TROILUS

# Summary

## Environmental and Social Impact Study of the Troilus Project

# Table of Contents

# Context of the environmental and social impact study

This document summarises the results of the Environmental an Social Impact Study of the Troilus mining project, which we will refer to as an "impact study" in this document.

The Troilus Project is located approximately 170 kilometres north of Chibougamau, in the territory covered by the agreement.

Our mining company, Troilus Gold, is leading this project, which aims to restart a former gold, copper and silver mine that operated from 1996 to 2010.

## Where and when the impact assessment took place

The impact study took place on the restored site of the former Troilus mine and its surroundings.

To conduct this impact study, we assessed the mid-2019 to 2024 environment. Our assessment therefore took into account the state of the environment a few years after the closure of the old mine.

## Origin of the results of the impact study

The impact study is the result of more than 5 years of work, which includes:

- Environmental studies
- Community consultations
- Research projects and in-depth technical analysis

Table of content

# What is an Impact Study?

An Environmental and Social Impact Study is a rigorous process designed to assess the potential impact of a project on the environment and communities.

In fact, in order to conduct an impact study, the provincial and federal governments provide us with specific guidelines.

> Provincial guidelines can be found here:
> www.environnement.gouv.qc.ca/evaluations/directive-etude-impact /directive-realisation-etude-impact.pdf
>
> Federal guidelines specific to our project may
> can be consulted here::
> https://aeic-iaac.gc.ca/050/evaluations/document/147499

# How we prepare an Impact Study

To assess the impacts of the project, both positive and negative, we use the description of the project and "superimpose" it on the reference state of the receiving environment.

**The baseline** is the initial state of the receiving environment at the precise moment when we study it before the implementation of the project.

**The receiving environment** on the other hand, represents any milieu and its components that could be directly or indirectly affected by the project, i.e.:

- The physical environment, such as air, water or soil
- The biological environment, for example, animals and vegetation
- The human environment, for example, health, employment, infrastructure or the landscapes

We then analyze the interactions between the project and each receiving environment and its components.

# Description of the Impact Study for the Troilus Gold Project

## Role and importance of the impact study

The impact study is an important part of the development of the Troilus project. It makes it possible to predict and assess the potential impacts of the mine and to inform those who may be affected by the project.

It is also used to plan the impact mitigation measures as well as the monitoring and follow-up programs that we will put in place during all phases of the project's development.

Finally, the study makes it possible to assess whether or not the project is acceptable, according to the laws and regulations in force.

Since the Troilus mine has already been operated by another company in the past, several impacts have already been measured. The lessons of the past have therefore been used to develop a project that takes into account environmental and social issues, according to industry best practices.

## Who carried out the impact study

The impact study was carried out by several specialists from BluMetric and Stantec, including engineers and geologists. Their membership in professional orders ensures the independence of the work.

## Who is the impact study for

The impact study is submitted to the provincial and federal governments. The full version will also be available in the registries of the 2 governments :

On the website of the Ministère de l'Environnement , de la Lutte contre les changements climatiques, de la Faune et des Parcs :
Registre des évaluations environnementales

On the website of the Impact Assessment Agency of Canada :
Canadian Impact Assessment Registry

Table of contents

# The Troilus project in a few words

## Northern Quebec Mine exploitation

The Troilus project is located in Northern Quebec, north of the communities of Mistissini and Chibougamau. It consists of reopening an old gold, copper and silver mine.

## 4 open pits in exploitation

The project will resume the exploitation of 2 old pits and will exploit two new ones.

## Gold bars (containing silver) and copper concentrate

The project will process ore in the concentrator at the rate of 50,000 tons per day. Gold bars will be produced. The bars will also contain some silver. A copper concentrate will also be produced and shipped by truck.

## 22 years of production

The life of the producing mine will be approximately 22 years, after which the site will be remediated and revegetated.

Table of contents

Photos of the current condition of the site that would host the new mine

View of waste rock piles and water-filled pits

View of restored tailings storage area

# Components of the Troilus project

The Troilus project will have different components. Some will be for industrial activities and others for related services. Related services include, for example, garages and storage areas.

## Mining Installations

**The mining installations will consist of :**

- Open pits and connex infrastrutures
- The concentrator and related buildings
- The covered ore pile
- The tailings storage area
- The waste rock piles
- Explosives and detonator storage
- Pumping unit in Lake A
- Industrial water treatment plant and other related infrastructure

## Complementary Infrastructures

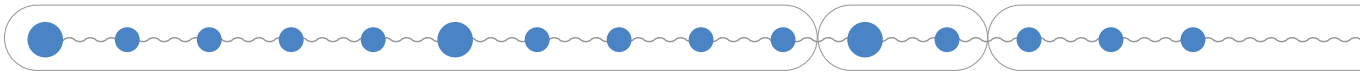
**The additional infrastructure to the operation will be as follows :**

- An existing access road
- A network of service roads on the site
- An on-site electricity distribution network and substations
- Garages and fuel storage
- A warehouse for detonators and explosives
- Overburden piles
- Construction camps and a permanent camp with :
  - A cafeteria
  - On site potable water
  - Domestic waste water treatment facility
- Other buildings and installations

Table of contents

# The Troilus Project… then and now

## The Troilus Project from 1985 to 2010




## 1985 to 1994

### Exploration

Various companies are exploring. Over time, the deposit was identified as promising.

In 1993, a feasibility study demonstrated the potential profitability of the project following mining and drilling.

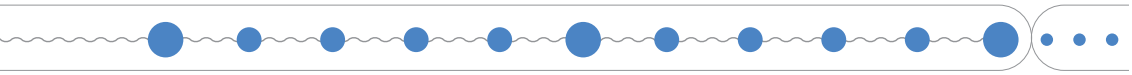
## 1995 to 1996

### Construction

In June 1995, the financing of the project was completed.

A 44 kilometres access road is being rehabilitated from the Route du Nord. A power line of 137 kilometres and 2 electrical substations were built.

In the fall of 1996, construction of the ore processing plant and all facilities was completed.




# 1997 to 2010

## Operation

During the years of operations, the open pits were mined continuously.

On the site, a camp could accommodate up to 450 workers. The camp included dormitories, kitchens, and various recreational facilities.

The Troilus mine produced more than 2 million ounces of gold and nearly 70,000 tonnes of copper during its years of operation.

Concentrator recovery averaged 83% for gold and 89% for copper.

Until April 2009, mining works continuously.

Until June 29, 2010, the plant continues to process ore piles.

# After 2010

## Site closure, dismantling and rehabilitation

In 2010, the former company that owned the project decided to cease operations and close the mine. The closure has involved the following activities:

- The tailings storage area has been revegetated
- The final spillway of the dike has been built
- The waste rock piles were covered with an overburden layer and seeded.
- The camp was dismantled

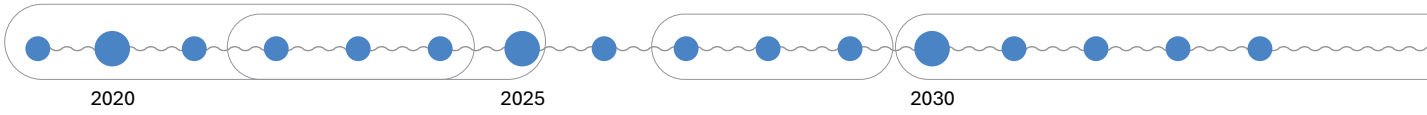
Environmental monitoring for closure and post-closure has been put in place.

In addition, the power line and the electrical substation have been preserved and are still functional today.

Table of contents

# The Troilus Project… then and now

## The Troilus Project from 2019 to 2052




## 2019 to 2025

### Impact Study phase

The impact study was conducted on and around the restored site of the former Troilus Mine. It generated a wealth of data and an extensive report. We present only the main results in this summary.

## 2022 to 2024

### Feasibility Study phase

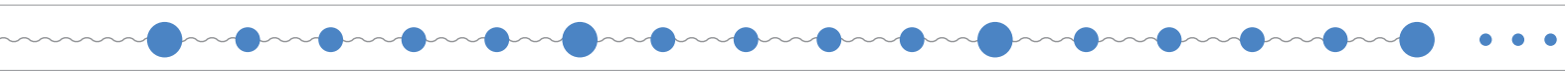
The feasibility study assessed the Potential for mine reopening.

## 2027 to 2029

### Construction phase

The main activities that will be carried out during the construction phase are :

- Setting up a construction camp
- The Bibou Creek Diversion
- The construction of the buildings, i.e. the concentrator and the garage, and the installation of the tanks
- Stripping and blasting
- Separating and setting aside topsoil and overburden for use as backfill at the end of the mine's operation
- The development of ditches




# 2030 to 2052

## Operation phase

The main activities that will take place during the mine's operating years are as follows:

- Extraction of the ore
- Ore concentration, i.e. activities to collect copper, such as crushing, grinding, gravity separation and flotation
- Shipping of copper concentrate
- Storage of waste rock in the waste rock piles and tailings :
  - from year 1 to 10 in the tailings area
  - from year 11 to 22 in the pits
- Maintenance of equipment and buildings
- Water treatment
- Environmental monitoring
- Progressive restoration for completed waste rock piles
- Restoration of the tailings area after year 11

# 2053 to 2055

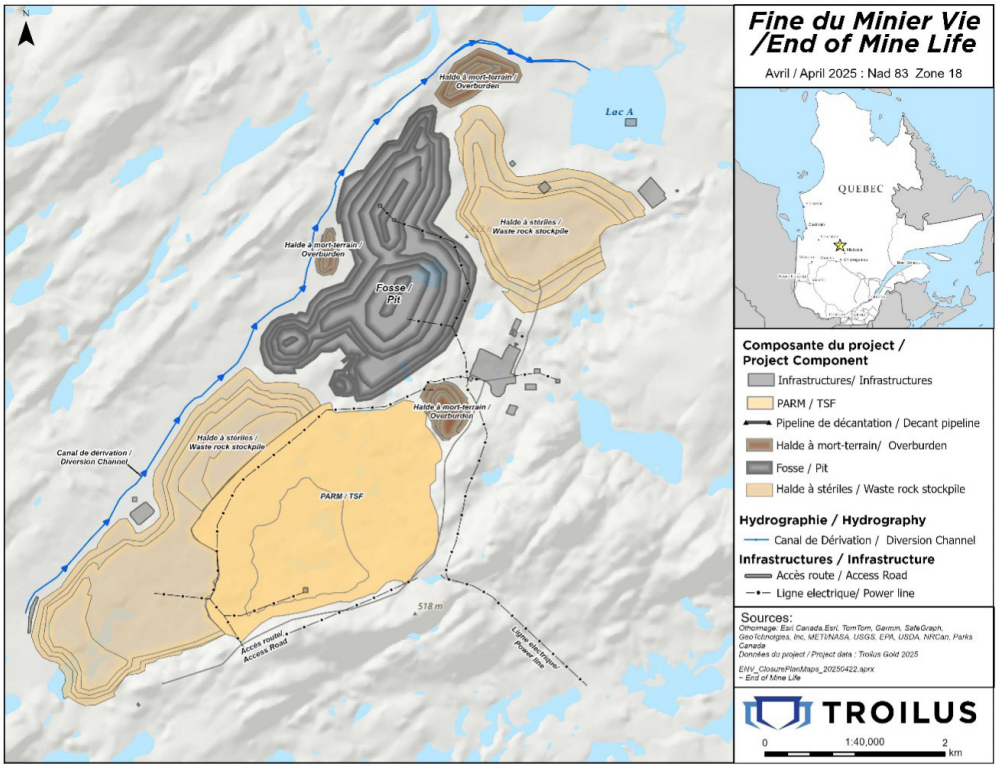
## Closure and restauration phase

During the closure and restoration phase, the main activities planned are:

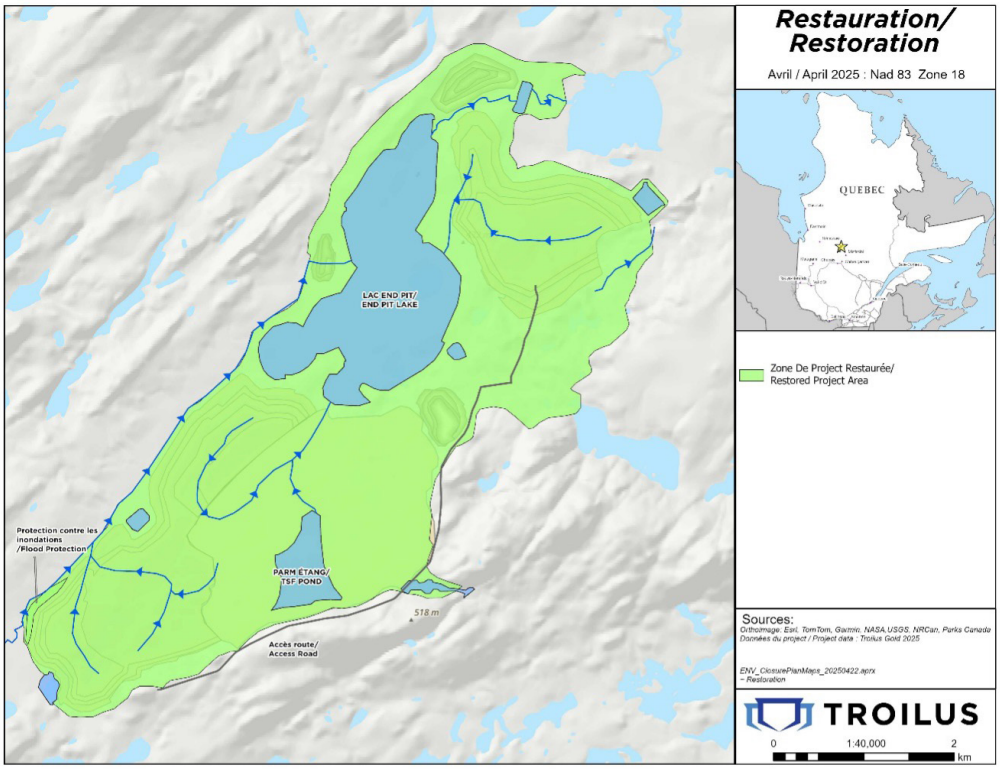
- The dismantling of the factory and buildings
- Revegetation of waste rock piles
- Revegetation of the tailings pond
- Filling the pits by natural means, i.e. without human intervention

Table of contents

# Troilus Project Site Plans




Site in production, year 22, towards the end of pit mining




Site after closure and final restoration

# Consultations that we have conducted

Prior to preparing and filing the Project Notice with the provincial and federal governments, we held consultations with various stakeholders

**These consultations had several objectives:**

- Provide information on the Troilus project
- Collect concerns, questions and suggestions regarding the project,

  the upcoming consultation process and the impact analysis
- Explain the impact assessment process and discuss its various aspects
- Explore ways to facilitate the consultative process

During these consultations, each stakeholder was given the opportunity to express its concerns and to make its suggestions and recommendations.

We have been careful to make changes to the Troilus project, in light of what we have heard from the people we met. For example, we have made adjustments to water and dust management.

Evaluating the impact of such a project is a work that continues throughout the different phases of development. This is why we want to continue the dialogue with stakeholders.
Any concerns can be directed to us:

**In person at the Chibougamau office**
334, 3e Rue
Chibougamau, Québec
G8P 1N5

**by email**
info@troilusgold.com

**On our website via our form**
https://troilustogether.com

Table of contents

# Stakeholders consulted

## Governmental entities

13

Cree Nation of Mistissini

Cree nation of Ouje-Bougoumou

Cree Nation Government

Gouvernement régional d'Eeyou Istchee Baie-James

Grand Council of the Cree

---

Impact Assessment Agency of Canada

---

Centre Régional de Santé et de Services Sociaux de la Baie-James

---

Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs

Ministère des Ressources naturelles et des forêts

Ministère de la Santé et des Services sociaux

Ministère des Transports et de la mobilité durable

Société de développement de la Baie-James

Société du Plan Nord

## Traditional Activities

2

Land Users

Cree Trappers Asociation of Mistissini

## Municipalities

2

Ville de Chapais

Ville de Chibougamau

## Mining Industry

5

Association d'exploration minière du Québec

Association minière du Canada

Association minière du Québec

SOQUEM inc.

Table jamésienne de concertation minière

## Institutions

4

Cree Board of Health and Social Services of James Bay

Aanischaaukamikw Cree Cultural Institute

Apatisiiwin Skill Development

Cree Schoolboard

## 60 Organisations

We sincerely thank the 60 organizations consulted in the preparation of the Project Notice. Their contribution enriches our approach and reinforces the accuracy of our impact study.

### 6 Tourism and outfitters

Corporation Niibischii

Cree Outfitting and Tourism Association

Mistissini Tourism

Mistassini Outfitting Camps Inc.

Pourvoirie Square-Tail Lodge

Tourism OujéBougamau

### 7 Social organizations

Association des femmes cries de Eeyou Istchee

Cree Nation Youth Council

Cree Women Association of Mistissini

Mistissini Elders Council

Mistissini Youth Council

Nishiiyuu Council of the Elders

Petaapin radio

### 8 Environment and nature

Conseil régional de l'environnement et du développement durable du Saguenay–Lac-Saint-Jean

Corporation Nibiischii

Eau Secours

FaunENord

MiningWatch Canada

Nature Québec

Société pour la nature et les parcs du Canada – Section Québec

Société pour Vaincre la Pollution

### 13 Business and economic development

Eskan

Minopro-Cree

Mistissini Drilling

Nisk Construction

Administration régionale Baie-James Attraction Nord

Chambre de commerce Chibougamau-Chapais

Carrefour Jeunesse-Emploi de Chapais

Carrefour Jeunesse-Emploi de Chibougamau

Centre d'Entrepreneurship Nordique

Corporation de développement économique de Chapais

Développement économique Chapais

Développement économique Chibougamau

Table of contents

# The results of the impact study, in brief

The area that was the subject of the impact study was regional. In other words, it was not limited to the site of the future mine. In this area, we studied the impacts of the Troilus project on 3 types of environment :

- Physical environment
- Biological environment
- Human environment

For each environment, we took initial measurements and drew up inventories to find out the original situation. This state of affairs allowed us to better understand the potential effects of the project and to plan measures to reduce the negative effects. In the longer term, it will also allow us to monitor the real effects over time.

In the following pages, we present the summary results of this study impact based on the following types of information.

## What we evaluated

We present the various analyses we have carried out to fully understand the site of the Troilus project and the mitigation measures to be planned, i.e., the measures to minimize the negative impacts related to the operation of the mine. These measures are also sometimes referred to as "mitigation measures".

## Concerns we heard

We report on the main concerns that stakeholders have raised during the consultations that we have conducted.

## Anticipated impacts

We present the main impacts, both positive and negative, that the Troilus project could generate on the various components of the environments.

## The proposed measures to mitigate Impacts

We have identified several mitigation measures. We present the ones we intend to put in place throughout the project.

In general, we will make sure to train anyone who will work directly or indirectly for the Troilus project so that they are familiar with:

- Our environmental protection measures
- Actions to take to minimize impacts, depending on their sector of activity

We will also ensure that a risk prevention system and emergency plans related to workers' health and the environment are in place.

## The magnitude of impacts once mitigation measures are applied

We present the extent of the expected impacts after implementing measures mitigation. These impacts can be either:

### Negligible or low

A small negative residual impact can cause a temporary impact or any of the following consequences:

- A small decrease in air, water or soil quality
- Reduction of a small area of vegetation or habitat for animal species

### Moderate

A moderate negative residual impact may result in some of the following:

- Decreased air, water, or soil quality
- A decrease in the availability of plant and animal species of interest to the Cree

However, a moderate impact does not compromise access to these species in the regional study area and maintenance of their longterm functions in the area.

### High

A high negative residual impact can result in any of these consequences:

- A significant decrease in air, water or soil quality
- Loss of plant and animal species of interest to the Cree

In fact, a high impact may either compromise access to one or more species in the regional study area, or alter air, water or soil quality in a way that compromises the long-term viability and maintenance of the functions of one or more species in the area.

## What we will monitor during the project to minimize impacts

We mention the key aspects of our environmental monitoring program. This program will be deployed during the construction and operation phases of the mine.

The goal is to:

- ensure that the project does not have more negative impacts than expected
- quickly detect unexpected or more severe impacts than anticipated
- ensure that the various mitigation measures described in the impact statement are applied and that they are effective
- correct or adjust mitigation measures, as necessary

## Cumulative impacts

In addition, we also looked at the cumulative impacts of this project. In other words, our impact study took into account other projects in the region, which are ongoing or could be developed in the foreseeable future.

Only components that are affected outside the local project area can experience cumulative effects.

The components that are most affected by cumulative impacts are:

- threatened species, particularly woodland caribou
- human environment, i.e. the economy, employment and housing



Table of contents

# Physical environment

## Soils
## Climate
## Atmospheric environment
## Water

Table of contents

# Physical environment
# **Soils**

## What we evaluated

We analysed the relief of the site and the composition of the different soil layers, in particular the sediments present on site.

We also studied the geological conditions of the study area, such as:

- the type of rock and its physical and chemical characteristics
- the content of metals with economic potential, neutral matter and possible contaminants

Finally, we did geochemical analyses to understand how the rock extracted from the ground will behave when it is in the presence of oxygen and water.

## What we did with the information we collected

The information gathered initially allowed us to avoid carrying out the project inside of sensitive environments.

It was also used to design various components of the project, including:

- extraction processes
- shapes of the pit
- measures to be taken to mine the deposit safely

A better understanding of these aspects has enabled us to plan the construction of infrastructure and buildings that will optimize:

- footprint
- drainage management
- stability of the foundations

Finally, the results of these studies also allowed us to conclude that the site will not generate acid.

# Physical environment
# **Climate**

## What we evaluated

We described the current climate at the project site, for example:

- annual precipitation
- strength of the winds
- average and extreme temperatures

We also studied the climate changes that could occur in the coming years, among other things:

- changes in the amount of annual precipitation
- temperature changes
- the potential for extreme weather events to occur

## What we did with the information we collected

Climate information has allowed us to design infrastructure and buildings that are appropriate for today's climate and will be resilient to climate changes that may occur.

Table of contents

# Physical environment
# **Atmospheric environment**

## What we evaluated

We studied the atmospheric environment, including noise and brightness, but especially air quality.

## Concerns we heard

The stakeholders we consulted told us about the importance of maintaining air quality.

## What we did with the information we collected

The information gathered allowed us to plan for mitigation measures for the main impacts studied and mentioned during the consultations.

## Anticipated impacts

- Dust, more present in the area near the project
- An increase in greenhouse gas production

## The measures we propose to mitigate the impacts

- Water the roads in dry periods and apply dust suppressant
- Ensure the proper functioning of dust collectors and their good maintenance
- Place a dome over the ore transfer pile

## The magnitude of impacts once mitigation measures are applied

Overall, the residual impact on air quality is considered unfavorable but reversible, with a limited geographical scope.

## What we will monitor during the project to minimize impacts

- The choice of materials during the construction of access and haulage roads to limit the presence of dust
- Atmospheric emissions, including the emission of fine particles into the air and greenhouse gases
- The noise level of the activities

# Physical environment
# Water

## What we evaluated

We have conducted rigorous studies over several years to fully understand various aspects of water quality.

For example, we studied:

- Groundwater flow and quality
- The flow and quality of surface water, i.e. river and lakes:
  **For the flow,** we looked at the seasonal flows and the different water levels, both floods and low flows, in other words, both their highest and lowest levels.
  **For quality,** we analyzed various physical and chemical parameters, such as temperature, pH, oxygen content, suspended solids, and metal and other content.

## Concerns we heard

The stakeholders we consulted told us about the importance of maintaining water quality for both humans and animals on site.

## What we did with the information we collected

The information collected has helped guide our water management practices to minimize impacts during mining operations.

It has also allowed us to determine the methods we will use to restore the site at the end of operations.

## Anticipated impacts

Exceedances of environmental criteria (arsenic, cadmium, selenium,etc.) are anticipated up to junction 27, but not at junction 28. The impacts would therefore be confined to the local study area (LSA) and would only affect a minor portion of the regional area (RA).

## The measures we propose to mitigate the impacts

- No cyanide in the process
- Recycle water as much as possible
- Install temporary sediment traps along the banks or in drainage ditches during work to prevent particules from being carried into waterways and soils
- Make sure we have treatments in place to reduce the amount of suspended solids in water during operations
- Seed bare areas susceptible to erosion and place mulch to prevent soil loss or particule transport due to runoff
- Keep a spill response kit in all vehicles and heavy equipment

Table of contents

# Physical environment
# **Water**

## The magnitude of impacts once mitigation measures are applied

The impact on water is considered moderate after installation of mitigation measures.

## What we will monitor during the project to minimize impacts

- Protecting rivers and lakes
- Construction of haulage roads by avoiding rivers and lakes
- Control and treatment of contact water, e.g. rain falling on waste rock piles
- Quality control of process water, which is used in the plant, and the water that will be discharged as a result of the operations, i.e., the mine final effluents
- Water quality control

# Biological environment

## Plant and animal species

Table of contents

# Biological environment
# **Plant and animal species**

## What we evaluated

We have made detailed inventories of the plant species present in the study area and their natural functions for the biological environment.

We also established the types of environments present in the study area, such as riparian or wetland environments.

We also carried out detailed inventories of the animal species present in the study area and characterized their habitat. For fish, we have established the function of the different habitats, to better understand, for example, the areas of reproduction, feeding or resting.

Specifically, we studied:

- Mammals, such as mice, foxes, moose, bears, and wolves
- Birds and migratory birds, such as waterfowl, passerines and raptors
- Reptiles and amphibians, such as frogs, salamanders and snakes
- Fish, such as walleye, char, pike, whitefish, and sucker

Finally, we also paid special attention to species at risk, such as woodland caribou.

## Concerns we heard

The stakeholders we consulted told us the importance of:

- Minimizing impacts on woodland caribou
- Minimize habitat loss for animal species, both aquatic and terrestrial
- Facilitating the return of animal species after mine closure

## What we did with the information we collected

The information collected allowed us to properly establish the mitigation measures that will allow us to minimize the impacts.

They also allowed us to properly document sensitive areas and species in order to ensure that the project does not have a major impact on them.

Finally, the information on fish and fish habitat allowed us to clearly identify the areas that will be affected by the project and the measures that will have to be taken to offset the negative effects.

## Anticipated impacts

The predicted impacts on plant and animal species are:

- A loss of wetlands and forest environments
- Fragmentation of plant habitat
- The disturbance of animal species

## The measures we propose to mitigate the impacts

- Perform the work outside of spawning periods, i.e. outside of the fish's reproductive period
- Limit noise and light pollution
- Limit dust emissions
- Separate water that has been in contact with the ore from natural waters
- Redevelop plans to divert Bibou Creek, as proposed during consultations
- Build gentle slopes for the waste rock piles, i.e. where we will accumulate the rock removed to extract the ore

Table of contents

# Biological environment
# **Plant and animal species**

## The magnitude of impacts once mitigation measures are applied

The impact on mammals and avian fauna is assessed as low to moderate after mitigation measures are implemented. However, the impact on aquatic life is considered high, according to the results of surface water quality modeling, which is based on a very conservative approach.

## What we will monitor during the project to minimize impacts

- Protection of plant and animal species and habitats
- Warning signs of failures in tailings management equipment and infrastructure
- The noise level of the activities
- Tailings management
- Soil management after the topsoil has been removed
- Environmental quality control of management for chemicals, hydrocarbons and waste
- Protection against accidental spills
- The gradual and final restoration of the premises

# Human environment

Table of contents

# Human environment
# **Socio-economic aspects**

## What we have evaluated

The human environment that we studied includes the cities and communities surrounding the Troilus project, namely Mistissini, Oujé-Bougoumou, Chibougamau and Chapais.

We have documented many aspects in order to draw a complete current portrait of these cities and communities.

Here are the main documented aspects:

- The current situation of housing and services, such as:
  - healthcare facilities
  - police and emergency service
  - social services
- Economic conditions and the employment situation
- Training needs of the Troilus project and the current training supply and capacity
- Community health status
- Natural and cultural heritage
- Landscapes, for example:
  - the height of mountains, hills and piles
  - types of vegetation
- The special situation of indigenous peoples
- Current land and resource use

## Concerns we heard

The stakeholders we consulted asked us to:

- Maximize local employment
- Ensure economic benefits, such as jobs or contracts, in nearby cities and communities
- Provide schedules and incentives that will encourage out-of-town workers to settle in the regions
- Maintain access to traditional activities for Crees who use the territory
- Ensure good communication :
  - on the project site to minimize possible language issues
  - with stakeholders from nearby cities and communities

Other concerns, particularly of a social nature, have been raised. They are still being discussed with stakeholders representing the Cree Nation and the towns of Chibougamau and Chapais.

## What we did with the information we collected

The information gathered allowed us to establish the current situation of these cities and communities to ensure that, for all these aspects and throughout the duration of the project, and even after, they:

- achieve maximum positive impacts
- suffer the least amount of negative impact

The information also allowed us to study the effects of the arrival of additional workers in the region. A project like Troilus creates jobs, which has the potential to increase demand for housing and services.

Knowing these aspects better has also allowed us to predict labour needs while maximizing the number of jobs available in surrounding cities and communities.

Finally, the analysis of the current landscape will not only allow us to modify the landscape as little as possible during the development of the site, but also to properly plan the restoration of the site after exploitation.

# Human environment
# **Socio-economic aspects**

## Anticipated impacts

Assessing social and economic impacts is more complex because there are positive and negative aspects.

In addition, the perception of these impacts depends on the life, experience and situation of each individual. Indeed, the perception may be different if, for example, a person is employed by Troilus or if he or she lives in the surrounding cities and communities.

We identified the following potential negative impacts:

- Changes in family dynamics, especially due to schedules who require commuting to and from work
- Rising house prices due to more people working in the region
- Pressure on service infrastructure
- Change in dynamics for the people who make traditional use of the territory

We identified the following potential positive impacts :

- Improving the economy
- Job creation and increased household incomes
- Improving the training offer and developing skills
- Connections between colleagues and community members

## The measures we propose to mitigate the impacts

- Have agreements with neighbouring communities
- Promote employment and local contracts
- Have intercultural sensitivity programs for staff

## The magnitude of impacts once mitigation measures are applied

In general, negative impacts are considered moderate. In addition, the positive impacts are considered significant.

## What we will monitor during the project to minimize impacts

- Local economic benefits
- Impacts on services and infrastructure in the region
- Partnerships with communities

Table of contents

# What will follow this impact study

Now that the impact study has been completed, the next step is to obtain authorizations from the Government of Quebec as well as various permits from the Government of Canada.

Throughout the project, we will ensure that we continue to share information about the project. In addition, we will create additional opportunities for anyone affected by the project to participate, including by taking part in consultations.

In the meantime, we invite you to:

- visit the website: troilustogether.com
- leave us a voicemail at: 1-800-625-6850
- write us at the email: feedback@troilusgold.com
- visit us in person at one of our offices:

**Chibougamau**
334, 3e Rue
Chibougamau, Québec
G8P 1N5

**Mistissini**
168, Main Street
Mistissini, Québec
G0W 1C0

TROILUS

troilustogether.com