



2016

Bipole III Transmission Project

Summary of Environmental Monitoring

Each year Manitoba Hydro shares monitoring results and mitigation outcomes for the Bipole III Transmission Project. This report provides a summary of outcomes from 2016, or the third construction season. More details on the Bipole III Biophysical Monitoring and Mitigation program can be found online at www.hydro.mb.ca/projects/bipoleIII/ where technical data reports on many of the topics included here can be found.

The Bipole III Biophysical Monitoring Program (BMP) is designed to ask the questions:

- Are we seeing the effects we predicted in the environmental impact assessment?
- How effective are the mitigation measures put into action?
- How have we responded to unforeseen events and unexpected results?

Answers to these questions are organized here by topic, and include: Aquatics, Wildlife, Access and Wildlife Interactions, Restoring the land to a healthy right-of-way, Soils and Terrain, and Heritage. Also included is a discussion on how results we've receive so far will influence future monitoring.

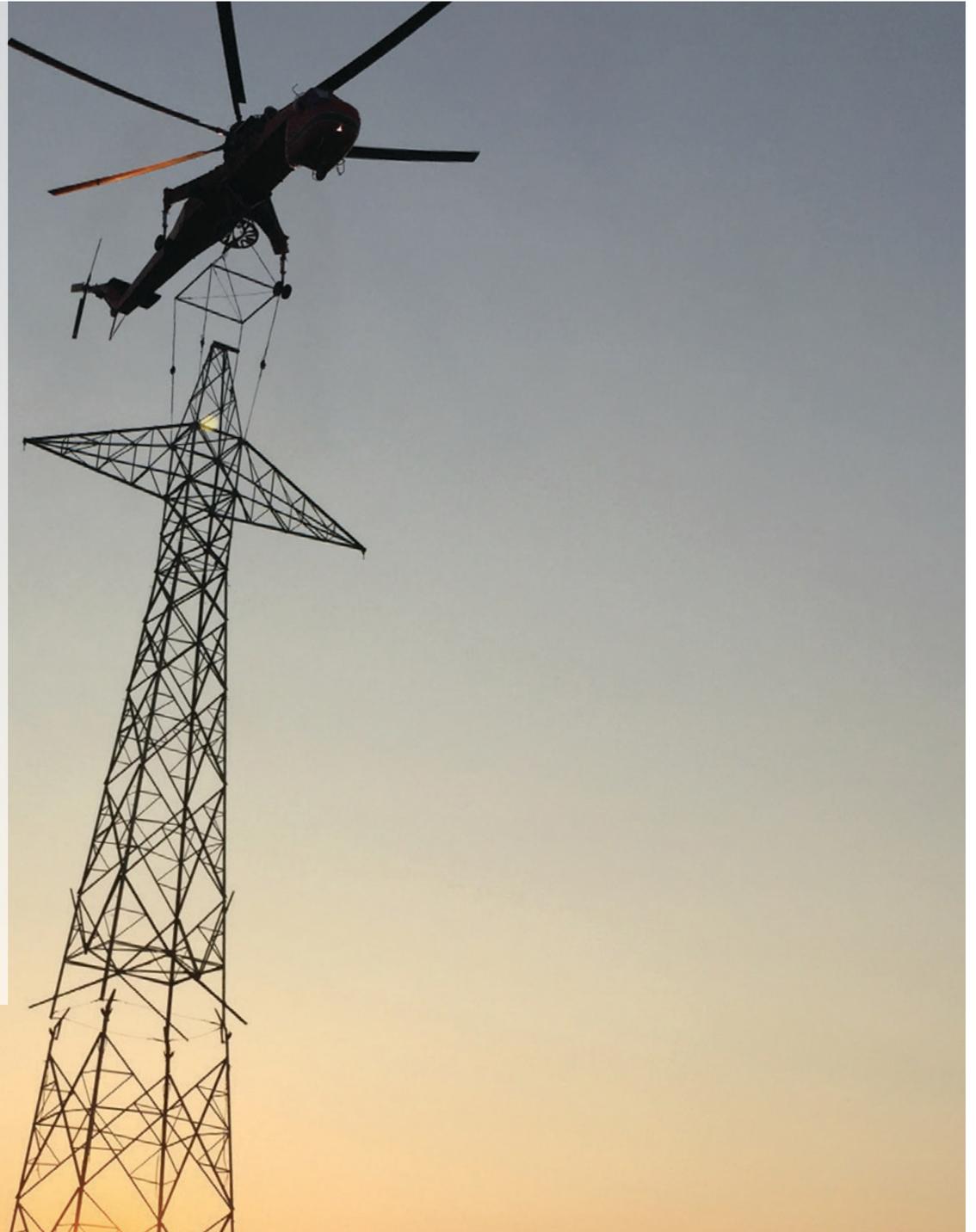


Table of Contents

Update on the Project	2
Keewatinohk Converter Station	2
Riel Converter Station	2
Transmission Line	3
The Monitoring Program	5
Aquatics	6
Wildlife	8
Moose	10
Caribou	11
Whitetailed deer	14
Wolf, bear, furbearers	14
Reptiles	16
Birds	17
Access and Wildlife Interactions	18
Restoring the Land to a Healthy Right-of-Way	20
Native grasslands	21
Plants important to Indigenous peoples	21
Wetlands	22
Invasive species	22
Species of conservation concern	23
Soils and Terrain	24
Heritage	26
Summary	28

Update on the Project

This was a busy year for the Bipole III construction team. Substantial progress was made at the Keewatinohk and Riel converter stations, much of the clearing work was completed and many foundations and towers were installed.

Keewatinohk Converter Station

Two large, heavy transformers were brought to the Keewatinohk Converter site in 2016. To accommodate the weight of these transformers, plans were made to offload them from rail cars north of the Limestone River where they were then hauled to site using special transport trucks. The station is divided into a 500 kV and 230 kV switchyard. Steel frames, switch gear, cabling and lighting were installed in the 230 kV switchyard. The main HVDC converter building was erected, enclosed and interior works are well underway. Foundation work progressed on other electrical components.

Site rehabilitation work began at a fuel depot and a material laydown area. Environmental site monitoring at the Keewatinohk station focused on drain water quality, wildlife interactions, erosion control and hazardous materials spills. There were no stop work or improvement orders issued to contractors at this station in 2016 – a good sign that demonstrates successful environmental management of the site.

Riel Converter Station

This station is also divided into a 230 kV and a new 500 kV switchyard. The existing Riel station site was developed to accommodate a new 500 kV switchyard, converter station and other facilities. The first two converter transformers were moved onto the site and were tested prior to final installation. The HVDC converter building was enclosed and interior concrete, mason and metal work completed. Similar to Keewatinohk, there were no stop work or improvement orders issued to contractors at the station in 2016.



Transmission Line

The vast majority of right-of-way clearing was completed in 2016. Clearing activities were completed in sections N1, N2, N3 and C2. Sections N4 and C1 were nearly completed, and approximately 70% of section S1 was completed. Section S2, located close to Riel converter station, requires little clearing as it is mostly located within agricultural lands.

Tower foundations and anchor installation activities were initiated in the northern (N1, N2, N3 and N4) and central sections (C1, C2) of the line. Towers were erected in N2 and N3, and conductor stringing occurred along about 10% of the line.

The general sequence of events for transmission line construction begins with right-of-way clearing, then followed by tower foundation work and the installation of anchors. Once foundations and anchors are installed, transmission towers can be erected, then finally the towers are strung with conductors – or the steel bundle of cables that transmits electricity from the northern generating stations to the south.

A route revision was required in Section S1 to maintain the required distance between Nav Canada radar and navigational beacon sites. Several possible route modifications were considered, environmental approvals were sought and property was acquired to accommodate the change.



Preparing for tower assembly along the Bipole III right-of-way

Update on the Project

The Bipole III Transmission Project transmission line will be built on steel towers along a 66 meter wide right-of-way. The transmission line spans 1,364 km in length between its northernmost point, Keewatinohk converter station and its southern extent, the Riel converter station. Due to this long length, the Project is often described in sections, or segments of the transmission line (see Map 1, right). Construction of the Project is managed along these sections, where often different construction crews are responsible for different sections of the Project. There are eight sections in total, grouped into northern, central and southern areas.

There are four northern sections:

- N1 - Keewatinohk converter station to Odie Lake
- N2 - Odie Lake to the Wabowden area (by Gormley Lake)
- N3 - Wabowden area to the Pas
- N4 - The Pas to Swan River

There are two central sections:

- C1 - Swan River to Rorketon area
- C2 - Rorketon area to north of Langruth

There are two southern sections:

- S1 - north of Langruth to Elm Creek
- S2 - Elm Creek to Riel converter station

These construction sections are also used to tailor mitigation measures and monitoring efforts to the terrain and environmental conditions that characterize each section. These sections are referenced throughout this report to describe to mitigation and monitoring endeavours.



MAP 1 - Project Area

The Monitoring Program

Roles

Monitoring Bipole III is a team effort where staff from Manitoba Hydro work with monitors from First Nations, Northern Affairs Communities, the Manitoba Metis Federation (MMF) and specialists from a variety of consultants. There are different roles played by team members, including:

Construction Environmental Inspectors are Manitoba Hydro employees who conduct field inspection according to Construction Environmental Protection plans developed for the Project. They work closely with Environmental Monitors.

Environmental Monitors are representatives from local Indigenous communities or organizations who are funded by Manitoba Hydro to monitor mitigation measures and collect wildlife observations in active construction areas. Environment monitors work alongside Construction Environmental Inspectors.

Community Liaisons are also representatives from local communities or organizations who observe construction activities and report back to their community. Liaisons may also take part in socio-economic monitoring efforts.

An Environmental Protection Management Team meets regularly to discuss the outcomes of inspections, monitoring results and project events. This management team also coordinates with contractors, executive staff and regulators to develop mitigations strategies, solve problems and report outcomes.

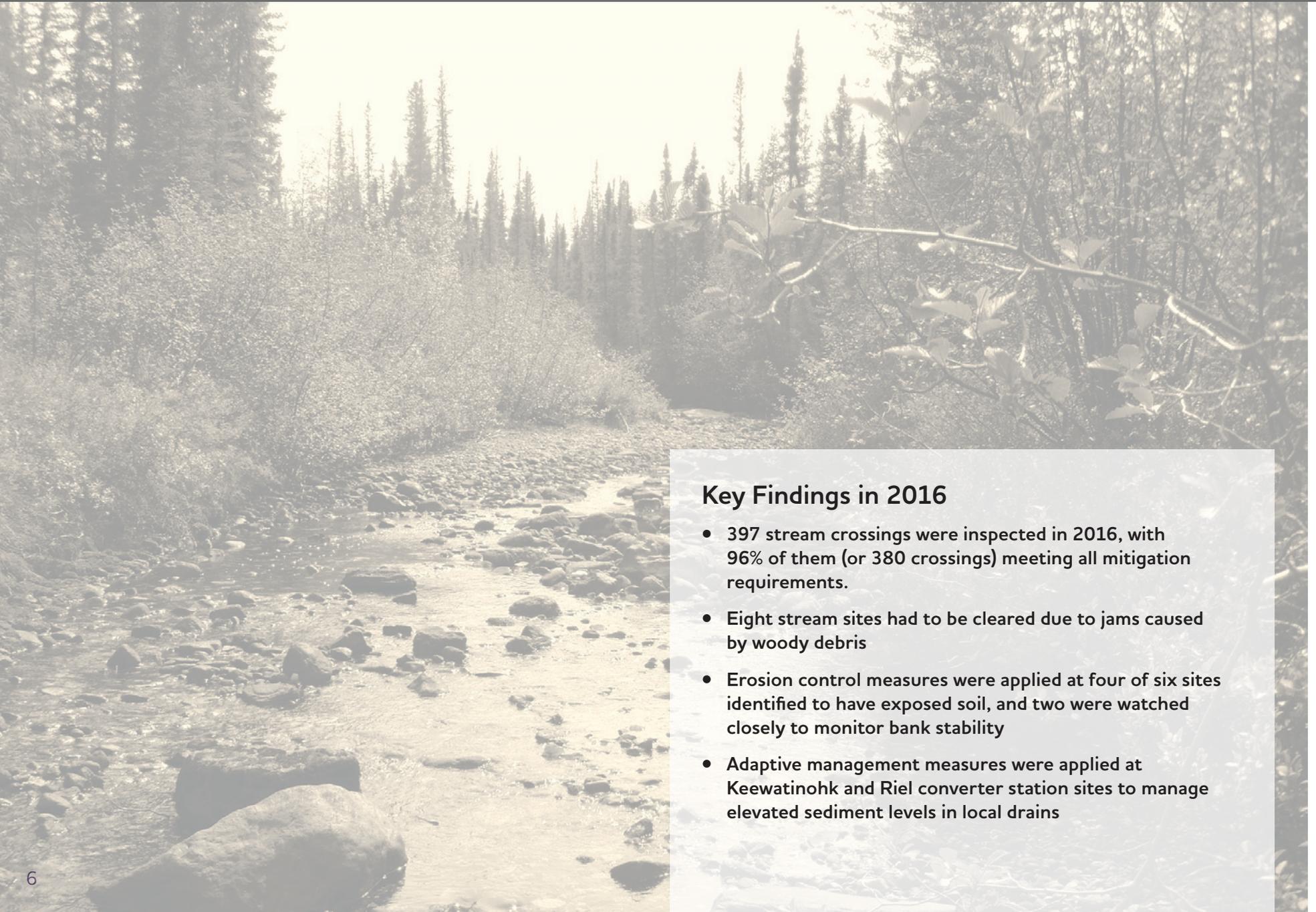
There are many other people who take part in monitoring the environment. Transmission line inspectors, engineering technicians, field supervisors, and many others look for spills, make sure buffers are maintained, check ice thickness, watch for wildlife and the variety of other aspects involved in making sure the environmental protection plan is followed. It's a team effort.



Checking cameras, 2016

As you may imagine, this diverse program produces an enormous amount of data. Data is stored and organized in an internal Environmental Protection Information Management System (EPIMS). Staff depend on this database to help them to sort years of information, see trends and create reports.

Aquatics



Key Findings in 2016

- 397 stream crossings were inspected in 2016, with 96% of them (or 380 crossings) meeting all mitigation requirements.
- Eight stream sites had to be cleared due to jams caused by woody debris
- Erosion control measures were applied at four of six sites identified to have exposed soil, and two were watched closely to monitor bank stability
- Adaptive management measures were applied at Keewatinohk and Riel converter station sites to manage elevated sediment levels in local drains

Key Predictions

The environmental impact statement predicted that there may be potential for:

- A loss of riparian habitat which could affect fish habitat;
- An increase in sedimentation to waterways; and,
- Altered stream flows.

Responding to unforeseen events and unexpected results

In November of 2016 Manitoba Hydro heard concerns from a representative from Swan Lake First Nation (SLFN) regarding right-of-way clearing works in the vicinity of the Assiniboine River. Some community members felt the crossing was not done in accordance with plans, and that heritage sites may be present. After discussions with the landowner, Environmental Inspectors and Monitors, Elders, community members and the SLFN monitors, a plan was put in place to remedy the situation and improve communication protocols with the SLFN clearing contractor moving forward. A post-clearing site assessment involving the project archaeologist and a community representative from SLFN was conducted to ensure compliance.



Swan Lake First Nation hand clearing steep slopes at the Assiniboine River

A planned site audit at the Keewatinohk Converter Station identified high suspended solids in some drains leaving the site, a contributing factor was lack of adequate erosion and sediment control measures around a stock pile. Silt fencing was installed to reduce sediment entering these drains. In 2017 further mitigation measures will be applied at this site, including new sediment fencing, re-sloping and revegetation of the area. To remediate this further, flocculent tanks were brought in to settle out suspended particles in the water prior to water leaving the site. This step, and the response to demonstrates adaptive management when encountering unexpected events.

Monitoring efforts at the Riel Converter Station revealed higher than expected levels

of suspended sediment in the discharge water leaving the station site.



Key Findings in 2016

- A second, joint survey of moose in the Tom Lamb WMA with Provincial biologists showed the population had not changed since 2012.
- Boreal woodland caribou are being monitored closely in four areas: Pasquia Bog, Naosap-Reed, Wabowden and Charron Lake (acting as a control).
- Surveys showed that white-tailed deer have not moved into caribou ranges, reducing the likelihood that diseases carried by deer may be transferred to caribou.
- Over the course of 2015 and 2016, 46 sites were surveyed for northern prairie skinks. None were found at any of the sites surveyed. The Project area is at the far eastern edge of their range, so this result is not unexpected.
- Prior to project construction studies revealed that most boreal woodland caribou deaths (81%) were caused by wolves.
- Overall, the risk of predation to caribou, moose, deer and elk was higher in 2016 than 2015.
- The density of marten, fisher, fox, wolf and hare tracks increased the further away you were from the Project
- There was no difference between the density of tracks found on or off the right-of-way for other species, such as squirrel, moose, lynx, ermine and weasel

Goals of the program

The overall objectives of the mammals monitoring program are to:

- better understand use, population and habitat requirements of valued species;
- ensure compliance with regulatory requirements and EIS commitments;
- monitor and measure mammal responses to ROW creation and operation; and,
- assess the success of mitigation measures.

Key predictions for Moose, Caribou & White-tailed Deer

The environmental impact statement predicted that effects would include:

- more mortality due to:
 - o increased predator mobility
 - o increase harvest because it will be easier to access wilderness areas that were previously difficult to access
 - o increase in the transfer of disease, such as chronic wasting disease, where new corridors may contribute to increasing movement, which influence these effects

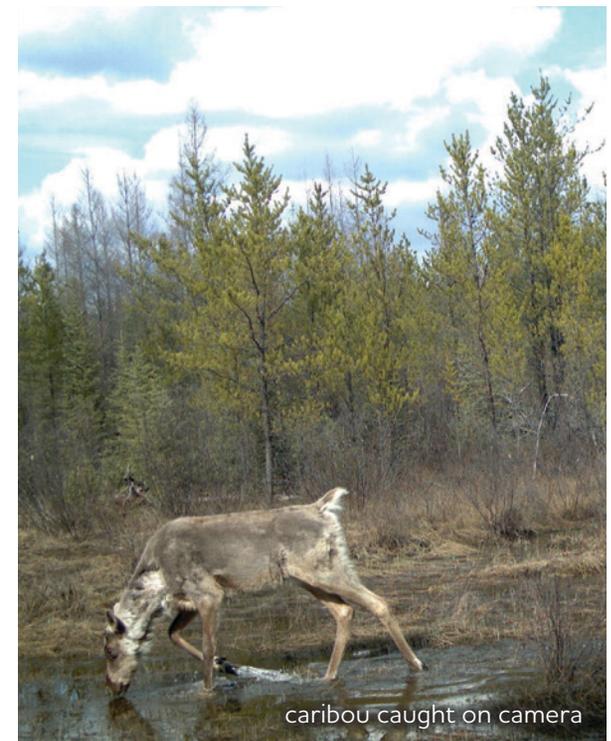
- less habitat available due to clearing for the project
- fewer calves born due to disturbance from the Project or because the animals are forced to move away from their preferred habitat.

One of the challenges with understanding the effects of a project on moose, caribou and deer, is that these animals typically range widely and are affected by other stresses in their environment. For example, moose had been experiencing population declines in areas along the Project route before initiating the Project. The abundance of these populations had already been affected by factors like deep snow conditions, over harvesting, disease, or a combination of these stresses. To understand potential cumulative effects to the population, Manitoba Hydro is supporting the Province in conducting surveys in the Tom Lamb Wildlife Management Area (WMA), Moose Meadows, and Pine River area.

How effective are the mitigation measures put into action?

Mitigation measures have been put in place to protect mammals. Some measures that appear to show early success include

- Maintaining vegetated areas near natural caribou crossing areas appears to be an effective mitigation measure as animals are observed using these areas to move across the right-of-way.



caribou caught on camera

Moose - Key Findings

- Tom Lamb WMA - Prior to starting the Bipole III project, a moose survey conducted in the Tom Lamb WMA identified 317 individuals. This 2012 survey revealed a decline from past surveys where the average number of moose typically found in the WMA was approximately 648. In 2016 a new survey identified 339 moose in the WMA. Although the number is up from the 2012 survey, the population seems to have stabilized at this lower level of abundance. Despite this lower level of abundance, there were encouraging signs within the population. Biologists identified an increase in both adult females and calves within the population. Higher numbers of cows and calves will contribute to the stability and potential for recovery of the population.
- Moose Meadows (also known as the Bellsite Swamp) – This area is located about 65 km north of Swan River, MB. Moose populations in the area tend to fluctuate based on snow conditions in the nearby Porcupine Hills. Moose Meadows is only one part of a larger area that is surveyed regularly. Moose in this area, termed Game Hunting Area 14 (GHA 14) have experienced significant declines beginning in the early 1990's from approximately 3,300 to the current 150 individuals. Similar declines are seen throughout the Swan-Pelican game hunting area (GHA 14/14A).
- Pine River - Pine River is in GHA 14A/19A. Population data is limited for this area. Modelling has been used to predict trends, revealing that population levels have been in steep decline since the early 1990's. In 1991/92 there were 1,047 moose in the area. In 2001/02 modelling projected a population of 213 individuals. In 2004 this trend continued with only 100 moose. Similar trends are seen in the Duck Mountains (GHA 18/18A/18B/18C) and Porcupine Hills (GHA 13/13A).



Although it is clear these declines occurred prior to Bipole III, additional pressures on this sensitive population are watched closely as they may have a greater effect on the population. Manitoba Sustainable Development continues to be the authority responsible for moose management, and is leading the effort to recover moose populations in western Manitoba. Manitoba Hydro supports these efforts and continues to be open to solutions to maintain these valued populations. For more information on big game population abundance in Manitoba, see Sustainable Developments 'Big Game Aerial Surveys' web page: www.gov.mb.ca/sd/wildlife/hunting/biggame/survey/index.html

Caribou - Key Findings

- Caribou generally avoid the project area by about 1-2 kilometers, even during the spring and summer when construction activities are at a minimum.
- Caribou were more likely to be encountered if a wetland was nearby, and less likely to be encountered if we were within dense forest and open water.
- Early results show that mitigation efforts to encourage the continued use of historical crossing areas appear to be successful.

Caribou are sensitive to changes in habitat, particularly changes that alter their calving or wintering areas, sensory disturbance and any increase in the number of predators. There are two major sub-species of caribou

found within the Project area: the woodland caribou and the barren-ground caribou. Both have been assessed as threatened by the Committee on the Status of Endangered Wildlife in Canada.



Woodland Caribou

The woodland caribou are generally grouped into boreal and forest-tundra woodland caribou.

Boreal Woodland Caribou

The boreal woodland caribou are typically found in low densities in large, un-fragmented tracts of mature boreal forest. They congregate during winter in common areas. To calve, pregnant cows travel to isolated, relatively predator-free areas where forage is available, such as islands in lakes, peat lands and lakeshores. A key consideration during the Bipole III routing process was to avoid these critical areas.

The Project intersects three boreal woodland caribou ranges, called: The Pasquia Bog, Naosap-Reed, and Wabowden. Animals from each of these ranges are collared, as well as animals from a fourth range called Charron Lake. The collars are equipped with units that connect to satellites and transmit information about their movement patterns. Understanding movement patterns helps in understanding responses of the herd to the Project. Charron Lake acts as a control as it is not located by any development. Data from these animals will be compared to herds in the other three ranges.

- The Pasquia Bog –the Project created a new linear corridor in this area. Caribou avoided this area by about 1 km during construction, and may have avoided the area by as much as 3 km during the spring and summer. Despite

this buffer the caribou seem to keep around the Project, another study aimed at testing how caribou traverse the Project suggests that collared caribou have not changed the way they cross the Project area. Natural crossing areas were mapped, then clearing was reduced in these areas to improve landscape connectivity. These mitigated areas appear to be effective and likely helped as caribou continue to move across the Project.

- Naosap-Reed – A recent fire in this area may be a contributing factor for the suspected declining population trend and subsequent lower adult female survival relative to other monitored ranges.
- Wabowden - the Project widened an existing corridor created by the railroad line. Results suggest that female boreal caribou avoided this existing corridor by 1 to 2 km prior to the Project being constructed. Telemetry results show that this avoidance has not changed since Project construction, as caribou continue to have reduced occurrences within 2 km of the Project. Results also showed that collared caribou crossed the Project in this area less frequently than what was expected with no development; however, these results also show that the caribou cross the about the same amount as when there was just a railway.

Forest-Tundra Woodland Caribou

There is an eight-year study involving the Province, Manitoba Hydro and Integrated Resource Management Boards to better understand two ranges of the forest-tundra woodland caribou, the Cape Churchill and Pen Island ranges. This study monitors how these caribou use their range seasonally, how caribou use their ranges after calving, and identifies changes in population abundance. Cape Churchill and Pen Islands caribou periodically migrate from the Hudson Bay coast and overlap with the northern extent of the N1 construction segment. These occurrences are infrequent. No Cape Churchill or Pen Island caribou were present in the Project area in 2015. In 2016 a group of what are believed to be Cape Churchill animals were observed in the Bird-Gillam area.

Barren-ground Caribou

The barren-ground caribou are lighter and smaller than the boreal woodland caribou. They are found in the far north of Manitoba. They travel in large herds named after their calving grounds. Members of this population give birth on the open arctic tundra, and have significant cultural and social value to northern Indigenous peoples. The Qamanirjuaq herd had declined from approximately 349,000 in 2008 to 264,000 individuals in 2014. A portion of this herd, mainly bulls, occasionally move into the Project area near the N1 segment. The last known occurrence of this herd travelling into the Project area was in 2004 where approximately 10,000 barren ground caribou were observed.



Boreal woodland caribou

Whitetailed deer- Key Findings

- Tests were planned in two areas of the Project to see if deer were infected with brainworm in the population. Due to low population and access issues, no samples were taken.
- Surveys showed there was no evidence of deer or elk moving into woodland caribou ranges. Deer were spotted during aerial surveys; however, all were within their expected range.

It's important to understand if white-tailed deer are moving into an area they previously did not occur. Deer and elk can bring disease and predators to an area, creating increased risk for other prey animals such as caribou and moose. This year aerial surveys were conducted alongside the three key areas important for boreal woodland caribou (Pasquia Bog, Naosap-Reed, and Wabowden, described under 'Caribou'). Results from these surveys and from remote cameras set up in N2 and N3 sections showed that there was limited evidence (one deer track) of deer or elk moving into these three important areas.

Fecal samples were collected and tested for spiny-tailed larvae, an indicator of *P. Tenuis*, or brainworm in the population. Generally this parasite is limited to deer populations, but it can spread to moose and caribou, causing death. Efforts were unsuccessful as the deer population was low and access restrictions to private lands prevented sampling.



Wolf, Black Bear & Furbearers - Key Findings

- Prior to project construction studies revealed that most boreal woodland caribou deaths (81%) were caused by wolves.
- Overall, the risk of predation to caribou, moose, deer and elk was higher in 2016 than 2015.
- Where wolves may prefer the right-of-way over natural areas, bears tend to avoid it
- The density of marten, fisher, fox, wolf and hare tracks increased the further away you were from the Project
- There was no difference between the density of tracks found on or off the right-of-way for other species, such as squirrel, moose, lynx, ermine and weasel

Key predictions for Wolf, Black Bear & Furbearers

- The Project will create more opportunity for deer or moose movement along the right-of-way, likely increasing populations like wolf and bear.
- Bears may be drawn to the area due to the regrowth of new vegetation along the right-of-way

Grey wolf

The number and density of wolves may be increasing in the southern portion of the study area; however, more studies will be required to be more certain.

When a collared caribou dies, the study team will endeavor to track down the animal to retrieve the collar and try to determine the cause of death. The manner in which a caribou dies tells you something about both that animal and the predator that may have killed it. Caribou are particularly vulnerable to an increase in predators to an area. Prior to construction, 81% of all recovered collars were retrieved from caribou that were killed by wolves. In 2016 seven, or 100%, of recovered collars were retrieved from caribou killed by wolves.

The locations of sites where dead caribou are found and collars are retrieved can also tell you something about both predators and their prey. The locations of kill sites were measured to see how far they were from the Project right-of-way. The closest kill site was over 3 km away, with most greater than 15 km away. This suggests that the project right-of-way was not a likely contributor to these predation events.

Ground surveys and remote cameras show that wolves occurred more frequently on the right-of-way than compared to areas 1.5 km away. This shows that wolves prefer the right-of-way over natural areas, likely due to ease of travel.

Black bear

Bears may avoid the right-of-way more than wolves. No bear dens were disturbed during winter construction in 2016 and more bears (24) were observed 1.5 km away from the right-of-way than those found on it (18). Caribou mortality from bears is still quite low and does not seem to be a factor in caribou survival.

Furbearers

The density of marten, fisher, wolf and hare tracks increased the further away you were from the Project. There was no difference between the density of tracks found on or off the right-of-way for other species, such as moose, lynx, ermine and weasel.

A trapping success study was initiated in 2016 to understand the potential effects of the project on fur harvest. Data collected in 2016 will be compared to harvest rates in future years to understand potential effects of construction and operation of the Project.



black bear caught on camera

Reptiles - Key Findings

- Over the course of 2015 and 2016, 46 sites were surveyed for skinks. None were found at any of the sites surveyed. The Project area is at the far eastern edge of their range, so this result is not unexpected.

One of the reptiles studied during 2016 was a lizard named the northern prairie skink. The northern prairie skink is listed as endangered under the federal Species at Risk Act and The Endangered Species and Ecosystems Act (Manitoba). The range that this reptile typically lives has recently expanded, where their range now overlaps the Project footprint. Skinks are found in sandy soils with grasses and low growing plants such as creeping juniper (Prairie Skink Recovery Team 2009). Knowing their preferred habitat helped focus our monitoring efforts.

Key predictions for Reptiles

Both habitat modelling and Aboriginal traditional knowledge were used to predict effects to reptiles in Project area. Through Aboriginal Traditional Knowledge, Manitoba Hydro understood that there was potential skink habitat at 48 tower sites. After further consideration, two of the 48 sites were considered too far from the animals range to support their survival.



northern prairie skink

Birds

To fulfill federal requirements, monitoring work includes 'bird sweeps'. Bird sweeps are surveys that take place prior to conducting any clearing activities. Biologists check for bird nests, young birds, or birds with nesting behavior during the breeding bird season. If a nest is identified, a buffer is created around the area and work is delayed or diverted until the birds have fledged.

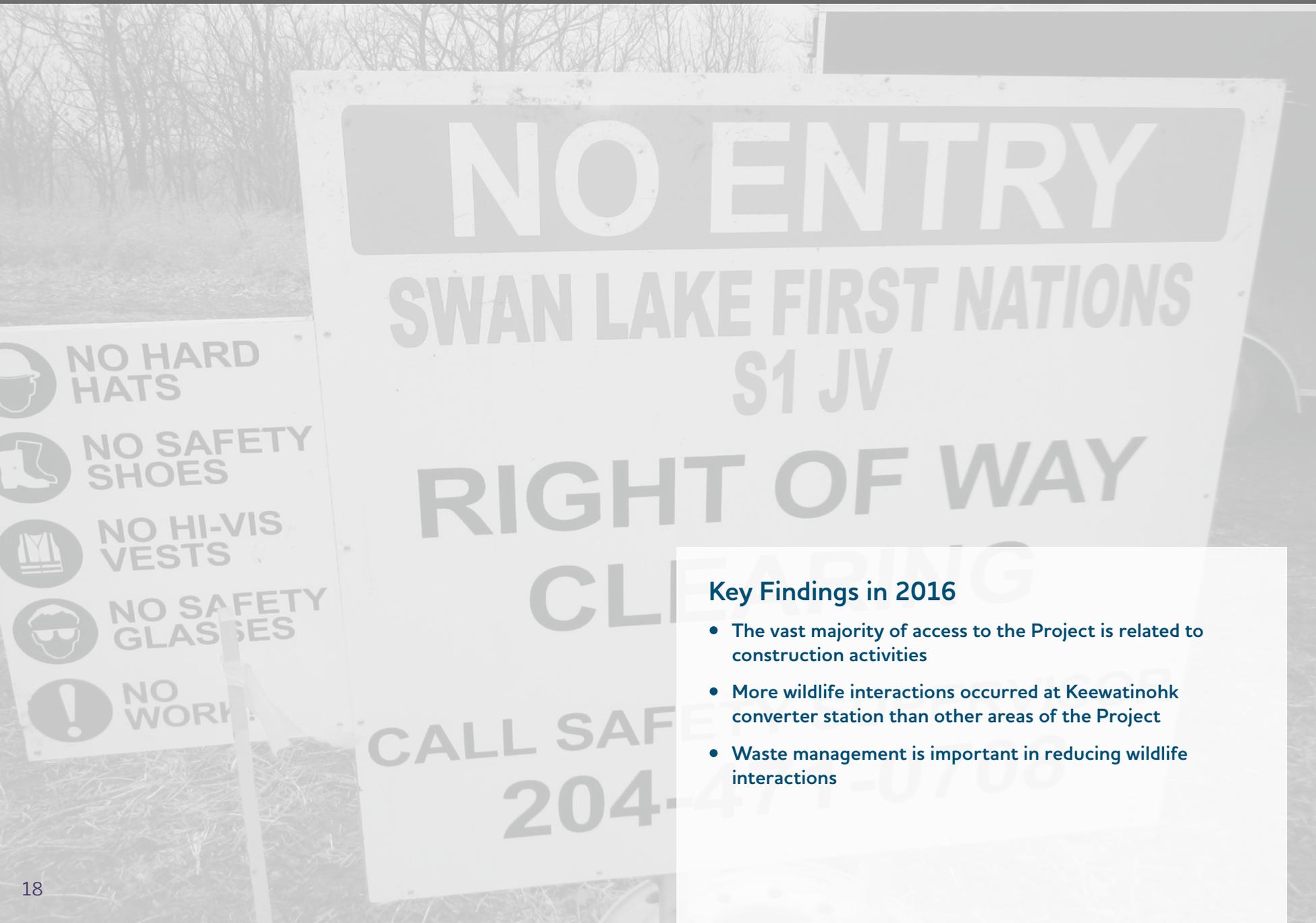
In June and July several instances of nests or nesting behavior were identified. Several grassland birds including bobolink and savanna sparrow were identified. Once identified, buffer zones were created, flagged and construction disturbance was prevented until the birds had left the area.

Some birds established nests within the Riel converter station. In total 19 nests were identified with species such as Canada geese, killdeer and robins. When encountered, bird nests were protected until vacated at the end of their breeding season. To reduce the instances of nesting a number of decoys were set up including a coyote and owl. Inspectors also conducted foot patrols to identify and discourage nesting.



grouse caught on camera

Access and Wildlife Interactions



Key Findings in 2016

- The vast majority of access to the Project is related to construction activities
- More wildlife interactions occurred at Keewatinohk converter station than other areas of the Project
- Waste management is important in reducing wildlife interactions

People

Trail cameras placed at several all-weather access points to monitor human access of the right-of-way at those locations indicates the vast majority of use is related to Project construction, with very limited local access for recreation or resource use.

Wildlife

A variety of wildlife were observed at the Keewatinohk Converter Station, including caribou, black bear, red foxes, arctic foxes, wolves, pine marten, and many bird species. Sometimes interactions with wildlife result in problems.

- A nuisance bear was trapped at the station and relocated using a helicopter. The bear returned to site several weeks later. It was then trapped a second time and transported off site by vehicle to a location specified by Sustainable Development.
- In the winter of 2016 pine martens began frequenting food waste bins outside the Keewatinohk camp. A worker was attacked by one of the animals, which resulted in improvements to waste handling procedures, the installation of additional animal proof containers and animal awareness training for employees.
- A beaver was killed by a vehicle on the access road south of the work camp in August of 2016.



Two contractors use completely enclosed bins – highest rated.



Ten of these type wildlife proof bins are strategically placed around site. No other small bins are allowed outdoors.

Restoring the land to a healthy right-of-way



Key Findings in 2016

- 201 different plant species were observed on the right-of-way during vegetation surveys
- The most frequently found invasive species are sow thistle and sweet white clover
- As you would expect after 1-2 years post clearing there is less vegetative cover and a reduced variety of plants along the right-of-way compared to the sites off the right-of-way
- Many of the uncommon or rare plants observed in the previous year's sampling program were observed again in 2016.

Healthy rights-of-way

After a right-of-way is cleared, seeds that naturally occur in local soils will take advantage of limited competition from tall plants and begin growing. As early as the year after clearing, rights-of-way will show new growth. Manitoba Hydro monitors this regeneration to watch for invasive species, species of conservation concern and to monitor plant communities that are important to many Manitobans, such as native grassland prairie, wetlands, and traditionally valued species.

Native grasslands

Native grasslands are a valued ecosystem in Manitoba. Native grasslands have been identified at nine locations along the right-of-way, each one marked as an Environmentally Sensitive Site. Protections are placed around these sites so clearing activities reduce effects to these valuable species.

One of these nine locations was sampled in 2016 to understand effects to this ecosystem. Results showed that the diversity and abundance of grassland plants remained about the same between 2015 and 2016; however, the area covered by these grassland species reduced.

This survey also showed that there was regeneration of aspen and oak along the right-of-way.

Plant species important to Indigenous peoples

A highly valued berry harvesting area was identified by local Indigenous communities in 2014 along segment C1 of the right-of-way near the Cowan Resource Area. Sampling was conducted at 10 sites within the Cowan Resource Area in 2015 and 2016. Sampling results showed some recovery of the area, with blueberries found at five of the 10 sites in 2016. This is an increase from 2015 where just two of the 10 sites supported the berries. Other edible berries observed during sampling included strawberry, dew berry and Saskatoon.

Members of Pine Creek First Nation and the community of Duck Bay joined Manitoba Hydro and their botanical consultants on a visit to two of the traditional plant monitoring sites. At these two plots, blueberries were plentiful and community members noted that the berry plants did really well and exceeded their expectations. It was also noted by a community member that increased sunlight created with clearing is required for better plant growth and from what they observed in the field, this area will provide good blueberry picking.



Restoring the land to a healthy right-of-way

Wetlands

Seven environmentally sensitive sites were visited in 2016 to sample wetland vegetation. These sites were selected as they supported a particular type of wetland, a patterned fen. Patterned fens are generally located in peat areas with poor drainage and support plants like bog birch, three-leaved Solomon's-seal and sphagnum moss.

All wetlands sampled showed low disturbance from construction activities. Vehicle traffic appeared to use existing trails under frozen ground conditions. In several locations the equipment path could not be identified as a result of abundant vegetation cover. Natural re-vegetation is occurring in previously disturbed wetland sites.

Invasive species

To understand if non-native and invasive species are encroaching on cleared areas, sites are surveyed at various locations along the right-of-way (Sections N1 to N4, C1, C2). Forty sites were visited along the right-of-way to sample for invasive and non-native vegetation. Each of these sites was paired with another sample along an existing right-of-way not related to the Project. This pairing let researchers compare what is occurring on a new right-of-way to what is occurring in a similar environment that has been reestablished.

Results show that there is less vegetative cover and a reduced variety of plants along the right-of-way compared to the sites off the right-of-way. Sampling also showed that of the 201 different plant species observed along the new right-of-way, 15 were non-native and 9 invasive. The most frequently found invasive species include sow thistle and white sweet clover.

Surveys showed that although there is less plant cover on the new right-of-way when compared to locations not on the right-of-way, the percent cover is increasing between sample years (2015, 2016) indicating a recovery.



Photo by Kevin Swaluk

Species of conservation concern

In Manitoba plant species are ranked as uncommon, rare, very rare, or historically known, depending on how common they are found in the landscape. In 2016 the Province added new plants to the list of ranked species. Sampling was conducted at 27 sites along the right-of-way to identify species of conservation concern (including the newly added plants) in 2016. Results showed that 43 species of conservation concern were observed along the right-of-way, 16 of which are considered rare or very rare.

Monitoring was conducted at 16 sites in northern sections of the right-of-way. Eight species of conservation concern were observed in 2016, seven of which were observed in previous sampling efforts. Little tree willow was observed at two new locations. Slender-leaved sundew, considered rare throughout its range or in the province, was observed in section N4. White beakrush, a sun-loving plant that likes wet areas that was previously abundant in this area of the right-of-way was not seen as often, and many of the plants observed were shorter in height compared to previous years. Activities on the right-of-way could have caused surface

compaction or altered drainage. These sites will be closely watched in the future to determine if further measures should be taken to support the success of this species.

Monitoring was conducted at 11 sites in an area along the Assiniboine River that supports mature bur oak and black ash. These pockets of forest are exceptional because unlike much of the southern agricultural landscape, they have remained intact as they are located in

areas of steep slope and are difficult to access. These mature forests remain refuges for diverse species.

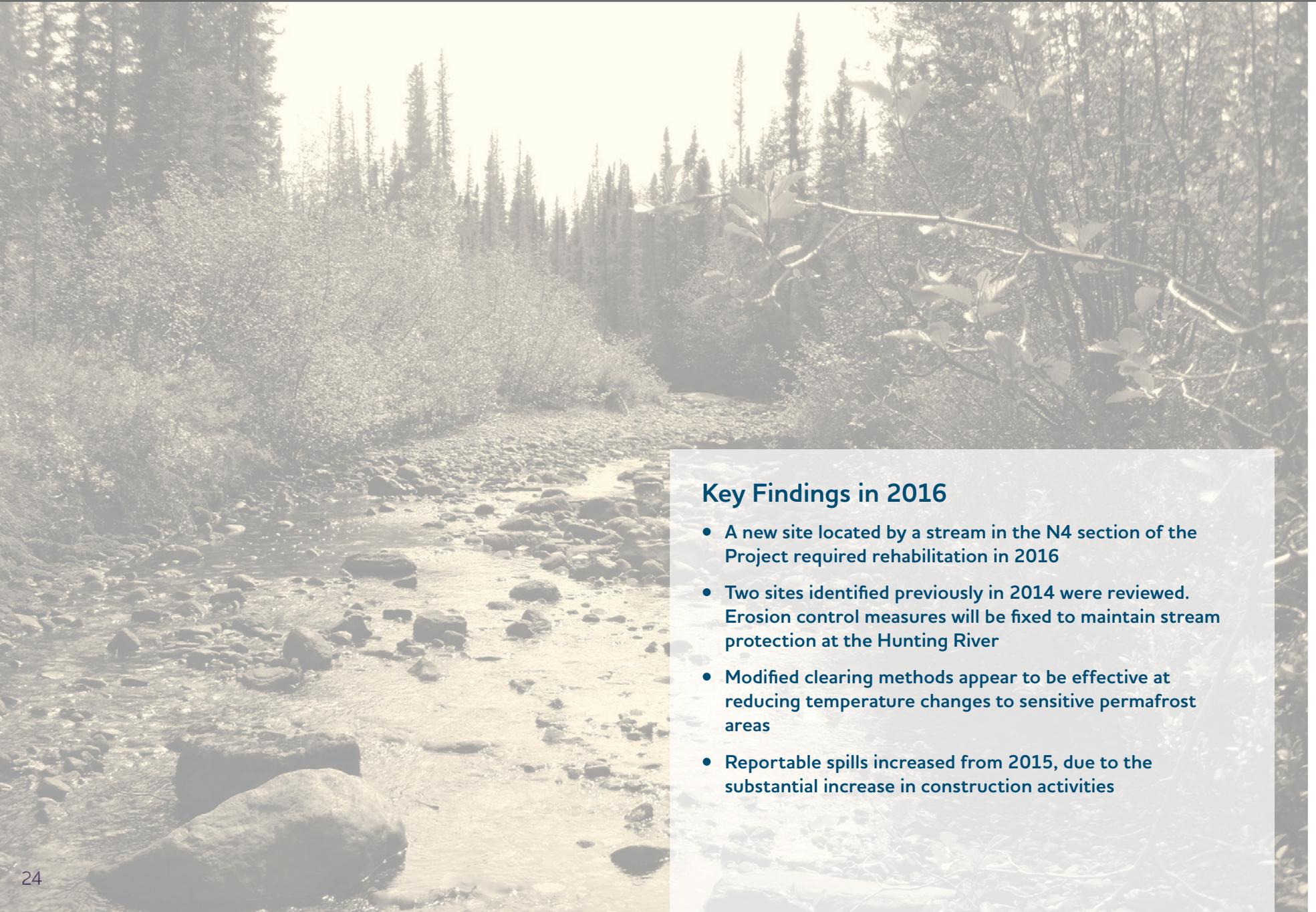
A total of 15 species of conservation concern were recorded in the vicinity of the Assiniboine crossing, four of which had not been observed in the previous year of sampling. Newly recorded species in 2016 include western jewelweed, beggar's-lice, clasping twisted-stalk, and skeletonweed.



slender-leaved sundew

Photo by Kevin Swaluk

Soils and Terrain



Key Findings in 2016

- A new site located by a stream in the N4 section of the Project required rehabilitation in 2016
- Two sites identified previously in 2014 were reviewed. Erosion control measures will be fixed to maintain stream protection at the Hunting River
- Modified clearing methods appear to be effective at reducing temperature changes to sensitive permafrost areas
- Reportable spills increased from 2015, due to the substantial increase in construction activities

Rehabilitation

Aerial surveys of the right-of-way and access trails were conducted in 2016 to determine areas in need of rehabilitation. Surveys revealed that one new site was in need of rehabilitation, a stream site located in N4. The shoreline had exposed soil and there was evidence of erosion occurring on the stream bank. Surveys along access trails showed that minor rutting had occurred in the N1 and N2.

Additional surveys were done to follow up on two sites in need of rehabilitation that were identified in 2014. Clearing work had disturbed shoreline areas in the Hunting and Mitishito rivers. Fiber blankets intended to prevent soil erosion had been installed to rehabilitate these areas. Surveys done in 2016 revealed new vegetation growth, but that some of the fiber blanket was missing. The fiber blanket will be re-installed on the east side of the Hunting River to continue to provide soil protection.

Soil Productivity

The 2016 monitoring program also looked at potential effects to agriculture. Soil compaction, rutting, or changes in soil drainage patterns could impact soil productivity, impacting crop production. Agricultural land was protected with matting and by restoring damaged soil. Monitoring plans in the future include using satellite imagery to better identify and track impacted areas.

Permafrost

Clearing vegetation from the ground is likely to increase ground temperature, potentially thawing permafrost areas along the right-of-way. Permafrost areas were digitally mapped and considered sensitive areas. Clearing methods were modified in these locations to reduce permafrost thawing. The effectiveness of these modified clearing methods was tracked by using Lidar 8 Infrared scanners. These scanners measured ground temperatures to compare the mapped sensitive areas of permafrost to areas of the right-of-way cleared with typical methods. Results showed that these modified clearing methods were successful in reducing ground surface temperature increases, reducing effects to permafrost areas.

The 2016 monitoring program also looked at potential effects to agriculture. Soil compaction, rutting, or changes in soil drainage patterns could impact soil productivity, impacting crop production. Agricultural land was protected with matting and by restoring damaged soil. Monitoring plans in the future include using satellite imagery to better identify and track impacted areas.

Waste & hazardous materials

Many precautionary measures were taken to reduce risk to sensitive areas around the Project, like streams or areas with sensitive vegetation. Hazardous materials are stored away from waterways and protocols are in place for their safe handling. All hazardous material storage areas, active work areas, camp facilities,

heavy equipment and fuel storage areas are monitored daily. Storage areas are contained and personnel are trained to properly manage materials handling or a spill event.

Contractors must report all spills to Manitoba Hydro, and spill reports are further submitted to regulatory agencies. Depending on the volume and the material, spills are either reportable or non-reportable to government. In 2016 there were eight reportable spills. This is an increase from 2015, where only four reportable events occurred. With a busier construction year in 2016 there were more contractors and more activities underway, leading to this increase. Overall, non-reportable spills, or spills of a volume or material that did not require reporting, decreased from 2015 by approximately 20%.

There were six reportable releases of hazardous materials occurring at the Keewatinohk converter station. These materials included hydraulic oil, luminol (insulating oil), glycol, and wastewater. All spills were cleaned up as soon as identified to reduce environmental impact.

Spills	2015	2016
Keewatinohk converter station		
Reportable	3	6
Non-reportable	91	124
Riel converter station		
Reportable	0	1
Non-reportable	22	47
Transmission line		
Reportable	1	1
Non-reportable	125	19
Total		
Reportable	4	8
Non-reportable	238	190

Heritage



Key Findings in 2016

- The Project archeologist followed up on a potential burial site by the Bell River. After substantial testing nothing was found
- No heritage resources were found in the seven sites surveyed in C1
- Evidence points to a Red River cart trail located at a present day mile road in C2

Heritage Resources

Manitoba Hydro maintains a Culture and Heritage Resources Protection Plan (CHRPP). This plan tells contractors and Manitoba Hydro staff what to do and who to contact should something be discovered during Project activities. The focus of the 2016 field program was to complete investigations for environmentally sensitive sites that had not yet been investigated for potential cultural and heritage resources prior to construction.

Archeological work tends to focus on areas where people were likely to live, camp and travel. People often camped and travelled in higher elevations areas or places that would have been dry in the past. People also tended to stay close to water, so our Project archeologist examines areas nearby waterways or lakeshores by conducting 'shovel tests' or small excavations, or 'pedestrian surveys' where they investigate the terrain and landscape to look for mounds or other signs of surface disturbance.

N4

Through Aboriginal Traditional Knowledge, Manitoba Hydro understood there was potential for a burial site near the Bell Cemetery, located by the Bell River. The corridor was examined for depressions or mounds that may indicate possible burials; however, no features were found. Shovel testing also occurred on both sides of a ravine

and did not result in the discovery of heritage resources. A total of 20 shovel tests were conducted.

The Swan and the Woody Rivers were also tested. The area around the Woody River was examined with six shovel tests and a pedestrian survey. All tests came back with negative results, or no discoveries.

The Swan River has multiple bends crossing the ROW corridor. The area is low-lying and swampy and therefore testing focused on areas with high elevations. A total of 17 shovel tests were conducted across all three heritage Environmentally Sensitive Site (ESS) locations along with extensive pedestrian survey. There were no heritage resources identified during the survey.

C1

In 2016 seven sites in C1 were surveyed. Three stream crossings were surveyed at Bigstone, Wellburn and Cork Cliff creeks to survey for heritage resources. Shovel tests and inspections did not reveal any artefacts or indications of historical use. Of the 29 designated heritage sites in this section, eight remain un-surveyed due to limitations in accessing bison pastureland.

C2

New information received through Aboriginal traditional knowledge indicated that a historic cart trail used to race Red River carts crossed

the right-of-way. Heritage surveys in 2016 determined the original trail was now part of the mile road. This conclusion was reached by considering the wet terrain on either side of the road and surveys results.

All data collected from heritage surveys is catalogued and stored in a database called Data Inventory Heritage Resource Tracking (DIHRT), or the DIHRT database. Archeological and heritage resource information is stored in the database that can be accessed spatially. The majority of designated heritage sensitive sites have been surveyed after clearing in accordance with the Environmental Protection Plan for each site. There are several remaining sites in N4, C1, S1 and S2 construction sections to be surveyed in 2017.



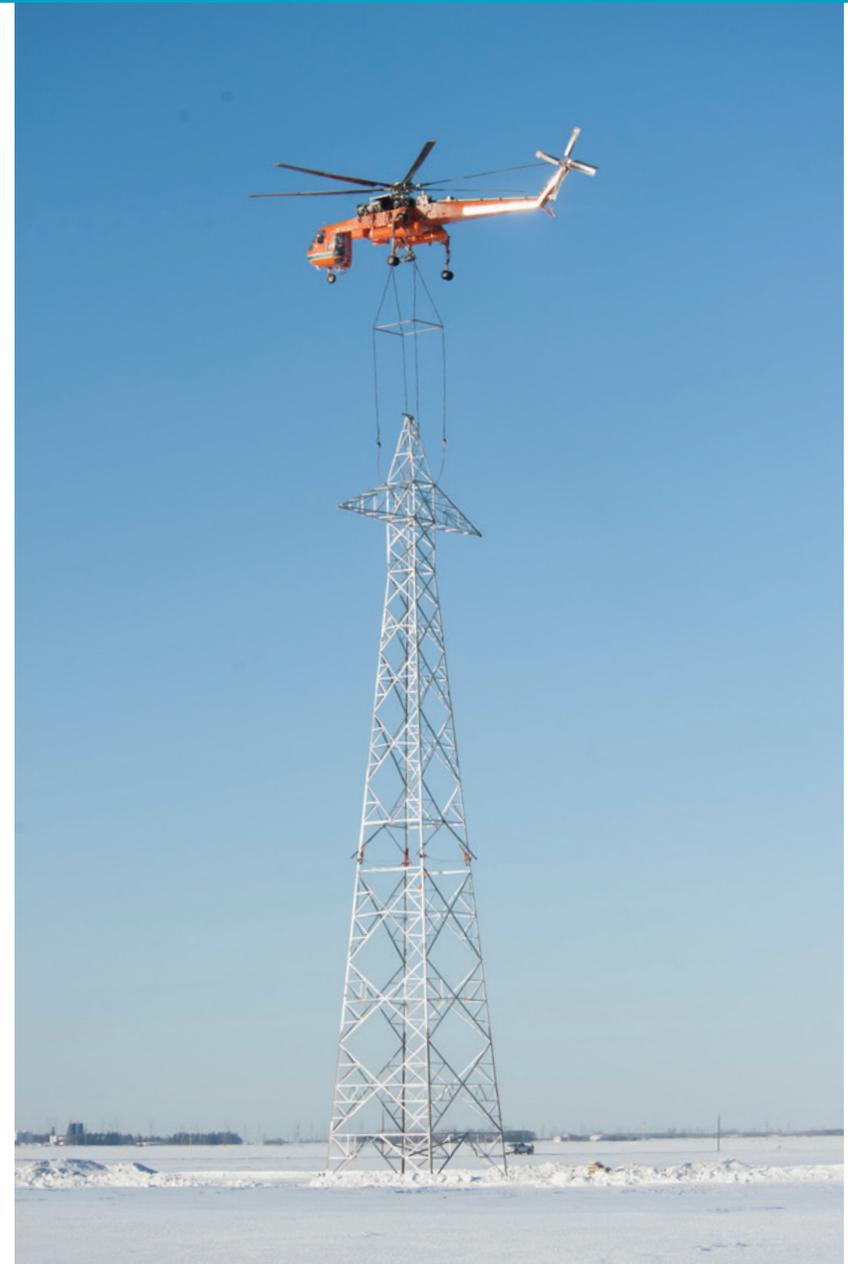
Summary

Construction Status

- Construction ramped up substantially in 2016 compared to past years. This resulted in more activity at all project sites.
- Much of the clearing work was completed and many tower foundations were installed.
- Major equipment was transported to both Keewatinohk and Riel converter stations.

Aquatics

- 397 stream crossings were inspected in 2016, with 96% of them (or 380 crossings) meeting all mitigation requirements.
- Eight stream sites had to be cleared due to jams caused by woody debris.
- Erosion control measures were applied at four of six sites identified to have exposed soil, and two were watched closely to monitor bank stability.
- Adaptive management measures were applied at Keewatinohk and Riel converter station sites to manage elevated sediment levels in local drains.



Wildlife

- A second survey of moose in the Tom Lamb WMA showed the population had not changed since 2012.
- Caribou are infrequently killed by black bear in the Project area.
- Caribou are being monitored closely in four areas: Pasquia Bog, Naosop-Reed, Wabowden and Charron Lake (acting as a control). Prior to Project construction, the Naosop-Reed population was in decline.
- Surveys showed that white-tailed deer have not moved into caribou ranges, reducing the likelihood that diseases carried by deer may be transfer to caribou.
- Over the course of 2015 and 2016, 46 sites were surveyed for skinks. None were found at any of the sites surveyed. The Project area is at the far eastern edge of their range, so this result is not unexpected.
- Bird sweeps continued in 2016 prior to any clearing works done during the breeding bird season. Nests were identified in S2 and nesting birds were found within Riel station.
- Overall, the risk of predation to caribou, moose, deer and elk was higher in 2016 than 2015.
- The density of marten, fisher, fox, wolf and hare tracks increased the further away you were from the Project.
- There was no difference between the density of tracks found on or off the right-of-way for other species, such as squirrel, moose, lynx, ermine and weasel.



Summary

Access and wildlife interactions

- The vast majority of access to the Project is related to construction activities.
- More wildlife interactions occurred at Keewatinohk converter station than other areas of the Project.
- Waste management is important in reducing wildlife interactions.

Soils and terrain

- A new site located by a stream in the N4 section of the Project required rehabilitation in 2016.
- Two sites identified previously in 2014 were reviewed. Erosion control measures will be fixed to maintain stream protection at the Hunting River.
- Modified clearing methods appear to be effective at reducing temperature changes to sensitive permafrost areas.
- Reportable spills increased from 2015, due to the substantial increase in construction activities.
- Non-Reportable spills decreased from 2015 to 2016.



American bittern

Heritage

- The Project archeologist followed up on a potential burial site by the Bell River. After substantial testing nothing was found.
- No heritage resources were found in the seven sites surveyed in C1.
- Evidence points to a Red River cart trail located at a present day mile road in C2.

Restoring the land to a healthy right-of-way

- 201 different plant species were observed on the right-of-way during vegetation surveys.
- The most frequently found invasive species are sow thistle and sweet white clover.
- As you would expect after 1-2 years post clearing there is less vegetative cover and a reduced variety of plants along the right-of-way compared to the sites off the right-of-way.
- Many of the uncommon or rare plants observed in previous year's sampling program we observed again in 2016.



pine marten

For more information about the Bipole III Transmission Reliability Project:

Email bipole3@hydro.mb.ca

Phone 204-360-7888 or toll-free 1-877-343-1631

Mail Manitoba Hydro
Bipole III Transmission Reliability Project
360 Portage Ave.
Winnipeg, MB R3C 0G8

