Chapter 3:
Project Description

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[1] Unless otherwise indicated, photos showing construction–related activities and components such as constructed road, bridges and culverts are from the Project 1 area (P1 All-Season Road recently constructed between PR 304 and Berens River First Nation).

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3.0 PROJECT DESCRIPTION

This chapter of the Environmental Impact Statement provides a description of the proposed Project 6, which is a 141 kilometre (km) all-season road linking Manto Sipi Cree Nation, Bunibonibee Cree Nation and God's Lake First Nation (the Project). The proposed all-season road will be constructed on provincial Crown land and will connect the communities of Manto Sipi Cree Nation, Bunibonibee Cree Nation and God's Lake First Nation, on the east side of Lake Winnipeg (**Figure 3-1**). The purpose of the proposed Project is to link these communities. The Project will also benefit God's Lake Narrows Northern Affairs Community as it has existing all-season road access to God's Lake First Nation.

This Chapter provides the Project description information required to facilitate the identification and analysis of potential environmental effects and to identify the mitigation measures required to avoid or minimize potential adverse effects.

3.1 Scope of the Project

The scope of the proposed Project includes components and activities described in this Chapter related to the construction and operation of the Project including maintenance activities and the decommissioning and reclamation of Project components not required for on-going maintenance of the Project (ex: construction camps and borrow areas). There is no intent to decommission the proposed Project as it will provide all-season road access among Manto Sipi Cree Nation, Bunibonibee Cree Nation and God's Lake First Nation for the foreseeable future (> 50 years).

3.2 Project Phases

The proposed Project will comprise the following four main phases:

1. Planning
2. Design
3. Construction
4. Operation and Maintenance

Further discussion of each Project Phase is provided in the following sub-sections.

3.2.1 Planning

The Project is currently in the planning phase, which began with the identification of broad road corridors, a possible road alignment within the corridors and selection of the final road alignment (**Chapter 2, Section 2.2.2**). Exploratory clearing was required to support information requirements to enable selection of the road alignment. Baseline environmental studies were completed during this phase and included gathering information that influences the alignment and the development of the road design. This included heritage resources, fisheries, wildlife, soil and vegetation assessments, geophysical surveys, quarry location identification, Indigenous and public engagement and Traditional Knowledge studies and

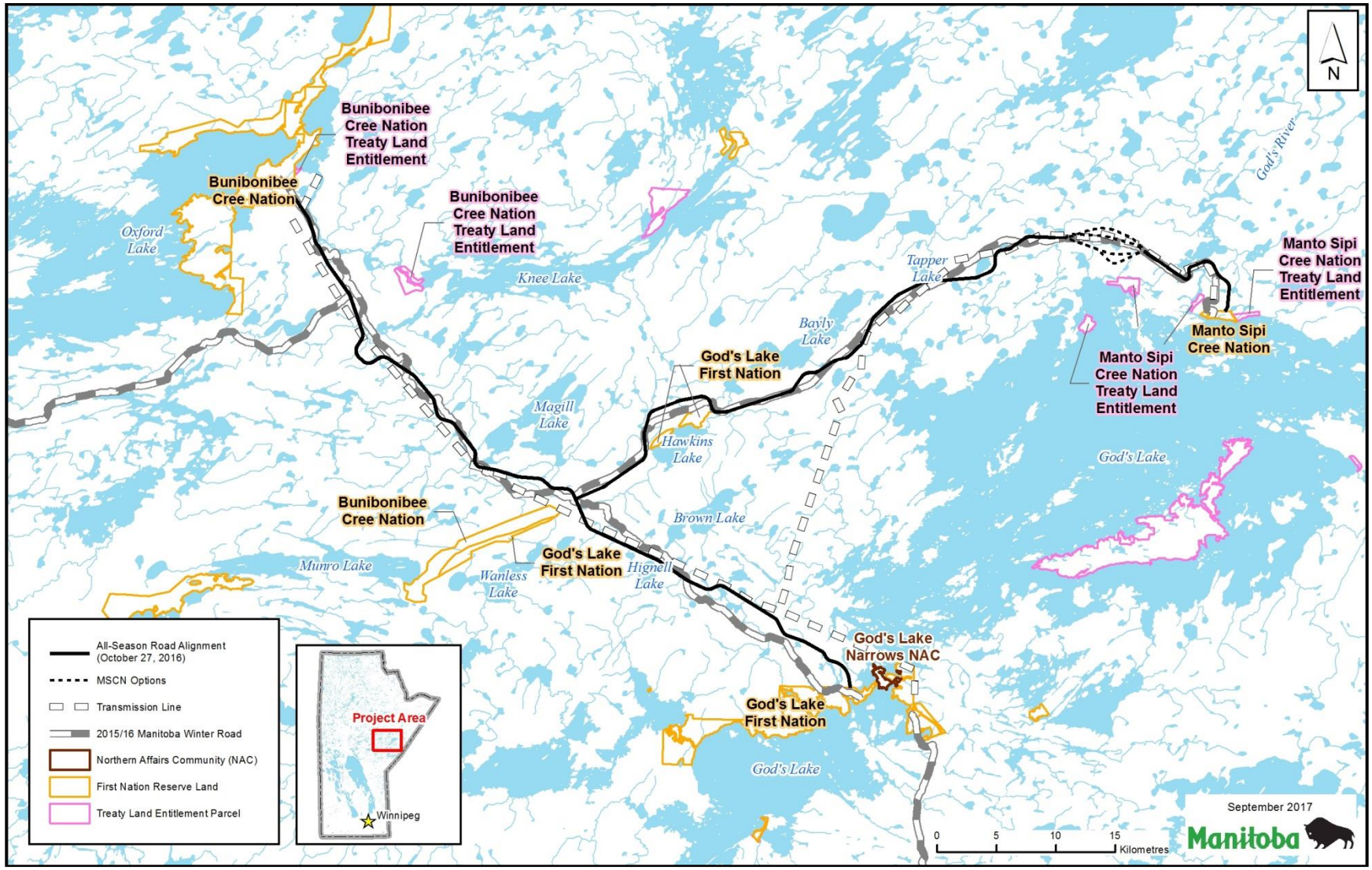


Figure 3-1: Proposed Project all-season road alignment on the east side of Lake Winnipeg

workshops. The Environmental Assessment was conducted during this planning phase.

3.2.2 Design

During the design phase, the functional and detailed construction design will be completed and a Construction Phase Environmental Management Plan (EMP) will be finalized. A separate Operational Phase EMP will be prepared during the construction phase, prior to operation. Bridge and stream crossing locations, quarry and borrow areas, temporary access routes, construction laydown areas and construction camps will also be located, surveyed and flagged. Detailed geotechnical investigations and testing will be conducted along the proposed all-season road right-of-way (ROW), temporary access routes and at quarry sites and borrow areas.

During the design phase, the functional and detailed construction design will be completed and EMP will be finalized.

Topographical maps of the route alignment showing potential quarry locations can be found in **Appendix 3-7.**

3.2.3 Construction

During the construction phase, equipment, machinery, vehicles, construction materials and supplies including fuel, generators, trailers and other provisions will be transported to the Project and laydown areas via the existing winter road.

The Project will be constructed in segments, beginning at Bunibonibee Cree Nation and extending south and eastwards, to optimize construction scheduling and resource use. Segments will be constructed sequentially so that completion of the construction phase at one segment will initiate pre-construction of the adjacent segment. ROW clearing will be conducted in similar segments, with clearing being completed during the winter months, wherever possible, to facilitate clearing machinery access and to minimize potential adverse environmental effects. Separate contracts will be tendered for each of the two potential major water crossings at God's River and Magill Creek.

Vegetation will be cleared along the ROW to a width of 60 m and potentially wider on the inside of curves, where required, to increase sightlines of road users. Equipment marshalling areas, laydown areas and construction camps will be prepared within the cleared ROW, where possible. Additional information on clearing activities is provided in **Section 3.4.1.2**.

Rock quarries and borrow areas will be cleared and prepared for use. Rock fill and granular materials will be excavated, crushed, sorted and stockpiled. The Project roadway, bridges and culvert crossings will then be constructed. Culverts will be installed as construction progresses along the alignment.

Temporary facilities and work areas during construction including quarry and borrow areas, access routes, laydown areas and construction camps that will not be needed for future maintenance activities will be decommissioned following construction. Additional information on the construction activities is provided in **Sections 3.4.1**.

3.2.4 Operation and Maintenance

Following construction, the Project will be owned and operated by the Government of Manitoba. The Government of Manitoba will assume responsibility for road safety, operations and stewardship, once the all-season road is designated as a departmental road (Provincial Road) under *The Highways and Transportation Act*.

Maintenance activities for the proposed Project, such as winter snow clearing, routine scheduled grading, topping the road with additional aggregate, managing vegetation and cleaning out culverts, will occur over the life of the road. Manitoba Infrastructure (MI), Northern Airports and Marine Operations currently have maintenance facilities, for the storage of equipment, at the airports in each of the communities. Likewise, MI Remote Road Operations, Winter Road Program currently has a maintenance facility at the God's Lake Airport. If additional equipment is required to be stored in the area, the quarry or construction camp closest to each community could be retained as a maintenance yard. Road maintenance and safety methods used will conform to the most current MI practices and guidelines. Additional information on maintenance activities is provided in **Section 3.4.2**.

3.2.5 Decommissioning

There are no plans to decommission or abandon the Project as it will provide all-season road access among Manto Sipi Cree Nation, Bunibonibee Cree Nation and God's Lake First Nation for the foreseeable future (> 50 years). Decommissioning of temporary components (ex: laydown areas, construction camps, temporary access routes, quarries and borrow areas not required for on-going road maintenance) will occur as part of the construction phase of the Project. Based on the Canadian Environmental Assessment Agency decision statement for Project 4, it is anticipated that sections of the existing winter road not used for the all-season road alignment will be progressively abandoned during the construction phase. This will be done by blocking access points, restoring disturbed areas and allowing for natural revegetation in these areas.

3.3 Project Components

The main components of the proposed Project are:

- gravel-surface two-lane all-season road (141 km) on new ROW
- potential major water crossings over the God's River and Magill Creek
- culvert crossings at fish-bearing watercourse crossings
- culverts for conveyance and drainage at non-fish-bearing watercourse crossings
- culverts for drainage equalization outside of watercourse crossing to maintain hydraulic functioning of the local landscape
- temporary water crossings to facilitate permanent crossing construction
- temporary construction access routes
- temporary construction laydown areas
- temporary construction camps
- construction quarry sites

- construction borrow areas
- explosives storage facilities

The dimensions and capacities for these physical works are not available at this time as detailed design has not begun. The total permanent footprint area of the Project, including the all-season road, bridges, culverts and quarries required for on-going maintenance will be approximately 924 hectares (ha, 9.24 km^2) within the cleared ROW. The footprint of cleared areas required for temporary Project components and activities during Project construction such as construction camps, equipment laydown areas, borrow areas and most quarries is estimated to be less than 545 ha (5.45 km^2). In total, the Project will therefore result in a permanent and temporary footprint of approximately 1,469 ha (14.7 km^2). The footprint area of temporary Project components and activities that will be required only during Project construction will be rehabilitated by natural re-vegetation and seeding/planting.

Details of the Project components are described in the following sub-section. Activities associated with constructing and maintaining the Project are described in **Section 3.4**.

3.3.1 All-Season Road

The 141 km all-season road *will have a road top width of 8.4 m within a typical cleared width of 60 m in the 100 m ROW.*

The proposed alignment for the 141 km all-season road linking Manto Sipi Cree Nation, Bunibonibee Cree Nation and God's Lake First Nation is shown in **Figure 3-1**. Where terrain permits, the all-season road will follow the current winter road alignment. Most of the alignment is located on or within approximately 1 km of the existing winter road corridor, although the route does deviate up to approximately 3 km from the existing winter road in locations to avoid the lower and wetter conditions of that route. The all-season road is also close to an existing transmission line that crosses through the area. The proposed two-lane gravel road will be centered on a new 100 m ROW. Typical clearing width of the road ROW will be 60 m with additional clearing as required in horizontal curves to maintain sight lines for safety. An estimated 830 ha of provincial Crown land will be cleared for the road ROW.

The proposed all-season road will be built to the standard of a secondary arterial road, according to published Manitoba Highway Standards (Manitoba Department of Highways and Transportation 1998). In keeping with these standards, the roadway will be constructed with an 8.4 m road top width. The road will be constructed with a 90 km/h design speed, or potentially less where natural landscape features inhibit the design standard. The posted speed limit will be 70 km/h or less where required for safety in relation to natural landscape features. The Geometric Design Criteria for the proposed Project is summarized in **Table 3.1** and provided along with typical cross section drawings in **Appendix 3-1**.

To accommodate safe snowmobile/ATV crossings of the proposed all-season road, the road platform will be modified at key trapline access points and other key community access points (ex: portages) to include gradual slopes and sufficiently cleared areas to facilitate on-coming traffic visibility. Signage indicating these crossing locations will be installed.

Table 3.1: Geometric Design Criteria for the Proposed Project

Criterion	Project Standard
Estimated 10 Year Average Annual Daily Traffic (AADT)	<300 vehicles per day
Terrain	Rolling
Design Speed	90 km/h
Gradient – Maximum Percentage	7%
Posted Speed	70 km/h (posted speed limits may vary in certain locations such as at high wildlife density/crossing areas, bridge approaches, snowmobile crossings and curves)
Minimum Stopping Sight Distance	170 m
Minimum Passing Sight Distance	620 m
Minimum Vertical Curve "K" Values*	KC = 55, KS = 40
Curvature – Minimum Radius	340 m
Number and Widths of Lanes	2 lanes at 4.2 m each
Total ROW Width	100 m (60 m cleared)
Truck Use (Percentage of AADT)	10% Assumed
Truck Haul Type	Supply / Haulage
Roadbed Width	Approximately 18.0 to 24.0 m (variable)
Roadway Fill Slope	4H:1V
Ditch Bottom Width	3.5 m
Ditch Back Slope	3H:1V
Clear Roadway Minimum Width on Structure	9.6 m

Note: * Parabolic curves are defined by the K value: the length of curve divided by its change in grade %

3.3.2 Watercourse Crossings

The proposed Project will require construction of the following crossings at fish-bearing watercourses (North/South Consultants Inc. 2017a, b):

- possible replacement or upgrade of the existing Acrow bridge[2] with either a two-span bridge or widening current existing bridge at God's River
- a two-span bridge at Magill Creek
- culverts (size to be determined) at 23 unnamed streams

Culverts will also be installed at 28 non-fish-bearing watercourse crossings (North/South Consultants Inc. 2017a, b). The minimum culvert size is 900 mm. An estimated 429 equalization culverts will be installed along the road to maintain hydraulic functioning of the local landscape.

The locations of proposed watercourse crossings are indicated in **Figure 3-2**. The UTM locations of each watercourse crossing and the type of crossing structure to be installed are summarized in **Table 3.2**. Additional descriptions of these crossing structures are provided in **Sections 3.3.2.1**. Representative design drawings for watercourse crossings are provided in **Appendix 3-2**. A description of the major water crossing location characteristics is provided in **Chapter 6** (**Section 6.1.6**).

[2] Option chosen will depend on available funding at the time of construction.

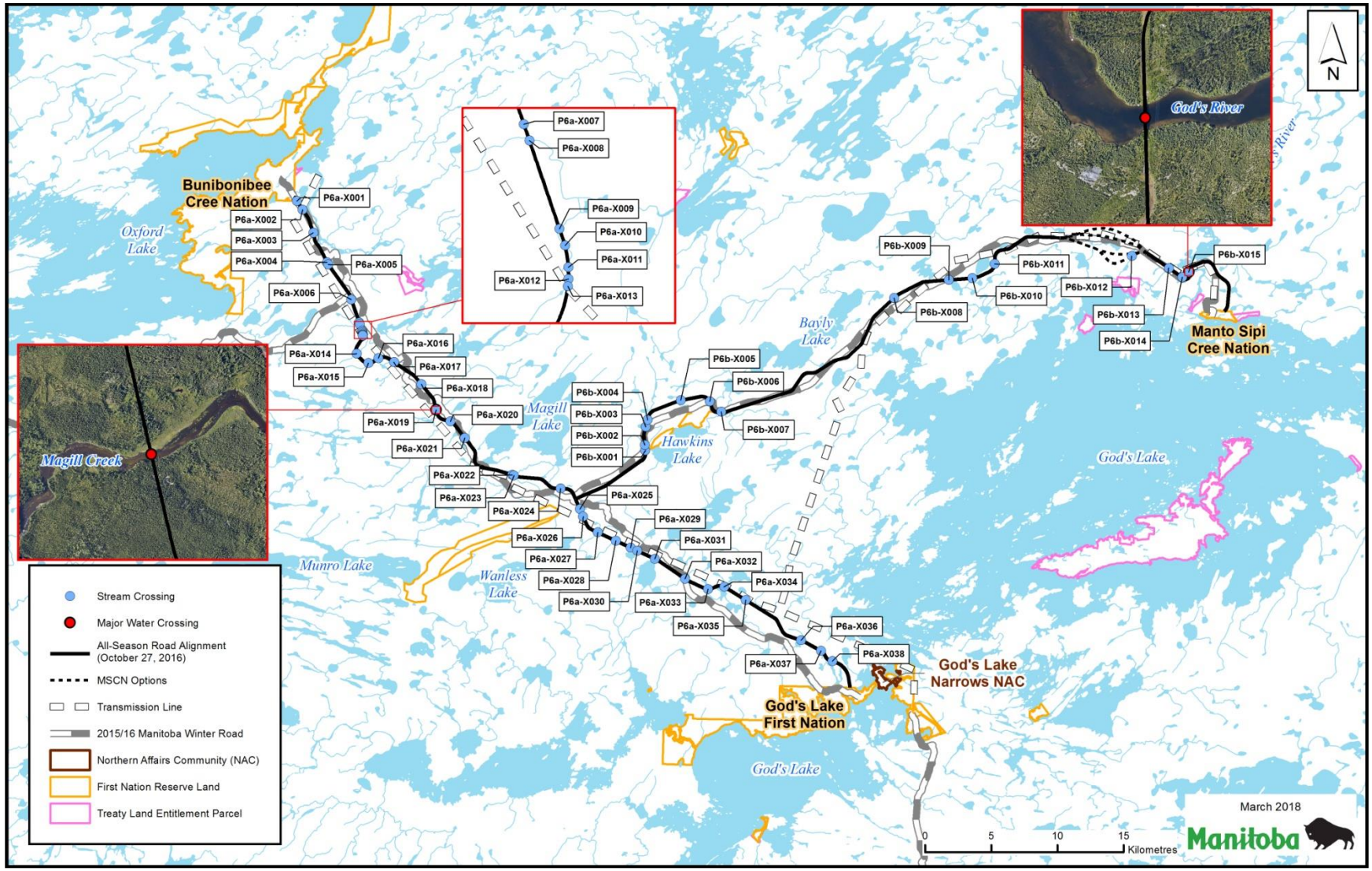


Figure 3-2: Proposed Project all-season road watercourse crossings

Table 3.2: List of Watercourse Crossings and Proposed Crossing Structure

Site*	Water Course	Northing	Easting	Crossing Structure
Bridges over Major Watercourses				
P6a-X019	Magill Creek	6069210	366392	Two-span bridge with 1 in-water pier
P6b-X015	God's River	6080809	429706	Option 1: No change to existing bridge, Option 2: Upgrade to widen existing bridge, or Option 3: Replace existing with two-span bridge with 1 in-water pier
Culverts in Fish-Bearing Watercourses				
P6a-X002	Unnamed Tributary of Hayes River	6086046	355166	Single or Multiple Round Culverts
P6a-X005	Unnamed Tributary of Hayes River	6081440	357317	Single or Multiple Round Culverts
P6a-X007	Unnamed Tributary of Michikanes Lake	6076546	359925	Single or Multiple Round Culverts
P6a-X008	Unnamed Tributary of Michikanes Lake	6076436	359963	Single or Multiple Round Culverts
P6a-X018	Unnamed Tributary of Knee Lake	6071363	365150	Single or Multiple Round Culverts
P6a-X020	Unnamed Tributary of Magill Creek	6068240	367584	Single or Multiple Round Culverts
P6a-X022	Unnamed Tributary of Laird Lake	6063748	372798	Single or Multiple Round Culverts
P6a-X023	Unnamed Tributary of Laird Lake	6063705	372935	Single or Multiple Round Culverts
P6a-X027	Unnamed Tributary of Wanless Lake	6058916	379995	Single or Multiple Round Culverts
P6a-X028	Unnamed Tributary of Wanless Lake	6058214	381509	Single or Multiple Round Culverts
P6a-X029	Unnamed Tributary of Hignell Lake	6057629	382770	Single or Multiple Round Culverts
P6a-X031	Unnamed Tributary of Hignell Lake	6056689	384797	Single or Multiple Round Culverts
P6a-X032	Unnamed Tributary of Hignell Lake	6055019	387333	Single or Multiple Round Culverts
P6a-X033	Unnamed Tributary of an Unnamed Lake	6054142	389260	Single or Multiple Round Culverts
P6a-X034	Unnamed Tributary of an Unnamed Lake	6054355	390626	Single or Multiple Round Culverts
P6a-X037	Unnamed Tributary of an Unnamed Lake	6048950	398766	Single or Multiple Round Culverts
P6a-X038	Unnamed Tributary of an Unnamed Lake	6048087	399735	Single or Multiple Round Culverts
P6b-X002	Unnamed Tributary of Hawkins Lake	6066261	383950	Single or Multiple Round Culverts
P6b-X003	Unnamed Tributary of Hawkins Lake	6067799	384030	Single or Multiple Round Culverts
P6b-X006	Unnamed Tributary of Opaskaykow Lake	6069930	389409	Single or Multiple Round Culverts
P6b-X007	Unnamed Tributary of Opaskaykow Lake	6069047	390380	Single or Multiple Round Culverts
P6b-X009	Unnamed Tributary of Tapper Lake	6080144	409513	Single or Multiple Round Culverts
P6b-X013	Unnamed Tributary of God's River	6081141	428031	Single or Multiple Round Culverts
Culverts in Non-Fish Bearing Watercourses				
P6a-X001	Unnamed Tributary of Hayes River	6086782	354680	Small Diameter Culvert
P6a-X003	Unnamed Tributary of Hayes River	6084096	356066	Small Diameter Culvert
P6a-X004	Unnamed Tributary of Hayes River	6081611	357220	Small Diameter Culvert
P6a-X006	Unnamed Tributary of Michikanes Lake	6078497	359259	Small Diameter Culvert
P6a-X009	Unnamed Tributary of Michikanes Lake	6075841	360165	Small Diameter Culvert
P6a-X010	Unnamed Tributary of Michikanes Lake	6075729	360202	Small Diameter Culvert
P6a-X011	Unnamed Tributary of Michikanes Lake	6075583	360225	Small Diameter Culvert
P6a-X012	Unnamed Tributary of Michikanes Lake	6075505	360226	Small Diameter Culvert

Site*	Water Course	Northing	Easting	Crossing Structure
P6a-X013	Unnamed Tributary of Michikanes Lake	6075456	360222	Small Diameter Culvert
P6a-X014	Unnamed Tributary of Michikanes Lake	6073936	359702	Small Diameter Culvert
P6a-X015	Unnamed Tributary of Michikanes Lake	6073154	360702	Small Diameter Culvert
P6a-X016	Unnamed Tributary of Michikanes Lake	6073552	361536	Small Diameter Culvert
P6a-X017	Unnamed Tributary of Michikanes Lake	6073221	362851	Small Diameter Culvert
P6a-X021	Unnamed Tributary of Magill Creek	6066857	368803	Small Diameter Culvert
P6a-X024	Unnamed Tributary of Laird Lake	6062609	376856	Small Diameter Culvert
P6a-X025	Unnamed Tributary of Hawkins Lake	6060867	378492	Small Diameter Culvert
P6a-X026	Unnamed Tributary of Wanless Lake	6060265	378756	Small Diameter Culvert
P6a-X030	Unnamed Tributary of Hignell Lake	6057373	383321	Small Diameter Culvert
P6a-X035	Unnamed Tributary of an Unnamed Lake	6053228	392437	Small Diameter Culvert
P6a-X036	Unnamed Tributary of an Unnamed Lake	6049844	397092	Small Diameter Culvert
P6b-X001	Unnamed Tributary of Hawkins Lake	6065801	383989	Small Diameter Culvert
P6b-X004	Unnamed Tributary of Hawkins Lake	6068376	384190	Small Diameter Culvert
P6b-X005	Unnamed Tributary of Opaskaykow Lake	6070020	386967	Small Diameter Culvert
P6b-X008	Unnamed Tributary of Bayley Lake	6078620	404927	Small Diameter Culvert
P6b-X010	Unnamed Tributary of Tapper Lake	6080295	411494	Small Diameter Culvert
P6b-X011	Unnamed Tributary of Tapper Lake	6081483	413389	Small Diameter Culvert
P6b-X012	Unnamed Tributary of God's Lake	6082134	424907	Small Diameter Culvert
P6b-X014	Unnamed Tributary of God's River	6080372	429148	Small Diameter Culvert

Note: * Refer to Figure 3-2 for watercourse crossing site locations.

Hydraulic and geotechnical investigations will be conducted to finalize crossing locations and determine site hydraulics and foundation conditions at watercourse crossings. The results of hydraulic analyses will be used to determine the size of crossings to meet 1 in 50 year flood scenario design (Q2% flood/flow), fish passage requirements and navigation requirements for crossing designs, as required. While all watercourses to be crossed by the Project are identified as "non-scheduled" under the federal Navigation Protection Act, MI will meet Transport Canada navigation clearance requirements for all bridges in response to input from community members and stakeholders.

Topographical maps of the route alignment showing watercourse crossing locations can be found in **Appendix 3-7.**

3.3.2.1 Bridge Crossings

The locations of the two bridge crossings along the all-season road alignment are shown on **Figure 3-2**. The proposed all-season alignment currently crosses God's River at the existing single lane Acrow bridge. MI may opt to upgrade the existing crossing to a wider two-lane Acrow bridge or replace it with a two-lane 'steel girder' structure depending on community needs and funding allocations at the time of construction. The Magill Creek bridge will be a two-lane 'steel girder' structure. The general design criteria and assumptions used for the bridges and structures will be in accordance with American Association of State Highway and Transportation Officials – Load and Resistance Factor Design Bridge Design

Specifications (Latest Edition) as required by the Government of Manitoba. Additionally, the structure designs will comply with the Manitoba Infrastructure Structures Design Manual and the following live loading requirements:

- Modified HSS40 Truck Loading
- HS40 Lane Loading
- HL-93 Combined Truck and Lane Loading

A typical steel girder two-span bridge is illustrated in **Photograph 3-1**. A typical clear-span bridge is illustrated in **Photograph 3-2**. The vertical alignment for the steel girder bridges will be horizontal with approach grades parallel to the road grade. Navigation requirements for new bridges will meet the Transport Canada navigation clearances (Canadian Standards Association 2014). The length of new bridges will be the sum of the river width plus abutment offsets. Typical abutment offsets will be approximately 7 m from the water's edge. The overall width of the bridge may be up to 10.8 m wide plus two 0.6 m curbs/guardrails based on expected traffic volumes and available funding. If the bridge was 10.8 m wide, the width of each traffic lane would be 3.7 m. Structural materials for bridges will consist of concrete and reinforcing steel. A concrete batch plant will be established in close proximity to bridge crossing locations to produce concrete for the bridge abutments, piers and deck. Water for mixing concrete will be drawn from the river associated with the bridge crossing; provincial water use licences will be obtained, where required.



(**Source**: Manitoba Infrastructure)

Photograph 3-1: Typical Two-Span Bridge with single pier – Pigeon River (under construction Project P1)



(**Source**: Dillon Consulting Limited)

Photograph 3-2: Typical Clear-Span Bridge – Loon Creek (Project P1)

3.3.2.2 Culvert Crossings at Fish-Bearing Watercourses

Culvert crossings at fish-bearing watercourses will be constructed using either corrugated steel pipe culverts or box culverts with minimum culvert diameters of 900 mm. The culvert crossings may involve either closed or open-bottom designs depending on fisheries sensitivities and soil conditions. Where culverts cross fish habitat (23 locations), the culverts will be sized to accommodate fish passage requirements as specified in the Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat (Fisheries and Oceans Canada and Manitoba Natural Resources 1996).

The following design criteria and assumptions will apply to culverts at smaller creek/stream crossings.

- Maximum head loss of 0.3 m during passage of the design discharge (1% Flood).
- Velocities through culverts shall be less than 1.0 m/s for the 2-year, the 3DQ10[3] and the 100-year return periods event for culverts less than 25 m in length and 0.8 m/s for culverts greater than 25 m in length in accordance with the Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat (Fisheries and Oceans Canada and Manitoba Natural Resources 1996).

Examples of culvert crossings are illustrated in **Photographs 3-3** and **3-4**.

[3] 3DQ10 = 3 day delay discharge with a 10% probability of exceedance



(**Source**: Joro Consultants)

Photograph 3-3: Typical Multi-Culvert Stream Crossing



(**Source**: Joro Consultants)

Photograph 3-4: Typical Single-Culvert Stream Crossing

3.3.2.3 Culvert Crossings of Non-Fish Bearing Watercourses and Drainage Pathways

An estimated 28 culverts will be installed at non-fish-bearing stream crossings and an additional 429 culverts (estimated) will also be installed to facilitate drainage/prevent flooding and to maintain hydraulic function (ex: equalization culverts). Culvert design and installation methods will consider best practices for crossings in boreal forest areas of Manitoba and Saskatchewan (Louisiana Pacific *et al.* 2014). Equalization culverts will be a minimum of 900 mm in diameter. An example equalization culvert installation method for boreal fen and bog areas is illustrated in **Figure 3-3**. Note that the use of large rock in the road base promotes subsurface flow from one side of the road to the other in a manner consistent with fen and bog environments.

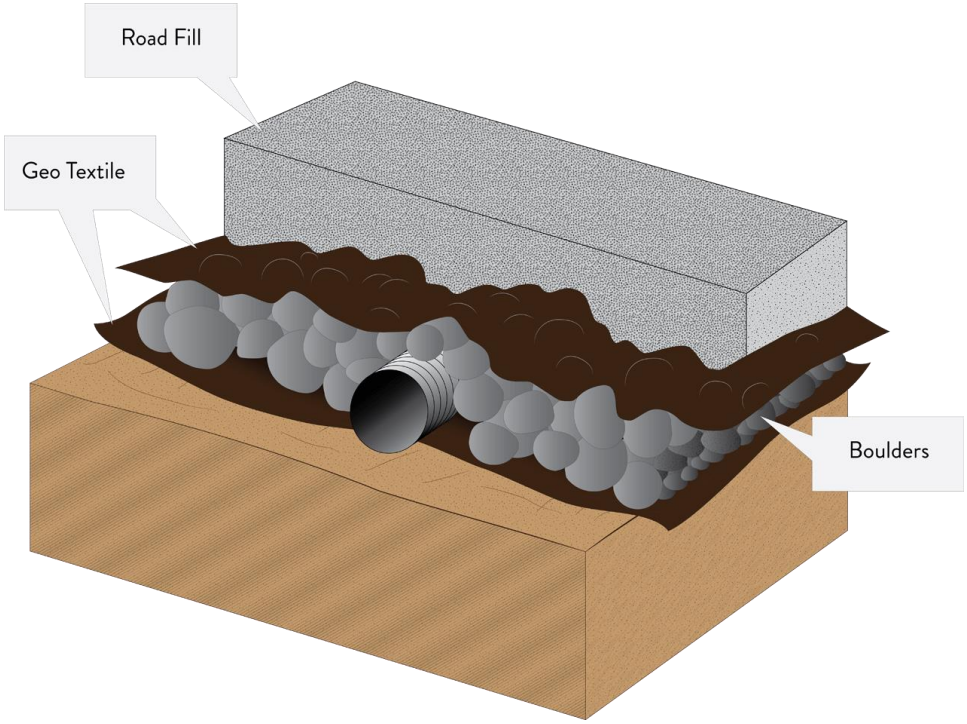


Figure 3-3: Example of culvert installation method for boreal fen and bog areas (after Louisiana Pacific *et al*. 2014)

3.3.2.4 Temporary Crossings

It is anticipated that temporary crossings of watercourses may be required during the construction phase within the 60 m cleared ROW. Existing roads and cut lines will be used as access to temporary crossings whenever possible. At fish-bearing watercourses, in-stream placement (if required) and removal of temporary crossing structures will be scheduled in accordance with Fisheries and Oceans Canada timing windows for in water work in Northern Manitoba to avoid serious harm to fish (Fisheries and Oceans Canada 2015a). Temporary crossing structures will be removed when no longer required and temporary crossings will be rehabilitated and revegetated using a native vegetation seed mix for boreal areas.

3.3.3 Temporary Access Routes

Temporary access routes will be required for quarries and borrow areas, laydown areas, construction camps and other areas required for road construction purposes. These will range from rough trails where vegetation may be removed or snow compacted to service roads that are cleared, grubbed, graded, compacted and gravelled to support heavy construction vehicle movement (ex: quarry access). An estimated 13 km of temporary access is expected to be developed during construction of the Project, which equates to an approximate 39 ha (0.39 km^2) of disturbed area.

Construction-related traffic will be restricted to the Project ROW, winter roads and associated temporary access routes required during Project construction and maintenance. Existing trails, portages and other travel routes will not be altered adjacent to the Project footprint area other than as required for Project construction and maintenance purposes. Where temporary access routes are accessible by the public, access will be blocked when not in use.

After Project construction, access routes not required for on-going maintenance of the road will be decommissioned by contouring, decompacting and trimming to encourage natural re-vegetation and will be seeded and/or planted as required. Access routes will be blocked using large boulders.

3.3.4 Temporary Construction Laydown Areas

A maximum of 15 temporary construction laydown areas totalling an estimated 86 ha (0.86 km^2) of cleared area will be established by the Project construction contractor at various locations within 500 m of the proposed all-season road ROW to store construction vehicles, machinery, construction materials and supplies, petroleum products, Portland cement, bridge and culvert components, geotextile rolls, explosives, erosion control supplies and other construction materials for the Project.

Laydown areas will be located to minimize the amount of clearing required, thereby maximizing road construction efficiency and helping to minimize overall effects on the environment, Project construction costs and schedule.

Laydown areas will be located to minimize the amount of clearing required, thereby maximizing road construction efficiency and helping to minimize overall effects on the environment, Project construction costs and schedule.

Buildings and other structures used for equipment maintenance and materials storage at laydown areas will be trucked or skidded in on the existing winter road or constructed on site. Sanitary, hazardous and solid waste storage will be provided at laydown areas and at quarry sites as required. Details regarding waste materials storage and disposal are provided in **Section 3.9**. Bulk petroleum products (diesel fuel and gasoline) will be stored in double walled tanks in accordance with the National Fire Code of Canada 2010 and the *Storage and Handling of Petroleum Products and Allied Products Regulation* of *The Dangerous Goods Handling and Transportation Act* of Manitoba.

Where laydown areas are located outside of the 60 m cleared ROW, vegetation will be cleared, stockpiled and burned (or, where feasible, provided for community use as firewood or building material). Organic

matter may be scraped from the surface and stockpiled for site reclamation purposes. Laydown areas may be contoured and levelled using dozers and graders and an aggregate base may be installed depending on operational needs and duration of use.

Following construction, temporary construction laydown areas will be decommissioned by reclaiming aggregate where feasible, contouring, decompacting and redistributing organic materials to encourage natural revegetation.

3.3.5 Quarries and Borrow Areas

New rock quarries and borrow areas will be developed to provide rock fill, crushed rock and granular materials for construction of the all-season road, as well as bridge abutments, culvert crossings, temporary access routes, construction laydown areas and construction camps. To the extent possible, the road layout and design will attempt to balance "cut and fill" quantities; however, additional fill and aggregate is known to be required from local quarries and borrow areas for Project construction.

All quarry and borrow areas will be located on provincial Crown land as close to the centerline of the proposed road alignment as possible, while adhering to work permit conditions which for other all-season road projects has required 150 m buffer between roadway and borrows. It is expected that quarry and borrow areas will be within 500 m of the road centreline to minimize the need for temporary access route development and minimize haul distance by heavy construction equipment. The estimated area of quarries and borrow areas required during the construction phase is 384 ha (3.84 km^2).

Quarry and borrow sites will be located on provincial Crown land as close to the centreline of the proposed all-season road alignment, as feasible, to minimize environmental disturbance.

Rock from quarries will be drilled, blasted, excavated, crushed and stockpiled while granular materials from borrow areas will be excavated, crushed (where necessary), screened/separated and stockpiled. The work will require the use of drill rigs, excavators, rock crushers, loaders, rock trucks and a variety of construction equipment. Blasting activities (see **Section 3.4.1.3**) will be conducted at quarries by appropriately-trained blasting crews supervised by a licenced blaster. Explosives will be stored in magazines in accordance with applicable provincial and federal safety protocols and regulations as described in **Section 3.3.9**. The extent, location and technology of crusher facilities will be determined by the Contractor's requirements and in consideration of the quantity of material needed from each specific quarry and borrow site. Preliminary estimates of quantities of aggregate and granular materials sourced from quarry and borrow areas are provided in **Section 3.4.1.8**.

While 62 potential quarry locations have been identified in the vicinity of the proposed all-season road alignment (**Figure 3-4**), only 19 quarries are expected to be required for Project construction. Geochemical testing of rock at potential quarries will be completed early in the detailed design phase of

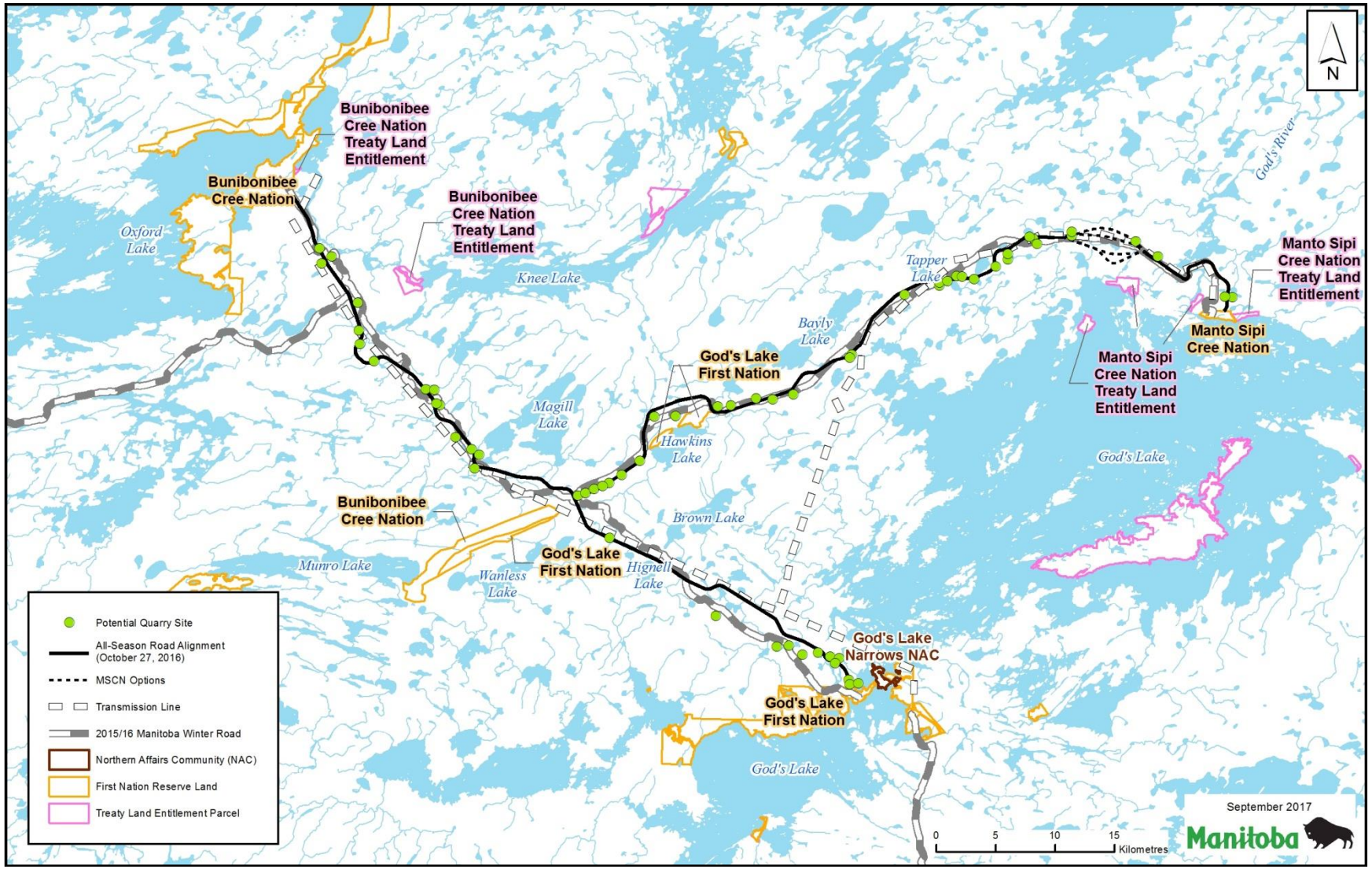


Figure 3-4: Potential construction quarry sites

the Project to assess the potential for metal leaching and acid generation from quarried rock. This information will be used in the selection of quarry sites. Additionally, Heritage Resource Impact Assessments will be completed on high and moderate heritage potential quarry locations to assess the presence of cultural materials or features. Of the estimated 19 quarries required for Project construction, up to 6 will remain open for on-going maintenance of the all-season road (approximately 60 ha of permanent quarry area and 18 ha of access to these quarry areas). Quarry sites not required for on-going maintenance of the Project will be rehabilitated as described in **Section 3.4.1.14**.

Borrow areas will be developed as needed along the road alignment as sources of clay and granular materials for use in the construction of road embankments or side slopes. Borrow areas will be excavated as uniformly as possible to the depths and widths permitted. Individual borrow areas are typically used for short periods only and will be backfilled with stockpiled organic materials and other organic debris from the right of way and contoured to blend with the existing terrain.

Vegetation at quarry sites will be cleared, stockpiled and burned or, where feasible, provided for community use as firewood or building material. Where organic soils are present, they will be scraped from the surface and stockpiled for site restoration purposes. Borrow areas will be decommissioned upon the completion of Project construction by contouring, decompacting and redistributing organic materials to encourage natural revegetation. For additional information on the decommissioning of quarry sites and borrow areas, see **Section 3.4.1.15**.

3.3.6 Water Management Infrastructure

The point of discharge of any seepage, runoff water or pumped water from any excavation will be located a minimum of 30 m from any watercourse; pumps will be discharged onto geofabric, straw bales or an alternate approved by contract administrator to dissipate the energy of the discharge.

Cofferdams are typically used to manage water and provide temporary erosion protection and sediment control by isolating work areas during in water work such as bridge construction (piers and abutments) and culvert installation. In fish bearing waters, fish salvages will be conducted to remove fish from within the isolated area. Flow in fish bearing waters will be maintained around isolated work areas either by temporary diversion or through the use of pumps. If granular coffer dams are required then silt curtains will be deployed downstream to control sedimentation.

3.3.7 Temporary Construction Camps

Temporary construction camp facilities will be established by the construction contractor at strategic locations within 500 m of the proposed road ROW to support crews constructing the Project. It is estimated that up to 6 temporary camp locations totalling approximately 96 ha (0.96 km^2) of cleared area will be established. Each camp will accommodate approximately 40 workers. Temporary camps are expected to comprise of structures for sleeping, dining, offices as well as structures for equipment storage and maintenance. Construction camps will be fenced, where necessary, and site security may be provided, where required. Electricity will be provided by diesel generators sized appropriately for the camp needs. If feasible, connection to the existing transmission line will be made to provide metered electric power

from Manitoba Hydro. Potable water will be trucked to the construction camps, as required, from existing sources in the nearby communities. Depending on availability, groundwater may be obtained, with prior approval from Manitoba Sustainable Development, from wells drilled on site and treated to comply with Manitoba standards for potable water. Sanitary and solid waste storage will be provided with waste disposal and treatment as described in **Section 3.3.8**.

Existing vegetation at temporary camp locations will be cleared, stockpiled and burned (or, where feasible, provided for community use as firewood or building material) to allow for functional temporary camp areas. Organic matter will be scraped from the surface and stockpiled for use in site reclamation purposes. The area will be contoured and levelled using dozers and graders and provided with drainage control and erosion protection. An aggregate base may be established depending on the time of year and ground conditions. A non-permeable liner to contain potential fuel spills will be used at fuel storage sites and equipment maintenance areas.

Following construction, temporary construction camps will be decommissioned by removal of temporary facilities, contouring, decompacting and redistributing organic materials to encourage natural revegetation.

3.3.8 Waste Disposal

Solid, liquid and hazardous wastes from the Project will be collected, stored, transported, disposed of and/or treated in accordance with government regulations.

Solid, liquid and hazardous wastes from the Project will be collected, stored, transported, disposed of and/or treated in accordance with *The Environment Act* (*Waste Disposal Grounds Regulation*) and *The Dangerous Goods Handling and Transportation Act* (*Dangerous Goods Handling and Transportation Regulation*, *Environmental Accident Reporting Regulation* and *Storage and Handling of Petroleum Products and Allied Products Regulation*). If contaminated soil is discovered during the life of the proposed Project, the affected site will be assessed and soil determined to be contaminated will be removed to an approved treatment site. Based on experience gained during construction of Project 1 it has been estimated that accidents and malfunctions results in approximately 4.4 m^3 of contaminated soil per km of road when including quarries, camps and laydown areas, with approximately 2.3 m^3 of contaminated soil per km of road due to road work only.

The contractor is responsible for managing wastes associated with their construction and/or maintenance contracts and is required to provide a waste management plan at the beginning of the contract, prior to work being started. Small quantities of domestic solid waste will be collected in appropriate on-site containment for transport to the closest landfill in Bunibonibee Cree Nation, Manto Sipi Cree Nation and God's Lake First Nation. If, at the time of construction, these community landfills do not meet regulatory requirements then the solid waste would be transported by winter road to the nearest licenced disposal grounds located in Thompson. Wastewater (sewage and grey water) from work camps and construction sites will be collected in approved holding tanks and will be hauled to the nearest community for disposal and treatment at the existing mechanical SBR (Sequence Batch Reactor) wastewater treatment plants

within Bunibonibee Cree Nation, Manto Sipi Cree Nation and God's Lake First Nation. MI will work with the First Nations for approval and agreements to dispose of domestic solid waste and wastewater within the community facilities. If this is not possible, waste will be stored and transported to Thompson. Waste petroleum products (ex: lubricants, oils, greases) from construction vehicles and equipment will be collected and stored in designated areas and containers until they can be removed from site for recycling or disposal through a licensed waste disposal/treatment company.

Fuel handling and storage areas will be located a minimum of 100 m from a waterbody. Fuel storage containers will incorporate secondary containment to minimize the potential for contamination in the event of an unexpected spill or container leak. Materials and equipment for the containment and recovery of accidental hazardous material spills will be available at all construction sites. Rock barricades will be placed around fuel tanks to minimize potential for construction vehicle collision with tanks. Expected fuels and hazardous materials for the proposed Project are summarized in **Table 3.3** by Project component.

Table 3.3: Expected Fuels and Hazardous Materials List

Project Components	Fuel/Materials	Purpose
All-Season Road; Temporary Access; and Quarries and Borrow Areas	Diesel	Construction equipment/vehicle fuel
	Gasoline	Construction equipment/vehicle fuel
	Propane	Construction equipment/vehicle fuel Heating trailers/structures
	Oil	Construction equipment/vehicle motor lube
	Hydraulic fluid	Construction equipment
Steel Girder Bridges; Culverts; and Temporary Construction Bridges	Diesel	Construction equipment/vehicle fuel
	Gasoline	Construction equipment/vehicle fuel
	Propane	Construction equipment/vehicle fuel Heating trailers/structures Heating under hoarding
	Oil	Construction equipment/vehicle motor lube
	Hydraulic fluid	Construction equipment
	Acetylene	Cutting steel
Temporary Construction Laydown Areas and Temporary Construction Camps	Diesel	Construction equipment/vehicle fuel Electrical generator
	Gasoline	Construction equipment/vehicle fuel
	Propane	Construction equipment/vehicle fuel Heating/cooking Heating trailers/structures
	Oil	Construction equipment/vehicle motor lube
	Hydraulic fluid	Construction equipment

Note: Volumes cannot be determined until the detail design stage.

3.3.9 Facilities for the Storage of Explosives

Explosives and initiation systems to be used for blasting activities during the construction phase will be stored in temporary, independent magazines. Magazines used for the storage of explosives will meet the federal standards and licensing requirements as specified in the *Explosives Regulation* of the federal

Explosives Act. Siting of magazines will meet the provincial standards and licensing requirements as specified in the *Operation of Mines Regulation* of *The Workplace Safety and Health Act* of Manitoba.

3.4 Project Activities

The Project activities that are expected to be carried out during the site preparation and construction, as well as operation and maintenance phases of the proposed Project are described in the following sections and summarized in **Table 3.4**.

Table 3.4: Project Activities Expected During Construction and Operation and Maintenance Project Phases

Project Component	Project Activities	
	Construction	Operation and Maintenance
All-Season Road	▪ Clearing ROW ▪ Salvaging ▪ Windrowing ▪ Burning ▪ Drilling ▪ Blasting ▪ Excavating ▪ Stockpiling ▪ Grading ▪ Contouring ▪ Filling ▪ Controlling erosion ▪ Producing aggregate ▪ Transporting equipment ▪ Operating equipment ▪ Operating machinery ▪ Operating vehicles ▪ Signing ▪ Refueling	▪ Grading ▪ Operating equipment ▪ Operating vehicles ▪ Maintaining ▪ Producing aggregate ▪ Stockpiling ▪ Controlling vegetation ▪ Controlling dust ▪ Clearing snow ▪ Inspecting
Steel Girder Multi-span Bridges	▪ Minor clearing ▪ Staging equipment ▪ Excavating ▪ Filling ▪ Drilling: testing ▪ Blasting ▪ Contouring Coffer damming ▪ Controlling erosion ▪ Operating equipment ▪ Transporting bridge materials Batching concrete ▪ Pouring concrete	▪ Maintaining ▪ Inspecting
Culvert Stream Crossings/ Drainage Equalization Culverts	▪ Coffer damming ▪ Excavating ▪ Filling ▪ Contouring ▪ Controlling erosion ▪ Restoring	▪ Maintaining ▪ Inspecting ▪ Steaming ▪ Cleaning
Temporary Crossings over Watercourses	▪ Minor clearing ▪ Excavating ▪ Filling ▪ Contouring ▪ Coffer damming ▪ Controlling erosion ▪ Crossing stream ▪ Operating equipment ▪ Transporting materials ▪ Dismantling ▪ Recycling materials ▪ Removing abutments ▪ Restoring	▪ Testing for contamination ▪ Inspecting
Temporary Access Routes	▪ Clearing ▪ Grubbing (only for quarries and temporary camps) ▪ Grading ▪ Gravelling ▪ Closing ▪ Restoring ▪ Demobilizing	▪ Inspecting
Temporary Construction Laydown Areas	▪ Clearing ▪ Stockpiling materials ▪ Operating equipment ▪ Storing fuels ▪ Dispensing fuels ▪ Storing explosives ▪ Demobilizing ▪ Restoring	▪ Testing for contamination ▪ Inspecting
Temporary Construction Camps	▪ Clearing ▪ Operating equipment ▪ Operating generator ▪ Housing workers ▪ Storing foods ▪ Sourcing water ▪ Disposing solid wastes ▪ Disposing liquid wastes ▪ Demobilizing ▪ Drilling ▪ Testing soil ▪ Restoring	▪ Testing for contamination ▪ Inspecting

Project Component	Project Activities	
	Construction	Operation and Maintenance
Quarries and Borrow Areas	▪ Clearing ▪ Grubbing ▪ Excavating ▪ Stockpiling soils ▪ Blasting ▪ Crushing rock ▪ Stockpiling rock ▪ Operating equipment ▪ Transporting materials ▪ Closing ▪ Restoring	▪ Testing for contamination ▪ Inspecting For those retained ▪ Operating equipment ▪ Operating vehicles ▪ Maintaining ▪ Producing aggregate ▪ Stockpiling

3.4.1 Site Preparation and Construction

3.4.1.1 Surveys for Clearance Width

Quarry and borrow areas, temporary access routes, construction staging areas and construction camps and the 60 m wide clearing will be surveyed and flagged to mark the extent of clearing after the locations are determined during detailed design. Field surveys will be completed by MI staff.

3.4.1.2 Vegetation and Surface Soil Clearance

ROW clearing for Project construction will generally be 60 m wide (ex: **Photograph 3-5**), will be conducted in accordance with regulatory requirements and applicable forest management guidelines (Government of Manitoba 2017b) and will be contracted out under a competitive tendering process. ROW clearing will consist of the removal and disposal of trees, shrubs, fallen timber and surface litter from the ROW and other areas such as borrow pits, prior to grading. Organic materials stripped from the surface will be stockpiled for use on road shoulders or placed in berms along edges of the cleared ROW. Materials such as logs or timber suitable for manufacturing forest products will be salvaged for community use, where feasible. Where required, stumps and roots will be grubbed out and separated from the soil. The non-salvageable material such as brush, roots and limbs will be piled and burned or buried.



(**Source**: East Side Road Authority)

Photograph 3-5: Typical All-Season Road 60 Metre-Wide Right-of-Way Clearing for Construction

3.4.1.3 Blasting

Blasting of rock will occur at quarries (**Section 3.3.5**) and, as required, at specific locations in association with road and bridge construction throughout the length of the project. Contractors will be required to store, handle and transport explosives in compliance with relevant provincial and federal legislation, best practices and guidelines for safety and environmental protection. To the extent possible, the timing of blasting activities will consider area-specific environmental sensitivities (such as critical life stages of local fish, birds, and wildlife, or periods of traditional land use) as identified by Traditional Knowledge information, Indigenous and Public Engagement Program and Sustainable Development during various phases of the project including baseline studies, licencing, preconstruction, and ongoing engagement with local communities and regulators. The frequency of blasts will ultimately be at the discretion of the contractor based on construction timelines, aggregate requirements, physical conditions of the geography, and availability of supplies provided timing restrictions placed on them by MI and/or regulators are complied with. Communities are to be informed (through local radio and or posted material in the community) by the contractor prior to carrying out quarry operations in areas where they are likely to be present or to collect country foods or medicinal plants.

Blasting and quarrying is a highly regulated activity requiring authorization and / or certification from a number of government agencies to minimize effects to people and the environment. Environmental procedures relating to blasting and quarrying can be found in EP12, EP14, and EP20 (Appendix 8-2).

3.4.1.4 Bridge Construction

There are four basic activities associated with bridge construction that include:

- construction of land-based footings and abutments and in-water piers using reinforced concrete
- steel girder placement across the span of the bridge
- bridge deck construction using reinforced concrete
- establishment of a gravel surface on the bridge deck

A concrete batch plant will be established in close proximity to each bridge crossing location to produce concrete for the bridge abutments, piers and deck. Heavy equipment required for bridge construction will include loaders, excavators, dump trucks, dozers, hoisting equipment, pump trucks, concrete trucks and compactors. Temporary erosion protection and sediment control measures such as cofferdams are included in typical bridge construction activities as are more permanent measures such as riprap placement. Bridge construction activities will also include site restoration activities such as natural re-vegetation and seeding and/or planting, as required by substantial and total performance inspections that are performed prior to close out of each construction contact and or post construction inspection.

3.4.1.5 Culvert Installation

Culverts will be installed along the road embankments at 23 fish-bearing stream crossings and 28 non-fish bearing drainage channels and to facilitate drainage/prevent flooding in low lying areas and maintain hydraulic function at fen/bog locations. In addition, approximately 429 drainage equalization culverts will be installed along road embankments where there is no defined drainage channel. Typical stream crossing culvert installation activities will include placing silt fencing, turbidity curtains or installing cofferdams to isolate the work area, excavating the stream bottom, laying geotextile material, installing the culvert and placing and compacting granular fill and road topping. Culverts will be installed and embedded so that post-construction settlement of fill will result in a level profile. Riprap will be placed at the entrance and exit of the culverts to control erosion and provide habitat diversity for fish and aquatic invertebrates. Temporary erosion protection and sediment control measures (**Appendices 3-3** and **3-4**), including the installation and removal of cofferdams to isolate the work area as required (ex: at fish-bearing watercourse crossings), will be utilized during construction. Following installation of culverts, the culvert sites will be rehabilitated by natural re-vegetation and seeding and/or planting with native species, as required. Seeding and/or planting may also be undertaken at locations vulnerable to erosion and sedimentation, as required. Requirements for seeding will be identified by substantial and total performance inspections that are required to close out individual construction contracts. Refer to **Sections 3.3.2.2** and **3.3.2.3** for further description of culvert components.

3.4.1.6 Construction of Roadbed

Road construction activities will be used to construct the road fill, bed and surface. This process will consist of four sub-activities including:

- top soil stripping, if required

- unsuitable soil removal
- installation of geotechnical materials where appropriate
- rock and granular placement and compaction
- trimming and shaping

Photograph 3-6 illustrates typical road construction activities.



(**Source**: East Side Road Authority)

Photograph 3-6: Typical Road Construction along an All-Season Road Right-of-Way

3.4.1.7 Alterations to Linked Roadways

The all-season road will connect to an existing on-reserve access road at the Bunibonibee Cree Nation boundary, whereas on-reserve access roads will need to be constructed separately in Manto Sipi Cree Nation and God's Lake First Nation to connect to the all-season road that will terminate at the reserve boundaries. Connecting community infrastructure to the all season road will be the responsibility of the First Nation as the work will occur on Federal Reserve land, although MI will provide technical advice if requested. These on-reserve works will require approval through the Indigenous and Northern Affairs Canada Environmental Review Process. The connecting on-reserve access roads will likely have similar roadway and intersection design standards, with an 8.4 m road-top and suitable road structure for connection with the proposed all-season road.

3.4.1.8 Construction and Borrow Materials

Construction materials anticipated to be used for the proposed Project are listed in **Table 3.5** by Project component.

Table 3.5: Expected Construction Materials List

Project Components	Construction Materials	Use
All-Season Road	Crushed rock Granular materials Clay Riprap Geotextile Organic materials	Road bed Road bed Road bed Erosion protection Liner Side slope cap
Permanent Bridges	Steel Concrete Granular materials Organic materials Riprap	Girders/abutments Abutments/bridge bed Abutments Shoulder/reclamation Erosion protection
Culverts	Steel (or other culverts) Riprap Geotextile Crushed rock Granular materials Organic materials	Water passage Erosion protection Liner Road bed Embedding Reclamation
Temporary Crossings over Watercourses	Steel Concrete Pressure treated wood Granular materials Organic materials	Girders Abutments Bridge bed Abutments Shoulder/reclamation
Temporary Access	Granular materials Geotextile Organic soil	Road bed Liner Reclamation
Temporary Construction Laydown Areas	Granular materials Organic soil	Site pad Reclamation
Temporary Construction Camps	Granular materials Wood Metal Organic materials	Site pad Construction Construction Reclamation
Quarries and Borrow Areas	Crushed rock Granular materials Organic materials	Reclamation Reclamation Reclamation

Various quantities of raw materials will be required in the construction of the proposed Project. Raw materials will be locally-sourced and obtained on provincial Crown land, as required (ex: quarries and borrow pits). **Table 3.6** indicates the type of raw materials and estimated quantities required for construction of the Project.

Table 3.6: Estimated Quantities of Raw Materials Required for Project Construction

Raw Material Required	Estimated Quantity	Unit
All-Season Road		
Composite Excavation[a]	750,000	m^3
Solid Rock Excavation[b]	5,400,000	m^3
TG Class[d]	176,000	m^3
Quarried Rock Base Course[c]	294,000	m^3
Quarried Rock Base Course[d]	1,000,000	m^3
Rock Fill[c]	TBD	m^3
Stone Riprap[c] Class 350	12,000	m^3
Access Routes		
Composite Excavation*	13,000	m^3
Solid Rock Excavation**	184,000	m^3
TG Class[d]	9,000	m^3
Quarried Rock Base Course[c]	14,000	m^3
Quarried Rock Base Course[d]	50,000	m^3
Rock Fill	TBD	m^3
Stone Riprap Class 350	TBD	m^3

Note: a Existing suitable composite material from areas above the road bed elevation, ditches and within the 100 m ROW will be used.
b Estimate based on approximately 27,000 m^3 of solid rock required per kilometre of road.
c Riprap quantities are described in square metres (m^2). Estimate based on approximately 25 m^2 per culvert for approximately 480 culverts.
d Excludes estimate for the four bridge crossings (to be determined).

3.4.1.9 Water Diversion

Cofferdams will be used to isolating work areas during in water work such as bridge construction (piers and abutments) and culvert installation. Flow in fish bearing waters will be maintained around isolated work areas either by temporary diversion or through the use of pumps. Additional temporary erosion protection and sediment control measures such as silt fences and turbidity curtains will be used in accordance with the Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat (Fisheries and Oceans Canada and Manitoba Natural Resources 1996). Drawings showing the typical installation of cofferdams and erosion and sediment control measures are provided in **Appendices 3-3** and **3-4**.

3.4.1.10 Equipment Requirements

Construction equipment and vehicles likely to be used during construction of the proposed Project are listed in **Table 3.7**. A variety of rubber-tired and tracked equipment and vehicles will be used during construction of the proposed all-season road and other Project components. The types and numbers of equipment and vehicles to be used during the construction of the proposed Project cannot be determined at this time as the type and quantity of equipment will be depend on the number and size of individual construction contracts.

Table 3.7: Expected Construction Equipment and Vehicles Used for Project Components

Project Components	Equipment / Vehicle		
All-Season Road	Tree feller bunchers Logging trucks Dozers Flatbed trucks Rock/Dump Trucks	Excavators Packers Pick-up trucks Fuel trucks/trailers Loaders	Hand tools Snow-clearing equipment Graders Sprayers
Steel Girder Bridges	Flatbed trucks Cranes Drill rigs Blast trucks Excavators	Loaders Graders Dozers Back hoe Rock/Dump trucks	Fuel truck/trailers Concrete batch plants Concrete trucks Pick-up trucks Hand tools
Culvert Stream Crossings/Drainage Equalization Culverts	Excavators Pick-up trucks	Rock/Dump trucks Flatbed trucks	Graders Loaders
Temporary Crossings over Watercourses	Flatbed trucks Excavators Loaders	Dozers Graders Rock/Dump trucks	Pick-up trucks Hand tools Cranes
Temporary Access	Tree feller bunchers Hand tools Loaders	Dozers Rock/Dump trucks	Graders Pick-up trucks
Temporary Construction Laydown Areas	Semi-trailers Excavators Flatbed trucks Loaders	Fuel trucks Generators Dozers Rock/Dump trucks	Tree feller bunchers Graders Pick-up trucks Hand tools
Temporary Construction Camps	Excavators Flatbed trucks Fuel trucks Loaders	All-terrain vehicles Dozers Graders Rock/Dump trucks	Tree feller bunchers Pick-up trucks Hand tools Generators
Quarries and Borrow Areas	Drill rigs Excavators Rock crushers Blast trucks (explosives transportation)	Dozers Loaders Rock/Dump trucks Flatbed trucks	Tree feller bunchers Graders Pick-up trucks Generators

Note: An estimate of the quantity of equipment cannot be determined until the detail design stage.

3.4.1.11 Atmospheric Emissions

During construction, atmospheric emissions, including greenhouse gases, will predominantly be the result of combustion emissions from the construction vehicles, equipment and machinery used in the proposed Project. These will include sulphur dioxide, nitrous oxides, carbon dioxide and particulate matter. Localized atmospheric emissions may occur, including dust from construction activities such as clearing and particulate matter as a result of burning brush piles from clearing of the ROW. This will be reduced because the communities of Manto Sipi Cree Nation, Bunibonibee Cree Nation and God's Lake First Nation

will have access to salvageable wood before burning wood waste. Other localized emissions include blasting residue at quarries or at work sites along the all-season road (such as levelling construction camps or high rock points along the alignment). During the assumed 8 year construction period for the Project an estimated 138,300 tonnes of Carbon Dioxide equivalency (CO_2e) will be emitted (Dillon Consulting Ltd. 2017). Refer to **Section 6.2.1** for further details of atmospheric emissions.

3.4.1.12 Liquid Discharges

There are no processing streams that would result in liquid discharges, however, accidental releases and unplanned discharges of liquids may occur associated with construction and operation activities such as concrete batch plants, camps, laydown areas and operation of machinery and construction equipment. Septage waste at construction camps or work sites is noted in **Section 3.3.8**.

3.4.1.13 Construction of Ancillary Facilities

Buildings at the construction camps for sleeping, dining and offices, as well as other structures such as garages used for equipment maintenance and materials storage at laydown areas will be trucked or skidded in on the existing winter road or constructed on site.

3.4.1.14 Number and Transportation of Employees

Construction will be carried out under contracts tendered and managed by MI. Presently, the number and scope of the contracts to support the construction of the proposed Project are not fully known. It is anticipated that multiple contractors will be engaged concurrently on the Project and as per MI's Project Management Agreement. During the period of peak construction on the proposed Project, an estimated maximum workforce of 120 is anticipated. As part of MI's commitment to local residents participating in and benefiting from the Project, MI specifically includes a requirement for a percentage of the construction tenders to be supplied from local content (ex: equipment, services or employment). The percentage of community involvement is modified for each contract based on discussions with the community to identify and confirm its capacity to deliver equipment, services and or manpower, which is converted to a dollar figure and becomes a percentage of the entire project. Presently, the Project P1 all-season road that is being constructed has an estimated First Nation workforce of 80%.

During the initial construction phase of the Project, it is expected that non-local contractor employees, contract administration staff and MI staff will travel to the Project site by air and/or winter road. As each segment of the Project is completed, the completed all-season road segments will provide access for employees to the construction site of the next road segment. It is anticipated that employees from local communities will either commute to the site or reside in temporary construction camps and employees who are not from local communities will use local accommodations (ex: lodges) or reside in contractor-provided accommodations.

3.4.1.15 Closure of Temporary Components

Facilities and work areas including quarry and borrow areas, access routes, laydown areas and construction camps that will not be needed for future Project maintenance activities will be decommissioned following construction.

Stockpiles of organic soils and other material will be used as fill and capped, where required, for borrow area rehabilitation. Side slopes will be maintained at a slope of 4:1 unless otherwise permitted. Quarries will undergo a two-stage rehabilitation process.

Facilities and work areas including quarry and borrow areas, access routes, laydown areas and construction camps that will not be needed for future Project maintenance activities will be demobilized and sites rehabilitated after construction.

- Site cleanup, including the removal of waste and contaminated soils, if present, as well as establishment of rock tiers (benches) into the quarries to reduce the steepness of the quarry walls and depth.
- Additional quarry rehabilitation by the Manitoba Department of Mineral Resources through Manitoba's Pits and Quarry Rehabilitation Program under *The Mines and Minerals Act* if required after quarry inspection by the Department.

Access routes to quarries not required for on-going maintenance of the road will be blocked with boulders to discourage access and encourage regrowth of vegetation. Where organic materials were stripped to develop temporary access routes, they will be redistributed and seeded likely using the boreal mix identified in MI's Native Revegetation Program (**Appendix 3-5**).

Closure of temporary construction work areas will involve levelling and trimming the areas to encourage natural re-vegetation. Organic materials stripped from the areas will be redistributed to encourage natural regeneration of the area. Seeding following MI's Native Revegetation Program for boreal areas (**Appendix 3-5**) will be done as required on disturbed lands such as in areas vulnerable to erosion and sedimentation.

3.4.1.16 Facilities for the Storage of Explosives

Explosives and initiation systems to be used for blasting activities during the construction phase will be stored in temporary, independent magazines. Siting of magazines will meet the provincial standards and licensing requirements as specified in the *Operation of Mines Regulation* of *The Workplace Safety and Health Act* of Manitoba. Explosives magazines will be situated in reasonably close proximity to blasting sites to minimize transportation distance. Magazines used for the storage of explosives will meet the federal standards and licensing requirements as specified in the *Explosives Regulation* of the federal *Explosives Act*.

3.4.2 Operation

3.4.2.1 Equipment Requirements

During operation and maintenance activities, the type of equipment and vehicles that will typically be required include; excavators, graders, snow plows, sprayer trucks, pick-up trucks, tractors, riding mowers and weed-eaters. MI Northern Airports and Marine Operations currently have maintenance facilities, for the storage of equipment, at the airports in each of the communities. Likewise, MI Remote Road Operations, Winter Road Program currently has a maintenance facility at the God's Lake Airport. If additional equipment is required to be stored in the area the quarry or construction camp closest to each community could be retained as a maintenance yard. The specific use of the equipment for the project components is outlined in more detail in the following sub-sections.

3.4.2.2 Water Management

Ditch maintenance will be carried out on an on-going basis to maintain drainage to original design standards and as a means to prevent sub-grade saturation and erosion. This activity will consist of excavating, filling, trimming and shaping to maintain required roadside ditch profiles including ditch slopes, inverts and the functioning of riprap areas. Work will typically occur in summer or fall. Ditch maintenance activities will also include the removal of sediment and debris from culverts inlets and outlets, where conveyance may be impeded. Water management may also included pumping water around an area if required during ditch maintenance.

MI implements a Nuisance Beaver Management Program (NBMP) as part of the maintenance program as a supplementary measure where standard beaver control structures, such as beaver cones, are ineffective at reducing the risk of road washout. The NBMP, as described in **Appendix 3-6**, includes measures for removal of nuisance beaver as well as for the removal of beaver dams and intends to involve local trappers to assist MI staff in road maintenance activities within their registered trap line areas.

3.4.2.3 Snow Clearing

Plowing snow from the road surface will be undertaken on an as required basis with motor graders, truck plows or rotary plows. Transporting and stockpiling of plowed snow is not anticipated.

3.4.2.4 General Road Maintenance

Grading of the finished road surface will be an on-going maintenance activity to promote a safe and reliable all-season road. As necessary, washout repair will be completed in the event that the road sub-grade, surface, shoulders or culverts are damaged by flooding, erosion, or debris. These repairs will be undertaken as soon as possible and as soon as conditions permit safe site access. Traffic controls may be required to provide safe travelling alternatives until repairs can be completed.

Required road repairs will be undertaken as soon as possible and as soon as conditions permit safe site access.

Dust control products approved by MI are water, (38%, 35%, 34%, 30%) Calcium Magnesium Chloride, 77% Flake Calcium/Magnesium Chloride, (32.6%, 30.3%, 28%) Magnesium Chloride, and Lignosulfonate. During construction water will be the main control agent to improve visibility and reduce potential health concerns. It is also the least expensive option and will be extracted from local waterbodies utilizing proper fish screens when extraction is from fish bearing waters. During operation, water will also be the preferred option due to the remoteness of the project and shipping and storage costs for the other products. Product may be applied to intersections or near dwellings (if any should be built near the road) where needed for safety.

A minimum amount of product will be used to control dust and prevent it from moving beyond the project footprint minimizing risk associated with dust affecting soils, surface waters, vegetation, wildlife, and human health. If/when used, chemicals such as magnesium chloride will not be applied within 100 m of a stream crossing or beyond the road surface and are not expected to have any negative effects on soils, surface water, vegetation, animal health, or human health.

Environmental procedures relating to blasting and quarrying can be found in EP18 (Appendix 8-2).

Mowing of short vegetation (ex: grasses) on road shoulders will occur during the summer months to improve visibility for driver safety and control noxious weeds while native vegetation becomes established. Generally, mowing will be completed within 4.5 to 9 m of the road surface. Various types of mowing equipment will be used including tractors, riding mowers and weed-eaters.

The removal of brush and small trees growing in the road ROW will be completed by mechanical brushing in late summer/fall to improve or maintain driver sight lines, maintain proper drainage and to reduce the cost of snow removal. The majority of mechanical brushing will take place in areas of abundant tree growth or where conventional mowing equipment cannot access ditch slopes due to rock outcrops or wetland areas.

The boreal mix identified in MI's Native Revegetation Program (**Appendix 3-5**) will be used in the disturbed area of the proposed road ROW to stabilize disturbed soils and minimize erosion. Where tree and/or shrub planting is required to adequately rehabilitate temporarily disturbed sites in sensitive areas, locally-appropriate native species will be used.

3.4.2.5 Bridge and Culvert Maintenance Activities

Seasonal inspections of culverts and bridge crossings will be conducted to assess the potential build-up of debris caught on piers or at the inlets of culverts to prevent upstream flooding, reduce stress on the structure and allow for fish passage. Annual inspections will typically occur in summer but may occur in fall or spring as well as following heavy run-off events to confirm their condition and proper function. Observations from local communities will be obtained through an ongoing Indigenous and Public Engagement Program extending beyond the assessment process. Erosion control techniques (ex: riprap) will be implemented, if necessary. As required, maintenance crew will be dispatched to locations where the accumulation of debris represents a potential risk to the structure or the environment. Bridge and

culvert maintenance and erosion control activities will be undertaken in accordance with Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat (Fisheries and Oceans Canada and Manitoba Natural Resources 1996).

3.4.2.6 Atmospheric Emissions

During operation, localized atmospheric emissions can be expected due to similar combustion emissions from vehicle traffic and road maintenance activities as well as generation of airborne dust by traffic. The amount of combustion emissions due to road traffic will increase from the current situation, since there will be year round vehicle traffic instead of only during the winter road season and a shift from air traffic to vehicular travel. Emissions from air traffic, however, are anticipated to decrease by approximately 10% and will cease entirely from annual winter road construction due to the all-season road access. During the first 10 years of operation an estimated 23,690 tonnes of CO_2e will be emitted (Dillon Consulting Ltd. 2017). Refer to **Section 6.2.1** for further details of atmospheric emissions.

3.4.2.7 Facilities for the Storage of Explosives

Drilling and blasting of rock, requiring the use of explosives during operation activities, would only be required on an infrequent basis when additional aggregate materials are required for maintenance activities. Therefore a permanent facility for the storage of explosives will not be required. In the event that explosives are required then they would be handled and stored on a temporary basis as described in **Section 3.4.1.16**.

3.4.2.8 Aggregate Materials Handling and Storage

Aggregate material will be required during operation for road maintenance activities such as topping the road and washout repair. Up to 6 quarries established during construction will remain open for on-going maintenance of the all-season road. Surplus aggregate materials, processed during construction as described in **Section 3.3.5**, will be stockpiled at the 6 permanent quarry areas for usage during maintenance activities. When additional aggregate materials are required in the future then they would be drilled, blasted, crushed and sorted in the same manner as described in **Section 3.3.5** along with any additional geochemical testing, if required, to assess the potential for metal leaching and acid generation from quarried rock. It is expected that 5/8" traffic gravel will be applied in late spring/early summer annually at a rate of approximately 75 to 100 m^3 per km. Dependent on winter conditions, a mixture of sand and salt (19:1) will be applied at a rate sufficient to improve traction in dangerous area.

3.4.2.9 Characterization and Management of Overburden

The surficial geology of the area includes silt till deposits and glacial deposits of clay, silt, sand and minor gravel **(Chapter 6, Section 6.1.3)**. If any sand and gravel overburden materials are required for maintenance activities, in addition to the aggregate materials, or if a new quarry area needs to be established then geochemical testing would be conducted to assess the potential for metal leaching and

acid generation from the overburden materials. The processing, handling and storage of these materials would be completed the same as described in **Section 3.3.5**.

3.4.2.10 Storage and Handling of Hazardous Materials

Hazardous materials will be stored and handled in accordance with *The Dangerous Goods Handling and Transportation Act (Dangerous Goods Handling and Transportation Regulation, Environmental Accident Reporting Regulation and Storage and Handling of Petroleum Products and Allied Products Regulation*). It is expected that a maintenance yard would require up to 20,000 L of diesel storage (in double walled, above ground tanks) and a smaller quantity gasoline. Cleaners, lubricant, paints and engine fluids would also be required and would be stored in appropriate secondary containment and / or fire cabinets as required. Additionally, used oil and other waste products generated by maintenance equipment will be stored in appropriate containers with secondary containment until such time as it can be transported to a licenced facility for disposal and/or recycling.

3.4.2.11 Use of Ancillary Facilities

A maintenance yard would be required to service the newly constructed road unless the maintenance work is completed by a local contractor from the communities. The maintenance yard, if required, would consist of a heated shop equipment shed, for equipment and tool storage as well as maintenance and repairs of equipment. Additionally there would be a requirement for an office with washroom facilities and lunchroom and potentially accommodations for non-local staff. A fenced yard for storage of seasonal machinery, materials such as culverts and large machine parts (ex: grader blades, loader buckets) would be attached to these facilities.

The site would require a well (if no municipal water source exists) and septic tank. Domestic garbage will be disposed of at the nearest authorized waste disposal facility and septic waste will be transported to the nearest water treatment plant.

The location of the maintenance yard would typically be central, however, there is currently a winter roads maintenance yard in God's Lake Narrows with all of these facilities in place that could be repurposed for maintenance of the all season road.

3.4.2.12 Number and Transportation of Employees

Typical staff complements would require 4 persons to maintain 141 km of road. These could be permanent staff employed by MI, or contract workers employed by a local contractor fulfilling a service agreement or bid hourly contract. Additional contract workers (6 to 10) would be required for producing new aggregate and camp facilities may be required if the contractor is not local. Transport to site would use the winter road network or scheduled flights to the communities and the all season road among the communities.

3.5 Project Schedule

Detailed design is anticipated to begin in 2020 (Year 1) and take approximately 3 years to complete, once all appropriate approvals have been obtained. Construction of the proposed Project is estimated to start in 2030 (Year 11) following detailed design and be completed approximately 8 years thereafter (Year 18). Scheduling of Project components and activities will be determined upon tendering of individual construction contracts; however, assuming all approvals have been obtained by 2020 an approximation of the schedule is summarized in **Table 3.8**. Estimated construction schedules are based on current Provincial budgets and funding allocations. Should additional funding be acquired or allocated for the project, construction schedule could be advanced. Activities will occur throughout the year except where not permitted to do so by legislation or Environmental Protection Specifications included in construction contracts (ex. conducting construction activities in fish bearing waters will not permitted during spawning window unless approved by Department of Fisheries and Oceans Canada).

Table 3.8: Planned Project Schedule

Project Components	Project Phase / Activity	Start Date	Completion Date
All-Season Road	Planning/Design Construction Operation/Maintenance	Year 1 Year 11 Year 18	Year 3 Year 18 On-going
Steel Girder Bridges	Planning/Design Construction Operation/Maintenance	Year 1 Year 12 Year 18	Year 5 To be determined On-going
Culvert Stream Crossings / Drainage Equalization Culverts	Planning/Design Construction Operation/Maintenance	Year 1 Year 11 Year 18	Year 5 Year 18 On-going
Temporary Access Routes	Planning/Design Construction Decommissioning	Year 1 Year 11 Year 13	Year 5 Year 18 On-going through to Year 18
Temporary Construction Laydown Areas	Planning/Design Construction Decommissioning	Year 1 Year 11 Year 13	Year 5 Year 18 On-going through to Year 18
Temporary Construction Camps	Planning/Design Construction Decommissioning	Year 1 Year 11 Year 13	Year 5 On-going through to Year 18 Year 18
Quarries and Borrow Areas	Planning/Design Construction Operation/Maintenance Decommissioning of construction phase quarries and borrow areas	Year 1 Year 11 Year 12 Year 13	Year 5 On-going through to Year 18 On-going for those quarries retained for Project maintenance On-going through to Year 18

3.6 Project Funding

The source of funding for construction and operation of the proposed Project is the Manitoba Government.

CHAPTER 3 APPENDICES

Appendix 3-1:
Manitoba Infrastructure Geometric Design Criteria and Typical Cross Section Drawings

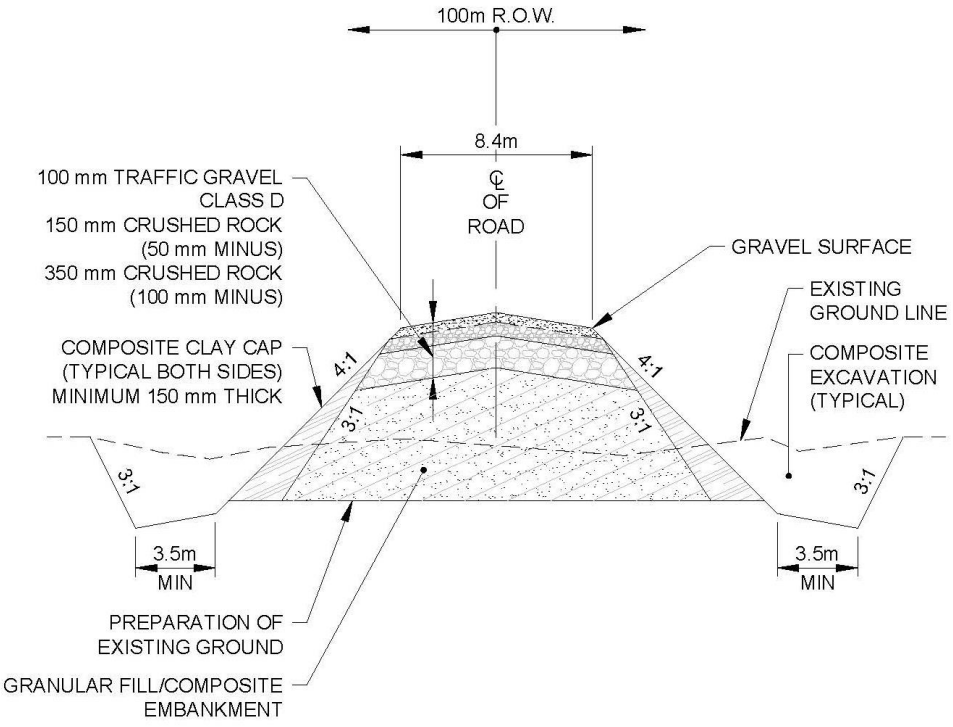
MANITOBA INFRASTRUCTURE
GEOMETRIC DESIGN CRITERIA

	Present Conditions	Project Design Standards
Year	2017	2026
Average Annual Daily Traffic	N/A	< 300 vehicles per day
Highway Classification	N/A	Collector, Rolling
Design Speed	N/A	90 km/hr
Posted Speed	N/A	70 km/h (may vary in certain locations)
Gradient – Maximum Percentage	N/A	7%
Minimum Stopping Sight Distance	N/A	170m
Minimum Passing Sight Distance	N/A	620m
Minimum Vertical Curve "K" Values	N/A	K_c 55 K_s 40
Curvature – Minimum Radius	N/A	340m
Maximum Super elevation	N/A	6%
Lane Width & Number	N/A	8.4m Top Width - 2 lanes at 4.2m each
Shoulder Width – New Construction	N/A	N/A
Shoulder Edge Treatment	N/A	N/A
Median Width	N/A	N/A
Right-Of-Way Width	N/A	100m, 60m cleared (50m)
Truck Percentage	N/A	Assume 10%
Truck Haul (Identify Type)	N/A	Supply / Forest Products
Roadbed Width	N/A	See x-sections on Sheet 2 & 3
Clear Roadway Width on Bridges	N/A	9.6

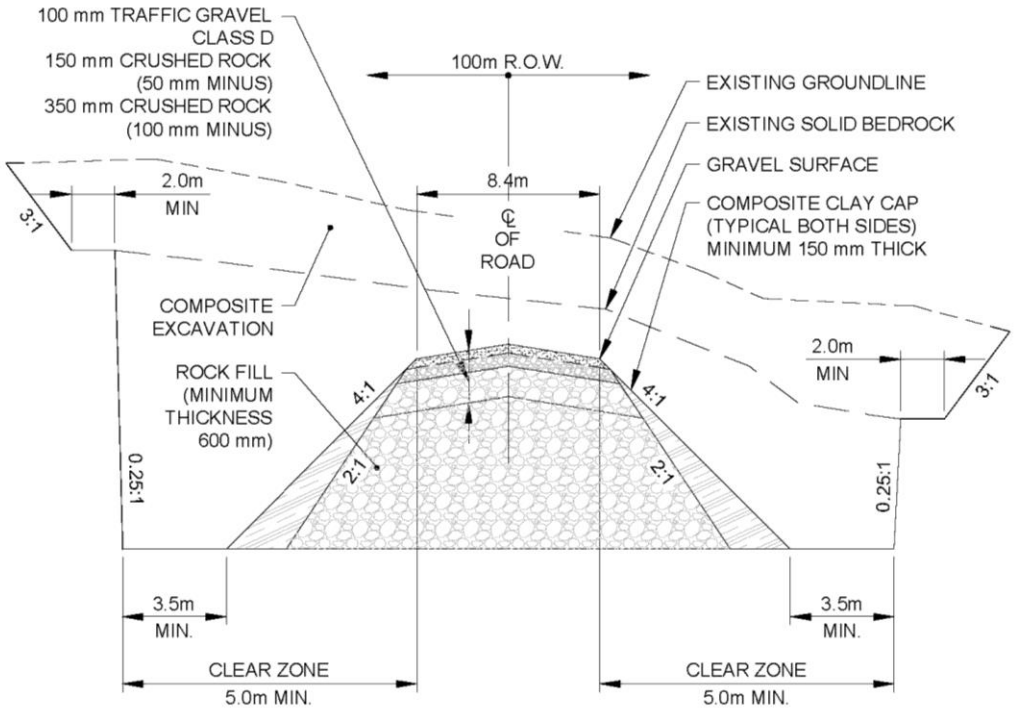
Notes:

1. For Project Design Standards that differ from the Basic Design Standards identified in Table 1.3.2.1M of the Manitoba Infrastructure (MI) TAC Geometric Design Guide Supplement, the Basic Design Standards are entered in brackets to the right of the Project Design Standards
2. Proposed highway loading class is B1 (Unrestricted), which is the Provincial Standard for gravel PR's and has been applied to other projects on the East Side Road Network. Due to the intended use of this roadway, seasonal permits for increased loading will likely be required
3. Traffic Volume (AADT)
    a. Present - N/A (2017)
    b. Growth Rate – N/A
    c. Future (10 Year) - <300 vehicles per day
4. Terrain Type (Flat, Rolling or Rugged) – Rolling
5. The geometric design criteria and highway loading class are based on a Rural Collector Highway Classification with a rolling terrain and a gravel surface. The roadway cross sections provide an 8.4 m wide roadway (top width) with two undivided lanes to accommodate the projected low traffic volumes (< 300 vehicles per day)
6. Roadway Structure Design – 350mm (100mm minus crushed rock), 150mm (50mm minus crushed rock), 100 mm (Traffic Gravel, Class D)
7. Proposed right-of-way width of 100 m (60 m cleared) is greater than the Basic Design Standard of 50 m for a Rural Collector (Rolling Terrain), the additional right-of-way is typical for other sections of the East Side Road Network
8. All intersection/access points to be studied to determine possible improvements/rationalization
9. This GDC is to be reviewed prior to construction if 5 years have elapsed since its approval to ensure its appropriateness
10. Regionally approved GDC's to be forwarded to Highway Planning and Design for filing

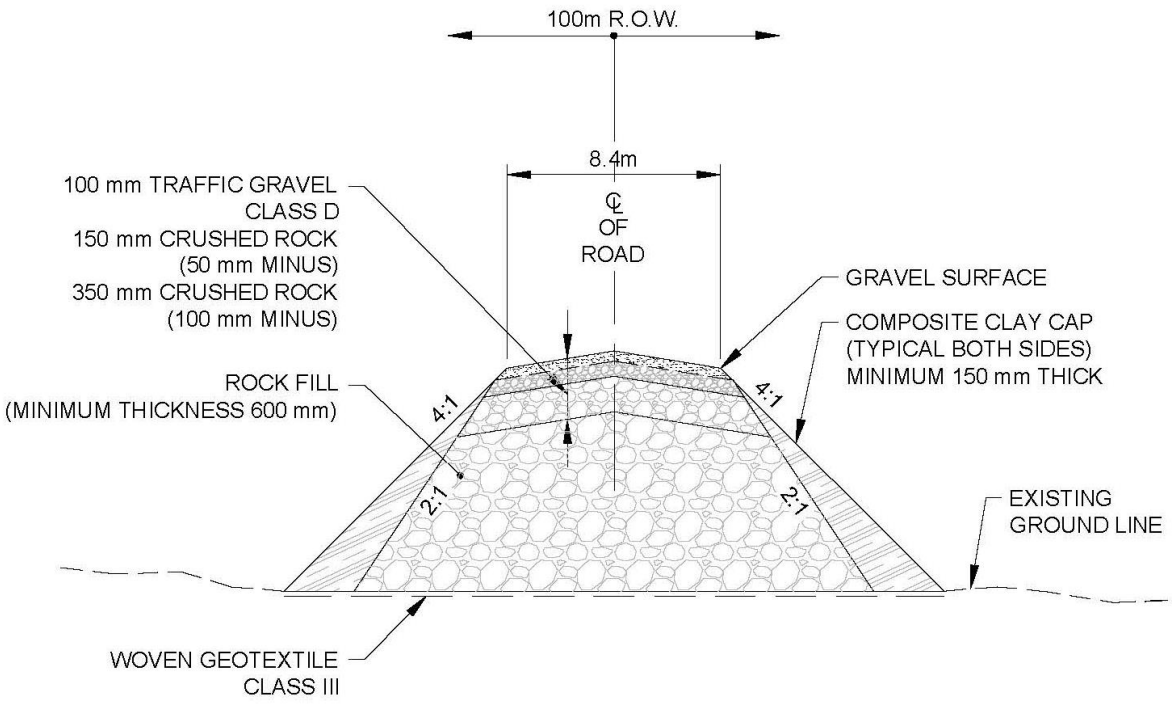
CROSS SECTIONS



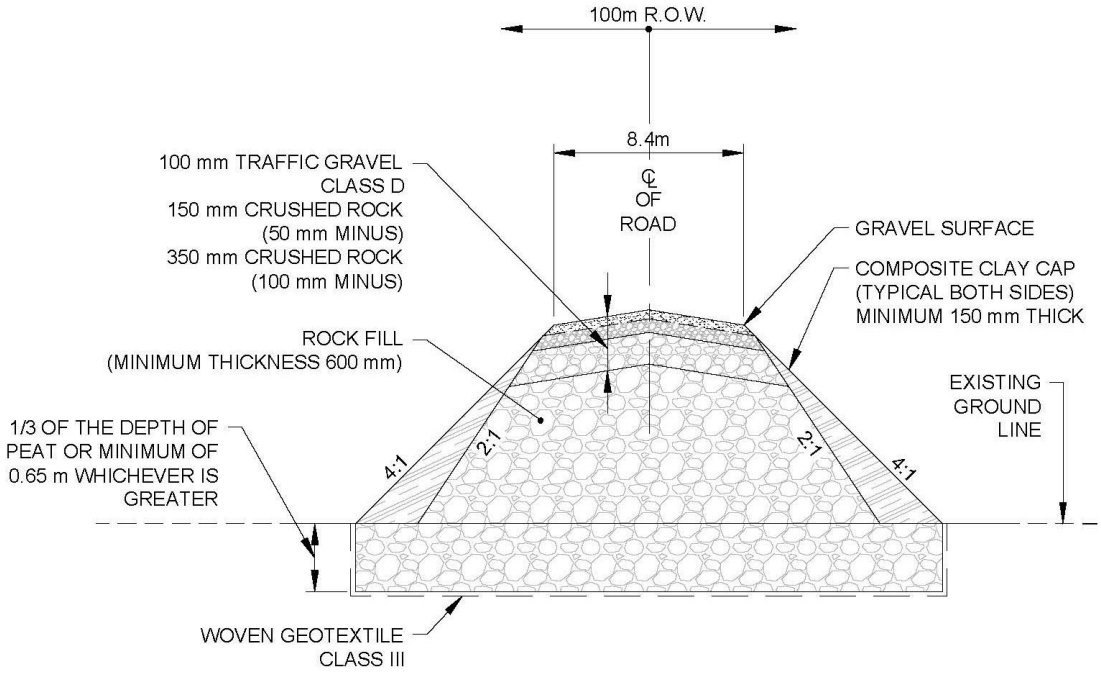
Typical Cross Section on Clay/Granular Substrate



Typical Cross Section on Rock Substrate



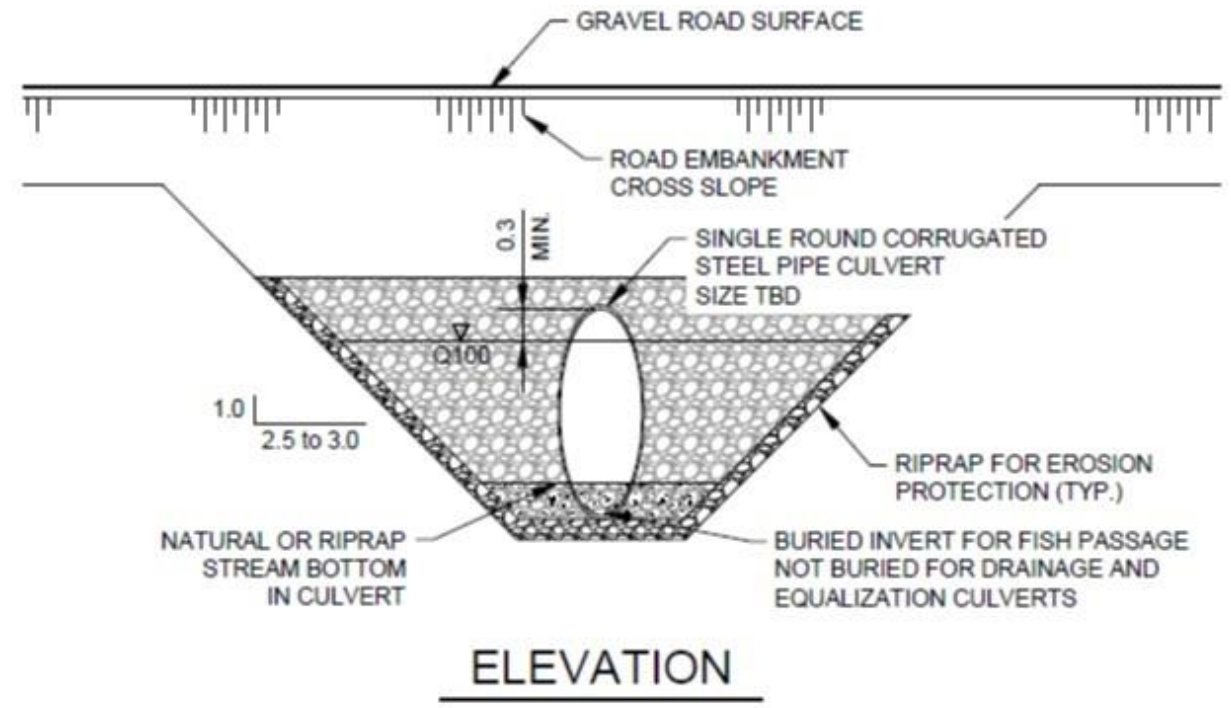
Typical Cross Section on Peat Substrate – Depth 0.6 m or Less

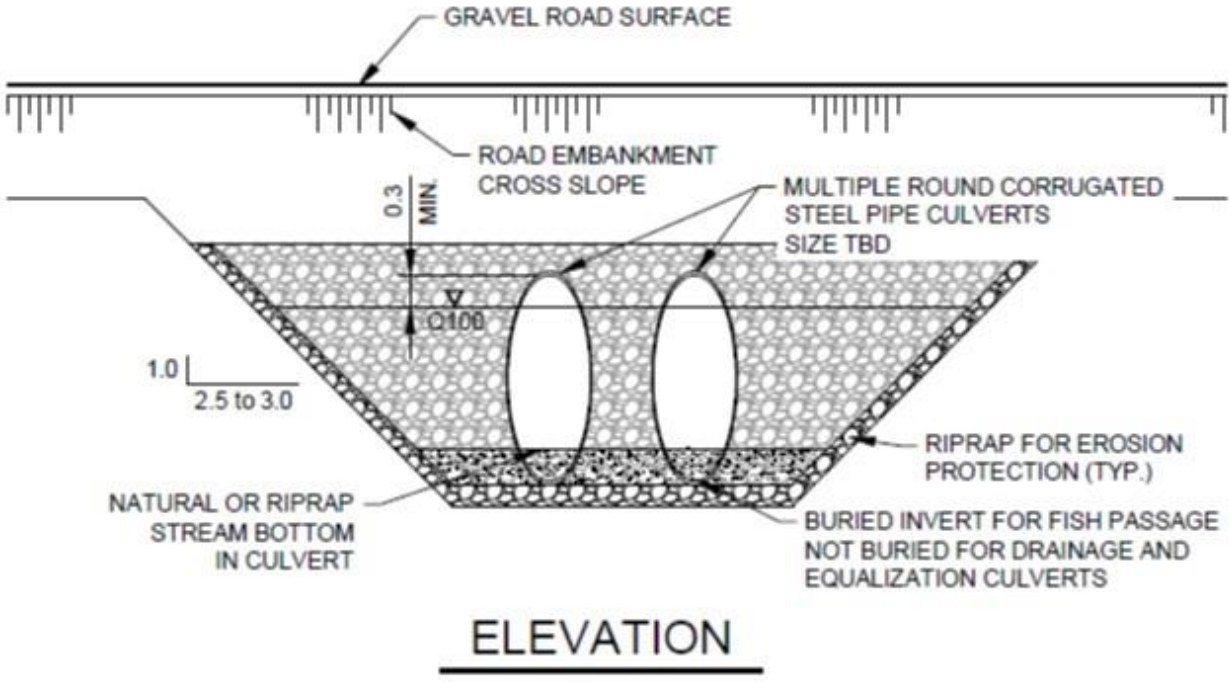


Typical Cross Section on Peat Substrate – Depth Greater Than 0.6 m

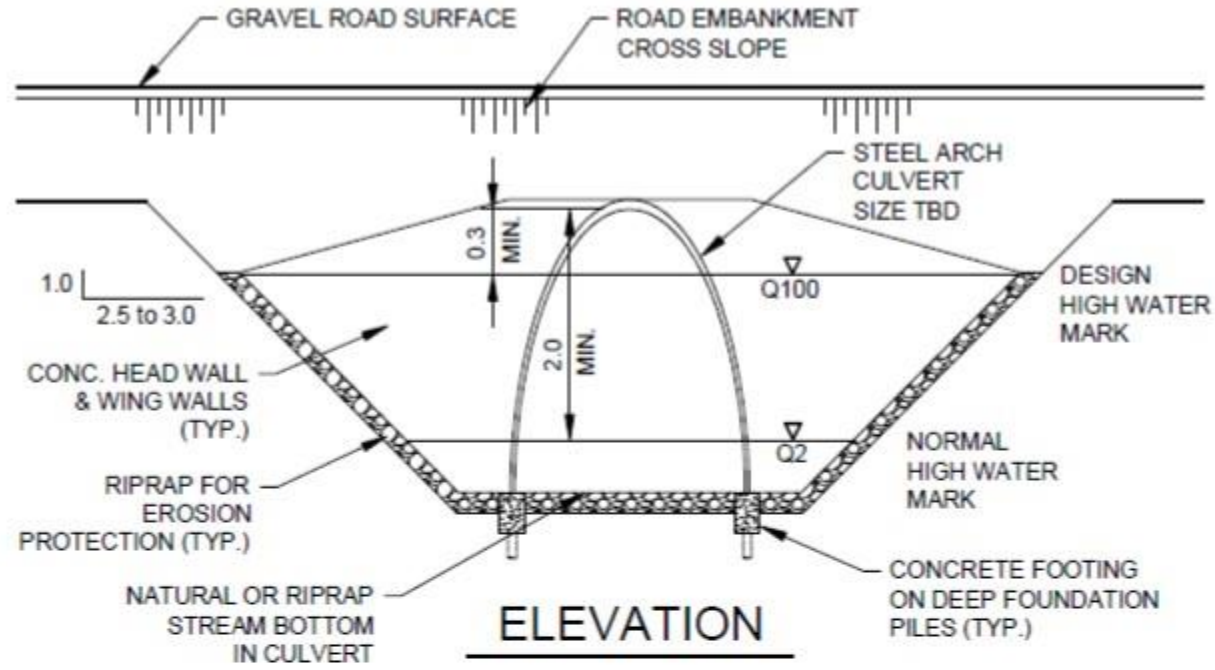
Note: Roadway cross sections and geometry are based on typical roadway sections approved for use on other sections of the East Side Road Network with similar low traffic volumes.

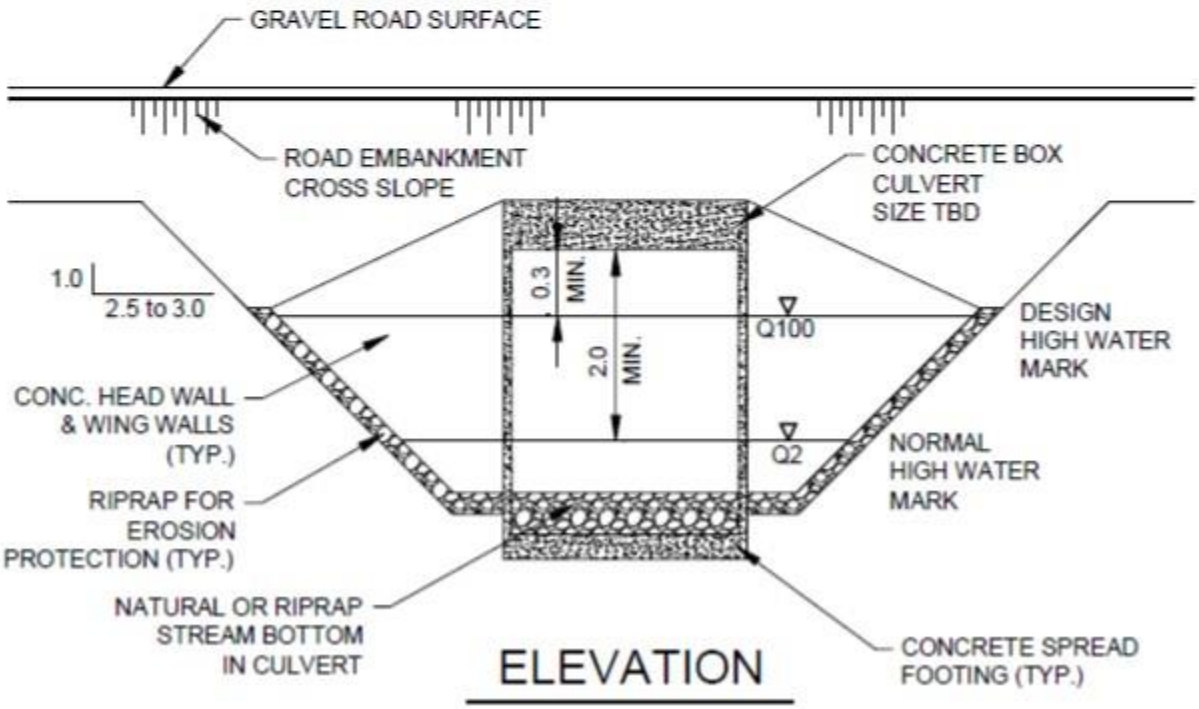
Appendix 3-2:
Representative Watercourse Crossing Design Drawings



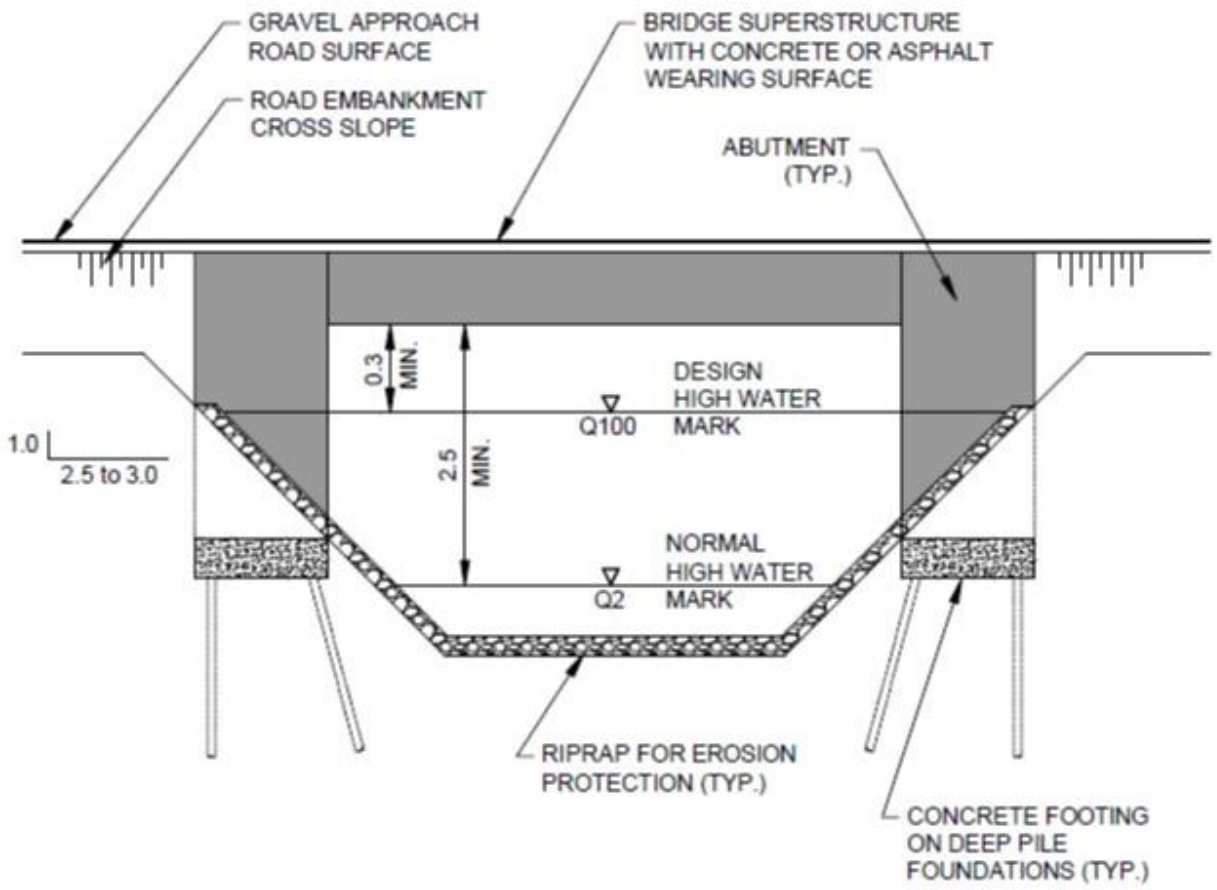


Typical Single and Multi Corrugated Steel Pipe (CSP) Culverts



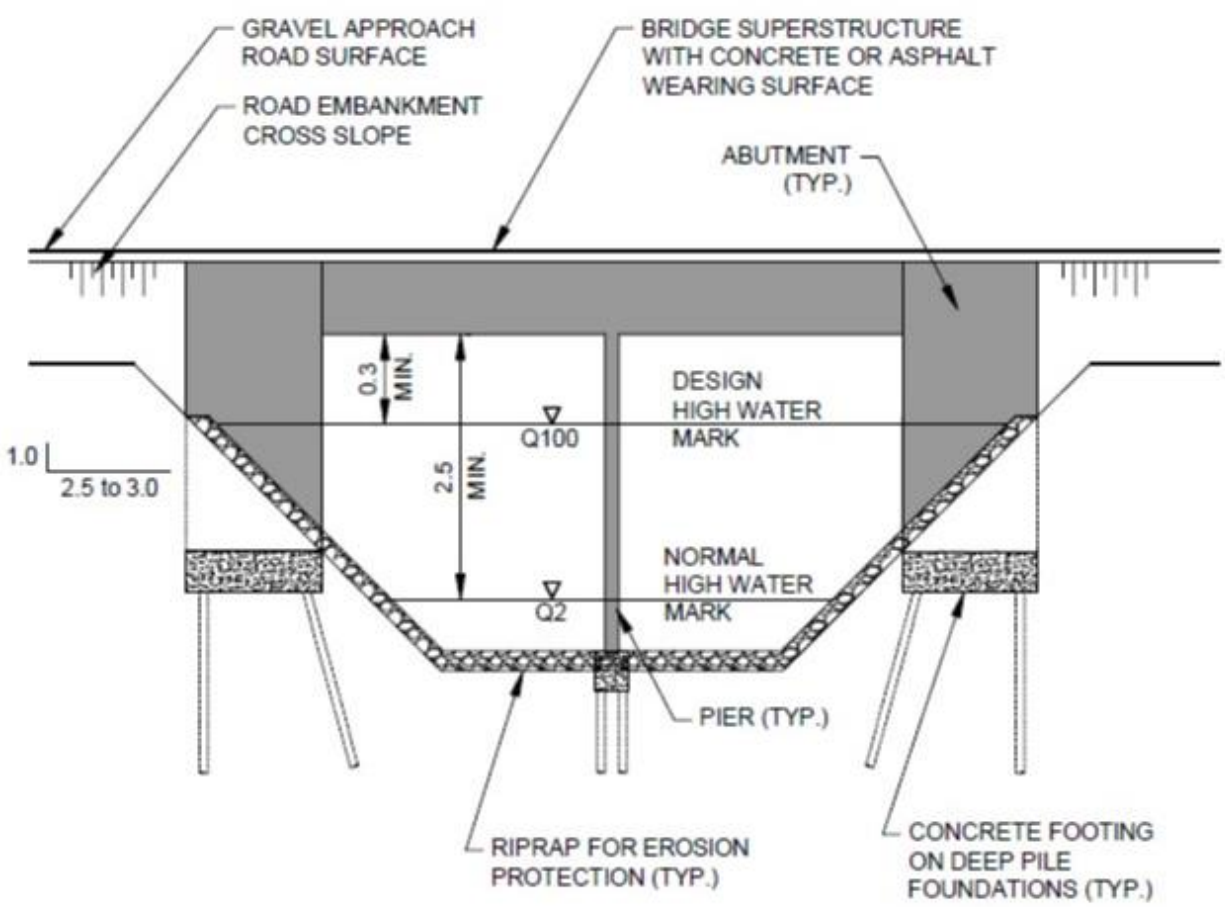


Typical Steel Arch and Concrete Box Culverts



ELEVATION

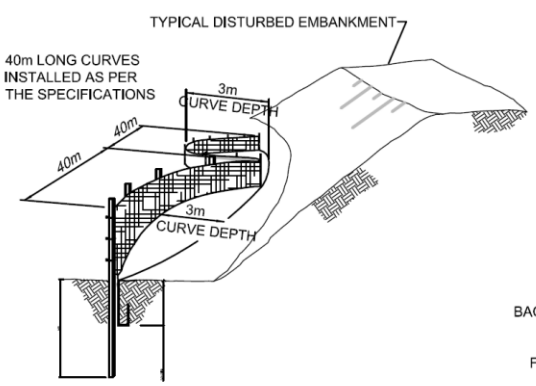
Typical Clear Span Bridge



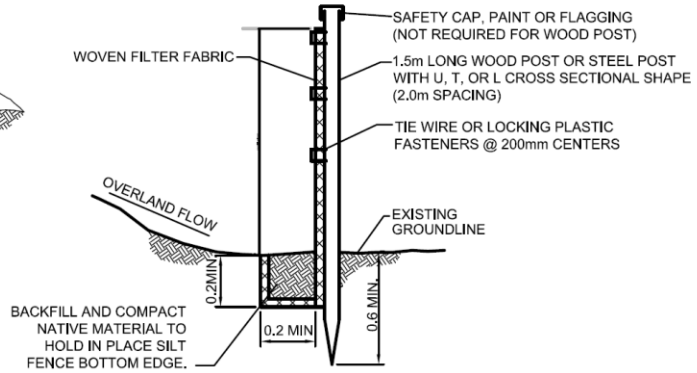
ELEVATION

Typical Two-Span Bridge

Appendix 3-3:
Examples of Erosion and Sedimentation Control Methods

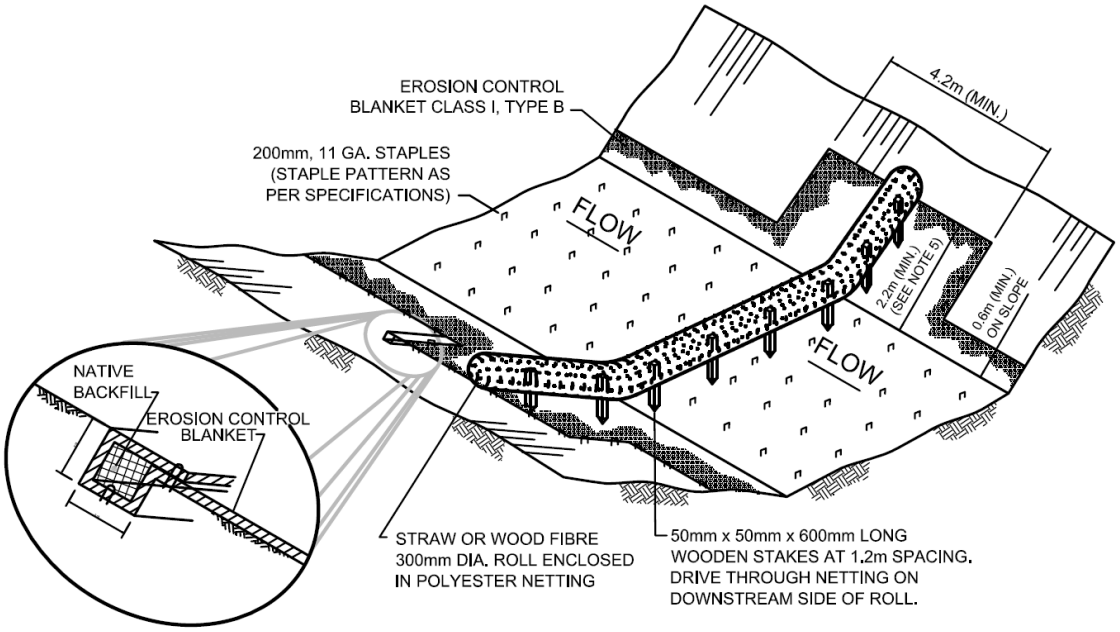


TYPICAL FENCING PLACEMENT

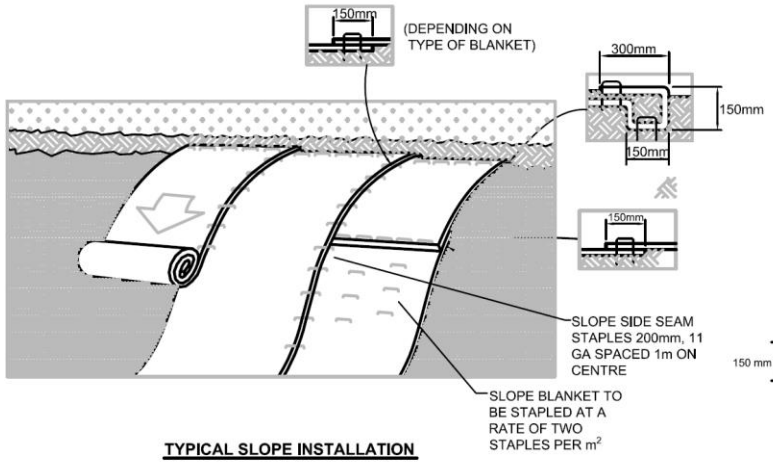


TYPICAL FENCE AND POST DETAIL

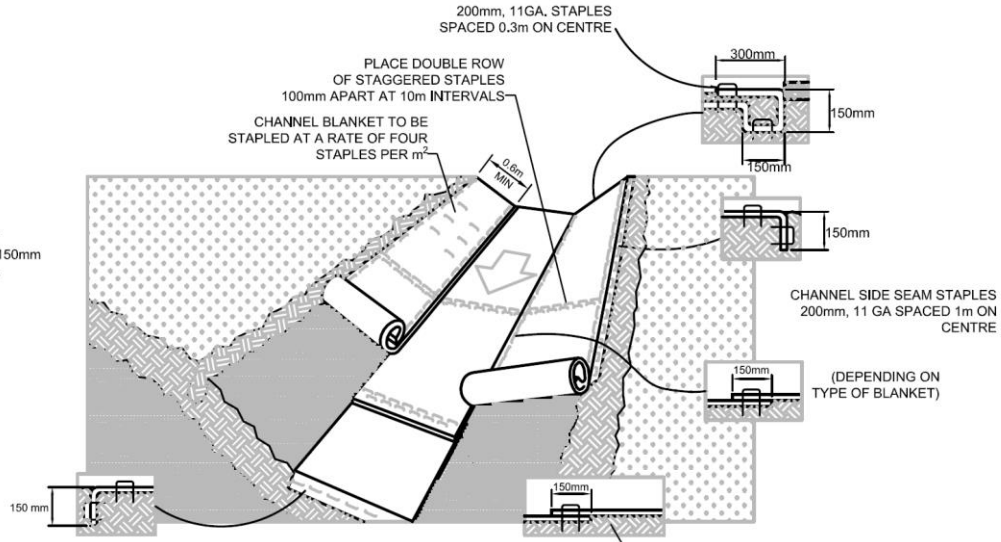
A **TYPICAL SILT FENCE INSTALLATION DETAIL** N.T.S.



B **TYPICAL STRAW ROLL DITCH CHECK DETAIL** N.T.S.



TYPICAL SLOPE INSTALLATION



TYPICAL DRAINAGE CHANNEL INSTALLATION

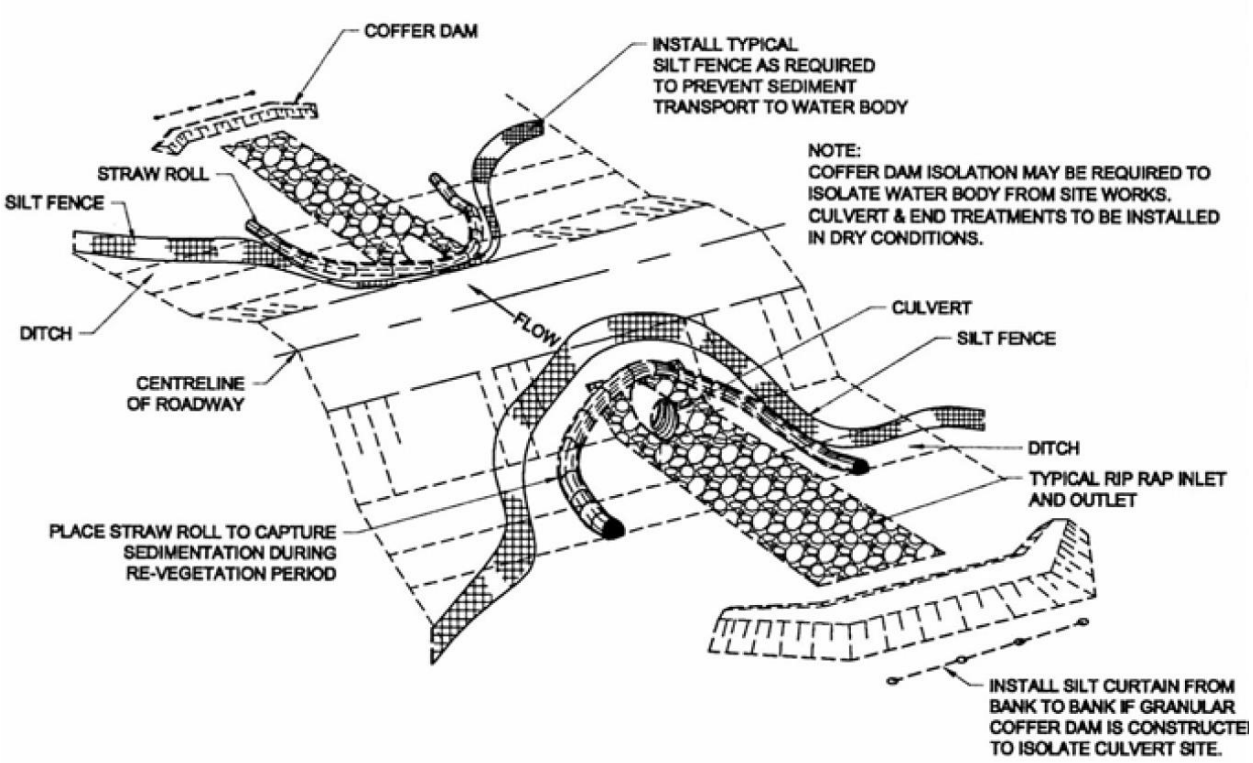
C EROSION CONTROL BLANKET DETAIL

N.T.S.

NOTES:

1. SEDIMENT AND EROSION CONTROL DETAILS ON THIS DRAWING REPRESENT TYPICAL INSTALLATIONS. FOR LOCATION AND SPECIFIC APPLICATIONS REFER TO APPROPRIATE DRAWING IN THIS CONTRACT.
2. SILT FENCE SHALL BE INSTALLED AT THE LOCATIONS SHOWN ON DRAWINGS, OR AS DIRECTED BY THE CONTRACT ADMINISTRATOR.
3. THE TOP OF STEEL POSTS SUPPORTING SILT FENCE POSTS SHALL BE MARKED WITH FLUORESCENT PAINT, FLAGGING TAPE, OR SAFETY CAPS.
4. THE STRAW ROLL DITCH CHECKS SHALL BE INSTALLED ACCORDING TO SPECIFICATIONS AND DETAIL DRAWINGS.
5. IF STRAW ROLL DITCH CHECKS ARE REQUIRED, EROSION CONTROL BLANKET SHALL BE PLACED UNDER THE STRAW ROLL DITCH CHECKS. ECB TO BE 4.2m MINIMUM LENGTH ALONG CHANNEL WITH LEADING EDGE ENTRENCHED AS SHOWN IN DETAIL. THE BLANKET SHALL BE PLACED TO A HEIGHT OF 2.2m UP THE DITCH SIDE SLOPE. WHERE SIDE SLOPE IS LESS THEN 2.2m THE BLANKET AND STRAW ROLL SHALL EXTEND TO TOP OF SLOPE.
6. IF REQUIRED, EROSION CONTROL BLANKET SHALL BE INSTALLED IMMEDIATELY FOLLOWING GRADING.
7. ALL MATERIALS AND INSTALLATION METHODS SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.

Appendix 3-4:
Culvert Installation at Environmentally Sensitive Watercourse Crossings



1 CULVERT ESC MEASURES AT ENVIRONMENTALLY SENSITIVE CROSSINGS

SCALE NTS

Appendix 3-5:
Manitoba Infrastructure Native Revegetation Program

MIT Native Revegetation Program
Guidance Document
June, 2015

PURPOSE

To protect disturbed soils from erosion and weed growth, reduce mowing requirements, and enhance the ecological integrity of Manitoba's roadside environment.

PRACTICE

Seeding

Seed the highway right-of-way (ROW) or other location using a combination of the recommended species in the attached *Manitoba Recommended Seed Mixes* document. The seeds listed have been selected for commercial availability, as well as suitability to the relevant soil zones and surrounding land uses.

Common Oats can be added to the seed mixture in erosion prone areas to provide a cover crop until native seeds establish. Due to its rapid germination, oats may help reduce erosion and trap moisture for the emerging native species. However, oats also compete with native species for moisture, light, and nutrients, and may lengthen establishment times. If used as a cover crop, oats should be seeded at a rate of 2.2 to 5.6 kg/ha (i.e. 2 to 5 lb/acre).

Fall rye and winter wheat are not desirable as cover crops as they inhibit the growth of other plants.

Topsoil

In the case of seeding newly graded ROWs, existing grade slope topsoil should be salvaged and re-used onsite. Additional topsoil may not always be required or desirable. In cases where the local topsoil is known to be particularly infested with weed seeds, it may be advisable to seed directly into the subsoil, or amend the soil with a mixture of 50% clean sand to 50% peat moss, or use a commercial growth medium. These alternate options will not introduce additional weed seeds, as imported topsoil will.

In native Boreal Forest areas, topsoil (i.e. the organic layer) that is salvaged for re-use may contain native seeds and may not require re-seeding. The existing seed bed will

generally regrow if the existing topsoil is replaced. In southern areas (i.e. Fescue, Mixed Grass, and Tall Grass/Interlake Zones), the existing topsoil will not contain any, or enough, native seeds to regenerate native vegetation.

Seeding Rate

Seed grass at the rate recommended by the MIT *Seeding Calculator*, your Regional Biologist, or commercial seed supplier.

The MIT *Seeding Calculator* will be available, along with this document, on the MIT Environmental Services Section intranet site.

Seeding Timing

The best times for successful seeding are:

- May to early July
- Mid-October to freeze-up.

Mid-summer and early fall seeding can also work, but are riskier. Summer can be too dry for successful germination and plants that do germinate in late summer or early fall may be too tender to survive a killing frost.

Site Management

Sites that erode after seeding should be repaired and re-seeded. Areas where the seed does not 'catch' may need to have the soil amended with a mixture of 50% clean sand to 50% peat moss and re-seeded. Note that native grasses may take 2-3 years to fully grow in, but during this time will be developing extensive root systems.

Weeds may be an issue the first years after seeding to natives, but will eventually be out-competed by the native grasses. Mowing annual weeds to prevent seed-set and spot spraying perennial weeds in the first and second years will greatly increase native seeding success.

SEED MIXTURES

Seed Mix Selection (Native vs Tame)

For MIT's purposes, the province has been divided into four native seed mix zones (see attached *Manitoba Native Seed*

Mix Zones map). Native grass mixes are provided for each zone in the *Manitoba Recommended Seed Mixes* list. Tame grass mixtures and wildflower mixtures are also provided.

Native seed mixes will work best in areas adjacent to annual crop land, native pasture, or native grassland where there is no competition from invasive species or perennial weeds. At sites adjacent to tame hayfields or tame pastures, or sites with significant weed infestations, a 'Tame' mix of non-invasive agronomic grass species may be used.

In areas where adjacent vegetation type is unknown, or varies along the length of the project area, consult with your MIT Biologist to determine the appropriate seed mix.

Wildflowers

Wildflowers are a natural and important part of ecosystems and should ideally be included in all native mixes. They are considerably more expensive than native grasses, but even very small quantities are beneficial to pollinating insects and the area's ecosystem. If a site is regularly sprayed with broadleaf herbicides, be aware that wildflowers will be damaged or destroyed by spraying.

Using the Recommended Seed Mixes Table

The province has been divided into four planting zones (Figure 1):

- Tallgrass and Interlake Prairie
- Mixed Grass Prairie
- Fescue Prairie
- Boreal

The *MIT Recommended Seed Mixes* lists a variety of native grass species for each zone. It is possible to choose the least expensive or most readily available species from each category in the list. As a general guideline, use an equal proportion of each grass seed species in the final mix, recognizing that price and availability may force adjustments. The proportion of nitrogen-fixer seeds should be about 5 to 10% of the total mix.

If you use the MIT *Seeding Calculator* to create your native seed mix, the proportions of each species will be automatically adjusted for you.

Tame grass and wildflower mixtures are also provided. Select any combination of species from these lists.

Do Not Plant

The following species should **never** be used in any seed mix as they act invasively.

- Smooth Brome
- Kentucky Bluegrass
- Crested Wheatgrass
- Reed Canary Grass
- Birdsfoot Trefoil
- Yellow Sweet Clover
- White Sweet Clover
- Alfalfa
- Creeping Red Fescue
- Alsike Clover
- Downy Brome
- Dutch Clover
- Meadow Foxtail
- Tall Fescue
- Tufted Vetch (aka Cow Vetch or Bird Vetch)

MIT Recommended Seed Mixes

Native Seed Mixes:

Use a native seed mixture for areas next to annual cropland, native pastures, native grasslands and urban areas.

Directions: Select Zone from map. Create seed mix by selecting 4 or 5 species from the Dry Areas list, 1 species from the Wet Areas list, and 1 of the Nitrogen-Fixers. The mix should ideally result in a plant community that consists of 90-95% dry/wet species and 5-10% nitrogen-fixer species. Use the seed calculator to determine the kg/ha seeding rate for each species in the mix.

Native Seed Mix by Zone	Dry Areas (Select 4-5)	Wet Areas (Select 1)	Nitrogen-Fixer (Select 1)
Tall Grass/Interlake Prairie Zone	Canada Wild Rye	Marsh Reed Grass	Purple Prairie Clover
	June Grass	Northern Reed Grass	White Prairie Clover
	Big Bluestem	Slough Grass	Canada Milkvetch
	Little Bluestem	Tufted Hair Grass	
	Awned Wheatgrass	Prairie Cord Grass	
	Indian Grass		
Mixed Grass Prairie Zone	Blue Grama	Marsh Reed Grass	Purple Prairie Clover
	Canada Wild Rye	Northern Reed Grass	White Prairie Clover
	June Grass	Slough Grass	Canada Milkvetch
	Big Bluestem	Prairie Cord Grass	
	Little Bluestem		
	Awned Wheatgrass		
	Slender Wheatgrass		
Fescue Prairie Zone	Big Bluestem	Marsh Reed Grass	Purple Prairie Clover
	Little Bluestem	Northern Reed Grass	White Prairie Clover
	Awned Wheatgrass	Slough Grass	Canada Milkvetch
	Canada Wild Rye		
	June Grass		
	Rocky Mountain Fescue		
	Rough Fescue		
	Northern Wheatgrass		
Boreal Zone	Hair Grass	Tufted Hair Grass	Canada Milkvetch
	June Grass	Fowl Bluegrass	Northern Hedysarum
	Nodding Brome	Slough Grass	Alpine Hedysarum
	Rocky Mountain Fescue		
	Canada Wild Rye		
	Hairy Wild Rye		
	Northern Wheatgrass		
	White-grained Mountain Rice Grass		
	Slender Wheatgrass		

Native Wildflowers:

The use of wildflowers (or forbs) is not compulsory. Use along with native grasses for greater ecological diversity. As with native grasses, native wildlfowers do best next to annual cropland, native pastures, or native grasslands.

Wildflower Seed Mixture	Choose Any Combination Of
Wildflowers	Canada Goldenrod
	Stiff Goldenrod
	Showy Goldenrod
	Narrow-leaved Sunflower
	Beautiful Sunflower
	Many Flowered (Heath) Aster
	Smooth Aster
	Rough False Sunflower
	Black-eyed Susan
	Yellow Coneflower
	Gaillardia

Tame Seed Mixes:

Use an agronomic or tame seed mixture for areas next to tame pastureland or hayfields, or areas with heavy weed infestations. Non-native species can be used if they do not spread invasively.

Cover crops can be used for temporary erosion control while waiting for native or tame grasses to establish.

Tame Seed Mixes	Choose Any Combination Of
Tame Mix	Intermediate Wheatgrass
	Tall Wheatgrass
	Russian Wild Rye
	Sheep Fescue
	Timothy
	Any introduced species recommended by your supplier, as long as it is not on the **Do Not Plant List**.
Cover Crops	Common Oats

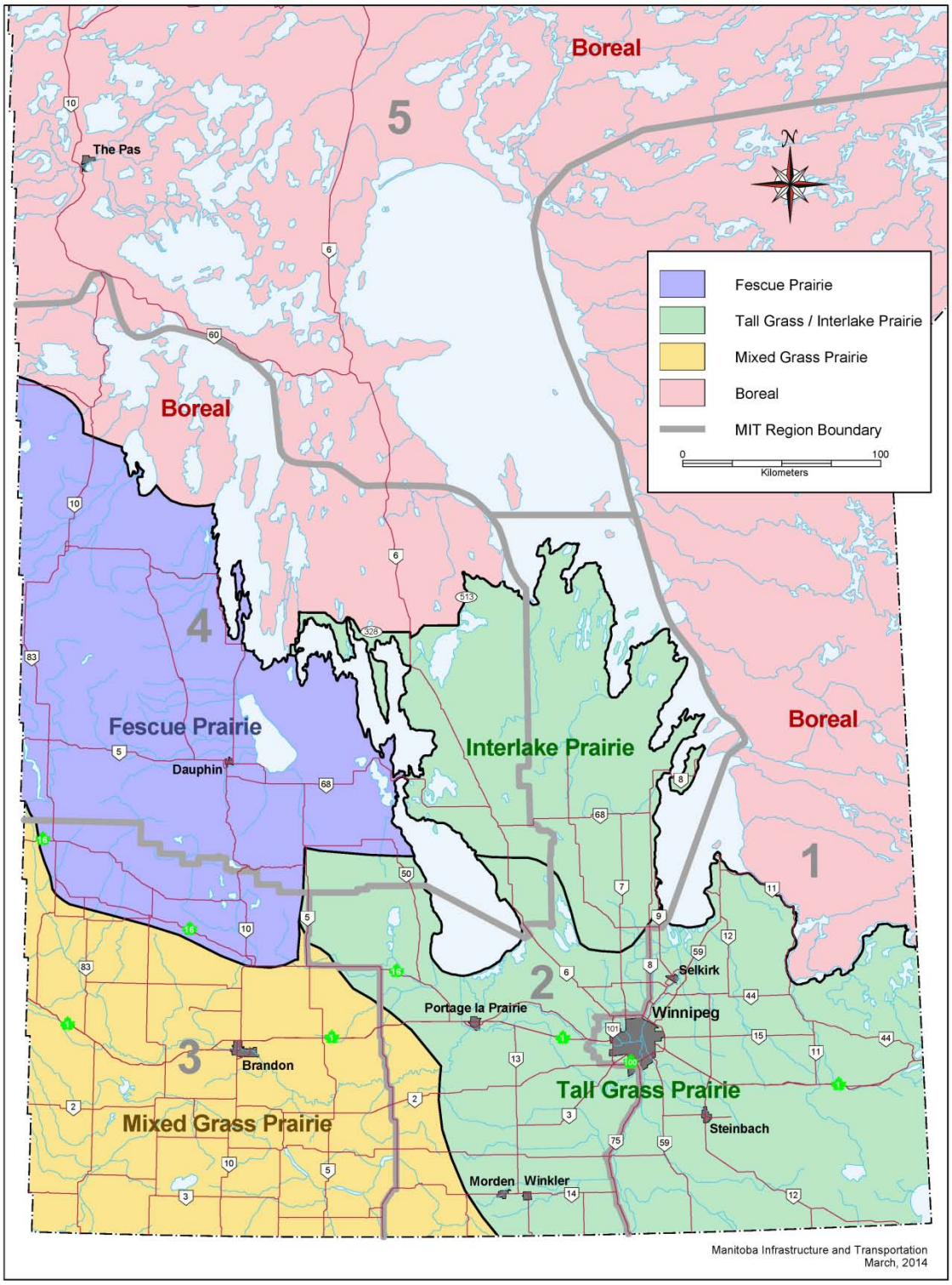


Figure 1. Manitoba Native Grass Seed Mix Zones

MIT Do Not Plant List

Invasive / Undesirable Plants for Right of Ways

Undesirable - Instead of:

- 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*)
- Tall Fescue (*Festuca arundinacea*)
- Tufted Vetch (aka Cow Vetch or Bird Vetch) (*Vicia cracca*)

Plant Natives &/or Acceptable Non-natives:

- Natives - See *MIT Recommended Native Seed Mixes by Zone*
- Acceptable Non-Natives - See *MIT Tame Seed Mix*
  {NOTE: Acceptable non-natives do not spread aggressively or take over existing native vegetation.}

Appendix 3-6:
Manitoba Infrastructure Nuisance Beaver Management Program

Manitoba Infrastructure:

Nuisance Beaver Management Program for Remote Roads Operations

September 2017

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3. Permitting Requirements and Implementation 3
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6. Payment 5
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8. General Contact Information 6

Appendices

Appendix A – Department of Fisheries and Oceans Timing Windows for Avoidance of In-Water Work

Appendix B – Registered Trap Lines intersecting the All-Season Road Linking Manto Sipi Cree Nation, God's Lake First Nation, and Bunibonibee Cree Nation and Trapper Listing

Appendix C – Beaver Tail Payment Form

1. Purpose

The Nuisance Beaver Management Program (NBMP) is intended to serve as part of the Remote Road Operations maintenance program for All-Season Road linking Manto Sipi Cree Nation, God's Lake First Nation and Bunibonibee Cree Nation (P6-ASR). The NBMP will act as a supplementary measure in instances where standard beaver control structures, such as beaver cones, are ineffective at reducing beaver activity at and around culverts, ditches, and water crossings. This activity increases the risk of washout and will be identified by routine road inspections, typically done twice a year in spring and fall and as discussed between MI and local communities.

The NBMP includes measures for removal of nuisance beaver as well as for the removal of beaver dams, but is not a bounty system. Unlike a bounty system, the NBMP will employ a more proactive and site specific approach to managing nuisance beavers. The NBMP intends to involve local trappers to assist MI staff in road maintenance activities within their registered trap line areas.

The NBMP identifies the regional limits, permitting requirements, trapper eligibility, nuisance beaver removal methods, payment, and record keeping requirements.

2. Effective Area

The area of focus can generally be defined as a 200m buffer to either side of the P6-ASR. Any damage to roads, water crossings, and other structures resulting from beaver activity within that area will fall under the scope of NBMP.

Under the direction of Manitoba Infrastructure (MI) staff, extenuating circumstances may require that beaver control measures be conducted beyond the 200m buffer.

3. Permitting Requirements and Implementation

The removal of nuisance beaver during the normal trapping season as identified in the Manitoba Trapping Guide (typically October 1 – May 31) does not require special authorization but must be conducted by a licensed trapper.

The removal of nuisance beaver beyond the trapping season (typically April 1- September 30) requires the issuance of a valid Wild Animal Kill Permit by a Manitoba Sustainable Development District Office. Copies of the Wild Animal Kill Permit must be on hand when removing nuisance beaver under its authorization.

The removal of beaver dams requires site-specific authorization under a Muskrat House, Beaver Dam and/or Beaver Lodge Removal Permit. Dam removals should be done in ice-free conditions when possible and may require removal of beavers prior to removal of the dam and adherence to other

special conditions as listed on the permit. If problematic beaver dams are located within fish bearing waters, Department of Fisheries and Oceans timing windows for in water work apply (Appendix A). Clearing or cleaning-out plugged culverts do not require special authorization.

The MI-NBMP shall be in effect year-round, but will only be utilized as needed. Kill permits will only be effective for periods beyond the beaver trapping season. Note that beaver dam removal permits may not be issued by Manitoba Sustainable Development during the winter season.

4. Trapper Eligibility

In order to be considered eligible to partake in MI NBMP, trappers must:

- hold a valid trapping license;
- be registered as the line holder or helper for a Registered Trap Line (RTL) intersecting P6-ASR (Appendix B);
- be designated or identified as an alternate to remove nuisance beaver if the trapper or helper declines.

MI will strive to respect the existing RTL system, and will give first priority for beaver removal to existing RTL line holders. In the event that a line holder, helper, or community line trapper declines an offer to participate in the removal of nuisance beaver an alternate trapper will be asked to conduct the work.

All trappers acting under MI NBMP will be required to carry a valid copy of the Wild Animal Kill Permit when removing nuisance beaver beyond the normal trapping season.

MI will maintain an up-to-date listing of designated trappers for all RTLs intersecting the P6-ASR alignment (Appendix B). These trappers will be contacted by MI and asked to partake in the removal of nuisance beavers within their RTL and community line limits as required.

5. Identification and Removal of Nuisance Beaver

Identification

Beavers are to be designated as “nuisance beavers” if roads, water crossings, culverts or other water exchange or equalization structures have been, or are expected to be, compromised by beaver activity (damming or other).

Nuisance beaver areas along the P6- ASR will be identified by MI staff or contractors during annual road inspections or community members that have raised the issue with MI’s project manager or contacted MI through its Indigenous and Public Engagement Program (IPEP).

The removal of nuisance beavers is to be done by the designated trapper for the RTL in which the problem area exists. The trapper will be contacted by MI and will be advised of the location of the nuisance beaver for removal. Prior to the removal of nuisance beaver, a MI representative will meet with the designated trapper and pre-approve the number of beaver to be removed from the area on Beaver Tail Payment form (Appendix C).

Removal

Trapping is the preferred method for the removal of nuisance beaver. All traps used must be humane and meet the *Agreement on International Humane Trapping Standards* as outlined in the Manitoba Trapping Guide. Some examples, of certified humane traps which may be used for beaver are as follows:

Bélisle Classic 330
Bélisle Super X 280
Bélisle Super X 330
BMI 280 Body Gripper
BMI 330 Body Gripper
Bridger 330
Duke 330
LDL C280
LDL C280 Magnum
LDL C330
LDL C330 Magnum
Rudy 280
Rudy 330
Sauvageau 1000-11F
Sauvageau 2001-8
Sauvageau 2001-11
Sauvageau 2001-12
Species-Specific 330 Dislocator Half-Magnum
Species-Specific 440 Dislocator Half-Magnum
Woodstream Oneida Victor Conibear 280
Woodstream Oneida Victor Conibear 330

The use of a small calibre rifle (.22) may also be permitted for extenuating circumstances, or as approved by MI.

Designated trappers must have a valid copy of the Wild Animal Kill Permit in-hand when removing, or in possession of, a nuisance beaver beyond the trapping season.

Natural Resources Officers may be present along the P6- ASR and may request to see a copy of the Wild Animal Kill Permit for out-of-season beaver removal activity. Trappers who do not have a valid copy of the Wild Animal Kill Permit in-hand when removing or being in possession of nuisance beaver may be charged under the Wildlife Act (Manitoba).

6. Payment

Payment will be made to designated trappers who successfully remove pre-designated nuisance beavers. A total of $50.00 will be paid for each pre-approved beaver tail returned to MI. The remainder of the carcass, including the pelt, meat, and castor glands will remain the property of the trapper.

Beaver tails for identified nuisance beaver are to be presented to MI shortly after the beaver(s) have been removed. MI staff will arrange an appropriate time and location in order to meet with the participating trapper, collect the beaver tail(s) and complete the Beaver Tail Payment form (Appendix C).

Nuisance beaver carcasses must be disposed of in an appropriate manner. Trappers will not receive payment if carcasses are left along the roadway.

Conditions

Payment will be made for the removal of identified nuisance beavers only. No payment will be made for beavers taken in areas which have not been identified or pre-approved by MI staff.

7. Records and Reporting

All Beaver Tail Payment forms must be filled out correctly, and copies must be provided to MI Environment staff. Records of beaver removal are to be provided to Manitoba Sustainable Development regularly.

8. Identification and Removal of Beaver Dams

Beaver dams which risk compromising roads, water crossings, culverts or other water exchange or equalization structures must be identified by MI staff, contractors or community members whenever possible. Potential issues must be communicated to the MI Project Manager and MI Environment Officer(s) with sufficient notice to obtain necessary permits.

Once authorization is obtained beaver dams can be removed. Whenever possible, beaver dams should be drawn down by hand to ensure a slow release of water. Releasing water too fast may result in sedimentation issues, erosion or washout of downstream features, including roads. If equipment or explosives are required, further authorization from Manitoba Sustainable Development may be required.

9. General Contact Information

Manitoba Infrastructure

Remote Roads Operations
16th floor-255 Garry Street
Winnipeg, MB,
R3C 3P3
(204) 945-4900

MB Sustainable Development

Lake Winnipeg Northeast District Office
Box 828
59 Elizabeth Drive
Thompson, MB
R8N 1X4
(204) 667-6653

God's Lake Narrows Office
General Delivery
God's Lake Narrows, MB
R0B 0M0
(204) 335-2366

Oxford House Office
Box 100
Oxford House, MB
R0B 1C0
(204) 538-2248

Appendix A

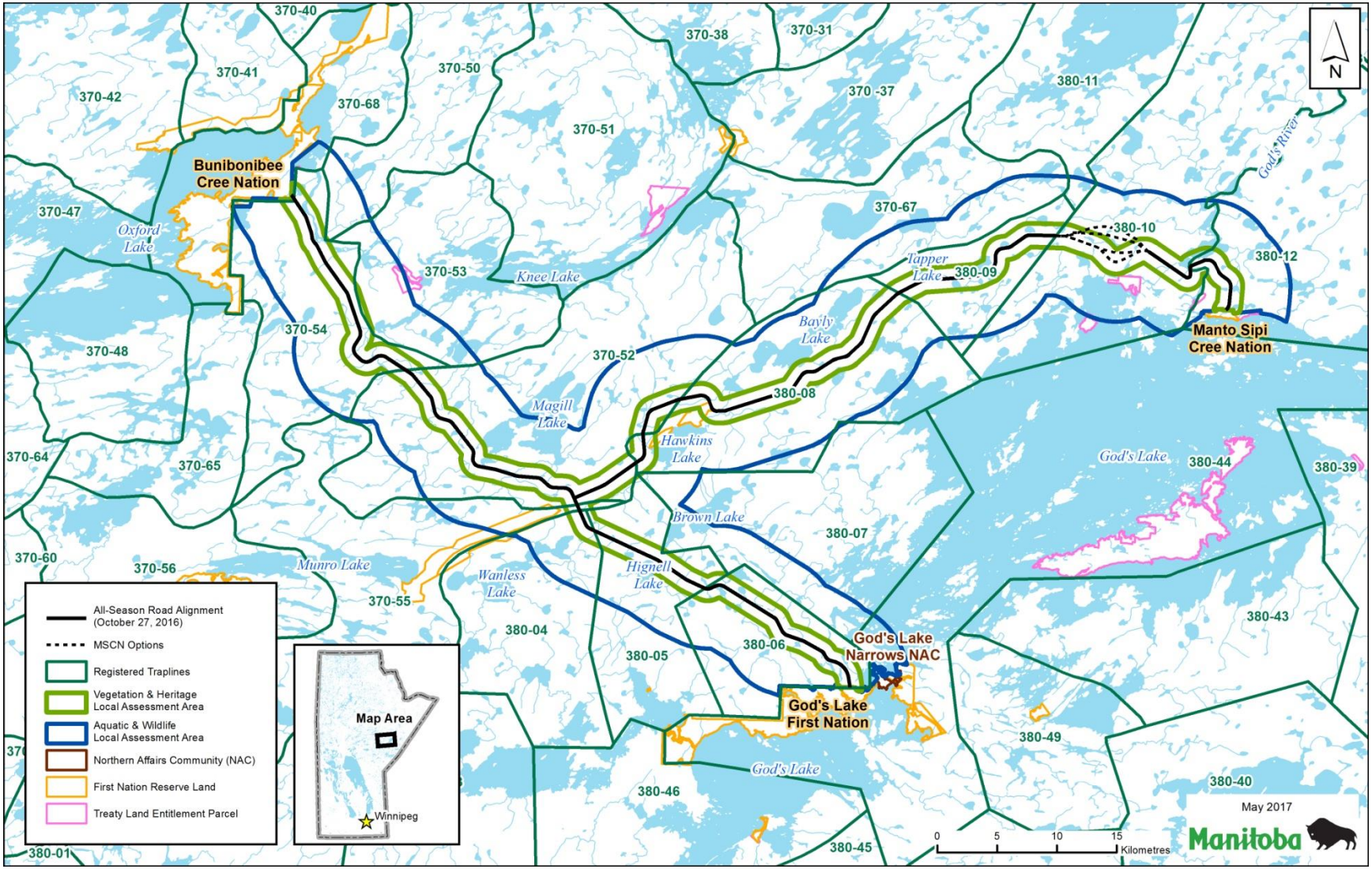
Department of Fisheries and Oceans Timing Windows for Avoidance of In-Water Work

Table 1. Department of Fisheries and Oceans Timing Windows for Avoidance of In-Water Work

	Spring Spawning Fish	Summer Spawning Fish	Fall Spawning Fish
Northern Manitoba (North of Leaf River)	April 15 to June 30	May 15 to July 15	September 1 to May 15

Appendix B

Registered Trap Lines Intersecting the All-Season Road Linking Manto Sipi Cree Nation, God's Lake First Nation and Bunibonibee Cree Nation and Trapper Listing



Bunibonibee Cree Nation
Manto Sipi Cree Nation
God's Lake Narrows NAC
God's Lake First Nation
Oxford Lake
Knee Lake
Magill Lake
Hawkins Lake
Brown Lake
Munro Lake
Wanless Lake
Hignell Lake
Bayly Lake
Tapper Lake
God's Lake
God's River
370-40
370-41
370-42
370-68
370-50
370-51
370-38
370-31
370 -37
380-11
370-47
370-67
380-10
380-12
370-53
380-09
370-54
370-48
370-52
380-08
370-64
370-65
380-44
380-39
380-07
370-60
370-56
370-55
380-04
380-05
380-06
380-43
380-49
380-46
380-40
380-45
380-01
N
All-Season Road Alignment (October 27, 2016)
MSCN Options
Registered Traplines
Vegetation & Heritage Local Assessment Area
Aquatic & Wildlife Local Assessment Area
Northern Affairs Community (NAC)
First Nation Reserve Land
Treaty Land Entitlement Parcel
Map Area
Winnipeg
0 5 10 15 Kilometres
May 2017
Manitoba

Appendix C

Beaver Tail Payment Form

Manitoba Infrastructure- Remote Road Operations
1630 - 215 Garry Street, Winnipeg, MB R3C 3P3
Phone: (204) 945 - 4900 Fax: (204) 948 - 2462

AUTHORIZATION TO REMOVE PROBLEM BEAVER

Part A: to be completed prior to removal of problem Beaver in conjunction with MI Representative

On behalf of Manitoba Infrastructure (MI), permission to remove problem beavers is hereby granted to:

Name (print):_____ Phone #: _____

Mailing Address: _____

SIN #: _____

Location (km)	Max. No. of Beaver to be Removed

Additional Directives or Criteria (Specify): _________

_____

MI-RRO Authorization: _____ Date: _____

Part B: to be completed upon removal of problem Beaver:

Tails must be submitted to MI representative as evidence of the number of problem beaver removed.

Location (km)	No. of Beaver Taken

Total Number of beavers trapped and destroyed _____ @ $50.00 = _$_____

Trapper Signature: _____ Date:_____

For MI Use Only

The evidence received hereby authorizes payment for the removal of the above beaver @50.00.

Signature:_____ Date:_____
(MI Rep)

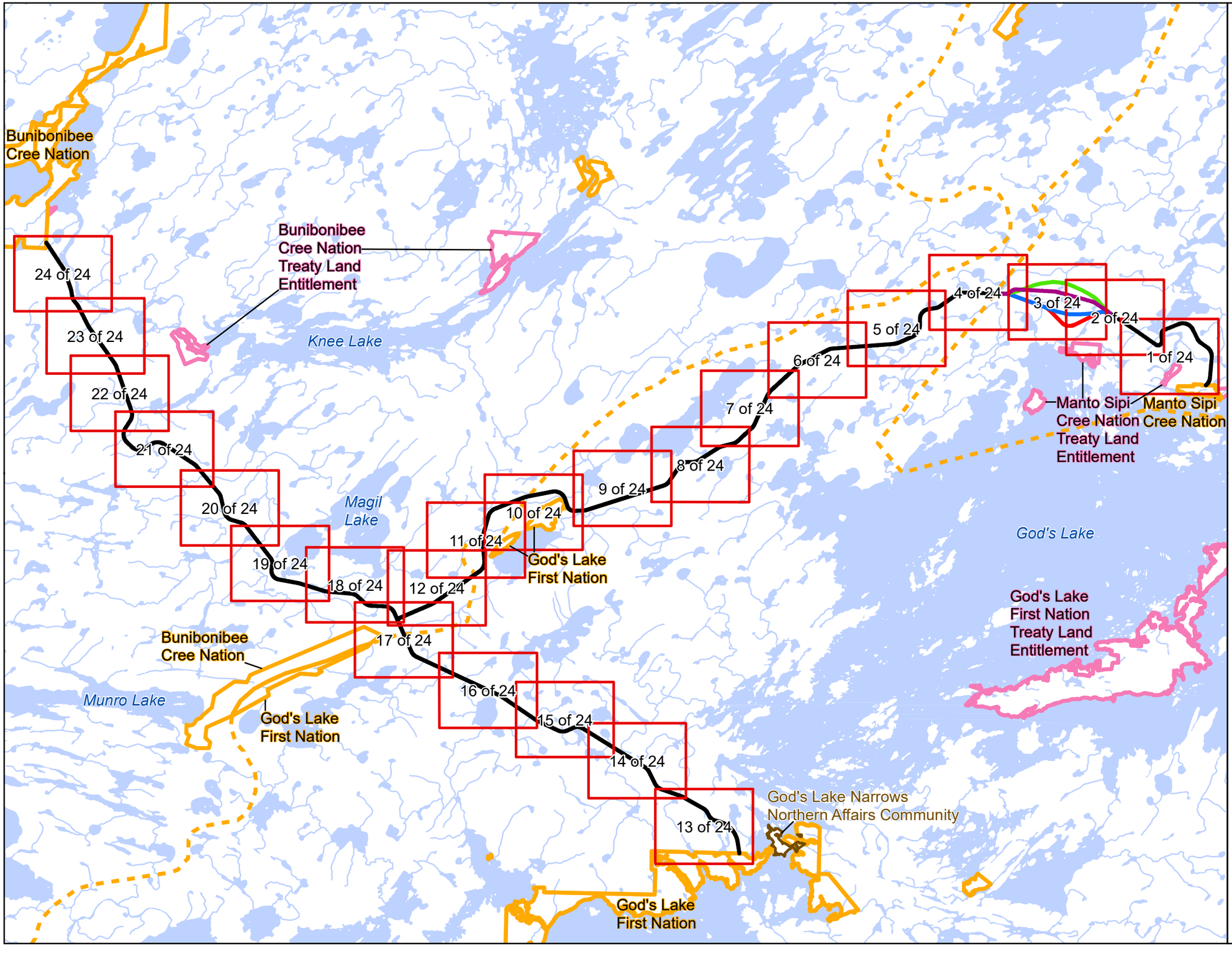
Signature:_____ Date:_____
(MI, Manager of Construction & Engineering)

Appendix 3-7:

Topographic Maps of Route Alignment

Project 6
All-Season Road
5m Contour

Refernce Map



- Large Scale Maps
- Manto Sipi Option 1
- Manto Sipi Option 2
- Manto Sipi Option 3
- Manto Sipi Option 4
- P6 Centerline
- NAC Boundary
- Traditional Territory Boundary
- Reserve Boundary
- TLE Boundary

1:250,000

0 2.5 5 10 15 km

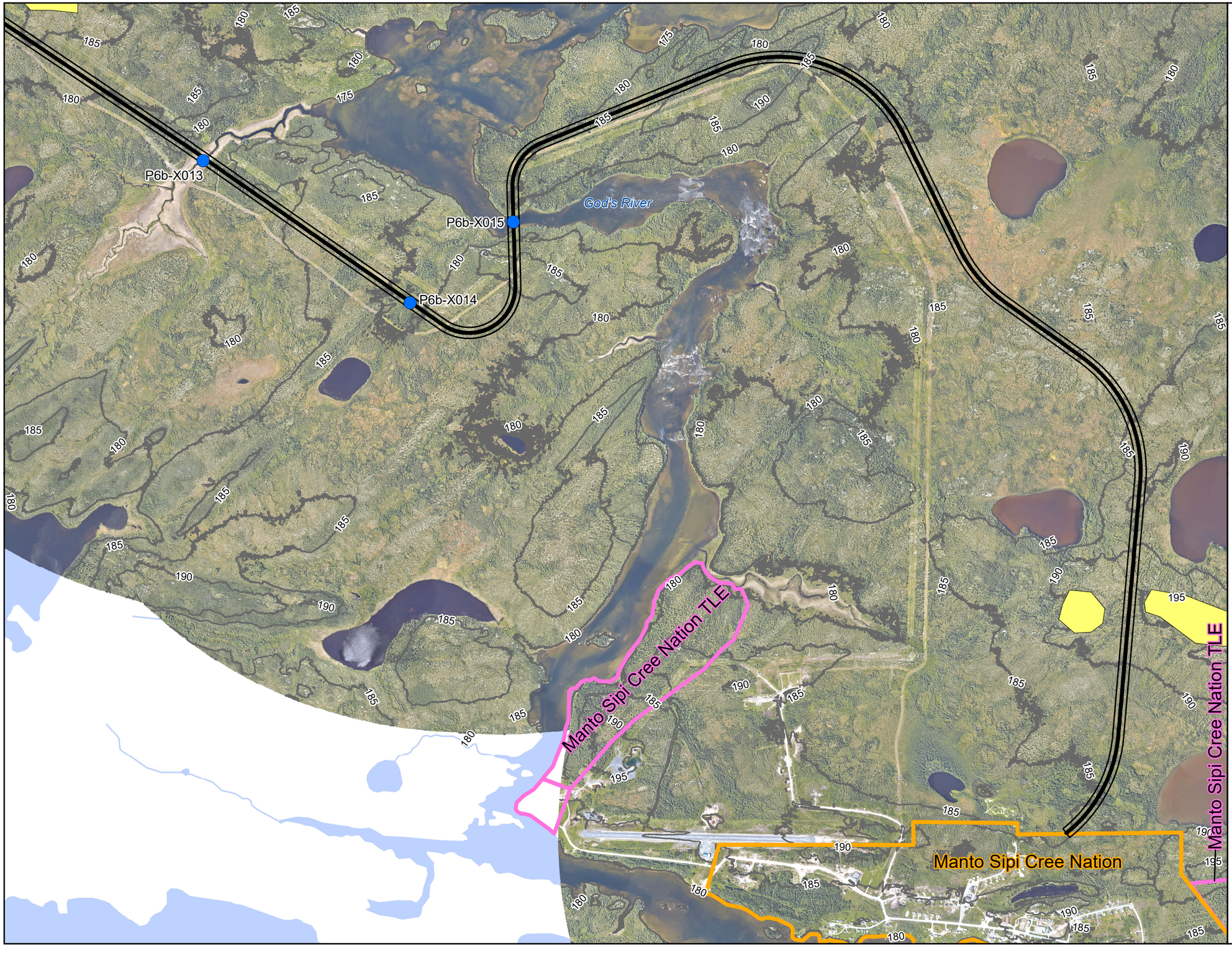
N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

1 of 24



- P6 Centerline
- 60m Clearing Limit
- Potential Quarry Sites
- Water Course Crossing
- Reserve Boundary
- TLE Boundary
- Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

2 of 24

P6 Centerline

Manto Sipi Option 1

Manto Sipi Option 2

Manto Sipi Option 3

Manto Sipi Option 4

60m Clearing Limit

Potential Quarry Sites

Water Course Crossing

Elevation (m ASL)

P6b-X012

P6b-X013

P6b-X014

P6b-X015

God's River

Manto Sipi Cree Nation TLE

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

3 of 24

God's Lake First Nation Trad. Terr.

Manto Sipi Cree Nation Trad. Terr.

P6b-X012

- P6 Centerline
- Manto Sipi Option 1
- Manto Sipi Option 2
- Manto Sipi Option 3
- Manto Sipi Option 4
- 60m Clearing Limit
- Potential Quarry Sites
- Water Course Crossing
- Elevation (m ASL)

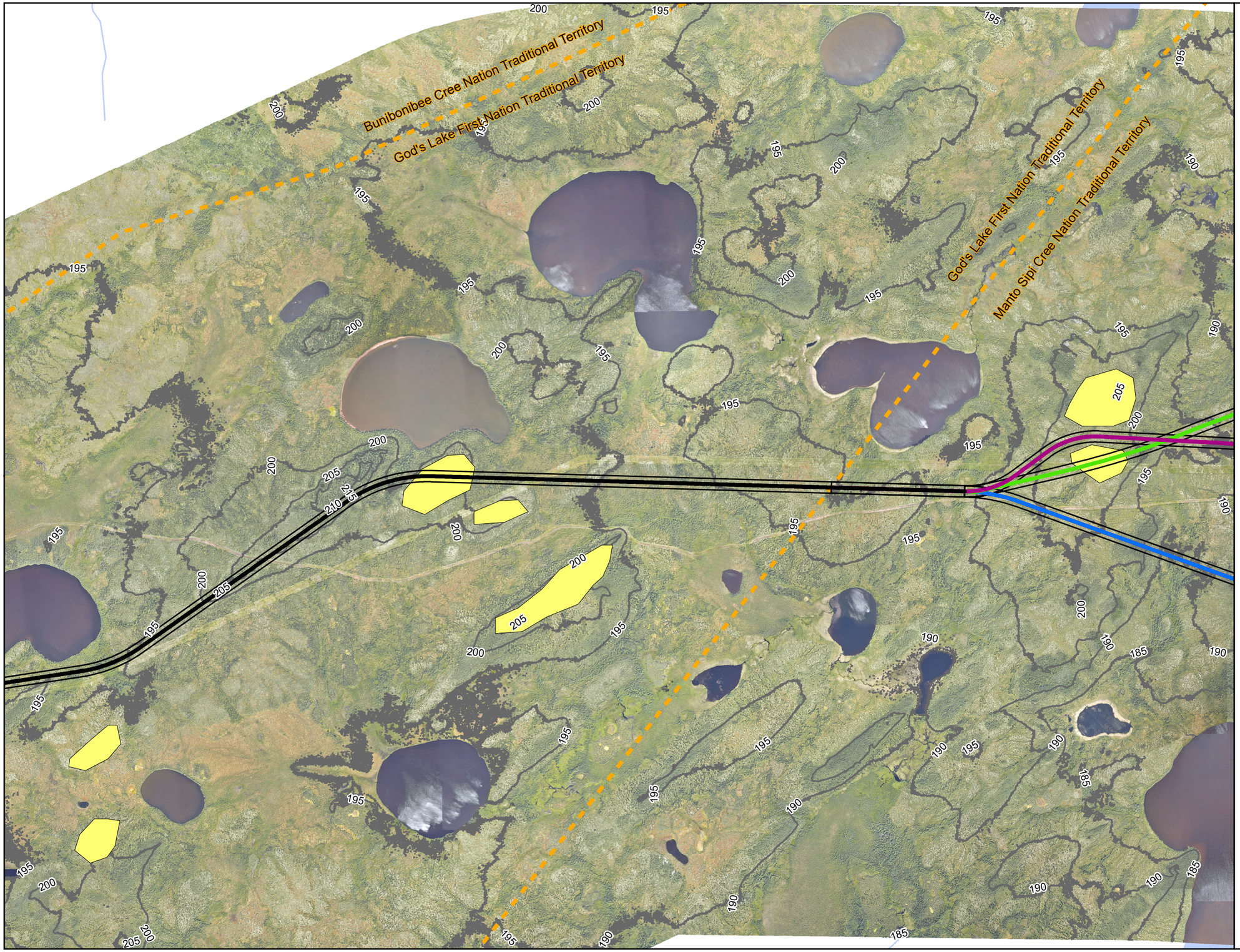
1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure



Project 6
All-Season Road
5m Contour

4 of 24

- P6 Centerline
- Manto Sipi Option 1
- Manto Sipi Option 2
- Manto Sipi Option 3
- Manto Sipi Option 4
- 60m Clearing Limit
- Potential Quarry Sites
- Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

5 of 24

Bunibonibee Cree Nation Traditional Territory

God's Lake First Nation Traditional Territory

P6b-X011

P6b-X010

P6b-X009

- P6 Centerline
- 60m Clearing Limit
- Potential Quarry Sites
- Water Course Crossing
- Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

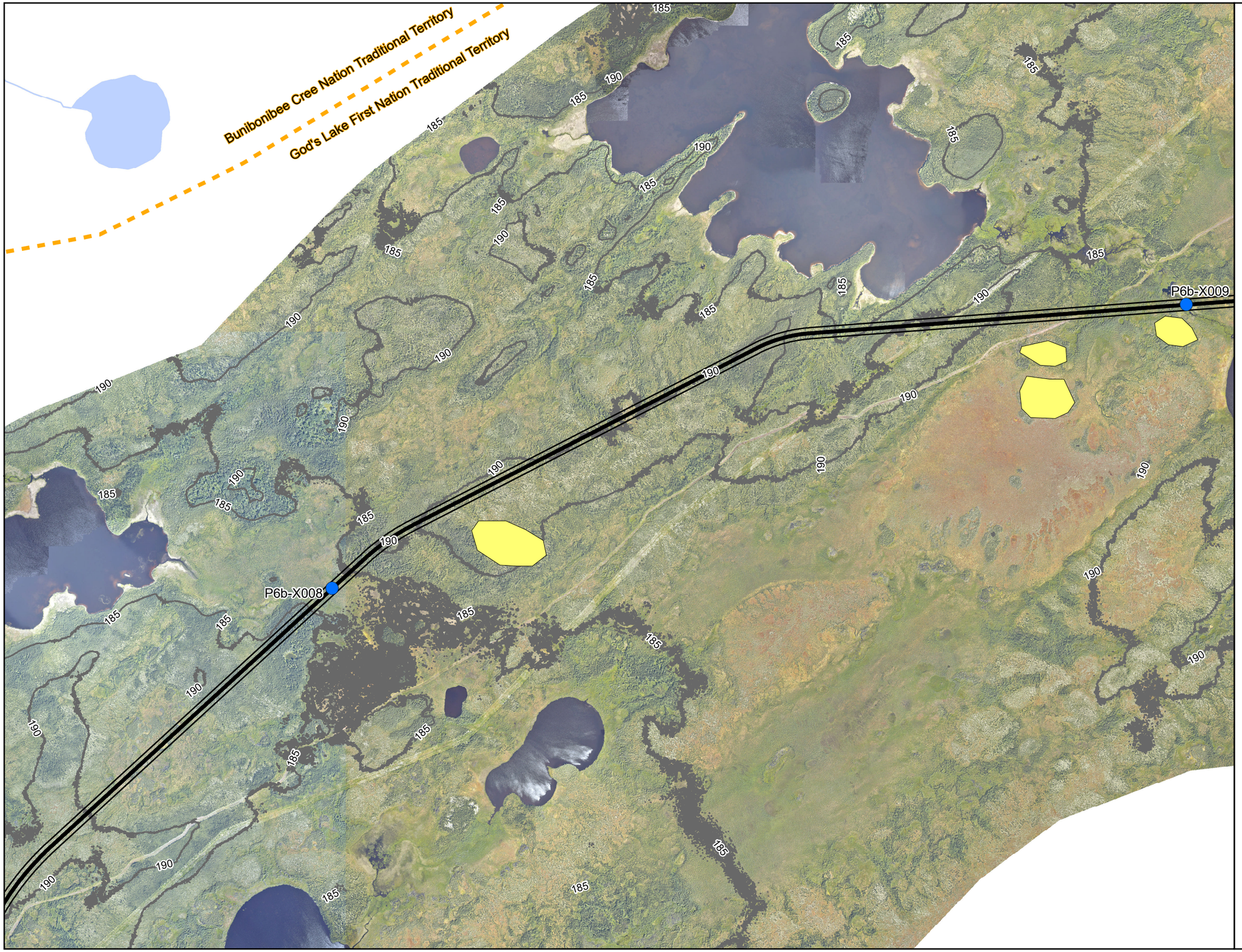
N

NAD_1983_UTM_Zone_15N

God's Lake Trad. Terr.

Manto Sipi Trad. Terr.

Manitoba Infrastructure



Project 6
All-Season Road
5m Contour

6 of 24

- P6 Centerline
- 60m Clearing Limit
- Potential Quarry Sites
- Water Course Crossing
- Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

7 of 24

P6 Centerline

60m Clearing Limit

Potential Quarry Sites

Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

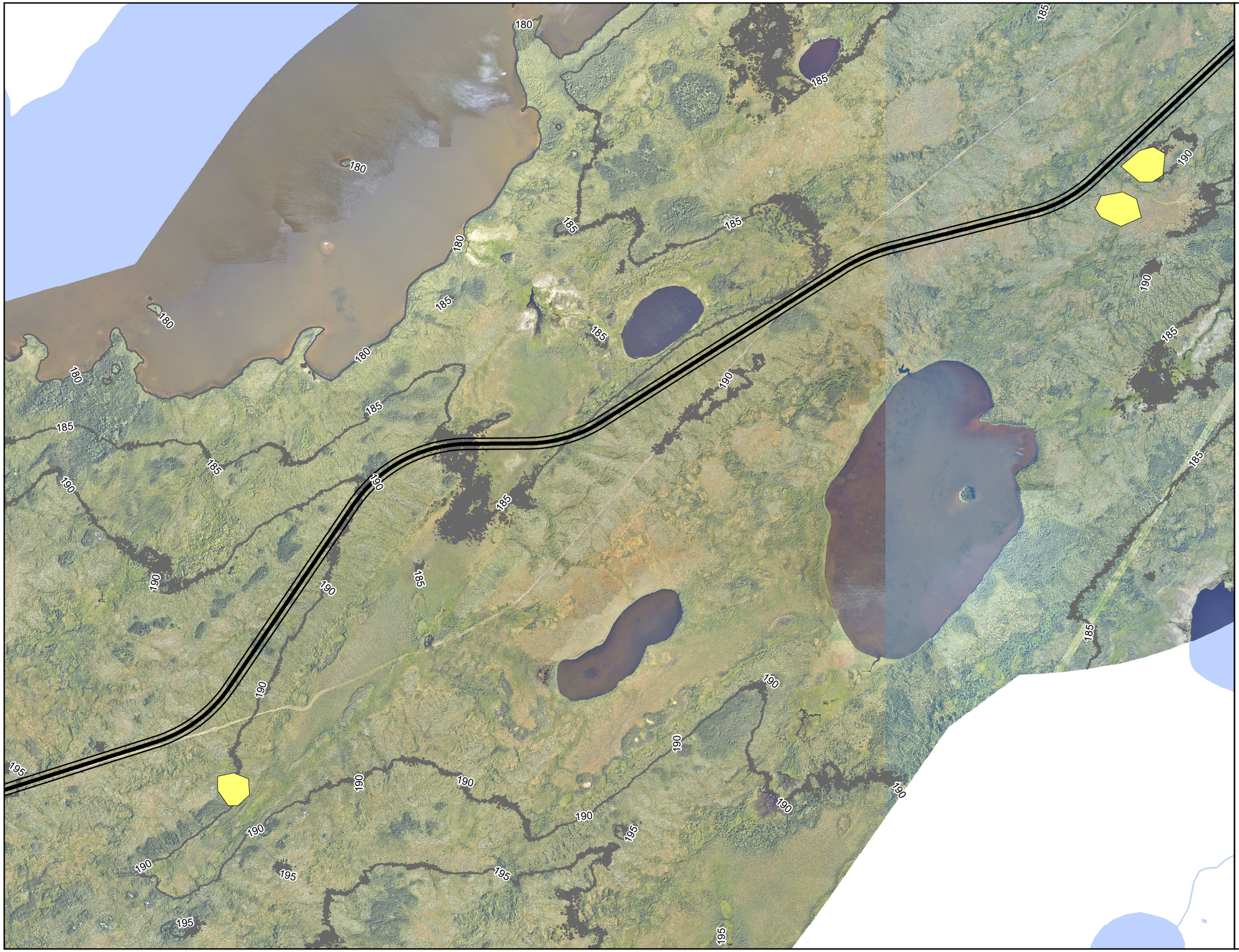
N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

8 of 24



P6 Centerline

60m Clearing Limit

Potential Quarry Sites

Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

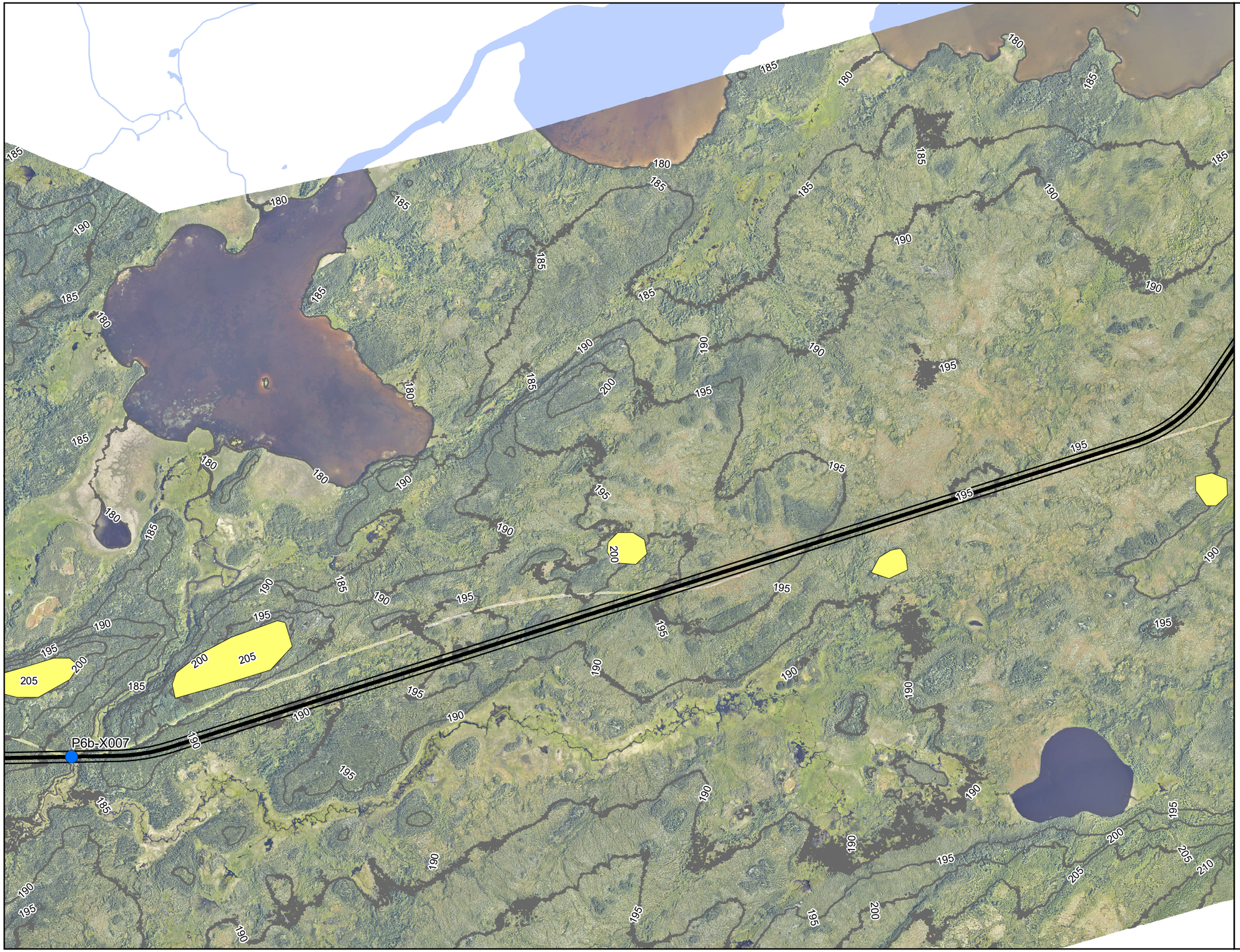
N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

9 of 24



- P6 Centerline
- 60m Clearing Limit
- Potential Quarry Sites
- Water Course Crossing
- Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

10 of 24

Bunibonibee Cree Nation Traditional Territory

God's Lake First Nation Traditional Territory

P6b-X003

P6b-X004

P6b-X005

P6b-X006

P6b-X007

God's Lake First Nation

- P6 Centerline
- 60m Clearing Limit
- Potential Quarry Sites
- Water Course Crossing
- Reserve Boundary
- Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

11 of 24

P6b-X004

P6b-X003

P6b-X002

P6b-X001

Bunibonibee Cree Nation Traditional Territory

God's Lake First Nation Traditional Territory

God's Lake First Nation

- P6 Centerline
- 60m Clearing Limit
- Potential Quarry Sites
- Water Course Crossing
- Reserve Boundary
- Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

12 of 24

P6b-X002

P6b-X001

Bunibonibee Cree Nation Traditional Territory

God's Lake First Nation Traditional Territory

P6 Centerline

60m Clearing Limit

Potential Quarry Sites

Water Course Crossing

Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

13 of 24

P6a-X036

P6a-X037

P6a-X038

God's Lake First Nation

- P6 Centerline
- 60m Clearing Limit
- Potential Quarry Sites
- Water Course Crossing
- Reserve Boundary
- Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

14 of 24

P6a-X035

P6a-X036

P6 Centerline

60m Clearing Limit

Water Course Crossing

Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

15 of 24

P6a-X032

P6a-X033

P6a-X034

P6a-X035

P6 Centerline

60m Clearing Limit

Water Course Crossing

Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

16 of 24

P6a-X028
P6a-X029
P6a-X030
P6a-X031
P6a-X032

P6 Centerline
60m Clearing Limit
Potential Quarry Sites
Water Course Crossing
Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

17 of 24

P6a-X024

P6a-X025

P6a-X026

P6a-X027

P6a-X028

Bunibonibee Cree Nation

God's Lake First Nation

Bunibonibee Cree Nation Traditional Territory

God's Lake First Nation Traditional Territory

- P6 Centerline
- 60m Clearing Limit
- Potential Quarry Sites
- Water Course Crossing
- Reserve Boundary
- Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

18 of 24

P6 Centerline

60m Clearing Limit

Potential Quarry Sites

Water Course Crossing

Elevation (m ASL)

P6a-X022

P6a-X023

P6a-X024

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

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P6a-X021

P6a-X022

P6a-X023

- P6 Centerline
- 60m Clearing Limit
- Potential Quarry Sites
- Water Course Crossing
- Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

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P6a-X018

P6a-X019

P6a-X020

P6a-X021

Magill Creek

- P6 Centerline
- 60m Clearing Limit
- Potential Quarry Sites
- Water Course Crossing
- Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

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P6a-X010
P6a-X011
P6a-X012
P6a-X013
P6a-X014
P6a-X015
P6a-X016
P6a-X017
P6a-X018

P6 Centerline
60m Clearing Limit
Potential Quarry Sites
Water Course Crossing
Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

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P6a-X006
P6a-X007
P6a-X008
P6a-X009
P6a-X010
P6a-X011
P6a-X012
P6a-X013

P6 Centerline
60m Clearing Limit
Potential Quarry Sites
Water Course Crossing
Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

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P6a-X004

P6a-X005

P6a-X006

P6 Centerline

60m Clearing Limit

Potential Quarry Sites

Water Course Crossing

Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Project 6
All-Season Road
5m Contour

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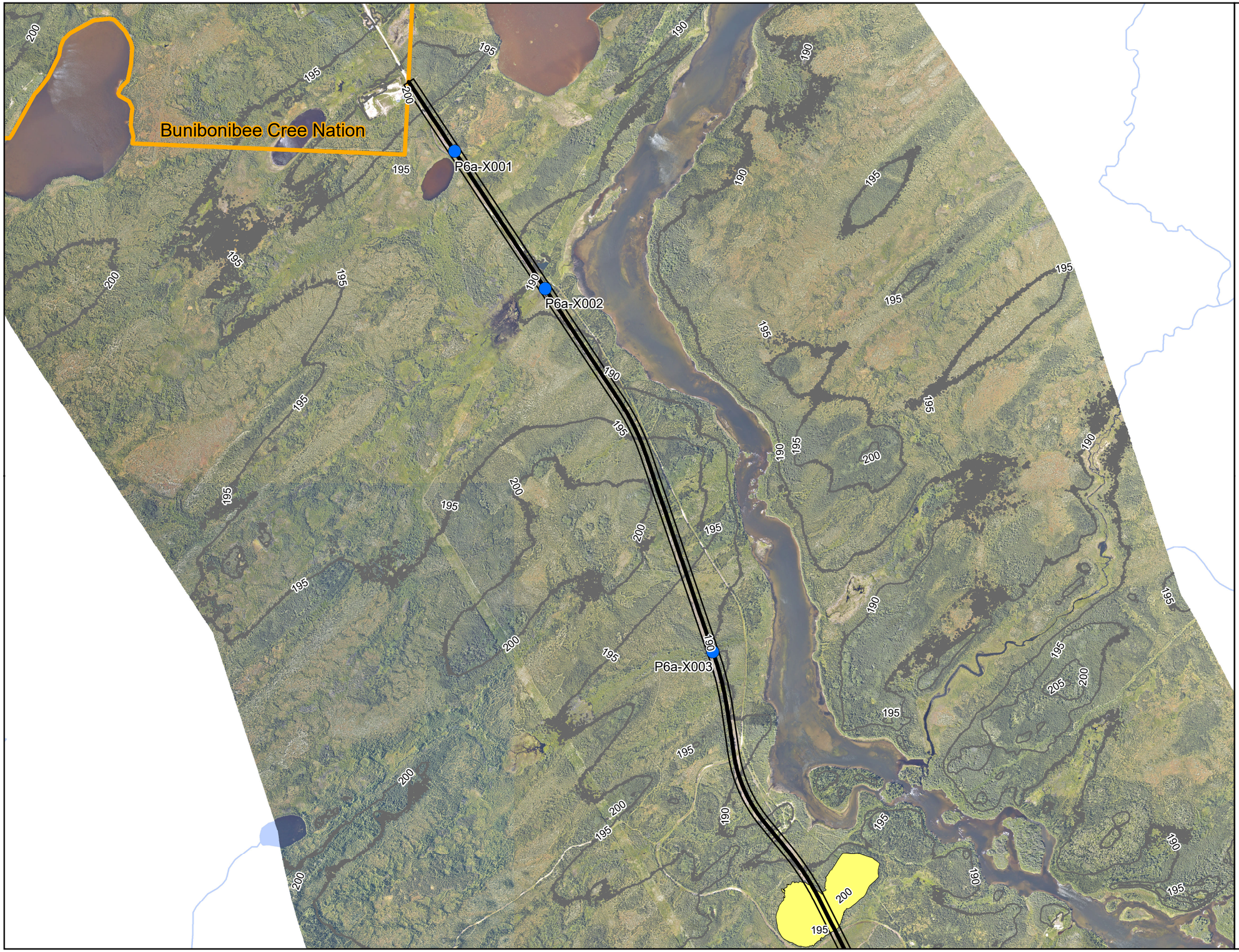

- P6 Centerline
- 60m Clearing Limit
- Potential Quarry Sites
- Water Course Crossing
- Reserve Boundary
- Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure