KIVALLIQ
HYDRO-FIBRE
LINK

ᑭᓯᓪᓗᒍ ᓇᐸᔪᐊᐃᓕᑦ ᖃᓄᑕᑐᖅᓴᕐᔪᑦᓯᓗ
ᖃᐅᔨᓴᓕᐅᓂᖅᑎᑦ ᓇᐃᓕᑎᐊᖅᓯᒪᔪᖅ ᐅᓂᒃᑲᖅᓯᒪᔪᖅ

DATA COLLECTION SUMMARY REPORT

İᒪᐃᑦ 2021
MARCH 2021

kivalliqlink.ca

KIVALLIQ HYDRO-FIBRE LINK

INUKSHUK, RANKIN INLET

ᐃᓗᓕᕆᔨ

CONTENTS

Prepared by/ᐱᓕᕆᖅᑎᖅᑯᓗᒃᑎᑐᖅ:
InterGroup Consultants Ltd.
In coordination with/ᑭᖑᓪᓕᒥ ᐃᓄᐃᑦ ᑲᑎᕐᖅᑎᑐᑎᒍᑦᓯᖅ
Kivalliq Inuit Association
Chadwick Consulting Project Management

KIVALLIQ HYDRO-FIBRE LINK

ᐱᓕᕆᐊᖓᔪᓂᐊᖅᑐᑦ · PROJECT OVERVIEW

ᑲᖏᖅ / RANKIN INLET

ᑭᖑᓪᓗᒍ ᖃᐅᔨᓴᐅᑎᑦ ᖃᓚᑕᐅᔭᓴᑉᓗ ᐊᑐᐅᓂᑭᖓᓪᓚᖅᑐᑦ ᐅᓪᓚᓴᐅᑎᑦ ᐊᒪ ᖃᓚᑕᐅᔭᓴᖓᓪᓚᐅᑦ ᒪᑭᒪᔾᑎᑦ ᐱᓕᕆᐊᖓᔪᑦ ᑭᖑᓪᖅ ᐃᓄᐃᑦ ᑲᑐᔾᔨᖃᑎᖓᓴᓴᑦ ᔭᓇᑎᑦᑕᖏᓐᓇ ᔭᓇᐳᒍᒪᑉ. ᔭᓇᒪᒋᑦ ᐱᓕᕆᐊᖓᔪᐊᖅᑐᑦ ᖃᐅᔨᓴᖅᑎᓂᐅᔾᔪᑦ ᐃᐅᓴᖃᑦᑕᖓᒪᑦ ᐃᐊᕐᕌᖅ ᐱᓪᓚᑦᑎᐊᓕᒃᑐᑦ ᑲᑐᔾᔨᖃᑎᒌᖓᓂᒃ ᐃᓄᐃᑦ ᑲᑐᔾᔨᖃᑎᖓᓴᓴᑦ ᔭᓇᐳᒍᒪᑉ.

ᐱᓕᕆᐊᖓᔪᐊᖅᑐᑦ ᑲᓇᓂᐊᕐᓇᖅ 1,200 ᑭᓚᒥᑐ ᓴᖅᑭᔨᐊᓗᖅᓯᒃ ᖃᐅᔨᓴᐅᑎᑦᑕᐅᓂᐊᖅᑐᑦᓯᒃ ᑲᑎᑕᐅᔪᒪᓂᐊᓴᓂᓗ 370 ᑭᓚᒥᑐ ᓴᖅᑭᖑᓂᖅᓴᓯᒃ ᖃᐅᔨᓴᐅᑎᑦ ᑲᑎᑕᐅᓂᐊᓴᖅᓂ 5–ᓄᑦ ᔭᓇᓪᓗᒍ ᔭᓇᐳᒍᒪᑉ (ᔭᓇᖅᓯᐊᖅ 1).

ᑕᓴᓇ ᐱᓕᕆᐊᖓᔪᐊᖅᑐᑦᑐᖅ ᑲᑎᑎᕐᔪᓂᐊᓴᒪᑦ ᔭᓇᓪᓗᖅᓂᒃ ᑭᖑᓪᓚᖅᑐᑦ ᔭᓇᐳᒍᒪᑉ (ᐊᖏᕕᐊᑦ, ᖃᐅᒪᓂᒋᐊᖅᑐᖅ, ᐃᓗᓕᓕᒫᖏᓐᓇ. ᑲᖏᖅᓴᓂᖅᑐᑦ ᐊᒻᒪ ᑎᑎᕐᕕᐊᖅᑐᖅ) ᒪᓂᒋᐳᖅᓯᐅᑦ ᖃᐅᔨᓴᐅᑎᑦᑎᓪᓗᒋᑦ ᐊᒻᒪ ᖃᓚᑕᐅᔪᓄᑦᑎᓪᓗᒋᑦ ᓯᓚᓄᓪᓗᒋᑦᑎᓪᓗᒋᑦ.

The Kivalliq Hydro-Fibre Link is a renewable energy and broadband internet infrastructure project led by the Kivalliq Inuit Association ("KIA") of Nunavut. Initial early fieldwork and pre-feasibility work were supported under a partnership with Anbaric Development Partners.

The Project's vision is to build a 1,200km high-voltage electricity transmission line, which will connect to over 370km of lower voltage 'feeder' lines to link five communities in Nunavut (Map 1). The Project will connect communities of the Kivalliq region of Nunavut (Arviat, Baker Lake, Chesterfield Inlet, Rankin Inlet and Whale Cove) to the Manitoba electricity and fibreoptic grids. The Project will be rated at 150 megawatts (MW) of capacity and have a fibreoptic bandwidth capacity of at least 1,200 gigabits per second (Gbps). This will be Nunavut's first infrastructure link to southern Canada and will

ᐊᕐᕕᐊᑦ / ARVIAT

provide enough power and fibreoptic internet capacity for the Kivalliq region for generations to come. Importantly, the Project will also provide renewable energy and fibreoptic internet to the mining industry in Nunavut allowing for more sustainable operations. The Project would sell this renewable energy and internet to customers, the largest of which include Qulliq Energy Corporation and Agnico Eagle Mines' Meadowbank and Meliadine facilities.

ᓄᓇᕗᒻᒥ ᒪᑭᒪᔨᑕᐅᓂᐊᖅᑐᖅ ᓯᕗᓕᒻᒥᔅᓱᒪᓕᕆᓂ ᑲᑎᑕᐅᑦ ᓂᑎᐊᓂᑦ ᖃᐅᔨᒪᖕᓂᕆᓂᖅᓂᖅ ᖃᓄᑕᐅᔭᑯᑎᓂᓪᓗ ᐊᑐᖅᑎᓂᔪᓂᐊᖏᒪᑦ ᑭᓲᓕᓕᖅᑎᐅᓄᑦᓄᑦ ᐊᑲᔪᓂᓂ ᐊᒥᔪᓂᓂ ᔪᓚᕐᓂ.

ᐱᓕᕆᐊᖅ ᓴᖅᑭᓂᖅᓂᓂᐊᖅᑐᖅ 150 ᒥᒃᓵᓕᓴ (MW) ᐃᓂᖅᑭᖏᓐᓇᕐᓂᓂ ᐊᒻᒪ ᔪᐅᔨᒥᖅ ᖃᐅᔨᑕᐅᔭᑦ ᐊᔪᕐᔪᑎᑎᓐᓄᓂᓂ 1,200 ᑭᒃᓯᐃᑦ ᐊᑕᐅᔪᓂᖅ ᔪᐅᓂ (Gbps). ᓄᓇᕗᒥ ᔪᓚᕐᓕᐅᓂᐊᖏᒪᑦ ᒪᑭᒪᔨᑕᐅᓂᓂᓂ ᑲᑎᑕᐅᑦ ᓂᑎᐊᓂᑦ ᐱᖓᓱᖅᑎᓂᐊᕐᓂᓂᓂ ᖃᐅᔨᒪᖕᓂᕆᓂᖅᓂᖅ ᐊᒻᒪ ᔪᐅᔨᒥᖅ ᖃᐅᔨᑕᐅᔭᑯᑎᓂᓂᖅ ᑭᓲᓕᓕᖅᑎᐅᓄᑦᓄᑦ ᐊᑲᔪᓂᓂ ᔪᓚᕐᓂ. ᐊᑐᓂᓂᖅᓴᖅᑭᓂᖅᓂᓂᐊᖏᒪᑦ ᐊᒻᒪ ᔪᐅᔨᒥᖅ ᖃᐅᔨᑕᐅᔭᓄᑦᓂᖅ ᐊᔪᖓᑎᓂᔪᓂᓂ ᐅᔭᓂᑕᒪᐊᓄᑦᓂᓪᓗ ᓄᓇᕗᒥ ᑲᔪᔪᓄᑦᓂᓂᓂ ᐊᐅᓪᓚᑕᐅᓄᖓᓕᑦ. ᐱᓕᕆᐊᖓᔪᓂᐊᖅᑐᖅ ᓂᐅᕕᖅᑎᓂᔪᓚᑦᓗᐊᓂᐊᖏᖅᑭᒪᑦ ᖃᐅᔨᒪᖕᓂᕆᓂᖅᓂᖅ ᐊᑐᐃᓐᓇᖅᑐᖅᓂᖅ ᐊᒻᒪ ᖃᐅᔨᑕᐅᔭᑯᑎᓂᓂᖅ, ᐅᑯᐊ ᐊᖏᑕᒋᔪᓂᐊᖅᑐᑦ ᓂᐅᕕᔪᓂᖅᓂᐊᖏᒪᑦ ᓴᑯᓚᖅ ᖃᐅᔨᒪᖕᓂᕆᓂᖅᓂᖅ ᐊᒻᒪ ᐊᖏᓂᔨ ᐃᔨᖅᑯᑦ ᐊᐳᖅᑎᓯᖅᑐᒻᒪ ᑕᔪᖅᔪᐊᖅᑎᓗ ᐅᓴᖅᑕᐅᓚᐊᖏᖓᑦ.

ᑲᖏᑕᓂᖅ / RANKIN INLET

This will be Nunavut's first infrastructure link to southern Canada and will provide enough power and fibreoptic internet capacity for the Kivalliq region for generations to come.

ᓄᓇᕗᒻᒥᐅᑦ 1: ᑭᖑᓪᓗᒍ ᓇᐸᔪᓂᖅ ᖃᓄᐃᑦᑐᑦᓯᓗᒃᑐᑦ ᐊᑦᑎᐊᑎᒃᖃᓕᒫ ᐃᓕᓴᕐᕕᐊᑦ

MAP 1: KIVALLIQ HYDRO-FIBRE LINK PROPOSED ROUTE

ᐱᓕᕆᐊᖑᓂᐊᖅᑐᖅ · ABOUT THIS REPORT

ᕙᒃᔅ ᑕᓯᖓ ᐊᓪᓚᐃᑦ ᐱᐊ ᒫᐊᑦ ᖃᐅᔨᓴᕐᓂᖓᑦᑕ ᐱᓕᕆᐊᖏᑦ / FOX LAKE CREE NATION BEAR GUARD MONITORING FIELDWORK ACTIVITIES

ᑕᒻᓇ ᐱᓕᕆᐊᖑᔪᖅ ᑮᓇᐅᔭᑎᒍ ᐃᑲᔪᒐᐅᕗᖅ ᑳᓇᑕᒻᒥ ᐅᑭᐅᖅᑐᑉ ᐱᕙᓕᐊᓂᖓᑕ ᐱᕈᐸᓕᐊᑎᑦᓯᓂᕐᒧᑦ ᑐᑦᑕᕐᕕᖕᒥᑦ.

ᑕᒻᓇ ᐅᖃᐅᓯᖃᕐᓂᐊᖅᑐᖅ ᐱᓕᕆᐊᖑᓯᒪᓕᖅᑐᓐᓂᒃ ᑲᖅᓱᐃᓂᕐᒧᑦ ᐊᒻᒪ ᓄᓇᒻᒥ ᐱᓕᕆᐊᖑᔪᓐᓂᒃ ᐊᒃᑐᐱᓇ ᐊᒻᒪ ᑎᓯᒻᐱᓇ 2020, ᒪᓴᐅᔪᕐᒧ ᐱᓕᕆᐊᖑᔪᓐᓂᒃ ᑎᑭᓪᓗᒍ ᒪᐊᑦᓯ 2021. ᑕᒻᓇ ᐅᓂᑉᑲᖅᓯᒪᔪᖅ ᖃᓄᐃᐅᓕᐅᕈᑕᐅᓂᐊᖅᑐᓐᓂᒃ ᐅᖃᐅᓯᖃᕐᓂᐊᖅᐳᖅ ᖃᐅᔨᓴᕐᓂᕐᒧᑦ ᐱᓕᕆᐊᑉ ᐊᑉᖁᑎᖏᓂᐊᖅᑕᖓᓂ. ᓄᓇᓕᑦ ᑕᐃᑉᓱᒪᓂ ᓄᓇᒥᐅᑕᐅᓚᐅᖅᑐᑦ ᓴᓇᔭᐅᓂᐊᖅᑐᑉ ᐊᑐᕐᓂᐊᒐᐃᓐᓂ ᑐᑭᓯᑲᓂᕈᐊᖅᓯᒪᕗᑦ ᓱᓕᕆᓂᐊᕐᒪᖔᑕ ᓄᓇᒥᒃᑯ ᐊᑐᖅᑎᐅᔪᑦ ᑲᔪᓯᔪᒻᒥᒃ ᐋᑐᑎᖃᖅᐳᑦ ᓱᓕ ᐱᕙᓪᓕᐊᓂᖓᓄᑦ.

ᖃᐅᔨᓴᖅᐸᓕᐊᓂᐊᖅᐳᑦ ᓄᓇᒥᓯᐅᕐᓗᑎᒃ ᐅᑯᓂᖓ ᐊᔨᖏᖏᑐᓐᓂᒃ:

- ᓄᓇᐅᑉ ᖄᖓᓐᓂᒃ ᖃᐅᔨᓴᕐᓗᑎᒃ ᐊᒻᒪ ᓄᓇᑉ ᕿᕿᓂᖓᓐᓂᒃ ᐊᑉᑯᑕᐅᓂᐊᒻᒥ;
- ᓂᕐᔪᑎᓐᓂᒃ;
- ᐃᒪᕐᒥᐅᑕᓐᓂᒃ; ᐊᒻᒪ
- ᐃᓄᐃᑦ ᐱᕐᑯᑎᕕᓂᖏᓐᓂᒃ ᐊᑐᖅᐸᓚᐅᖅᑕᖏᓐᓂᒃᓗ.

Support for this work is being funded in partnership with the Canadian Northern Economic Development Agency.

This report summarizes western scientific data collection and fieldwork programs completed between October and December 2020, and current activities to March 2021. This report presents suggested next steps to further refine and study the proposed Project corridor. Communities whose traditional territories overlap with the Project corridor have requested more information about the Project. Ongoing engagement with communities and land users continues to be a valuable insight to the project development process.

Data collection and fieldwork programs have included initial assessment of:

- Geomorphology and permafrost along the proposed route;
- wildlife;
- aquatics, and
- heritage and archaeology.

ᑕᒻᓇ ᖃᐅᔨᓴᕐᓂᐅᔪᖅ ᓯᑕᒪᐃᓕᖓᑉᓗᓐᓂ ᐱᓕᕆᐊᖃᓗᐊᕐᓂᐊᖅᑐᖅ ᓄᓇᒥ ᖃᐅᔨᓴᖅᑎᓪᓗᒋᑦ ᐱᓕᕆᖃᑎᖃᕐᓗᑎᒃᓗ ᓄᓇᒻᒥᒃ ᐊᑐᖅᑎᐅᔪᓐᓂᒃ ᓄᓇᓕᖕᓂᒃᓗ.

ᓄᓇᓖᑦ ᓄᓇᖃᖅᐸᓚᐅᖅᑐᑦ ᐱᓕᕆᐊᖑᓂᐊᖅᑐᑉ ᐊᑐᕐᓂᐊᒐᐃᓐᓂ ᑐᑭᓯᑲᓂᕈᑎᓂᒃ ᑐᒃᓯᕋᖅᓯᒪᖕᒪᑕ ᓱᓕᓇᓂᐊᖅᑐᓐᓂᒃ. ᓄᓇᓕᖕᓂᒃ ᑐᓴᐅᒪᑎᑦᓯᓂᖅ ᐊᑐᖅᑎᐅᑕᔪᓂᒃᓗ ᓄᓇᒻᒥᒃ ᐃᓱᒪᒋᓯᒪᔭᖓᑦ ᐱᕙᓪᓕᐊᓂᐅᓂᐊᖅᑐᓐᓂ.

ᑕᒻᓇ ᐅᓂᒃᑲᖅᓯᒪᕗᖅ ᑐᕋᒐᐅᓂᐊᖅᑐᓐᓂᒃ, ᐱᓕᕆᐊᖑᓂᐊᑦ ᖃᓄᖅ ᐱᒋᐊᕐᓂᖏᓐᓂᒃ, ᐊᔪᕈᑕᐅᓂᐊᖅᑐᓐᓂᒃ, ᐊᒻᒪ ᓯᕗᓂᕐᒥ ᓱᓕᓇᖑᓂᐊᖅᑐᑦ. ᓯᕗᓂᕐᒥᓗ ᓄᓇᒻᒥᓯᐅᕐᓗᓐᓂ ᖃᐅᔨᓴᕐᓂᖅ ᐃᑲᔪᑎᖃᕐᓂᐊᕐᒪᑦ ᐱᓕᕆᐊᕐᒧᑦ ᐊᑉᖁᑎᒃᓴᖓᓐᓄᑦ ᖃᓄᐃᓂᖓᓄᑦᓗ, ᐊᒪ ᐃᑲᔪᕐᓗᓐᓂ ᐊᒃᑐᐃᓂᖃᕐᓂᖓᓐᓂᒃ ᐱᓕᕆᐊᑉ ᓄᓇᒥᒃ.

ᐱᓕᕆᐊᖑᓂᐊᖅᑐᑉ ᐱᕙᓪᓕᐊᓂᖓ, ᐊᒃᑐᐃᓇᔭᕐᓂᖓᓪᓗ ᐊᕙᑎᑉᑎᖕᓂᒃ, ᐊᒻᒪ ᐃᓚᓕᐅᑎᓯᒪᓗᒋᓪᓗ ᐃᓄᐃᑦ ᖃᐅᔨᒪᓂᖏᑦ (IK) ᐊᒻᒪ ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖏ (IQ) ᓯᕗᓕᐅᑐᐃᓐᓇᖅᐳᒃ ᐱᓕᕆᐊᕐᒥ. ᖃᐅᔨᓴᕐᓂᐊᖅᑐᑦ ᓱᓕ ᑕᑉᑯᓂᖓ ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖏᓐᓂᒃ ᐊᒪ ᐃᓄᐃᑦ ᖃᐅᔨᒪᓂᖏᓐᓂᒃ.

The research in these four areas build on earlier desktop research and analysis activities and will inform field programs for upcoming fieldwork research and further engagement efforts with land users and communities.

For each fieldwork program area, this report describes their objectives, approach, challenges, results, and next steps. Future fieldwork research will support ongoing refinement of the Project's proposed route and design, as well as help inform the environmental assessment process for the Project.

Communities whose traditional territories overlap with the Project corridor have requested more information about the Project. Ongoing engagement with communities and land users continues to be a valuable insight to the project development process.

Project development, including consideration of project environmental impacts, that integrates Indigenous Knowledge (IK) and Inuit Qauijimajatuqangit IQ (IQ) remains a priority of the Project. The next stages of data collection will include support for the collection and integration of IK and IQ in the process.

ᐱᓕᓇᐋᖏᓂᐋᕐᒪᖅ · PROJECT PROPONENT

ᑭᖑᓕᓕᒃ ᐊᑐᐱᕆᑎᑦ ᑲᑎᒪᔨᖅᑕ ᑲᑎᒪᓗᑦ ᐊᕐᕕᐋᒻᒪᒃ, ᕿᓘᑭᐋᓇ 2020 / KIA BOARD MEETING IN ARVIAT, FEBRUARY 2020

ᑕᒻᓇ ᓄᓇᕆᕆᖏᑦᑐᒪᒪᑦ ᒪᑭᒪᔪᑎᑕᐅᓂᐋᕐᓂᖅᑕᖅᑐᑦ ᓯᐅᒪᔪᒋᐅᓂᐋᕐᓂᖅ ᑭᖑᓕᓕᒃ ᐃᓄᐃᑦ ᑲᑐᔨᕆᑎᑕᐅᑦ ᓄᓇᐅᒪᒻᒪᒃ. ᑭᖑᓕᓕᒃ ᐃᓄᐃᑦ ᑲᑐᔨᕆᑎᑦ (KIA) ᑎᒥᖓᕆᑕᐅᓯᒪᖓᑦ ᓂᕈᐊᑲᐅᖑᔪᓂᖅ ᐃᓄᐃᑦ ᐱᔪᒪᔭᕆᕐᓂᖅ ᒪᑕᒪᔨᐅᑎᒋᔭᖅᑐᑦ. ᑭᖑᓕᓕᒃ ᐃᓄᐃᑦ ᑲᑐᔨᕆᑎᑦ (KIA) ᐊᑕᐅᓚᕆᖓᑦ ᐃᓄᐃᑦ ᐱᔪᒪᔭᕆᕐᓂᖅ ᐊᔪᓚᖅᑎᑦᑎᓂᖅ, ᑎᐊᓂᖅᓯᔨᑐᓂᒃ ᐃᓕᑕᖅᑎᑦᑎᓂᒃ ᐃᓄᐃᑦ ᐱᔪᒪᔭᕆᕐᓂᖅ ᐅᖃᐅᓯᖅ ᐅᓇᓱᒋᔭᐅᓂᖅ. ᑭᖑᓕᓕᒃ ᐃᓄᐃᑦ ᑲᑐᔨᕆᑎᑦ (KIA) ᐊᑕᐅᓚᖅᑎᑦᑎᓂᒃ ᑭᒃᑯᐊᑦᑐᒪᒃ, ᓂᕈᐊᑭᓇᖅᑎᑦᑎᓂᒃᑐᒃ ᐃᓄᓐᓂᒃ ᑭᖑᓕᓕᒫᓂᒃ ᐊᐅᓚᑦᑎᓂᒃ ᐃᓄᐃᑦ ᐱᔪᒪᔭᕆᕐᓂᖅ ᐊᐅᓚᑦᑎᓂᒃ ᑭᖑᓕᓕᒫᓂᒃᑐᒃ ᓄᓇᕆᕆᖏᑦᑐᒪᒪᑦ ᑕᐃᒪᐃᑦᑐᒪᒪᑦ. ᑭᖑᓕᓕᒃ ᐃᓄᐃᑦ ᑲᑐᔨᕆᑎᑦ (KIA) ᐊᑐᐃᓐᓇᖅᑐᑦ ᑭᒃᑯᐊᑦᑐᒪᒪᑦ ᐊᑐᖅᑕᐅᓯᒪᔪᓂᒃ ᐃᓄᐃᑦ ᐱᔪᒪᔭᕆᕐᓂᖅ ᐊᐅᓚᑦᑎᓂᒃ ᐃᓄᓐᓂᒃ ᑭᖑᓕᓕᒫᓂᒃᑐᒃ ᐊᑭᓕᕆᔨᑦᑎᓂᒃ ᐃᓄᐃᑦ ᐊᐅᓚᑦᑎᓂᒃ ᐊᑭᓕᕆᔨᑦᑎᓂᒃᑐᒃ ᓄᓇᕆᕆᖏᑦᑐᒪᒪᑦᑐᒃ ᑕᐃᔨᐅᑦᑎᓂᒃ. ᑭᖑᓕᓕᒃ ᐃᓄᐃᑦ ᑲᑐᔨᕆᑎᑦ (KIA) ᐊᐅᓚᑦᑎᓂᒃ ᐃᓄᐃᑦ ᐱᔪᒪᔭᕆᕐᓂᖅ ᐊᐅᓚᑦᑎᓂᒃ ᐃᓄᓐᓂᒃ ᑭᖑᓕᓕᒫᓂᒃᑐᒃ ᐊᑭᓕᕆᔨᑦᑎᓂᒃᑐᒃ, ᐃᓄᐃᑦ ᐱᔪᒪᔭᕆᕐᓂᖅ ᐊᐅᓚᑦᑎᓂᒃ ᐃᓄᓐᓂᒃ ᑭᖑᓕᓕᒫᓂᒃᑐᒃ ᐊᑭᓕᕆᔨᑦᑎᓂᒃᑐᒃ ᓄᓇᕆᕆᖏᑦᑐᒪᒪᑦᑐᒃ ᑕᐃᔨᐅᑦᑎᓂᒃ. ᑭᖑᓕᓕᒃ ᐃᓄᐃᑦ ᑲᑐᔨᕆᑎᑦ (KIA) ᐊᐅᓚᑦᑎᓂᒃ ᐃᓄᐃᑦ ᐱᔪᒪᔭᕆᕐᓂᖅ ᐊᐅᓚᑦᑎᓂᒃ ᐃᓄᓐᓂᒃ ᑭᖑᓕᓕᒫᓂᒃᑐᒃ ᐊᑭᓕᕆᔨᑦᑎᓂᒃᑐᒃ ᓄᓇᕆᕆᖏᑦᑐᒪᒪᑦᑐᒃ ᑕᐃᔨᐅᑦᑎᓂᒃ. ᑭᖑᓕᓕᒃ ᐃᓄᐃᑦ ᑲᑐᔨᕆᑎᑦ (KIA) ᐊᐅᓚᑦᑎᓂᒃ ᐃᓄᐃᑦ ᐱᔪᒪᔭᕆᕐᓂᖅ ᐊᐅᓚᑦᑎᓂᒃ ᐃᓄᓐᓂᒃ ᑭᖑᓕᓕᒫᓂᒃᑐᒃ ᐊᑭᓕᕆᔨᑦᑎᓂᒃᑐᒃ ᓄᓇᕆᕆᖏᑦᑐᒪᒪᑦᑐᒃ ᑕᐃᔨᐅᑦᑎᓂᒃ ᐊᑐᐃᓐᓇᖅᑐᑦ ᑭᒃᑯᐊᑦᑐᒪᒪᑦ ᐊᑐᖅᑕᐅᓯᒪᔪᓂᒃ ᐃᓄᐃᑦ ᐱᔪᒪᔭᕆᕐᓂᖅ ᐊᐅᓚᑦᑎᓂᒃ ᐃᓄᓐᓂᒃ ᑭᖑᓕᓕᒫᓂᒃᑐᒃ ᐊᑭᓕᕆᔨᑦᑎᓂᒃᑐᒃ ᓄᓇᕆᕆᖏᑦᑐᒪᒪᑦᑐᒃ ᑕᐃᔨᐅᑦᑎᓂᒃ. ᑭᖑᓕᓕᒃ ᐃᓄᐃᑦ ᑲᑐᔨᕆᑎᑦ (KIA) ᐊᐅᓚᑦᑎᓂᒃ ᐃᓄᐃᑦ ᐱᔪᒪᔭᕆᕐᓂᖅ ᐊᐅᓚᑦᑎᓂᒃ ᐃᓄᓐᓂᒃ ᑭᖑᓕᓕᒫᓂᒃᑐᒃ ᐊᑭᓕᕆᔨᑦᑎᓂᒃᑐᒃ ᓄᓇᕆᕆᖏᑦᑐᒪᒪᑦᑐᒃ ᑕᐃᔨᐅᑦᑎᓂᒃ ᐊᑐᐃᓐᓇᖅᑐᑦ ᑭᒃᑯᐊᑦᑐᒪᒪᑦ ᐊᑐᖅᑕᐅᓯᒪᔪᓂᒃ ᐃᓄᐃᑦ ᐱᔪᒪᔭᕆᕐᓂᖅ ᐊᐅᓚᑦᑎᓂᒃ ᐃᓄᓐᓂᒃ ᑭᖑᓕᓕᒫᓂᒃᑐᒃ ᐊᑭᓕᕆᔨᑦᑎᓂᒃᑐᒃ ᓄᓇᕆᕆᖏᑦᑐᒪᒪᑦᑐᒃ ᑕᐃᔨᐅᑦᑎᓂᒃ.**

The Project is an Indigenous nation-building infrastructure project led by the Kivalliq Inuit Association of Nunavut. The Kivalliq Inuit Association (KIA) is an elected body representing the interests of all Inuit in the Kivalliq region. The KIA is a land and resource owner, acts as an advocacy group, and administers provisions of the Nunavut Agreement in the Kivalliq region. The KIA's mission is to represent, in a fair and democratic manner, Inuit of the Kivalliq region in the development, protection, administration, and advancement of their rights and benefits as an Indigenous people. The KIA also strive to promote their economic, social, political, and cultural well-being through succeeding generations. For more information, please visit www.kivalliqinuit.ca.

KIVALLIQ HYDRO-FIBRE LINK

IMPLEMENTATION APPROACH

FOX LAKE CREE NATION BEAR GUARD OVERSEEING FIELDWORK

The KHFL Project is led by the KIA and recognizes the importance of developing solid working relationships and sharing information with communities, land users, interested organizations and Inuit and Indigenous groups. The Project team takes this approach and has committed to building relationships as the Project advances. This section describes how the Project team has done this when approaching various challenges over the last year.

The fieldwork program was successfully completed between October and November 2020. Although presented with challenges relative to COVID-19 pandemic protocols, unforeseen weather conditions, and the ability to access Crown land in the entire length of the development corridor, the Project team adapted and found ways to successfully complete the fieldwork program.

The Project team recognizes the importance of local participation in gathering knowledge through the field program. However, the COVID-19 pandemic has made it challenging to engage with local communities and/or safely include them in fieldwork activities. Virtual technology has become an important tool for connecting with local communities and allowed for successful meetings and discussions through the use of platforms like Zoom. Discussion with community leadership in Manitoba provided guidance on how best to approach local fieldwork participation.

HUNTER, LAND USER/BEAR GUARD FROM FOX LAKE CREE NATION ON LOOKOUT

For most fieldwork activities, local participation was limited, however, the wildlife and geomorphology and permafrost fieldwork did include Fox Lake Cree Nation community members as bear guards. The fieldwork program planned to proceed with an aerial survey to acquire high-resolution imagery and elevation data (LiDAR) for the land surface. The survey would have included a pass of the entire proposed route with additional overflights at priority river crossings. Local weather was monitored for favourable snow-free conditions required for LiDAR/imagery data collection but low-level cloud and snow cover in September and October 2020 did not allow this to be done. These activities are now being planned as soon as possible in 2021.

Early discussions have occurred with Hunters and Trappers Organizations (HTOs) and the Kivalliq Regional Wildlife Board this past fall to provide more information about the Project and gather input and feedback. The HTOs and the Kivalliq Regional Wildlife Board both provide expert information on land and harvesting perspectives, and continued interaction with these groups is essential for Project baseline data collection and project development.

The Project team is also pursuing ongoing contact with the Nunavut Planning Commission (NPC), which is responsible for the development, implementation, and monitoring of land use plans that guide and direct resource use and development in the Nunavut Settlement Areas. The Keewatin Regional Land Use Plan (KRLUP) (NPC 2000) currently guides conservation, development, and utilization of land within the area of the Nunavut Settlement Areas, as well as the land and waters of Hudson Bay and James Bay. The KRLUP describes the application and review process for transportation and/or communication corridors such as the Project. Additionally the Kivalliq Hydro-Fibre Link proposed route follows a "speculative linear infrastructure corridor" identified in the Draft Nunavut Land Use Plan (NPC 2016). Consideration for all aspects of development and regulatory permitting and review has included early and ongoing discussions with the Northern Projects Management Office (NPMO) in Iqaluit. The NPMO was established to improve the environmental review process for proposed major resource development and infrastructure projects in northern Canada. The NPMO is expected to have an important role supporting the Project development and regulatory review process.The Project team is currently planning for fieldwork activities in Nunavut in the summer and fall of 2021. This planning is expected to include preparation and submission of applications to environmental regulatory agencies.

RANKIN INLET AIRPORT

Early discussions have occurred with Hunters and Trappers Organizations (HTOs) and the Kivalliq Regional Wildlife Board this past fall to provide more information about the Project and gather input and feedback.

Within Manitoba the Regional Lands Branch of the Manitoba Government has a Duty to Consult with Indigenous communities with traditional territories that intersect with the Project, including consideration of field activities that may impact the exercise of any Indigenous or Treaty rights. To access Crown land along the proposed Project corridor the Project team submitted three Crown Lands Work Permit Applications for segments which represented the entire proposed development corridor within Manitoba. Three First Nations, Sayisi Dene First Nation, Tataskweyak Cree Nation, and Fox Lake Cree Nation were contacted by the Manitoba Regional Lands Branch and informed of the work permit application for the preliminary studies and data collection by the Project. Based on preliminary assessment of the proposed studies, the Manitoba Regional Lands Branch noted that the proposed studies did not infringe on the exercise of Indigenous or Treaty rights.

The Crown Lands Work Permit Applications process offered opportunities for engagement with First Nations leadership and applicable Resource Management Boards. This was a valuable opportunity to share information about the Project and receive feedback from the communities. These meetings occurred remotely because of COVID-19 and KIA leadership was unable to accommodate some requests for leadership-to-leadership discussions. The Project remains committed to an open and transparent process with Indigenous communities and is advancing Project-related data sharing agreements with the Tataskweyak Cree Nation, Fox Lake Cree Nation, Sayisi Dene First Nation (which at the request of the Sayisi Dene is also extended to the Northlands First Nation), and the Manitoba Metis Federation.

The Project remains committed to an open and transparent process with Indigenous communities and is advancing Project-related data sharing agreements.

FIELDWORK

DATA COLLECTION PROGRAMS

GEOMORPHOLOGY AND PERMAFROST

HELICOPTER PICK UP AFTER INSTALLING GROUND TEMPERATURE SENSOR AT KHFL002

Fieldwork and desktop analysis was initiated to gain a better understanding of the physical and biophysical environment along the Project corridor.[1] The data collected will provide preliminary baseline information along the proposed Project corridor and is required for submission of the Impact Assessment (IA). The following sections outline the objectives, approaches, summaries of activities completed, and description of data collected for field and desktop programs completed 2020/21.

TRANSLATIONAL LANDSLIDE OBSERVED ALONG THE BANKS OF THE CHURCHILL RIVER

FIELD PROGRAM

Palmer, working in collaboration with Dr. Pascale Roy-Léveillée, from Laval University, was retained to complete a multi-phase scope of work to improve the understanding of terrain and permafrost conditions along the proposed corridor and, in turn, inform the siting, design and costing of transmission towers.

The objectives of this field program included collection of reconnaissance-level observations of the terrain along the proposed Project corridor, under early winter conditions, to help calibrate geomorphological interpretations during preliminary mapping over the 2020-2021 winter as well as installation of a series of temperature sensors

[1] Due to COVID-19 safety precautions, local community member participation in fieldwork was limited.

to initiate collection of baseline information about permafrost and ground thermal regime in different terrain units along the corridor.

The study area for Palmer's November 2020 fieldwork was an approximately 1,200 m wide corridor centered on the Manitoba segment of the proposed Project route, starting near Keewatinohk Converter Station and extending northward approximately 450 km to the Nunavut-Manitoba border (Map 2). The study area crosses several major rivers, including the Weir River, Churchill River, South and North Knife Rivers, and the Seal River.

A helicopter-assisted field reconnaissance program was completed between November 2 and 8, 2020, to preliminarily observe terrain and permafrost conditions and install temperature sensors at or near pre-selected locations.

Weather during the field program varied between clear skies, light fog, and snowfall. The ground had already begun to freeze and was covered by 10 to 20 cm of snow and ice had formed in ponds and lakes. Overall, conditions were favourable for helicopter access and flights were possible every field day.

Field observations were completed with a focus on characterizing the diverse range of terrain conditions encountered along the Manitoba portion of the proposed Project corridor. Photographs and notes were taken during helicopter fly-overs to inform the subsequent terrain and permafrost mapping program. Ground-based observations were made at each instrumentation installation location, including descriptions of the local topography, vegetation community, surface material characteristics, and depth to frost (where present). The study area was covered by 10–20 cm of snow, which complicated field observation by reducing opportunities for visual overviews and examination of subtle surface expressions. A thick layer of approximately 10-30 cm of surface frost limited the potential for shovel testing and frost probing, and interpretations were made based on observations at the holes drilled to install instrumentation.

AIR TEMPERATURE AND HUMIDITY SENSOR INSTALLED NEAR KHFL005, (SEE MAP 7 NEXT PAGE) WITH TRAIL CAMERA IN THE BACKGROUND

CONSPICUOUS GEOMETRIC PATTERN INDICATIVE OF ICE-WEDGE POLYGONS IN PERMAFROST WITHIN OFFSHORE GLACIOMARINE DEPOSITS NEAR THE PROJECT CORRIDOR.

SUMMARY RESULTS

Instrument Installation

Palmer completed the installation of ground temperature sensors at ten sites and air temperature and humidity sensors at three sites (Table 1). Ground temperature sensors were installed to depths up to 1 m to measure soil temperature at both the bottom of the drill hole and near surface (<5 cm). Air temperature and relative humidity sensors were mounted in a radiation shield on a post with graduated markings approximately 80 cm above the ground. Where possible, air temperature sensors were installed in the field of view of the trail cameras to provide a visual record of snow pack development at the equipped sites.

MAP 2: FIELD WORK STUDY AREA SHOWING MANITOBA SECTION OF THE PROPOSED PROJECT CORRIDOR, NOVEMBER 2020

SITE ID	INSTRUMENTATION	LOCATION NOTES
KHFL001	Ground Temperature	Site located next to concentration of surface boulders associated with till deposit
KHFL002	Ground Temperature	Site approximately 150 m from thermokarst lake in area of patterned ground interpreted to be glaciomarine sediments
KHFL003	Ground Temperature	Site on topographic high on sandy well drained till ridge
KHFL004	Ground Temperature	Site on a grass tussock in a topographic low in area of peaty and poorly drained soils
KHFL005	Ground Temperature & Air Temperature	Site in broad plateau on north side of Seal River, interpreted to be near-shore glaciomarine sediments
KHFL006	Ground Temperature	Site within forested area on north side of Seal River
KHFL007	Ground Temperature & Air Temperature	Site on wide plain interpreted to be a glaciomarine shoreline feature
KHFL008	Ground Temperature	Site in forest on slight topographic high interpreted to be the beach crest of a near-shore glaciomarine deposit
KHFL009	Ground Temperature	Site on the north side of the Churchill River in wide plain near areas of thermokarst subsidence
KHFL010	Ground Temperature & Air Temperature	Site in burned forest, with locally sandy and well drained soils

TABLE 1: SUMMARY OF INSTRUMENTATION LOCATION AND BRIEF SITE DESCRIPTIONS

CURRENT ACTIVITIES

Desktop Program

Palmer is advancing preliminary mapping and characterization of geomorphology and permafrost along the Nunavut portion of the Project development corridor. This includes:

- Mapping to be completed based on interpretation of stereo aerial and satellite imagery, once provided by the Project team.
- Mapping will be completed using Palmer's softcopy photo-interpretation workstations, in DAT/EM's Summit Lite and Esri's ArcGIS, which allow the imagery and elevation data to be viewed on a three-dimensional platform.

Palmer is advancing preliminary mapping and characterization of geomorphology and permafrost along the Nunavut portion of the Project development corridor.

Geophysical Ground Survey

Palmer is currently implementing a targeted ground-based geophysical survey along the Manitoba portion of the Project development corridor using ground penetrating radar (GPR) in areas inaccessible in summer. Planning is underway for a Nunavut field program this summer.

RANKIN INLET

NEXT STEPS

Follow-up field work will be necessary in the summer of 2021 to complete several main tasks:

- Investigate surficial materials, landforms, and permafrost under snow-free conditions when the active layer has thawed;
- 'Ground truth' preliminary geomorphological mapping completed during the winter of 2020-2021;
- Install additional ground temperature sensors to complement the sensors already installed;
- Download monitoring data recorded by instrumentation; and
- Extract representative cores of permafrost from different terrain units as a basis for visualizing cryostratigraphy and determining volumetric ice contents.

Aerial LiDAR and imagery survey and subsequent data processing for the Project corridor will also be a priority for Palmer to initiate and assess.

DATA COLLECTION PROGRAMS

WILDLIFE

WINTER CARIBOU

FIELD PROGRAM

In November 2020, Joro conducted preliminary aerial wildlife survey and trail camera deployment along the proposed route within Manitoba up to the Nunavut boarder. The objective of this initial aerial wildlife survey and trail camera deployment was to support development of a framework for baseline data collection supporting an impact assessment process as well as to contribute to baseline data to assess potential constraint areas which may require further assessment in future field seasons. This work is also being done to prepare for and better plan future fieldwork programs in Nunavut.

TRAIL CAMERA INSTALL

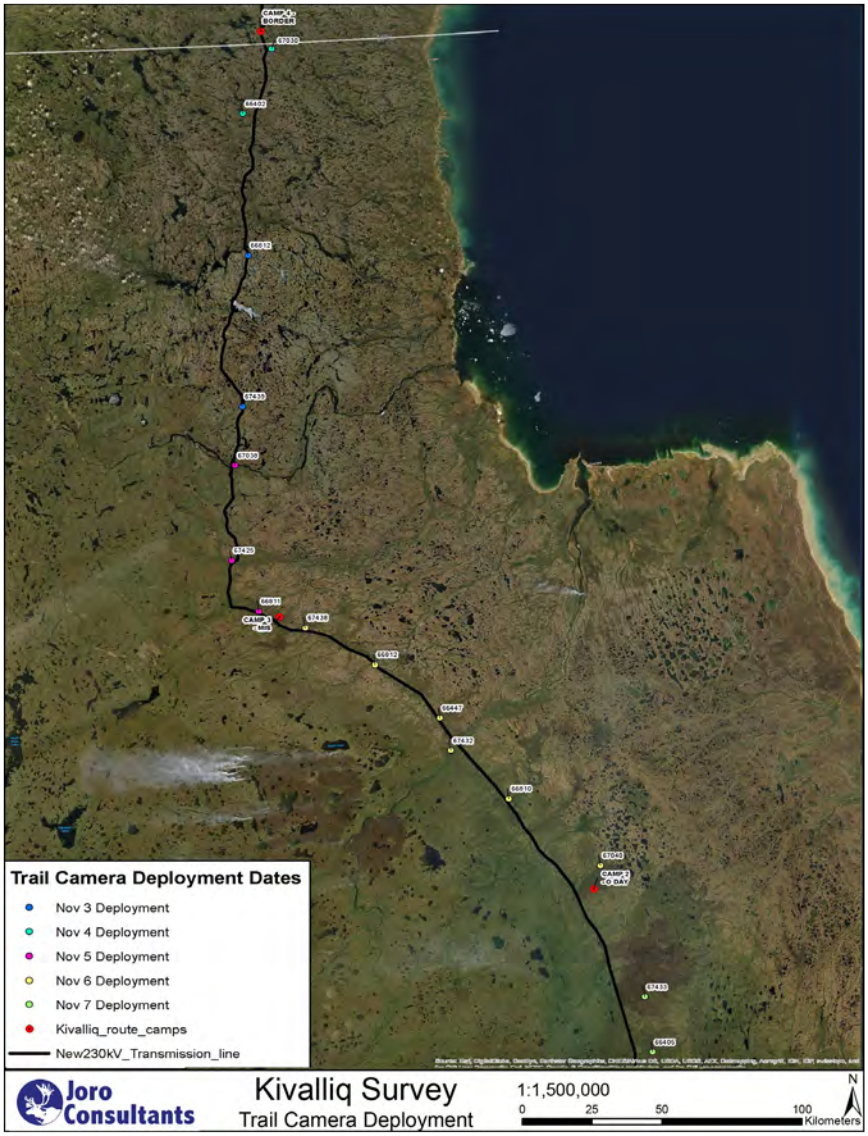
Initial discussions with the Nunavut Department of Environment have taken place as fieldwork teams plan out logistics for a fieldwork program within the Project route in Nunavut. Unique considerations and planning are underway for the deployment of field cameras above the treeline as well as methods for collecting baseline data on important species, and emphasis on caribou, of which distribution data are being assessed.

Aerial wildlife survey and trail camera deployment (**November 2020**)
Aerial wildlife survey activities included aerial observation of track and sign as well as trail camera deployment. A wildlife survey was conducted by helicopter November 2 through November 7, 2020. Field survey activities were coordinated between Joro and Palmer to allow for efficiencies in helicopter logistics as well as field crew support for the Project.

Joro deployed 15 trail cameras along select game trails near the proposed corridor, primarily targeting ungulate, predator and furbearer activity (Map 3). Joro also completed an aerial multispecies survey along the preferred route within the Manitoba section. Helicopter landing sites were coordinated within the team to determine suitable locations to install both Joro's trail cameras and Palmer's permafrost ground sensors. The field crew included a Fox Lake Cree Nation member from Gillam, Manitoba who was hired by the fieldwork team and assisted as bear guard. He was responsible for firearm safety and to be on the lookout for polar bears in landing areas while trail cameras and permafrost temperature sensors were installed. The bear guard, also a local trapper and hunter, has spent time on the land and is familiar with the area, and brought his knowledge of the land to support the field crew team.

TRAIL CAMERA FACING NORTH

TRAIL CAMERA WITH TREE TOPPED TO REDUCE WIND SWAY



MAP 3: TRAIL CAMERA DEPLOYMENT LOCATIONS AND DATES

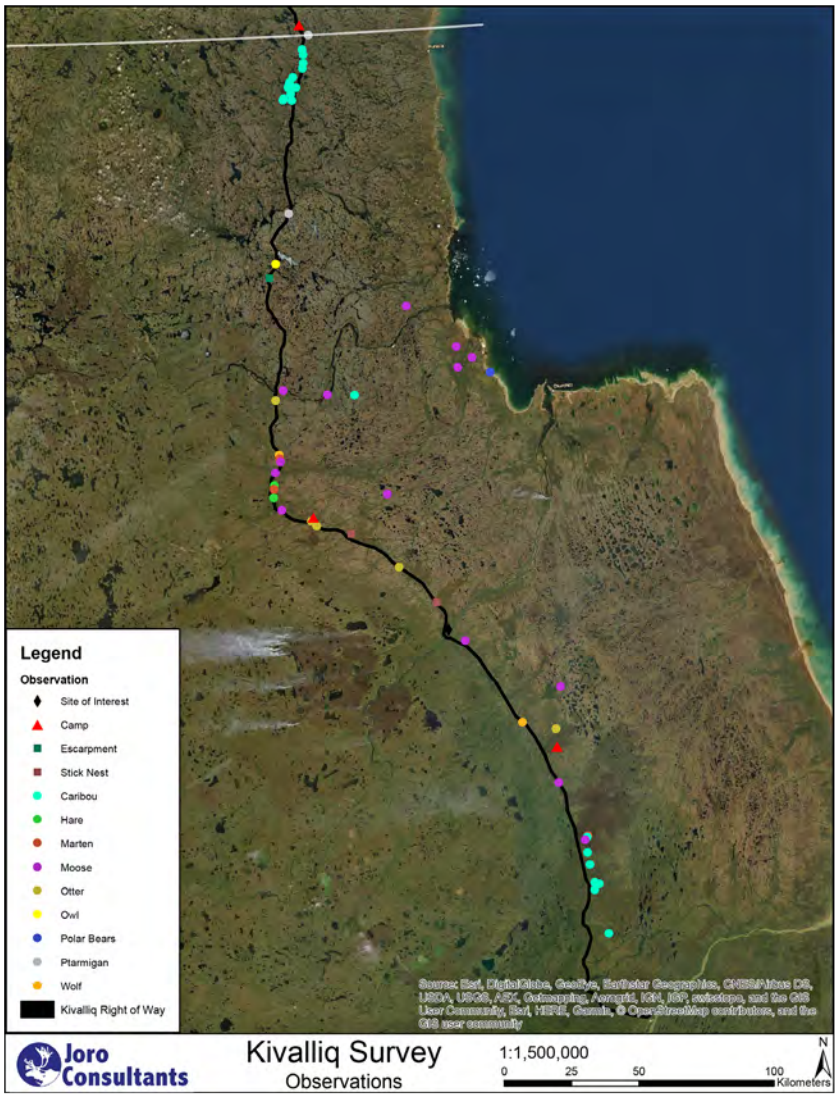
SUMMARY RESULTS

Manitoba aerial wildlife survey and trail camera deployment results (November 2020)

Aerial survey observations during the flight recorded 163 caribou (Map 4). Most caribou were found in the northern part of the corridor at the Nunavut border, and were considered to be part of the Quaminariak caribou herd. Other concentrations were observed in the southern end of the proposed corridor and considered to be animals from the Cape Churchill Coastal Population. Moose were also observed, with a total count of 30 individuals south of the Seal River, with incidentals recorded during flights to and from Churchill for fuel. Two sticks nests were observed close to the Churchill River. Numerous ptarmigans were observed throughout the flights and one owl. No polar bears were observed along the corridor; the only polar bear noted was close to the town of Churchill waiting for the ice to form.

Most caribou were found in the northern part of the corridor at the Nunavut border

BARREN-GROUND CARIBOU



MAP 4: WILDLIFE SURVEY OBSERVATIONS

CURRENT ACTIVITIES

Desktop Program

Joro is currently analyzing barren-ground and coastal caribou telemetry and polar bear and furbearer data to understand species movement and habitat occupancy through seasons in relation to proposed Project corridor. They are also conducting GIS analysis to determine seasonal core use areas from historical and current data, develop maps to determine areas of seasonal use overlap with proposed Project corridor. Polar bear data analysis information will assist in assessment of identifying possible presence of bears or denning locations.

Polar bear data analysis information will assist in assessment of identifying possible presence of bears or denning locations.

Joro is also evaluating habitat of major Land Cover Classification covertypes and their proportional abundance within the proposed Project corridor. Habitat evaluation work is based on the national Land Cover Classification (LCC) spatial database with statistics generated using a Landscape Cumulative Effects Simulator (ALCES) where appropriate.

Depending on data availability, focus of desktop analysis for several components may be restricted to the Manitoba segment of the proposed Project corridor. Further engagement with Hunter Trapper Organizations and the Kivalliq Regional Wildlife Board is anticipated to share data and engage with Knowledge Keepers.

POLAR BEAR, HUDSON BAY

Aerial Multi-species Survey

Joro has conducted an aerial transect track and observation survey following the Manitoba section of the proposed development corridor. This includes multi-flight transects on each of the east and west sides of the Project corridor to assess the presence and relative density of caribou, moose populations, wolverine presence, furbearers, wolves and any winter caribou activity to supplement GIS analysis described above.

Planning is underway for a summer fieldwork survey within Nunavut.

NEXT STEPS

Phase one monitoring activities including aerial surveys and the installation of trail cameras in the Manitoba portion of the Project that provided valuable baseline information towards the development of an IA. Next steps towards further characterizing the existing environment are provided. (Considerations for COVID-19 precautions and travel restriction are assumed to be a factor in conducting any fieldwork in Manitoba and Nunavut).

Recommended next steps include:

MIGRATORY WATERFOWL AND BREEDING BIRD SURVEYS

Nunavut

- Migratory birds survey including waterfowl, birds of prey (bald and golden eagle nests) to be surveyed by helicopter along the proposed corridor. Where creeks and rivers intersect the proposed corridor shorelines will be surveyed to determine the presence of nesting or staging waterfowl or any other waterbirds or mammal sightings. Wetland areas including marshes with emergent aquatic vegetation will be documented for mapping and IA characterizing purposes. Use of Autonomous Recording Units or bird call recorders is proposed to provide baseline data on song and waterbird presence.

Manitoba

- Migratory birds survey including waterfowl, birds of prey (bald and golden eagle nests) to be surveyed by helicopter along the proposed route. Where creeks and rivers intersect the proposed ROW shorelines will be surveyed to determine the presence of nesting or staging waterfowl or any other waterbirds or mammal sightings. Wetland areas including marshes with emergent aquatic vegetation will be documented for mapping and IA characterizing purposes.
- Potential for installation of bird call recorders or Autonomous Recording Units (ARU's) that will be important to federal review to consider all Species at Risk species.

AERIAL MULTI-SPECIES SURVEY AND TRAIL CAMERA DEPLOYMENT

Nunavut

- Aerial multi-species survey to assess the presence and relative density of caribou activity, bear (recognizing potential den emergence) and other wildlife observations (furbearers/wolverine) along the proposed Project corridor, and trail camera installation if appropriate landscape available.

Manitoba

- Aerial multi species survey to assess the presence and relative density of moose populations, wolverine and wolf presence and any winter caribou activity along the proposed Project corridor. This would include the ability to switch out data cards currently deployed in 15 trail cameras to provide base line presence and occupancy for mammal species including baseline information on predation risk.
- Engagement with First Nation, Métis and Inuit Elders, Resource Management Boards, Hunters and Trappers Organizations, Kivalliq Regional Wildlife Board, resource users and community members to document Indigenous Traditional Knowledge and Inuit Qaujimajatuqangit to direct and provide focus to wildlife field investigations.

KIVALLIQ HYDRO-FIBRE LINK

DATA COLLECTION PROGRAMS

AQUATIC ENVIRONMENT

LATE FALL GROUND CONDITIONS ALONG THE CORRIDOR

FIELD PROGRAM

AAE Tech Services has begun to conduct an inventory of watercourses and assessments of fish communities and aquatic habitat along the proposed route. Investigations of environmental sensitivities within the Project footprint, aimed at developing environmental protection plans, identified the need to conduct an inventory and classification of watercourses intersected by the proposed Project corridor. This serves to detail the appropriate measures to mitigate risks associated with construction of the transmission line and to protect aquatic ecosystems within and adjacent to the proposed Project route.

DIANE RIVER, RANKIN INLET

The approach included aerial surveys on October 5-6, 2020 via helicopter of approximately 450 km of the proposed Project route from the Keewatinohk Converter Station on the Nelson River (65 km northeast of Gillam, MB), extending north to the Manitoba-Nunavut border, roughly 46 km inland from the Hudson Bay. The assessment also included a combination GPS technologies, video, and photographic documentation, to inventory and provide preliminary habitat classifications to watercourses within the proposed corridor. Desktop studies were conducted to describe potential fish species' occurrences based on known distribution ranges, and information on spawning behaviour

and habitat for each of these species was provided based on available literature. Satellite and orthophotography imagery is being used for an initial classification of rivers, wetlands and water crossings within the Nunavut portion.

Watercourse Classification

Preliminary habitat classifications were assigned to each watercourse inventoried during aerial surveys. Current analysis remains in process for the Nunavut section of the Project corridor.

SPRING FISHING

Satellite and orthophotography imagery is being used for an initial classification of rivers, wetlands and water crossings within the Nunavut portion.

Status and Presence of Fish Species

A desktop study was conducted to identify possible fish species occurrences within each watercourse inventoried. The objectives of the desktop study were threefold: first, to identify any fish species known to have distribution ranges overlapping with the proposed Project corridor; second, to identify the current listing for each of these species in the Government of Canada's Species at Risk Act (SARA) (i.e. not listed, of special concern, threatened or endangered) or by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (i.e. endangered, threatened, of special concern or not at risk)(Government of Canada; accessed 2020); and finally, to provide details on spawning time and behaviour, as well as habitat preferences for these species, to assist in project planning.

SUMMARY RESULTS

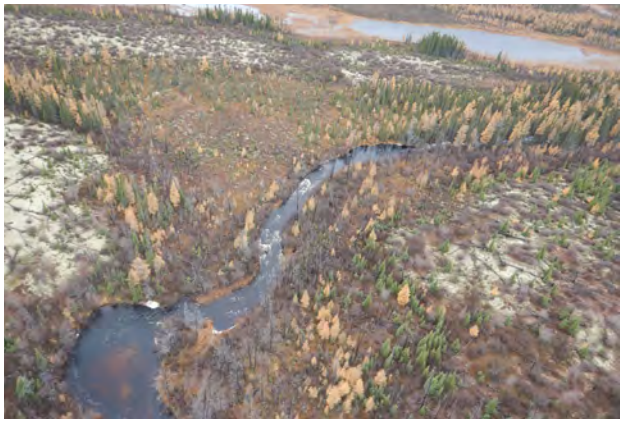
Watercourse Classification within Manitoba

A total of 127 watercourses were identified within the Project corridor boundaries and classified through aerial surveys conducted along the proposed Project route, including 74 streams, 33 wetlands and 20 lakes. See below as examples of representative typical stream watercourses. Watercourse classifications are defined as follows:

- S1 streams were those generally exceeding 20 m in width throughout their course;
- S2 streams ranged from 5-20 m in width;
- S3 streams ranged from 1.5-5 m in width; and
- S4 streams were those measuring less than 1.5 m in width.
- S5 & S6 classifications were not considered at this time, as these apply only to non-fish bearing streams and require demonstrated absence of fish (may be assessed in Phase 2).

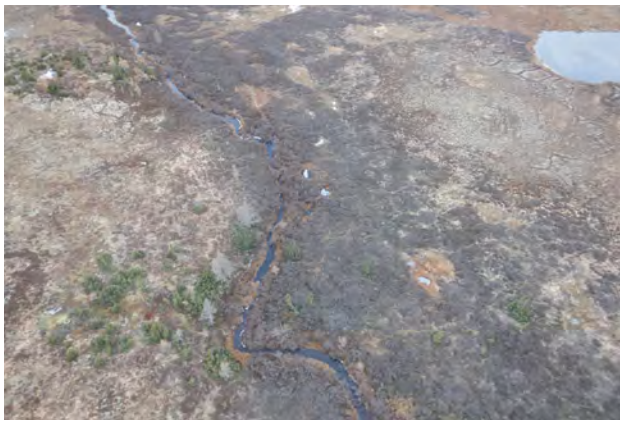
A total of 127 watercourses were identified within the Project corridor boundaries and classified through aerial surveys conducted along the proposed Project route...

THE NORTH KNIFE RIVER, REPRESENTATIVE OF A TYPICAL S1 WATERCOURSE



THE CROSSWELL RIVER, REPRESENTATIVE OF A TYPICAL S2 WATERCOURSE

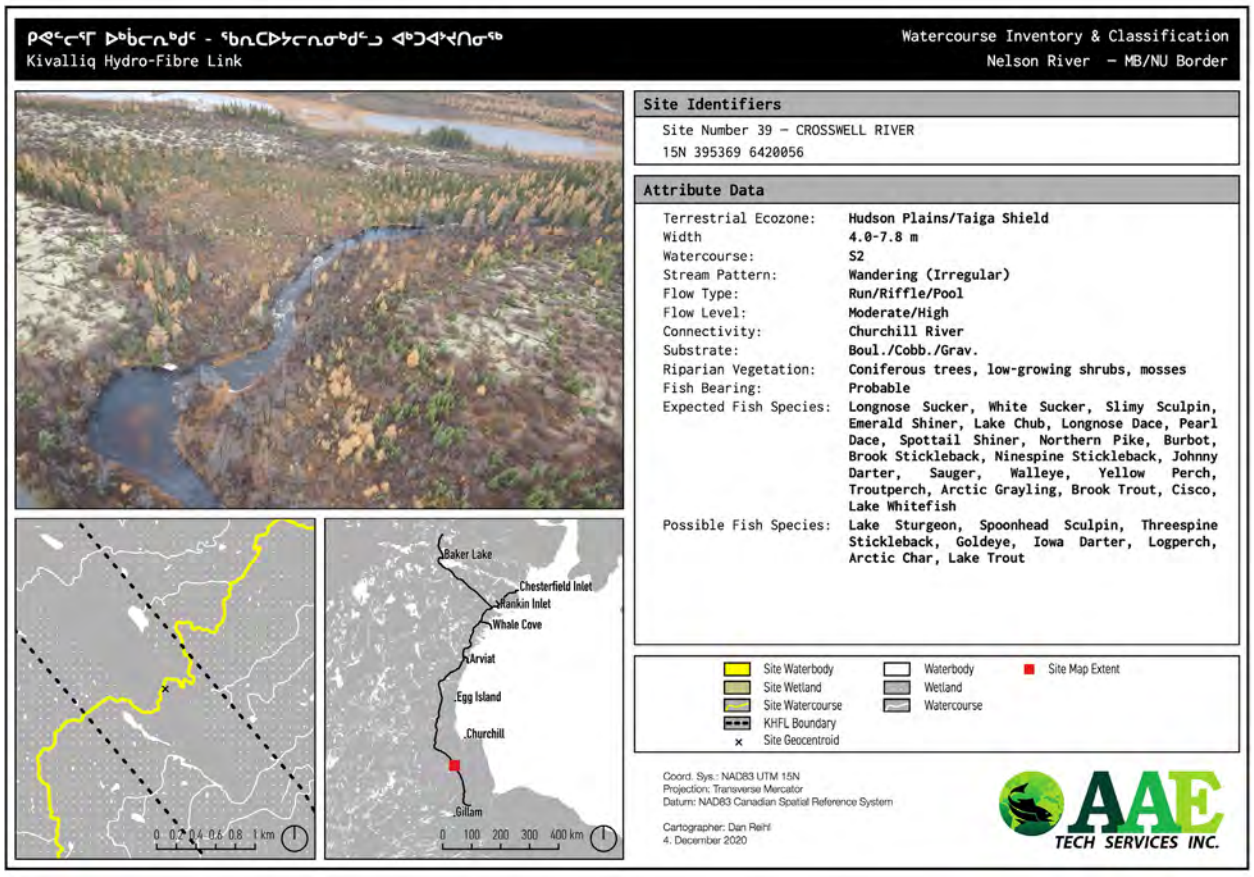
SKROMEDA CREEK, REPRESENTATIVE OF A TYPICAL S3 WATERCOURSE



SITE 113, REPRESENTATIVE OF A TYPICAL S4 WATERCOURSE

Status and Presence of Fish Species

A total of 46 species of freshwater fish (including anadromous fishes) were identified as having distribution ranges that may extend to include watercourses transected by the proposed Project corridor within Manitoba (Stewart and Watkinson, 2004). Among these 46 species, only one species is currently listed by COSEWIC or SARA as having elevated status (Government of Canada; accessed 2020). As of April 2017, both the Saskatchewan-Nelson River and Western Hudson Bay populations of Lake Sturgeon (Acipenser fulcescens) are listed by COSEWIC as "Endangered" and are currently being considered for listing and protection under Schedule 1 of the Species-at-Risk Act (Government of Canada; accessed 2020). Notably, the Saskatchewan – Nelson River populations of Silver Lamprey (Ichtyomyzon unicuspis) are currently listed as "Data Deficient". Elsewhere in its range, Silver Lamprey is listed as "Special Concern" under Schedule 1 of SARA (Great Lakes – Upper St. Lawrence populations). Owing to the absence of Sea Lamprey and the generally undeveloped natural environments along the northwestern coast of the Hudson Bay (except for the mainstems of the Nelson and Churchill rivers where hydroelectric development and operations have drastically altered the condition of aquatic habitats), none of these threats are currently expected to have significant impact on lamprey populations that may inhabit the study area.



SAMPLE WATERCOURSE INVENTORY SITE CARD

Watercourse Inventory

An inventory of watercourse crossing locations, classified by watershed and habitat type, was created, and summarized in a master watercourse crossing table. Detailed site cards were generated for each watercourse inventoried and include aerial photographs, site maps, and information such as the geographic setting within the Project study area, coordinates, watershed connectivity, general attributes and habitat characteristics of each watercourse and the potential fish species which may be reasonably expected to inhabit them.

Summary tables were created to compile information gathered during desktop investigations of freshwater fish potentially inhabiting these watercourses. These detail each species' known distribution ranges, potential occurrences within the study area, as well as their spawning periods, habitat preferences and behaviours, and their current status under SARA and COSEWIC.

CURRENT ACTIVITIES

AAE Tech is currently undertaking desktop studies and GIS analysis to identify all watercourse crossings along the Nunavut segment of the proposed Project development corridor. This includes fish distribution maps and relevant literature review. Desktop activities will be based on Nunavut satellite and ortho-imagery as shared by the Project team. If data is sufficient, Watercourse Inventory Site cards will be created for the Nunavut segment of the proposed Project development corridor.

NEXT STEPS

To address knowledge gaps that persist following these preliminary classifications of aquatic habitat throughout the Project study area, AAE Tech proposes to return to each watercourse in spring/summer conditions, following the break-up of ice cover, to conduct detailed baseline assessments of physical habitat characteristics (water velocities, discharge, stream bed and bank profiles, substrate characteristics), water quality (temperature, dissolved oxygen, pH, conductivity, turbidity), and to conduct assessments of fish community to verify species occurrences and evaluate the extent to which each species may utilize specific habitats.

These assessments will serve to document baseline habitat condition and quality, beyond that which was possible strictly from aerial surveys, as well as to ground-truth specific assumptions and conclusions presented here.

Engagement with First Nation, Métis and Inuit Elders, Resource Management Boards, Hunters and Trappers Organizations, Kivalliq Regional Wildlife Board, resource users and community members to document Indigenous Traditional Knowledge and Inuit Qaujimajatuqangit will also aid in directing and providing focus to field investigations by constructing historical data sets and detailing local knowledge related to fisheries and other traditionally significant ecosystem components within the Project study area.

Data collected through future assessments will ensure that high quality, detailed and reliable information is available to incorporate into project environmental protection plans and to aid in the development of risk mitigation during project construction, and environmental remediation and compensation strategies following project completion.

KIVALLIQ HYDRO-FIBRE LINK

DATA COLLECTION PROGRAMS

ARCHAEOLOGY

BAKER LAKE

DESKTOP REVIEW

Consideration of the potential for heritage resources in Nunavut began with review of published and publicly accessible reports (i.e., through the Nunavut Impact Review Board (NIRB) website) to develop a summary of previous archaeological findings. Site form records for known archaeological sites along the proposed Project corridor were shared by the Government of Nunavut Department of Culture and Heritage. The database contains approximately 738 registered sites reported from dozens of past projects. The Project development corridor follows a path of high archaeological potential along the west coast of Hudson Bay. Recorded archaeological sites are densely clustered around the communities and previously built infrastructure, including mines within the study area. There have been 68 previous archaeology investigations within the Project boundaries, ranging from archaeological consulting (cultural resource management preceding land development), research projects, and avocational discoveries along the corridor dating back to as early as 1894. These sites contain evidence of thousands of years of history by the Inuit and earlier groups.

The data collected will provide a baseline, validity of the proposed Project corridor and is required for submission of the Impact Assessment (IA).

When supplied with coordinates for specific planned Project infrastructure, archaeologists can advise engineers and planners if there are known sites in the vicinity. However, the summary will raise

important matters to deal with in areas that may already have a high density of sites and will need extra care in planning. Of course, the absence of recorded archaeological sites in the area should not be considered an indication when evaluating the area's heritage potential. It is more likely the absence of formal archaeological fieldwork being conducted. The absence of archaeological sites can only be confirmed by fieldwork, and interviews with land users, and local Knowledge Keepers.

FIELD PROGRAM

InterGroup conducted an initial archaeological assessment of the proposed route within the Manitoba section of the proposed development corridor and two archeaologists were retained to begin a desktop review of resources with the Nunavut section of the Project route. The objective of this initial archaeological assessment was to support development of a framework for baseline data collection supporting an impact assessment process as well as provide initial baseline data to determine potential constraint areas which may require further assessment in future field seasons.

On October 5-6, 2020, InterGroup conducted an aerial overview flight of the proposed Project development corridor within Manitoba. The assessment consisted of visual observations of the general topography within and adjacent to the proposed corridor, with the objective of classifying areas as possessing either high, moderate, or low archaeological potential. Additionally, the entirety of the proposed corridor within Manitoba was recorded with the use of a high-definition digital video camera attached to the bottom of the Bell Jet Ranger helicopter.

Photographs of the land from above were examined for pertinent information, and images were interpreted to determine archaeological potential. Classifications were based upon several criteria including elevated topography, well drained soils, and proximity to non-standing water bodies (e.g., lakes, rivers, creeks). Areas considered high or moderate are based on ideal topographic features that would be used by past and present peoples (e.g., eskers, ridges, and prominent watercourses). Observed areas of high archaeological potential were georeferenced on a handheld GPS unit (Garmin GPSMAP 64S), photo documented, and recorded in field notes.

INUIT ELDER, ARVIAT

This section outlines areas that have been identified as possessing high, medium, or low archaeological potential. For reporting purposes, the proposed corridor within Manitoba was divided into five areas, Northern, North Central, Central, South Central, and Southern (Map 5).

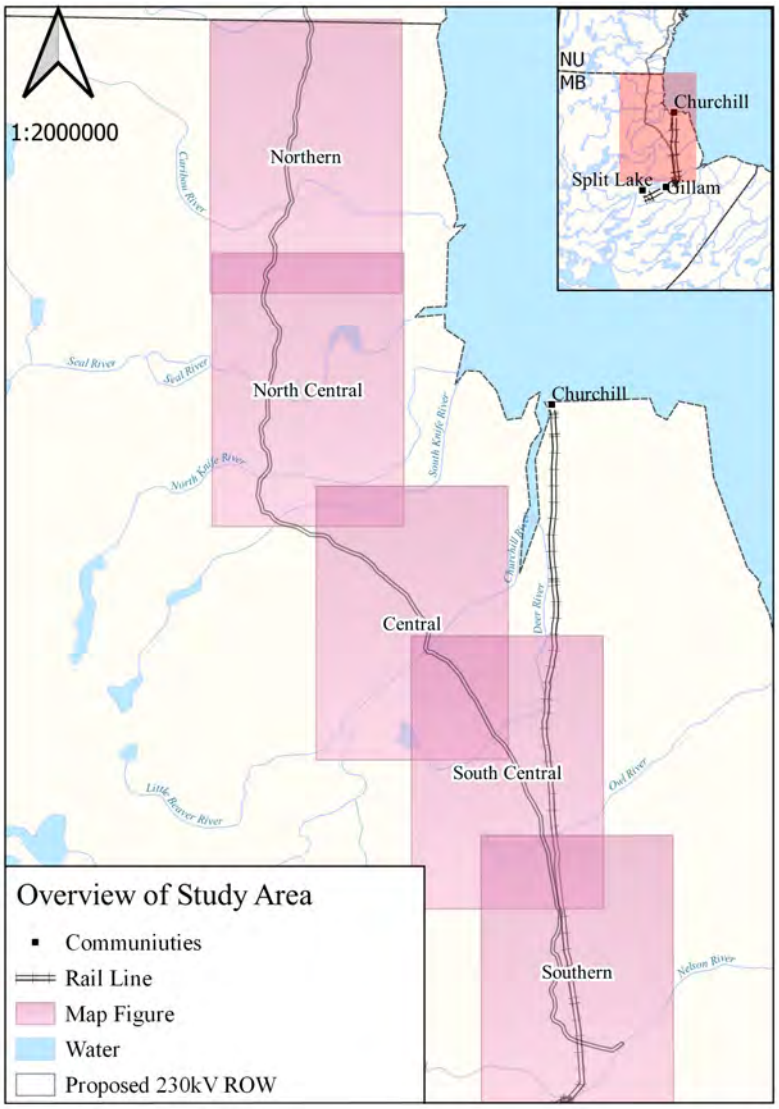
SUMMARY RESULTS

Visual observations of the general topography, within and adjacent to the proposed corridor were ranked based on their archaeological potential. Classifications were based upon several criteria including elevated topography, well drained soils, and proximity to non-standing water bodies (e.g., lakes, rivers, creeks). Areas considered high or moderate are based on ideal topographic features that would be used by past and present peoples (e.g., eskers, ridges, and prominent watercourses).

As an example, the North Central section features large areas of elevated well drained sandy terrain, long eskers, and tall sandy wave-washed ridges. Additionally, the proposed corridor crosses several important river systems, including the Seal River, a

WAVE WASHED FEATURES

THE SEAL RIVER



MAP 5: OVERVIEW OF ARCHAEOLOGICAL ASSESSMENT SECTIONS WITHIN THE PROJECT PROPOSED ROUTE IN MANITOBA

SEGMENT	RESULTS		
	High	Moderate	Total
Northern Section	34%	3%	37%
North Central Section	62%	0%	62%
Central Section	7%	21%	28%
South-Central Section	0%	24%	24%
Southern Section	12%	66%	78%

TABLE 2: RESULTS OF THE AERIAL EVALUATION: PERCENTAGE OF HIGH AND MODERATE POTENTIAL BY SECTION

designated Heritage River as well as the North and South Knife Rivers. There are four areas of high archaeological potential in the North Central section.

In total, 25 areas of high or moderate archaeological potential were identified. Primarily, the areas with high archaeological potential are the Nelson River, and the lands north of the Churchill River (Table 2).

Areas observed as low archaeological potential should not be disregarded entirely due to the nature of data capture. The most accurate method of determining heritage potential involves ground-truthing and consultations with communities who regularly utilize the land. Additionally, there are a multitude of factors that contribute to an area's cultural importance that may not be visible within a region's topography (e.g., areas identified through traditional knowledge studies).

CURRENT ACTIVITIES

InterGroup is currently reviewing all relevant literature and drafting a report detailing the environment and the cultural history of the area within Manitoba. This includes consideration for archaeological record and previous studies done in the area. This report will be used in a future Project description as a background chapter. Archaeologists are preparing to undertake a similar process within the Nunavut section.

NEXT STEPS

Nunavut

Currently a review of the published and publicly accessible reports is being conducted. The site form records for known archaeological sites along the proposed Project development corridor, shared by the Government of Nunavut Department of Culture and Heritage, are being reviewed. Recorded archaeological sites are densely clustered around the communities and previously built infrastructure, including mines within the study area. The next phase of data collection will involve the ground truthing of areas of heritage potential scheduled to occur in 2021 as well as engagement with Knowledge Keepers.

Manitoba

Further follow-up studies will be conducted to develop archaeological knowledge about the past peoples, archaeological sites, and landscapes. Engagment with First Nations and Métis Elders, resource users and community members to document Indigenous Traditional Knowledge will provide focus to field investigations. Ground truthing based on Indigenous Traditional Knowledge input including areas flagged as high potential will advance.

KIVALLIQ HYDRO-FIBRE LINK

SUMMARY OF NEXT STEPS

HUDSON BAY ICE

Anticipated steps for fieldwork programming include activities to advance assessment of the entire proposed development corridor, both Manitoba and Nunavut segments, as well as anticipate areas of future fieldwork as part of the overall larger Environmental Assessment program.

Data collection processes to date have supported the characterization of existing conditions and the identification of priority activities in 2021/2022, including:

- Secondary data analysis;
- Ground and aerial based surveys;
- Collection of data from deployed monitoring equipment;
- LiDAR data collection; and
- Mapping.

Engagement with Indigenous and Inuit communities, including Elders and resource users will remain an important activity. The Project will support the inclusion of Indigenous Knowledge and Inuit Qaujimajatuqangit and will work with communities to determine the approach to do this.

Engagement with Indigenous and Inuit communities, including Elders and resource users will remain an important activity

BOWHEAD WHALE, RANKIN INLET

PROJECT TEAM EXPERTS

This section includes description of service providers undertaking the initial preliminary studies along the proposed Project corridor.

InterGroup Consultants Ltd. (**InterGroup**) is an independent, multi-disciplinary firm based in Winnipeg, Manitoba, with over 46 years of experience providing consulting services to clients and industries across Canada and all three Territories. InterGroup provides leading-edge consulting services in managing project development, multi-stakeholder processes, public engagement, socio-economic research, heritage and cultural resources, and economic analyses. The InterGroup team provides advice on the strategic development, regulatory and licensing considerations for the Project, along with planning and implementation of engagement efforts, socio-economics, and archaeology and heritage for the future impact assessment.

Joro Consultants Inc. (**Joro**) is a Manitoba owned and operated environmental consulting firm specializing in wildlife research and monitoring and environmental assessment. Joro has extensive experience with large biological monitoring and environmental assessment undertakings and has experience in presenting data and findings as part of environmental and cumulative impact assessments involving terrestrial and avian wildlife. They specialize in caribou, large mammals, geospatial analysis, that has served to contribute both to industry partners and academia. Joro has worked with a variety of academic, corporate, government, First Nations, and community partners. Their mission is to provide innovative, efficient services to address original research questions as well as prevent, mitigate, and monitor environmental effects of development. Canadian-owned and operated since 1992 (formerly Terrestrial and Aquatic Environmental Managers), Joro is a committed team of highly-trained personnel including wildlife biologists, ecologists, geographic information systems (GIS) technicians, field technicians, and environmental professionals. The Joro team provides support on the initial terrestrial wildlife and habitat assessment for the Project.

AAE Tech Services Inc. (**AAE**) is a professional consulting company providing environmental services on a wide variety of projects across Canada. They specialize in aquatic ecology and conservation biology. AAE's primary goal as an environmental consulting firm is to work with communities, companies, and stakeholders to ensure the environment is protected. As their company grows, they are continually expanding their capabilities and taking on new challenges on behalf of their clients, while their partnerships with local independent specialists enable us to carry out large-scale, multi-disciplinary projects. They strive to provide their clients with exceptional service at an outstanding value. The AAE team provides support on the initial aquatic assessment for the Project.

Established in 2010, **Palmer** is a respected team of geoscience and environmental professionals who provide strategic advice and technical expertise to government, land development, and resource industry clients across Canada. Palmer has extensive northern experience in geomorphology, permafrost, hydrology, hydrogeology, water quality, aquatic and terrestrial ecology, and environmental permitting. Their team has earned a reputation in northern Canada as leaders in the characterization and mapping of geomorphology and permafrost based on interpretation of high-resolution imagery and topographic data, for a variety of applications including routing and design of linear infrastructure (e.g., transmission lines, roads/highways), aggregate resource assessment, mineral exploration, archaeological studies and ecosystem mapping. Palmer is working in collaboration with Dr. Pascale Roy-Léveillée, from Laval University. Dr. Pascale Roy-Leveillée holds the research chair in permafrost geomorphology operating a research team out of the Churchill Northern Studies Centre in Churchill, Manitoba. The Palmer/ Leveillée team provides support on the initial geomorphological and permafrost assessment for the Project.

IGI Consulting Inc. (**IGI**) has over 30 years of experience in the digital mapping and geospatial industry. IGI provides both airborne and satellite based image acquisition, stereo viewable file set generation, digital mapping, ortho-imagery as well as aerial LiDAR and IFSAR acquisition and classification/processing. The IGI team supports the development of Summit stereo models, ortho-imagery and autocorrelated (ortho-quality) digital elevation model (DEM)/ digital surface model (DSM) for the Project.

REFERENCES

Province of Manitoba. 1990. Fatality Inquiries Act. C.C.S.M. c. F52.

Province of Manitoba. 1987. Reporting, Exhumation and Reburial of Found Human Remains.

Province of Manitoba. 1986. The Heritage Resources Act. C.C.S.M c.H39.1

Province of Manitoba. n.d. Geographical Names in Manitoba. National Library of Canada.

B.C. Environment. 1995. Riparian Management Area Guidebook. Forest Service, British Columbia.

Government of Canada. Species at Risk Public Registry. [accessed online 2020].

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

Stewart, R. E. and Kantrud, H. A. 1971. Classification of natural ponds and lakes in the glaciated prairie region. Washington, D.C.

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

Nunavut Planning Commission (NPC). 2000. Keewatin Regional Land Use Plan.

Nunavut Planning Commission (NPC). 2016. Draft Nunavut Land Use Plan. Available from: https://www.nunavut.ca/sites/default/files/2016_draft_nunavut_land_use_plan_0.pdf

LIST OF MAPS

LIST OF TABLES

KIVALLIQ HYDRO-FIBRE LINK

DESIGNED AND PRODUCED BY JACKPINE DYNAMIC BRANDING JACKPINE.CO

kivalliqlink.ca