Collaborative approach to protect aquifer eskers in power line projects

Annie Prince

Project manager and team leader / Hydro-Québec
Canada

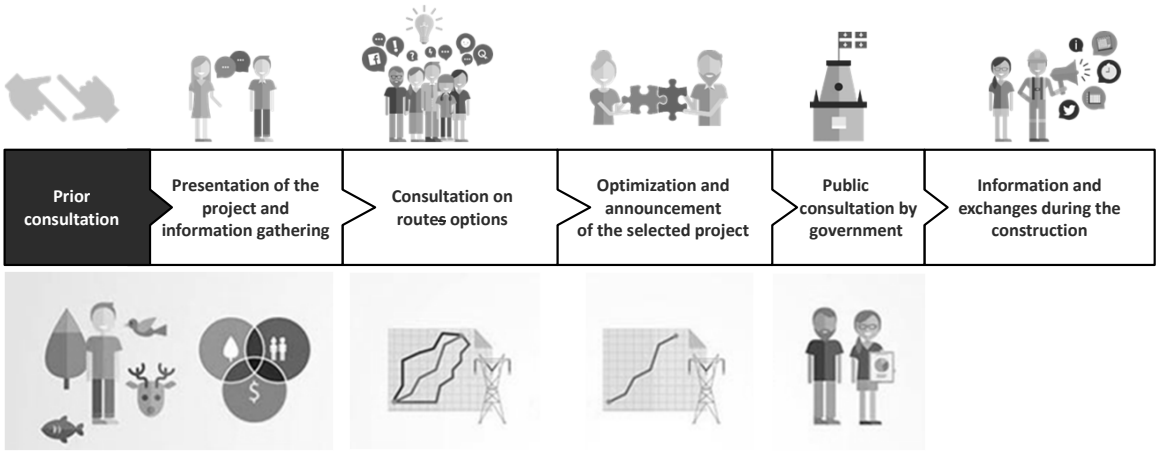
Prince.annie@hydroquebec.com

https://hydroquebec.com

Hello every One, im glad to be here today.
I will present a case study where the collaborative approach has improved the protection of eskers in a power line project

PUBLIC PARTICIPATION APPROACH

The concern shared by the greatest number of stakeholders encountered is the protection of eskers



Hydro-Quebec is a parapublic company that produce, transport and distribute electricity in Quebec. 99,9% of the energy pruduce is renewable. When starting up its projects Hydro-Québec implements a public participation process to integrate into the Impact assessment the elements valued by the community, the concerns of citizens and local organizations, as well as the scientific knowledge.

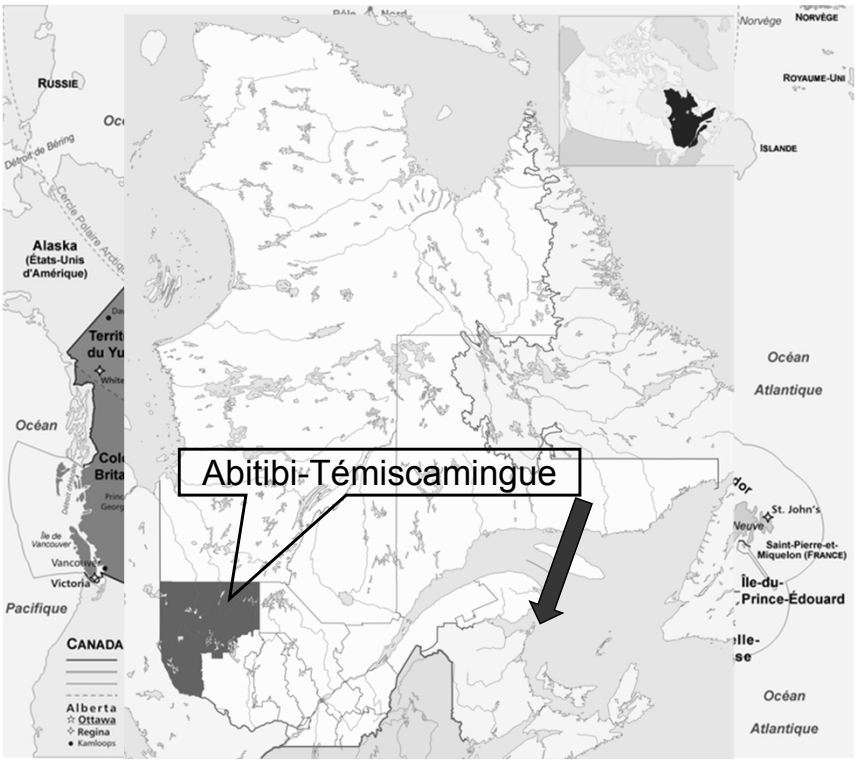
The main stages are the announcement of the project, the consultation on the study area, the consultation on the power line routes and the announcement of the chosen solution.

In the context of a new power line project in Abitibi-Témiscamingue in Canada, the consultation process highlighted the importance of protecting the aquifer eskers, as they are considered an exceptional resource in the region. Citizens, first nations, environmental groups and scientists were unanimous on the need to implement mitigation measures during the construction and operation of the power line to protect this groundwater, which is of world-renowned quality

let's explore the context of the eskers in Abitibi-Témiscamingue

Aquifer eskers

Abitibi-Témiscamingue Québec Canada



To situate you
The project is in the province of Quebec in eastern Canada in the region of Abitibi-Témiscamingue.
In this region we find several aquifer eskers, a geological heritage of the last ice age.

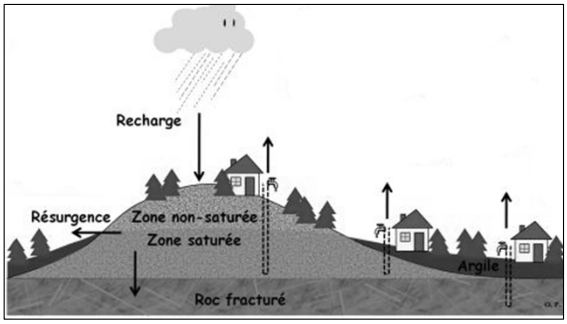
What is an aquifer esker?

Esker

long ribbon of sand and gravel deposited by subglacial rivers during the retreat of the glaciers nearly 10,000 years ago.

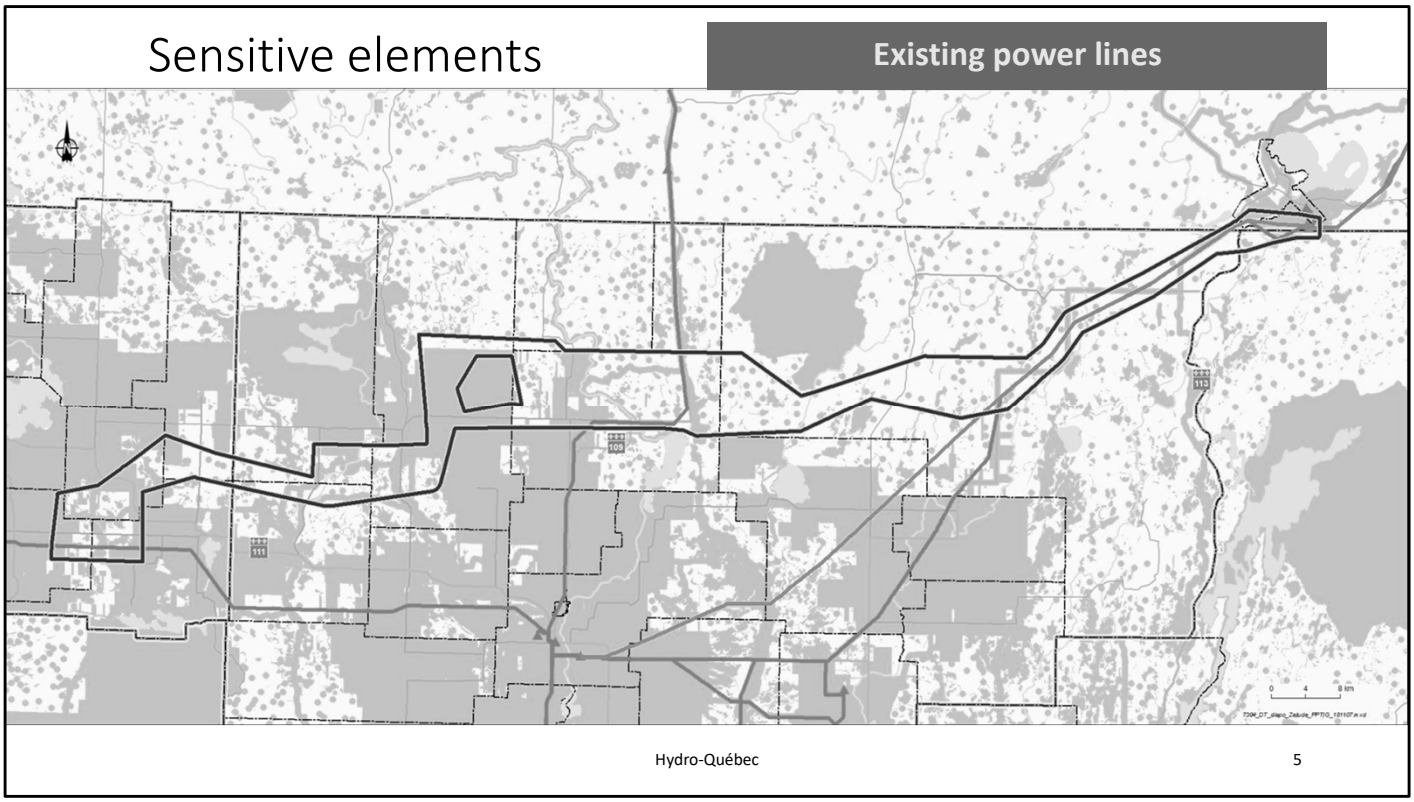
Aquifer esker

Eskers that contain water. Their sides are covered with a layer of impermeable clay. The excess groundwater emerges all along the esker in the form of bogs.



The waters of the eskers are of high quality since they are filtered by a layer of sand.

The eskers provide water to large part of the population even without treatment and sometimes they are used by water bottling factories. the water from these eskers has received international awards for its quality.

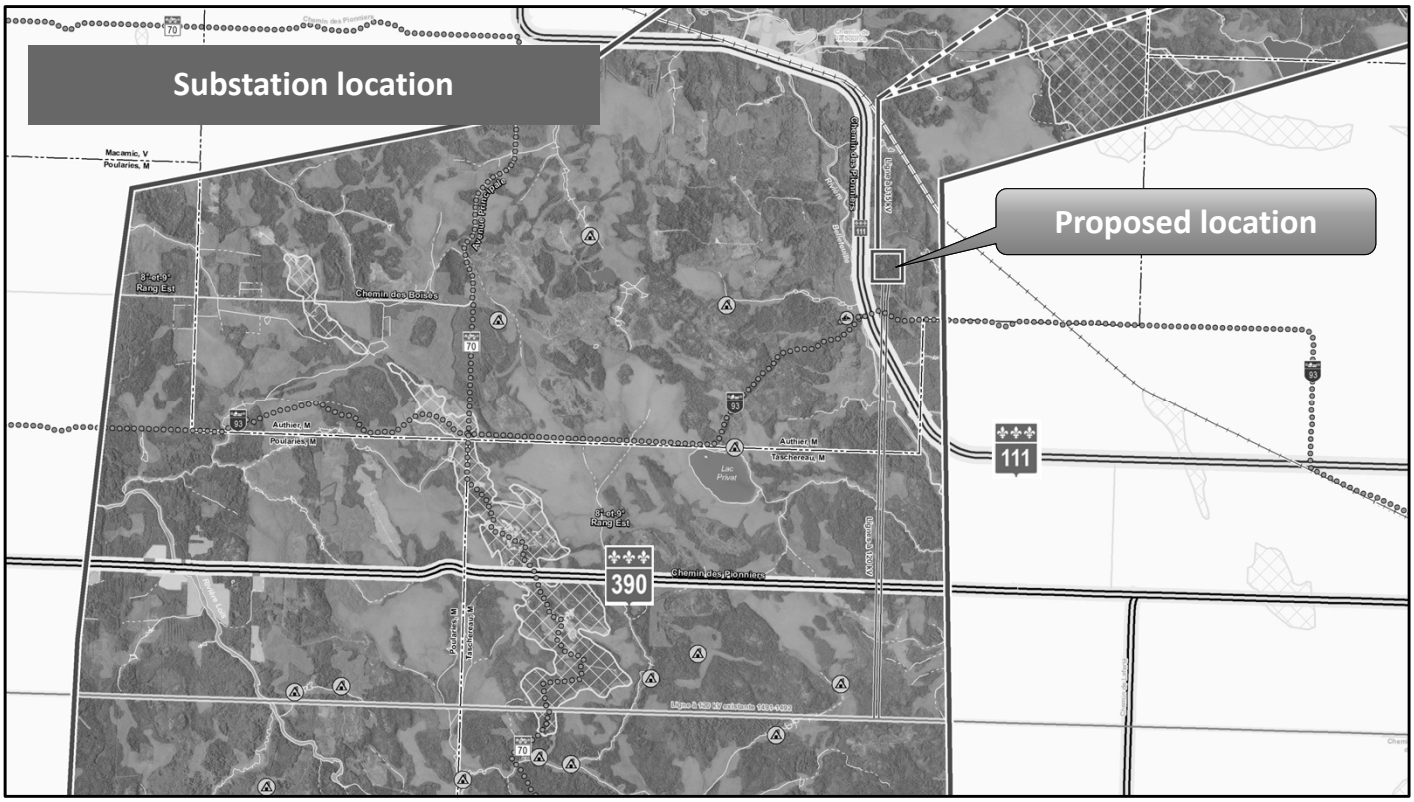


The project consists of building a line of 150 km which crosses Abitibi east to west and a new substation to the west.
The first step of a project consists in mapping the sensitive element to avoid them as much as possible to reduce the impacts of the project at the source
diapos
The sensitive elements are grouped together in order to identify a study corridor in a vast territory.
Then we work on a more detailed scale to design the possible routes.

Avoiding the eskers

Considerable efforts have been made to avoid eskers in the study area. Several small eskers are thus outside the selected route or the substation location

For example



We use different criteria for the choice of the substation location as :

<u>Environmental aspects</u>:

avoid as much as possible wetlands, esker, streams and lakes;

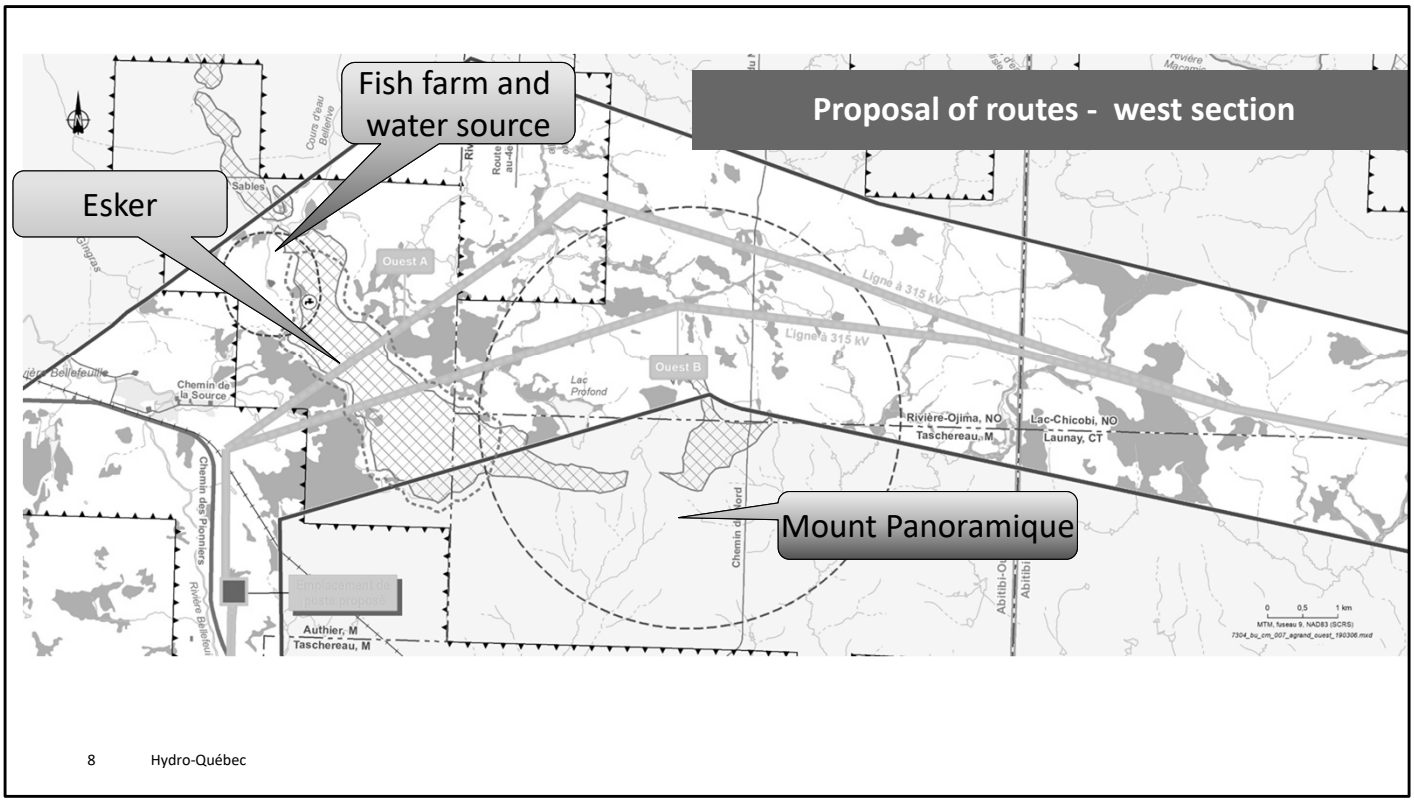
<u>Human aspects</u>:

Protect agricultural land, recreational trails and private properties;

and we consider

<u>Technical aspects</u>:

For example, soil characteristics, geomorphology and the type of road…the culverts on some Route do not have the capacity to transport the substation equipment.



We proposed two variants in the western portion of the line.
Each has advantages and disadvantages and elements valued by the community.

Mont Panoramique with hicking trails ans point of view. Fish farm, water source wetlands and eskers

After the consultation a third route was chosen to avoid completely the eskers, but we had to get through bugs.

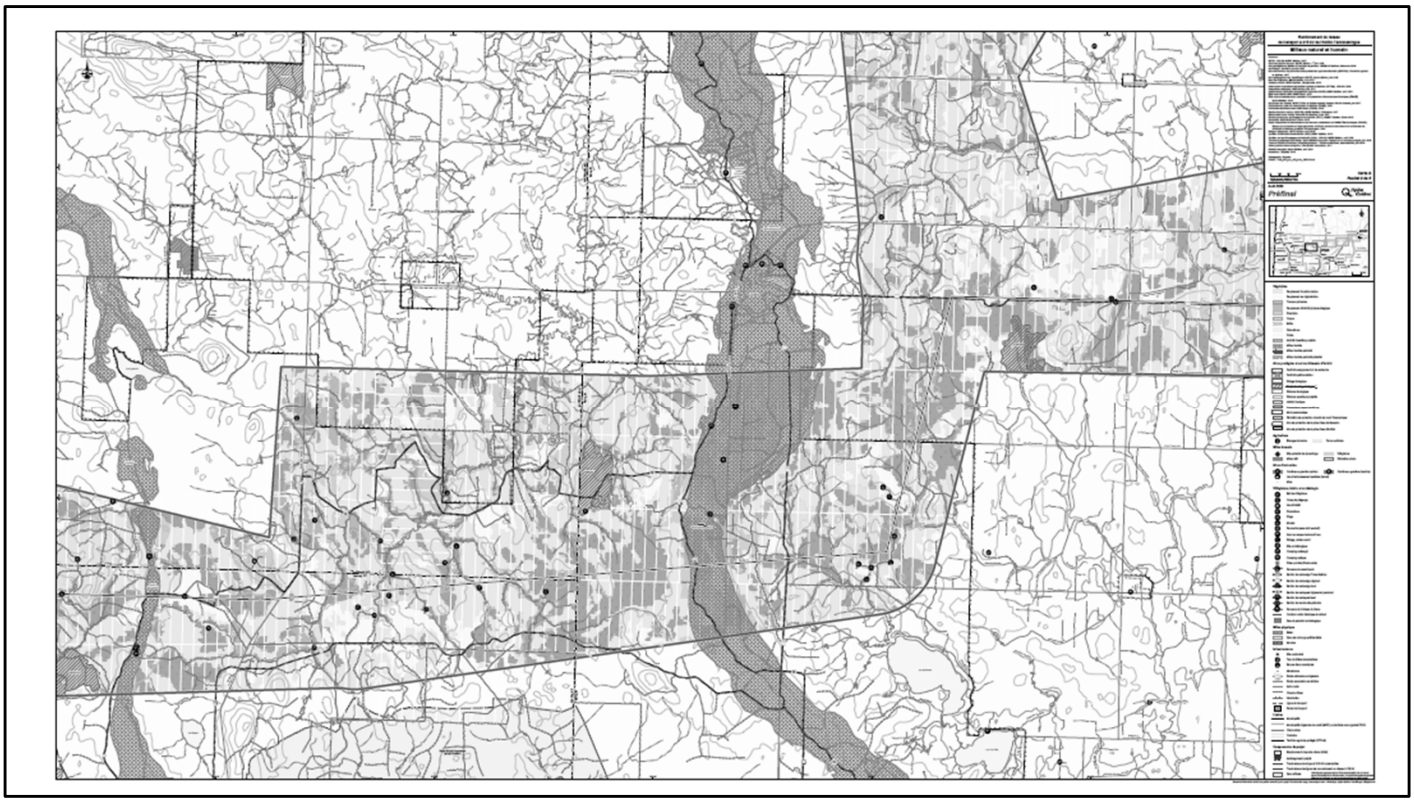
Due to their north-south orientation and their size, it was not possible to avoid all eskers

Name	Length (m)	Area (ha)	Number of pylons
Esker de Launay	301	2,1	0
Esker de Saint-Mathieu–Berry	782	5,5	2
Moraine d'Harricana	1 115	7,8	2
No name Esker	14,5	0,003	0

The eskers in Abitibi are all oriented north-south. Due to their orientation and their size, it was not possible to avoid all of them.
4 eskers must be crossed by the right-of-way
And different strategies have been used to reduce the impacts

Right-of-way orientation

we carefully chose the position and the orientation of the center line

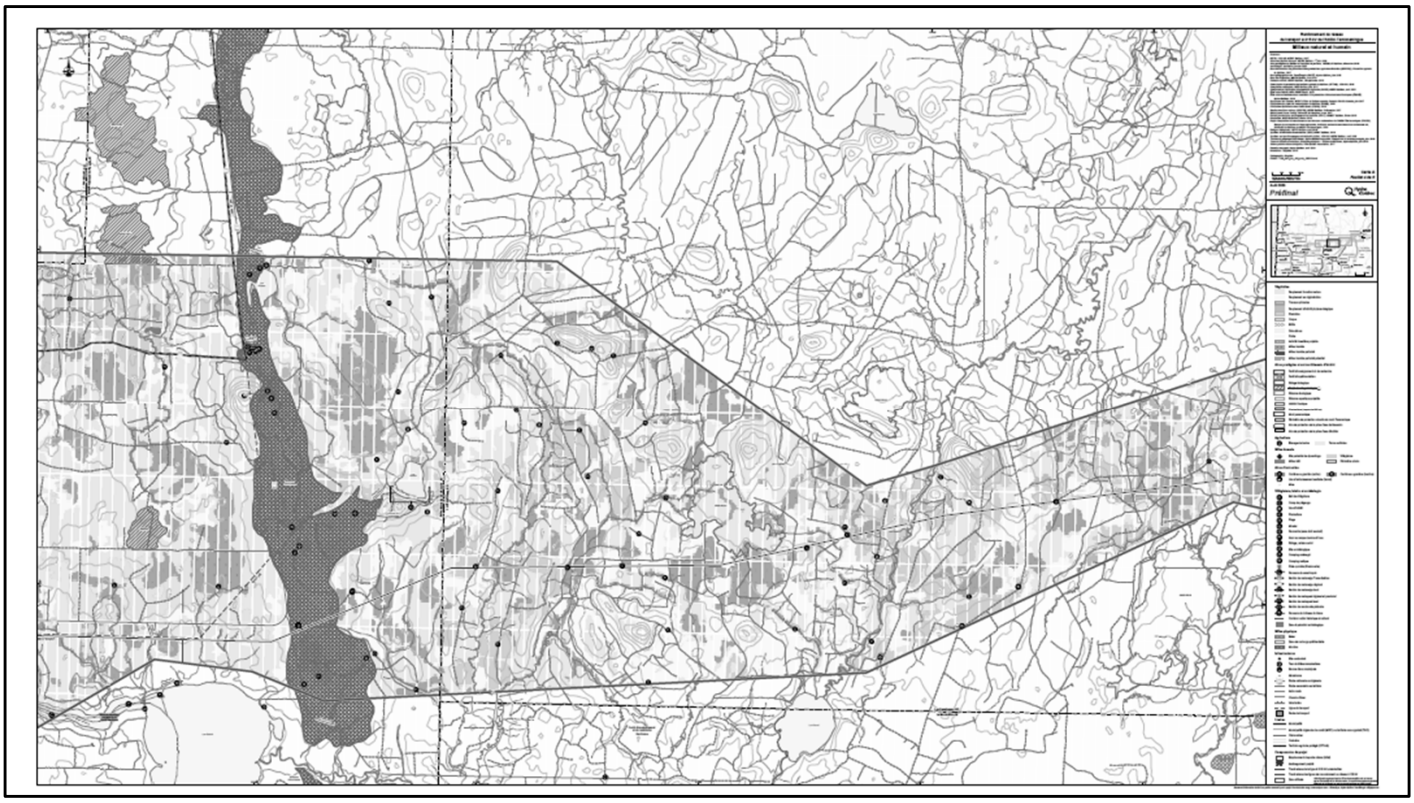


the right-of-way has been positioned to protect the eskers by crossing them in their narrowest recharge zone

It allow to:

- Limit the area of the esker intersected by the right-of-way
- And reduce the number of pylons to be installed in the eskers

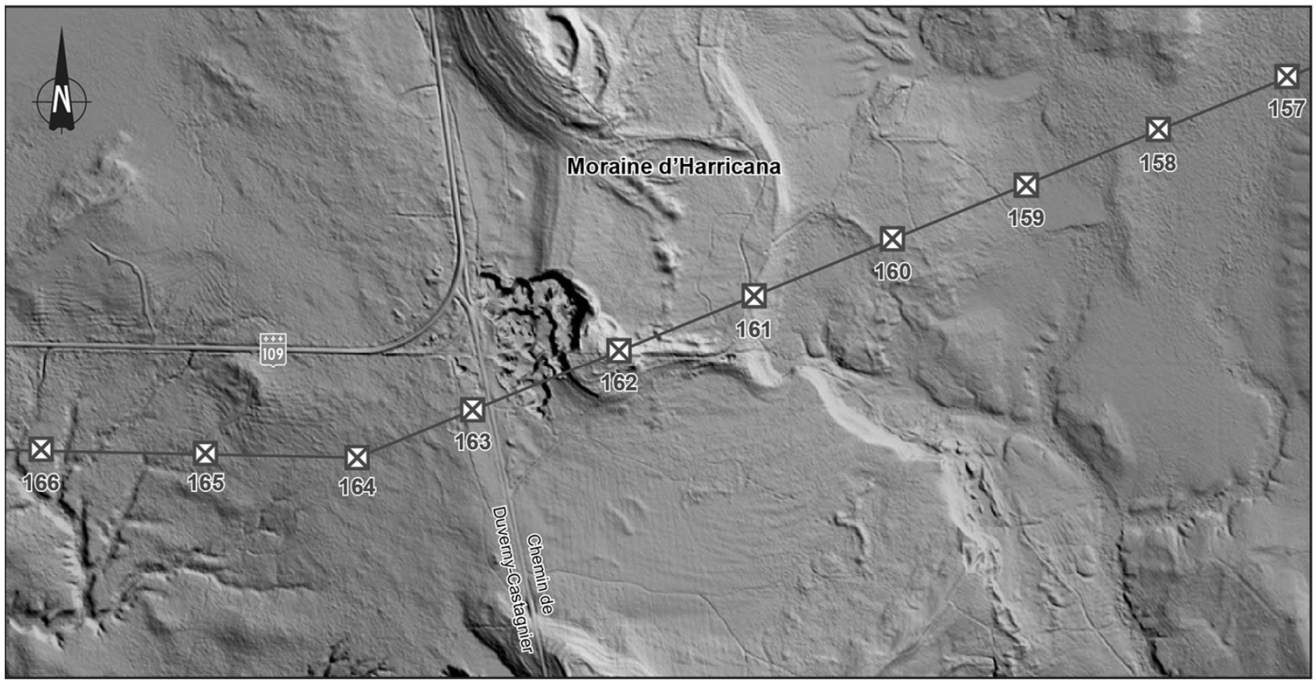
The maximum span in between pylons is 500 m so it was possible to step over 2 eskers.



But The maximum span in between pylons is 500 m so it was possible to step over 2 eskers.

Type and position of pylons

However, even at narrow crossing points, the Saint-Mathieu–Berry esker and the Harricana moraine could not be totaly avoided.
Two pylons will have to be built in each of these eskers.



However, even at narrow crossing points, the Saint-Mathieu–Berry esker and the Harricana moraine could not be totaly avoided.
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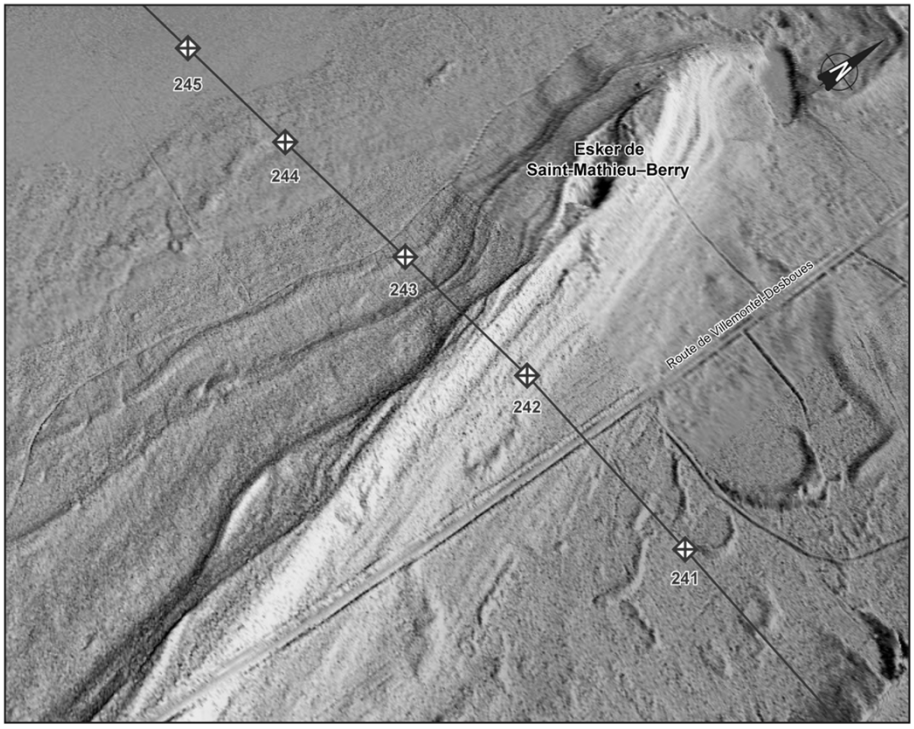
- To reduce the impacts, we chose EUA type pylons which have smaller foundations which make it possible to limit the excavation volume.
- The positioning was done in such a way as to reduce direct contact with the aquifer.
- The pylons have been installed in the lower part of the slopes, which makes it possible to reduce the risk of contaminating the groundwater. The waters that could be generated during the excavation will be naturally directed towards lateral flows which feed the peripheral wetlands.



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Document d'information destiné aux publics concernés par le projet. Pour tout autre usage, communiquer avec :
Géomatique, Hydro-Québec TransÉnergie et Équipement.

Mitigation mesures

- Finally, to mitigate the impacts that could not be avoided, the following measures will be put in place

Mitigation mesures

- **Realization of geotechnical surveys at the location of the 4 pylons**
  - ✓ Specify the hydrogeological conditions under each of the towers
  - ✓Establish a reference state in soils and groundwater specifically for zinc
- **Integration of eskers into the database of sensitive elements used by Hydro-Québec for power line maintenance**
- **No herbicides will be applied above eskers that have an aquifer potential**

- Prior to the start of construction, geotechnical surveys were carried out on the margins of the eskers where the four towers were planned. The objective was to establish baseline groundwater and soil conditions by characterizing the hydrogeological conditions, as well as zinc concentrations under each of the towers.

- Data will be integrated into Hydro-Québec's databases.

- In addition, no herbicides will be applied during vegetation control activities.

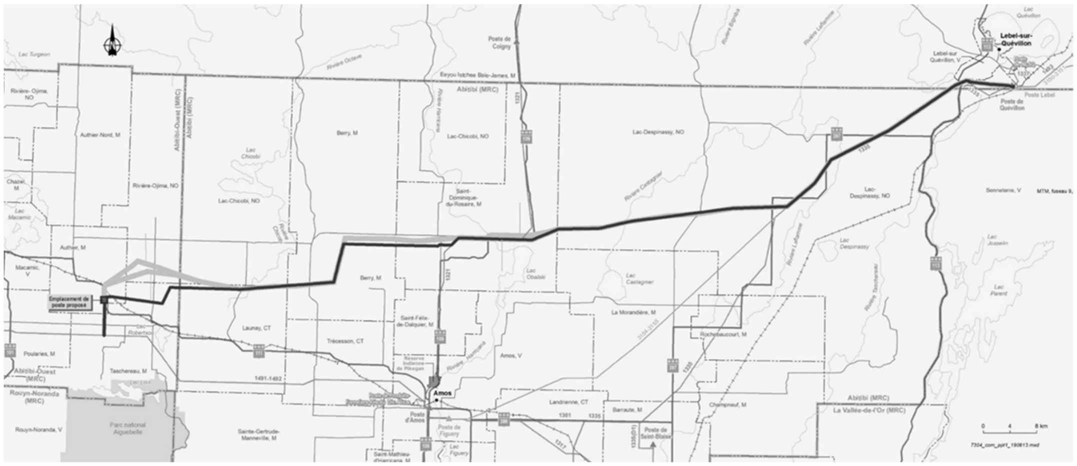
Galvanized steel structures (pylons, fences, etc.) can leach zinc into surface soils. In 2007 the QSAR Risk Analysis Service (2007) conducted an ecotoxicological and toxicological risk assessment on behalf of Hydro-Québec. Soil characterizations have shown that most of the zinc contamination is limited to surface soil. Zinc migration is therefore unlikely to reach groundwater.

In the Intervention Guide, Soil Protection and Rehabilitation of Contaminated Land, the MELCC discusses zinc and galvanized steel in fact sheet 2 entitled "The problem of soils contaminated by zinc under galvanized fences"

(Quebec, MELCC, 2019b). The MELCC recognizes that contamination associated with leaching of galvanized steel due to weathering is generally limited to the surface and right of the structure.

According to the information available on the leaching of zinc and on the impacts of this contamination on the environment, the contaminated soils under these fences, although they may exceed the applicable criteria and limit values, do not present any significant risks for humans. , fauna and flora. A groundwater table several meters deep (e.g. deep aquifer) should therefore not be affected due to the behavioral chemistry of this metalloid (zinc) in the underlying soils.

Conclusion



SOCIÉTÉ DE L'EAU SOUTERRAINE ABITIBI-TÉMISCAMINGUE

SESAT

UQAT

GROUPE DE RECHERCHE SUR L'EAU SOUTERRAINE

The final route illustrated in this slide is the result of the public participation process and the collaborative work carried out with SESAT (Abitibi-Témiscamingue Underground Water Society)
and GRES (groundwater research group -Univertity of Québec in Abitibi-Témiscamingue)

Who helped us to improve the project to protect a precious ressource

Questions

Annie Prince, project manager and team leader Hydro-Quebec
Diane Guillemette, regional advisor Hydro-Québec

Let’s continue the conversation!

Post questions and comments in the IAIA23 app.

#iaia23

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