+

MANITOBA MINNESOTA TRANSMISSION PROJECT

AMPHIBIAN MONITORING PROGRAM 2020

TECHNICAL REPORT

March 2021

Prepared for:

Manitoba Hydro

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

SENSITIVE DATA REDACTED

EXECUTIVE SUMMARY

As part of Manitoba Hydro's Manitoba-Minnesota Transmission Project (MMTP), North/South Consultants Inc. directed studies on the amphibians within the MMTP Study Area in an effort to provide a post-construction description of Northern Leopard Frog and Tiger Salamander populations on and adjacent to the Project Development Area (PDA). Wetland mitigation compliance monitoring was also conducted, as outlined in Sections 4.5.1 of the MMTP Environmental Monitoring Plan (EMP).

Wetlands and streams known to support Northern Leopard Frogs and/or Eastern Tiger Salamanders were prioritized for visits during summer and fall amphibian and water quality surveys. This included wetlands and waterbodies previously surveyed and found to support Northern Leopard Frogs, and any additional wetlands observed to be good habitat. Surveys included amphibian visual encounter surveys (VES) and water quality surveys in the summer and fall, and summer salamander surveys. Spring site visits focusing on anuran call surveys could not be undertaken during the 2020 survey period as construction was not yet complete at the time. The Least Bittern (*Ixobrychus exilis*) was also surveyed incidentally throughout the course of amphibian wetland surveys.

Overall, there did not appear to be any unanticipated project effects on Northern Leopard Frogs, Eastern Tiger Salamanders, or water quality at surveyed amphibian wetland sites within or adjacent to the PDA. Least Bittern was not identified incidentally during the course of amphibian wetland surveys.

During summer VES, Northern Leopard Frogs were observed at two of the 17 sites. Northern Leopard Frogs were also observed incidentally at these sites, outside of the VES, as well as at a third site. Northern Leopard Frog tadpoles were also captured incidentally in funnel traps during salamander surveys at four additional sites. Site 17.5 had both the greatest amphibian species richness and the greatest number of Northern Leopard Frogs observed. During fall VES, Northern Leopard Frogs were observed at nine of the 15 surveyed sites and incidentally at one additional site.

Of the 17 summer sites examined in 2020, seven were also examined during pre-construction surveys in 2017. Northern Leopard Frogs were observed in equal or greater abundance at all seven of the summer sites that were also examined during 2017 pre-construction surveys. Of the 15 fall sites examined in 2020, 12 were also examined during pre-construction surveys in 2014 or 2017. Northern Leopard Frog abundance was variable at fall survey sites, with six sites having greater abundances of Northern Leopard Frogs during pre-construction surveys, and five sites having greater abundance of Northern Leopard Frogs during post-construction surveys. Generally, the river sites had fewer frogs in 2020, while the shallow creek sites had a greater abundance of frogs, suggesting that Northern Leopard Frogs might not have yet migrated to their overwintering sites.

Summer salamander surveys were conducted at 11 wetland ponds. Larval Eastern Tiger Salamanders were caught at REDACTED. Larvae were similar in length and head width, suggesting they are all from the same larval cohort.

Water quality parameters were variable at sites dependent on the size, depth and flow pattern of the waterbodies. During fall surveys, Northern Leopard Frogs were consistently observed at all sites where DO was relatively high. Overall, water quality at sites was similar during pre-construction and post-construction fall surveys.

Construction was compliant with prescribed mitigation and considered to be effective at 23 of the 26 wetlands and water courses assessed in 2020. The wetland buffer was less than 30 m at Sites 17.5 and 19; rutting, erosion, sedimentation were not observed however, and water quality and amphibian abundance did not appear to be affected. It is recommended that a follow up survey be conducted at these sites to monitor for the re-establishment of vegetation. In consideration of the presence of Eastern Tiger Salamanders at Site 19, it is also recommended that a 30 m riparian buffer be established around the wetlands at Site 19 for any future Right of Way maintenance work. Although water quality readings were similar in pre- and post-construction surveys, subsequent water quality measurements are recommended at Site 19 for continued monitoring of turbidity levels. Large woody debris from riparian clearing remained in the channel at Site 27 (Aqua-130). Removal of the debris was recommended and has since been removed. There is no longer a mitigation concern with the watercourse crossing at Site 27.

ACKNOWLEDGEMENTS

Manitoba Hydro is thanked for the opportunity to conduct this project, as well as support with land access, and logistics.

The collection of amphibian samples was authorized by Manitoba Agriculture and Resource Development under terms of wildlife scientific permit # WB24553.

NORTH/SOUTH CONSULTANTS INC. STUDY TEAM

Data Collection

Katarzyna Dyszy

Kim Mandzy

Data Analysis, Report Preparation, and Report Review

Duncan Burnett

Katarzyna Dyszy

Kim Mandzy

Kurt Mazur

Candace Parker

TABLE OF CONTENTS

page

LIST OF TABLES

LIST OF MAPS

LIST OF PHOTOS

LIST OF APPENDICES

1.0 INTRODUCTION

In September 2015, Manitoba Hydro filed an Environmental Impact Statement (EIS) in support of the Manitoba-Minnesota Transmission Project (MMTP), a 500 kilovolt (kV) alternating current (AC) international transmission line in southeastern Manitoba (Map 1). The transmission line originates at the Dorsey Converter Station, located near Rosser, Manitoba, northwest of Winnipeg, and continues south-east to the Manitoba-Minnesota border near Piney, Manitoba, where it connects to Minnesota Power's Great Northern Transmission Line. MMTP also includes additions and upgrades to three associated transmission stations at Dorsey, Riel and Glenboro South.

As outlined in MMTP's Environmental Impact Statement (EIS, Chapter 9) and supporting materials, the MMTP Environmental Protection Plan (EPP) and supporting Environment Monitoring Plan (EMP), amphibians favoring wetland habitat for part or all of their life cycle may be vulnerable to changes in habitat availability as a result of Project activity. The prairie population of the Eastern Tiger Salamander (*Ambystoma tigrinum*) that overlaps MMTP's Local Assessment Area (LAA) (COSEWIC 2013) is listed under the *Species at Risk Act* (SARA) as Endangered. Similarly, the Northern Leopard Frog (*Lithobates pipiens*) is listed SARA as a species of Special Concern within portions of Manitoba (COSEWIC 2009). This species is found in wetlands within the MMTP Development Area (PDA) and surrounding LAA.

In 2014, as part of a multi-disciplinary study, existing conditions were described for amphibians and their habitat in the general region that would support the project (Stantec 2015). Additional pre-construction amphibian surveys were conducted on wetlands and waterbodies within the LAA in 2017 (Dyszy 2018). As outlined in Section 4.2.1 of the EMP, North/South Consultants Inc. (NSC) directed studies in 2020 on amphibians within the MMTP LAA in an effort to provide a post-construction description of Northern Leopard Frog and Eastern Tiger Salamander populations on and adjacent to the MMTP footprint. Sites were also examined to assess mitigation compliance, as outlined in the EMP. This report presents the findings from summer and fall 2020 field surveys conducted on the amphibian communities and associated waterbodies within the MMTP Assessment Area.

2.0 STUDY AREA

MMTP lies within the transitional zone of 3 Ecozones: Boreal Shield, Boreal Plains and Prairie Ecozones. Within the Regional Assessment Area (RAA), ecoregions are represented predominately by Lake Manitoba Plain, Interlake Plain, and Lake of the Woods, with additional smaller representation by Aspen Parkland and Southwest Manitoba Uplands. Within the MMTP LAA, all ecoregions but the Southwest Manitoba Uplands are represented.

The Study Area is primarily restricted to the area overlapping the transmission line and 30m right-of-way corridor, from the Dorsey Converter Station near Rosser Manitoba, west and south of Winnipeg, and south-east of Winnipeg to the Manitoba-Minnesota border near Piney, Manitoba (Map 1). The Study Area also includes some wetlands within the LAA, which extends 1 km on either side of the MMTP centreline. In particular, field studies focused on wetland areas and waterbodies within the LAA.

3.0 METHODS

Amphibian Surveys

As outlined in Sections 4.2.1 and 7.3.1.1 of the EMP, wetlands and streams surveyed for Northern Leopard Frogs and/or Eastern Tiger Salamanders during pre-construction surveys (2014 and 2017) were prioritized for visit during the 2020 summer and fall amphibian and water quality surveys. Spring site visits focusing on anuran call surveys could not be undertaken during the 2020 survey period as construction was not yet complete at the time.

Northern Leopard Frog Surveys

Visual encounter surveys (VES) were completed at accessible sites, where landowner permission had been granted, to identify the presence of Northern Leopard Frogs and their habitat. The VES were conducted during two time periods coincident with important Northern Leopard Frog life history stages: (1) in mid-summer during the post-breeding season when larvae (tadpoles) and emerging young of year are abundant (July 6-11, 2020); and (2) in fall during the pre-hibernation period (September 8-10, 2020).

VES were conducted during daylight hours between 09:00 and 18:15 hrs. Before walking commenced, a start location was established. At this start location a number of attributes were recorded, including: ambient air temperature (°C), water temperature (°C), wind speed (km/hr) and direction, cloud cover (%), and precipitation (%). Ideal survey conditions include water and air temperatures greater than 10°C, calm winds, and precipitation not exceeding light to intermittent rains (Kendell 2002). The VES commenced with two field biologists walking the perimeter of the wetland for a maximum of 20 min, or until the field crew encircled the entire circumference of the wetland, whichever came first. The path walked approximately followed the 2017 VES track and was mapped using a Garmin GPSMAP® 78s handheld GPS. The two field biologists walked side-by-side along the wetland edge, with one individual disturbing the vegetation along the wetland edge and monitoring for amphibians while the other individual monitored and recorded all amphibians observed. Where possible, all amphibians observed during the VES were identified to species and photographed. Observation locations were recorded using a Garmin GPSMAP® 78s handheld GPS. Survey start and end time, start and end location, and shoreline photographs were recorded.

Incidental Sightings

Incidental observations of amphibians were defined as all auditory and visual observations made outside of intended surveys. These included individuals observed before or after VES, during water quality measurements, and those caught incidentally during salamander surveys. All incidental amphibian observations, where possible, were enumerated and identified to species, photographed using a Nikon Coolpix GPS-linked digital camera, and location recorded using a Garmin GPSMAP® 78s handheld GPS.

As outlined in Section 4.5.1 of the EMP, the Least Bittern (*Ixobrychus exilis*) was also surveyed for incidentally throughout the course of amphibian wetland surveys.

Eastern Tiger Salamander Surveys

Larval amphibian surveys were conducted in summer (July 6-11, 2020) at wetland ponds previously surveyed in 2017 as well as additional sites identified as being potentially suitable for salamanders (i.e. no fish, not marshy). At each wetland, a number of physical parameters were collected, including: ambient air temperature (°C), water temperature (°C), wind speed (km/hr) and direction, cloud cover (%), and precipitation (%). Pictures of the wetland, including the location and direction, were taken using a Nikon Coolpix GPS-linked digital camera.

At each wetland, five funnel traps were set along the shoreline. Funnel traps were set in the evening partially submerged in approximately 15-25 cm deep water, baited with 2 glow sticks (Grayson and Roe 2007), left overnight, and checked the following morning. In addition to funnel traps, where conditions permitted, one wetland site was also sampled for larval salamanders (and other amphibians) using a dipnet. Each funnel trap location and dipnet track was recorded using a Garmin GPSMAP® 78s handheld GPS. Where possible, larval amphibians captured were measured for snout-length and total length. Tissue samples were collected from all individuals captured for DNA analysis by the Manitoba Conservation Data Centre. All amphibian larvae captured were identified to species and released.

Water Quality

Water quality parameters were measured at summer and fall VES sites where water was of sufficient depth (i.e., >0.3 m). *In situ* measurements were recorded at three subsample locations spaced along the shore at each VES site. Measurements were made at the interface between emergent and submergent vegetation at 0.30 m from the surface (Archer et al. 2010). *In situ* parameters were measured using an Analite NEP-160 (Turbidity) and the YSI-Pro Plus (pH, Specific Conductance, Water Temperature, and Dissolved Oxygen). During the summer surveys, a water sample was collected at one of the subsample locations at each VES site for laboratory analysis of pH, Turbidity and Total Suspended Solids (TSS). Samples were analyzed at ALS Laboratories in Winnipeg, MB.

Mitigation Compliance Monitoring

Mitigation compliance and effectiveness at amphibian sites was evaluated using a combination of Manitoba Hydro's Daily Inspection Reports, visual on-site inspections during amphibian surveys, and aerial photographs taken at sites during a helicopter fly-over on June 29, 2020. Mitigation measures included both general mitigation prescribed for wetlands in the Construction Environmental Protection Plan (CEnvPP) as well as site specific mitigation prescribed for Environmentally Sensitive Sites (ESS).

Stability of banks and floodplain were visually evaluated, and rutting, slumping, or other damage to the ground noted. The presence of slash/instream debris or disturbed sediment within the buffer was noted, as well as any evidence of erosion. Buffer widths were evaluated and compared to the width prescribed, as well as the amount of vegetation left in the buffer. Water quality results (i.e. turbidity) aided in the evaluation of erosion and sedimentation. Recommendations for further reclamation to meet the prescribed mitigation were made as required. Specific wetland mitigation measures outlined in the CEnvPP are presented in Appendix Table A1-5.

4.0 RESULTS

Amphibian Surveys

Amphibians were observed during VES, as incidental observations during water quality sampling, and during summer salamander surveys. Amphibians recorded included American Toad (*Anaxyrus americanus*; Photo 1), Cope's/Gray Treefrog (*Hyla chrysoscelis/versicolor*; Photo 2), Spring Peeper (*Pseudacris crucifer*), and Wood Frog (*Lithobates sylvaticus*; Photo 3) Observations of the above mentioned species are included in Map 2 and 3 and presented in Table 1 and 2. For the purpose of this report the following results primarily focus on the Northern Leopard Frog (Photo 4) and Eastern Tiger Salamander (larvae; Photo 5) as representatives of the amphibian community.

Northern Leopard Frog Surveys

Visual encounter surveys occurred at 17 sites in the summer and 15 sites in the fall (Map 2 and 3; Photos 6-47). Seven of these sites had suitable summering and overwintering habitat, and were surveyed in both summer and fall. Site 11 was surveyed by both VES and dipnet during summer surveys, and 7US was not surveyed in the fall due to lack of water. Five species of anurans were detected during VES including Northern Leopard Frogs (Table 1).

Northern Leopard Frogs were detected at both summer and fall VES sites. During summer VES, Northern Leopard Frogs were observed at two of the 17 sites (12%; Sites 17.5 and 19); this was similar to 2017 summer VES, where Northern Leopard Frogs were observed at 14% of sites surveyed. Northern Leopard Frog observations represented 22.5% of all anuran observations.

The greatest number of Northern Leopard Frogs observed was at Site 17.5 (n = 13), predominantly young of year, suggesting this site is a Northern Leopard Frog breeding site. Species richness was also highest at Site 17.5 with five anuran species seen during the course of summer surveys, indicating it is a highly productive wetland with suitable habitat for Northern Leopard Frogs and other anuran species. Three Northern Leopard Frogs were observed at Site 19 during VES.

During fall VES, Northern Leopard Frogs were observed at nine of the 15 sites (60%) visited; during 2017 surveys, Northern Leopard Frogs were observed at 40% of sites surveyed. Northern Leopard Frog observations represented 73.5% of all anuran observations during 2020 fall VES. Four or more individuals were observed at Site 6 (n = 6), Site 26 (n = 6), and Site 27 (n = 4), and one or two individuals were observed at Sites 1, 3, 7DS, 9b, 21, and 28 (Table 1).

Of the 17 summer sites examined in 2020, seven were also examined during pre-construction surveys in 2017 (Table 3). Northern Leopard Frogs were found in equal or greater abundance (CPUE) at all seven sites surveyed in 2020 when compared with the pre-construction surveys. Pre-construction surveys focused on spring call surveys as an indicator of Northern Leopard Frog breeding activity, augmented by summer VES; therefore, a more detailed comparison of breeding activity from post-construction will be made in 2021.

Of the 15 fall sites examined in 2020, 12 were also examined during pre-construction surveys in 2014 or 2017 (Table 3). Northern Leopard Frog CPUE was variable at fall survey sites, with six sites having greater abundances of Northern Leopard Frogs during pre-construction surveys, and five sites having greater abundance of Northern Leopard Frogs during post-construction surveys. Generally, the river sites (i.e., Sites 1, 4, 7DS, and 13) had lower VES CPUE in 2020, while the shallow creek sites of Pine Creek (Sites 26, 27, and 28) all had greater CPUE in 2020. This suggests that although dates and water temperatures of pre- and post- construction surveys were comparable between pre- and post-construction surveys, Northern Leopard Frogs might not have yet migrated to their overwintering sites (river sites) and were mostly still present at summering or staging sites in 2020 (shallow creeks).

Incidental Sightings

Incidental observations of amphibians before or after wetland surveys (i.e., VES or water quality measurements), or as caught incidentally during salamander surveys are presented in Table 2.

During summer surveys, Northern Leopard Frogs were observed incidentally at Sites 17.5 and 19, outside of the VES, as well as adjacent to Site 23. Northern Leopard Frog tadpoles were also captured incidentally in funnel traps during salamander surveys (Photo 48) at Sites 10 (n = 1) and 21 (n = 9), 27 (n = 3) and 28 (n = 2); Northern Leopard Frogs were not observed at Site 10 during summer VES.

During fall surveys, Northern Leopard Frogs were observed incidentally at Sites 9a (n = 9), 9b (n = 3), and 27 (n = 1). Northern Leopard Frogs were not observed at Site 9a during fall VES.

Least Bittern was not identified during incidental surveys during the course of amphibian wetland surveys.

Eastern Tiger Salamander Surveys

Summer salamander surveys were conducted at 11 wetland ponds (Map 4 and 5). Thirteen larval salamanders were caught at REDACTED (Table 4). Larvae were similar in length and head width, suggesting they are all from the same larval cohort. Total lengths ranged from 41.5 to 56.5 mm (avg = 49.7 mm), snout-vent length ranged from 22.0 to 30.0 mm (avg = 27.0 mm), and head width ranged from 7.0 to 12.0 mm (avg = 7.4 mm). Identification of Eastern Tiger Salamanders was based on in-field identification, photo confirmation (D. Collicutt, C. Murray pers. comm.) and size at time of year. Mudpuppy larvae (*Necturus maculosus*) are found in permanent waterbodies such as lakes, streams, and rivers, and have 4 digits on their hindfeet as compared to the 5 digits of tiger salamanders. Blue Spotted Salamander larvae (*Ambystoma laterale*) tend to be smaller and thinner than Eastern Tiger Salamander larvae. Tissue samples were collected from all captured individuals and are currently awaiting DNA sequencing by the Manitoba Conservation Data Centre which would confirm the species identification. REDACTED falls within the range of the Eastern Tiger Salamander and is in close proximity to individuals found in the Sandilands and Tolstoi regions (Manitoba Herp Atlas Project 2021). During the MMTP EIS surveys in 2014, one Eastern Tiger Salamander was observed at EIS Site 22 (Stantec 2015). This site is relatively close to REDACTED. Eastern Tiger Salamanders were not found in wetlands sampled on the PDA pre-construction (i.e., in 2017), including at REDACTED.

Water Quality

In situ water quality was measured at 14 of the 17 VES sites in summer and 15 of the 16 fall VES sites (Table 5). Three of the summer VES sites (Sites 14, 15, and 22) were too shallow for water quality measurements during summer surveys. During fall surveys, Site 7US was too shallow for water quality measurements. While all sites were sampled at three locations and measurements represent averages of the three subsamples, Sites 27 and 28 could only be measured at one sub-sample location where water was deep enough for a meter reading. Overall, water quality parameters were variable at sites dependent on the size, depth and flow pattern of the waterbodies and did not appear to differ post-construction when compared to pre-construction.

During summer surveys, water temperatures ranged from 16.7 to 30.6 °C. Dissolved Oxygen (DO) ranged from 0.75 to 16.34 mg/L (avg = 5.74 mg/L; Table 5) of which five sites were above minimum acceptable concentration guidelines set out in the Manitoba Water Quality Standards, Objectives and Guidelines (MWQSOG) for the protection of early life stages of cool-water

species (i.e., 6.0 mg/L; MWS 2011). In general, DO can vary in daily and seasonal patterns and decreases with higher temperatures. DO and associated oxygen saturation was exceptionally high at Site WA9 (16.34 mg/L, 212.4%). These measurements were outliers, likely due to unusually high phytoplankton production at the site and were not included when listing the range at sites above. Visual inspection confirmed green water, and lab TSS results are high at this site supporting the idea that DO measurements were high due to phytoplankton production. Specific conductance at sites ranged from 284-920 µS/cm. The pH was circum-neutral to alkaline (6.8-8.6) at sites and was within MWQSOG (i.e., 6.5-9.0, MWS 2011). *In situ* turbidity was generally low (usually <10 NTU) with the exception of Site WA9 (359.7 NTU) and Site WA10 (25.7 NTU).

During fall surveys, average water temperatures ranged from 8.4 to 17.1 °C. The range for fall DO was similar to summer, from 2.89-12.77 mg/L but with a higher relative average than in summer (avg = 7.89 mg/L). This can be attributed to more river sites being sampled during fall surveys, as surveys focused more on overwintering sites. Overall, DO remained above MWQSOG (i.e., 6.0 mg/L; MWS 2011) at 10 of the 15 sites. Specific conductance ranged from 295-1405 µS/cm across all sites, except for Site 2 (the wastewater pond) where specific conductance averaged 2333 µS/cm. The pH was again circum-neutral to alkaline (7.0-8.4) across sites and was within MWQSOG. *In situ* turbidity was highest at the Site 2 (163.4 NTU) and river sites (Sites 1, 3, 4, and 6; Table 5).

Northern Leopard Frogs are known to overwinter in well oxygenated waters that do not freeze to the bottom (Kendell 2002; Russell and Bauer 2000; Alberta Northern Leopard Frog Recovery Team 2005; Hine et al. 1981). During fall surveys, Northern Leopard Frogs were consistently observed during VES at all sites where DO averaged greater than 9.5 mg/L (Sites 1, 3, 6, 7DS, and 27; Table 5). Three of these sites (Sites 1, 3 and 6) had water depths greater than 1 m suggesting Northern Leopard Frogs may be overwintering at these sites. Where water depth at sites was less than 1 m (Sites 7DS and 27), locations further upstream or downstream of the sample site may be deeper and thus suitable as overwintering sites. Northern Leopard Frogs were also observed at some sites with lower DO concentrations (Sites 9b, 21, 26, and 28). Sites 26 and 28 are shallow creeks, but may be connected to deeper more oxygenated sections further upstream or downstream of the sites. Sites 9a and 21 are deep, interconnecting wetlands suitable for overwintering, and low DO readings might be a product of shoreline sampling where fall plant senescence is high.

At REDACTED, where Eastern Tiger Salamander larvae were observed, summer turbidity and TSS was low. Summer DO was low at REDACTED. Little is currently known about the water quality requirements of Eastern Tiger Salamanders but it is presumed the larvae can tolerate a wide range of DO levels, including anoxic conditions, as they have developing lungs and are able to supplement their oxygen uptake by gulping air (Wassersug and Seibert 1975, Heath 2003, Kokesh 2015).

Overall, water quality at sites was similar during pre-construction and post-construction fall surveys (Table 6), with the exception of turbidity at site 7-DS which was considerably higher pre-construction compared to post-construction (194.4 NTU vs 6.6 NTU, respectively); such a high reading could be a result of any number of short-term influences and is considered an outlier. Pre-construction water quality measurements were collected during 2017 spring and fall sampling pre-construction surveys, but spring water quality measurements were not collected during 2020 post-construction surveys as construction was not yet complete at the time. Following spring sampling in 2021, a more detailed comparison of pre- and post-construction water quality will be made. Pre-construction spring and post- construction summer water quality cannot be compared due to variability in water quality related to differences in seasonal water temperatures.

Mitigation Compliance Monitoring

At the time of monitoring, MMTP was fully constructed with all towers and conductors in place. Construction was compliant with prescribed mitigation and considered to be effective at 23 of the 26 wetlands and water courses assessed in 2020. A summary of mitigation compliance for all sites is presented in Table 7 and a list of mitigation measures outlined in the CEnvPP are presented in Appendix Table A1-5.

Site 17.5

The wetland buffer was less than 30 m at the northern corners of Site 17.5 (Photo 31). According to the CEnvPP (Manitoba Hydro 2019; Appendix Table A1-5), natural vegetated buffer areas of 30 m will be established around wetlands and riparian zones will be maintained to the extent possible (EC-8.03). It is recommended that a follow up survey be conducted at the site to monitor for the re-establishment of vegetation. It should be noted that despite the absence of a vegetated buffer, other mitigation measures such as winter construction appear to have maintained the integrity of the wetland; rutting, erosion, and sedimentation were not observed, and water quality and amphibian abundance did not appear to be affected.

Site 19

The wetland buffer was less than 30 m at Site 19 (Photo 35). According to the CEnvPP (Manitoba Hydro 2019; Table A1-5), natural vegetated buffer areas of 30 m will be established around wetlands and riparian zones will be maintained to the extent possible (EC-8.03). It is recommended that a follow up survey be conducted at this site to monitor for the re-establishment of vegetation. In consideration of the presence of Northern Leopard Frogs and Tiger Salamanders, it is also recommended that a 30 m riparian buffer be established around the wetlands at Site 19 for any future Right of Way (RoW) maintenance work. Despite the absence of a vegetated buffer, other mitigation measures such as winter construction appear to have maintained the integrity of the wetland; rutting, erosion, and sedimentation were not observed, and water quality and amphibian abundance did not appear to be affected. Although water

quality readings were similar in pre- and post- construction surveys, subsequent water quality measurements are recommended for continued monitoring of turbidity levels.

Site 27 – Aqua-130 Pine Creek

Large woody debris from riparian clearing remained in the channel at Site 27 (Pine Creek, Aqua-130; Photo 49). According to the CEnvPP (Manitoba Hydro 2019) cleared trees and woody debris should not be pushed into (or adjacent) to standing timber, or within the high-water mark of wetlands or waterbodies (EC-8.05, Table A1-5). It was recommended the woody debris be removed from the channel in order to prevent blockage of the watercourse and potentially affecting amphibian staging and overwintering habitat. Based on the above recommendations, the MMTP contractor at the request of Manitoba Hydro removed the woody debris from Aqua-130. Removal of the woody debris from the channel was confirmed by a Manitoba Hydro inspector on August 25, 2020 (Photo 50). There is no longer a mitigation concern with the watercourse crossing at Aqua-130.

Additional Observations

Large woody debris was observed in the channel at Site 3 (Aqua-108; La Salle River; Photo 9). Woody debris was likely the result of natural processes and was not deemed construction related therefore was not considered a non-compliance issue. Minor rutting along the PDA RoW was also noted at three sites but was likely due to local land owner use and was not considered to pose a threat to the nearby amphibian wetland sites and therefore was not considered a mitigation non-compliance issue.

Oily surface sheens were seen within the PDA on the way to sites 9a and 9b (Aqua-312), WA10 (Aqua-334, Photo 51), 22 (Aqua-349), and 23 (Aqua-350), but are likely the result of iron bacteria naturally occurring at the survey sites.

Refuse was present along the PDA RoW around Site 19 (Photo 52). Environmental Requirements require all project areas to be maintained clean and free of rubbish and debris, disposed of at approved facilities (Manitoba Hydro 2019). It is recommended that the refuse be cleared from the area around Site 19.

5.0 REFERENCES

Alberta Northern Leopard Frog Recovery Team. 2005. Alberta Northern Leopard Frog Recovery Plan, 2005-2010. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Recovery Plan No.7. Edmonton, AB. 26 pp.

Archer, R.W., P. Christopher, J. Lorenz, and K.E. Jones. 2010. Monitoring and Assessing Marsh Health in the Niagara River Area of Concern. Final Project Report. Prepared for

Environment Canada – Great Lakes Sustainability Fund by Bird Studies Canada, Port Rowan, ON. 47 pp.

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. xiii + 53 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC. 2009. COSEWIC assessment and update status report on the Northern Leopard Frog *Lithobates pipiens*, Rocky Mountain population, Western Boreal/Prairie populations and Eastern populations, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 69 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

Dyszy, K. 2018. Manitoba-Minnesota Transmission Project. Amphibian and reptile monitoring program 2017. Draft Technical Report. North/South Consultants Inc. vii + 55 pp.

Environment Canada. 2009. Petroleum industry activity guidelines for wildlife species at risk in the prairie and northern region. Canadian Wildlife Service, Environment Canada, Prairie and Northern Region, Edmonton Alberta. 64 pp.

Government of Manitoba. 2018. Species listed under The Endangered Species and Ecosystems Act.Wildlife Branch. Available at: https://www.gov.mb.ca/sd/environment_and_biodiversity/cdc/index.html [accessed February 8, 2021].

Government of Canada. 2020. Species at risk public registry. Available at: https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html [accessed February 8, 2021].

Grayson, K.L. and A.W. Roe. 2007. Glow sticks as effective bait for capturing aquatic amphibians in funnel traps. Herpetological Review. 38 (2): 168-170.

Heath, A. 2003. Cardiac responses of larval and adult tiger salamanders to submergence and emergence. Comparative Biochemistry and Physiology Part A: Physiology. 65(4): 439-444.

Hine, L. L., B. L. Les, and B. F. Hellmich. 1981. Leopard Frog Populations and Mortality in Wisconsin, 1974-76. Department of Natural Resources, Madison, Wisconsin.

Kendell, K. 2002. Survey protocol for the Northern Leopard Frog. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No.43, Edmonton, AB. 30 pp.

Kokesh, B. 2015. The effects of water quality on habitat use of Tiger Salamanders in prairie wetlands. Poster presentation, Undergraduate Research Symposium 2015, Book 7. University of Minnesota.

Manitoba Herp Atlas Project. 2021. Nature North. Species distribution map. Available at: http://www.naturenorth.com/Herps/MHA_Final_Maps.html [accessed February 11, 2021].

Manitoba Hydro. 2019. Manitoba-Minnesota Transmission Project. Construction Environmental Protection Plan. 262 pp.

Manitoba Water Stewardship (MWS). 2011. Manitoba Water Quality Standards, Objectives, and Guidelines. Water Science and Management Branch. Manitoba Water Stewardship. Report 2011-01.

Russell, A.P., and A.M. Bauer. 2000. The amphibians and reptiles of Alberta. A field guide and primer of boreal herpetology, 2nd Edition. University of Calgary Press and University of Alberta Press, Calgary and Edmonton, AB. 279 pp.

Stantec. 2015. Manitoba-Minnesota transmission project. Wildlife and wildlife habitat- technical data report. Prepared for Manitoba Hydro. Report no. 111420050. Winnipeg, Manitoba. 274 pp.

Wassersug, R.J. and E.A. Seibert. 1975. Behavioral responses of amphibian larvae to variation in dissolved oxygen. Copeia. 1975(1): 86-103.

6.0 PERSONAL COMMUNICATIONS

Collicutt, Doug. NatureNorth. Winnipeg, Manitoba. July 2, 2020.

Murray, Colin. Manitoba Conservation Data Centre, Wildlife and Fisheries Branch, Agriculture and Resource Development. Winnipeg, Manitoba. July 21, 2020.

7.0 TABLES

Table 1. Summary of anurans observed (i.e., seen or heard) during Manitoba-Minnesota Transmission Project visual encounter surveys conducted in summer and fall 2020.

Season	Site	Survey Length (mins)	AMTO	C/GRTF	NLFR	SPPE	WOFR	Unid
Summer	8	21	0	0	0	0	0	0
	9a	7	0	0	0	0	0	0
	9b	10	0	0	0	0	0	0
	10	21	0	0	0	0	0	0
	11	20	0	1	0	0	1	0
	14	23	0	0	0	0	0	0
	15	20	0	0	0	0	0	0
	WA9	3	0	0	0	0	0	0
	17.5	20	6	4	13	1	8	0
	18	20	18	0	0	0	0	0
	WA10	20	0	0	0	0	1	0
	19	21	0	0	3	0	0	0
	21	20	1	0	0	0	4	0
	22	20	0	0	0	0	0	0
	23	20	0	0	0	0	1	0
	27	20	0	0	0	0	8	0
	28	20	0	0	0	0	1	0
		Total	**25**	**5**	**16**	**1**	**24**	**0**
Fall	1	20	0	0	1	0	0	0
	2	20	0	0	0	0	0	0
	3	21	0	0	2	0	0	0
	4	20	0	0	0	0	0	0
	6	20	0	0	4	0	0	0
	7DS	21	0	0	2	0	0	0
	7US	N/A	-	-	-	-	-	-
	9a	7	0	0	0	0	0	0
	9b	20	0	0	2	0	0	0
	10	20	0	0	0	0	0	0
	11	20	0	0	0	0	0	0
	13	20	0	0	0	0	1	0
	21	20	0	0	2	0	1	0
	26	20	0	0	6	0	0	0
	27	20	0	0	4	0	2	1
	28	15	0	0	2	0	1	3
		Total	**0**	**0**	**25**	**0**	**5**	**4**
		Grand Total	**25**	**5**	**41**	**1**	**29**	**4**

AMTO: American Toad; C/CGRTF: Cope's/Gray Treefrog; NLFR: Northern Leopard Frog; SPPE: Spring Peeper; WOFR: Wood Frog; Unid: unidentified frog species

Table 2. Summary of anurans observed incidentally during Manitoba-Minnesota Transmission Project wetland surveys (i.e., visual encounter and water quality surveys), and salamander surveys (FN), 2020.

Season	Site	AMTO	C/GRTF	NLFR	SPPE	WOFR	Unid
Summer	8	0	0	0	0	0	0
	9a	0	0	0	0	1	0
	9b	0	0	0	0	2	2
	10	0	0	FN(1)	0	0	0
	11	0	0	0	0	0	0
	14	0	0	0	0	1	0
	15	0	0	0	0	0	0
	WA9	0	0	0	0	0	0
	17.5	0	25, FN(1)	1	0	0	FN(1)
	18	0	0	0	0	0	FN(1)
	WA10	30	0	0	0	0	0
	19	FN(1)	FN(1)	4	0	1	0
	21	0	0	FN(9)	0	0	0
	22	0	0	0	0	0	0
	23	1	0	1	0	1	0
	27	1	0	FN(3)	0	0	0
	28	0	0	FN(2)	0	0	0
	Total	**33**	**27**	**21**	**0**	**6**	**4**
Fall	1	0	0	0	0	0	0
	2	0	0	0	0	0	0
	3	0	0	0	0	0	0
	4	0	0	0	0	0	0
	6	0	0	0	0	0	0
	7DS	0	0	0	0	0	0
	7US	0	0	0	0	0	0
	9a	0	0	9	0	0	0
	9b	0	0	3	0	0	0
	10	0	0	0	0	0	0
	11	0	0	0	0	0	0
	13	0	0	0	0	0	0
	21	0	0	0	0	0	0
	26	0	0	0	0	0	0
	27	0	0	1	0	0	0
	28	0	0	0	0	0	0
	Total	**0**	**0**	**13**	**0**	**0**	**0**
Grand Total		**33**	**27**	**34**	**0**	**6**	**4**

AMTO: American Toad; C/CGRTF: Cope's/Gray Treefrog; NLFR: northern leopard frog; SPPE: spring peeper; WOFR: wood frog; Unid: unidentified frog species

Table 3. Summary of catch per unit effort (CPUE[1]) for Northern Leopard Frogs heard and seen within the Manitoba-Minnesota Transmission Project Local Assessment Area, during pre-construction (2014 and 2017) and post-construction (2020) visual encounter surveys.

Survey Period	Site	Pre-Construction		Post-Construction
		2014[2]	2017[3]	2020
Spring	1	0	-	-
	4	0	-	-
	6	0	-	-
	10	N/A	3.5	-
	16	-	0	-
	17.5	-	0	-
	18	-	0	-
	19	-	0	-
	21	-	6.0	-
	22	3.0	0	-
	23	-	0	-
	27	-	0	-
	28	-	0	-
Summer	8	-	-	0
	9a	-	0	0
	9b	-	-	0
	10	N/A	0	0
	11	-	0	0
	14	-	-	0
	15	-	-	0
	WA9	-	-	0
	17.5	-	2.2	39.0
	18	-	0	0
	WA10	-	-	0
	19	-	0	8.6
	21	-	0	0
	22	-	-	0
	23	-	-	0
	27	-	-	0
	28	-	-	0

Table 3. Continued.

Survey Period	Site	Pre-Construction		Post-Construction
		2014[2]	2017[3]	2020
Fall	1	30.0	-	3.0
	2	-	-	0
	3	-	-	5.7
	4	39.0	-	0
	6	3.0	-	12.0
	7DS	-	21.8	5.7
	7US	-	0	-
	9a	-	4.3	0
	9b	-	-	6.0
	10	N/A	0	0
	11	-	3.0	0
	13	-	30.0	0
	21	-	0	6.0
	26	-	0	18.0
	27	-	0	12.0
	28	-	0	8.0

1 - CPUE is defined as the number of NLFRs observed per hour of survey effort; dashes indicate a survey was not conducted
2 - From Stantec 2015; Results from Site 10 were not presented in Stantec 2015
3 - North/South Consultants Inc (Dyszy 2018)

Table 4. Summary of salamander larvae caught in funnel traps at REDACTED, Manitoba-Minnesota Transmission Project, summer 2020.

ID	Total Length (mm)	Snout-Vent Length (mm)	Head Width (mm)
REDACTED	54	30	7
	56.5	30	12
	42	24	7
	52	27.5	7
	48.5	27.5	7
	44	28.5	7
	51.5	30	7
	52.5	26	7
	51	22.5	7
	48	22	7
	54.5	29.5	7
	41.5	28.5	7.2
	50.5	25.5	7

Table 5. Water quality results from *in situ* measurements and laboratory analysis from samples collected in the field during Manitoba-Minnesota Transmission Project amphibian studies in the summer and fall, 2020.

		In-situ measurements (average)							Lab sample results		
Site ID	Sample Date	Sampling Time	Temperature (°C)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%)	Specific Conductance (µS/cm)	pH	Turbidity (NTU)	Turbidity (NTU)	TSS (mg/L)	pH
Summer											
8	06-Jul-20	11:13	23.6	3.64	42.9	691	7.66	0.3	0.37	<1.0	8
9a	06-Jul-20	14:30	25.1	2.34	28.4	444	6.8	1.2	0.88	2.5	7.65
9b	06-Jul-20	16:13	26.6	4.34	54.9	503	7.1	1.6	0.89	1.7	7.81
10	07-Jul-20	12:17	27.3	8.31	97.0	920	7.7	1.4	-	-	-
11	07-Jul-20	15:08	28.7	10.39	135.1	288	8.5	8.2	0.9	1.2	8.49
14	07-Jul-20	-	-	-	-	-	-	-	-	-	-
15	08-Jul-20	-	-	-	-	-	-	-	-	-	-
WA9	08-Jul-20	13:31	28.2	16.34	212.4	792	8.6	359.7	123	104	8.35
17.5	08-Jul-20	14:49	29.5	5.84	76.4	284	7.7	1.1	0.97	1.3	8.28
18	08-Jul-20	15:59	30.6	9.32	125.0	569	7.9	4.7	26.4	82.4	8.37
WA10	09-Jul-20	12:43	19.8	1.83	20.2	730	7.3	25.7	5.5	13.5	7.77
19	09-Jul-20	14:10	21.3	0.75	8.5	415	7.3	1.5	1.11	4.8	7.75
21	09-Jul-20	15:55	26.1	3.65	45.0	287	7.4	0.9	0.73	<1.0	7.76
22	10-Jul-20	-	-	-	-	-	-	-	-	-	-
23	11-Jul-20	9:57	16.7	3.70	37.9	359	7.0	1.5	0.5	<1.0	8
27	11-Jul-20	12:43	20.4	7.39	82.1	334	7.4	2.3	1.69	<1.0	8.01
28	11-Jul-20	13:41	19.1	2.48	26.8	416	7.1	0.7	0.83	1.4	7.87
Fall											
1	8-Sep-20	10:32	13.2	11.58	110.4	858	8.3	65.3	-	-	-
2	8-Sep-20	12:43	12.8	6.79	64.8	2333	8.1	163.4	-	-	-
3	8-Sep-20	14:12	14.1	9.65	94.2	1405	8.4	35.3	-	-	-
4	8-Sep-20	15:25	17.1	8.22	85.4	852	8.2	106.8	-	-	-
6	8-Sep-20	17:06	14.4	11.30	110.9	458	8.4	46.7	-	-	-
7DS	8-Sep-20	18:18	14.6	12.77	126.2	709	8.3	6.6	-	-	-
7US	8-Sep-20	N/A	-	-	-	-	-	-	-	-	-

Table 5. Continued.

	In-situ measurements								Lab sample results		
Site ID	Sample Date	Sampling Time	Temperature (°C)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%)	Specific Conductance (µS/cm)	pH	Turbidity (NTU)	Turbidity (NTU)	TSS (mg/L)	pH
9a	9-Sep-20	11:17	11.2	4.69	42.3	549	7.3	1.3	-	-	-
9b	9-Sep-20	12:16	11.1	3.20	29.3	564	7.0	2.7	-	-	-
10	9-Sep-20	10:05	13.8	5.36	51.9	944	7.7	0.9	-	-	-
11	9-Sep-20	14:26	13.7	9.14	87.9	330	8.0	18.0	-	-	-
13	9-Sep-20	15:32	13.3	9.21	88.2	442	8.1	4.6	-	-	-
21	10-Sep-20	10:22	11.9	7.69	71.0	295	7.4	1.8	-	-	-
26	10-Sep-20	12:14	8.4	2.89	24.6	337	7.1	19.4	-	-	-
27	10-Sep-20	13:36	15.4	11.72	118.2	465	7.6	5.3	-	-	-
28	10-Sep-20	14:03	14.8	4.16	41.4	441	7.3	11.8	-	-	-

Table 6. Pre- and Post-construction fall water quality results from *in situ* measurements during Manitoba-Minnesota Transmission Project amphibian studies.

Site ID	2017						2020					
	Temperature (°C)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%)	Specific Conductance (µS/cm)	pH	Turbidity (NTU)	Temperature (°C)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%)	Specific Conductance (µS/cm)	pH	Turbidity (NTU)
7-DS	10.9	6.32	56	574	7.36	194.4	14.6	12.77	126.2	709	8.29	6.64
7-US	-	9.57	87.1	545	-	-	-	-	-	-	-	-
9	14.9	3.3	33.4	546	7.11	0.85	11.2	3.95	35.8	557	7.14	2.00
10	15.2	8.49	87.3	854	7.56	0.69	13.8	5.36	51.9	944	7.70	0.94
11	16	7.15	71.2	335.7	6.96	1.09	13.7	9.14	87.9	330	7.98	18.02
13	14.5	9.12	90	441.5	7.73	4.5	13.3	9.21	88.2	442	8.11	4.62
21	14.6	5.65	56.2	375.8	7.33	2.71	11.9	7.69	71.0	295	7.39	1.76
26	14.7	6.95	67.2	357	6.83	6.38	8.4	2.89	24.6	337	7.08	19.41
27	15.1	4.53	44.9	412.5	7.21	7.9	7.6	11.72	118.2	465	7.64	5.32
28	13.1	1.67	15.1	292.7	6.64	3.9	14.8	4.16	41.4	441	7.33	11.76

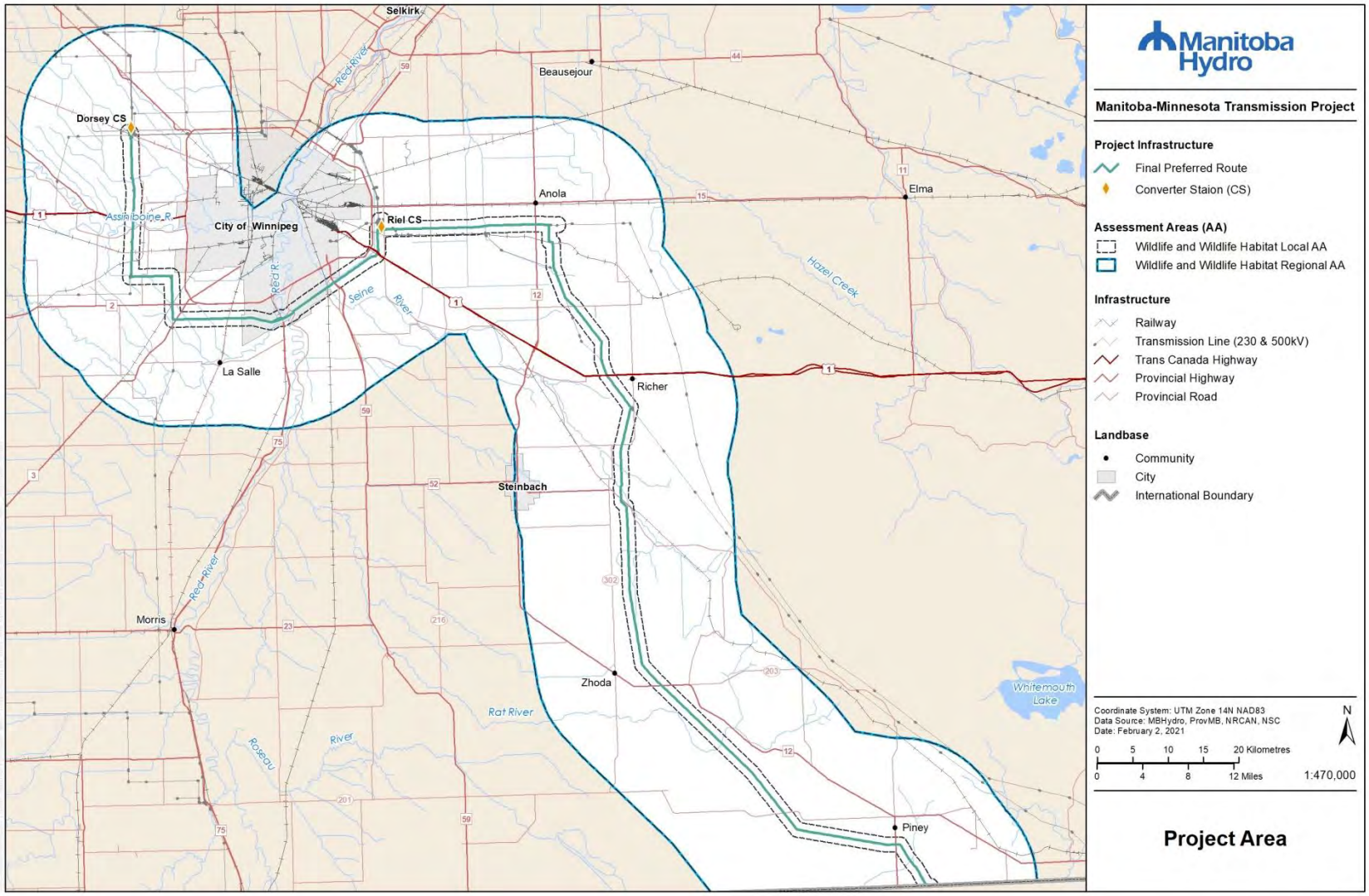
Table 7. Mitigation compliance monitoring at amphibian wetland sites within the Manitoba-Minnesota Transmission Project Development Area, 2020.

Site	ESS ID	Name/Description	Buffer	Rutting	Erosion	Instream Debris	Comments
1	Aqua-103	Assiniboine River	YES	NO	NO	NO	Minor rutting seen along RoW, undetermined whether from construction or from recreational use
2	N/A	wastewater pond	N/A	NO	NO	NO	N/A
3	Aqua-108	La Salle River	YES	NO	NO	NO	Large woody debris present instream at RoW; likely from natural sources
4	Aqua-109	Red River	YES	NO	NO	NO	N/A
6	Aqua-111	Seine River Siphon/Bypass	YES	NO	NO	NO	N/A
7DS	Aqua-112	Seine River Diversion (Old Prairie Grove Drain)	YES	NO	NO	NO	N/A
7US	Aqua-112	Seine River Diversion (Old Prairie Grove Drain)	YES	NO	NO	NO	N/A
8	Aqua-115	Edie Creek	YES	NO	NO	NO	N/A
9a	Aqua-312	Medium Wetlands	YES	NO	NO	NO	Oily sheen seen on way to site, possibly result of naturally produced iron bacteria
9b	Aqua-312	Medium Wetlands	YES	NO	NO	NO	Oily sheen seen on way to site, possibly result of naturally produced iron bacteria
10	N/A	Large Wetland	N/A	NO	NO	N/A	Site is just outside PDA
11	N/A	Large Wetland Lake	N/A	N/A	N/A	N/A	Site is outside the PDA
13	Aqua-123	Seine River at golf course	YES	NO	NO	NO	N/A
14	Aqua-202	Small Wetland/Fen/Aquifer	YES	NO	NO	NO	N/A
15	Aqua-329	Small Wetland	YES	NO	NO	NO	N/A
WA9	N/A	Cattle Dugout	YES	NO	NO	NO	N/A
17.5	N/A	Wetland	**NO**	NO	NO	NO	Buffer on the NE & NW corners <30m
18	Aqua-333A	Small wetland	YES	NO	NO	N/A	Site is just outside of RoW
WA10	N/A	Shallow Wetland	YES	NO	NO	NO	Oily sheen at site, possibly result of naturally produced iron bacteria
19	N/A	Small Shallow Wetland	**NO**	NO	NO	NO	No buffer observed around wetlands; refuse observed at site

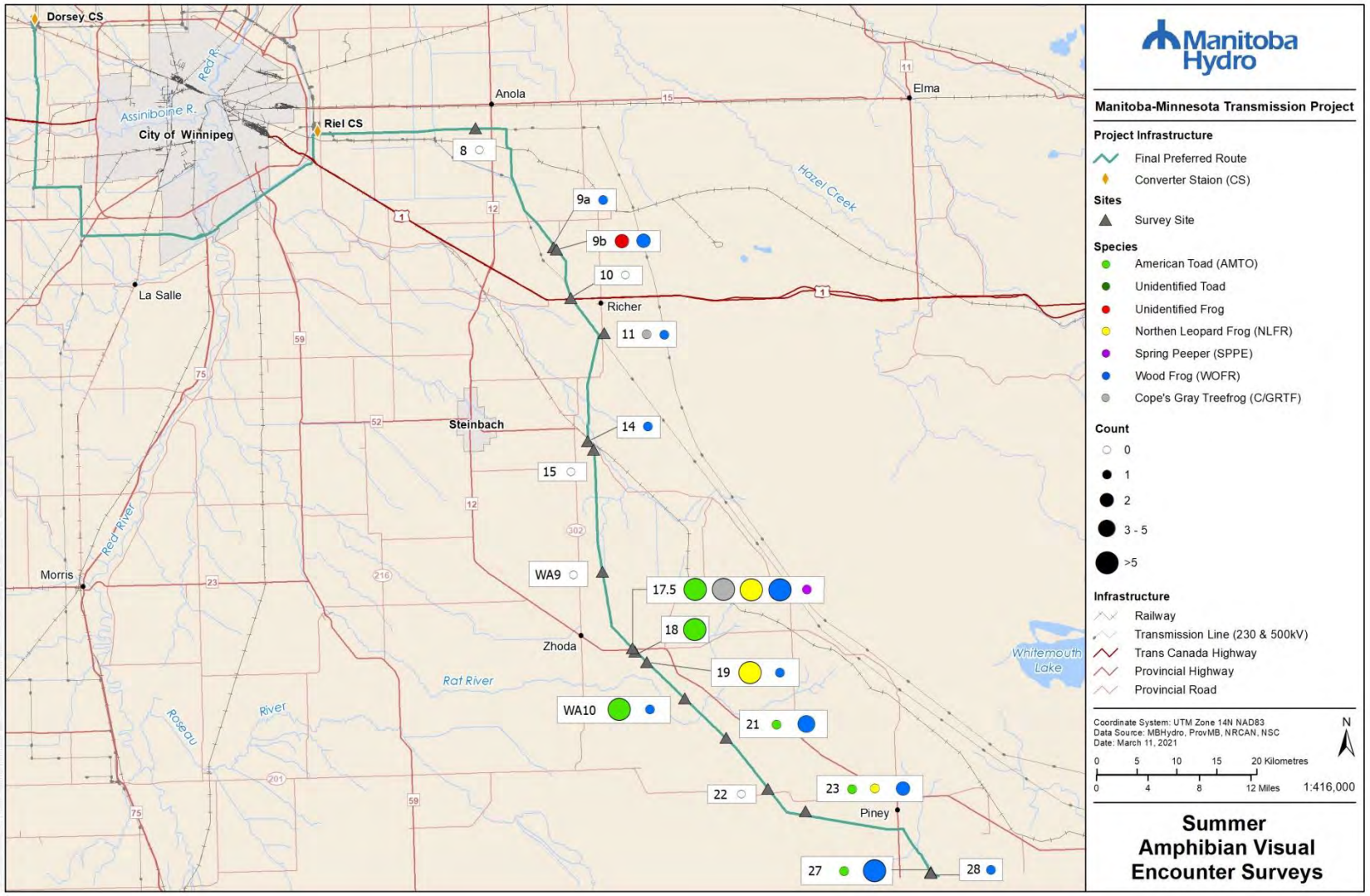
Table 7. Continued.

Site	ESS ID	Name/Description	Buffer	Rutting	Erosion	Instream Debris	Comments
21	Aqua-344	Large Wetland (Sundown Bog)	YES	NO	NO	N/A	Wetland is just outside PDA
22	Aqua-349 & Aqua-127	Large Shallow Wetland (Sundown Bog) & Drain	YES	NO	NO	NO	Oily sheen at site, possibly result of naturally produced iron bacteria
23	Aqua-350	Medium Wetland (Sundown Bog)	YES	NO	NO	NO	Oily sheen at site, possibly result of naturally produced iron bacteria
26	N/A	Pine Creek	N/A	N/A	N/A	N/A	Site is outside PDA
27	Aqua-130	Pine Creek	YES	NO	NO	**YES**	Large woody debris was present instream, removed Aug 2020; compliance issue has been resolved.
28	Aqua-131	Pine Creek	YES	NO	NO	NO	N/A

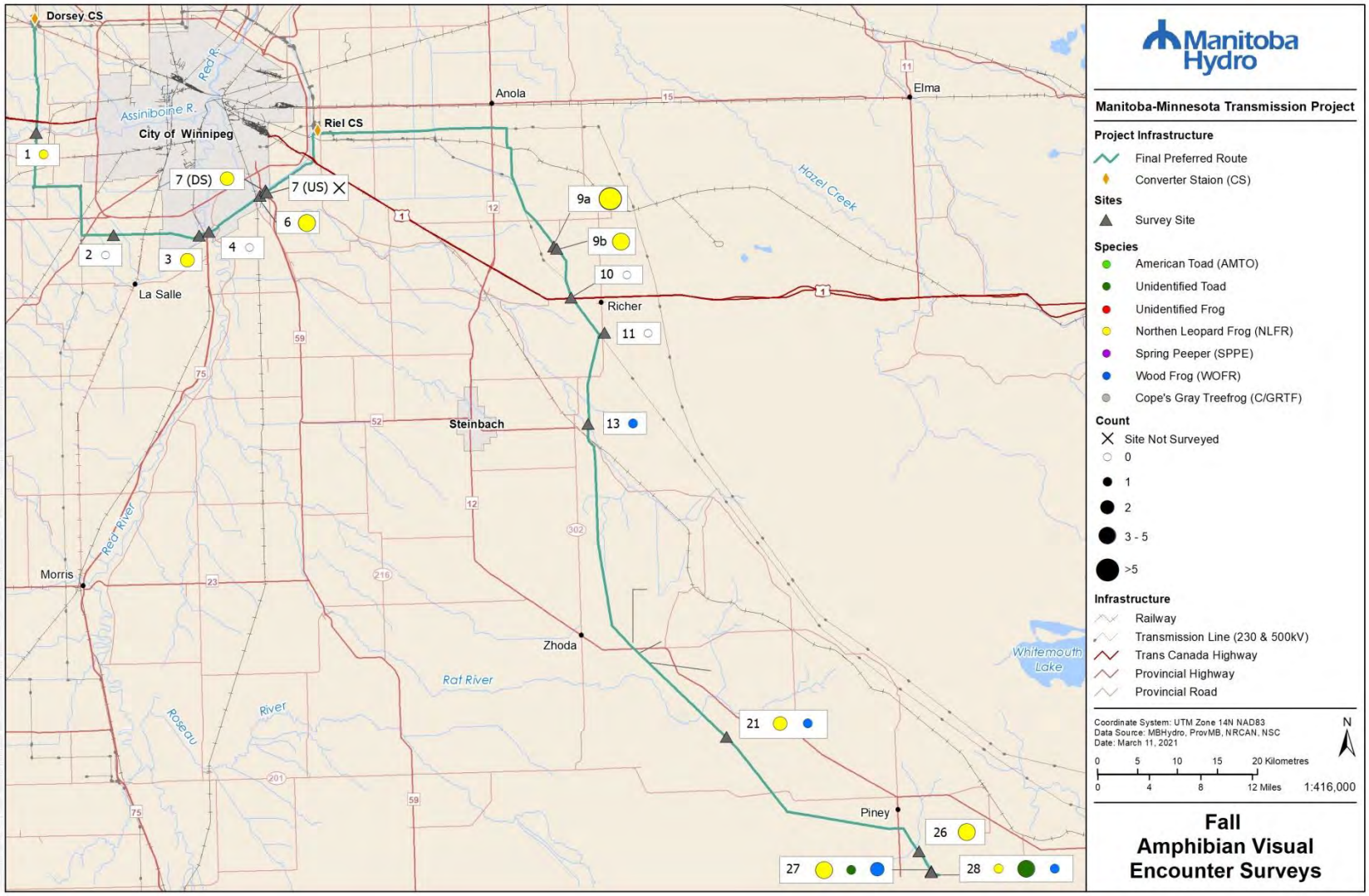
8.0 MAPS



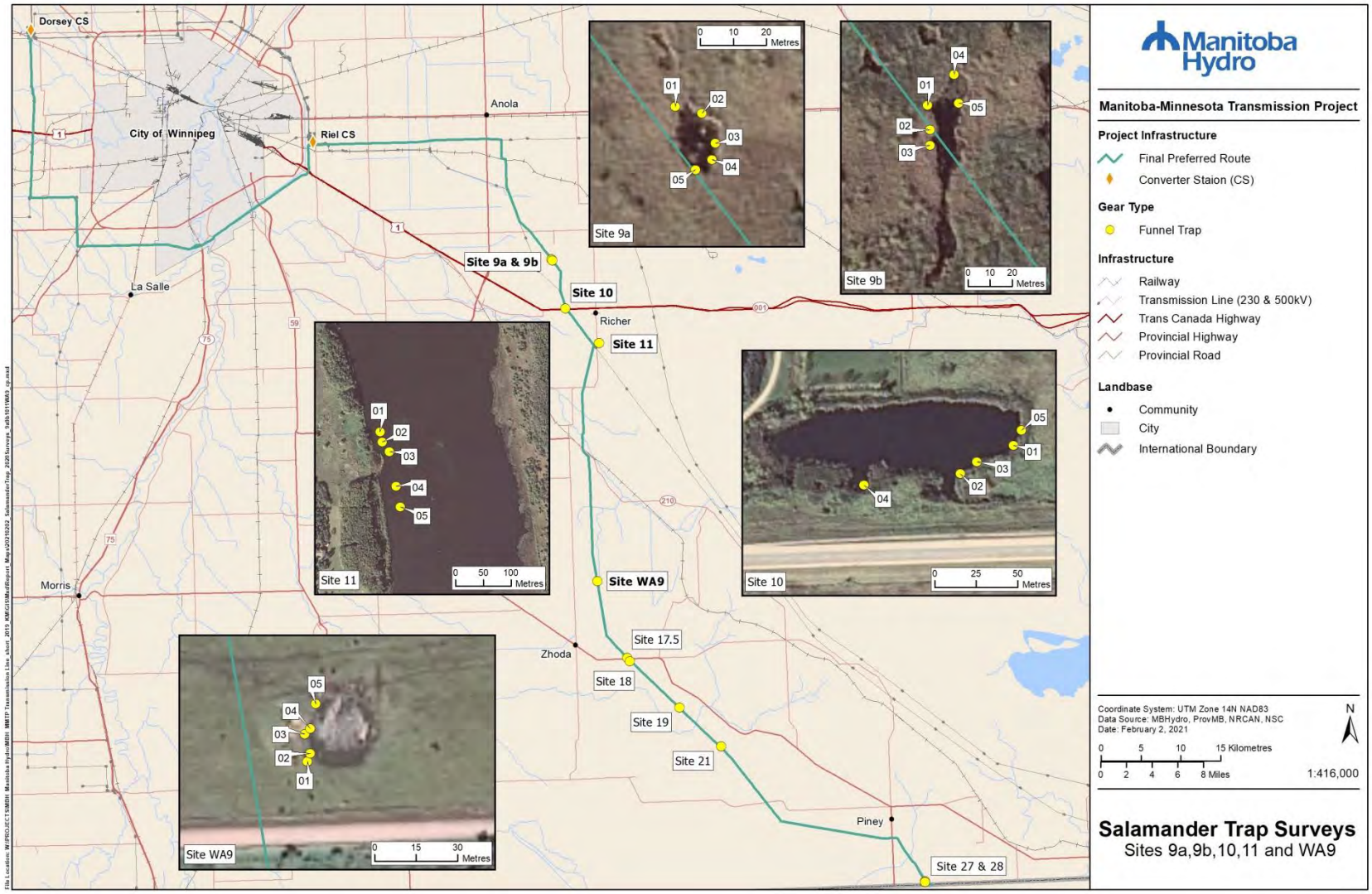
Map 1. The Manitoba-Minnesota Transmission Project Study Area.



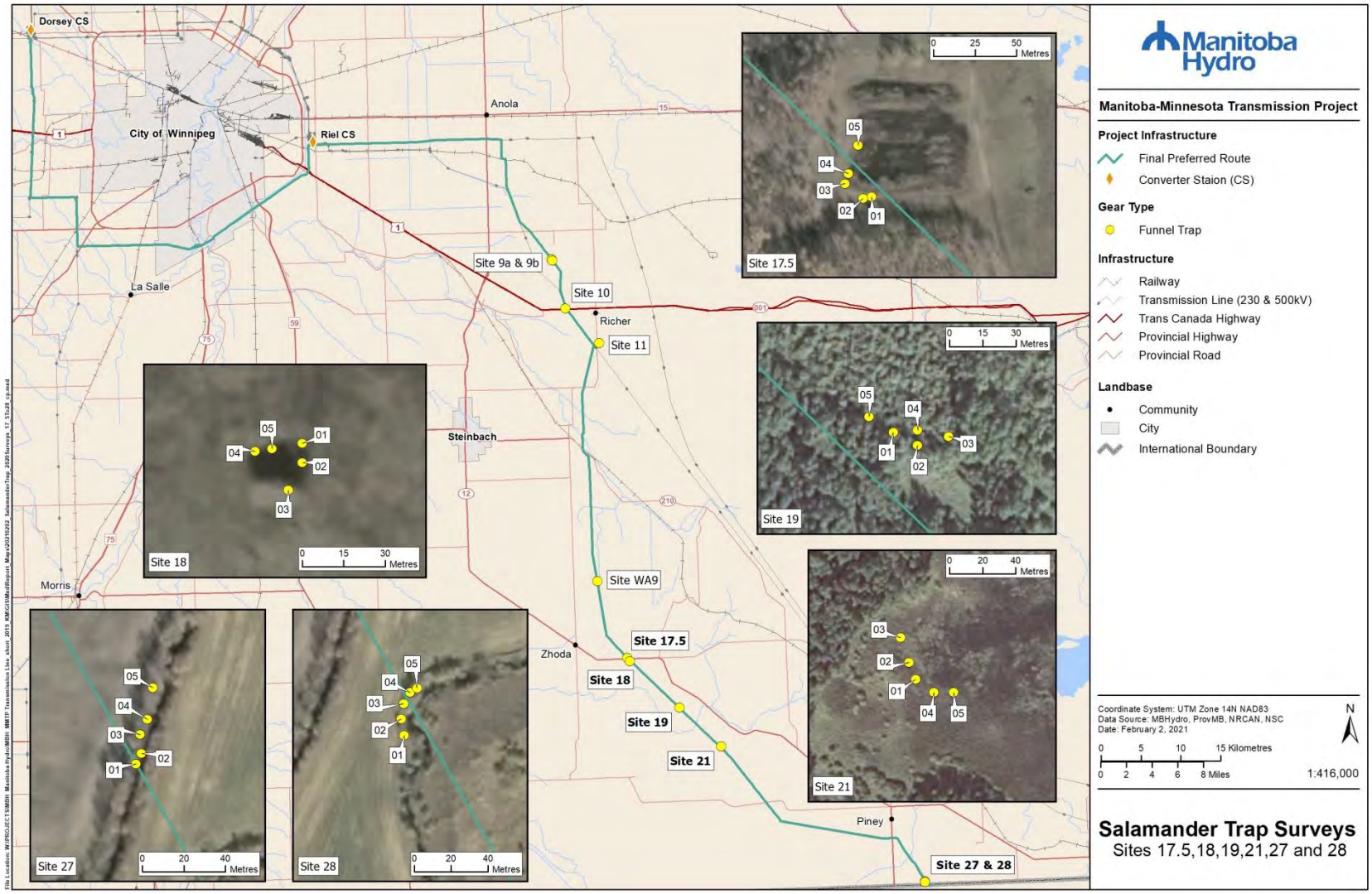
Map 2. Post-construction amphibian survey results for the Manitoba-Minnesota Transmission Project, showing total number of individuals observed during summer 2020 surveys.



Map 3. Post-construction amphibian survey results for the Manitoba-Minnesota Transmission Project, showing total number of individuals observed during fall 2020 surveys.



Map 4. Post-construction salamander survey trap locations Site 9 through WA9, Manitoba-Minnesota Transmission Project, summer, 2020.



Map 5. Post-construction salamander survey trap locations Site 17.5 through 28, Manitoba-Minnesota Transmission Project, summer, 2020.

9.0 PHOTOS

Photo 1. American Toad (*Anaxyrus americanus*) seen during summer Visual Encounter Surveys at Site 18, July 10, 2020.

Photo 2. A newly metamorphosed Cope's/Gray Treefrog (*Hyla chrysoscelis/versicolor*) seen at Site 17.5 during summer Visual Encounter Surveys, July 9, 2020.

Photo 3. Wood Frog (*Lithobates sylvaticus*) seen during summer Visual Encounter Surveys at Site 21, July 10, 2020.

Photo 4. Northern Leopard Frog (*Lithobates pipiens*) adult seen at Site 19 during summer Visual Encounter Surveys, July 10, 2020.

Photo 5. Eastern Tiger Salamander larvae (*Ambystoma tigrinum*) caught in funnel trap FN03 at REDACTED during summer surveys, July 10, 2020.

Photo 6. Aerial view of Site 1 (Assiniboine River) during fly over surveys June 29, 2020.

Photo 7. Overview of Site 1 (Assiniboine River) during fall survey, looking upstream from the south bank, September 8, 2020.

Photo 8. Aerial view of Site 3 (La Salle River) during fly over surveys June 29, 2020.

Photo 9. Overview of Site 3 (La Salle River) during fall survey, at water quality site 3-1, September 8, 2020.

Photo 10. Aerial view of Site 4 (Red River) during fly over surveys June 29, 2020.

Photo 11. Downstream view of Site 4 (Red River) at water quality site 4-2 during fall surveys, September 8, 2020.

Photo 12. Aerial view of Site 6 (Seine River Siphon) during fly over surveys June 29, 2020.

Photo 13. Overview of Site 6 (Seine River Siphon) during fall surveys, September 8, 2020.

Photo 14. Aerial view of Site 7DS and 7US (Seine River Diversion) during fly over surveys June 29, 2020.

Photo 15. Site 7DS (Seine River Diversion) during fall surveys, September 8, 2020.

Photo 16. Site 7US (Seine River Diversion) during fall surveys, September 8, 2020.

Photo 17. Aerial view of Site 8 (Edie Creek) during fly over surveys June 29, 2020.

Photo 18. Water quality site 8-2 at Site 8 (Edie Creek) during summer surveys, July 6, 2020.

Photo 19. Aerial view of Sites 9a and 9b during fly over surveys June 29, 2020.

Photo 20. Looking north at Site 9a during summer surveys, July 6, 2020 with funnel trap in foreground.

Photo 21. Overview of Site 9b looking south from water quality site 9b-1 during summer survey, July 6, 2020.

Photo 22. Aerial view of Site 10 during fly over surveys June 29, 2020.

Photo 23. Overview of Site 11 from funnel trap location FN01 during summer surveys, July 7, 2020.

Photo 24. Aerial view of Site 13 during fly over surveys June 29, 2020.

Photo 25. Overview of Site 13 (Seine River) during fall surveys, September 9, 2020.

Photo 26. Aerial view of Site 14 during fly over surveys June 29, 2020.

Photo 27. Overview of Site 14, showing shallow water covered with duckweed, July 7, 2020.

Photo 28. Aerial view of Site 15 during fly over surveys June 29, 2020.

Photo 29. Overview of Site 15 during summer surveys, showing shallow cattail wetland, July 8, 2020.

Photo 30. Overview of Site WA9 (a cattle dugout) during summer surveys, July 8, 2020.

Photo 31. Aerial view of Site 17.5 during fly over surveys June 29, 2020.

Photo 32. Overview of site 17.5 showing funnel trap FN01 during summer surveys, July 8, 2020.

Photo 33. Aerial view of Site 18 during fly over surveys June 29, 2020.

Photo 34. Overview of Site 18 during summer surveys, July 8, 2020.

Photo 35. Aerial view of Site 19 during fly over surveys June 29, 2020.

Photo 36. Overview of Site 19 during summer surveys, July 9, 2020.

Photo 37. Aerial view of Site 21 on the left of the RoW, during fly over surveys June 29, 2020.

Photo 38. Overview of Site 21 during summer surveys, July 9, 2020.

Photo 39. Aerial view of Site 22 during fly over surveys June 29, 2020.

Photo 40. Overview of Site 22 during summer surveys, showing a shallow dry wetland, July 10, 2020.

Photo 41. Aerial view of Site 23 during fly over surveys June 29, 2020.

Photo 42. Overview of Site 23 during summer surveys, July 11, 2020.

Photo 43. Aerial view of Site 26 during fly over surveys June 29, 2020.

Photo 44. Overview of Site 26 during fall surveys, September 10, 2020.

Photo 45. Aerial view of Sites 27 and 28 during fly over surveys June 29, 2020.

Photo 46. Overview of Site 27 looking upstream during summer surveys, July 11, 2020.

Photo 47. Overview of Site 28 during summer surveys, July 11, 2020.

Photo 48. Northern Leopard Frog (*Lithobate pipiens*) tadpole from funnel trap FN04 at Site 10, caught during summer surveys July 8, 2020.

Photo 49. Woody debris observed in the channel at Site 27 (Aqua-130; Pine Creek) July 11, 2020.

Photo 50. Woody debris removed from Site 27 (Aqua-130) by contractor, confirmed by Manitoba Hydro Project inspector on August 25, 2020.

Photo 51. Oily sheen seen on water surface at Site WA10 during summer surveys, July 9, 2020, likely the result of iron bacteria naturally occurring at the survey site.

Photo 52. Refuse found along the RoW at Site 19 during summer surveys, July 9, 2020.

APPENDIX

Table A-1. Summary of amphibian species that have been observed or have the potential to occur in the Manitoba-Minnesota Transmission Project Local Assessment Area and if they were detected during surveys.

Common Name	Scientific Name	Status Listings				Observed in the LAA[3]				
		COSEWIC[1]	SARA[1]	MESEA[2]	2014	2017			2020	
						Spring	Summer	Fall	Summer	Fall
Mudpuppy	*Necturus maculosus*	Not at Risk	No Status	No Status	N	N	N	N	N	N
Blue-spotted Salamander	*Ambystoma laterale*	No Status	No Status	No Status	N	N	N	N	N	N
Eastern Tiger Salamander	*Ambystoma tigrinum tigrinum*	Endangered	Endangered	No Status	Y	N	N	N	Probable	N
American Toad	*Anaxyrus americanus*	No Status	No Status	No Status	N	Y	N	N	Y	N
Canadian Toad	*Anaxyrus hemiophrys*	No Status	No Status	No Status	Y	N	N	N	N	N
Boreal Chorus Frog	*Pseudacris maculata*	No Status	No Status	No Status	Y	Y	N	N	N	N
Gray Tree Frog	*Hyla versicolor*	No Status	No Status	No Status	Y	N	N	N	Y	N
Cope's Gray Tree Frog	*Hyla chrysoscelis*	Not at Risk	No Status	No Status	Y	N	N	N		
Spring Peeper	*Pseudacris crucifer*	No Status	No Status	No Status	Y	Y	N	N	Y	N
Wood Frog	*Lithobates sylvaticus*	No Status	No Status	No Status	Y	Y	Y	Y	Y	Y
Northern Leopard Frog	*Lithobates pipiens*	Special Concern	Special Concern	No Status	Y	Y	Y	Y	Y	Y
Mink Frog	*Lithobates septentrionalis*	No Status	No Status	No Status	N	N	Y	N	N	N

[1]Government of Canada, 2020
[2]Government of Manitoba, 2018
[3]2014: Stantec 2015; 2017: Dyszy 2018

Table A-2. Amphibian observations at wetland and stream sites within the Manitoba-Minnesota Transmission Project Local Assessment Area, 2020. Bolded species denote priority species.

Site	Species[1]	Survey Types[2]	≥5 NLFR	Description	Surrounding Habitat Type
1	**NLFR**	FallVES, WQ		Assiniboine River	forest/urban
2	none	FallVES, WQ		Ditch and wastewater pond	agriculture
3	**NLFR**	FallVES, WQ		La Salle River	forest/agriculture/golf course
4	none	FallVES, WQ		Red River	agriculture/urban
6	**NLFR**	FallVES, WQ		Seine River Siphon	agriculture
7DS	**NLFR**	FallVES, WQ		Seine R Diversion/ Old Prairie Grove Drain	agriculture/grassland
7US	none	FallVES, WQ		Seine R Diversion/ Old Prairie Grove Drain	agriculture/grassland
8	none	SummVES, WQ		Edie Creek	forest/agriculture
9a	**NLFR**, WOFR	FallVES, FN, SummVES, WQ		Medium Wetlands	forest
9b	**NLFR**, WOFR	FallVES, FN, SummVES, WQ	YES	Medium Wetlands	forest
10	**NLFR**	FallVES, FN, SummVES, WQ		Large Wetland	forest/grassland
11	C/GRTF, WOFR	FallVES, FN, SummVES, WQ		Large Wetland Lake	forest/pasture
13	WOFR	FallVES, WQ		Seine River	treed grassland
14	WOFR	SummVES, WQ		Small Wetland/Fen	agriculture
15	none	SummVES, WQ		Small Wetland	agriculture
WA9	none	FN, SummVES, WQ		Cattle Dugout	pasture
17.5	AMTO, C/GRTF, **NLFR**, SPPE, WOFR	FN, SummVES, WQ	YES	Wetland	forest/pasture/
18	AMTO	FN, SummVES, WQ		Small Wetland	pasture/dugout
WA10	AMTO, WOFR	SummVES, WQ		Shallow Wetland	forest
19	AMTO, C/GRTF, **NLFR**, WOFR	FN, SummVES, WQ	YES	Small Shallow Wetland	forest
21	AMTO, **NLFR**, WOFR	FallVES, FN, SummVES, WQ		Large Wetland (Sundown Bog)	forest
22	none	SummVES, WQ		Large Shallow Wetland (Sundown Bog)	forest
23	AMTO, **NLFR**, WOFR	SummVES, WQ		Medium Wetland (Sundown Bog)	forest
26	**NLFR**	FallVES, WQ	YES	Pine Creek	treed grassland/agriculture
27	AMTO, **NLFR**, Toad, WOFR	FallVES, FN, SummVES, WQ	YES	Pine Creek	agriculture
28	**NLFR**, Toad, WOFR	FallVES, FN, SummVES, WQ		Pine Creek	agriculture

1 - AMTO: American Toad; C/GRTF: (Cope's) Gray Treefrog; EATS: Eastern Tiger Salamander; NLFR: Northern Leopard Frog; SPPE: Spring Peeper; WOFR: Wood Frog
2 - FN: salamander funnel trap surveys; SumVES: summer frog visual encounter survey; FallVES: fall frog visual encounter survey; WQ: water quality

Table A-3. Summary of Manitoba-Minnesota Transmission Project visual encounter survey sites visited in 2020.

Site[1]	Date	Zone	Start Easting	Start Northing	Survey Time (min)	Water Temp (°C)	Air Temp (°C)	Avg Wind (km/hr)	Depth (m)	Habitat Type	NLFR	Anurans
						Summer						
8	6-Jul-20	14U	667538	5525485	0:21	23.6	28.3	1.6	<1	Creek	NO	NO
9a	6-Jul-20	14U	677976	5510407	0:07	25.1	30.0	6.2	1-2	Wetland	NO	YES
9b	6-Jul-20	14U	678089	5510213	0:10	26.6	27.9	9.9	1-2	Wetland	NO	YES
10	7-Jul-20	14U	679771	5504267	0:21	27.3	27.2	1.7	>2	Wetland	NO	NO
11	8-Jul-20	14U	683985	5499760	0:20	28.7	23.3	2.0	1-2	Wetland	NO	YES
11	8-Jul-20	14U	683996	5499842	0:15	28.7	23.3	2.0	1-2	Wetland	NO	NO
14	7-Jul-20	14U	681906	5486375	0:23	23	27.8	2	<1	Wetland/Fen	NO	YES
15	8-Jul-20	14U	682645	5485310	0:20	25	23.8	11	<1	Wetland	NO	NO
WA9	8-Jul-20	14U	683725	5470059	0:03	28.2	25.9	5.4	<1	Dugout	NO	NO
17.5	9-Jul-20	14U	687579	5460430	0:20	29.5	21.3	3.3	<1	Wetland	YES	YES
18	8-Jul-20	14U	687834	5460054	0:20	30.7	26.8	5.0	<1	Wetland	NO	YES
WA10	9-Jul-20	14U	689570	5458503	0:20	19.8	19.3	9.6	<1	Wetland	NO	YES
19	10-Jul-20	14U	693986	5454290	0:21	21.3	20.4	5.0	<1	Wetland	YES	YES
21	10-Jul-20	14U	699228	5449272	0:20	26.1	27.6	0.0	1-2	Wetland	NO	YES
22	10-Jul-20	14U	704462	5442959	0:20	24.0	25.6	8.8	N/A	Wetland	NO	NO
23	11-Jul-20	14U	709372	5439511	0:20	16.7	25.7	0.0	<1	Wetland	YES	YES
27	11-Jul-20	15U	286060	5432040	0:20	20.4	26.0	5.3	<1	Creek	NO	YES
28	11-Jul-20	15U	286085	5431957	0:20	19.1	25.4	8.5	<1	Creek	NO	YES
						Fall						
1	08-Sep-20	14U	612868	5524843	0:20	13.1	9.3	10.6	>2	River	YES	YES
2	08-Sep-20	14U	622519	5512042	0:20	12.8	10.4	10.5	1-2	Pond (Wastewater)	NO	NO
3	08-Sep-20	14U	633254	5512069	0:21	14.1	11.0	5.6	1-2	River	YES	YES
4	08-Sep-20	14U	634442	5512509	0:20	17.1	13.1	2.5	>2	River	NO	NO
6	08-Sep-20	14U	640839	5517024	0:20	14.4	12.3	4.1	1-2	River Siphon	YES	YES
7DS	08-Sep-20	14U	641620	551740	0:21	14.6	10.6	7.9	<1	River Diversion	YES	YES
7US	08-Sep-20	N/A	641695	5517426	N/A	N/A	10.6	7.9	<1	River Diversion	N/A	N/A
9a	09-Sep-20	14U	677972	5510407	0:07	11.2	12.9	9.6	1-2	Wetland	YES	YES
9b	09-Sep-20	14U	678081	5510261	0:20	11.1	12.8	11.8	1-2	Wetland	YES	YES
10	09-Sep-20	14U	679812	5504199	0:20	13.8	9.7	4.2	1-2	Wetland	NO	NO

Table A-3. Continued.

Site[1]	Date	Zone	Start Easting	Start Northing	Survey Time (min)	Water Temp (°C)	Air Temp (°C)	Avg Wind (km/hr)	Depth (m)	Habitat Type	NLFR	Anurans
11	09-Sep-20	14U	683969	5499833	0:20	13.7	17.8	1.9	1-2	Wetland	NO	NO
13	09-Sep-20	14U	681932	5488447	0:20	13.3	14.6	11.6	1-2	River	NO	YES
21	10-Sep-20	14U	699243	5449305	0:20	11.9	13.0	4.3	1-2	Wetland	YES	YES
26	10-Sep-20	15U	284734	5434650	0:20	8.4	18.5	5.8	<1	Creek	YES	YES
27	10-Sep-20	15U	286001	5431951	0:20	15.4	19.4	2.9	<1	Creek	YES	YES
28	10-Sep-20	15U	286069	5431941	0:15	14.8	19.4	2.9	<1	Creek	YES	YES

[1]Site 11 was surveyed by VES and dipnet

Table A-4. Summary of Manitoba-Minnesota Transmission Project funnel trap catch, summer 2020.

Site	Trap ID	Zone	Easting	Northing	Set Date	Set Time	Pull Date	Pull Time	Anurans	Salam
9a	1	14U	677977	5510409	6-Jul-20	14:36	7-Jul-20	9:47	No	No
	2	14U	677985	5510407	6-Jul-20	14:46	7-Jul-20	9:52	No	No
	3	14U	677989	5510398	6-Jul-20	14:56	7-Jul-20	9:55	No	No
	4	14U	677988	5510393	6-Jul-20	15:06	7-Jul-20	9:57	No	No
	5	14U	677983	5510390	6-Jul-20	15:17	7-Jul-20	10:00	No	No
9b	1	14U	678087	5510261	6-Jul-20	16:20	7-Jul-20	10:16	No	No
	2	14U	678088	5510250	6-Jul-20	16:27	7-Jul-20	10:28	No	No
	3	14U	678088	5510243	6-Jul-20	16:35	7-Jul-20	10:33	No	No
	4	14U	678099	5510275	6-Jul-20	16:45	7-Jul-20	10:20	No	No
	5	14U	678101	5510262	6-Jul-20	16:57	7-Jul-20	10:24	No	No
10	1	14U	679762	5504239	6-Jul-20	18:18	7-Jul-20	13:22	No	No
	2	14U	679730	5504222	6-Jul-20	18:29	7-Jul-20	13:09	No	No
	3	14U	679740	5504229	6-Jul-20	18:26	7-Jul-20	13:18	No	No
	4	14U	679672	5504215	6-Jul-20	18:37	7-Jul-20	13:44	Yes	No
	5	14U	679767	5504248	6-Jul-20	18:19	7-Jul-20	13:02	No	No
11	1	14U	683976	5499905	7-Jul-20	15:22	8-Jul-20	9:36	No	No
	2	14U	683980	5499887	7-Jul-20	15:30	8-Jul-20	9:43	No	No
	3	14U	683993	5499869	7-Jul-20	15:45	8-Jul-20	9:48	No	No
	4	14U	684005	5499807	7-Jul-20	15:56	8-Jul-20	10:03	No	No
	5	14U	684013	5499769	7-Jul-20	16:14	8-Jul-20	10:12	No	No
WA9	1	14U	683733	5470069	8-Jul-20	13:28	9-Jul-20	9:43	No	No
	2	14U	683734	5470072	8-Jul-20	13:30	9-Jul-20	9:45	No	No
	3	14U	683732	5470079	8-Jul-20	13:34	9-Jul-20	9:46	No	No
	4	14U	683734	5470081	8-Jul-20	13:37	9-Jul-20	9:47	No	No
	5	14U	683736	5470090	8-Jul-20	13:40	9-Jul-20	9:48	No	No
17.5	1	14U	687532	5460434	8-Jul-20	14:41	9-Jul-20	10:50	Yes	No
	2	14U	687527	5460433	8-Jul-20	14:43	9-Jul-20	10:49	Yes	No
	3	14U	687516	5460442	8-Jul-20	14:55	9-Jul-20	10:47	No	No
	4	14U	687518	5460448	8-Jul-20	15:00	9-Jul-20	10:46	No	No
	5	14U	687524	5460465	8-Jul-20	15:03	9-Jul-20	10:44	No	No
18	1	14U	687843	5460053	8-Jul-20	15:52	9-Jul-20	11:19	No	No
	2	14U	687843	5460046	8-Jul-20	16:02	9-Jul-20	11:18	No	No
	3	14U	687838	5460036	8-Jul-20	16:08	9-Jul-20	11:14	Yes	No
	4	14U	687826	5460050	8-Jul-20	16:11	9-Jul-20	11:11	No	No
	5	14U	687832	5460051	8-Jul-20	16:15	9-Jul-20	11:09	No	No
19	1	14U	694058	5454200	9-Jul-20	14:13	10-Jul-20	9:28	No	No
	2	14U	694069	5454194	9-Jul-20	14:17	10-Jul-20	9:31	No	No
	3	14U	694083	5454198	9-Jul-20	14:20	10-Jul-20	9:37	Yes	Yes
	4	14U	694069	5454201	9-Jul-20	14:23	10-Jul-20	9:35	No	No
	5	14U	694047	5454207	9-Jul-20	14:25	10-Jul-20	9:21	Yes	No

Table A-4. Continued.

Site	Trap ID	Zone	Easting	Northing	Set Date	Set Time	Pull Date	Pull Time	Anurans	Salam
	1	14U	699297	5449343	9-Jul-20	15:48	10-Jul-20	12:47	No	No
	2	14U	699293	5449353	9-Jul-20	15:57	10-Jul-20	12:44	Yes	No
21	3	14U	699288	5449368	9-Jul-20	16:09	10-Jul-20	12:41	Yes	No
	4	14U	699308	5449335	9-Jul-20	16:14	10-Jul-20	12:50	Yes	No
	5	14U	699320	5449335	9-Jul-20	16:20	10-Jul-20	12:56	No	No
	1	15U	286048	5432007	10-Jul-20	16:29	11-Jul-20	14:59	No	No
	2	15U	286051	5432012	10-Jul-20	16:32	11-Jul-20	15:00	Yes	No
27	3	15U	286051	5432021	10-Jul-20	16:33	11-Jul-20	15:05	Yes	No
	4	15U	286055	5432028	10-Jul-20	16:34	11-Jul-20	15:11	No	No
	5	15U	286059	5432043	10-Jul-20	16:36	11-Jul-20	15:13	No	No
	1	15U	286072	5431929	10-Jul-20	16:46	11-Jul-20	14:49	No	No
	2	15U	286071	5431938	10-Jul-20	16:48	11-Jul-20	14:40	Yes	No
28	3	15U	286073	5431946	10-Jul-20	16:50	11-Jul-20	14:37	No	No
	4	15U	286077	5431952	10-Jul-20	16:51	11-Jul-20	14:36	No	No
	5	15U	286081	5431954	10-Jul-20	16:52	11-Jul-20	14:23	Yes	No

Table A-5. General wetland mitigation measures for sites overlapping potential amphibian habitat within the Manitoba-Minnesota Transmission Project PDA. (Source: Manitoba-Minnesota Transmission Project Construction Environmental protection Plan, August 2019).

ID	Mitigation
EC-8.01	Clearing wastes and other construction debris or waste will not be placed in wetland areas. Existing logs, snags and wood debris will be left in place.
EC-8.02	Wetland areas will be prescribed riparian buffers in site specific mitigation tables in which understory low-growth vegetation will be maintained where possible. Environmental protection measures for working in and around wetlands will be reviewed with the contractor and employees prior to commencement of any construction activities.
EC-8.03	Natural vegetated buffer areas of 30 m will be established around wetlands and riparian zones will be maintained to the extent possible.
EC-8.04	Disturbance of wetlands will only be carried out under frozen ground conditions. If frozen ground conditions don't exist alternate mitigation measures such as construction matting may be used to minimize surface damage, rutting and erosion if approved by MH Environmental Officer/Inspector.
EC-8.05	Cleared trees and woody debris will not be pushed into (or adjacent) to standing timber, or within the high-water mark of wetlands or waterbodies

Available in accessible formats upon request