PR # 304 TO BERENS RIVER ALL-SEASON ROAD ENVIRONMENTAL ASSESSMENT

PROJECT DESCRIPTION

July 2009

Prepared for

East Side Road Authority

Prepared by:

SNC·LAVALIN

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AECOM

Disclaimer

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None of the material provided in this document represents final design of the Project, and no aspect is intended for construction purposes.

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1.0 GENERAL INFORMATION

1.1 General

The Government of Manitoba, in late 2008, announced its intention to conduct a strategic initiative to provide improved, safe and more reliable transportation service connecting the remote communities on the east side of Lake Winnipeg with the provincial highway system. The Government also announced its intention to proceed with construction of an all-season road (ASR) from Provincial Road 304 at Manigotagan to Berens River (PR 304 to Berens River) The East Side Road Authority (ESRA) was established as a provincial Crown Agency to manage the East Side Transportation Initiative (ESTI), including completion of an Environmental Impact Assessment, design and construction of the PR 304 to Berens River ASR.

This document provides a summary description of the proposed PR 304 to Berens River ASR.

The PR 304 to Berens River ASR Project comprises the following:

- upgrading of the existing 76 km Rice River forestry road north towards Bloodvein;
- extension and construction of Rice River road by 12 km to Bloodvein, utilizing the winter road or the hydro alignment; and
- construction of an ASR extension from Bloodvein to Berens River.

Four alternative route options were considered for the new road segment between Bloodvein and Berens River:

- the **shoreline route**, following the existing winter road alignment;
- the **inner shoreline route**, similar to the shoreline route but located further to the east to take advantage of soils conditions and provide crossings of major watercourses at narrower locations;
- the **central route**, identified further to the east of the inner shoreline route to take advantage of soils conditions; and
- a **revised shoreline route**, identified with input from potentially affected communities, taking advantage of existing corridors to minimize disturbance, and to avoid First Nation Reserve lands.

The revised shoreline route was selected as the preferred route. Details of how these route options were identified and compared are provided in the Route Selection Study, under separate cover.

The Recommended Alignment from Manigotagan (PR #304) to Bloodvein, is shown on Figure 1-1.

The all-season road will comprise a number of components and ancillary facilities, including:

- Bridges, culverts and structures for crossing watercourses;
- Staging areas;
- Maintenance areas;
- Access Roads;
- Borrow and quarry areas;
- Camp facilities;
- Water and wastewater treatment facilities; and
- Waste management facilities.

Construction of the PR 304 to Berens River ASR is scheduled to begin in the fall of 2010.

1.2 Project Location and Study Area

As shown on Figure 1-1, the Project is located on the east side of Lake Winnipeg in Manitoba, extending from Provincial Road PR 304 east of Manigotagan, north, approximately 155 km to Berens River. The segment of the road between Manigotagan and Bloodvein will follow the Rice River Road alignment, which generally follows the existing winter road/seasonal road. The segment of the road between Bloodvein and Berens River follows the Revised Shoreline Alignment option described above.

The study area for this Project has been identified through the Environmental Impact Statement (EIA) process, and includes communities, areas and features with the potential to be affected by construction and/or operation of the road, as shown on Figure 1-1. In general, the study area includes a number of First Nations whose traditional lands will be bisected by the road, as well as a number of Northern Affairs Communities that would be connected to the road. At this stage, potentially affected communities include the following:

First Nations (FN)

- Berens River First Nation
- Hollow Water First Nation
- Bloodvein First Nation
- Little Grand Rapids First Nation
- Pauingassi First Nation
- Poplar River First Nation

Northern Affairs Communities (NACC)

- Manigotagan
- Loon Straits
- Princess Harbour
- Seymourville
- Aghaming
- Berens River
- Pine Dock
- Matheson Island

Manigotagan/Seymourville and Berens River have Metis populations that have been engaged through the community consultation process. Initial discussions have also occurred with the Manitoba Metis Federation on the identification of Metis communities.

Land Use in the study area is shown on Figure 1-2.

As shown on Figure 1-1, the road begins at STA 00 + 000 **(1)** in the Hollow Water Area (UTM Coordinates - 5667939.475N 697536.898E). The initial 77 kilometres involves the upgrading of the Rice River Road to the Bloodvein FN community. From just north of the Bloodvein River, at Sta 85+133.231 (UTM Coordinates - 5738481.039N 663125.555E), a new road is then constructed to Berens River terminating at STA 156 +211.731 (UTM Coordinates – 5799349.082N 642855.071E)

Note 1: The proposed alignment is based on conventional station or chainage designations, where:

- **STA XXX** represents kilometre post 000 (PR 304 for this project); and
- **+ XXX.XXX** refers to the distance in metres measured horizontally from STA 000.

UTM Coordinates for key water course crossings are identified in Table 2.2.

1.3 Community Engagement

As shown on Figure 1-1A Community Engagement Program was commenced in March 2009 with public notice of Project Initiation. The Community Engagement Program has been designed to involve aboriginal, non-aboriginal and Métis community members at various levels, including leadership, elders, resource users, and the community at large.

Two rounds of community meetings are planned for the PR 304 to Berens River ASR EIA. Round 1 of the community meetings is nearing completion. All communities were provided opportunities to attend at least one public meeting within the community or a community nearby, at the outset of the EIA process, to discuss route alignments, EIA process and road design characteristics.

Round 2 of the community meetings will occur coincident with completion of the technical work for the EIA, to discuss selection of the recommended route alignment, the assessment of potential impacts, including mitigation measures, and the EIA process.

1.4 Ownership

It is intended that the PR 304 to Berens River ASR will be constructed exclusively on provincial Crown Land and will be owned and operated as a provincial highway.

1.4.1 Federal Involvement/Ownership

There is no federal government ownership of the project. The Project will not be located on federal land, including First Nation Reserve land, and all Project funding is from the Manitoba Government.

1.5 Regulatory Framework

The PR 304 to Berens River ASR is subject to both provincial and federal legislation and regulations. All approvals, permits and licenses required by applicable statutes will be obtained prior to development, in accordance with the law. A summary of key legislation is provided in the following sections.

1.5.1 Manitoba Environment Act

As a two lane road in a new location plus widening of an existing road in areas potentially sensitive to environmental disturbance, the Project constitutes a Class 2 development as defined by the Classes of Development Regulation under the Manitoba *Environment Act* (MEA).

ESRA initiated the MEA regulatory review process in March 2009 with submission of scoping document and an Environmental Act Proposal Form (Project Notification) to Manitoba Conservation; these documents have been posted on the provincial public registry at http://www.gov.mb.ca/conservation/eal/registries/index.html. Manitoba Conservation then circulated the Project Scoping and Notification documents to all potentially interested agencies within the Manitoba Government, for review and

comment, and to indicate their interest in continuing to participate in the process. Potentially interested federal agencies were also provided an opportunity to review the Project Scoping document.

1.5.2 Canadian Environmental Assessment Act

With respect to the *Canadian Environmental Assessment Act* (CEAA), it is anticipated that permits and authorizations for the project will be required under the *Fisheries Act* (FA) and the *Navigable Waters Protection Act* (NWPA). These permits and authorizations trigger an EIA under the Law List Regulation of CEAA. By prior agreement the PR 304 to Berens River ASR will require a screening level decision under the CEAA.

1.5.2.1 Fisheries Authorization

There are several rivers and several creeks, as well as several unnamed watercourses (creeks, streams and brooks) located within the immediate ASR Preferred Alignment. Fisheries Authorizations may be required for a number of watercourse crossings listed in Table 2-2 of this document including the following:

- Wanipigow River,
- Rice River,
- Bloodvein River,
- Bradbury River,
- Pigeon River, and
- Berens River.

1.5.2.2 Navigable Waters Authorizations

As part of the original environmental assessment studies conducted in 2005 for km 0-88 of the PR 304 to Berens River Road ("Rice River Road"), Transport Canada provided determinations that the following watercourses are navigable[1], and, therefore, subject to the provisions of the *Navigable Waters Protection Act* (NWPA) at the proposed crossing locations:

- Wanipigow River
- English Brook

[1] Reponses to Navigability Requests Al Jones. Navigable Waters Protection Officer. Transport Canada. August 19, 2005. Transport Canada File References: 8200-98-6160; 8200-98-6161; 8200-98-6162; 8200-98-6163; 8200-98-6164; 8200-98-6165; 8200-98-6166; 8200-98-6167; 8200-98-6168; 8200-98-6169; 8200-98-6170; 8200-98-6171

- Steeprock Creek
- Rice River
- Loon Creek
- Bloodvein backwater channel
- Bloodvein River
- Pakasekan Creek
- Longbody Creek

Whereas confirmation has not yet been obtained from Transport Canada for km 88-156 of the PR 304 to Berens River Road, it is anticipated that four or more watercourses along the new road alignment will be deemed navigable, including:

- Petopeko Creek
- Bradbury River
- Pigeon River
- Berens River

All crossings of streams determined as navigable by Transport Canada will be designed in accordance with the provisions of the NWPA and specific direction from Transport Canada.

1.5.3 Other Permits and Approvals

No other federal permits or authorizations are anticipated.

Other Provincial permits and authorizations that may be required for such activities as clearing, quarry and borrow pit development and operation, camp facilities, maintenance areas, water and wastewater treatment and disposal, and waste management.

No municipal permits are required.

A detailed permits and approvals register will be developed as design progresses.

1.5.4 Canada/Manitoba Agreement on Environmental Assessment Cooperation

The Project will be reviewed under the provisions of the March 2007 Canada/Manitoba Agreement on Environmental Assessment Cooperation.

The province will be the lead jurisdiction and the federal authorities will provide comment through the provincial process. The province will establish a Technical Advisory Committee to provide input into the EA process

1.6 Contacts

1.6.1 Name of the Proponent

The Project proponent is the East Side Road Authority (ESRA) Inc., a registered corporation wholly owned by the Government of Manitoba.

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1.6.2 Co-Proponent

There are no Co-Proponents for this project.

1.7 Document Distribution

The Project Description will be provided to the federal government through the Canadian Environmental Assessment Agency which will distribute the project description to other government departments with potential interest in the project. It is anticipated that this will include the following departments[2]:

- Fisheries and Oceans Canada (DFO)
- Environment Canada

[2] The listing of departments that the Canadian Environmental Assessment Agency circulated the Project Scoping document (Kris Frederickson, March 9, 2009, letter to Bryan Blunt. CEAA project number MP2008-078)

- Indian and Northern Affairs Canada (INAC)
- Health Canada
- Natural Resources Canada
- Parks Canada
- Public Works and Government Services Canada
- Transport Canada (TC)

Initial feedback on the Project was already provided by DFO, INAC and TC in response to the scoping document circulated earlier this year.

It will also be distributed to Manitoba Conservation which may make the document available in the public registry as well as to other provincial government departments that are members of the TAC. Any documents posted on the provincial public registry at http://www.gov.mb.ca/conservation/eal/registries/index.html will be linked to ESRA's Project web site.

2.0 PROJECT INFORMATION

2.1 Project Components and Structures

The length of the proposed PR 304 to Berens River ASR is 155 kilometres with an approximate area of 2000 hectares utilized for the Project.

The primary project components include:

- All-Season Road from PR 304 to Berens River (not including access roads on Reserve Lands);
- Water course crossing structures;
- Borrow and quarry areas to support both construction and operations and maintenance requirements;

Project components during construction will include

- Staging areas;
- Maintenance areas;
- Temporary Construction Camp facilities
- Temporary Construction Access Roads.

2.1.1 All Weather Road

The ASR is intended to be gravel surfaced roadway for the foreseeable future and will be centered within a 100 metre right-of-way (ROW). The cleared limit for the roadway will be 60 metres with additional clearing as required to maintain sight distances. The roadway ROW will be combined with the Manitoba Hydro transmission line ROW where applicable to reduce clearing requirements. The roadway will be constructed with two 3.7 metre lanes, 1.0 m shoulders and a 0.3 metre shoulder rounding allowance. This results in a total roadway top width of 10.0 metres which allows for future roadway surface upgrading without major embankment work.

In areas of rock excavation an 11.0 metre clearance will be provided on each side from overbreak (rockfalls) following blasting. Typical Roadway sections are provided in the Drawings Section at the end of the document.

The Geometric Design Criteria (GDC) to be used for this project was provided by Manitoba Infrastructure & Transportation (MIT). See Table 2.1 for key design component. The standards are based on standards for Secondary Arterial/Collector highways and modified to suit the surrounding conditions and function of the roadway.

Table 2.1: Preliminary ASR Geometric Conceptual Design Criteria [(1)]

Classification	**Secondary Arterial/Collector**
Estimated 10 Year Average Annual Daily Traffic	<300
Terrain	Rolling
Design Speed	100 km/h
Gradient – Maximum Percentage	6 %
Posted Speed	50 -80 kph
Minimum Stopping Sight Distance	200 m
Minimum Passing Sight Distance	680 m
Minimum Vertical Curve “K” Values [(2)]	$K_c = 70$, $K_s = 50$
Curvature – Minimum Radius	440 m
Lane Width and Number	2 lanes at 3.7 m
Shoulder Width	1.0 m each side
Shoulder Edge Treatment	0.30 m each side
Total Right of Way Width	100 m (60m cleared)
Truck Use (Percentage of AADT)	10% Assumed
Truck Haul Type	Supply/Haulage
Roadbed Width	15.4 metres & 13.8 metres
Roadway Fill Slope	4H:1V
Ditch Bottom Width	3.5 min. (4.5 – 6.0 m desirable)
Ditch Back Slope	3H:1V
Clear Roadway Minimum Width on Structure	Short < 60 m, 9.6 m

Note: 1. See General Structures and Section - Drawing TR-06
2. Parabolic curves are defined by the K value: the length of curve divided by its change in grade %.

The proposed ASR involves upgrading the portion of the existing Rice River Road from PR304 to the Bloodvein River, and a new road alignment onwards to the Berens River First Nation.

Based on ground truthing, field surveys and geometric design criteria, the functional alignment originally proposed in the 2005 UMA Functional Design Report from Loon Straits to the Bloodvein FN was refined. The new recommended functional alignment from the Bloodvein FN to Berens River FN was initially determined using satellite imagery and then further refined using ortho-corrected aerial imagery.

South of the Bloodvein River, minor adjustments were made to the original alignment to make better use of the existing winter road embankment. The proposed centreline was re-positioned on the surveyed existing winter road centerline to the maximum extent possible so as to minimize disturbance. Based on the ground truthing the alignment was adjusted to minimize areas of unsuitable subgrade and to minimize excessive rock excavation.

For the road segment extending just north of the Bloodvein River to the Bloodvein FN adjustments to the functional alignment were made to minimize clearing of virgin timber, maximize the use of the Manitoba Hydro right of way and to avoid culturally significant areas.

For the section from the Bloodvein FN to the Berens River FN the recommended alignment generally follows the existing winter road and Manitoba Hydro ROW to a location south of the Pigeon River IR (km 132). At this point the alignment turns to the northeast crossing the Pigeon River and the Berens River and terminates just east of the Berens River FN east boundary.

Functional Alignment Drawings of the proposed road from PR304 (km 0) to Berens River FN (km 155) can be found in the drawing section at the end of the document.

In areas of bridge construction additional working room may be required to facilitate the bridge construction. Clearing and grubbing will include the removal of all trees, vegetation, and roots within the 60 metre construction work zone. Trees will be salvaged to the maximum extent possible for merchantable timber and fire wood. Typically clearing and grubbing will take place during the winter periods and predominately during the first winter.

Based on the lane, shoulder, shoulder edge treatment widths, sideslopes and ditch width indicated in the GDC, typical standard cross sections have been developed for each of the various subgrade types to be encountered on Rice River Road. The subgrade types are expected to include; suitable subgrade (gravel, clay, rock), or unsuitable subgrade

(peat). Recommendations for embankment construction techniques in areas of unsuitable subgrade Ranges of anticipated consolidation values are also indicated where the peat may be too thick to be totally excavated. Typical roadway construction practices in conformance with Manitoba Infrastructure and Transportation Standard

Construction Specifications are anticipated to be used in rock excavation areas and areas of suitable subgrade material.

Typical road cross-sections and structures plan/sections can be found in drawing RT 06.

2.1.3 Watercourse Crossings and Bridge Structures

The proposed all-season road will pass through localized rock areas, low-lying lacustrine and marsh environment areas and cross a number of continuously flowing watercourses. There are seven rivers and several creeks, as well as several unnamed watercourses located within the immediate ASR Preferred Alignment.

Currently there is limited geotechnical and hydraulic data available for inclusion into the functional design. Hydraulic and geotechnical work will be conducted to determine channel depths and foundations conditions. Hydraulic analysis will be conducted to determine sizing and fish passage requirements.

The crossing structures will be constructed using a combination of CSP culverts, box culverts, clear span and multi-span bridges, where applicable. The culverts may involve either closed or open bottom designs depending on fisheries sensitivities. Where culverts cross fish habitat the culverts will be sized to accommodate fish passage requirements a specified in the *Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat.*

There are four existing temporary bridge structures on the Rice River Road from PR 304 (km 0) to south of the Bloodvein River (km 76.8). These structures will require replacement to both bring them up to Provincial Road Standard and to remove any constraints to the transportation of material and equipment to the northern project area.

The preliminary design is being undertaken for the Wanipigow River Bridge.

The existing bridge structures include:

- Wanipigow River (km 0.8) – Existing Bailey bridge (width restricted, 3.5 m width), rated to 59 tonnes.
- English Brook (km 2.1) – Existing Acrow panel bridge (RTAC loading, 7.3m width).

- Steeprock Creek (km 16.0) – Existing Acrow panel bridge (RTAC loading, 7.3 m width).
- Rice River (km 30.0) – Existing timber stringers on concrete abutments (HS 25 truck loading, 7.2 m width)

For the section starting south of the Bloodvein River (km 76.8) and going north to Berens River FN, six major structures have been identified:

- Bloodvein River Backwater Channel (km 77.4), (proposed box culvert) ;
- Bloodvein River (km 77.5), main channel (proposed 36 m long, single span bridge structure with 1.5m deep structural steel girders);

- Longbody Creek (km 84) (proposed 42 m long, single span bridge structure with 1.5m deep structural steel girders);
- Bradbury River (km 110), (proposed 116 m long, multi-span bridge structure with 1.5 m deep structural steel girders),
- Pigeon River (km 133), (proposed 91 m long, multi-span bridge structure with 1.5 m deep structural steel girders),
- Berens River (km 155), (proposed 76 m long, multi-span bridge structure with 1.5 m deep structural steel girders),

In addition, locations where large culverts or bridges may be required have been identified as follows;

- Loon Creek (km 53),
- Pakasekan Creek (km 82),
- Petopeko Creek (km 91),
- Creek Crossing 3 (km 91),
- Creek Crossing 10 (km 144) and
- ten other un-named creek crossing locations.

The characteristics and proposed dimensions of the crossings from Bloodvein to Berens River are included in Table 2.2

Table 2.2 Watercourse Crossing Details

UID	Crossing	Station	Northing	Easting	Estimated Channel Width (m)	Assumed Water Width (m)	Abutment Offset (m) North	Abutment Offset (m) South	Total Length (m)	Catchment (km^2)	Flow (m^3/s) 10%	Flow (m^3/s) 1%	Structure Type	Culverts Single	Culverts Double	Culverts Triple
1	Wanipigow River	0+576.500	5668408.496	697496.620	12	9	7	7	23	1,466	77.44	136.04	Single Span Structure	-	-	-
2	English Brook	2+035.147	5669819.276	697370.790	20	15	15	15	45	343	22.83	36.04	Single Span Structure	-	-	-
3	Steeprock Creek	17+072.000	5681073.135	688203.723	9	7	4	4	15	30	3.82	5.84	Single Span Structure, Box or Multiple Culverts	-	1800	1500
4	Rice River	30+827.200	5692216.950	681253.980	11	7	1.48	1.48	9.96	587	33.82	53.41	Single Span Structure	-	-	-
5	Loon Creek	53+100.800	5710554.284	672094.622	16	7	4	4	15	77	8.94	15.71	Open or Closed Bottom Structure or Multiple Culverts	-	-	2400
6	Creek	61+954.800	5717441.070	667025.863	10	7	4	4	15	87	9.77	17.16	Open or Closed Bottom Structure or Multiple Culverts	-	-	2400
7	Bloodvein Backwater Channel	77+402.326	5731067.063	663955.193	13	10.515	n/a	n/a	10.515	1	0.22	0.40	Open or Closed Bottom Structure or Multiple Culverts	900	600	
8	Bloodvein River	77+490.600	5731155.310	663957.385	30	28	4	4	36	9,091	295.01	518.26	Single Span Structure	-	-	-
9	Pakasekan Creek	82+923.266	5736322.689	663344.288	10	7	4	4	15	57	7.16	12.58	Open or Closed Bottom Structure or Multiple Culverts	-	-	2200
10	Longbody Creek	84+528.451	5737883.472	663362.133	30	28	7	7	42	318	25.24	44.35	Single or Multi Span Structure	-	-	-
11	Creek	85+191.011	5738534.762	663104.286	34	12	4	4	20	1	0.10	0.18	Culvert	600		
12	Petopeko Creek	90+908.187	5743626.958	660674.101	25	22	7	7	36	14	2.21	3.97	Single Span Structure, Box or Multiple Culverts	2200	1500	
13	Creek	91+312.577	5744059.297	660568.827	28	22	7	7	36	2	0.35	0.64	Single Span Structure, Box or Multiple Culverts	1200	900	600
14	Pond	92+911.775	5745485.499	659969.111	65	12	4	4	20	19	2.86	5.07	Single Span Structure, Box or Multiple Culverts	2400	1800	1500
15	Pond	93+514.382	5746008.294	659669.411	26	12	4	4	20	9	1.50	2.69	Box or Multiple Culverts	1800	1500	1200
16	Creek	99+723.057	5748972.215	654724.209	26	12	4	4	20	0	0.03	0.06	Culvert	600		
17	Pond	109+392.942	5757876.944	653053.667	199	12	4	4	20	1	0.16	0.30	Single or Multiple Culverts	900	600	
18	Bradbury River	110+326.470	5758705.263	652708.115	80	77	7	7	91	556	37.94	65.69	Multi Span Structure (minimum 2 river piers anticipated)	-	-	-
19	Creek	121+748.960	5768094.861	646795.389	15	12	4	4	20	2	0.31	0.56	Single or Multiple Culverts	900		600
20	Creek	123+839.320	5769130.541	644990.182	16	12	4	4	20	5	0.81	1.47	Box or Multiple Culverts	1500	1200	900
21	Creek	125+244.522	5770034.09	643933.828	48	12	4	4	20	2	0.35	0.64	Box or Multiple Culverts	1200	900	600
22	Creek	129+231.324	5773830.180	642749.020	15	12	4	4	20	28	3.97	6.94	Multiple Culverts	-	2000	1800
23	Pond	131+385.695	5775952.728	642380.097	31	12	4	4	20	7	1.18	2.12	Box or Multiple Culverts	1800	1200	
24	Creek	132+749.678	5777283.301	642094.451	15	12	4	4	20	10	1.56	2.82	Box or Multiple Culverts	1800	1500	1200
25	Creek	139+811.353	5784108.086	641781.541	17	12	4	4	20	0	1.56	2.82	Box or Multiple Culverts	1800	1500	1200
26	Pigeon River	140+581.862	5784770.476	642159.702	75	72	12	7	91	16,000	445.29	771.12	Multi Span Structure (minimum 1 river pier anticipated)	-	-	-
27	Creek	142+469.527	5786468.179	642152.269	25	12	4	4	20	2	0.38	0.68	Single or Multiple Culverts	1200	900	600
28	Creek	144+955.930	5788766.793	642241.688	24	22	7	7	36	4	0.69	1.24	Box or Multiple Culverts	1500	900	
29	Creek	145+472.300	5789281.031	642288.536	15	12	4	4	20	12	1.86	3.35	Single Span Structure, Box or Multiple Culverts	2000	1500	1200
30	Creek	151+194.366	5794723.499	643906.899	15	12	4	4	20	3	0.51	0.92	Single or Multiple Culverts	1200	900	
31	Creek	152+187.247	5795714.984	643859.487	17	12	4	4	20	4	0.56	1.01	Single or Multiple Culverts	1200	900	
32	Creek	155+263.296	5798429.624	642708.365	16	12	4	4	20	1	0.14	0.25	Single or Multiple Culverts	900	600	
33	Berens River	155+761.990	5798915.696	642734.893	55	52	12	12	76	16,000	445.29	771.12	Multi Span Structure (minimum 1 river pier anticipated)	-	-	-

2.1.5.1 Structure Design Criteria and Assumptions

The general design criteria and assumptions used for the bridges and structures are to be in accordance with AASHTO – LRFD Bridge Design Specifications (Latest Edition) as required by MIT. Additionally, the structure designs shall have a design loading to HSS40 and comply with the MIT Structures Design Guide.

The following design criteria and assumptions were referenced for bridges greater than 30m over the large river crossings:

- Channel widths were taken from ortho-corrected aerial mosaics and field surveys were possible.
- Depth from water to underside of girder was assumed to be 3m to approximately allow for navigation of small watercraft, increased flood flow and nominal freeboard.
- Bridges assume an abutment offset 7m from the waters edge.
- On bridges where crossing locations are much narrower than the upstream and downstream channel, a 12m abutment offset is assumed onto land outcroppings.
- Total bridge length is the sum of the river water width, abutment offset, and river width added for hydraulic assumptions.
- Floodplain/marsh width is estimated based on aerial imagery and hydraulic modeling where applicable.
- Bridge width is assumed to be 10m plus two 0.6m curbs/guardrails.
- Rock fill approaches are assumed.
- River crossing bridges are assumed to be multi-span for the larger crossings.

For creek crossings using smaller bridges and large culverts the following design criteria was referenced:

- For channel widths less than 15m, a water width of 12m plus a 4m offset for each abutment was assumed for a total length 20m.
- For channel widths between 15m to 25m a water width of 22m on average plus a 7m offset for each abutment was assumed for a total length of 36m.
- Bridge clear width is assumed to be 9.6 m plus two 0.6m curb/guardrails.
- All bridges for creek crossings are assumed to be single span. However, multi-span bridges may be selected based on the site conditions and bridge costs.
- All crossings are assumed to be small bridges but many crossings could potentially be large multi-cell concrete culverts or multiple large steel culverts.

Preliminary culvert locations have been identified from the limited hydraulic modeling undertaken using existing data. (see Table 2.2)

2.1.3 Quarries and Borrow Areas

Aggregate for the road bed will be derived from local borrow sources and rock quarries established for the project. It is assumed that the supply of this construction material will be through third-party and local Aboriginal suppliers.

Borrow areas identified for local fill, sand, aggregate and crushed rock are shown on the functional alignment and will be provided in the Environmental Assessment Document.

2.1.4 Construction Staging Areas

Construction staging areas for the mainline road sections will be established at quarry and bridge crossing locations.

Each of the major bridge crossing areas will also have a construction staging area to store equipment and materials brought in during the winter periods that will be used during construction during the rest of the year. Staging for these locations will be confined to the proposed right-of-way, where possible.

2.1.5 Access Routes

The Preferred ASR Alignment is situated in close proximity to segments of the existing Rice River and existing Winter Road eliminating the fragmentation of the existing natural areas by establishing new rights-of-way. The existing winter road will also provide a means of accessing the right-of way during the early stages of construction.

Local access routes will be established to access the borrow pits and quarry sites to provide construction aggregate and fill for the road base. The majority of these borrow areas will be rehabilitated upon the completion of construction except for those borrow areas that will be retained to supply material for road maintenance purposes.

The major water courses and sections of the existing winter road(s) may also serve as a means of access to the bridge work sites and adjacent areas by workers involved in the construction works.

2.1.6 Temporary Construction Camp Facilities

Temporary Camp facilities will be constructed at various locations along the ROW. These facilities may include associated ancillary water and waste water treatment facilities, waste management facilities or services, and waste disposal areas.

2.2 Project Activities

Detailed Design of the PR 304 to Berens River ASR is scheduled to take place in Winter/Spring of 2010 and Tendering in Spring 2010. Project approvals are anticipated to enable start of construction in the fall of 2010.. Construction is expected to extend over a period of approximately 42 months, with substantial completion by March 2014. However, it is anticipated there will be segments of the ASR completed and operational prior to March 2014.

2.2.1 All-Weather Road

The Manigotagan-Berens River (PR 304 to Berens River) All Weather Road (ASR) is proposed to be constructed along the east side of Lake Winnipeg from PR304 to Berens River. Currently Manitoba Infrastructure & Transportation (MIT) has tendered a Heavy Maintenance contract to replace several culverts and haul, place and grade Traffic Gravel Class D material on the segment from km 0 (PR 304) to km 48.5 (Loon Straits Access Road).

From Bloodvein River to Berens River, clearing of a new right-of-way will be required. The detailed road design and preliminary bridge design for the segment from Loon Straits (km 48) to the Bloodvein First Nation (km 88) is underway. The proposed functional alignment from the Bloodvein FN to Berens River (km 88 to km 158) crosses a variety of rivers and creeks and has been developed identifying the location of the road right-of–way (ROW), bridge crossings and large culverts.

For road construction in the Canadian Shield typical construction techniques involve the clearing and grubbing of the trees and organic materials. In areas where timber can be salvaged, chainsaws or mechanical cutting and equipment may be used. For areas where it may not be necessary to re-use the trees mechanical brushing equipment (i.e. hydro-axes) may be used and dozers, excavators and trucks used to remove the overburden.

The material for the road fills may consist of blasting and crushing of granite materials in sufficient quantities to maximize the cut/fill balance while minimizing overhaul distances. Typical equipment used in the quarry operations include primary and secondary crushers fed using large front end loaders and stockpiled using a combination of loaders and trucks. The quantity of these units is variable based on the Contractors schedule, rock type and crusher hourly capacity. Typically a single shift will utilize up to 4 to 6 people to operate a single crusher.

For excavation, large excavation equipment will be utilized to remove the unsuitable material to competent subgrade. Depending on the time of year, schedule and type of unsuitable material, the size and number of these units will vary. In some areas that are difficult to access, large drag lines may be used to cast and remove unsuitable material. The road is then advanced using blast rock hauled by large trucks and moved into place with dozers. These operations may involve up to 50 or more people per shift for a given location.

Final road structure construction consists of a crushed rock subgrade (maximum aggregate size of 150mm), a sand layer and a surface type of a graded aggregate. The crushed rock and graded aggregate will be provided by the various quarries along the alignment. Blasting will occur at these locations. Sand materials may have to be hauled from an external site if no sand can be found within the project limits. These materials are hauled, placed, graded and compacted using various loaders, trucks, graders, dozers and compaction equipment. Typically these operations may involve up to 50 people per shift

2.2.2 Crossing Structures

Bridge and crossing construction activities will vary depending on structure type, site access and foundation conditions. Typically clearing and grubbing of tress and organic materials will occur, foundation construction through excavation and drilling and assembly and installation of steel girders and bridge deck. Other activities will include erosion and sediment control and installation of and rip rapping during construction and re-vegetation monitoring post construction. Materials are hauled, placed, graded and compacted using various loaders, trucks, graders, dozers, compaction and crane equipment.

Bridge construction at the key watercourses will require more specialized crews than the general road construction crews (e,g. foundation specialists, crane operators, and form assembly specialists, etc.). The number of workers at each bridge location will vary depending upon the tasks being undertaken. The number of workers at bridge construction sites could typically range between 10 – 50 workers.

2.2.3 Temporary Facilities

During construction, temporary support infrastructure including access roads, staging areas, quarries and camps will be located near or adjacent to the ASR alignment. During the construction the site will be cleared and any topsoil from the site will be stripped and stored for later use. There may be opportunities to transfer ownership of certain facilities (e.g. camps) to ESRA after construction ceases.

2.2.4 Decommissioning

The ASR is expected to operate for at least the next 50 to 100 years so decommissioning activities will not be required in the foreseeable future.

A Decommissioning Plan related to temporary construction facilities will be developed during design and a complete and a comprehensive decommissioning plan will be prepared early during construction, specifying the activities that will be undertaken during the decommissioning and abandonment phase of the project.

All facilities and works areas that will not be retained for future maintenance activities will be decommissioned. This will be done at various stages progressively during construction as areas (e.g. staging areas, borrow pit etc) become available and at the end of road construction activities.

Construction related sites to be decommissioned and reclaimed will be recontoured and restored so that the pre-disturbance conditions (e.g. vegetation) can re-establish itself in a short period of time. Reclamation will be limited to disturbed areas of the site.

Close attention will be paid to areas where erosion potential is high. Large plots of land such as staging areas, borrow pits, and main camp sites will be revegetated and maintained until plant growth is established. Disturbed areas where temporary construction facilities existed will be returned to natural contours where possible.

2.2.5 Proposed Schedule

The Project will be constructed in stages as proposed in the following sections and as illustrated on Figure 2-1.

<u>Staging and Implementation</u>

As indicated in the UMA 2005 Functional Design Report, the Rice River Road project was originally broken down into four Stages involving the section of roadway from the Bloodvein First Nation (Station 88+511.30) south to PR 304 (Station 0+100). Due to the increased scope of the work a refinement of the initial staging plan has been proposed in order to address the extension of the project to include works north of the Bloodvein FN to the Berens River FN. A revised staging plan is as follows;

Stage 1

Once all necessary documentation and agreements have been concluded, clearing and grubbing of the ROW of the recommended alignment could begin at the Berens River FN (km 155) and work south towards the Pigeon River (km 141). Clearing would also be required for the access road and work area for a proposed new quarry site south of the Berens River.

Once access to the quarry site has been completed blasting and mobilization of crushing equipment to the quarry site south of Berens River could begin. Additionally new quarry sites could be developed and crushing operations could begin south of the Pigeon River crossing location (km 133). It has been proposed that a new camp site be set up at the location of the old Abitibi site just south of the Pigeon River to accommodate quarry operation personnel.

Clearing and grubbing could also begin along the recommended alignment from the Bloodvein FN (km 85.1) towards Petopeko Creek (km 90.9) and the Bradbury River (km 110.3).

This stage also includes as part of an external stand-alone project, a Heavy Maintenance Contract currently underway by MIT which includes mechanical brushing of the existing Rice River Road ROW, minor culvert replacement and gravelling of the existing roadway surface, from PR 304 (km 0) to the Loon Straits access road (km 48.5).

Stage 2

This stage would involve the construction of approximately 9.9 km of a new All-Weather Road (AWR) from Bloodvein First Nation (km 85.1) along a new alignment south to intersect the existing Winter Road at km 75.2. This stage would include construction of bridges at Longbody Creek (km 84.5) and the Bloodvein River (km 77.5) and larger box culverts at Pakasekan Creek (km 82.9), the Bloodvein backwater channel (km 77.4) and Loon Creek (km 53.1).

It also includes the upgrading and realignment of approximately 28.3 km of the existing Rice River Road from the end of the existing Winter Road (km 75.2) south to the Loon Straits access road (km 48.5).

Stage 3

During this stage construction of the AWR could begin at the Berens River FN working south towards the Pigeon River including the construction of the larger structure at Creek Crossing 28 (km 145) and the smaller crossings. As well, replacement of the bridges and reconstruction of the road south of the Loon Straits access road (km 48.5) to PR304 (km 0) could be undertaken.

Stage 4

Once access to the Pigeon River crossing is established, construction of the Pigeon River bridge (km 140.6) could begin. Additionally, work on the construction of the AWR could continue south from the Pigeon River and north from the Bloodvein FN. This would include construction of the larger creek crossings at Petopeko Creek (km 90.9), Creek Crossing 13 (km 91.3) and the smaller crossings.

Stage 5

This stage could involve the construction of new structures at the Berens River (km 155.8), the Bradbury River (km 110.3) and completion of the remaining AWR sections.

Preliminary Schedule

Based on the proposed functional staging a preliminary schedule has been developed and presented in Table 2.3.

Table 2.3 Preliminary Construction Schedule

Construction Stage	Start	Finish	Duration
Stage 1: Berens River to Pigeon River/PR304 to Loon Straits			
ROW Clearing	Fall 2009	Fall 2010	12 months
Crushing	Fall 2009	Spring 2011	18 months
Heavy Maintenance Work km 0 to km 48.5	Fall 2008	Fall 2009	12 months
Quarry Access Roads	Fall 2009	Winter 2009/2010	6 months
Camp Site Development at Pigeon River	Winter 2009/2010	Spring 2010	6 months
Stage 2: Loon Straits to Bloodvein First Nation			
ROW Clearing	Winter 2009/2010	Spring 2010	6 months
Crushing	Winter 2009/2010	Fall 2010	9 months
Bridge Culvert Works	Fall 2010	Spring 2012	18 months
Quarry Access Roads	Winter 2009/2010	Spring 2010	6 months
All Weather Road km 48.5 to km 88.5	Fall 2010	Spring 2012	18 months
Stage 3: Berens River to Pigeon River/Loon Straits to PR304			
ROW Clearing	Fall 2010	Spring 2011	6 months
Crushing	Spring 2011	Spring 2013	24 months
Bridge Culvert Works	Fall 2011	Spring 2013	18 months
All Weather Road km 141 to km 155	Fall 2010	Fall 2011	12 months
All Weather Road km 0 to km 48.5	Spring 2012	Fall 2013	18 months
Stage 4: Pigeon River to Bradbury River			
Bridge Culvert Works	Fall 2011	Fall 2012	18 months
All Weather Road km 110.5 to km 141	Fall 2012	Fall 2013	12 months
Stage 5: Bradbury River to Bloodvein First Nation/Berens River			
Bridge Culvert Works	Fall 2013	Spring 2014	12 months
All Weather Road km 88.5 to km 110	Spring 2013	Spring 2014	12 months

2.3 Resource Material Requirements

2.3.1 Specialized Production Requirements

Production processes associated with this project will include the development of new quarry sites. Blasting and crushing of granite materials at new quarry sites will be undertaken to provide construction materials for the roadway and access roads to the quarry sites. Certain select quarry sites will remain operational after construction has been completed to provide materials for road maintenance.

2.3.2 Raw Materials Required

Based on terrain type analysis, aerial photography and the geometric design criteria, a Class D quantity estimate was prepared to identify the scope of materials that may be used in the construction of the 156 km All Weather Road (AWR) from PR 304 to Berens River. Note that the first 76 km is comprised mainly of the existing winter road and it is expected that the proposed road will generally follow the alignment provided by the 2005 UMA Functional Design Report. This road will consist of a mass/balance of cut and rock/composite fills primarily sourced within the existing right-of-way (ROW). For the preferred alignment from km 76 (Bloodvein River) to km 141 (Pigeon River), it again generally follows the alignment of the existing winter road. In this section however it is expected that some of the rock quantity required for fill will be sourced from various quarry sites adjacent to and within the proposed ROW. The section from km 141 (Pigeon River) to km 156 (Berens River will be constructed on a new location through rock, fen and swamp areas. It will also require suitable rock material sourced from quarries adjacent to the ROW. Table 2.4 contains a quality estimate of earthwork materials for the Project.

Final road structure construction consists of a crushed rock subgrade (maximum aggregate size of 150mm), a sand layer and a surface type of a graded aggregate. The crushed rock and graded aggregate will be provided by the various quarries along the alignment. Sand materials may have to be hauled from an external site if no sand can be found in the vicinity of the project.

It is estimated that nearly 3 million tonnes of crushed rock will be required for the construction of the road structure. For fill material it is estimated that over 1 million cubic meters of blast rock will be required. In areas of unsuitable subgrade it is estimated that nearly 2.7 million cubic metres of rock and composite excavation will be required.

Small quantities of typical building materials including timber, concrete, steel, etc. may be used to construct work camps, field stations and other structures.

Energy requirements will be typical for construction activities including fuel for machinery as well as small quantities to generate electrical power and heat at work camp locations and construction sites. Portable solar power at work camps and construction sites may also be used as appropriate. Where feasible, hydro electric power from grid sources will be accessed for electrical needs.

Water from local water sources may be utilized for dust control.

2.4 Waste Management and Disposal

The project will draw a significant number of workers from the local FN communities and which will minimize the number of temporary construction camps that will be required.

Waste will be collected and stored temporarily in bins located at each temporary construction camp. Recylable materials will be segregated and stored in designated areas for removal as conditions permit from each of the camp areas.

Small waste disposal sites (landfills) may be established to address waste that can not be removed from the camp sites along the right-of-way, or from accessible waterways during the initial stages of road construction.

Septage from small temporary camps would be disposed of in accordance with provincial regulations.

2.4.1 Hazardous Material Management and Disposal

Hazardous materials used during construction principally involves the fuel and lubricants used by the construction vehicle fleet, portable gensets, and other portable equipment (e.g, pumps). Waste oils and lubricants derived from vehicle and equipment will be collected and stored until removed from site for recycling or disposal through a waste services company.

Soils contaminated through spills during any construction activity will be addressed through clean-up procedures and removal where practical. Bioremediation sites may be established subject to the approval of regulatory authorities.

Table 2.4 Proposed All-Season Road: Preliminary Material Quantities Estimate – Earthworks

PR304 TO BERENS RIVER PREFERRED ALIGNMENT QUANTITY ESTIMATE

Design Criteria	Design Parameter
Road Structure X-Section	9.57 m2
Top Width	10.0 m
Ditch Slopes	4 to 1

Road Structure	Road Structure Area m2
100 - Traffic Gravel Class "D" Modified	1.03
75 - Sand	0.87
500 (min.) - Crushed Rock Subbase (150 Minus)	7.67

Terrain Types	
G+S	Gravel + Swamp
L	Lacustrine
L+R	Lacustrine + Bedrock
L+S	Lacustrine + Swamp
M	Muskeg
M+R	Muskeg + Bedrock
R	Bedrock
R+L	Bedrock + Lacustrine
R+S	Bedrock + Swamp
S	Swamp
S+G	Swamp + Gravel
S+L	Swamp + Lacustrine
S+L+R	Swamp + Lacustrine + Bedrock
S+M	Swamp + Muskeg
S+R	Swamp + Bedrock

M-BR Revised Shoreline 2 Alignment Quantity Estimates Station 88+840 to Station 156+760

Terrain Type	Terrain Segment Length (km)	Rock Fill Area (m2)	Rock Fill Quantity per Segment (m3)	Road Structure Quantity per Segment (m3)			Excavation (m3)		
				Traffic Gravel Class "D" Modified	Sand	Crushed Rock Subbase (150mm Minus)	Ditches	Roadway	Composite
G+S	1.7	11.63	19,771	1,751	1,479	13,039	18,224	19,774	37,998
L	11.6	11.63	134,908	11,948	10,092	88,972	124,352	134,931	259,283
L+R	10.0	15.10	151,000	10,300	8,700	76,700	107,200	150,993	258,193
L+S	3.8	12.79	48,602	3,914	3,306	29,146	40,736	48,593	89,329
M	5.7	34.75	198,075	5,871	4,959	43,719	61,104	198,063	259,167
M+R	1.9	30.12	57,228	1,957	1,653	14,573	20,368	57,237	77,605
R	5.8	23.19	134,502	5,974	5,046	44,486	62,176	134,502	196,678
R+L	3.8	18.57	70,566	3,914	3,306	29,146	40,736	70,554	111,290
R+S	5.2	20.88	108,576	5,356	4,524	39,884	55,744	108,567	164,311
S	5.1	16.26	82,926	5,253	4,437	39,117	54,672	82,901	137,573
S+G	1.3	12.79	16,627	1,339	1,131	9,971	13,936	16,624	30,560
S+L	7.4	15.10	111,740	7,622	6,438	56,758	79,328	111,735	191,063
S+L+R	3.5	15.10	52,850	3,605	3,045	26,845	37,520	52,848	90,368
S+M	1.5	22.03	33,045	1,545	1,305	11,505	16,080	33,051	49,131
S+R	0.9	18.57	16,713	927	783	6,903	9,648	16,710	26,358
Sub-totals	**68.2**	**278.61**	**1,237,129**	**71,278**	**60,204**	**630,784**	**741,824**	**1,237,083**	**1,978,907**

Note: Quantity estimates based on the Revised Shoreline 2 Terrain Summaries Provided by JD Mollard & Associates May 20, 2009

Rice River Road Functional Alignment Quantity Estimates Station 0+100 to Station 88+840

Station Sections	Terrain Segment Length (km)	Rock Excavation Quantity per Segment (m3)	Road Structure Quantity per Segment (m3)			Excavation (m3)
			Traffic Gravel Class "D" Modified	Sand	Crushed Rock Subbase (150mm Minus)	Composite
0+100 to 48+900	48.8	45,300	48,130	39,056	310,191	358,300
48+900 to 75+100	26.2	19,600	26,652	20,944	177,048	173,300
75+100 to 88+840	13.7	7,700	13,391	10,833	90,191	81,900
Sub-totals	**88.7**	**72,600**	**88,173**	**70,833**	**577,430**	**613,500**

Note: Quantity estimates based on the 2005 UMA Functional Design Study

	Component	m3	tonnes
Quantity Estimate Summary PR304 to Berens River	Traffic Gravel Class "D" Modified	159,449	366,733
	Sand	131,037	235,867
	Crushed Rock Subbase (150 Minus)	1,108,194	2,327,207
	Composite Excavation	2,592,407	n/a
	Rock Fill	1,237,129	n/a
	Rock Excavation	72,600	n/a

3.0 PROJECT SITE INFORMATION

3.1 Location

The proposed ASR Project is located on the east side of Lake Winnipeg in Manitoba, extending from PR 304 to the Berens River. The road will follow the existing Rice River Road and logging road from PR 304 to the Bloodvein River, with upgrades completed as required. The road will continue north to Berens River First Nation

The proposed Project, the ASR is shown in Figure 1-1. Water crossings, access roads, quarry sites will be associated with the ASR. Temporary construction camps and small landfill sites may also be developed in the area of the identified quarry sites.

3.2 Environmental Features

The topography generally maintains an elevation of 230 metres above sea level (masl), however, the elevation varies from approximately 220 to 250 masl in various areas throughout the project area. The elevation is typically around 220 masl, near many of the rivers, Lake Winnipeg, east of the Northern Affairs Community of Loon Straits, as well as the area between the Pigeon River and Berens River. South of the Rice River to Provincial Road 304, the elevation varies between 230 and 240 masl though raises in elevation to 250 masl east of the Northern Affairs Community of Aghaming. (Natural Resources Canada 2009).

3.2.1 Surficial Geology

The surface geology in the project area is a mixture of quaternary and pre-quaternary sediments. Generally, north of the Bloodvein River the project area consists of a mixture of organic deposits (peat and clay/soil) and offshore glaciolacustrine sediments (clay, silt and minor sand) with periodic bedrock outcrops, while south of the Bloodvein River, bedrock outcrops and organic deposits dominate the area with interspersed areas of offshore glaciolacustrine sediments. Two additional pockets of sediments may be encountered in the project area. The southern pocket occurs south of Hollow Water and consists of marginal glaciolacustrine sediments (sand and gravel). The northern pocket occurs along the shoreline of Pigeon Bay and consists of shoreline sediments (sand and gravel) (Matile and Keller 2004a; Matile and Keller 2004b).

Surface Deposits

Surface materials in the project area are associated with the Seven Upland Division of the Canadian Shield Physiographic Region, which is typically characterized by rolling to

hilly bedrock. Predominantly, surface deposits consist of clay textured lacustrine sediments broken with occasional bedrock outcrops. In areas with level to gentle slopes, shallow deposits of various peats are typically underlain by lacustrine sediments. In areas with gentle to steep slopes, Precambrian bedrock dominates the surface though are subdued with veneers and blankets of lacustrine sediments on the low3.2.2

Bedrock Geology

The project area is located in the Superior Province of the Precambrian Shield (Bulloch et al. 2002). The majority of the area is underlain by granite, granodiorite, and quartz diorite formations with a complex of granetized sedimentary gneiss and schist and migmatite occurring along the eastern portion of Lake Winnipeg south of the Bloodvein River (Woo et al. 1977, Dutchak et al. 1978).

3.2.2 Soils

The soils of the Lac Seul Upland Ecoregion are relatively young since the land surface was covered by ice or glacial lakes up to seven (7) to twelve (12) thousand years ago. Organic soils cover much of the Ecoregion, with the proposed project area falling entirely within soils having 10 to 90% organic content. These organic soils have developed on poorly drained peatlands, and are predominantly Mesisols and Fibrisols. Mesisols consist of moderately decomposed peat, while Fibrisols are composed of only weakly decomposed peat (Bulloch et al. 2002).

The project area falls within two (2) major land regions as characterized by climate, vegetation, soil development and permafrost condition. The land regions of the project area are the Low Boreal region and the High Boreal-temperate region. The Wanipigow River is the rough boundary dividing the two regions, with the Low Boreal region located north of the Wanipigow River and the High Boreal-temperate region located south of the Wanipigow River. (Woo et al. 1977)

<u>Soils of the Wrong Lake Ecodistrict 371 (southern portion of the route)</u>

Soil drainage in the Wrong Lake Ecodistrict 371) varies from very poor to rapid to well drained, with much of the northern and west-central areas composed of very poor to poor with tracts of rapid to well drained soils. Rock of unclassified drainage is common in the west-central areas of the Ecodistrict, while the southern portion is a mix of all of the aforementioned drainage classes. In the Manigotagan area, the soil drainage is predominantly rapid to well drained, however the proposed project area is expected to cross very poor, imperfect to poorly drained and unclassified rock, moving northward.

Soils of the Berens River Ecodistrict 370 (central and northern portion of the route)

Soil drainage in the Berens River Ecodistrict 370 is predominantly classified as very poor, particularly in the northern areas. The proposed project area is located in the southern half the Ecodistrict and in addition to large areas of very poorly drained soils, may include areas classified as imperfect to poorly drained and rapid to well drained. Areas of rock with unclassified drainage are also found in the proposed project area at the southern end of the Ecodistrict, as well as along the shore of Lake Winnipeg between Loon Straits and the Bloodvein River.

Soil Associations within the Project Area

Together, under the Northern Resource Information Program, the Canada-Manitoba Soil Survey and the Department of Renewable Resource and Transportation Services conducted a biophysical land classification of the Hecla Lake NTS - 62P region, and the Berens River NTS - 63A region in 1976. This effort produced reports and accompanying maps that depict the relevant land systems at a scale of 1:125,000. Based on these biophysical land classification maps, the project area crosses the following soil associations (Woo et al. 1977, Dutchak et al. 1978):

- Baynham Soil Association
- Cayer Soil Association
- Indian Bay Complex Soil Association
- Lettonia Soil Association
- Okno Soil Association
- Rockland Soil Association
- Stead Soil Association
- Whithorn Soil Association

Soil Capability for Forestry

The CLI also provides information regarding the suitability of soils for forestry. Lands are grouped into seven classes according to the natural state of the land, prior to improvements such as fertilization, drainage or amelioration practices. The capability for forestry is ranked between Class 1, which has no important limitations to the growth of commercial forests, to Class 7, which has severe limitations that preclude the growth of commercial forests. (Canada Land Inventory 2000)

Within the proposed project area that falls within the 63A NTS map location, the lands are rated between Class 5 and Class 7, with Class 5 land having moderately severe

limitations to commercial forestry, Class 6 land having severe limitations to commercial forestry, and Class 7 lands having such limitations that it is unsuitable for commercial forestry. The tracts of Class 5 and Class 6 land typically occur along river systems such as the Berens River or along the shores of Lake Winnipeg. (Canada Land Inventory 2000)

Although the CLI has mapped land capability for forestry for the NTS 62P map location, no information is provided for the lands located east of the eastern shore of Lake Winnipeg. (Canada Land Inventory 2000)

3.2.3 Hydrogeology

According to the Province of Manitoba, Department of Natural Resources, Water Resources Branch Bedrock Aquifer map, there are no continuous bedrock aquifers within the study area. According to the same source, "the aquifers in the Precambrian rocks are found in fractures or fracture zones in the rock. The water bearing fractures often are very scarce and, therefore, considerable test drilling may be required to find them." (Rutulis 1986). Yields generally range from 0.01 L/s to 0.5 L/s but can exceed 5 L/s. The water quality in these aquifers varies considerably depending on local conditions. (Rutulis 1986).

The geology is a mixture of quaternary and pre-quaternary sediments consisting of organic deposits of peat and muck, offshore glaciolacustrine sediments of clay, silt and minor sand and bedrock outcrops. The potential for shallow aquifers exists with these sediments but the extents and quality will vary locally. (Matile and Keller 2004a; Matile and Keller 2004b)

Extent of Groundwater Use

Based on a review of Manitoba Water Stewardship's Groundwater Management Section 2007 well records, an estimated 23 registered wells exist within the study area. Of these wells, two appear to have incorrect location information. Nine wells are located within the communities of Manigotagan and Aghaming, south west of the study area. Three wells are located within the community of Bloodvein and the former adjacent community of Long Body Creek. Seven wells are located in Berens River at the north end of the study area. Two wells are located in the Curries Landing Park at the junction of the project area and PR 304. The well records indicate that of the 21 registered wells near or in the study area, 13 are registered as production wells and eight are registered as test wells. (Manitoba Water Stewardship, Groundwater Management Section 2007).

3.2.4 Hydrology

The potential waterway crossings of the preferred alignment include several named rivers and numerous smaller water crossings (creeks, streams and brooks).

Due to the remote nature of the area, notable data and information could only be obtained for the Manigotagan River, Bloodvein River, Pigeon River and Berens River.

The Water Survey of Canada has four hydrometric stations located along the preferred alignment on the Manigotagan River, Bloodvein River, Pigeon River and Berens River that record water flow data along with one hydrometric station on the Berens River that records water level data. Water flow and level data for the other river systems are not available.

Details for the various rivers are provided in Section 4.1.

3.2.5 Water Quality

Over the years, the Province of Manitoba and Environment Canada have collected water samples at various times and locations along four of the named rivers in the project area, including Manigotagan River, Wanipigow River, Bloodvein River and Berens River.

Manitoba Water Stewardship collected 26 water samples from within the Manigotagan River in the years 1993, 1994 and 1997. The 26 samples were collected over seven locations near the mouth of the river. In 1993, the samples were collected in July, while in 1994, the samples were collected in February and March and in 1997, the samples were collected in October. (Manitoba Water Stewardship, Water Quality Management Section 2009). Details of the laboratory results for the water samples collected will be presented in the documentation of the Environmental Setting in the EIS Report.

3.2.6 Ambient Air Quality

No ambient air quality data for the Project Area exists, as there is no continuous air quality monitoring near the project area. However, Manitoba Conservation and Environment Canada have several air quality monitoring stations in Manitoba and northwestern Ontario. Manitoba Conservation's air quality monitoring stations are located in the City of Winnipeg, the City of Brandon, the City of Flin Flon and the City of Thompson. The nearest Environment Canada air quality monitoring stations in northwestern Ontario are located in Pickle Lake, Experimental Lakes Area and Fort Frances. There are presently no industrial activities in the study area and the air quality

is generally but may degraded at times by forest fires. Construction activities and road dust may result in localized dust conditions along the roadway.

3.2.7 Climate

The project area typically experiences short warm summers and very cold winters. It receives 557.1 mm of precipitation per year, with 134 mm as snow (Environment Canada 2009a). The closest meteorological station which measures temperature and precipitation is located in Bissett, Manitoba while the next closest meteorological station that measures wind speed and direction is located in Red Lake, Ontario.

3.2.8 Vegetation

The proposed project area is located in the Lac Seul Upland - Ecoregion 90 within the Boreal Shield Ecozone. The Lac Seul Upland Ecoregion is subdivided into three ecodistricts, two of which are crossed by the proposed ASR:

- the Berens Ecodistrict 370; and
- the Wrong Lake Ecodistrict 371

The Wrong Lake Ecodistrict occupies an area of 21,501 km^2, stretching between the northern and southern boundaries of the ecoregion. The Berens Ecodistrict occupies 7,466 k m^2 and borders the eastern shore of Lake Winnipeg. (Bulloch et al. 2002)
The Lac Seul Ecoregion may also be subdivided into four main vegetation districts: the Northeast district, the Southeast district, the Northwest district and the Southwest district. Of these, the proposed ASR falls within the southwest, northeast and northwest vegetation districts. The Manigotagan portion of the project area lies within the Southwest vegetation district, which is a mix of Jack pine dominated forest, tamarack muskeg, black spruce forest (mostly wetland), aspen forest, aspen mixedwood forest, upland black spruce forest, and tamarack forest.

North of the Southwest vegetation district the project area passes through the portion of the Northeast bordering the eastern shore of Lake Winnipeg. This vegetation district is dominated by various types of Jack pine forest, as well as significant portions black spruce muskeg. The majority of the project area falls in the Northwest vegetation district, which is characterised by large areas of sparse black spruce wetland, tamarack wetland and Sphagnum bog. Approximately 65% of this district is covered by wetlands with forest cover lining the rivers. (Bulloch et al. 2002)

3.2.8 Wildlife

The Manitoba portion of the Lac Seul Upland Ecoregion contains a diverse collection of terrestrial vertebrate species including amphibians, reptiles, birds and mammals. The location of the ecoregion and its geophysical features, such as Lake Winnipeg, greatly influence the variety and distribution of the terrestrial vertebrate species that it supports. Different community types are bridged by transition areas that provide diversity in habitats and species. The transition areas provide habitat to those species which may not normally be associated with boreal forest ecosystems. (Bulloch et al. 2002).

Of the 390 terrestrial vertebrate species found in Ecoregion 90, 376 are predicted to be found in the Manitoba portion of the Ecoregion. Approximately 80% of the 376 terrestrial species predicted to be in the Ecoregion are birds, with mammals representing 16%, and amphibians and reptiles accounting for the remaining 4%.

3.2.9 Wildlife Species of Cultural Importance

Moose are of particular cultural and social importance in the Lac Seul Upland Ecoregion. Habitat availability for moose is generally positively influenced by factors such as fire and forest harvesting. In addition to habitat availability, the size and distribution of moose populations is affected by hunting, predators, parasites, and disease. Forest access by humans has been an especially important factor as it has offers hunters greater access to moose populations. (Bulloch et al. 2002).

Population estimates and information about the herd age and sex composition has been gathered in each of the Game Hunting Areas, including 17A and 26, both of which the proposed project area is expected to affect. Recent information indicates that the highest densities of moose are currently found in Game Hunting Area 26. (Bulloch et al. 2002)

Other species may be identified through the Project EIA and the Traditional Knowledge studies.

3.2.10 Terrestrial Species of Special Concern

To determine the Federal Species at Risk Act (SARA) Schedule 1 species that could potentially occur in the general project region, a search using Environment Canada's Species at Risk mapping tool was conducted. The search results found that there is potential for few at risk species to occur in the general project region.

The SARA public registry lists 9 scheduled species of plants for Manitoba. These are all either short or long grass species. Prairie habitats have been severely impacted by

agriculture and many prairie native plant species are endangered or threatened. There are no plants listed under SARA known to occur in the study area (Environment Canada, Canadian Wildlife Service 2009 (accessed)). There are 3 plant species listed as Endangered and 7 plant species listed as Threatened under the MBESA. Based on the approximate distribution maps shown in Manitoba's Species at Risk fact sheets associated with each species, it does not appear that any of these species would fall within the study area (Manitoba Conservation, Wildlife and Ecosystem Protection Branch 2009 (accessed)).

Amphibians listed in the SARA public registry include the northern leopard frog (Lithobates pipiens, western population) and the great plains toad (Bufo cognatus). The northern leopard frog occurs in the study area but is not a member of the western population of concern. The great plains toad is also protected under the Manitoba Endangered Species Act (MBESA) bud does not occur in the study area (Environment Canada, Canadian Wildlife Service 2009 (accessed); Manitoba Conservation, Wildlife and Ecosystem Protection Branch, Conservation Data Centre 2009 (accessed)).

Scheduled reptiles for Manitoba include only the prairie skink (Plestiodon septentrionalis) which is not included in the study area. (Environment Canada, Canadian Wildlife Service 2009 (accessed)). There are currently no reptiles protected under the MBESA (Manitoba Conservation, Wildlife and Ecosystem Protection Branch, Conservation Data Centre 2009 (accessed)).

The SARA public registry lists 17 scheduled birds for Manitoba of which one, the piping plover (Charadrius melodus circumcinctus) may occur in the study area. This species nests on sandy beaches, and is know to occur along the shores of Lake Winnipeg. It is unlikely to nest further inland in the boreal zone in which the project is located (Environment Canada, Canadian Wildlife Service 2009 (accessed)).

There are currently 9 bird species listed as Endangered and 4 species listed as Threatened under the MBESA. One of the MBESA Endangered species, only the piping plover may occur in the study area. Based on approximate distribution maps, none of the MBESA Threatened species are expected to occur in the project area (Manitoba Conservation, Wildlife and Ecosystem Protection Branch, Conservation Data Centre 2009 (accessed).

The only mammal listed under the SARA public registry for Manitoba that occurs east of Lake Winnipeg is the woodland caribou (Rangifer tarandus caribou) which is found throughout the study area. Although the eastern wolf (Canis lupus lycaon), ranked as a species of Special Concern is not listed as a SARA species for Manitoba, approximate distribution mapping shows that its range extends into the project area (Environment

Canada, Canadian Wildlife Service 2009 (accessed)). The MBESA lists the woodland caribou as Threatened, which is expected to occur in the vicinity of project area (Manitoba Conservation, Wildlife and Ecosystem Protection Branch 2009 (accessed)).

3.2.11 Aquatic Species

Fish Species

The list of possible fish species in the project region was compiled from a list of fish species inhabiting Lake Winnipeg and Berens River and a separate list of fish species found within the Lac Seul Upland Ecoregion 90. The combined list consists of 68 fish species, two species of leech, one species of crayfish and a family of mussels. Of the 68 total fish species identified, 53 are shared between both source lists. (Bulloch et al. 2002, Scott and Crossman 1998, Stewart and Watkinson 2004)

Fish Species of Special Concern

The Federal ranking of each of the 68 identified species under the Species At Risk Act was checked using the online SARA Public Registry. It should be noted that only those species under Schedule 1 of the Federal SARA have legal protection under the Act.

The Provincial ranking for each of the 68 identified species was checked using the online list of species under the Manitoba Endangered Species Act (MBESA), the online NatureServe Explorer website and the list of species of conservation concern under the Manitoba Conservation Data Centre (MBCDC). The conservation rankings provided by NatureServe and the MBCDC do not necessitate legal protection and as such only those species listed under the MBESA have legal protection. No fish species are currently listed under the MBESA.

The MBR road alignment is not believed to provide preferred habitat for species listed for protection provincially or federally under the *Species At Risk Act*. The following rare species may be present in the general project area, including Lake Winnipeg:

- Lake Sturgeon (*Acipenser fulvescens*) (Not listed under SARA, Red & Assiniboine rivers – Lake Winnipeg population designated Endangered by COSEWIC)
- Silver Chub (*Macrhybopsis storeriana*) (SARA Schedule 1)
- Chestnut lamprey (*Ichthyomyzon castaneus*) (Not listed under SARA, designated Special Concern by COSEWIC)
- Bigmouth Buffalo (*Ictiobus cyprinellus*) (Not listed under SARA, designated Special Concern by COSEWIC)

- Shortjaw cisco (*Coregonus zenithicus*) (SARA Schedule 2)

- Mapleleaf Mussel (*Quadrula Quadrula*) (Not listed under SARA, designated Endangered by COSEWIC)

Potential for the presence of other rare species in the project area will be addressed in the EA.

3.3 Land Use

3.3.1 Current and Past Land Use

Figure 1-2 shows the Preferred ASR Alignment with the following being within proximity to the Preferred ASR Alignment:

- First Nation Communities,
- String Bogs,
- Lakes,
- Wetlands,
- Un-Paved Highway,
- Rice River Road Upgrade,
- Winter/Limited Use Road,
- Transmission Lines,
- Watercourses,
- Forested areas,
- Areas of Special Interest (ASI),
- Patented (Private) Land,
- Provincial Park/Provincial Crown Land – Closed,
- Provincial Forest,
- Wildlife Management Area, and
- Wildlife Refuge.

In addition to those land uses identified in the above list, current and historic land uses in the vicinity of the project area include harvesting of country foods (mammals, fish, berries, mushrooms, wild rice etc), harvesting of medicinal plants, commercial fishing, ecotourism, hunting and fishing lodges, wildlife harvesting, forestry, quarry operations, portages, work campsites, archeological and heritage sites, etc.

3.3.2 Proximity to First Nation Reserves and Land Used Traditionally or Currently by Aboriginal Peoples

The First Nations reserve lands that are directly adjacent the proposed Project Site are Berens River (IR13)/Pigeon River (IR13A), Bloodvien (IR12), and Hollow Water (IR10). As required, access roads will be constructed to the reserve lands as separate projects

anticipated to be lead by the First Nation themselves. The project also falls in the Traditional Use areas of Berens River, Bloodvien, and Hollow Water First Nations. Little Grand Rapids (IR14) and Pauingassi First Nations Traditional Use Areas may also overlap or be in proximity to the project site. Metis may also have Traditional Use areas in the vicinity of the project. Known Metis communities are located in Berens River and the Manigotagan/Seymourville areas.

Traditional Knowledge studies are currently being undertaken in support of the environmental assessment that will more specifically define the hunting, fishing and other current and traditional use activity in the area of the proposed road alignment. Organizations that may have knowledge of traditional use areas will also be contacted as part of the EA and presented in the EA Document.

3.3.3 Protected Areas, Environmental and Cultural Sites

Designated areas within the proximity of the Preferred ASR Alignment include:

- Atikaki Provincial Park;
- the Bloodvein Canadian Heritage River;
- Manigotagan River Provincial Park;
- the proposed UNESCO World Heritage Site; and
- portions of the Nopiming Provincial Park in Manitoba.

The proposed United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site, known as the Atikaki / Woodland Caribou / Accord First Nations or Pimachiowin Aki site, includes the Atikaki Provincial Wilderness Park, Woodland Caribou Provincial Park, the Bloodvein Canadian Heritage River, the Eagle-Snowshoe Conservation Reserve, four proposed parkland additions and the traditional use areas of the Pikangikum, Poplar River, Pauingassi and Little Grand Rapids First Nations. The proposed site represents over 40,000 km^2 of boreal forest, rivers, lakes, wetlands and traditional land areas of the Anishinabe people.

The site contains numerous archaeological sites and provides habitat for a portion of the threatened woodland caribou, and a wide variety of plants and wildlife representative of the region. (Pimachiowin Aki Corporation 2008, Parks Canada 2009 (accessed), United Nations Educational Scientific and Cultural Organization 2009 (accessed).

4.0 WATERCOURSE CROSSINGS

4.1 Environment Features

The following provides a short description of major water bodies along the Preferred ASR Alignment in which crossings are required:

Bloodvein River

The Bloodvein River begins in Ontario, flows through Atikaki Provincial Park and drains into Lake Winnipeg at the Bloodvein First Nation. Numerous rapids and waterfalls exist between the Ontario border and Lake Winnipeg. A report issued by Canadian Heritage River Systems to Manitoba Conservation indicates that the entire Bloodvein River contains up to 112 sets of rapids and waterfalls. (Hilderman Thomas Frank Cram Landscape Architecture Planning 2000).

A Water Survey of Canada hydrometric station (05RB003) is located near Bloodvein Bay. The records indicate that water flows are historically highest in June (mean 92.5 m^3/sec) and lowest in March (mean 15.8 m^3/sec). The gross drainage area of the river is approximately 9,090 km2. (Environment Canada, Water Survey of Canada 2009)

Pigeon River

The Pigeon River flows into Lake Winnipeg at Pigeon Bay and is located between the Bloodvein and Berens River systems. The Pigeon River contains over 50 rapids, rated at a class of 2 to 4 by canoeists, and many waterfalls. One section of the river consists of a 40 km canyon which contains approximately 30 rapids and has compared to the whitewater rivers of Colorado. Long flat water stretches were noted between most rapids. (Canadian Mountain Encyclopedia 2009(accessed).

A Water Survey of Canada hydrometric station (05RD008) is located at the outlet of Round Lake. The records indicate that water flows are historically highest in July (mean 147 m^3/sec) and lowest in March (mean 37.1 m^3/sec). The gross drainage area of the river is approximately 18,400 k m^2. (Environment Canada, Water Survey of Canada 2009)

Berens River

The Berens River flows into Lake Winnipeg at the community of Berens River. The river is noted to contain many rapids and waterfalls, most of which must be portaged (Kocay 1995).

A Water Survey of Canada hydrometric station (05RD007) located at the outlet of Long Lake (approximately 60 km east-southeast from Berens River First Nation) records water flow data. Water flows are historically highest in July (mean 74.9 m^3/sec) and lowest in March (mean 13.9 m^3/sec). The gross drainage area of the river at Long Lake is approximately 18,400 k m^2. A second Water Survey of Canada hydrometric station (05RD005) is located at Lake Winnipeg which records water level data. Water levels at this station are historically highest in July (mean 217.643 m) and lowest in March (mean 217.296 m). The gross drainage area of the river at Lake Winnipeg is 1,020,000 k m^2. (Environment Canada, Water Survey of Canada 2009).

Manigotagan River

The Manigotagan River flows into Lake Winnipeg at the community of Manigotagan. The river section from Quesnel Lake and Manigotagan Lake, in Nopiming Provincial Park, to Lake Winnipeg contains at least nine waterfalls and rapids as well as a dam at Quesnel Lake. (Manitoba Eco-Network 2008).

A Water Survey of Canada hydrometric station (05RA001) is located near the community of Manigotagan to record water flow data. Water flows are historically highest in May (mean 23.4 m^3/sec) and lowest in March (mean 2.93 m^3/sec). The gross drainage area of the river is approximately 1,830 k m^2. (Environment Canada, Water Survey of Canada 2009)

Wanipigow River

The Wanipigow River flows into Lake Winnipeg through the Hollow Water First Nation, just north of the community of Manigotagan. The river is dammed by Wanipigow Dam which is located approximately halfway between Lake Winnipeg and Wanipigow Lake where Highway 304 intersects with Rice River Road (Natural Resources Canada 2009). Bridge crossings occur over the Wanipigow River and English Brook on Rice River Road (Chambers 1999).

The Manitoba Water Stewardship reported that the Wanipigow River in the area of Nopiming Park reached its highest autumn flow on record in 2007. (Government of Manitoba 2007)

Rice River

The Rice River is located north of the community of Manigotagan between the Wanipigow and Bloodvein rivers. A single span bridge along the Rice River Road crosses the river (Chambers 1999). Three rapids and one waterfall were noted between

Lake Winnipeg and Shallow Lake, with one set of rapids located near Rice River Road (Natural Resources Canada 2009).

Currently there is hydraulic input into the preliminary design. Hydraulic testing will be conducted to determine sizing and fish passage requirements.

4.2 Fish / Fish Habitat Affected

Surface waters in the area of the MBR alignment flow in a general east-to-west direction, towards Lake Winnipeg. Through much of the area, but particularly north of the Bloodvein River, surface waters move as diffuse flow through wide, thickly vegetated fens, with occasional consolidation in defined channels. Many of these channels appear as pools of open water (usually created by beaver dams) that are connected to larger watercourses or Lake Winnipeg by narrow, poorly defined channels, or by fens without recognizable channels. As the water volumes within these small watercourses are continuous with those that saturate the vast areas of flooded peat surrounding them, they are characterized by high acidity and very low dissolved oxygen concentrations. For many streams, the poor water quality and lack of connectivity to larger watercourses likely pose severe limitations to their suitability as fish habitat.

Reflective of the surficial geology in the area, streambed substrata are dominated by fine, highly organic sediments in the smaller and lower-gradient streams, with bedrock outcrops influencing the channel morphology in the larger rivers. In particular, high proportions of the Bloodvein, Pigeon and Berens river channels are confined by bedrock. Gravel and sand deposits are likely rare to absent in the streams along the alignment.

Due to the very poor drainage in the area, small streams fed by fens, as described above, tend to retain water throughout the year. Very few streams in the area are truly seasonal or ephemeral, although water velocities within them may become imperceptible as instream vegetation develops over the growing season. Many of the smaller streams are likely to provide habitat for only a small number of hardy forage fish species (e.g. sticklebacks and fathead minnow). Due to the similarity of habitats within and among these small streams in the area, construction of small stream crossings along the MBR alignment is not expected to have a significant impact on the productive capacity of available habitats to the local fishery.

The larger streams in the area maintain significant base flows (with fairly consistent water levels) through fall and winter, and, therefore, can provide important fish habitat throughout the year. Approximately 60 species of fish inhabit the area, and, considering the proximity of the alignment to Lake Winnipeg, the largest streams along the alignment likely provide habitat for all species except those highly specialized to the lake habitats. Riffles and rapids associated with rock outcrops in the larger rivers may represent

significant habitat features for a number of species including lake sturgeon, which are known to inhabit the Pigeon and Berens rivers. No species of fish listed for protection under Schedule 1 of the *Species At Risk Act* in habit the area of the MBR alignment.

Due to the presence of fish habitat in most of the larger drainages along the MBR alignment (Table 2.2), instream construction associated with stream crossings identified

in Table 2.2 may constitute a Harmful Alteration, Disruption or Destruction of fish habitat. Clear-span bridges will be used, where possible, to prevent impacts to fish habitat. On streams where construction of clear-span bridges is not feasible instream construction will take place with appropriate mitigation measures to prevent or minimize potential impacts to fish habitat.

All crossings at or downstream of fish habitats will be designed to meet DFO's criteria for provision of fish passage. Due to available flexibility in the setting of the final MBR alignment, efforts will be made to avoid any instream construction at habitats determined to be critical fish habitat through field studies and discussion with the Department of Fisheries and Oceans Canada.

4.3 Navigable Waters

As part of the original environmental assessment studies conducted in 2005 for km 0-88 of the MBR Road ("Rice River Road"), Transport Canada provided determinations that the following watercourses are navigable, and, therefore, subject to the provisions of the *Navigable Waters Protection Act* (NWPA) at the proposed crossing locations:

- Wanipigow River
- English Brook
- Steeprock Creek
- Rice River
- Loon Creek
- Bloodvein backwater channel
- Bloodvein River
- Pakasekan Creek
- Longbody Creek

Whereas confirmation has not yet been obtained from Transport Canada, it is anticipated that four or more watercourses along the MBR alignment will be deemed navigable, including:

- Petopeko Creek
- Bradbury River
- Pigeon River

- Berens River

All crossings of streams determined as navigable by Transport Canada will be designed in accordance with the provisions of the NWPA and specific direction by Transport Canada.

4.4 Use of Waterways

Local rivers and streams are used for small watercraft travel by local hunters, trappers, and fishermen (including First Nations/Métis people. The current and historic extent of use of the rivers by larger vessels such as barges is being clarified. Additional information on the use of the waterways is being obtained through on-going socio-economic and Traditional Knowledge studies. Results will be reported in the EIA. No new barriers to navigation are being anticipated.

4.5 Commercial, Recreations, or Aboriginal Subsistence Fisheries

Commercial fisheries exist primarily for walleye/sauger (pickerel) and lake whitefish. Other species have some commercial value, but are not generally targeted in the fisheries. The commercial fisheries are generally located on Lake Winnipeg and not associated with the rivers in the study area although there may be spawning/rearing life stages.

Most of the watercourses in the study area are used to varying degrees for recreational and subsistence fishing (walleye, and whitefish, with some limited sturgeon fishing). Subsistence fisheries exist on Lake Winnipeg and in lower reaches of most streams and rivers. Lake whitefish is a primary target species, although walleye, and sturgeon are likely harvested as well. Additional information on subsistence fisheries is being obtained through Traditional Knowledge studies.

Recreational fisheries exist at numerous remote lodges in the upper portions of the watersheds (Manitoba and Ontario, including several in Ataikaki Park). Examples include: Dogskin Lake, Shining Falls, Aikens Lake, and Sasaginnigak lodges. Recreational fisheries nearer the project area are currently limited by access.

FIGURES AND DRAWINGS

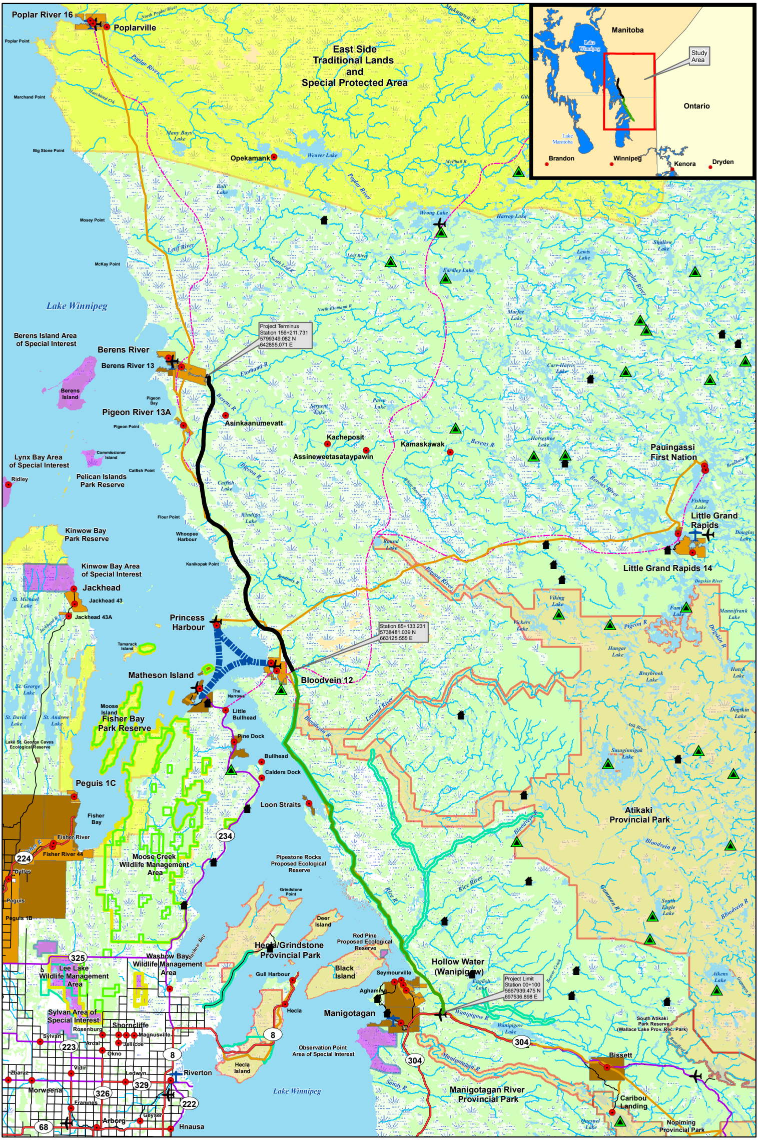
EAST SIDE TRANSPORTATION INITIATIVE:

PROVINCIAL ROAD 304 TO BERENS RIVER
ALL- SEASON ROAD

Study Area

Date: July, 2009 | File Number: 333144 | Sub Code: MBR

Figure Number: **1-1** | Rev. 0



Legend

- Preferred Shoreline Route
- First Nation
- NAC Community
- Community
- Air Field
- Sea Plane Facility
- Outfitter
- Cottage Subdivision
- Summer Ferry
- Rice River Road Upgrade
- Un-Paved Highway
- Winter/Limited Use Road
- Transmission Line
- Watercourse
- Wetland
- String Bog
- Lake
- Provincial Park/Prov. Crown Land - Closed
- Areas Of Special Interest (ASI)
- Provincial Forest
- Wildlife Management Area
- Wildlife Refuge
- Forested

Note:
This map is intended for illustrative purposes only. Do not rely on this map for legal administrative purposes, or as a precise indicator of routes, locations of features.
Sources: Promises To Keep, East Side Planning Initiative (ESPI), 2004/ National Topographic Data Base (NTDB) 1:50,000.Government of Canada, Natural Resources Canada, Centre for Topographic Information 2003/ Manitoba Land Information (MLI) 2009. Projection: Canada_Lambert_Conformal_Conic (GCS_North_American_1983)

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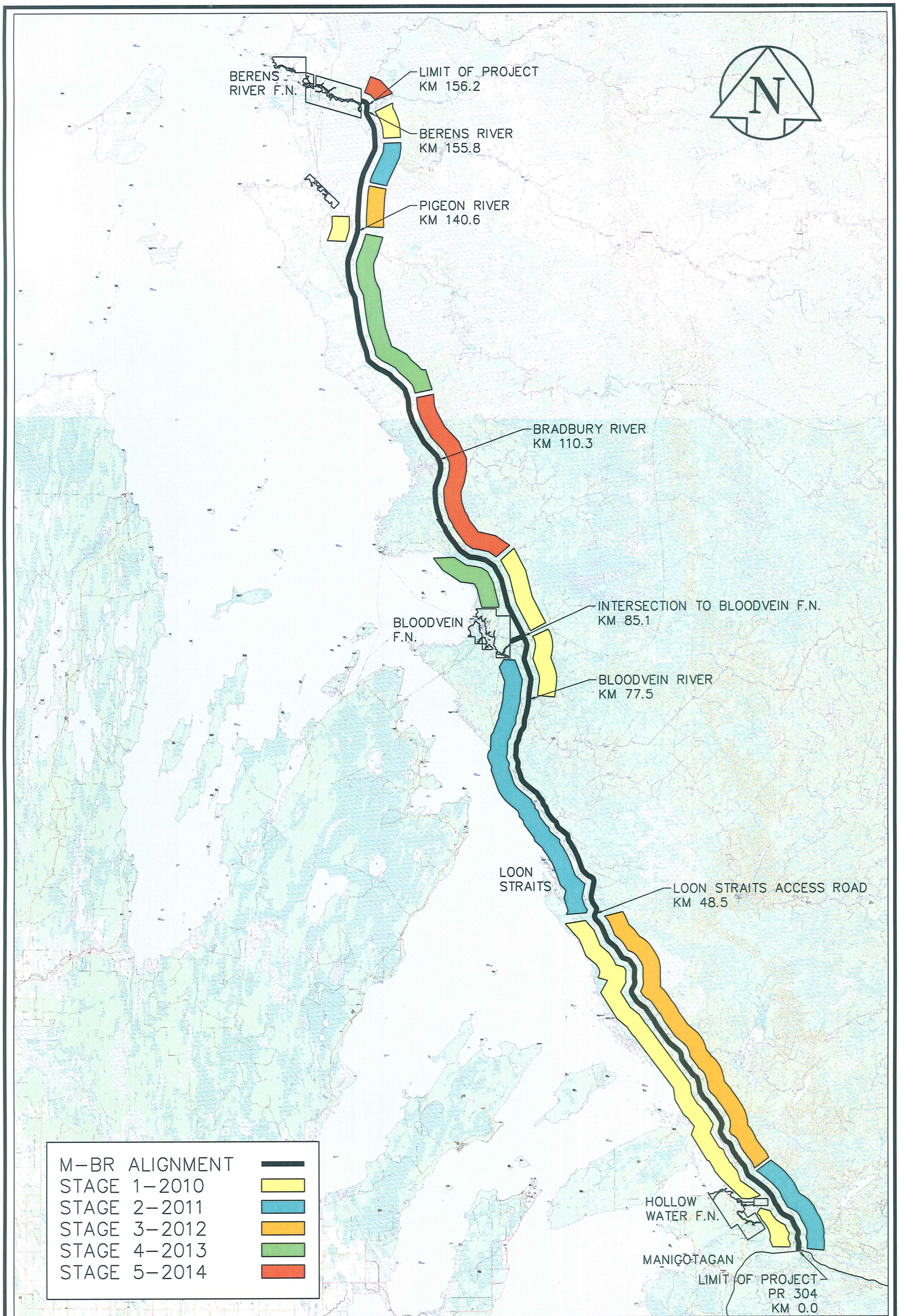
0 2.5 5 10 15 20 25 30 35 Km

SNC·LAVALIN East Side Road Authority Inc. AECOM

EAST SIDE TRANSPORTATION INITIATIVE:
PROVINCIAL ROAD 304 TO BERENS RIVER ALL- SEASON ROAD
Land Use/ Envrionmentally Sensitive Areas

Date: July, 2009	File Number: 333144	Sub Code: MBR
Figure Number:	1-2	Rev. 0



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1	09-07-21	REVISED PER ESRA COMMENTS	RC	JRM

AECOM

FUNCTIONAL ALIGNMENT FOR PR 304 TO BERENS RIVER ALL SEASON ROAD

ALIGNMENT AND STAGING

designed JRM	scale 1:400000	yy-mm-dd 09-07-21
drawn RC	project no. 112041	
checked	drawing no. FIG. 2.1	rev. 1
approved		

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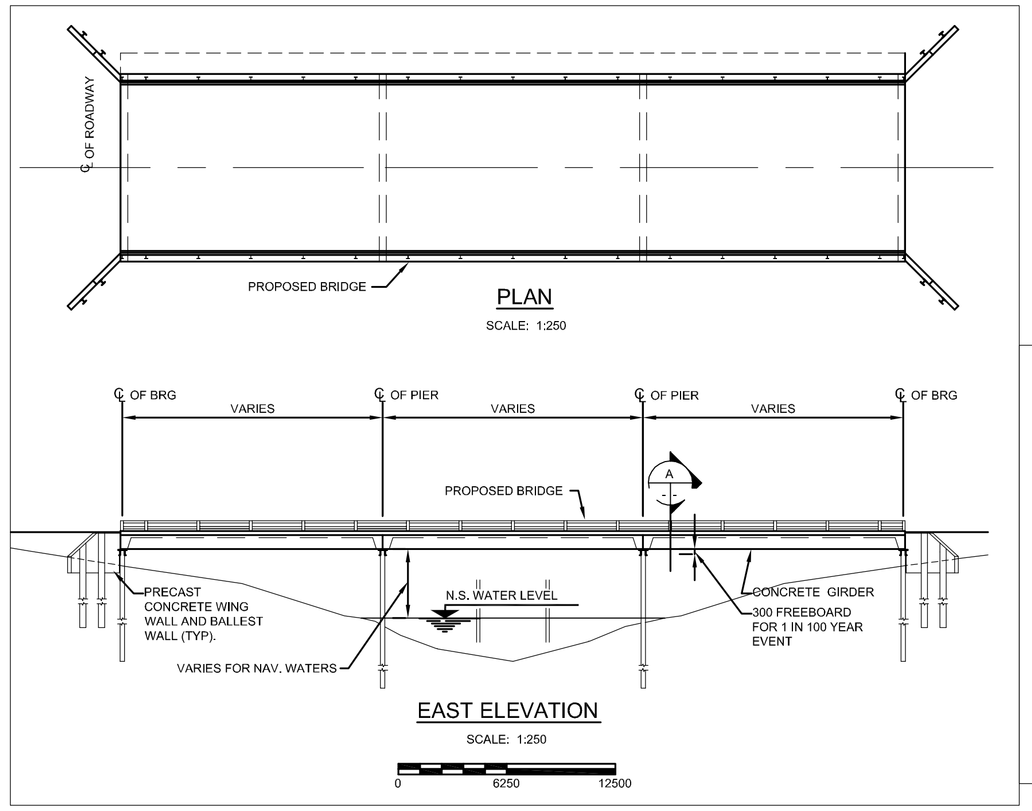

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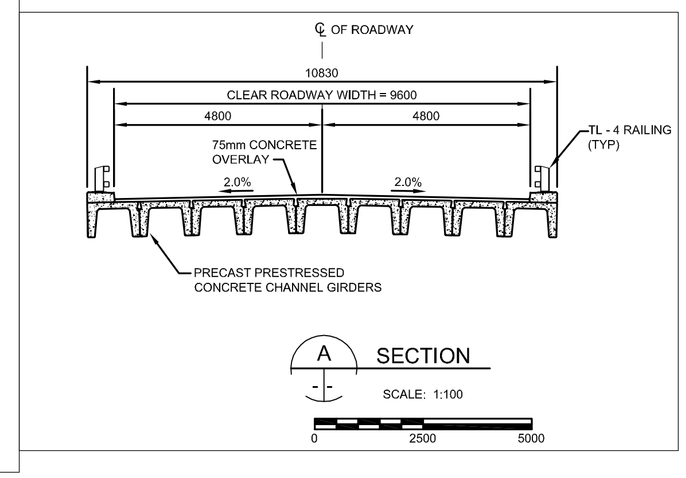
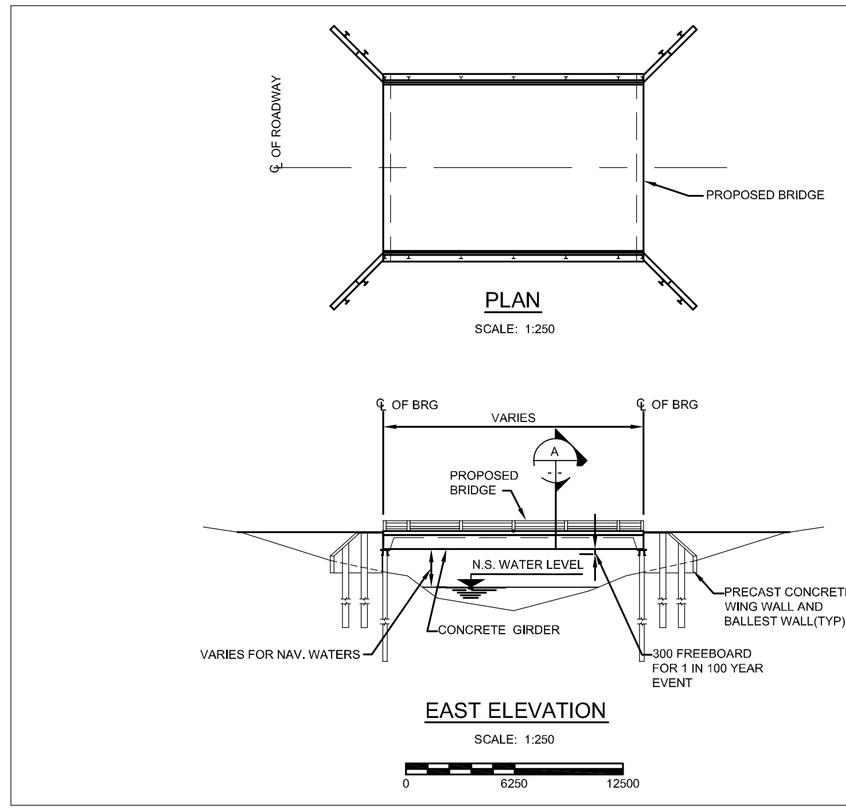
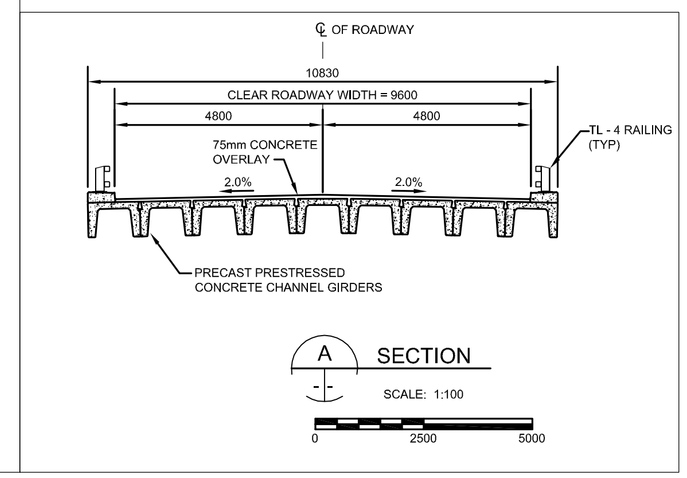
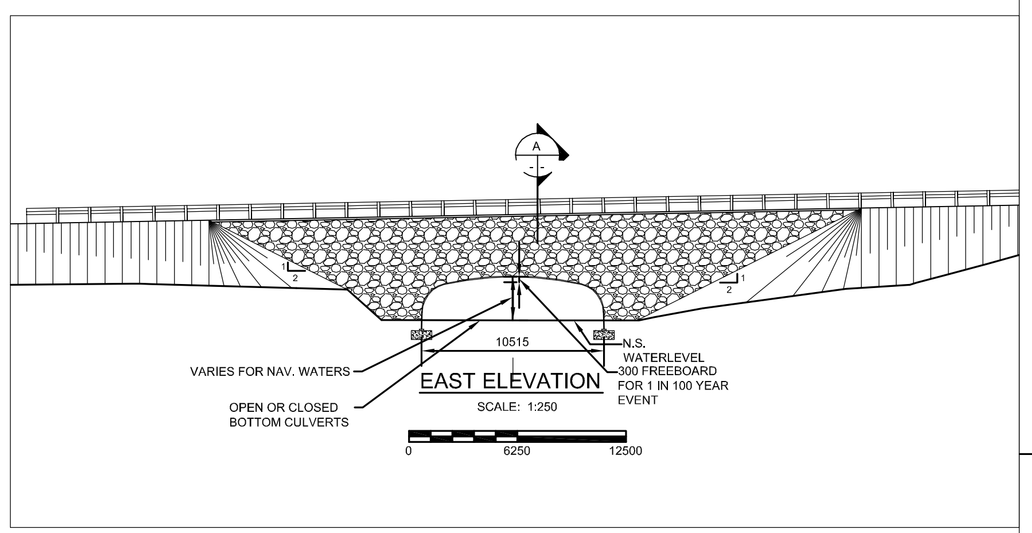


PROPOSED MULTISPAN STRUCTURE





PROPOSED SINGLESPAN (<15m) STRUCTURE



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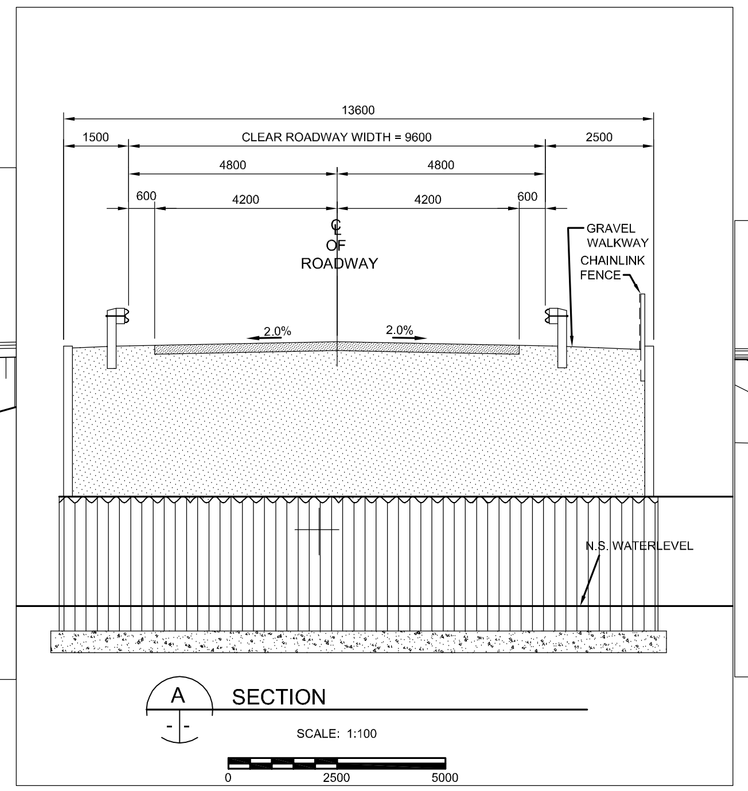
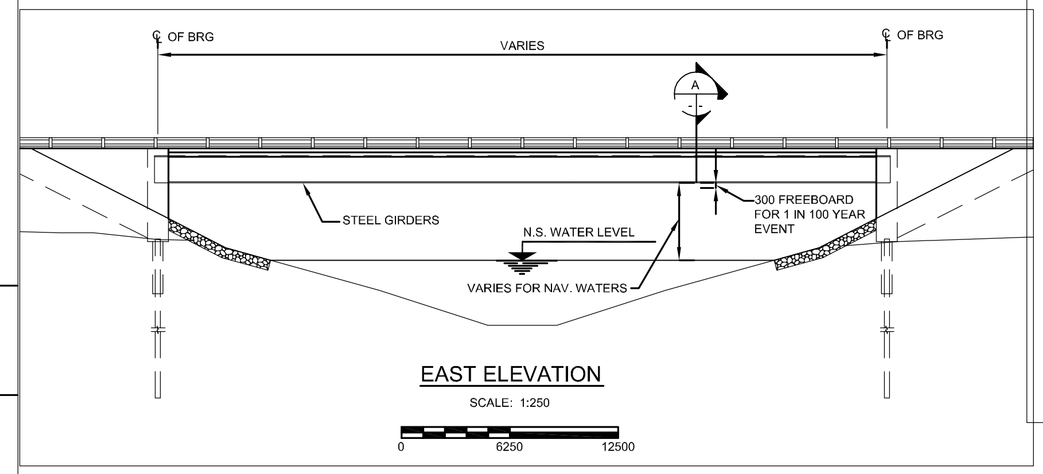
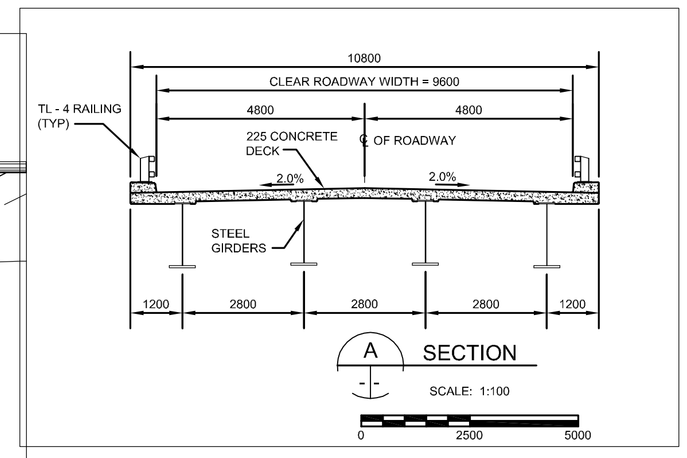
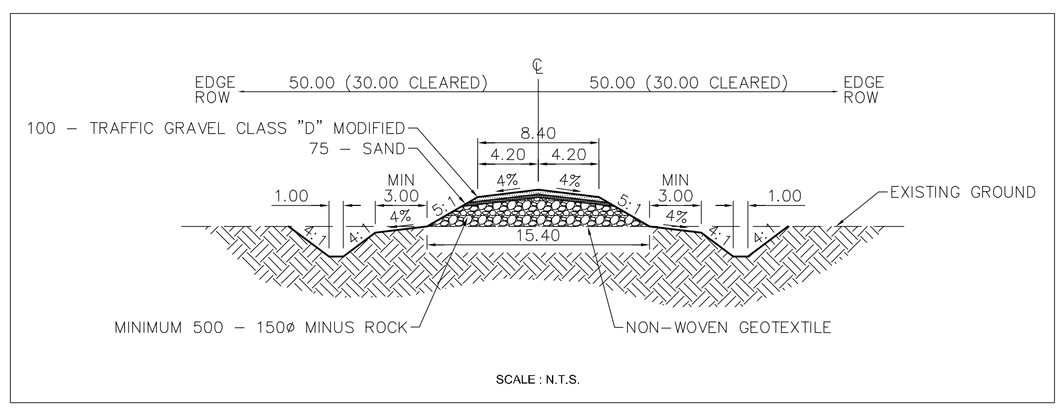


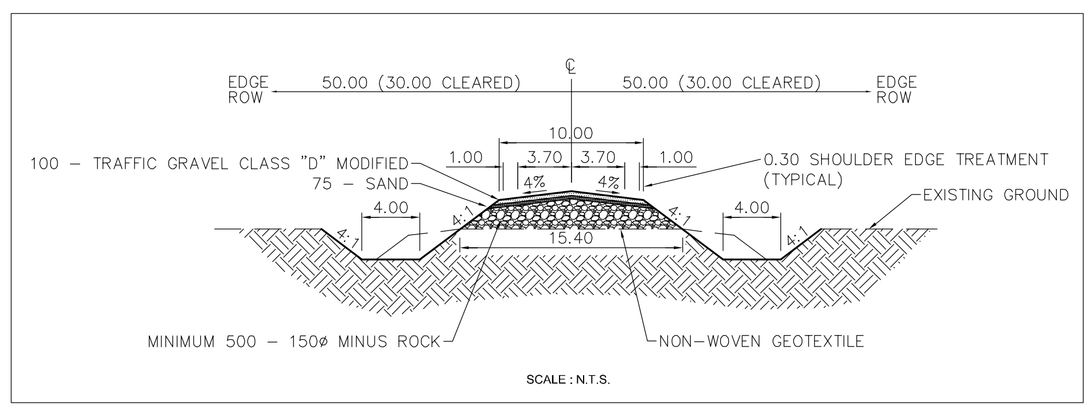


PROPOSED SINGLESPAN (>15m) STRUCTURE

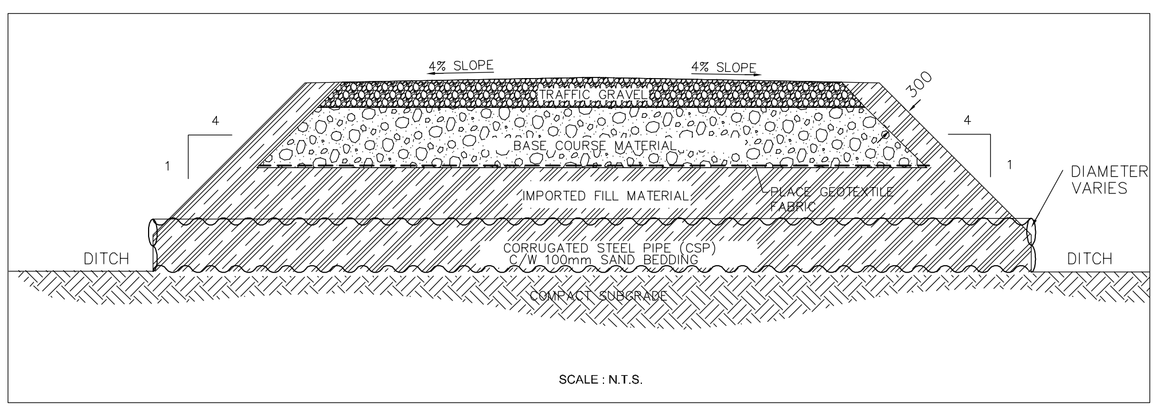




COMMUNITY ACCESS ROAD



ALL WEATHER ROAD



TYPICAL CORRUGATED STEEL PIPE (CSP) SECTION DETAIL

FOR REFERENCE PURPOSES ONLY

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seal

AECOM

FUNCTIONAL ALIGNMENT FOR PR 304 TO BERENS RIVER ALL SEASON ROAD

GENERAL ARRANGEMENT STRUCTURES AND ROAD SECTIONS

designed	scale AS SHOWN	yy-mm-dd 09-07-20
drawn	project no. 112041	
checked	drawing no. RT06	rev. 0
approved		

PRELIMINARY (NOT FOR CONSTRUCTION)

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