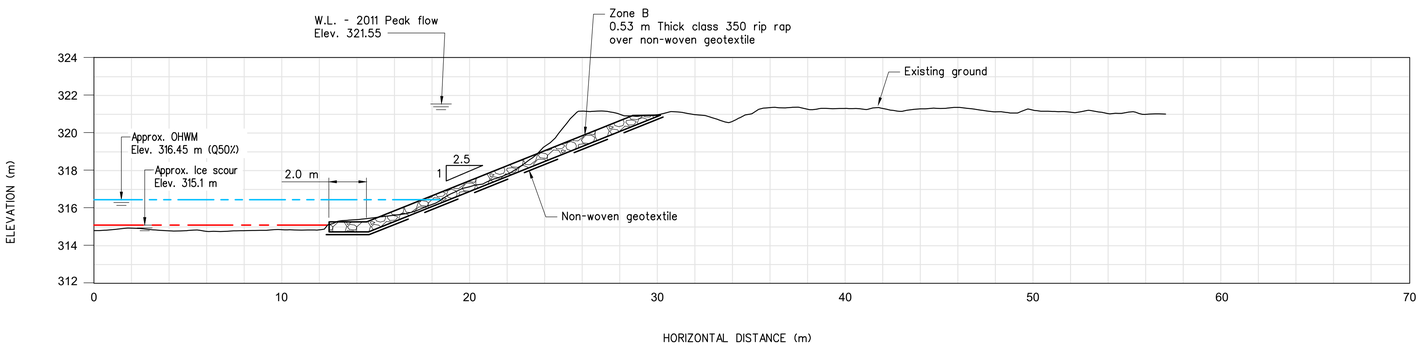
SECTION F-F

Scale 1:150



SECTION G-G

Scale 1:150



SECTION H-H

Scale 1:150

REVISIONS		
24/12/10	RE	ISSUED FOR REGULATORY REVIEW-R1
24/12/03	RE	ISSUED FOR REGULATORY REVIEW
DATE	BY	DESCRIPTION

DESIGN SEAL | RECORD SEAL

FOR REGULATORY APPROVAL

DILLON CONSULTING

CONSULTANT PROJECT NO. 236533

BRIDGE REPLACEMENT PLAN SUBMITTED FOR NAVIGATIONAL & ENVIRONMENTAL REVIEW

FOR 172 000 LONG STEEL I-GIRDER BRIDGE
OVER ASSINIBOINE RIVER ON P.T.H. No. 5
11 400 ROADWAY WIDTH
IN N.E. 1/4 SEC. 14-08-14W

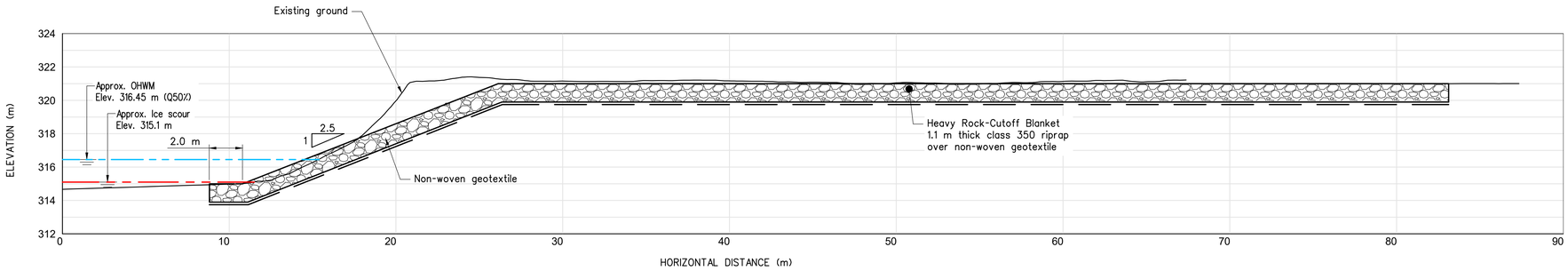
R.M. OF GLENBORO-SOUTH CYPRESS

Manitoba
Transportation and Infrastructure
Bridges and Highway Structures

RELEASED FOR CONSTRUCTION
BY: _____
DIRECTOR OF BRIDGES AND HIGHWAY STRUCTURES
DATE _____

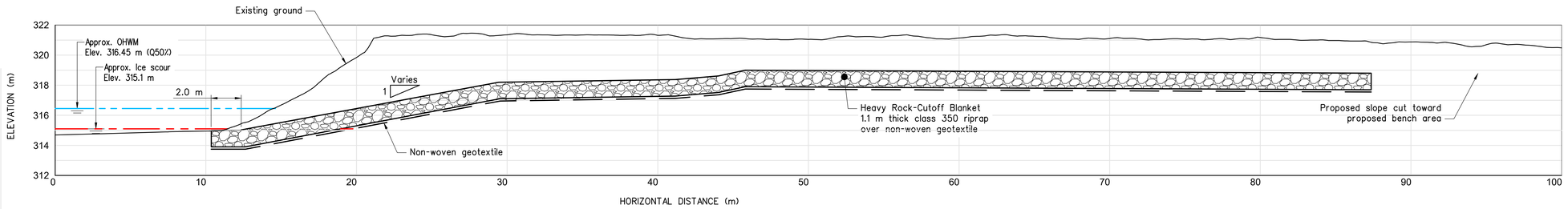
DESIGN — BY: RE — CHECKED: _____
DETAILS — BY: DJB — CHECKED: _____

SCALE: _____
SHEET No. 10
SITE No. 0352-10



SECTION J-J

Scale 1:150



SECTION K-K

Scale 1:150

REVISIONS		
24/12/10	RE	ISSUED FOR REGULATORY REVIEW-R1
24/12/03	RE	ISSUED FOR REGULATORY REVIEW
DATE	BY	DESCRIPTION

DESIGN SEAL | RECORD SEAL

FOR REGULATORY APPROVAL

DILLON CONSULTING

CONSULTANT PROJECT NO. 236533

BRIDGE REPLACEMENT PLAN SUBMITTED FOR NAVIGATIONAL & ENVIRONMENTAL REVIEW

FOR 172 000 LONG STEEL I-GIRDER BRIDGE
OVER ASSINIBOINE RIVER ON P.T.H. No. 5
11 400 ROADWAY WIDTH
IN N.E. 1/4 SEC. 14-08-14W

R.M. OF GLENBORO-SOUTH CYPRESS

Manitoba
Transportation and Infrastructure
Bridges and Highway Structures

RELEASED FOR CONSTRUCTION
BY: _____
DIRECTOR OF BRIDGES AND HIGHWAY STRUCTURES
DATE _____

DESIGN — BY: RE — CHECKED: _____
DETAILS — BY: DJB — CHECKED: _____

SCALE: _____
SHEET No. 11
SITE No. 0352-10

APPENDIX D – Site Photographs

Photo 1: Looking south along PTH 5 at approach to Assiniboine River bridge (2021-07-28)

Photo 2: Looking North along PTH 5 across the Assiniboine River bridge (2021-07-28)

Photo 3: Looking north along PTH 5 ROW at approach to Assiniboine River bridge (2021-07-28)

Photo 4: Looking south at typical roadside vegetation along PTH 5 ROW south of the bridge (2021-07-28)

Photo 5: Nesting colony of cliff swallows on the underside of the Assiniboine River bridge (2021-03-23)

Photo 6: Looking at the upstream side of the Assiniboine River bridge from the north bank (2021-07-28)

Photo 7: Looking downstream from the south bank of the Assiniboine River bridge (2021-07-28)

Photo 8: Looking upstream from the south bank of the Assiniboine River bridge (2021-07-28)

APPENDIX E – Terrestrial Habitat Assessment

KGS GROUP

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

October 12, 2022

WSP Group Limited
111-93 Lombard Avenue
Winnipeg, Manitoba R3B 3B1

ATTENTION: Jim Lukashenko, P.Eng.
Project Manager

RE: Summary of Terrestrial Environment and Species at Risk Assessment
Provincial Trunk Highway 5 over the Assiniboine River (Bridge Site No. 352-10)
R.M. of Glenboro-South Cypress - Draft Letter Report

Dear Jim Lukashenko:

We are pleased to present this draft letter report summarizing the findings of the Terrestrial Environment and Species at Risk Investigations for the new bridge location over the Assiniboine River on Provincial Truck Highway (PTH) 5 in the Rural Municipality (R.M.) of Glenboro-South Cypress. We will finalize the report upon receipt of your comments.

1.0 INTRODUCTION

Kontzamanis Graumann Smith MacMillan Inc. (KGS Group) was contracted by WSP Group Limited to describe and characterize the terrestrial environment and Species at Risk (SAR) that may be impacted by the project located Stockton Ecodistrict of the Aspen Parkland Ecoregion in the R.M of Glenboro-South Cypress (Figure 1). The purpose of the assessment is related to provincial and federal regulatory requirements as part of the new PTH 5 bridge construction. The current bridge and associated highway are owned by the Province of Manitoba and are surrounded on all sides by Spruce Woods Provincial Park. The scope of work included a desktop review, site investigations, data assessment and report preparation.

This letter report summarizes the findings of the terrestrial environment and SAR investigations of the study area and discusses potential impacts and mitigation measures applicable to the work.

1.1 Purpose

With the existing bridge structure over the Assiniboine River on PTH 5 at Spruce Woods Provincial Park (Bridge Site No. 352-10) approaching the end of its design service life, the Government of Manitoba has retained an Engineering Service Provider (ESP) to provide the preliminary design of a new, replacement bridge structure. For this project, KGS Group has been engaged as part of the ESP team to provide terrestrial environment and SAR investigations and reporting.

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

1.2 Scope of Work and Objectives

The scope of work for this assignment is to accurately describe the terrestrial environment associated with the Bridge over Assiniboine River on PTH 5 project, as well as the potential effects of the Project on the surrounding terrestrial environment and SAR.

Tasks undertaken to complete the assignment are as follows:

- Compilation and review of existing information on the terrestrial environment and SAR for the project area.
- Field investigations to confirm and fully describe the terrestrial habitat of the project area, including:
  - Terrestrial habitat assessment,
  - Breeding bird surveys,
  - Vegetation surveys and plant community characterization,
  - Observations on wildlife presence and habitat use.
- Reporting on the results of terrestrial investigations, including, but not limited to:
  - Detailed descriptions of the surround terrestrial environments,
  - A summary of SAR with the potential to occur in the Project Area,
  - Exhaustive species lists for all documented plants, birds, mammals, and amphibians,
  - A description of potential impacts of the Project on the terrestrial environment and SAR, as well as mitigation measures to avoid or minimize these impacts,
  - Regulatory requirements and considerations for future project planning and design, and
  - Remedial approaches to address residual impacts of the Project on the terrestrial environment, SAR, and their habitat.

1.3 Methodology

The details of the tasks required to meet the project objectives and complete the scope of work within the study area are described below.

1.3.1 DESKTOP REVIEW

A desktop review of the proposed project area was conducted by KGS Group using available materials and resources. This review included the analysis of aerial imagery, land cover mapping, ecological and environmental reports and databases, Park Management Plans, as well as a Manitoba Conservation Data Centre (CDC) rare element check for the vicinity of the project area. Characterization of the existing terrestrial environment focused on the local project area, where most effects of the project are likely to be measurable. The local project area is defined as the existing and anticipated right-of-way (ROW) as well as the adjacent communities extending a minimum of 25m beyond the limits of the existing ROW.

1.3.2 FIELD INVESTIGATIONS

Over the course of the 2021 field season, three separate site visits were conducted to collect relevant ecological and environmental information. These site investigations are further described as follows:

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

Site Investigation #1 (June 1st, 2021):

During the first field survey, terrestrial habitat classification and delineation was completed. Preliminary habitat classification developed at the Desktop Review stage was refined in the field to provide habitat classification based on ground-level observations. Terrestrial habitat within and extending 25m outside of the limits of the existing and anticipated ROW was documented and characterized. Surveyors conducted meander surveys throughout the full extent of this area to collect relevant terrestrial data including plant community assemblages, structure, and condition. Site photography was collected for use in reporting.

Avian surveys were also conducted during Site Investigation #1 and included auditory and visual observations, as well as targeted surveys for multi-generational stick nests and avian nesting colonies. Survey sites (listening locations) were placed within each unique habitat type and spaced to provide extensive coverage throughout a 350m radius centered on the middle of the existing bridge. Breeding bird surveys were conducted within 4hrs of sunrise during suitable weather conditions. Figure 1 illustrates the placement of the breeding bird survey locations. Field staff conducted targeted stick nest surveys throughout all suitable forested habitats. Stick nest surveys relied on visual observations from the ground using 10x binoculars. If stick nests were detected, they were geo-referenced and observations on nest occupancy were made. Field staff surveyed the existing bridge structure to determine the presence/absence of cliff swallows which have been known to occupy nesting colonies under the bridge in the past. Observations on nest occupancy, species presence, and approximate colony size were recorded.

Incidental observations on wildlife presence and habitat-use were made throughout all field surveys. At the desktop stage, wildlife species known to, or with the potential to, occupy the project site were reviewed and assessed based on expected habitat types and professional experience. Wildlife signs (tracks, scat, hair, rubs, burrows, etc.) were documented with photography.

Site Investigation #2 (June 28, 2021):

During Site Investigation #2, a vegetation survey was conducted within the existing ROW and extending approximately 25m into the adjacent plant communities. The full extent of this area was investigated by meander survey along transects and vegetation information was collected relating to:

- Plant species presence,
- Plant community composition and quality (health, fragmentation, disruption etc.),
- Habitat suitability,
- Medicinal, subsistence, and culturally important species.

Breeding bird survey #2 was also conducted during this site investigation following the same protocol and sample locations identified for Site Investigation #1. Supplemental information or confirmation of earlier nesting observations were made, including documenting wildlife presence or habitat use.

Site Investigation #3 (August 28, 2021):

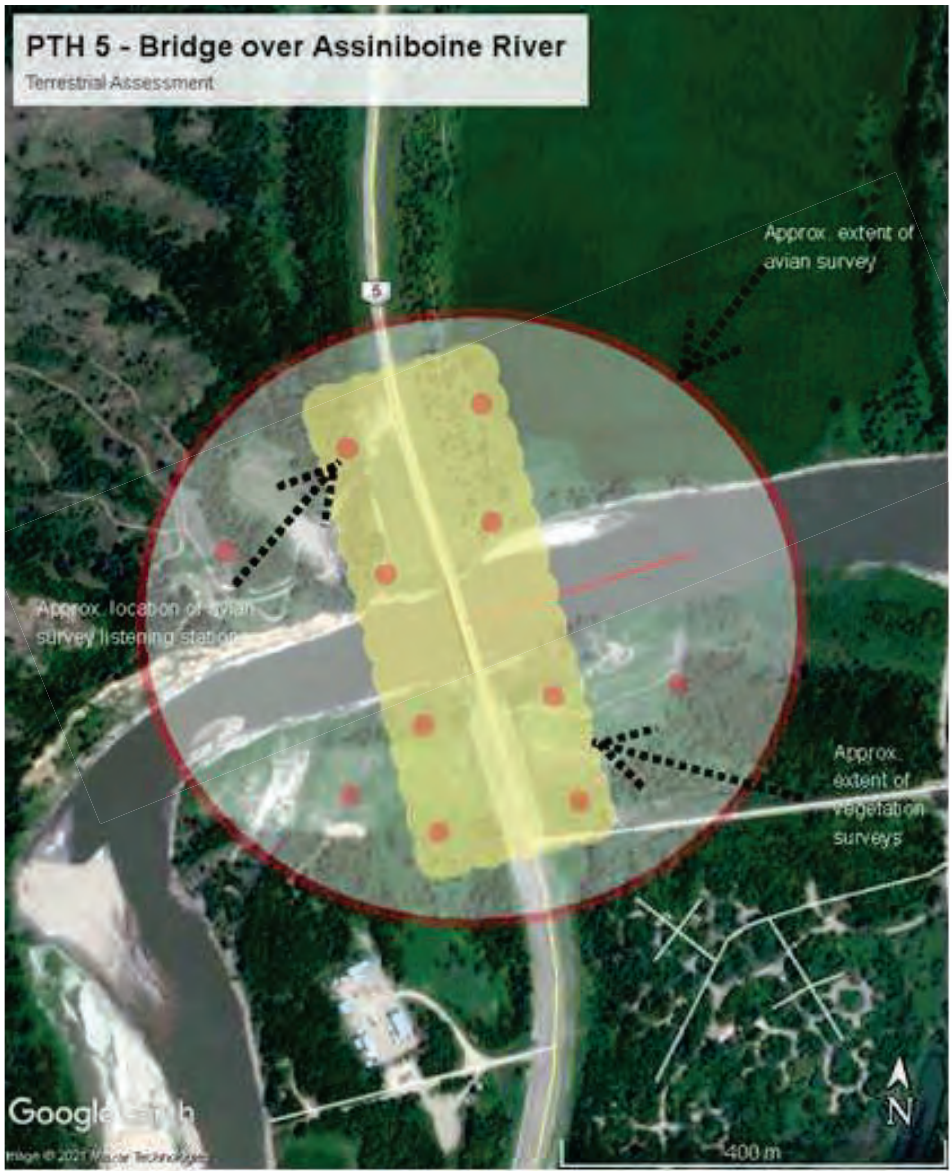
During the final site investigation, an additional vegetation survey was conducted to identify late flowering plant species and those that were not readily identifiable during the first vegetation surveys. Any supplemental site

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

information was collected, and observations on wildlife presence or habitat use were made during this site investigation.

FIGURE 1. SITE MAP SHOWING EXTENTS OF FIELD INVESTIGATIONS.



1.3.3 REPORT PREPARATION

All information collected during the study was evaluated and compiled into a letter report. The letter report includes copies of all species lists developed during desktop review and through field investigations (Appendix A), site photographs (Appendix B), and summarized information from MCC rare element searches (Appendix C).

KGS GROUP

Kontzamanis Graumann
Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

2.0 DESKTOP REVIEW

2.1 Overview of Terrestrial Habitat

The existing bridge structure over the Assiniboine River on PTH 5 at Spruce Woods Provincial Park is in the Aspen Parkland Ecoregion (Stockton Ecodistrict) of the Prairie Ecozone. It is part of the Transitional Grassland Ecoclimatic Region, which is characterized by a continental climate marked by short, warm summers and long, cold winters. The natural vegetation within this region varies, with trembling aspen groves in moist locations, grassland habitat on drier landscapes, and maple and ash commonly occurring on alluvial materials along the larger waterways. Within this ecodistrict along the Assiniboine River, soils are characterized as droughty Humic Regosols associated with a narrow band of duned sands (Smith *et al*., 1998).

The anticipated footprint of the new structure will largely overlap with the existing bridge and highway ROW. Within this extent, grassy and herbaceous vegetation occupies the cleared ROW, and narrow riparian habitat abuts the bridge structure as it crosses the Assiniboine River. The adjacent vegetation and plant communities varies across the project extent and includes mature and young hardwood forests as well as grassland/shrubland habitat. In addition to the natural habitat, the existing bridge is known to have been used as a cliff swallow nesting colony, a species that has seen its populations decline since the mid-1980s.

2.2 Plant Species of Conservation Concern

The Manitoba CDC tracks 122 plant species of conservation concern that may occur within the Aspen Parkland Ecoregion (Appendix A - Table 1). Of these species, seven plants are listed by the *Species at Risk Act* (SARA), The *Endangered Species and Ecosystems Act* (ESEA), or the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). A brief description of the habitat preferences for these species is provided below:

Rough agalinis (*Agalinis aspera*):
ESEA: Endangered **SARA: Endangered** **COSEWIC: Endangered**
Rough agalinis is a prairie species typically found in wet meadows where vegetation is sparse and open, allowing full exposure to the sun. They prefer alkaline soil, with exposed patches of bare stony soil and limestone gravel (soil disturbance appears to be tolerated). Extant Canadian sites represent remnant prairie habitats found primarily along roadsides (COSEWIC, 2006).

Buffalograss (*Bouteloua dactyloides*):
ESEA: Threatened **SARA: Special Concern** **COSEWIC: Special Concern**
Buffalograss is found in shortgrass and mixed-grass prairies. It is tolerant of grazing and is often found in native pastures. It is typically found growing in clay to loam soils along lower slopes of hills and ridges and along gradual slopes of river and creek valleys (COSEWIC, 2011).

Hackberry (*Celtis occidentalis*):
ESEA: Threatened **SARA: Not Listed** **COSEWIC: Not Listed**
Common hackberry is most often detected in hardwood gallery, floodplain, or bottomland forests along streams and rivers throughout the Great Plains.

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

Smooth goosefoot (*Chenopodium subglabrum*):
ESEA: Endangered **SARA: Threatened** **COSEWIC: Threatened**
The habitat for smooth goosefoot is characterized as partially stabilized sand dunes. These sand dunes are typically in an early- to mid-successional state. In other words, it is transitional between recently disturbed (active) sand dunes, and those that become fully stabilized through the process of natural vegetative succession (COSEWIC, 2006).

Small white lady's slipper (*Cypridium candidum*):
ESEA: Endangered **SARA: Endangered** **COSEWIC: Threatened**
It is found predominately in moist prairie and savannah, and rich, calcareous wetland fens. In Manitoba, critical habitat is described as moderately to imperfectly drained, open native prairie; or prairie openings with occasional sparse shrub cover; or prairie openings between tree "bluffs". Slopes are flat to undulating with ridge and swale topography (Environment Canada, 2014).

Hairy prairie-clover (*Dalea villosa* var. *villosa*):
ESEA: Threatened **SARA: Special Concern** **COSEWIC: Special Concern**
Hairy prairie-clover is found in open prairie communities that are part of sandhill complexes. Soils are dry, rapidly draining sands to sandy loams. Plants are most often found on partially stabilized sandy soils, but can occasionally be found in open, sandy blowouts (COSEWIC, 2000).

Western spiderwort (*Tradenscantia occidentalis*):
ESEA: Threatened **SARA: Threatened** **COSEWIC: Threatened**
In Manitoba, western spiderwort grows only in sandy soils, on open to partially stabilized dune systems. The plants are most often found on south-facing slopes, and on the crests of slopes. Western spiderwort favours areas with sparse vegetation but can also grow among small shrubs, especially in grazed areas (COSEWIC, 2002).

Considering the habitat preferences of these SARA listed plant species in relation to the terrestrial habitat provided by the project site, hackberry may occur within the riparian hardwood forests adjacent to the existing ROW. The other species are not expected due to their preference for native prairie and sand dune habitat; however, these species have a high likelihood of presence within Spruce Woods Provincial Park and the nearby Spirit Sands sand dune complex.

A rare element check was performed by the Manitoba CDC to investigate historic occurrences of plant species of conservation concern in the vicinity of the Project site. Historic records indicated a total of six (6) rare plant detections within 100m of the bridge site, none of which are SARA listed species. A total of 23 rare plant detections have occurred within 2km of the project site, of which two (2) are SARA listed species associated with sand dune and sandhill complexes (hairy prairie clover and smooth goosefoot) (Appendix A - Table 2). There are no endangered ecosystems protected by ESEA present within the vicinity of the Project site.

2.3 Avian Species of Conservation Concern

The Manitoba CDC tracks 38 avian species that may occur within the Aspen Parkland Ecoregion (Appendix A – Table 3). Of these species, 24 are listed by SARA, ESEA, or COSEWIC. A brief description of the specific habitat preferences for these species is presented in Appendix A - Table 4.

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

Considering the terrestrial habitat associated with the Project, adjacent uplands may provide suitable habitat for SARA listed species that include short-eared owl, eastern wood-pewee, loggerhead shrike, red-headed woodpecker, and golden-winged warbler. The nearby Spruce Woods Provincial Park provides habitat for many of the SARA listed species that associate with open native mixed grass prairie. The riparian environment may provide habitat for species that include bank swallow and piping plover. The bank of the Assiniboine River at the project location is within the Critical Habitat Unit identified in the recovery plan for bank swallows (1233_MB_16 – Assiniboine River (A)) (ECCC, 2021).

A rare element check was performed by the MB CDC to investigate historic occurrences of avian species of conservation concern in the vicinity of the Project. Historic records indicate a total of eight (8) rare bird detections within 2km of the project site, of which five (5) are SARA listed species (Appendix A - Table 5). Additionally, there is a documented record of a sharp-tailed grouse lek within 2km of the project site.

2.4 Amphibian, Reptile, and Mammal Species of Conservation Concern

The MB CDC tracks five (5) amphibian, five (5) reptiles, and two (2) mammalian species that may occur within the Aspen Parkland Ecoregion; this includes four (4) amphibians and three (3) reptiles listed under SARA (Appendix A – Table 6). A brief description of the habitat preferences for these species is provided below:

Western tiger salamander (*Ambystoma mavortium*):
ESEA: Not Listed **SARA: Special Concern** **COSEWIC: Special Concern**
Western tiger salamanders occupy a variety of open habitats, including grasslands, parkland, subalpine meadows, and semi-deserts. Key habitat features include sandy or friable (crumbly) soils surrounding semi-permanent to permanent water bodies lacking predatory fish (COSEWIC, 2021).

Eastern tiger salamander (*Ambystoma tigrinum*):
ESEA: Not Listed **SARA: Endangered** **COSEWIC: Endangered**
Eastern tiger salamanders inhabit areas where sandy or friable (crumbly) soils surround fishless, semi-permanent or permanent water bodies that they use as breeding sites; eastern tiger salamanders do not use river habitat (COSEWIC, 2013). Eastern tiger salamander in Manitoba live east of the Red River Valley, in the southeast corner of the province.

Great Plains toad (*Anaxyrus cognatus*):
ESEA: Threatened **SARA: Special Concern** **COSEWIC: Special Concern**
Great Plains toads inhabit the dry grasslands of the southern prairie region of Canada. This species breeds in shallow, temporary pools created by snowmelt and rainwater, as well as anthropogenic features such as waterfowl ponds, dikes, ditches, and flooded fields (CHS, 2021).

Northern leopard frog (*Lithobates pipiens*):
ESEA: Not Listed **SARA: Special Concern** **COSEWIC: Special Concern**
Northern leopard frogs typically breed in permanent or semi-permanent wetlands, streams and shallow sections of lakes and rivers that have clear water and are generally free of predatory fish. They may forage extensively in terrestrial habitats during summer (CHS, 2021).

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

Snapping turtle (*Chelydra serpentina*):
ESEA: Not Listed **SARA: Special Concern** **COSEWIC: Special Concern**
The snapping turtle occurs in almost any freshwater habitat, though it is most often found in slow-moving water with a soft mud or sand bottom and abundant vegetation. This species may inhabit surprisingly small wetlands, ponds, and ditches (CHS, 2021).

Plains hognose snake (*Heterodon nasicus*):
ESEA: Threatened **SARA: Special Concern** **COSEWIC: Special Concern**
In Canada, plains hognose snake occurs in grasslands on soils with high sand content. Within these grasslands, the snakes can be found in a variety of open-canopy communities, ranging from drier habitats to damp lowlands; the snakes are often found near water (COSEWIC, 2019).

Northern prairie skink (*Plestiodon septentrionalis*):
ESEA: Endangered **SARA: Endangered** **COSEWIC: Special Concern**
The northern prairie skink is found in one part of Canada – southwestern Manitoba where it is restricted to sandy soils with mixed grass prairie vegetation. These conditions occur in the Stockton Loamy and Miniota Sands of the Carberry Hills along the Assiniboine Delta, and at the Souris Sands of the Lauder Sandhills. The Project site occurs within the known range of the northern prairie skink and overlaps with a Critical Habitat polygon identified in the recovery plan for northern prairie skinks (COSEWIC, 2017).

Considering the terrestrial habitat associated with the Project, the riparian environment and the adjacent uplands may provide suitable habitat for SARA listed species that include northern leopard frog, snapping turtle, plains hognose snake, and northern prairie skink. The project area overlaps with a Critical Habitat polygon identified in the recovery plan for northern prairie skinks (COSEWIC, 2017).

A rare element check was performed by the MB CDC to document historic occurrences of amphibian, reptile, and mammal species of conservation concern in the vicinity of the Project. Historic records indicate a total of one recorded detection of a rare species (plains hognose snake) within 100m of the existing bridge structure. An additional four detections of rare species within 2km of the bridge structure have been recorded (Appendix A - Table 7). This includes the plains hognose snake, northern leopard frog, snapping turtle, and northern prairie skink.

3.0 FIELD INVESTIGATIONS

3.1 Terrestrial Environment

The terrestrial environment associated with the current project is characterized by three general conditions:

1. The existing ROW,
2. The riparian environment, and
3. The adjacent upland communities.

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

These three typical conditions are further described below with special attention given to habitat and habitat features that may support species of conservation concern with the potential to occur within the Aspen Parkland Ecoregion.

3.1.1 EXISTING RIGHT-OF-WAY

The existing bridge and highway ROW varies in width across the project site. The approximate widths of ROW are as follows:

- North-east: 10m
- North-west: 35m
- South-east: 10m
- South-west: 15m

All ROW areas are characterized as disturbed environments dominated by non-native and invasive plant species. Smooth brome, quack grass, and bluegrass species were the dominant grass species throughout the ROW, with only sporadic native grasses present within the groundcover. Common tansy and leafy spurge, both Tier 2 Noxious Weeds and Category 2 Terrestrial Invasive species, are common in the ROW as well as throughout the rock-lined riverbank on the north-west side of the bridge. Other common weed species present on the ROW include absinth, common burdock, Canada thistle, and perennial sow thistle.

Native plant species are relatively uncommon in all ROW quadrants except for showy milkweed which is prevalent throughout the north-east ROW and adjacent uplands. Native grass species including big bluestem, Indian grass, Canada wildrye, and switchgrass are sporadically present within the existing ROW, at low densities.

Sandy soils are present throughout the ROW and sporadic small scale surface disturbances have exposed underlying sandy soils.

3.1.2 RIPARIAN ENVIRONMENT

The riparian habitat surrounding the project site is characterized by relatively narrow and steep riverbanks dominated by flood tolerant and/or moisture loving plants, including both native and non-native species.

On the north side of the bridge the riverbank has been armoured with limestone riprap which extends up to 15m either side of the bridge before transitioning back to a natural eroded riverbank condition. The vegetation established along the riprap blanket is characterized by a mixture of aggressive noxious and invasive weed species (common burdock, Canada thistle, leafy spurge, etc.) as well as native woody vegetation (willow sp., Manitoba maple, and dogwood).

Vegetation on all other riverbanks is a combination of herbaceous native and non-native species including bulrush, water smartweed, horsetail, water plantain, and reed canary grass as well as flood tolerant woody species, predominantly sandbar willow. Exposed sand bars and benches exist on the riverbanks, which are typically sparsely vegetated with pioneering herbaceous and woody vegetation. Large mature trees and snags occupy adjacent upland habitat along much of the riparian corridor.

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

3.1.3 ADJACENT UPLAND COMMUNITIES

The plant communities adjacent to the existing ROW vary in their composition and condition based on their location. Sandy soils are present throughout the adjacent upland communities and sporadic small scale surface disturbances have exposed underlying sandy soils; a brief description of each plant community is provided below:

North-east:

The adjacent plant community on the north-east side of the project site is sparsely wooded with young Manitoba maple and sporadic larger white spruce, ash, or cottonwood trees (< 15% canopy coverage). Groundcover is dense and dominated by herbaceous weedy vegetation, predominantly smooth brome, leafy spurge, and common tansy. Coarse woody debris is common throughout this area. Forested portion of this area can be classified as Miscellaneous Hardwoods (V3) according to Zoladeski *et al*., (1995).

North-west:

On the north-west portion of the project site, the existing ROW gives way to mature deciduous forest habitat generally classified as Miscellaneous Hardwoods (V3) (Zoladeski *et al*., 1995). Overstory species include cottonwood, bur oak, green ash, maple, and basswood. Shrub layer species include buffaloberry, snowberry, chokecherry, black currant, and alder. Vines are common throughout this forest habitat, including riverbank grape, Virginia creeper, and Canada moonseed. At the ground level, lily-of-the valley, meadow rue, sedge sp., horsetail, and northern bedstraw are common.

A steep ridge exists within this forest area at a variable distance from the existing ROW (from approximately 5 – 25m into the forest). Beyond this ridge exists the Spirit Sands self-guided trail parking and rest area. This area is developed to include a parking area as well as washroom facilities, trailhead, and a well. Existing vegetation throughout this area is native and characteristic of the mixed-grass prairie environment.

South-east:

The forest habitat located on the south-east portion of the site is characterized by sporadic large snags and mature cottonwood and green ash trees. Manitoba maple and green ash are regular components of the understory, and the groundcover is predominantly herbaceous vegetation including smooth brome and reed canary grass. Forested portion of this area can be classified as Miscellaneous Hardwoods (V3) according to Zoladeski *et al*. (1995).

Moving away from the Assiniboine River, the adjacent upland community transitions to a young maple and ash dominated habitat with a diversity of native shrubs including prickly rose, saskatoon, snowberry, and chokecherry. The groundcover is a mixture of native and non-native species, including smooth brome, bluegrass, vetch, and reed canary grass. At the southern extent of the Project area, the vegetation shifts composition to a mid-aged oak and Manitoba maple community with understory and ground-level vegetation composed of primarily native species.

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

South-west:

The forest conditions on the south-west side of the site are consistent with the south-east. The area immediately upland from the river is occupied by sporadic snags and mature cottonwood and ash trees with a sparse understory and a groundcover that is dominated by non-native herbaceous vegetation (smooth brome, reed canary grass, common tansy, etc.). This habitat type transitions to a young Manitoba maple and green ash cover type with dense shrub cover and ground level vegetation dominated by smooth brome and other herbaceous species. Forested portion of this area can be classified as Miscellaneous Hardwoods (V3) according to Zoladeski *et al*. (1995).

3.2 Plant Species

A total of 105 plant species were recorded during field investigations at the Project site in 2021 (Appendix A - Table 8). This includes 10 tree species, 16 shrub species, 3 vines, 54 herbaceous and graminoid species, four (4) moss/fern/bryophytes and 18 non-native species.

No species listed by the ESEA, SARA, or COSEWIC were detected during the terrestrial surveys. One (1) provincially rare (S2) species, side-oats grama (*Bouteloua curtipendula*), and one (1) provincially uncommon (S3) species, Canada moonseed (*Menispermum canadense*), were detected during the terrestrial surveys. Side-oats grama was observed at the fringe of the adjacent upland forest in the north-west portion of the site, approximately 200m north of the bridge structure. Canada moonseed was detected within the adjacent upland forest in the north-west portion of the site approximately 100m north from the bridge structure.

An additional 18 non-native plant species were detected during the terrestrial surveys. Of these species, seven (7) are listed as Tier 3 Noxious Weeds and two (2) are listed as Tier 2 Noxious weeds by the *Noxious Weed Act* in Manitoba, these are leafy spurge and common tansy. These two Tier 2 Noxious weeds are also classified as Category 2 Invasive species by the Invasive Species Council of Manitoba (ISCM). These two invasive species were common throughout the existing ROW as well as portions of the riverbank and adjacent areas.

At least 69 of the 105 plant species detected during field investigations are known to have medicinal or subsistence uses or are culturally important (Appendix A - Table 8) (Marles *et al*., 2000). This includes species with known medicinal properties, such as Canada mint (*Mentha canadensis*) and common yarrow (*Achillea millefolium*), as well as culturally important species such as prairie sage (*Artemisia ludoviciana*) and paper birch (*Betula papyrifera*). Subsistence species are common throughout the adjacent uplands, including saskatoon, beaked hazelnut, chokecherry, black currant, raspberry, buffaloberry, and riverbank grape. The young, sparse forest cover found on the south side of the project site presents favorable habitat for many of these species, and this area presents ample food sources for collection or wildlife use. Fruit bearing shrubs were also found commonly at the forest fringe on the north-west side of the project area, including patches of buffaloberry, chokecherry and black currant.

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

3.3 Avian Species

A total of 27 avian species were detected during the terrestrial surveys, all of which are considered provincially common and widespread (S4X and S5X) (Appendix A – Table 9). None of the species detected are listed by ESEA, SARA, or COSEWIC.

The majority of documented breeding bird activity originated from adjacent upland areas surrounding the project site. The Spirit Sands Interpretive Trail area in the northwest quadrant provided the high-value habitat and was densely occupied by nesting birds including, American redstart, black-throated green warbler, white-throated sparrow, red-eyed vireo, and a Swainson's thrush which was identified calling from shrubby habitat adjacent the river. In other areas, grassy habitat with shrub cover provided nesting cover for sparrows including clay-coloured and song sparrow. Common yellowthroat, and alder flycatcher were observed on the southern side of the bridge where dense shrub areas provided nesting habitat adjacent the river channel. Several bird species were detected incidentally passing through the project site including blue-winged teal, common goldeneye, red-winged blackbird, and belted kingfisher all of which are species common to the Assiniboine River valley.

3.3.1 NESTING COLONIES AND MULTI-GENERATIONAL STICK NESTS

The existing bridge structure is being used extensively as nesting habitat by a cliff swallow (*Petrochelidon pyrrhonota*) colony, with abundant active nests located on the underside of the bridge. Hundreds of cliff swallows visiting more than a thousand potentially active nests were observed during the spring bird surveys. Most of the span of the bridge was occupied with nests on both the east and west sides.

All suitable trees were scanned for the presence of multi-generational stick nests during the spring bird surveys, with no existing stick nests identified within the vicinity of the project area.

Adjacent riverbanks were scanned for the presence of bank swallow colonies, and none were identified.

3.4 Wildlife Presence and Habitat Use

A total of six mammal species and no amphibian or reptile species were detected during field investigations.

All mammals are considered provincially common (S5) and are not listed by ESEA, SARA, or COSEWIC. These include northern pocket gopher, American beaver, white-tailed deer, coyote, red squirrel, and common raccoon (Appendix A - Table 10). The upland habitats adjacent to the existing ROW presents favorable habitat for white tailed deer, with ample woody and herbaceous browse and proximity to the riparian corridor. Evidence of habitat use by white tailed deer included numerous game trails, scat, and woody browse. The common fruit bearing shrubs present food source for many wildlife species, and the shrubby vegetation provides valuable wildlife cover.

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

4.0 POTENTIAL IMPACTS AND MITIGATION

4.1 Potential Impacts

The replacement of the existing bridge structure over the Assiniboine River on PTH5 has the potential to impact the terrestrial environment in several ways. Potential impacts to the terrestrial environment and species include direct loss of plant species and terrestrial habitat during clearing and construction, degradation of site soils, and the establishment and expansion of noxious and invasive species. Other effects on species may occur during construction due to noise, dust, and air quality.

Given that the disturbed ROW of the Project is expected to overlap considerably with the existing bridge structure and roadway, the extent of disturbance on terrestrial habitat and species is expected to be relatively low. Within this extent, during construction of the Project, the level of disturbance will be moderate to high resulting from grading, earthworks, and extensive use of heavy equipment.

4.1.1 DIRECT LOSS OF PLANT SPECIES AND TERRESTRIAL HABITAT

The construction of the project will remove or damage vegetation throughout the existing ROW and may necessitate clearing of some vegetation in the areas adjacent to the existing ROW. While the footprint of the ROW for the new bridge and road alignment is anticipated to overlap considerably with the exiting ROW, some expansion and realignment may occur. Within this existing ROW, grading and earthworks will result in the loss of existing plant species. Similarly, expansion or re-alignment of the roadway and bridge structure may necessitate additional clearing of adjacent vegetation resulting in loss of plant species and habitat.

The ROW vegetation is a mixture of native plant species and non-native weeds and is typical of roadside vegetation throughout the region. No plant species of conservation concern were detected in the ROW during the terrestrial investigations, and most of the plant species are either common native species or non-native species. The north-east existing ROW contains a patch of showy milkweed (*Asclepsia speciosa*), a native plant species which is considered an important food source for the SARA listed (Special Concern) monarch butterfly (*Danus plexippus*). This patch of milkweed extends beyond the existing ROW into the adjacent upland area.

When expansion of the existing ROW is required, clearing and construction will result in the loss of plant species. During the terrestrial investigations, one provincially uncommon (S3) and one provincially rare (S2) plant species were detected in the adjacent plant communities. These species were situated in the north-west portion of the site, within the Spruce Woods Provincial Park boundary. Fruit bearing shrubs and vines were common throughout the adjacent plant communities, particularly on the south side of the bridge. Expansion of the existing ROW in these areas will result in the loss of some of these subsistence species, however these species are all considered common and are widespread throughout the area.

Large mature trees and snags in the area immediately upland from the riverbank represent potential habitat for stick-nesting birds, though no active nests were detected during terrestrial investigations. Replacement of the bridge structure will directly result in the removal of an established nesting colony of cliff swallows. Biophysical characteristics required for bank swallow nesting do not appear to exist within the immediate footprint of the

project (rip-rap armoured or non-erodible banks). However, riverbanks located upstream of the bridge where naturally erodible riverbanks occupy both sides of the river could provide suitable habitat for this protected bird species.

Alterations to the riparian and adjacent upland environments because of the project have the potential to impact habitat suitable to local amphibian and reptile species through loss of vegetation, cover, and other habitat features. The Manitoba CDC has a recent record of an occurrence of plains hognose snake within 100m of the project site, indicating general habitat suitability, and the site overlaps with the known range and a Critical Habitat polygon identified in the recovery strategy for the northern prairie skink. While there were no detections of these species during field investigations, there is a potential for these species to occur in the vicinity of the project, particularly in association with the native grassland and dune habitat of Spruce Woods Provincial Park Spirit Sands dune complex.

4.1.2 SOIL DEGRADATION

Construction activities related to the project have the potential to lead to degradation of site soils through stripping and loss, compaction, and residual effects of applied or accidentally released chemical substances. Grading and earthworks have the potential to result in the loss of topsoil, as well as vegetation, seedbank, and important soil biota. Compaction related to the use of heavy equipment may occur, particularly in high traffic areas and areas experiencing prolonged heavy equipment use. Throughout construction there is a potential for accidental release of environmental pollutants, most commonly through fuel spills or equipment damage or malfunction. Following construction, while the site is cleared of perennial vegetation cover, the surface soils will be at an increased risk of erosion and sediment loss.

4.1.3 NOXIOUS AND INVASIVE PLANT SPECIES

Disturbance resulting from construction activities can result in the introduction of non-native and invasive weeds if not properly managed through monitoring, weed control, and effective revegetation. Following construction activities, while the site is not vegetated, exposed surface soils are highly susceptible to invasion and establishment of noxious and invasive plant species. Roads and highways, as well as animals and water courses are all vectors through which weed seed can be transported to site.

Currently, two (2) Tier 2 Noxious Weeds – common tansy (*Tanacetum vulgare*) and leafy spurge (*Euphorbia esuala*) are widespread on site throughout the existing ROW and in some cases extending into adjacent areas. These species are common on roadsides and in pastureland in the local area and are considered highly invasive and difficult to eradicate. Other weeds present on site include common burdock, Canada thistle, sow-thistle, dandelion, as well as quack grass, smooth brome, and reed canary grass.

Noxious and invasive species established within ROWs may expand into adjacent higher quality communities, potentially resulting in loss of native plant species and degradation of habitat. Weed populations that do not readily invade mature forest habitat may take advantage of disturbances in canopy cover either through clearing, fire, windthrow, or other disturbance to expand into new areas.

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

4.1.4 NOISE, DUST AND AIR QUALITY

Grading, earthworks, and other construction activities associated with the project have the potential to generate noise, dust, and erosion. Excessive noise, dust, and other air quality impacts from construction can influence wildlife behaviour in many ways, including to deter wildlife from nesting or taking residence in a particular habitat. The impacts from noise and dust are expected to be short in duration, confined to workday hours during the active construction period.

4.2 Constraints and Regulatory Requirements

- SARA permit may be required for potential impacts to habitat of the northern prairie skink, which is listed as Endangered. Follow up discussion will be required with Environment and Climate Change Canada to confirm whether a SARA Permit is required or not.
- A ministerial exemption under ESEA may be required for potential impacts to habitat of the Endangered northern prairie skink and Threatened plains hognose snake habitat. Follow up discussion will be required with Manitoba Natural Resources and Northern Development, Wildlife and Fisheries Branch to confirm whether a ministerial exemption under ESEA is required or not.
- Follow up discussion will be required with Manitoba Natural Resources and Northern Development, Wildlife and Fisheries Branch to confirm whether a ministerial exemption under ESEA is required or not and whether this satisfies *The Wildlife Act* or if additional permits would be required.
- Tree clearing and site preparation activities will need to be scheduled outside of the regional nesting period (approximately mid-April to late August) to avoid conflicts with nesting birds protected federally under the MBCA. If clearing and site preparation occurs within the regional nesting period, pre-construction breeding bird surveys will be required and when nests are identified construction set-backs may be required or a Damage or Danger Permit obtained from the Canadian Wildlife Service under the MBCA to permit the clearing.
- The cliff swallow is not listed in Schedule 1 of the Migratory Birds Regulations and therefore if the nests are cleared in the winter, when they do not contain a live bird or viable egg, a Damage or Danger Permit will not need to be obtained to remove the established cliff swallow nests on the existing bridge.
- Duty to destroy all Tier 2 and control Tier 3 Noxious Weeds in accordance with *The Noxious Weed Act* is the responsibility of the landowner (MTI).

4.3 Mitigation Measures

The potential impacts associated with the Project described above can largely be mitigated through design and planning considerations, construction phase environmental management practices, and effective site restoration. Follow-up monitoring allows for evaluation of residual effects of the project and may provide opportunities to take corrective measures if residual impacts are observed.

4.3.1 DIRECT LOSS OF PLANT SPECIES AND TERRESTRIAL HABITAT

Recommended mitigation measures to limit the impact of the project on plant species and habitat include the following:

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

1. Contact federal and provincial regulators to confirm the need for SARA and ESEA permits for the project as it relates to potential impacts to identified Critical Habitat of northern prairie skink, as well as the general habitat of plains hognose snake. Apply for and obtain permit as required prior to initiation of any site work.
2. Limit clearing to minimum area required for safe and effective construction. Where possible, avoid expanding the existing ROW into the adjacent plant communities. Use existing ROW for equipment and material lay-down. Undertake clearing outside of regional migratory bird nesting periods.
3. Avoid clearing and expansion of the existing ROW on the north-west side of the project area within Spruce Woods Provincial Park boundaries. This area represents the highest value terrestrial habitat within the project footprint, with mature forest habitat and high levels of plant diversity and including provincially rare and subsistence species. Given that this area has the widest existing ROW of all four quadrants of the project site, maintaining work to within the existing ROW should be technically feasible and safe.
4. Retain large mature trees and snags where technically feasible and safe to do so. Large mature trees and snags along the riparian corridor provide habitat for stick nesting and cavity nesting birds and can contribute to bank stabilization. Where clearing cannot be avoided, implement measures to encourage natural regeneration of these species (i.e., site restoration).
5. Apply for and receive a Damage or Danger (D&D) permit under the Migratory Birds Convention Act (MBCA) prior to any work impacting active nests.
6. Remove cliff swallow nests during winter months while they are not active and do not contain eggs. Implement exclusion measures to ensure new nests are not established on the bridge structure during the active construction period. Active nest structures are protected from being disturbed or damaged by the MBCA and *The Wildlife Act*.

4.3.2 SOIL DEGRADATION

Recommended mitigation measures to limit soil degradation associated with the project include the following:

1. Implement environmental Best Management Practices to limit fuel spills and accidental release of environmental pollutants (e.g., daily equipment checks and regular maintenance, secondary containment of fuels, etc.). Employ regular environmental monitoring to document any chemical releases and respond immediately to incidence of chemical release with appropriate site and soil remediation methods.
2. If topsoil salvage is technically feasible for the current project, avoid salvage and re-use of topsoil that has a legacy of weedy and invasive species establishment. Re-use of site soils that contain root, rhizome, or seed from noxious or invasive species will readily and rapidly regenerate on site.
3. Follow defined traffic patterns on site if technically feasible and safe to do so to limit soil compaction and disturbance. Relieve compaction in areas that have been significantly compacted as needed during site restoration and revegetation. Methods of de-compaction include deep tillage, fracturing or ripping with suitable agricultural or construction equipment.
4. Implement effective revegetation practices as soon as possible following construction to limit soil exposure and risk of erosion and weed invasion. Given the presence of invasive species currently on site and in the

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

vicinity of the project site, it should be anticipated that significant weed control efforts will be required during site restoration. Revegetation planning should focus on quickly establishing a competitive, site appropriate groundcover to limit opportunities for erosion and weed invasion.

Note: Manitoba Transportation and Infrastructure policy for highway revegetation is likely to specify use of native plant species in site revegetation due to the proximity to Spruce Woods Provincial Park. Successful establishment of native roadside vegetation is dependant on effective pre-plant and in-crop weed control that minimizes competition on the seeded species during early establishment.

4.3.3 NOXIOUS AND INVASIVE PLANT SPECIES

Recommended mitigation measures to limit the establishment or expansion of noxious and invasive plant species due to the Project include the following:

1. Avoid salvage and re-use of topsoil that has a legacy of weedy and invasive species establishment. Re-use of site soils that contain root, rhizome, or seed from noxious or invasive species will readily and rapidly regenerate on site. If imported topsoil is required for site restoration, source weed free topsoil from a known supplier or location.
2. Implement effective revegetation practices as soon as possible following construction to limit soil exposure and risk of weed invasion. Employ temporary cover crops for rapid cover and to support site specific erosion and weed control plans, when needed. Anticipate a period of site preparation before perennial (final) seeding during which weeds regenerating on-site are controlled integrated pest control methods. Do not proceed with perennial seeding, particularly if seeding to native cover, unless weeds present on site are sufficiently controlled.
3. Destroy or control Tier 2 and Tier 3 Noxious Weeds that establish on site promptly in accordance with the Manitoba Noxious Weed Act and according to industry best practice for eradication of the weed species of concern.
4. Establish a monitoring program to ensure site revegetation is on track and early establishment of weed and invasive species is detected and resolved promptly. Early detection of weed establishment is critical to gaining control and achieving successful site revegetation. Small infestations of invasive species can be controlled with moderate levels of effort and resource, however, if left un-corrected the level of effort and resource required to correct the situation can escalate rapidly.
5. Herbicides with residual soil activity should not be used in weed control efforts. Qualified applicators should be employed to follow a site-specific weed management plan developed by a qualified professional. In all cases, labels should be followed, respecting all boundaries and regulations.

4.3.4 NOISE, DUST AND AIR QUALITY IMPACTS

Recommended mitigation measures to limit noise, dust and air quality impacts associated with the project include the following:

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

1. Undertake construction outside of the typical breeding bird window, if technically feasible and safe to do so. Winter construction has the added benefit of frozen soil conditions limiting impacts of compaction on soils and reducing the risk of soil erosion and dust generation.
2. Employ well maintained equipment. Inspect and repair heavy equipment and vehicles as required to minimize excessive emissions and noise. Monitor air quality regularly throughout construction and take specific measures to correct the issue when necessary. Limit equipment and vehicle idling when possible.
3. Do not disturb or remove vegetative cover until necessary to complete specific construction activity. Phase in construction works to preserve existing cover vegetation until it is necessary to disturb and remove.
4. Employ dust suppression methods as needed to limit impacts to adjacent areas and vegetation.

5.0 REFERENCES

1. Canadian Herpetological Society (CHS). 2021. Species Information: Great Plains Toad (*Anaxyrus cognatus*), Northern leopard frog (*Lithobates pipiens*), and snapping turtle (*Chelydra serpentina*). http://canadianherpetology.ca/species/
2. The Cornell Lab. 2021. All About Birds. The Cornell Laboratory of Ornithology. (https://www.allaboutbirds.org/).
3. COSEWIC 2000. COSEWIC assessment and status report on the hairy prairie-clover *Dalea villosa* var. *villosa* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 22 pp.
4. COSEWIC 2002. COSEWIC assessment and update status report on the Western spiderwort *Tradescantia occidentalis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 25 pp.
5. COSEWIC 2006. COSEWIC assessment and status report on the rough agalinis *Agalinis aspera* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 22 pp.
6. COSEWIC 2006. COSEWIC assessment and update status report on the smooth goosefoot *Chenopodium subglabrum* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 33 pp. (www.sararegistry.gc.ca/status/status_e.cfm).
7. COSEWIC. 2011. COSEWIC assessment and status report on the Buffalograss *Bouteloua dactyloides* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 39 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm)
8. COSEWIC. 2012. COSEWIC assessment and status report on the Western Tiger Salamander *Ambystoma mavortium* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xv + 63 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).
9. COSEWIC. 2013. COSEWIC assessment and status report on the Eastern Tiger Salamander *Ambystoma tigrinum* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 53 pp. (Species at Risk Public Registry website).
10. COSEWIC. 2017. COSEWIC Assessment and Status Report on the Prairie Skink (*Plestiodon septentrionalis*) in Canada 2017. Committee on the status of Endangered Wildlife in Canada. Ottawa. (Species at Risk Public Registry website).

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

11. COSEWIC. 2019. COSEWIC assessment and status report on the Plains Hog-nosed Snake *Heterodon nasicus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 38 pp. (Species at risk public registry).
12. Environment Canada. 2014. Recovery Strategy for the Small White Lady's-slipper (*Cypripedium candidum*) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. v + 30 pp.
13. Environment and Climate Change Canada. 2021. Recovery Strategy for the Bank Swallow (*Riparia riparia*) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. ix + 122 pp.
14. Marles, R.J., Clavelle, C., Monteleone, L., Tays, N., and Burns, D. 2000. Aboriginal Plant Use in Canada's Northwest Boreal Forest. UBC Press. University of British Columbia, Vancouver BC. Pp. 368.
15. Smith, R.E., H. Veldhuis, G.F. Mills, R.G. Eilers, W.R. Fraser, and G.W. Lelyk. 1998. Terrestrial Ecozones, Ecoregions, and Ecodistricts: An Ecological Stratification of Manitoba's Landscapes. Technical Bulletin 98-9E. Land Resource Unit, Brandon Research Centre, Research Branch, Agriculture and Agri-Food Canada, Winnipeg, Manitoba.
16. Zoladeski, C.A., Wickware, G.M., Delorme, R.J., Sims, R.A., and Corns, I.G.W. Forest Ecosystem Classification for Manitoba (Field Guide). Nat. Resour. Can., Can. For. Serv., Northwest Reg., North For Cent., Edmonton, Alberta. Spec. Rep. 2. Canadian Standards Association. Standard Z768-01 Reaffirmed 2016. Phase I Environmental Site Assessment

KGS GROUP

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

6.0 CLOSURE

We trust the summarized information regarding the terrestrial environment and Species at Risk relevant to the Study Area as well as the potential impacts and mitigation measures for the PTH 5 bridge site and Study Area meet your current requirements. Should you have any questions on the contents of the letter report, please do not hesitate to contact Ian Young at iyoung@scatliff.ca or 204-927-3444.

Prepared By:

[redacted]

Ian Young, M.Sc.
Biologist

Approved By:

Shaun Moffatt, M.Sc.
Senior Environmental Scientist

KGS GROUP

Kontzamanis Graumann Smith MacMillan Inc.
3rd Floor - 865 Waverley St
Winnipeg, MB R3T 5P4

P 204-896-1209
F 204-896-0754
kgsgroup.com

STATEMENT OF LIMITATIONS AND CONDITIONS

Limitations

This report has been prepared for WSP Group Limited in accordance with the agreement between KGS Group and WSP Group Limited (the "Agreement"). This report represents KGS Group's professional judgment and exercising due care consistent with the preparation of similar reports. The information, data, recommendations and conclusions in this report are subject to the constraints and limitations in the Agreement and the qualifications in this report. This report must be read as a whole, and sections or parts should not be read out of context.

This report is based on information made available to KGS Group by WSP Group Limited. Unless stated otherwise, KGS Group has not verified the accuracy, completeness or validity of such information, makes no representation regarding its accuracy and hereby disclaims any liability in connection therewith. KGS Group shall not be responsible for conditions/issues it was not authorized or able to investigate or which were beyond the scope of its work. The information and conclusions provided in this report apply only as they existed at the time of KGS Group's work.

Third Party Use of Report

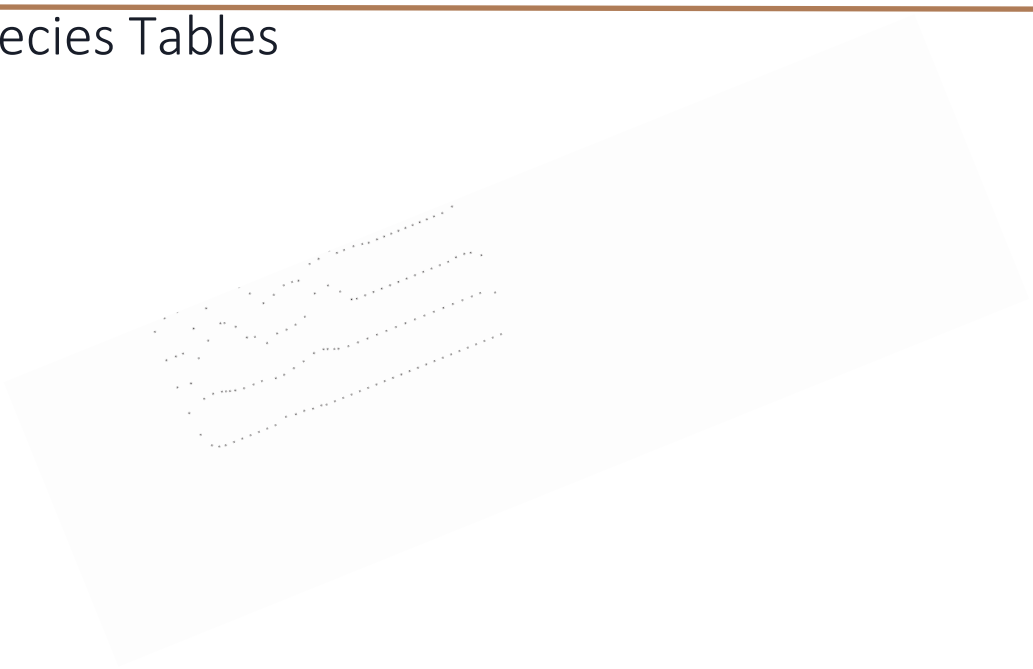
Any use a third party makes of this report or any reliance on or decisions made based on it, are the responsibility of such third parties. KGS Group accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions undertaken based on this report.

Geo-Environmental Statement of Limitations

KGS Group prepared the geo-environmental conclusions and recommendations for this report in a professional manner using the degree of skill and care exercised for similar projects under similar conditions by reputable and competent environmental consultants. The information contained in this report is based on the information that was made available to KGS Group during the investigation and upon the services described, which were performed within the time and budgetary requirements of WSP Group Limited. As this report is based on the available information, some of its conclusions could be different if the information upon which it is based is determined to be false, inaccurate or contradicted by additional information. KGS Group makes no representation concerning the legal significance of its findings or the value of the property investigated.

APPENDIX A

Species Tables



KGS GROUP

Table 1. Plant species tracked by the MB CDC for the Aspen Parkland Ecoregion (MB CDC, 2021).

Scientific Name	Common name	S Rank	ESEA	SARA	COSEWIC
Achnatherum hymenoides	Indian Rice Grass	S2			
Achnatherum richardsonii	Richardson Needle Grass	S1S2			
Acmispon americanus	Prairie Trefoil	S2S3			
Agalinis aspera	Rough Agalinis	S2	Endangered	Endangered	Endangered
Alisma gramineum	Narrow-leaved Water-plantain	S1			
Ambrosia acanthicarpa	Sandbur	S1			
Andropogon hallii	Sand Bluestem	S2			
Aristida purpurea var. longiseta	Red Three-awn	S1?			
Arnica fulgens	Shining Arnica	S2			
Artemisia cana ssp. cana	Silver Sagebrush	S1			
Asclepias lanuginosa	Hairy Milkweed	S2S3			
Asclepias verticillata	Whorled Milkweed	S3			
Asclepias viridiflora	Green Milkweed	S3			
Astragalus gilviflorus	Cushion Milkvetch	S1			
Astragalus pectinatus	Narrow-leaved Milkvetch	S2			
Atriplex argentea var. argentea	Silver Saltbush	S2			
Boltonia asteroides var. recognita	White Boltonia	S2S3			
Botrychium campestre	Prairie Moonwort	S1			
Bouteloua curtipendula	Side-oats Grama	S2			
Bouteloua dactyloides	Buffalograss	S1	Threatened	Special Concern	Special Concern
Bromus kalmii	Wild Chess	S2S3			
Bromus porteri	Porter's Chess	S2S3			
Calamagrostis montanensis	Plains Reed Grass	S3			
Callitriche heterophylla	Larger Water-starwort	S1?			
Carex cristatella	Crested Sedge	S1?			
Carex cryptolepis	Northeastern Sedge	S1			
Carex emoryi	Emory's Sedge	S2?			
Carex gravida	Heavy Sedge	S1			
Carex hallii	Hall's Sedge	S1S2			
Carex hystericina	Porcupine Sedge	S3			
Carex parryana	Parry's Sedge	S3			
Carex pedunculata	Stalked Sedge	S3			
Carex sterilis	Dioecious Sedge	S2			
Carex supina ssp. spaniocarpa	Weak Sedge	S2S3			
Carex tetanica	Rigid Sedge	S3			
Carex xerantica	White-scaled Sedge	S2			
Celtis occidentalis	Hackberry	S1?	Threatened	Not Listed	Not Listed
Chenopodium subglabrum	Smooth Goosefoot	S1	Endangered	Threatened	Threatened
Circaea canadensis ssp. canadensis	Large Enchanter's-nightshade	S2			
Clematis ligusticifolia	Western Virgin's-bower	S1			
Clematis virginiana	Virgin's-bower	S2?			
Coreopsis tinctoria	Common Tickseed	S1			
Corispermum americanum var. americanum	American Bugseed	S3			
Corispermum hookeri var. hookeri	Hooker's Bugseed	S1			
Corispermum pallasii	Pallas' Bugseed	SH			
Corispermum villosum	Hairy Bugseed	S1S2			
Cornus alternifolia	Alternate-leaved Dogwood	S3			
Coryphantha vivipara	Pincushion Cactus	S1?			
Cryptotaenia canadensis	Canadian Honewort	S1			
Cycloloma atriplicifolium	Winged Pigseed	S2S3			
Cymopterus glomeratus	Plains Cymopterus	S2S3			
Cyperus houghtonii	Houghton's Umbrella-sedge	S2S3			
Cyperus schweinitzii	Schweinitz's Flatsedge	S2			
Cypripedium candidum	Small White Lady's-slipper	S1	Endangered	Endangered	Threatened
Dalea villosa var. villosa	Hairy Prairie-clover	S2S3	Threatened	Special Concern	Special Concern

Table 1 Continued. Plant species tracked by the MB CDC for the Aspen Parkland Ecoregion (MB CDC, 2021).

Scientific Name	Common name	S Rank	ESEA	SARA	COSEWIC
Desmodium canadense	Beggar's-lice	S2			
Dichanthelium linearifolium	White-haired Panic-grass	S2?			
Dichanthelium wilcoxianum	Sand Millet	S2?			
Eleocharis engelmannii	Engelmann's Spike-rush	S1S2			
Elymus hystrix	Bottle-brush Grass	S2			
Eragrostis hypnoides	Creeping Teal Love Grass	S3			
Erigeron caespitosus	Tufted Fleabane	S1			
Eriogonum flavum	Yellow Eriogonum	S2S3			
Erythranthe geyeri	Smooth Monkeyflower	S1			
Euphorbia geyeri	Prostrate Spurge	S2			
Festuca hallii	Plains Rough Fescue	S3			
Festuca subverticillata	Nodding Fescue	S1			
Galium aparine	Cleavers	S3			
Helianthus nuttallii ssp. rydbergii	Tuberous-rooted Sunflower	S2			
Heliotropium curassavicum	Seaside Heliotrope	SH			
Juncus interior	Inland Rush	S1			
Krascheninnikovia lanata	Winterfat	S1?			
Leersia oryzoides	Rice Cutgrass	S3			
Lemna turionifera	Turion Duckweed	S1			
Linum sulcatum	Grooved Yellow Flax	S3			
Lomatium foeniculaceum	Hairy-fruited Parsley	S3			
Lomatium macrocarpum	Long-fruited Parsley	S2S3			
Lomatium orientale	White-flowered Parsley	S1S2			
Lomatogonium rotatum	Marsh Felwort	S2S3			
Malaxis monophyllos	White Adder's-mouth	S2?			
Malaxis paludosa	Bog Adder's-mouth	S1?			
Menispermum canadense	Canada Moonseed	S3			
Mentzelia decapetala	Gumbo-lily	SH			
Mertensia lanceolata	Tall Lungwort	S2			
Musineon divaricatum	Leafy Musineon	S1S2			
Myosurus minimus	Least Mousetail	S1?			
Orobanche ludoviciana	Louisiana Broom-rape	S2			
Osmorhiza claytonii	Hairy Sweet Cicely	S2?			
Ostrya virginiana	Hop-hornbeam	S2			
Oxytropis sericea	Early Yellow Locoweed	S1			
Penstemon nitidus	Smooth Blue Beard-tongue	S2			
Penstemon procerus	Slender Beard-tongue	S1S2			
Phlox hoodii	Moss Pink	S3			
Phryma leptostachya	Lopseed	S3			
Piptatheropsis micrantha	Little-seed Rice Grass	S2			
Plagiobothrys scouleri var. scouleri	Scouler's Popcornflower	S1			
Plantago elongata ssp. elongata	Linear Leaved-plantain	S2			
Poa cusickii	Mutton-grass	S2			
Poa fendleriana	Mutton Grass	S2			
Polanisia dodecandra ssp. dodecandra	Clammyweed	S1			
Polanisia dodecandra ssp. trachysperma	Clammyweed	S1			
Polygala verticillata	Whorled Milkwort	S2			
Polygala verticillata var. isocycla	Whorled Milkwort	S2			
Potamogeton amplifolius	Large-leaved Pondweed	S3			
Potamogeton illinoensis	Illinois Pondweed	S1?			
Potentilla gracilis var. flabelliformis	Graceful Cinquefoil	S1			
Potentilla plattensis	Platte River Cinquefoil	S2			
Rhynchospora alba	White Beakrush	S3			
Rhynchospora capillacea	Horned Beakrush	S2S3			

Table 1 Continued. Plant species tracked by the MB CDC for the Aspen Parkland Ecoregion (MB CDC, 2021).

Scientific Name	Common name	S Rank	ESEA	SARA	COSEWIC
Sanguinaria canadensis	Blood-root	S2			
Sceptridium multifidum	Leathery Grape-fern	S3			
Schedonnardus paniculatus	Tumble-grass	S2			
Selaginella densa	Prairie Spike-moss	S3			
Shinnersoseris rostrata	Annual Skeletonweed	S1S2			
Sisyrinchium campestre	White-eyed Grass	S3			
Sisyrinchium mucronatum	Michaux's Blue-eyed Grass	S1			
Sporobolus neglectus	Annual Dropseed	S2S3			
Thermopsis rhombifolia	Golden Bean	S2S3			
Townsendia exscapa	Silky Townsend-daisy	S2			
Tradescantia occidentalis	Western Spiderwort	S1	Threatened	Threatened	Threatened
Uvularia sessilifolia	Small Bellwort	S2			
Verbena bracteata	Bracted Vervain	S3			

Table 2. Historic detections of rare plant species in the vicinity of the Project site (MB CDC, 2021).

Location	Scientific Name	Common name	S Rank	ESEA	SARA	COSEWIC
Within 100m	*Andropogon hallii*	Sand Bluestem	S2			
Within 100m	*Polanisia dodecandra ssp. trachysperma*	Clammyweed	S1			
Within 100m	*Bouteloua curtipendula*	Side-oats Grama	S2			
Within 100m	*Townsendia exscapa*	Silky Townsend-daisy	S2			
Within 100m	*Polanisia dodecandra ssp. dodecandra*	Clammyweed	S1			
Within 100m	*Cymopterus glomeratus*	Plains Cymopterus	S2S3			
Within 100m	*Phryma leptostachya var. leptostachya*	American Lopseed	S3			
Within 2km	*Andropogon hallii*	Sand Bluestem	S2			
Within 2km	*Aphyllon ludovicianum*	Louisiana Broomrape	S2			
Within 2km	*Asclepias lanuginosa*	Hairy Milkweed	S2S3			
Within 2km	*Asclepias viridiflora*	Green Milkweed	S3			
Within 2km	*Bouteloua curtipendula*	Side-oats Grama	S2			
Within 2km	*Carex supina ssp. spaniocarpa*	Weak Arctic Sedge	S2S3			
Within 2km	*Chenopodium subglabrum*	Smooth Goosefoot	S1	Endangered	Threatened	Threatened
Within 2km	*Corispermum americanum var. americanum*	American Bugseed	S3			
Within 2km	*Corispermum hookeri var. hookeri*	Hooker's Bugseed	S1			
Within 2km	*Cymopterus glomeratus*	Plains Cymopterus	S2S3			
Within 2km	*Cyperus schweinitzii*	Schweinitz's Flatsedge	S2			
Within 2km	*Dalea villosa var. villosa*	Hairy Prairie-clover	S2S3	Threatened	Special Concern	Special Concern
Within 2km	*Erythranthe geyeri*	Geyer's Monkeyflower	S1			
Within 2km	*Escobaria vivipara*	Pincushion Cactus	S1?			
Within 2km	*Festuca hallii*	Plains Rough Fescue	S3			
Within 2km	*Linum sulcatum*	Grooved Yellow Flax	S3			
Within 2km	*Penstemon nitidus var. nitidus*	Wax-leaved Beardtongue	S2			
Within 2km	*Phryma leptostachya var. leptostachya*	American Lopseed	S3			
Within 2km	*Polanisia dodecandra ssp. trachysperma*	Clammyweed	S1			
Within 2km	*Townsendia exscapa*	Silky Townsend-daisy	S2			

Table 3. Bird species tracked by the MB CDC for the Aspen Parkland Ecoregion (MB CDC, 2021).

Scientific Name	Common name	S Rank	ESEA	SARA	COSEWIC
Aechmophorus occidentalis	Western Grebe	S4B	Not Listed	Special Concern	Special Concern
Ammodramus bairdii	Baird's Sparrow	S1B	Endangered	Special Concern	Special Concern
Ammodramus savannarum	Grasshopper Sparrow	S3B			
Anthus spragueii	Sprague's Pipit	S2B	Threatened	Threatened	Threatened
Ardea alba	Great Egret	S2S3B			
Ardea herodias	Great Blue Heron	S5B			
Asio flammeus	Short-eared Owl	S2S3B	Threatened	Special Concern	Special Concern
Athene cunicularia	Burrowing Owl	S1B	Endangered	Endangered	Endangered
Bubulcus ibis	Cattle Egret	S2B			
Buteo regalis	Ferruginous Hawk	S1B	Endangered	Threatened	Threatened
Calamospiza melanocorys	Lark Bunting	S1B	Not Listed	Not Listed	Threatened
Calcarius ornatus	Chestnut-collared Longspur	S2B	Endangered	Threatened	Threatened
Cardellina canadensis	Canada Warbler	S3B	Threatened	Threatened	Threatened
Chaetura pelagica	Chimney Swift	S2B	Threatened	Threatened	Threatened
Charadrius melodus	Piping Plover	S1B	Endangered	Endangered	Endangered
Chlidonias niger	Black Tern	S4B			
Chordeiles minor	Common Nighthawk	S3B	Threatened	Threatened	Threatened
Contopus cooperi	Olive-sided Flycatcher	S3B	Threatened	Threatened	Threatened
Contopus virens	Eastern Wood-pewee	S4B	Not Listed	Special Concern	Special Concern
Coturnicops noveboracensis	Yellow Rail	S3B	Not Listed	Special Concern	Special Concern
Cygnus buccinator	Trumpeter Swan	S1B	Endangered	Not Listed	Not Listed
Dolichonyx oryzivorus	Bobolink	S4B	Not Listed	Threatened	Threatened
Empidonax traillii	Willow Flycatcher	S3B			
Eremophila alpestris	Horned Lark	S3B,SUM			
Hirundo rustica	Barn Swallow	S4B	Not Listed	Threatened	Threatened
Ixobrychus exilis	Least Bittern	S2B	Endangered	Threatened	Threatened
Lanius ludovicianus excubitorides	Loggerhead Shrike	S1B	Endangered	Not Listed	Not Listed
Larus delawarensis	Ring-billed Gull	S5B			
Melanerpes erythrocephalus	Red-headed Woodpecker	S3B	Threatened	Threatened	Threatened
Nycticorax nycticorax	Black-crowned Night-heron	S4B			
Phalacrocorax auritus	Double-crested Cormorant	S5B			
Plegadis chihi	White-faced Ibis	S1B			
Podiceps auritus	Horned Grebe	S4B	Not Listed	Special Concern	Special Concern
Podiceps nigricollis	Eared Grebe	S4B			
Riparia riparia	Bank Swallow	S5B	Not Listed	Threatened	Threatened
Sayornis saya	Say's Phoebe	S3B			
Sterna forsteri	Forster's Tern	S4B			
Vermivora chrysoptera	Golden-winged Warbler	S3B	Threatened	Threatened	Threatened

Table 4. Habitat preferences of federally protected bird species that may occur in the Aspen Parkland Ecoregion (The Cornell Lab, 2021).

Scientific Name	Common name	Habitat Preferences
Aechmophorus occidentalis	Western Grebe	Western Grebes nest on large freshwater lakes and marshes edged with reeds and rushes.
Ammodramus bairdii	Baird's Sparrow	Baird's Sparrows breed almost exclusively in undisturbed mixed grass and tallgrass prairies.
Anthus spragueii	Sprague's Pipit	Sprague's Pipits are endemic nesters in North America's northern Great Plains, where they breed mostly in native mixed-grass prairie, usually in vegetation no more than 6–12 inches tall.
Asio flammeus	Short-eared Owl	Short-eared Owls live in large, open areas with low vegetation, including prairie and coastal grasslands, heathlands, meadows, shrubsteppe, savanna, tundra, marshes, dunes, and agricultural areas.
Athene cunicularia	Burrowing Owl	Burrowing Owls live in open, treeless areas with low, sparse vegetation, usually on gently sloping terrain.
Buteo regalis	Ferruginous Hawk	Ferruginous Hawk is strongly dependent on native grasslands; parkland and intensive agriculture are avoided.
Calamospiza melanocorys	Lark Bunting	Lark Buntings occur in a variety of *grassland* habitats, including shortgrass and mixed-grass prairie, weedy fallow fields, pastures, and croplands.
Calcarius ornatus	Chestnut-collared Longspur	Chestnut-collared Longspurs breed in the shortgrass and mixed-grass prairies of the northern Great Plains. They are typically found in areas where the grass is shorter than 1 foot, but will occasionally be found in tallgrass prairie that has been grazed or mowed.
Cardellina canadensis	Canada Warbler	Canada Warblers breed in mixed conifer and deciduous forest with a shrubby and mossy understory often near water.
Chaetura pelagica	Chimney Swift	Chimney Swifts breed in urban and suburban habitats across the eastern half of the United States and southern Canada.
Charadrius melodus	Piping Plover	Piping Plovers breed lakeshores, rivers, and alkali wetlands in the northern Great Plains and Great Lakes.
Chordeiles minor	Common Nighthawk	Common Nighthawks nest in both rural and urban habitats including coastal sand dunes and beaches, logged forest, recently burned forest, woodland clearings, prairies, plains, sagebrush, grasslands, open forests, and rock outcrops.
Contopus cooperi	Olive-sided Flycatcher	Olive-sided Flycatchers breed mostly in the boreal forest and in western coniferous forests, from sea level to over 10,000 feet elevation in some parts of the Rockies.
Contopus virens	Eastern Wood-pewee	Usually found in clearings and forest edges, Eastern Wood-Pewees breed in nearly any type of wooded habitat in the eastern United States and southeastern Canada—including mature woodlands, urban shade trees, roadsides, woodlots, and orchards.
Coturnicops noveboracensis	Yellow Rail	Yellow Rails occur in shallow marshes with fairly short vegetation.
Cygnus buccinator	Trumpeter Swan	Breeding Trumpeter Swans seek relatively shallow (less than 6 feet deep), undisturbed bodies of freshwater with abundant aquatic plants.
Dolichonyx oryzivorus	Bobolink	Bobolinks breed in open areas across the northern United States and southern Canada, preferring large fields with a mixture of grasses and broad-leaved plants like legumes and dandelions.
Hirundo rustica	Barn Swallow	Barn Swallows forage in open areas throughout most of the continent, including suburban parks and ball fields, agricultural fields, beaches, and over open water such as lakes, ponds and coastal waters.
Ixobrychus exilis	Least Bittern	Least Bitterns are relatively scarce breeders in coastal and inland wetlands, but they can be locally numerous where food is abundant.
Lanius ludovicianus excubitorides	Loggerhead Shrike	Loggerhead Shrikes inhabit open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns.
Melanerpes erythrocephalus	Red-headed Woodpecker	Red-headed Woodpeckers breed in deciduous woodlands with oak or beech, groves of dead or dying trees, river bottoms, burned areas, recent clearings, beaver swamps, orchards, parks, farmland, grasslands with scattered trees, forest edges, and roadsides.
Podiceps auritus	Horned Grebe	Horned Grebes breed on small, shallow, freshwater ponds with emergent vegetation such as rushes, sedges, and reeds.
Riparia riparia	Bank Swallow	Bank Swallows live in low areas along rivers, streams, ocean coasts, and reservoirs. Their territories usually include vertical cliffs or banks where they nest in colonies of 10 to 2,000 nests.
Vermivora chrysoptera	Golden-winged Warbler	Golden-winged Warblers breed in tangled, shrubby habitats such as regenerating clearcuts, wet thickets, tamarack bogs, and aspen or willow stands.

Table 5. Historic detections of rare bird species in the vicinity of the Project site (MB CDC, 2021).

Location	Scientific Name	Common name	S Rank	ESEA	SARA	COSEWIC
Within 2km	*Ammodramus savannarum*	Grasshopper Sparrow	S2S3B			
Within 2km	*Anthus spragueii*	Sprague's Pipit	S2B	Threatened	Threatened	Threatened
Within 2km	*Calcarius ornatus*	Chestnut-collared Longspu	S1S2B	Endangered	Threatened	Endangered
Within 2km	*Centronyx bairdii*	Baird's Sparrow	S1B	Endangered	Special Concern	Special Concern
Within 2km	*Chordeiles minor*	Common Nighthawk	S2S3B	Threatened	Threatened	Special Concern
Within 2km	*Cygnus buccinator*	Trumpeter Swan	S2B	Endangered	Not Listed	Not Listed
Within 2km	*Riparia riparia*	Bank Swallow	S4B	Not Listed	Threatened	Threatened

Table 6. Amphibian, mammal, reptile, and animal assemblage tracked by the MB CDC for the Aspen Parkland Ecoregion (MB CDC, 2021).

Scientific Name	Common name	S Rank	ESEA	SARA	COSEWIC
Ambystoma mavortium	Western Tiger Salamander	S4S5	Not Listed	Special Concern	Special Concern
Ambystoma tigrinum	Eastern Tiger Salamander	S2?	Not Listed	Endangered	Endangered
Anaxyrus cognatus	Great Plains Toad	S2	Threatened	Special Concern	Special Concern
Lithobates pipiens	Northern Leopard Frog	S4	Not Listed	Special Concern	Special Concern
Spea bombifrons	Plains Spadefoot Toad	S2S3			
Mustela frenata	Long-tailed Weasel	S3			
Odocoileus hemionus	Mule or Black-tailed Deer	S3			
Chelydra serpentina	Snapping Turtle	S3	Not Listed	Special Concern	Special Concern
Heterodon nasicus	Plains Hog-nosed Snake	S1S2	Threatened	Not Listed	Special Concern
Plestiodon septentrionalis	Northern Prairie Skink	S1	Endangered	Endangered	Special Concern
Thamnophis radix	Western Plains Garter Snake	S4			
Thamnophis sirtalis parietalis	Red-sided Garter Snake	S4			

Table 7. Historic detections of rare amphibian, reptile, and mammal species in the vicinity of the Project site (MB CDC, 2021).

Location	Scientific Name	Common name	S Rank	ESEA	SARA	COSEWIC
Within 100m	*Heterodon nasicus*	Plains Hog-nosed Snake	S1S2	Threatened	Not Listed	Special Concern
Within 2km	*Lithobates pipiens*	Northern Leopard Frog	S4	Not Listed	Special Concern	Special Concern
Within 2km	*Chelydra serpentina*	Snapping Turtle	S3	Not Listed	Special Concern	Special Concern
Within 2km	*Heterodon nasicus*	Plains Hog-nosed Snake	S1S2	Threatened	Not Listed	Special Concern
Within 2km	*Plestiodon septentrionalis septentrionalis*	Northern Prairie Skink	S1	Endangered	Endangered	Special Concern

Table 8. Plant species detected during vegetation surveys of the Project area.

Latin Name	Common Name	Provincial Rank	ESEA	SARA	COSEWIC	Medicinal, Subsistence, or Culturally Important***
Trees						
Acer negundo	Manitoba Maple	S5	Not Listed	Not Listed	Not Listed	√
Betula papyrifera	Paper (white) Birch	S5	Not Listed	Not Listed	Not Listed	√
Fraxinus pennsylvanica	Green Ash	S4S5	Not Listed	Not Listed	Not Listed	
Picea glauca	White Spruce	S5	Not Listed	Not Listed	Not Listed	√
Populus balsamifera	Balsam Poplar	S5	Not Listed	Not Listed	Not Listed	√
Populus deltoides	Cottonwood	S3S5	Not Listed	Not Listed	Not Listed	
Populus tremuloides	Trembling Aspen	S5	Not Listed	Not Listed	Not Listed	√
Quercus macrocarpa	Bur Oak	S5	Not Listed	Not Listed	Not Listed	√
Tilia americana	Basswood	S3S4	Not Listed	Not Listed	Not Listed	√
Ulmus americana	American Elm	S4S5	Not Listed	Not Listed	Not Listed	
Shrubs + vines						
Alnus incana ssp. *rugosa*	Speckled Alder (River Alder)	S5	Not Listed	Not Listed	Not Listed	√
Amelanchier alnifolia	Saskatoon	S5	Not Listed	Not Listed	Not Listed	√
Cornus sericea	Red-osier Dogwood	S5	Not Listed	Not Listed	Not Listed	√
Corylus cornuta ssp. cornuta	Beaked Hazelnut	S5	Not Listed	Not Listed	Not Listed	√
Elaeagnus commutata	Silverberry	S4S5	Not Listed	Not Listed	Not Listed	√
Glycyrrhiza lepidota	Wild Licorice	S4S5	Not Listed	Not Listed	Not Listed	√
Juniperus horizontalis	Creeping Juniper	S5	Not Listed	Not Listed	Not Listed	√
Menispermum canadense	Canada Moonseed	S3	Not Listed	Not Listed	Not Listed	
Parthenocissus quinquefolia	Virginia Creeper	SNA	Not Listed	Not Listed	Not Listed	√
Prunus virginiana	Chokecherry	S5	Not Listed	Not Listed	Not Listed	√
Ribes hudsonianum	Northern Black Currant	S5	Not Listed	Not Listed	Not Listed	√
Rosa acicularis	Prickly Rose	S5	Not Listed	Not Listed	Not Listed	√
Rubus idaeus	Raspberry	S5	Not Listed	Not Listed	Not Listed	√
Salix amygdaloides	Peach-leaved Willow	S4	Not Listed	Not Listed	Not Listed	√
Salix bebbiana	Bebb's Willow	S5	Not Listed	Not Listed	Not Listed	√
Salix interior	Sandbar Willow	S5	Not Listed	Not Listed	Not Listed	√
Shepherdia argentea	Silver Buffaloberry	S3S4	Not Listed	Not Listed	Not Listed	√
Symphoricarpos albus	Snowberry	S4S5	Not Listed	Not Listed	Not Listed	√
Vitis riparia	Riverbank Grape	S3S4	Not Listed	Not Listed	Not Listed	√
Herbaceous						
Achillea millefolium	Common Yarrow	S5	Not Listed	Not Listed	Not Listed	√
Alisma triviale	Common Water-plantain	S5	Not Listed	Not Listed	Not Listed	√
Anemone canadensis	Canada Anemone	S5	Not Listed	Not Listed	Not Listed	√
Anemone cylindrica	Thimbleweed	S5	Not Listed	Not Listed	Not Listed	√
Aralia nudicaulis	Wild Sarsaparilla	S5	Not Listed	Not Listed	Not Listed	√
Artemisia ludoviciana	Prairie Sage	S5	Not Listed	Not Listed	Not Listed	√
Asclepias speciosa	Showy milkweed	S3S4	Not Listed	Not Listed	Not Listed	√
Carex sp.	Sedge sp.	N/A	N/A	N/A	N/A	N/A
Dalea purpurea	Purple Prairie Clover	S5	Not Listed	Not Listed	Not Listed	√
Erigeron canadensis	Canada Horseweed	S5	Not Listed	Not Listed	Not Listed	
Fragaria vesca	Wild Strawberry	S4S5	Not Listed	Not Listed	Not Listed	√
Galium borealis	Northern Bedstraw	S5	Not Listed	Not Listed	Not Listed	√
Geum triflorum	Three-flowered Avens	S4S5	Not Listed	Not Listed	Not Listed	√
Helianthus maximiliani	Narrow-leaved Sunflower	S5	Not Listed	Not Listed	Not Listed	√
Heracleum maximum	Cow Parsnip	S4S5	Not Listed	Not Listed	Not Listed	√
Laportea canadensis	Canada Wood-nettle	S3S4	Not Listed	Not Listed	Not Listed	√

Table 8 Continued. Plant species detected during vegetation surveys of the Project area.

Latin Name	Common Name	Provincial Rank	ESEA	SARA	COSEWIC	Medicinal, Subsistence, or Culturally Important***
Lappula squarrosa	Bristly Stickseed	SNA	Not Listed	Not Listed	Not Listed	√
Lathyrus ochroleucus	Pale Vetchling	S5	Not Listed	Not Listed	Not Listed	√
Maianthemum canadense	Two-leaved Solomon's-seal	S5	Not Listed	Not Listed	Not Listed	√
Maianthemum trifolium	Three-leaved Solomon's-seal	S5	Not Listed	Not Listed	Not Listed	√
Mentha canadensis	Canada Mint	S5	Not Listed	Not Listed	Not Listed	√
Osmorhiza longistylis	Smooth Sweet Cicely	S5	Not Listed	Not Listed	Not Listed	√
Persicaria amphibia	Water Smartweed	S5	Not Listed	Not Listed	Not Listed	√
Petasites frigidus var. *sagittatus*	Arrow-leaved Colt's-foot	S5	Not Listed	Not Listed	Not Listed	√
Ranunculus abortivus	Kidneyleaf Buttercup	S5	Not Listed	Not Listed	Not Listed	√
Scutellaria galericulata	Hooded Skullcap	S5	Not Listed	Not Listed	Not Listed	√
Solidago canadensis	Canada Goldenrod	S5	Not Listed	Not Listed	Not Listed	√
Solidago missouriensis	Missouri Goldenrod	S5	Not Listed	Not Listed	Not Listed	√
Solidago nemoralis	Field Goldenrod	S5	Not Listed	Not Listed	Not Listed	√
Stachys tenuifolia	Hedge-nettle	SNR	Not Listed	Not Listed	Not Listed	√
Symphyotrichum ericoides	Many-flowered Aster	S4	Not Listed	Not Listed	Not Listed	√
Symphyotrichum laeve	Smooth Aster	S5	Not Listed	Not Listed	Not Listed	√
Thalictrum dasycarpum	Tall Meadowrue	S5	Not Listed	Not Listed	Not Listed	√
Toxicodendron rydbergii	Poison-ivy	S5	Not Listed	Not Listed	Not Listed	
Urtica dioica	Stinging Nettle	S5	Not Listed	Not Listed	Not Listed	√
Vicia americana	American Purple Vetch	S5	Not Listed	Not Listed	Not Listed	√
Viola adunca	Early Blue Violet	S5	Not Listed	Not Listed	Not Listed	
Viola canadensis	Canada Violet	S5	Not Listed	Not Listed	Not Listed	
Xanthium strumarium	Cocklebur	S4	Not Listed	Not Listed	Not Listed	
Zizia aurea	Golden Alexanders	S4S5	Not Listed	Not Listed	Not Listed	√
Graminoid						
Andropogon gerardii	Big Bluestem	S5	Not Listed	Not Listed	Not Listed	
Bouteloua curtipendula	Side-oats Grama	S2	Not Listed	Not Listed	Not Listed	
Bouteloua gracilis	Blue Grama	S4	Not Listed	Not Listed	Not Listed	
Carex rostrata	Beaked sedge	S4	Not Listed	Not Listed	Not Listed	
Elymus canadensis	Canada Wildrye	S4S5	Not Listed	Not Listed	Not Listed	
Elymus trachycaulus	Slender Wildrye	S5	Not Listed	Not Listed	Not Listed	
Elymus virginicus	Virginia Wildrye	S4	Not Listed	Not Listed	Not Listed	
Juncus arcticus var. *balticus*	Baltic Rush	S5	Not Listed	Not Listed	Not Listed	
Oryzopsis asperifolia	White-grained Mountain-ricegrass	S5	Not Listed	Not Listed	Not Listed	
Panicum virgatum	Switchgrass	S4	Not Listed	Not Listed	Not Listed	
Schizachyrium scoparium	Little Bluestem	S3S4	Not Listed	Not Listed	Not Listed	
Sorghastrum nutans	Yellow Indiangrass	S3S4	Not Listed	Not Listed	Not Listed	
Sporobolus michauxianus	Prairie Cordgrass	S4S5	Not Listed	Not Listed	Not Listed	
Typha latifolia	Broad-leaved Cattail	S4S5	Not Listed	Not Listed	Not Listed	√
Moss, ferns and bryophytes						
Brachythecium spp.	Feathermoss	N/A	N/A	N/A	N/A	√
Dryopteris carthusiana	Spinulose Shield Fern	S5	Not Listed	Not Listed	Not Listed	
Equisetum arvense	Common Horsetail	S5	Not Listed	Not Listed	Not Listed	√
Matteuccia struthiopteris	Ostrich Fern	S5	Not Listed	Not Listed	Not Listed	

Table 8 Continued. Plant species detected during vegetation surveys of the Project area.

Latin Name	Common Name	Provincial Rank	ESEA	SARA	COSEWIC	Medicinal, Subsistence, or Culturally Important***
Non-native species						
Arctium minus	Common Burdock*	SNA	Not Listed	Not Listed	Not Listed	√
Artemisia absinthium	Wormwood*	SNA	Not Listed	Not Listed	Not Listed	
Bromus inermis	Smooth Brome	SNA	Not Listed	Not Listed	Not Listed	
Cirsium arvense	Canada Thistle*	SNA	Not Listed	Not Listed	Not Listed	√
Elymus repens	Quackgrass	SNA	Not Listed	Not Listed	Not Listed	
Euphorbia virgata	Leafy Spurge**	SNA	Not Listed	Not Listed	Not Listed	
Medicago lupulina	Black Medic	SNA	Not Listed	Not Listed	Not Listed	
Medicago sativa	Alfalfa	SNA	Not Listed	Not Listed	Not Listed	√
Melilotus albus	White Sweet Clover	SNA	Not Listed	Not Listed	Not Listed	√
Phalaris arundinacea	Reed Canarygrass	S5	Not Listed	Not Listed	Not Listed	
Plantago major	Common Plantain	SNA	Not Listed	Not Listed	Not Listed	√
Poa pratensis	Kentucky Bluegrass	S5	Not Listed	Not Listed	Not Listed	
Rumex crispus	Curly Dock	SNA	Not Listed	Not Listed	Not Listed	
Sonchus oleraceus	Common Sow-thistle*	SNA	Not Listed	Not Listed	Not Listed	
Tanacetum vulgare	Common Tansy**	SNA	Not Listed	Not Listed	Not Listed	
Taraxacum officinale	Common Dandelion*	SNA	Not Listed	Not Listed	Not Listed	√
Tragopogon dubius	Goat's-beard	SNA	Not Listed	Not Listed	Not Listed	
Trifolium hybridum	Alsike Clover	SNA	Not Listed	Not Listed	Not Listed	√

*Designated Tier 3 Noxious Weeds

**Designated Tier 2 Noxious Weeds

*** Non-exhaustive list (Marles et al., 2000)

Table 9. Bird species detected during terrestrial surveys of the Project area.

Latin Name	Common Name	Provincial Rank	ESEA	SARA	COSEWIC
Red-winged Blackbird	*Agelaius phoeniceus*	S5B	Not Listed	Not Listed	Not Listed
Blue-winged Teal	*Anas discors*	S4B	Not Listed	Not Listed	Not Listed
Mallard	*Anas platyrhynchos*	S5B	Not Listed	Not Listed	Not Listed
Ruffed Grouse	*Bonasa umbellus*	S5	Not Listed	Not Listed	Not Listed
Common Goldeneye	*Bucephala clangula*	S5B,SUN	Not Listed	Not Listed	Not Listed
Swainson's Thrush	*Catharus ustulatus*	S5B	Not Listed	Not Listed	Not Listed
American Crow	*Corvus brachyrhynchos*	S5B,SUN	Not Listed	Not Listed	Not Listed
Common Raven	*Corvus corax*	S5	Not Listed	Not Listed	Not Listed
Blue Jay	*Cyanocitta cristata*	S5	Not Listed	Not Listed	Not Listed
Yellow Warbler	*Dendroica petechia*	S5B	Not Listed	Not Listed	Not Listed
Alder Flycatcher	*Empidonax alnorum*	S5B	Not Listed	Not Listed	Not Listed
Common Yellowthroat	*Geothlypis trichas*	S5B	Not Listed	Not Listed	Not Listed
Bald Eagle	*Haliaeetus leucocephalus*	S5B,SUN	Not Listed	Not Listed	Not Listed
Belted Kingfisher	*Megaceryle alcyon*	S5B	Not Listed	Not Listed	Not Listed
Song Sparrow	*Melospiza melodia*	S5B	Not Listed	Not Listed	Not Listed
Cliff Swallow	*Petrochelidon pyrrhonota*	S4B	Not Listed	Not Listed	Not Listed
Black-billed Magpie	*Pica hudsonia*	S4	Not Listed	Not Listed	Not Listed
Downy Woodpecker	*Picoides pubescens*	S5	Not Listed	Not Listed	Not Listed
Black-capped Chickadee	*Poecile atricapillus*	S5	Not Listed	Not Listed	Not Listed
Yellow-rumped Warbler	*Setophaga coronata*	S5B	Not Listed	Not Listed	Not Listed
American Redstart	*Setophaga ruticilla*	S5B	Not Listed	Not Listed	Not Listed
Black-throated Green Warbler	*Setophaga virens*	S4B	Not Listed	Not Listed	Not Listed
American Goldfinch	*Spinus tristis*	S5B	Not Listed	Not Listed	Not Listed
Clay-colored Sparrow	*Spizella pallida*	S5B	Not Listed	Not Listed	Not Listed
American Robin	*Turdus migratorius*	S5B	Not Listed	Not Listed	Not Listed
Red-eyed Vireo	*Vireo olivaceus*	S5B	Not Listed	Not Listed	Not Listed
White-throated Sparrow	*Zonotrichia albicollis*	S5B	Not Listed	Not Listed	Not Listed

Table 10. Mammalian species detected during terrestrial surveys of the Project area.

Latin Name	Common Name	Provincial Rank	ESEA	SARA	COSEWIC
Northern Pocket Gopher	*Thomomys talpoides*	S5	Not Listed	Not Listed	Not Listed
American Beaver	*Castor canadensis*	S5	Not Listed	Not Listed	Not Listed
White-tailed Deer	*Odocoileus virginianus*	S5	Not Listed	Not Listed	Not Listed
Coyote	*Canis latrans*	S5	Not Listed	Not Listed	Not Listed
Red Squirrel	*Tamiasciurus hudsonicus*	S5	Not Listed	Not Listed	Not Listed
Common Raccoon	*Procyon lotor*	S5	Not Listed	Not Listed	Not Listed

APPENDIX B

Site Photography

Typical highway ROW condition showing primarily non-native grassy and herbaceous vegetation.

Presence of showy milkweed on north-east highway ROW.

Riprap armouring on north-west side of existing bridge structure occupied by invasive species.

Showing common tansy and leafy spurge present on the project site.

Typical condition of riparian environment associated with the Project (looking south-east).

Typical condition of riparian environment associated with the Project (looking south-west).

Typical condition of the adjacent upland community on the north-east portion of the project site.

Typical condition of the adjacent upland community on the north-west portion of the project site.

Typical condition of the adjacent upland community on the south-east portion of the project site.

Typical condition of the adjacent upland community on the south-west portion of the project site.

Fruit bearing shrubs present in the adjacent upland habitat.

Cliff swallow nests on the underside of the existing bridge structure.

Active nesting colony of cliff swallows on the underside of the existing bridge structure.

Evidence of habitat use by local mammalian wildlife.

APPENDIX C

MCC File Search Request

KGS GROUP

Ian Young

From: Murray, Colin (ARD) <Colin.Murray@gov.mb.ca>
Sent: Wednesday, May 12, 2021 3:36 PM
To: Ian Young
Subject: DR I Young Scatliff 202100426 Bridge Assiniboine R at PR5
Attachments: DR I Young Scatliff 202100426 Bridge Assiniboine R at PR5.xlsx; DR I Young Scatliff 202100426 Bridge Assiniboine R at PR5ptb2k.zip

Hi Ian
Thank you for your information request. I completed a search of the Manitoba Conservation Data Centre's (CDC) rare species database for your area of interest. This includes the primary point location as defined in the request; and a 2km radius buffer from the footprint boundary.

I am attaching a Microsoft Excel spreadsheet summarizing these occurrences. The spreadsheet includes scientific and common names, the provincial (SRank) rank for each species as well as the Manitoba Endangered Species and Ecosystem Act, and the federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and Species at Risk Act (SARA) designations. I'm also attaching the point location and buffer used in the request.

Further information on this ranking system can be found on our website at: http://www.natureserve.org/conservation-tools/conservation-status-assessment.
These designations can be found at:
http://web2.gov.mb.ca/laws/statutes/ccsm/e111e.php,
https://www.canada.ca/en/environment-climate-change/services/committee-status-endangered-wildlife.html and
http://www.sararegistry.gc.ca/default.asp?lang=En&n=24F7211B-1.

Manitoba's recommended setback distances can be found at:
https://www.gov.mb.ca/sd/pubs/conservation-data-centre/mbcdc_bird_setbacks.pdf.

The information provided in this letter is based on existing data known to the Manitoba Conservation Data Centre of the Wildlife and Fisheries Branch at the time of the request. These data are dependent on the research and observations of CDC staff and others who have shared their data, and reflect our current state of knowledge. An absence of data does not confirm the absence of any rare or endangered species. Many areas of the province have never been thoroughly surveyed, therefore, the absence of data in any particular geographic area does not necessarily mean that species or ecological communities of concern are not present. The information should not be regarded as a final statement on the occurrence of any species of concern, nor should it substitute for on-site surveys for species or environmental assessments. Also, because our Biotics database is continually updated and because information requests are evaluated by type of action, any given response is only appropriate for its respective request.

Please contact the Manitoba CDC for an update on this natural heritage information if more than six months passes before it is utilized.

Third party requests for products wholly or partially derived from our Biotics database must be approved by the Manitoba CDC before information is released. Once approved, the primary user will identify the Manitoba CDC as data contributors on any map or publication using data from our database, as the Manitoba Conservation Data Centre; Wildlife and Fisheries Branch, Manitoba Sustainable Development.

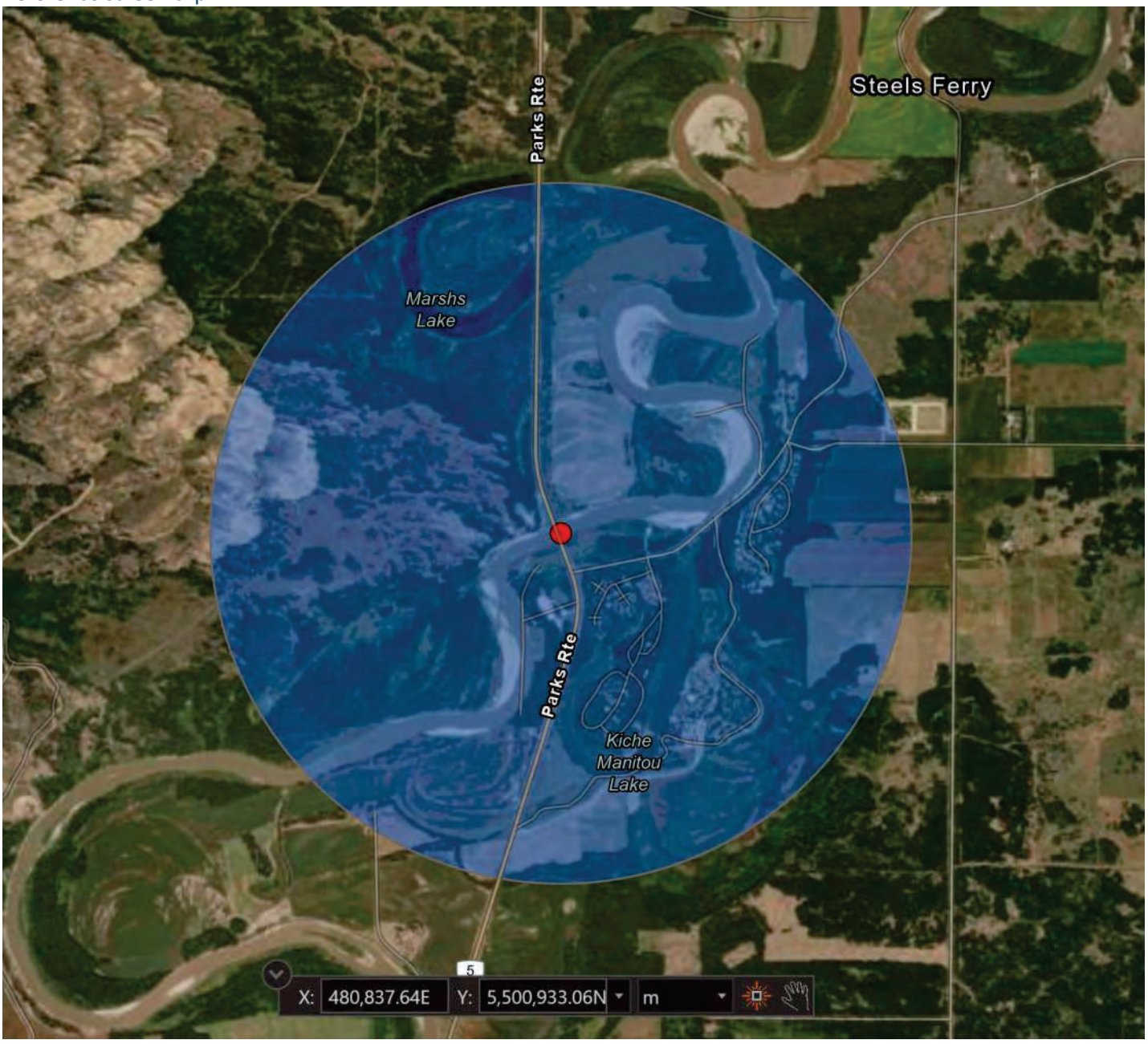
This letter is for information purposes only - it does not constitute consent or approval of the proposed project or activity, nor does it negate the need for any permits or approvals required by the Province of Manitoba.

We would be interested in receiving a copy of the results of any field surveys that you may undertake, to update our database with the most current knowledge of the area.

If you have any questions or require further information contact me directly at (204) 945-7760.

Colin

Reference screen clip:



Colin Murray
Information Manager- Manitoba Conservation Data Centre
Wildlife, Fisheries, and Resource Enforcement Branch
Manitoba Agriculture and Resource Development
200 Saulteaux Crescent, Winnipeg, MB R3J3W3
Colin.Murray@gov.mb.ca
T: 204-945-7760 F: 204-945-3077

Visit our website: MBCDC
Follow us on Twitter: twitter.com/MBGovAg
View our videos on YouTube: youtube.com/ManitobaAgriculture

-----Original Message-----
From: +WPG969 - Form Submissions (CEN) <noreply@gov.mb.ca>
Sent: April 26, 2021 10:45 AM
To: Murray, Colin (ARD) <Colin.Murray@gov.mb.ca>
Subject: WWW Form Submission

Below is the result of your feedback form. It was submitted by CDC Information Request () on Monday, April 26, 2021 at 10:44:36

DocumentID: Manitoba_Sustainable_Development

Project Title: Bridge over Assiniboine River PTH5

Date Needed: 2021/05/10

Name: Ian Young

Company/Organization: Scatliff+Miller+Murray

Address: 1120-201 Portage Ave

City: Winnipeg

Province/State: Manitoba

Phone: 204.995.7074

Email: iyoung@scatliff.ca

Project Description: Manitoba Infrastructure is undertaking preliminary design of a new bridge over the Assiniboine River on PTH 5. As part of the project, Scatliff+Miller+Murray biologists (as part of the KGS Group environmental team) will be providing assessment of the terrestrial environment to support environmental regulatory compliance. Information from the current data request will help inform field survey planning and future reporting.

Information Requested: Documented occurrences within the vicinity of the project of tracked and MBESEA and SARA listed terrestrial plant and wildlife species, including avian, amphibian, reptile, mammal, and plant species.

Format Requested: Microsoft Excel spreadsheet, Word Document, map; sent via email.

Location: Bridge structure site #352-10; bridge over the Assiniboine River on PTH 5; (49.660631, -99.265516)

action: Submit

APPENDIX F – MTI General Environmental Requirements

General Environmental Requirements

Manitoba Infrastructure

General Environmental Requirements

All construction shall be governed by the *Standard Construction Specification* set out in the contract and as modified in the Special Provisions.

Erosion and Sediment Control

1. Effective sediment and erosion control measures shall be installed before starting work near water to prevent the entry of sediment into any water course or wetland. Final erosion protection measures shall be installed progressively during the project.
2. Erosion and sediment control measures shall be inspected daily during the course of the work. Repairs or adjustments shall be made immediately if any damage is discovered or if these measures are not effective in controlling erosion and sedimentation.
3. Erosion and sediment control measures shall be maintained until complete revegetation of all disturbed areas is achieved. This period may extend beyond the duration of the construction contract, after which the monitoring of revegetation will be the responsibility of MI.
4. The duration of soil exposure shall be minimized and run-off shall be diverted away from the exposed soil.
5. Construction shall be halted during heavy rains with the exception of those works pertaining to erosion and sediment control.
6. Spoil piles shall not be placed within 30m of the ordinary high-water mark or as directed by the Engineer. Spoil piles shall be positioned and maintained in a manner not to increase sediment into the watercourse.

In-Water Work

7. No in-water work shall occur within fish bearing streams from April 1st to June 15th in Southern Manitoba or April 15th to June 30th in Northern Manitoba of any year to accommodate spawning and nursery periods, unless otherwise noted in the Special Provisions. Boundaries for Northern and Southern Manitoba are identified in the Manitoba Restricted Timing Activity Windows for the Protection of Fish and Fish Habitat (http://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/mb-eng.html).
8. Duration of in-water work shall be minimized.
9. Where possible in-water works shall be conducted under low flow, frozen, or dry conditions to reduce impacts to fish and fish habitat.
10. If work must proceed under flowing water conditions, then the work site shall be isolated from the water while maintaining downstream flow around the isolated site unless otherwise directed by the engineer. Placement of clean rip rap does not need to be isolated.
11. Disturbance to the bed and banks of the watercourse or wetland shall be minimized and confined to the immediate work site. Unnecessary removal of riparian vegetation shall be avoided. The bed and banks of the watercourse or wetland shall be

restored to pre-disturbance conditions in accordance with the contract documents or as directed by the Engineer.

12. Unless otherwise specified in the contract documents site isolation methods shall be approved by the Engineer based on an accepted plan or design submittal.
13. Where a cofferdam shall be installed:
    - Cofferdams shall be designed to accommodate any expected high flows during the construction period.
    - Cofferdams shall be constructed using clean, non-erodible materials. Silts and clays are not acceptable materials for the surficial zone of the cofferdam.
    - Materials shall not be taken from below the ordinary high-water mark of any water body.
    - All spoil material and debris shall be removed from the isolated area prior to the removal of the cofferdam.
    - Exposed soil on the banks of the isolated area shall be stabilized before the cofferdam or sediment barrier is removed.
    - All cofferdam materials shall be removed and the watercourse shall be restored to its original shape and profile.
14. Any isolated site shall be de-watered using an appropriately sized screened pipe or other suitable method to ensure fish do not become entrained in the pipe. Pump intakes shall be sized and adequately screened to prevent debris blockage and fish mortality in accordance with the Freshwater Intake End-of-Pipe Fish Screen Guideline (http://www.dfo-mpo.gc.ca/Library/223669.pdf).
15. Sediment laden dewatering discharge shall be pumped to a stilling basin, filtering system or through dense terrestrial vegetation a minimum of 30 metres away from the watercourse before re-entry downstream of the construction area, or as noted in the Special Provisions. All pump discharge points shall be lined with clean rock or other acceptable flow dissipating applications in order to prevent erosion and the release of suspended sediments.

Rip Rap

16. Where rock is required for rock armouring or stabilization:
    - Rock rip rap placement shall not damage the bed and/or banks of the watercourse
    - Clean rocks shall be placed by machinery operating from outside of the water.
    - No rocks shall be obtained from below the ordinary high-water mark of any water body.

Revegetation

17. Immediately following construction and decommissioning, all disturbed areas shall be covered with local top soil and seeded. If local topsoil is not available, other organic based covers may be used to allow seed germination.
18. Do not plant the following undesirable/invasive species:
    - Smooth Brome (*Bromus inermis*)
    - Downy Brome (*Bromus tectorum*)

- Crested Wheatgrass (*Agropyron cristatum*)
- Reed Canary Grass (*Phalaris arundinacea*)
- Creeping Red Fescue (*Festuca rubra*)
- Kentucky Bluegrass (*Poa pratensis*)
- Birdsfoot Trefoil (*Lotus corniculatis*)
- Yellow Sweet Clover (Melilotus officinalis)
- White Sweet Clover (Melilotus alba)
- Dutch Clover (Trifolium repens)
- Alsike Clover (Trifolium hybridum)
- Alfalfa (Medicago sativa)
- Meadow Foxtail (Alopecurus pratensis)
- Tufted/Cow/Bird Vetch (Vicia cracca)
- Tall Fescue (Festuca arundinacea

Clearing, Grubbing and Brushing

19. Clearing and grubbing shall NOT be undertaken between April 1st and August 30th of any year unless otherwise specified in order to avoid disturbance to nesting birds and other wildlife species.
20. Where possible, grubbing shall not occur within 2 m (2.5 yards) of standing timber in order to prevent damage to root systems of adjacent standing trees and reduce the occurrence of blow down.
21. Timber stockpile sites shall be located within existing clearings or areas of non-merchantable timber. Stockpile sites shall not be located within 30 meters of a waterbody unless otherwise directed by the Engineer. All stockpiled material shall be removed by April 30 following clearing activities.
22. There shall be no bulldozing of woody debris into standing timber.
23. Existing trails, portages and other travel ways shall not be permanently blocked as a result of clearing and grubbing activities so as not to interfere with other users.
24. All cleared vegetation and debris shall be piled and/or compacted in windrows as close to the ground as possible in preparation for disposal. Windrows shall be no closer than 1 meter to the bush line.

Temporary Water Crossings/Access and Pads

25. Temporary in-water crossings, site access, and pads shall be completely removed prior to April 1st of any given year.
26. Temporary water crossings shall be constructed out of clean stone, rock or crushed rock in accordance with the contract documents or as accepted by the Engineer.
27. Culverts shall be hydraulically sized to accommodate expected flows and fish passage requirements for the duration of the installation. The culvert design must be signed and sealed by a qualified engineer.
28. The temporary crossings, site access and pads shall be removed in their entirety upon completion of the work.
29. Upon removal of the temporary crossings, site access or pads, the site shall be rehabilitated to pre-disturbance conditions.

Blasting Near a Watercourse

30. Use of explosives in or near fish habitat shall follow DFO's Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky 1998) to avoid causing serious harm to fish. This guideline in available online at http://www.dfo-mpo.gc.ca/Library/232046.pdf.
31. The use of ammonium nitrate-fuel oil mixtures in or near water frequented by fish shall be avoided to prevent the deposit of toxic by-products (ammonia) in water frequented by fish.

Table 1. Setback distance (m) from centre of detonation of a confined explosive to fish habitat to achieve 100 kPa guideline criteria for various substrates.

Substrate Type	Weight of Explosive Charge (kg)							
	0.5	1	2	5	10	25	50	100
	Setback Distance (m)							
Rock	3.6	5.0	7.1	11.0	15.9	25.0	35.6	50.3
Frozen Soil	3.3	4.7	6.5	10.4	14.7	23.2	32.9	46.5
Ice	3.0	4.2	5.9	9.3	13.2	20.9	29.5	41.8
Saturated Soil	3.0	4.2	5.9	9.3	13.2	20.9	29.5	41.8
Unsaturated Soil	2.0	2.9	4.1	6.5	9.2	14.5	20.5	29.0

Machinery, Fuel Storage and Handling

32. All fuel handling and storage shall comply with Storage and Handling of Petroleum Products and Allied Products Regulation 188/2001 under The Dangerous Goods Handling and Transportation Act C.C.S.M. c. D12.
33. Storage of fuel stored in drums or containers of 230 L or less shall comply with the requirements of Manitoba Fire Code.
34. Designated Area(s) shall be established for fuel storage and handling, equipment cleaning, refueling and servicing. Any Designated Area shall be located at least 100m away from any waterbody or wetland and shall be kept clear of snow and/or miscellaneous materials to allow clear access, routine inspection and leak detection.
    - Machinery and equipment shall be washed, refueled and serviced in such a manner that washwater shall not contaminate surface water or be discharged into a surface water body.
    - In the event that a piece of equipment must be refueled or serviced outside a Designated Area, the fuel shall be transported in approved containers. Absorbent pads or other precautions, such as drip trays or a high density polyethylene (HDPE) groundsheet, shall be used to contain the fuel in the event of spillage.

- All mobile equipment that is not in use shall be parked within a Designated Area(s) where possible.

35. Tank vehicles used to deliver fuel to the work site and/or used to move fuel around the work site shall meet the requirements for highway tanks for the shipment of dangerous goods by road set out in CSA Standard B620-14, Highway Tanks and TC Portable Tanks for the Transportation of Dangerous Goods.
36. All fuel storage containers and tank vehicles shall be inspected daily for leaks and spillage. Damaged or leaking fuel storage containers shall be promptly removed from site. All used petroleum products and other regulated hazardous wastes shall be collected and disposed of at a licensed facility in accordance with applicable legislative requirements.
37. As refueling, fuel storage and equipment servicing sites are taken out of service, any required remediation shall be conducted, including the disposal of the contaminated material at an appropriate licensed facility to the satisfaction of the Department.
38. Machinery shall arrive on site in a clean condition and shall be maintained free of fluid leaks.

Emergency Response Plan for Spills

39. Due care and caution shall be taken to prevent spills, at all times.
40. An updated list of key contacts and telephone numbers for reporting spills, problems, etc., shall be kept on-site at all times.
41. A Workplace Hazardous Materials Information System (WHMIS) file shall be maintained on-site for all hazardous materials at the work area. Prior to commencement of the Work, Material Safety Data Sheets (MSDS) shall be available on-site for all hazardous materials to be used. An updated spill response and containment plan for each dangerous good/hazardous waste shall be maintained in the work area at all times.
42. A spill kit or sufficient supply of materials for clean-up or spill containment, for example absorbent material, high density HDPE groundsheets and absorbent oil booms when working near water, shall always be available on site. If necessary, additional material shall be made available on short notice.
43. All personnel responsible for the handling of dangerous goods and hazardous wastes shall be familiar with the on-site response and containment plan.
44. Any reportable spills shall be reported to the Accident Reporting Line at (204) 944-4888 pursuant to Manitoba Regulation 439/87.
45. All spills shall be reported to the Engineer within 24 hours whether it was necessary to report the spill to Manitoba Sustainable Development or not. The spill report shall include the following:
    - personnel responding to the spill
    - material spilled
    - cause of spill
    - estimated amount of material spilled
    - estimated area and volume of soil affected by the spill

- cleanup action undertaken
- means used to contain, transport and dispose of the materials involved

46. In the event that there is a spill onto the ground surface from any piece of equipment, such as a broken hydraulic hose, the entire affected area shall be cleaned up and all contaminated soil shall be appropriately disposed of offsite at an appropriate licensed facility. Such events shall be reported immediately to the Engineer and proof of appropriate disposal provided. Contractor field staff trained in spill containment and management shall always be on site.

Disposal

47. Dispose of all used petroleum products and other regulated hazardous wastes in accordance with the Manitoba "Dangerous Goods Handling and Transportation Act".
48. Dispose of non-reusable demolition and construction debris at a waste disposal ground operating under the authority of a permit pursuant to Manitoba Regulation 150/91 respecting Waste Disposal Grounds. Provide proof of appropriate disposal.
49. Any waste and non-salvageable demolition materials removed from the work site shall be stabilized above the Ordinary High-Water Mark to prevent them from entering any watercourse and/or transported to a designated disposal site.
50. Dispose of all sewage and septage from on-site sanitary facilities in accordance with Manitoba Regulation 83/2003, respecting Onsite Wastewater Management Systems Regulation. Provide proof of appropriate disposal.

Dust and Particulate Control

51. All work shall be conducted in a manner that minimizes the raising of dust from construction operations.
52. Only water or approved dust suppressants shall be used for dust control. The use of waste petroleum or petroleum by-products is not allowed.
53. All vehicles used to haul materials to or from the work site shall have the load covered with a tarpaulin cover during transport to prevent material from falling out and creating dust.
54. All material stock piles or spoil piles shall be maintained as to minimize release of particulate matters. This may include, but is not limited to, covering or stabilization of material stockpiled at the work site as required.

Noise and Noise Limitations

55. All plant and equipment supplied for use on the Project shall be effectively "sound-reduced" by means of proper silencers, mufflers, acoustic linings, acoustic shields or acoustic sheds.
56. Noise By-laws of the adjacent communities and municipal authorities shall be complied with.

APPENDIX G – Aquatic and Riparian Habitat Assessment of Expanded Upstream Guide Bank Footprint

Aquatic Environment Assessment
Site 352-10 Assiniboine River at PTH 5
Expanded Upstream Footprint

SUBMITTED TO

DILLON CONSULTING

August 2024

PREPARED BY

AAE TECH SERVICES INC.

Table of Contents

List of Tables

List of Figures

1. Introduction

AAE Tech Services Inc. (AAE) was contracted by Dillon to provide environmental support as part of additional investigations required as part of the PTH 5 bridge crossing of the Assiniboine River near Spruce Woods, MB. An aquatic habitat assessment of the PTH 5 bridge site was submitted in May, 2021 which extended to 800 m upstream and downstream of the existing PTH 5 bridge. However, proposed bank regrading and armouring required as part of relief bench flood mitigations to be constructed at this site required that the work space be extended an additional 600 m upstream , up to ~1400 m upstream of the PTH 5 bridge, along the right (east) bank of the river). The following report provides an assessment of aquatic and riparian habitat conditions within this extended footprint, between 800 m and 1400 m upstream of the PTH 5 bridge.

Environmental support for this project includes field assessments of the aquatic and riparian (up to 50 m from top of bank) habitats at this site. Aquatic habitat assessment focused on depth and substrate characteristics, to assess habitat quality and function for freshwater mussels in this system, including the Mapleleaf Mussel (*Quadrula quadrula*) which is known to inhabit the Assiniboine River.

1.1. Site Description

The Assiniboine River is a large, meandering watercourse originating in Saskatchewan and flowing eastward to its confluence with the Red River at The Forks in Winnipeg, MB. With a length of approximately 1,070 kilometres and a drainage area of 46,936 km^2, the Assiniboine River is a vital lifeline for the surrounding prairie wetlands and agricultural land that includes cultivated crops and pastureland.

The PTH 5 bridge site is located at the southern boundary of Spruce Woods Provincial Park, north of Glenboro, MB (Figure 1). Within the Aspen Parkland ecoregion, this area is known for predominantly sandy soils, with the Spirit Sands habitat area located to the north of this site; active sand dune cover at this site represents a unique and protected habitat, and is inhabited by numerous rare, at-risk, and culturally important species including the Northern Prairie Skink (*Plestiodon septentrionalis*).

Habitat assessment was completed from 800 to 1400 m upstream of the PTH 5 bridge, and included aquatic habitat, and riparian habitat along the right (east) bank (Figure 1).

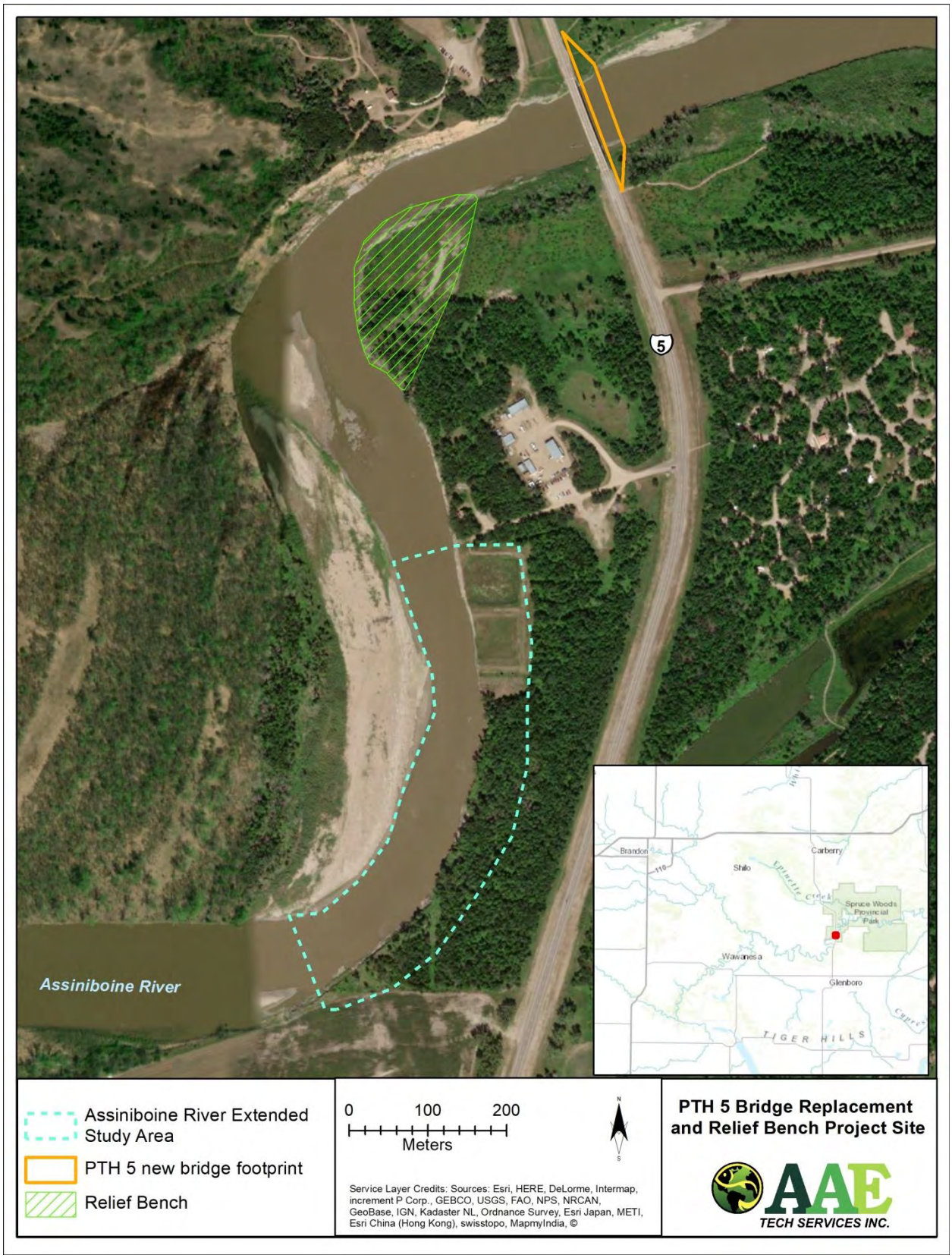


Figure 1. Assiniboine River PTH 5 aquatic and riparian extended habitat assessment area.

2. Methods

2.1. Field Investigations

2.1.1. Aquatic Habitat Characterization

The field assessment of the PTH 5 bridge site was completed in July 2024 to assess aquatic habitat conditions. The main objective of these investigations was to document aquatic habitat features and characteristics in the proposed work area and to assess the quality and function of the habitat to fish and mussels that may inhabit the watershed. This included investigations of channel morphology, bank slope and structure, water depth profiles, substrate composition, and riparian cover and type and vegetation species structure.

Bathymetric and substrate assessment was completed using hydroacoustic surveying (MX Echosounder) within the river from 800 to 1400 m upstream of the PTH 5 bridge (Figure 1). Visual and textural substrate assessments were also conducted at approximately 100 m intervals along the survey reach to verify survey results. Where applicable, substrate classes were selected to match those used in the original assessment at this site.

2.1.2. Riparian Zone Assessment

Riparian habitat surveys were completed within the assessment reach, along the right (east) bank only, as the workspace does not include the left (west) bank of the river in this extended footprint, Surveys were conducted perpendicular to the riverbank at 50 m intervals, documenting habitat conditions and function, including assessments of the bank slope and stability, avian and wildlife habitat use and habitat features, and vegetation cover type and species composition. Surveys extended up to 50 m from the riverbank, in order to fully capture habitat that will be cleared or disturbed within the workspace which is expected to extend up to 25 m from the top of bank. As part of this habitat assessment, signs of wildlife habitat use, breeding bird activity, and any other environmental features were documented including assessment of forested habitat within the assessment area for cavity nest trees. Additionally, riparian habitat features that support aquatic habitat function and quality were also documented, such as canopy cover, bank stabilization, and coarse woody debris.

2.1.3. Mussel Habitat Assessment

As part of the aquatic assessment, the suitability of habitat for mussel species was evaluated, taking into account factors such as substrate type, water depth, and habitat complexity. During the field investigations, the shoreline habitat was surveyed to detect the presence of freshwater mussels, with a particular focus on the Mapleleaf Mussel (*Quadrula Quadrula*), which is an endangered species in Manitoba waters.

3. Results

3.1. Aquatic Habitat Characteristics

The Assiniboine River within the extended footprint upstream of the PTH 5 crossing is characteristic of a left-bend meander; a U-shaped channel is skewed toward the right bank, with a gently sloping and vegetated (including emergent vegetation) left bank and a steep, eroding right cut bank (Figures 2 and 3). Maximum water depth recorded at the time of survey (July 5, 2024) was 3.2 m within a thalweg scour pool located immediately upstream of the decommissioned lagoon (Figure 2). Thalweg depths ranged form 1.8 to 3.0 m within the assessment reach, becoming shallower at the transition points into and out of the meander at the upstream and downstream extents of the survey respectively.

Water depths at the time of survey were noted to be deeper than conditions at the time of the original assessment in May 2021. Water levels recorded at the nearest Water Survey of Canada station (Station 05MH005, Assiniboine River near Holland) were reported to be 293.111 m asl at the time of original survey. Extended area surveying was completed July 5, 2024, with a reported water elevation at this same station of 293.851 m asl (Water Survey of Canada 2024), indicating water elevations presented in this report are approximately 0.740 m asl higher than site conditions at the time of the original 2021 survey.

Substrate assessment identified predominantly coarse substrate characteristics, including primarily Sand-Gravel and Gravel-Sand substrate types within the central channel (Figure 3). Substrate in the scour pool feature was similar but included finer sand and silt matrix embedding gravel material. Additionally, substrate along the left (west) bank was representative of an inundated gently sloping bank, with a predominantly finer silt material heavily embedded and stabilized with emergent and submerged grasses.

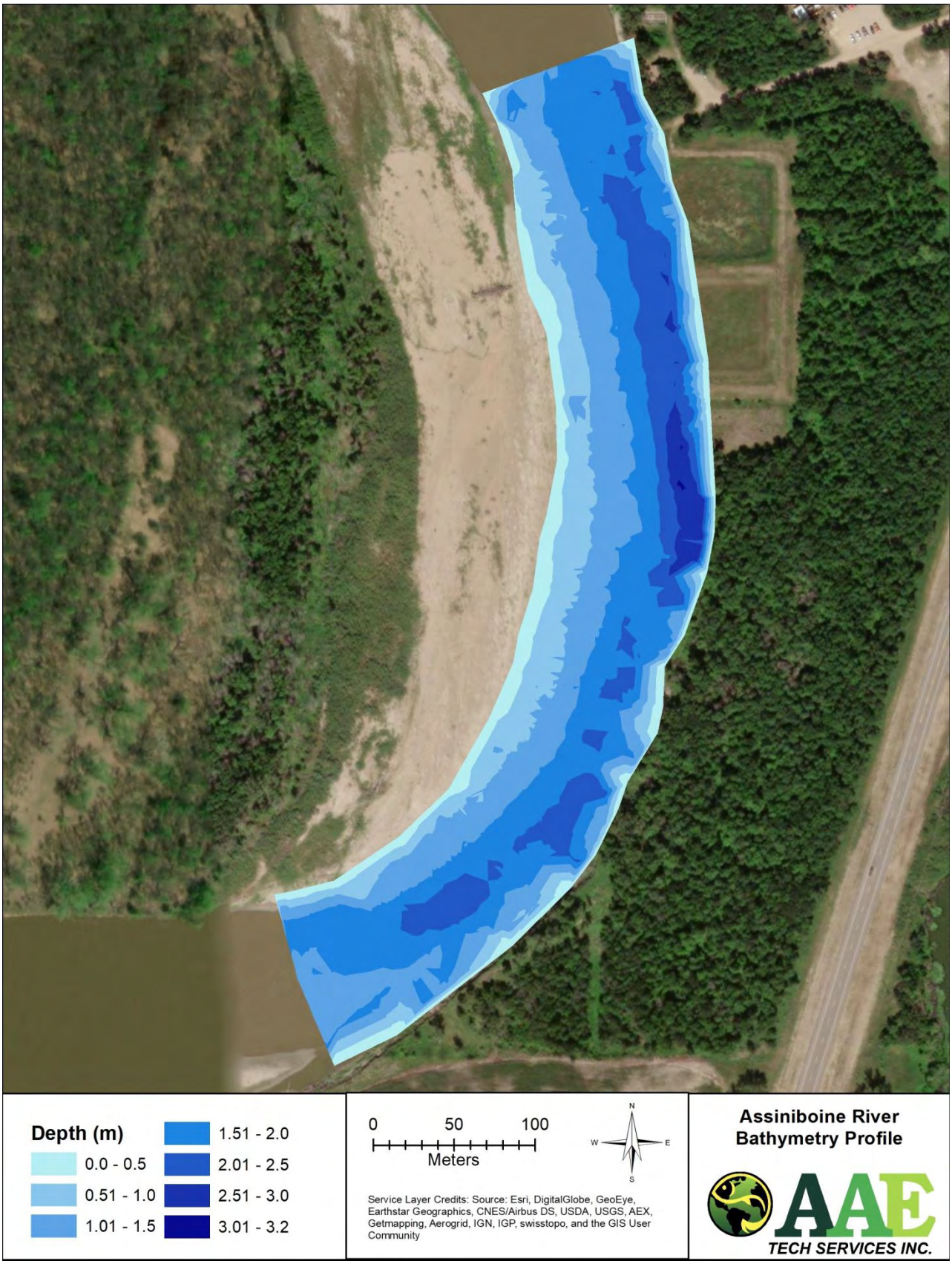


Figure 2. Bathymetric profile of the Assiniboine River at the PTH 5 extended assessment site.

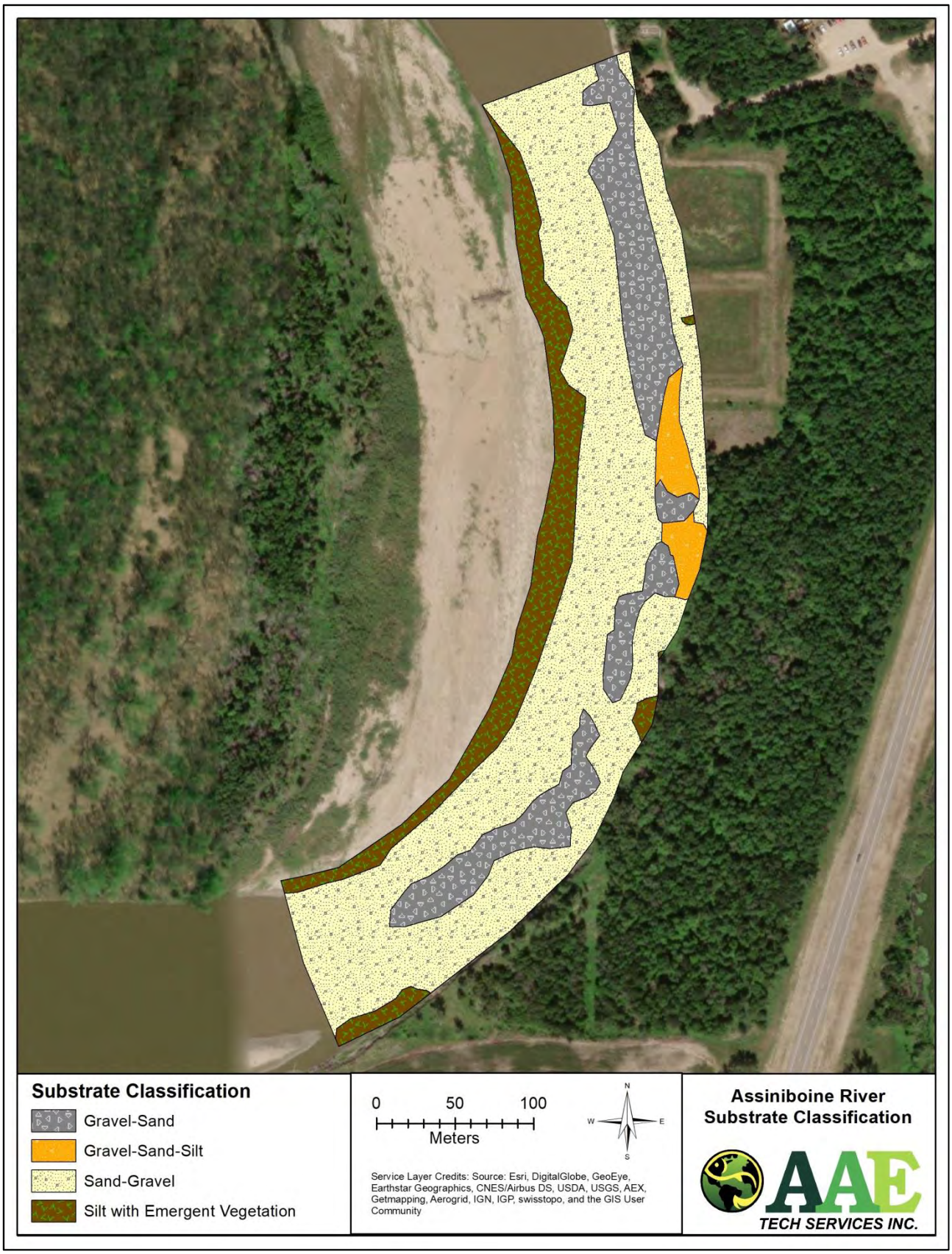


Figure 3. Substrate classification of the Assiniboine River at the PTH 5 assessment site.

3.2. Fish Habitat Classification and Habitat Function

Fish habitat within the Assiniboine River assessment area was classified according to the Department of Fisheries and Ocean's Fish Community and Fish Habitat Inventory of Streams and Constructed Drains Throughout Agricultural Areas of Manitoba (Milani, 2013 (Appendix A3). The fish habitat within the study area is classified as Type A, complex habitat. The classification is due to the potential presence of indicator fish species (including Walleye and Bigmouth Buffalo) and overall aquatic habitat characteristics that represent ideal fish habitat.

The Assiniboine River instream and riparian habitat zone conditions scored a total of 181 points, which suggests "Optimal" classification. The habitat complexity chart and habitat assessment chart with assigned scores is provided in Appendix A3 & Appendix A4.

With pools of varying depths and coarse shoal substrates documented within the assessment reach, and centre of channel depths up to 3.2 meters, many fish occupying the area would likely be able to complete most or all of their life processes (i.e., spawning, rearing, feeding, migration and over-wintering) within the watercourse. Overhanging riparian canopy cover along the steeper right (east) bank provides suitable cover for fish species, and submerged and emergent vegetation cover along the left (west) as well as in areas of slumping along the east bank offers refuge and nursery habitat for fish. Spawning habitat within the workspace is predominantly coarse material, suitable for species such as Walleye (*Sander vitreus*), and the deeper scour pool at the centre of the study reach can provide overwintering habitat.

It is understood that instream works at this site will focus on regrading and armouring of the right (east) bank of the river up to the toe of bank. Environmental planning and aquatic impact mitigation measures should focus on adherence to the Southern Manitoba restricted spawning window for both spring spawning species (Walleye, Northern Pike; April 1 – June 15), and summer spawning species (Channel Catfish; May 1 – June 30), and to ensure that any work in the riparian zone is limited to the minimum footprint required. Riparian vegetation clearing for required regrading and rip rap placement will permanently remove 385 linear metres of shoreline complex canopy cover at this site. The remaining riparian zone to be disturbed is cleared grassland/meadow habitat that does not overhang the river. This cover provides potential bank stabilization, though evidence shows natural stabilization at this site is insufficient to mitigate the strong flooding conditions experienced at this site, based on the significant bank erosion present.

3.3. Mussel Survey and Habitat Assessment

Thirteen mussel species have distribution ranges within the Assiniboine River watershed including Threeridge (*Amblema plicata*), Wabash Pigtoe (*Fusconaia flava*), Pink Heelsplitter (*Potamilus alatus*), White Heelsplitter (*Lasmigona complanata*), Creek Heelsplitter (*Lasmigona compressa*), Flutedshell (*Lasmigona costata*), Black Sandshell (*Ligumia recta*), Creeper (*Strophitus undulatus*), Cylindrical

Papershell (*Anodontoides ferussacianus*), Giant Floater (*Pyganodon grandis*), Plain Pocketbook (*Lampsilis cardium*), Fatmucket (*Lamsilis siliquoidea*), and Mapleleaf Mussel (*Quadrula quadrula*).

The sandy and coarse substrate within the PTH 5 project area is favourable for mussels, and water depths are sufficient for overwintering of freshwater mussel species. Investigations in 2021 identified the presence of mussels or empty shells upstream and downstream of the bridge site attributed to seven different species, including Threeridge, Wabash Pigtoe, Plain Pocketbook, Fatmucket, Black Sandshell, Mapleleaf, and White Heelsplitter. With suitable habitat characteristics continuing downstream into the expanded work space, it should be assumed that freshwater mussels will be inhabiting this portion of the river.

Among the thirteen (13) species of freshwater mussels identified as potentially occurring within the project area, one species, Mapleleaf Mussel, is listed as endangered by MBESA and SARA and has the potential to be found within the project area, with coarse shoal and sandy run habitat characteristics suitable of Mapleleaf mussel colonization. The Mapleleaf Mussel brooding period is from late spring to early summer, and mussel survey and salvage efforts are most effective in late summer, while water temperatures are > 16°C.

3.1. Riparian Zone Classification

The right (east) bank riparian zone along the Assiniboine River at this site consists of mixed cover including grass and small shrub cover near top of bank, transitioning to predominantly deciduous forest cover . The riparian corridor within the area extends as far as 135 m from the waters edge along the majority of the site, though narrows at the far upstream extent as the riparian zone narrows against adjacent cultivated agricultural land. Significant bank erosion at this meander has resulted in shoreline slumping and washout, and a shift in top of bank alignment of 40 – 50 m in the past 10 years.

The downstream extent of the riparian zone is an open but presently unmaintained clearing approximately 190 m x 80 m that is the site of a now decommissioned lagoon that is now characteristic of native grassland habitat, and provides approximately 300 m of fringe/transition habitat between grassland and deciduous forest cover. Species composition in this grassland habitat includes primarily grass and brome cover with yellow sweetclover (*Melilotus officinalis*) and white sweetclover (*Melilotus alba*). Other less prominent species included Canada thistle (*Cirsium arvense*), common dandelion (*Taraxacum officinale*), common tansy (*Tanacetum vulgare*), licorice mint (*Agastache foeniculum*), milkweed (*Asclepias syriaca*), golden Alexander (*Zizia aurea*), and Canada goldenrod (*Solidago canadensis*), with some creeping juniper (*Juniperus horizontalis*) along the south side fringe habitat.

Deciduous forest habitat included dense mature tree cover consisting of Bur Oak (*Quercus macrocarpa*), Green Ash (*Fraxinus pennsylvanica*), and some White Elm (*Ulmus Americana*). Understory cover includes ash saplings, grass/brome species, wood nettle (*Laportea Canadensis*), Canada mayflower (*Maianthemum canadense*), and Canada anemone (*Anemone canadensis*), with less prominent species including reed canary grass (*Phalaris arundinacea*), Bedstraw (Galium sp.),

common tansy, white sweetclover, eastern daisy fleabane (*Erigeron annuus*), stinging nettle (*Urtica dioica*), common burdock (*Arctium minus*), wild red raspberry (*Rubus idaeus*), and common wormwood (*Artemisia absinthium*).

At the southernmost edge of the survey area, approaching the adjacent cultivated property, forest cover becomes less dense, and additional species identified include Cottonwood (*Populus deltoides*), balsam poplar (*Populus balsamifera*), black-eyed Susan (*Rudbeckia hirta*), and false sunflower (*Heliopsis helianthoides*).

No listed at-risk plant species were identified during field investigations.

Figure 4. Riparian zone in upstream assessment area, right bank facing downstream. Forest habitat extends up to water edge, providing overhanging cover. Steep, eroding cut bank

Figure 5. Riparian zone in upstream area, right bank facing upstream. The riparian zone thins to the south as it approaches the adjacent cultivated agricultural land, visible in background. Tree cover is predominantly bur oak and green ash, with some cottonwood noted in the southern portion of the assessment area.

Figure 6. Steep bank erosion along the right bank is present throughout, characteristic of coarse gravel and sand material.

Figure 7. Riparian zone transitions to a wide, open grassland habitat at the decommissioned lagoon site. Bank erosion in this reach has created a near-vertical bank with slumping and coarse woody debris.

Figure 8. Vegetation species identified during riparian survey, including northern bedstraw (upper left), common tansy (upper right), eastern daisy fleabane (lower left), and wild red raspberry (lower right).

Figure 9. Vegetation species identified during riparian survey, including golden Alexander (upper left), Canada mayflower (upper right), Kentucky bluegrass (lower left), and false sunflower (lower right).

Figure 10. Vegetation species identified during riparian survey, including licorice mint (upper left), milkweed (upper right), common wormwood (lower left), and coral mushroom (lower right).

3.2. Terrestrial Wildlife – Northern Prairie Skink

During riparian surveys, a Northern Prairie Skink was identified in the fringe of riparian grassland habitat along the top of a steep cut bank. The skink was located within the deciduous forest habitat approximately 125 m south of the decommissioned lagoon area, within 30 cm of the top of bank edge of the river (Figures 11 and 13). The skink was identified, documented, and immediately released.

Northern Prairie Skink are Manitoba's only native lizard species and are known to inhabit the Sprit Sands (Carberry Sandhills) protected area north of this site. This species utilizes open areas with sandy soils, including the edges of deciduous and mixed-wood forest. In the winter they burrow in sandy soil to depths of up to 140 cm, and typically have relatively small home ranges and migrate very little from their hibernation site. They are active from mid-April to late September, breeding in May to early June, with a prolonged incubation period and eggs hatching in mid-August.

Figure 11. Northern Prairie Skink identified along the top of bank, in the transition zone of riparian grassland habitat along the south edge of the decommissioned lagoon area. (14U 480673 5500092).

3.3. Terrestrial Wildlife – Bank Swallow

During aquatic habitat surveys, Bank Swallow (*Riparia riparia*) nesting was identified in the steep cut bank of the river, adjacent to the southern half of the decommissioned lagoon area (Figures 12 and 13).

Bank Swallows are a Schedule 1 Threatened species under the Species at Risk Act and COSEWIC (COSEWIC 2021), that nest in colonies along riverbanks in southwest Manitoba, with typically dozens of burrowed nesting holes observable near the top of steep bank slopes. In Manitoba, this species is typically active between mid-May and early to mid-August.

Bank Swallows typically excavate new holes each year, and removal of existing nests will not be detrimental to the success and recovery of this species. Active nests are protected both under SARA and the *Migratory Bird Convention Act* (MBCA), and a buffer against direct disturbance of the bank swallow nesting colony should be applied to any construction activities taking place during the breeding bird window.

Figure 12. Bank swallow nesting identified along the right bank of the Assiniboine River within the assessment area, below the decommissioned lagoon area (14U 480674 5500252).

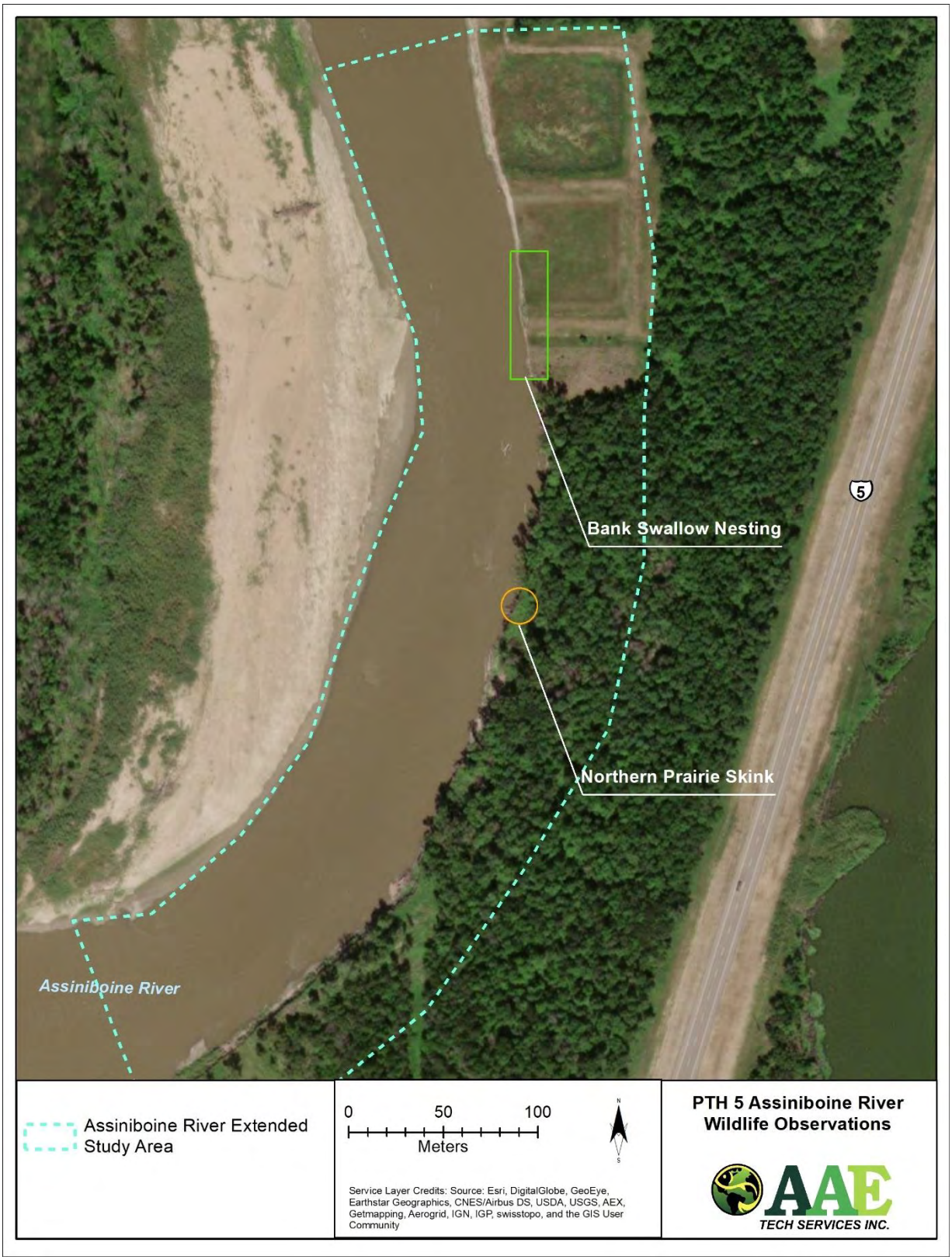


Figure 13. Location of wildlife observations during field investigations, including Northern Prairie Skink observation, and Bank Swallow nesting colony along the right bank of the Assiniboine River.

4. Recommendations and Mitigation Measures

The following are recommendations for mitigation measures presented as they relate specifically to planned works for the expanded assessment area, which includes riparian clearing up to approximately 25 m from top of bank, and regrading and rip rap armouring of the right bank of the Assiniboine River up to the foot of the existing bank slope.

These are in addition to any recommended considerations and mitigation measures that have already been presented as part of the original environmental assessment for this project, as well as any General Environmental Requirements that would be expected under most projects completed for Manitoba Transportation and Infrastructure.

Table 1. Recommendations and mitigation measures for protection of fish and aquatic habitat at the Assiniboine River project site.

Recommendation	Description/Specifications	Rationale	Applicable Project Component(s)	Risk - Environmental	Risk - Regulatory
Project Timing Restriction	Adherence to the following for all work below the high-water level: Spring Fish Spawning Window - April 1 - June 15 Summer Fish Spawning Window – May 1 – June 30	DFO Restricted timing window for in-water works. Includes Walleye and Sauger (spring spawners), and Channel Catfish (summer spawners) identified during field investigations.	Scheduling	High - Risk of direct disturbance to spawning habitat at the site. -Risk of sedimentation of spawning habitat at and downstream of the site. -Risk of disturbance to upstream spawning migration.	High - DFO (Fisheries Act) and provincially (Manitoba Fisheries Act and Fisheries Regulations) enforced restriction.
	Adherence to restricted activities during the Breeding Bird Window that may disturb Bank Swallow nesting at this site. Including riparian clearing within 30 m of the nesting colony.	MBCA restrictions for any activities that could disturb or damage active nesting of Bank Swallows. SARA/COSEWIC Threatened species, nests are protected while active.	Scheduling, Riparian Clearing, Construction	High – Risk of direct disturbance to an active nesting colony.	High – Bank Swallows are a Schedule 1 SARA listed species.
Mussel Salvage (SARA permit/ FAA required)	Mussel survey and salvage pre-construction. Should anticipate requiring a SARA permit and Fisheries Act Authorization to complete instream works that will disturb or destroy aquatic habitat at this site.	A mussel salvage will be required at this site, as habitat conditions are suitable for Mapleleaf Mussel. Mussel salvage should be done in the late summer when water temperatures are >16 C, and can be done the summer before any scheduled winter or spring construction activities. Based on experiences with other bridge projects of similar scale and involving work in Mapleleaf Mussel habitat, SARA/FAA permitting should be anticipated for this project.	Environmental Planning, Pre-Construction	Moderate – Substate conditions are suitable for Mapleleaf Mussel, and original assessment identified shells from this species at the bridge site.	High – Mapleleaf Mussel are a provincially and SARA-listed species at risk, and a SARA permit and Fisheries Act Authorization should be expected as requirements for this project.

Recommendation	Description/Specifications	Rationale	Applicable Project Component(s)	Risk - Environmental	Risk - Regulatory
Northern Prairie Skink Isolation and Salvage	An isolation and salvage plan will be required prior to any riparian clearing or other ground disturbance within the riparian zone along the right bank of the Assiniboine River.	Northern Prairie Skink are a Schedule 1 Endangered species under SARA and MBESEA. This species has a relatively small home range, and their identification at this site indicates this deciduous forest habitat hosts skink nests/breeding grounds as well as overwinter burrowing.	Environmental Planning, Construction Planning including temporary work spaces and ROW clearing.	High – Vegetation clearing and excavation will destroy potential skin nesting and overwintering sites.	High – Schedule 1 Endangered species under SARA and MBESEA.

5. Closure

AAE Tech Services has completed all field investigations related to the Aquatic Environmental Assessment of the expanded workspace on the Assiniboine River as it relates to the PTH 5 bridge replacement project.

Based on the results of this assessment, AAE has presented recommendations to be considered in project design and planning related to aquatic habitat protection, mitigation of potential disturbances and impacts to habitat and at-risk species at this site, and applicable to potential regulatory approval and authorization requirements.

Should you require additional information or have any questions regarding the above report please feel free to contact the undersigned at 204-997-3483 or via email at mlowdon@aaetechservices.ca.

Sincerely,

Mark Lowdon

Owner & Lead Scientist
AAE Tech Services Inc.

6. References

COSEWIC. COSEWIC Assessment and Status Report on the Mapleleaf Quadrula quadrula (2016).
Fisheries and Oceans Canada. Manitoba Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat: https://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/mb-eng.html (Accessed January 2022)

Government of Canada. Retrieved from Species at Risk Public Registry: https://wildlife-species.canada.ca/species-risk-registry/sar/index/default_e.cfm (Accessed January 2022)

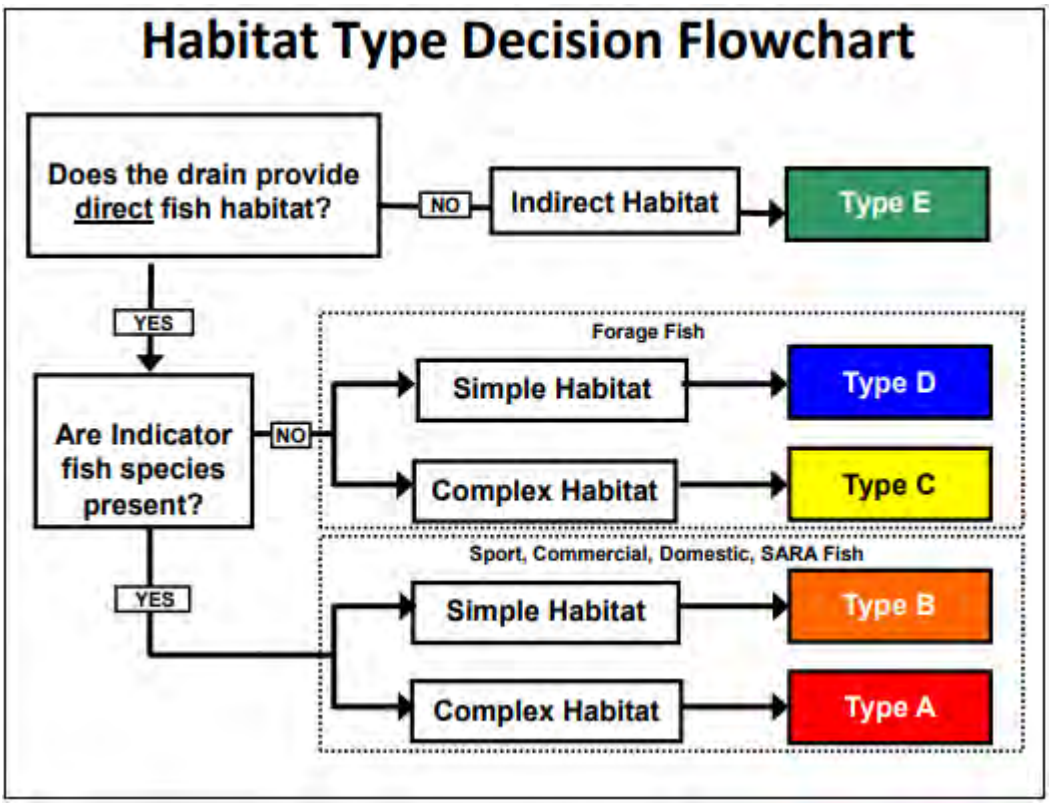
Government of Manitoba. Manitoba Lake Sturgeon Management Strategy (2012).

Milani, D.W. 2013. Fish community and fish habitat inventory of streams and constructed drains throughout agricultural areas of Manitoba (2002-2006). Can. Data Rep. Fish. Aquat. Sci. 1247: xvi + 6,153 p.

Scott, W.B., and E.J. Crossman. 1973. Freshwater fishes of Canada. Fish. Res. Board Canada Bull. 966 pp.

Stewart, K., & Watkinson, D. 2004. *Freshwater fishes of Manitoba*. Univ. of Manitoba Press.

7. Appendix A – Additional Tables



Appendix A1: Habitat Type Decision Flowchart (Milani, 2013) used to classify habitat type within the Assiniboine River proposed work site.

Appendix A2: Instream and riparian zone habitat conditions chart (Milani, 2013) assessment for the Assiniboine River, July 2024. Red circles indicate values assigned to habitat within the project assessment area

Habitat Parameter	Condition Category			
	Optimal	Sub-Optimal	Marginal	Poor
1. Available Cover/ Epifaunal Substrate	Greater than 70% of substrate favourable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Substrate Embedded-ness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity / Depth Regime	All 4 velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (slow is <0.3 m/s, deep is >0.5m).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Habitat Parameter	Condition Category			
	Optimal	Sub-Optimal	Marginal	Poor
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Recent channelization or dredging absent or minimal; stream with normal pattern.	Some new channelization, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or Bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural rest areas is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosion scars.
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Habitat Parameter	Condition Category			
	Optimal	Sub-Optimal	Marginal	Poor
9. Bank Vegetative Protection (score each bank)	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, under story shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimetres or less in average stubble height.
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Condition (score each bank)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE	Right Bank 10 9	8 7 6	5 4 3	2 1 0
11. Pool Substrate	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
12. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0