JAMES BAY LITHIUM MINE

SUPPLEMENT TO THE ENVIRONEMENTAL IMPACT ASSESSMENT

RESPONSES TO QUESTIONS AND COMMENTS BY THE CANADIAN ENVIRONMENTAL ASSESSMENT AGENCY

FEBRUARY 2019

REFERENCE NO.: 171-02562-00

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RESPONSE TO QUESTIONS AND COMMENTS BY THE CANADIAN ENVIRONMENTAL ASSESSMENT AGENCY – CONCORDANCE PHASE

GALAXY LITIUM (CANADA) INC.

FINAL VERSION

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Canadian Environmental Assessment Agency

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TABLE OF CONTENTS

TABLES

MAPS

FIGURES

APPENDICES

INTRODUCTION

As part of the analysis of conformity of the Environmental Impact Assessment (EIA) for the James Bay Lithium Mine project with the EIA guidelines dated February 21, 2018, the Canadian Environmental Assessment Agency (CEAA) submitted a request for additional information on November 30, 2018, for the purpose of starting the technical review of the EIA.

This document is the first addendum to the project EIA in response to the CEAA's request for information dated November 30, 2018 (Appendix 1). The CEAA's questions and comments are presented in their entirety **in bold** for ease of distinction from the answers provided. A code and number are associated to each question or comment by the CEAA (CEAA-1, CEAA-2, etc.), and to each answer (A-1, A-2, etc.) to facilitate any follow-up. Appendices in support of the answers are also numbered according to the referenced codes and numbers (CEAA-4, CEAA-5, etc.)

1 INFORMATION REQUESTED TO BEGIN THE TECHNICAL REVIEW

PART 1 – KEY CONSIDERATIONS

SECTION 4.5 SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT

CEAA-1 **In the summary of the Environmental Impact Statement (EIS) for each of the valued components, include an overview of the expected changes to the environment and their main potential environmental impacts on the valued components. Table 13 alone: Summary of residual impacts is not sufficient.**

A-1 An overview of the expected changes to the environment and their main potential environmental impacts on the valued components were added to the summary. Additions are underlined in the text below.

6.2 CHANGES AND ANTICIPATED IMPACTS, MITIGATION MEASURES AND THE IMPORTANCE OF RESIDUAL IMPACTS

This section includes a description of residual impacts which emerge from the environmental impact assessment for the James Bay Lithium Mine project. The project's impact summary is outlined in Table 13. This table presents any anticipated change to the physical, biological and social environments, the suitable mitigation measures, the value of each assessment parameter and the importance of residual impacts. Mitigation measures that are applicable to the project are listed in Appendix A.

6.2.1 Physical Environment

For the construction phase, the assessment of residual impacts, after the implementation of mitigation measures, shows that their importance is minor for all physical components assessed. For the operation and rehabilitation phases, including post-rehabilitation work, most components will only be subjected to minor impacts, except the hydrogeology and hydrological regime for which medium residual impacts have been determined. In terms of hydrogeology, the major impacts affecting the components, and by their intensity, scope and duration, causing residual impacts of medium importance, are the drawdown of the water table (operation phase only), the modification of the water flow pattern and the flooding of the mine pit (rehabilitation phase only).

6.2.2 Biological Environment

Of the biological components assessed, only the vegetation (including wetlands) will be affected by impacts of medium importance resulting from the project. During the construction and operation phases, the direct loss and modification of natural environments represent the main impact. Despite the implementation of several mitigation measures, the intensity, scope and duration lead to a residual impact of medium importance on this component.

Even though vegetation and wetlands are a key link to the habitat of most wildlife components, the surface area of affected territory during the various phases of the project does not cause a significant impact on the integrity of communities. All environmental impacts on other biological environment components are minor.

6.2.3 Social Environment

For the social environment components, the assessment of residual impacts shows that for most components the mitigation measures to be implemented will suffice so that environmental impacts are minor. However, for impacts on the everyday use of lands and ressources for traditional purposes, on the quality of life and on the landscape, residual impacts of medium importance have been assessed.

For the construction and operation phases, it is possible that traditional Cree activities across the territory be disrupted. Also, the use of the surface area associated with the mining infrastructure will no longer be possible for certain traditional activities. For the operation phase only, it is expected that the quality of life may be impacted by the mining operations and that the landscape be transformed by the presence of the mine pit, mine tailings, stockpiles, and other mining infrastructure.

CEAA-2 **Moreover, the summary should reflect all changes or additions made to the EIS subsequent to this correspondence.**

A-2 Apart from the additions made to the summary in response to CEAA-1, no other changes were made to the summary. All changes or additions made to the EIS subsequent to this correspondence lead to no major changes which could modify the project or its resulting environmental impacts.

PART 2 – CONTENT OF THE ENVIRONMENTAL IMPACT ASSESSMENT

SECTION 2.2 ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

CEAA-3 **Assess the alternative means of carrying out the project for the following components:**

- **location of the mine infrastructure and its operations, particularly the ore processing plant, the administrative and support facilities, workers' camps, the garage, the storage of explosives and the septic facilities, including the service buildings for disinfection and phosphorous dosing;**
- **location of discharge points of the final effluents.**

A-3 The location of the mine infrastructure and its operations was determined in an optimal manner from project conceptualization. The site design layout was developed so that the ore processing plant is located at the center of operations, at a reasonable distance from the ore mining site and on a lot with as little technical and environmental constraints as possible (i.e. on the only rocky outcrop in the area, apart from the deposit). The location of other mine infrastructure was also defined as to minimize the project footprint while complying with the required safety distances between each structure.

For the location of discharge points of the final effluents, optimization was also conducted to mitigate project impacts on surrounding creeks. CE2 and CE3 creeks were selected to receive water from the water treatment plant and from the sedimentation basin of the overburden stockpile (organic matter and unconsolidated deposit) respectively. These two creeks were assessed along their entire route within the study area. The discharge points of the effluents were located in these creeks as to maintain the current drainage conditions, i.e. comply with the watersed limits while considering the requirements of a mining site development (all water to be treated before discharge is gathered at a unique point on site). The discharge point on CE3 was selected because it will be affected by the project infrastructure (access road and creek crossings), as well as for reasons of efficiency during monitoring (discharge point located at the intersection of the creek crossing and the road).

No discharge point has been planned in CE5 creek. This creek was completely avoided at the request of the Crees. Photographies of the effluent sites can be found in Appendix D of the EIA.

An exercise of optimization and minimization of the project environmental footprint was done in parallel with the impact assessment as soon as site information was acquired and after completion of site biophysical inventories. Thus, the impact assessment was conducted according to a project alternative least damaging to the environment while ensuring the optimization of procedures and of required safety measures.

SECTION 3.1 PROJECT COMPONENTS

CEAA-4 **These elements are part of the designated project and must be considered in the project description and analysis of its impacts:**

- **borrow pits;**
- **concrete batch plant;**
- **warehousing area for dangerous materials and waste;**

- **infrastructure related to manufacturing and storing explosives (emulsion storage, detonator storage, garage, etc.);**
- **transportation of concentrate to the Matagami transloading facility;**
- **power line within the boundaries of the project area;**
- **fibre-optic line within the boundaries of the project area.**

A-4 The elements listed above can all be found in the project description (see following EIA sections: 4.4.3 Quarry and Borrow Pits, 4.4.4. Laydown and Concrete Batch Plant, 4.10.3 Residual Materials, 4.10.4 Hazardous Waste, 4.11.10 Explosives Magazine, 4.12 Concentrate Transport to Matagami, 4.11.7. Power Line, 4.11.11 Optical Fiber Cable). The majority of these structures were taken into account in the overall project footprint and thus considered in the impact assessment. In Table 7-1 of the EIA, which presents the impact sources, and when considering the "Site Preparation" and "Infrastructure Construction" items, the structures mentioned above are included, except the borrow pits located outside the project boundaries and the power line. However, the "Transportation and Traffic" item in the construction and operation phases includes local traffic between the borrow pits and the project boundaries, as well as the transportation of the concentrate to the Matagami transloading facility.

There is very little additional information on the elements mentioned at this stage of the project. Here is the additional information available:

Regarding the borrow pits, the areas identified in the EIA as potential borrow pits will not all be selected. This selection has not yet been made. Based on the very conservative early estimates, the maximum granular material volumes required from the borrow pits to satisfy project needs are 620,000 m^3 of sand and 480,000 m^3 of gravel. According to early estimates, borrow pits located within the project boundaries shall be able to provide up to 648,245 m^3 of material (Section 4.4.3. of the EIA). Existing borrow pits nearby the project could potentially provide 138,290 m^3 of additional material. Given costs associated with the commissioning of a new borrow pit, it is likely that locations already impacted by the project footprint, as well as existing borrow pits, be prioritized. These borrow pits should cover a good portion of needs, i.e. more than 70% based on maximum estimates. The use of borrow pit BE-3 (Map 4-4 of the EIA), which has a capacity of 415,000 m^3, would thus satisfy the totality of maximum granular material needs. The selection of this potential borrow pit is also based on the fact that it presents a reduced footprint, requiring a short access road and located at 1,800 m from the truck stop. It should be noted that the potential borrow pit BE-03 would be commissioned as a last resort and only partially exploited (maximum of 313,465 m^3 would be used, which represents a maximum of 75% of its total capacity).

Regarding the concrete batch plant, it will be used for construction of infrastructure. A photograph and a preliminary layout are provided in Appendix CEAA-4 for example. Hazardous residual materials produced by the concrete batch plant will be waste oil from machinery. The oil will be recovered and managed with the other hazardous waste in accordance with the regulation (Section 4.10.4 of the EIA).

The power line remains under Hydro-Québec's responsibility. Its route has still not been defined. Several options are being studied by Hydro-Québec. Based on our interpretation, the most likely route would connect the concentrator by following the optic fiber line route towards the north-east (Map 4-3 of the EIA) and would continue in the same direction to reach the corridor of an existing power line (450 kV, 4003-4004). The new power line would use the same corridor as the existing one up to its connection point. This route would probably entail the least amount of additional impacts on the biophysical and social environments considering the use of already impacted areas. However, this route has not been confirmed, but data could be available in the spring of 2019. It will then be possible to provide more information on this subject.

CEAA-5 Consider all these components of the project when analyzing the cumulative impacts.

A-5 As presented in A-4, associated infrastructure mentionned above will be developed within the planned project footprint which is shown in the EIA, except some potential borrow pits and Hydro-Québec's power line. Upon request by the CEAA, the power line footprint within the study area boundaries was added to the project overall footprint for assessment of cumulative effects on the environment. Since the project footprint is taken into account in the assessment of cumulative effects, only the construction of the power line (whose route is not final, see A-4) and the likely commissioning of BE-03, located outside the project boundaries (Map 4-4 of the EIA), were added to the assessment of the cumulative effects. Thus, sections of the EIA related to the assessment of cumulative effects

on the valued components (Sections 8.6.1 and 8.6.2 of the EIA) were reviewed as to see if cumulative effects may have been neglected in the EIA associated to the new project elements. After review, it appears that the additional elements do not change results of the assessment and of the valued components taken into account for the assessment of cumulative effects. Explanations are provided in the following paraprahs.

Chiroptera

As mentioned in Section 8.6.1.4. of the EIA, the main threats bats are faced with are habitat loss, wind energy developments and WNS (Tremblay and Jutras, 2010). Given the absence of wind energy projects in the region, the potential negative effects of human development projects are mainly related to habitat loss.

The assessment of the James Bay Lithium Mine project impacts in terms of habitat loss and disturbance for bat populations concluded that the residual effect is of minor significance, even considering the fact that bats of the genus *Myotis* and the hoary bat are species with a special status. Also, it is hard at this stage of the project to precisely know which of the borrow pits in Map 4-4 will likely be used for the project. However, the needs in granular materials from borrow pits would be satisfied at more than 70% (conservative scenario considering a maximum volume of materials required for the project) with the sites located within the project boundaries or existing sites outside the project (see A-4). The potential commissioning of BE-03 and its partial exploitation (maximum 75%) to meet needs (see answers in CEAA-4) would result in an increase of less than 3% of the current project footprint (13 ha) and would not cause significant additional effects than those already described in the EIA. The commissioning of a new borrow pit would therefore cause no additional effect to the valued components with respect to the initial assessment of cumulative effects in the EIA.

As mentioned in A-4, the final power line route is still unknown. However, based on the most likely scenario, the connection of the mine to the power grid would require spreading of the project footprint over a route of approximately 200 m since the line would be mainly installed in areas already impacted by other infrastructure. The construction and operation of the line will involve deforestation to clear the right-of-way and the maintenance of vegetation in this area. However, whatever the selected route, and as mentioned in the EIA (Section 8.6.1.4.), because of forest fires, most of the natural environments that will be affected by the project, including those that would be affected by borrow pits or the power line, are characterized by the absence or virtual absence of a tree stratum. These environments are therefore not the most propitious for the bat species identified in the study area, which are essentially arboreal. In addition, considering the planned remediation activities, habitat loss is not likely to compromise the integrity of local populations. Moreover, if deforestation is not carried out during the breeding season, the fact that there are sufficient replacement habitats of similar quality in the region means that the effect of this habitat loss will not prove to be significant for bat populations.

Thus, the anticipated cumulative effects of the project on bats shall be negligible and consist mainly in an increase in disturbance of bats near the site, as well as occasional loss and modification of the habitat. For this reason, the cumulative effect on bats is deemed to be of low intensity, local extent and long duration. The importance of this cumulative effect is definitively deemed to be minor. The new project elements shall therefore result in no change to the initial assessment of cumulative effects on bats.

Land Use

According to the impact assessment during the operation phase, the project would have a moderate negative residual effect on Cree land use. For Cree users, the loss of tranquility in the area surrounding the project could lead to avoidance of some popular areas or disruption of traditional activities. It should be noted that there will be a permanent worker camp at the mine site, which is on the RE2 trapline, and that it will house 150 employees during the operation period. The presence of these mainly non-Indigenous workers may cause Cree users to worry about contamination or disturbance of the natural environment and animal and fish populations. Mine activities may create the same kind of fears. The exploitation of a new borrow pit outside the project boundaries, as well as the construction of a power line may also disrupt the tranquility of Cree land users. The commissioning of a new borrow pit, by the roadside, will require the deforestation and creation of a short access road. Moreover, an increase in truck traffic is expected which could potentially disrupt members of the Eastmain Cree Community, especially those using the area surrounding the project footprint. The same applies for the construction of the power line which involves the deforestation and maintenance of the right-of-way, a source of disruption for members of the Cree community

which perform traditional activities in the area. However, the potential effect caused by the mining, borrow pit operation or the construction of the power line (connection to the power grid) will most likely be very low across the cumulative effects study area regarding land use. It will mainly be experienced by users of the trapline on which the project is located (RE2). The fact remains that the cumulative effect on Cree use of land for traditional purposes is considered of low intensity, isolated extent and long-term in duration; therefore, low. The cumulative effect of the project on Cree traditional use of land is therefore non-significant.

CEAA-6 **Describe the leakage and spillage detection systems of petroleum equipment or reservoirs or detection systems of leakage from waste rock piles/tailings sites or polishing and treatment ponds.**

A-6 Petroleum equipment and reservoirs shall all be designed as to prevent and contain any potential spillage as illustrated on drawing found in Appendix CEAA-6. Even though the final model has not been yet selected, it shall be similar, if not identical, to the one presented in the drawing. The equipment is regulated by the Building Act and subject to a RBQ (Régie du bâtiment du Québec) permit.

CEAA-7 **Provide the document entitled: Detailed map of surface deposits and identification of potential borrow source (WSP, 2018).**

A-7 The requested document can be found in Appendix CEAA-7.

SECTION 3.3 PROJECT ACTIVITIES

Section 3.3.1 Site Preparation and Construction

CEAA-8 **Site clearing, stripping and excavation**

Describe and map the surfaces that must be deforested on the entire project site. Specify and identify all the buffer zones that will be added to the area to deforest, clear, excavate or level.

A-8 Tables 7-10 and 7-11 of the impact assessment show surfaces to be deforested, both directly and indirectly, on the entire project site per type of population. This includes all buffer zones required for work.

A map which superimposes surfaces that must be deforested, excavated or levelled corresponding to the project boundaries was produced and presented in Appendix CEAA-8. The illustrated project boundaries correspond to the ones used to calculate the areas of land and wetland directly or indirectly impacted by the project (Tables 7-10 and 7-11 of the impact assessment).

CEAA-9 **Water management**

Present a section regarding water management during the construction phase and the details of infrastructure constructions and permanent and temporary systems.

A-9 Details of infrastructure construction development is still unknown, but this type of construction usually follows the same stages:

Earthwork is the first step in building access road. Follows transportation and traffic work between the various construction sites and infrastructure foundation work. These work activities are planned to be conducted during winter when the ground is frozen since materials are easier to move and there is no liquid to collect.

Road foundations, drainage ditches, platforms for the industrial site, explosives warehouse, storage area, water treatment plant and tailings stockpile area, as well as a first collection basin at the location of the future collection basin of the overburden stockpile, will most probably be finished by the end of the winter (Map 4-1 of the EIA).

Since the drainage ditches and collection basin will be waterproof (clay or membrane), the water management structure shall be operational before the spring melt. If necessary, pumps shall be installed to bring back water towards the sedimentation basin (Map CEAA-10, Appendix CEAA-10).

When thaw begins, water will be forwarded towards a sedimentation basin, by gravity or pumping if needed. Suspended solids (SS) will settle and water will be released into the CE3 at the future effluent location (Map 4-1 of

the EIA). A sediment barrier and hydrophobic sorbent booms[1] at the discharge point shall collect finer SS and hydrocarbons which could have been accidentally spilled[2] on the soils during work.

Thereafter, construction work shall unfold in accordance with a priority sequence: road surface, foundations and pillars, structures, equipment.

CEAA-10 Provide a map illustrating the development of the infrastructure during the construction phase, including the relevant details on an appropriate scale. This map should show the trajectory (the direction of the flow, pumping stations, feeder drains, etc.) of all water on the site.

A-10 Map CEEA-10 (Appendix CEAA-10) shows the areas impacted by earthwork (main project boundaries), as well as the drainage ditch network which will collect water during the construction phase to ensure proper management of water on the site. Direction of the flow is indicated by arrows.

CEAA-11 Include detailed information on the effluent treatment systems during the construction phase and on their capacity to treat different types of contaminants in the water.

A-11 Water management during construction shall be conducted via the same clean water network as during operation. Collected water shall be directed towards the sedimentation basin. As mentioned in A-9, treatment done at the exit of the collection ditches network shall be of mechanical nature. The sedimentation of suspended solids (SS) shall be conducted in the sedimentation basin (Map CEAA-10, Appendix CEAA-10). There will be sediment barriers and sorbent booms at the exit of the basin as to prevent the discharge of SS or potential petroleum products. Water will therefore be treated as it exits the basin thanks to those devices and before it is discharged into CE3.

Section 3.3.3 Decommissioning and Abandonment

CEAA-12 Describe the ownership, transfer and control of various elements of the project.

Describe who will have the responsibility of supervising and maintaining the integrity of the remaining structures.

A-12 All project components are owned by Galaxy Lithium (Canada) inc. At the time of site decommissioning, all structures will be dismantled in accordance with standards in force. However, project components may be preserved should they be wanted by the receiving communities.

SECTION 5 CONSULTATION WITH INDIGENOUS NATIONS AND CONCERNS RAISED

CEAA-13 Present the components valued by Indigenous Nations and explain how they will be considered in the EIS.

A-13 Components valued by Indigenous Nations were determined after consultation with the Crees, from themes addressed during meetings and aspects which are sensitive or present a specific interest for people consulted.

Here are the main components valued by Indigenous Nations:

- Water quality (including Eastmain River and CE5 creek);
- Air quality;
- Soil quality;
- Overall wildlife quality (especially beaver, moose, goose, sturgeon, trout, porcupine);
- Quality of vegetation consumed by users and animals (including medicinal plants and berries);
- Land integrity;

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[1] The sorbent booms and the sediment barrier shall be installed before the discharge of the effluent from the basin. This equipment is easy to find in Quebec; you can refer to www.lalema.com and www.terraquavie.com for example.

[2] Note that in accordance with construction procedures to be implemented, any soil affected by an accidental spill which could happen during work shall be recovered as soon as possible and stored in a location where no drainage occurs (i.e. a marine container for this purpose or wrapped with membranes) and then forwarded to a specialized contractor for treatment and disposal.

— Quality of life at worker camp (health, dust, noise);
— Jobs.

Since a valued component is considered as an element of scientific, social, cultural, economic, historical, archaeological or esthetic value, the components valued by Indigineous Nations were merged in the EIA as to consider the experience of professionals. Therefore, these elements where assessed under the social environment, mainly the “Land Use for Traditional Purposes”, “Perception of Physical Environment”, “Quality of Life”, “Landscape” and “Local and Regional Economy” valued components.

CEAA-14 Present their perspectives on:

1. the use of harvested plants and berries for nutritional or medicinal purposes;

A-14-1 According to land users met with regarding RE2, VC33 and VC35 traplines, the gathering of berries and other plants is done at various locations across the land. More specifically, in the study area, the gathering of blueberries is mainly carried out in areas that have been affected by forest fires, including in the James Bay Road area. The gathering of mushrooms, conducted by the community for commercial purposes, is also done in the James Bay Road area.

Users of the VC35 trapline are worried that vegetation may be contaminated by the mining project (through degradation of air quality, and soil or water contamination). According to Crees surveyed, to be used, medicinal plants must be “pure”, meaning that they must be contamination-free. For instance, eventhough berries growing under the power lines located across the land seem plumper, they prefer not eating them since, from their perspective, the vegetation is affected by radiation emitted by the power lines.

2. the effectiveness of the mitigation and accommodation measures;

A-14-2 At the time of the first consultations with the land users, and with other Eastmain groups and stakeholders, mitigation or adjustment measures had not been determined. They were developed after the consultations.

Throughout consultations held, measures were suggested by land users (see Appendix G of the EIA and table presented in A-68). Some of these suggestions had already been included in the project by the proponent, like giving priority to Eastmain workers, of equal skills, when it comes to hiring. Other suggestions allowed implementing measures which had not be considered before. For example, a Mining 101 course was provided to the Eastmain population so they can get familiar with the mining industry. Certain measures were noted for a later stage, when the project will be at a more advanced development phase. For example, some people suggested that Galaxy provide sponsorships or scolarships to the Eastmain community. The mining company noted these comments, but the distribution of benefits to the community shall be specified in the Impact and Benefit Agreement with the Eastmain community.

A comment was noted following the “Mining 101” presentation about the measure (NOR10 – Set aside overburden and segregate the topsoil for reuse when redeveloping disturbed areas) regarding the fact that strict monitoring must be conducted to avoid spontaneous ignition of stockpiles. This phenomenon will be taken into account during the construction of the stockpile.

A public presentation was held in the form of an open house in July 2018 to present the main results of the environmental impact assessment to the Eastmain Cree community. This presentation was mainly focused on the project impacts and mitigation measures. No opinion expressed by participants pertained to the mitigation measures.

All measures may be commented by the Eastmain community after consultation of the EIA which was submitted to the Band Council in the fall of 2018. Galaxy remains open to improving its list of measures in order to integrate comments by the Cree community throughout the life cycle of the project.

3. the cumulative impacts of the project on the use of the territory for traditional purposes;

A-14-3 Most users fear that the project will aggravate impacts caused by other sources. For instance, some people raised concerns about the project adversely affecting the regeneration of vegetation in the area which is only beginning to recover after the forest fires of 2013 or the project contributing to the reduction of resources across the territory initiated by hydropower projects. Another user mentioned that moose are just beginning to come back following the Eastmain 1-A project work, completed in 2013. Users of the VC35 trapline, who have seen a significant portion of their land submerged after the development of the Opinaca Reservoir in the 1980s and were affected by the Eastmain 1 and Eastmain 1-A projects, and by the diversion of the Opinaca and Eastmain Rivers, now fear that the quantity and quality of resources across the land they have left be further affected, more so because a mine is already in operation and another is projected close to their land. One RE2 trapline user mentioned that the taste of beavers has changed since the construction of James Bay Road due to the associated pollution and fears that the situation will worsen.

RE2, VC33 and VC35 land users also fear the risks of contamination of resources (e.g. sturgeon, beaver or moose) and hydrological network, as well as an increase in cancer rate caused by the presence of contaminants in the food chain. They also worry about the contamination of vegetation, notably because of dust. One user (VC35) is concerned by the impact of increased traffic on health in relation to dust (two users of a camp located close to the road suffer from asthma).

4. the review of the archaeological potential conducted as part of the project.

A-14-4 Land users and other groups or stakeholders interviewed were not consulted regarding the archaeological potential study. No comments where therefore noted. During the public presentation in Eastmain in July 2018, participants were informed that such a study was being conducted, but no comment was noted. The main results of the archaeological potential study were integrated into the EIA. The Eastmain community Representatives will be able to issue comments after consultation of the EIA which was submitted to the Band Council in the fall of 2018.

CEAA-15 Describe how Indigenous traditional knowledge was included in the Environmental Impact Assessment (including the methodology, the baseline conditions and the analysis of the impacts for all components valued by Indigenous Peoples, including the archaeological potential) (also see Part 1 – Section 4.2.2 of the Guidelines for more information).

A-15 Consultation with the First Nations were held from the project outset in 2011-2012, then in 2017-2018. These consultations allowed for further development of knowledge about the environment, discussion on stakeholders concerns and expectations regarding the project, as well as identification of the project main challenges.

The consultation of the Eastmain Cree community allowed for identification of sensitive elements and optimization of the project design by providing for several environmental protection measures.

It should be noted that the assessment of impacts sometimes differed for some Cree members who have participated to consultation.

Consultations were an occasion to discuss about various mitigation measures for reduction of project impacts on components valued by Indigenous Nations. Mitigation or improvement measures were provided to address concerns of the Eastmain population, including several environmental monitorings to study the evolution of components and assess the efficiency of measures, as well as means of communication to keep stakeholders informed of monitoring results. Galaxy remains open to reviewing the mitigation measures implemented and adjusting them throughout the project to properly address concerns of stakeholders.

Section 7.4.3 of the EIA was improved as to highlight the perception of people interviewed regarding project impacts on the physical and natural environments. Changes made are underlined in the text below.

7.4.3 PERCEPTION OF PHYSICAL AND NATURAL ENVIRONMENTS

CONSTRUCTION PHASE

SOURCES OF IMPACT

- Site preparation and infrastructure construction;
- Water management;
- Transportation and traffic.

MITIGATION MEASURES

Mitigation measures PER 01, UTT 02, CIR 04 and VIE 01 must be applied, as well as the measures intended to decrease atmospheric emissions (AIR 01 to AIR 05), noise (SON 01), water contamination (QUA 01 to QUA 05, QUA 07 to QUA 13), night-time lighting (LUM 01 to LUM 03), vibrations and air overpressure (VIB 01), as well as all relevant standards (NOR 2 to NOR 5, NOR 9, NOR 11, NOR 13 and NOR 14). These are set out in Table 7-5.

IMPACT

Activities associated with the construction phase will result in various disturbances that could potentially affect the perception of the quality of the atmospheric environment, lighting and noise, underground and surface water, as well as vibrations felt by Cree who use the areas surrounding the mine, km 381 truck stop workers and visitors, even if the regulatory requirements are met. It should be noted that before construction begins, territory users will be informed of when it will start and of its progress. Furthermore, an area closed to traditional activities near the mining site will be established in collaboration with the Tallyman, thereby limiting the use of this sector.

Since the site is in an isolated area, the current air quality in the area studied is very good. During the construction phase, activities to prepare the site and to build infrastructure will change the air properties since there will be an increased suspension of particulate matter in the air. However, results of the air dispersion modelling study show that the standard will be met at the sensitive receptors. It should be noted that RE2, VC33 and VC35 land users consider that project impacts on air quality will be felt over a greater area, beyond the radius used for modelling. Also, people interviewed raised concerns regarding the impacts of dust accumulation on the vegetation and its infiltration in the soil, as well as the impacts on the quality of wildlife resources, such as beaver, moose and goose, regarding the ingestion of said vegetation. Others have observed deformities on moose and attributed the situation to radiations emitted by power lines near their feeding area.

Regarding ambient noise, the only current anthropogenic contributors in the local study area are the James Bay Road and the km 381 truck stop. During construction, the standards set out will be met. The noise modelling survey produced demonstrates that noise levels during operations (under the worst operating conditions) will be compliant (WSP, 2018*d*). The construction activities planned will be smaller in scale than those simulated. Thus, noise levels will increase, but will still be acceptable. Like for air quality, Cree land users believe that the radius used to measure project impacts on the ambient noise is too small. They estimate that noise will be detected over a greater area. They also fear the impacts of noise on goose migration routes.

Because of its remote location, sources of vibrations in the study area are nearly non-existent. Vibrations may occur during construction in conjunction with quarry operations. However, blasting operations will be less significant than during the operations phase. Currently, it is expected that vibration thresholds at the km 381 truck stop will be acceptable, as well as the other sensitive areas surrounding the pit. These elements confirm that activities of a lesser scale will also be acceptable. However, some may still feel vibrations when blasting occurs. Cree land users fear that vibrations emitted may have an impact on sturgeon given the presence of a new spawning site on the Eastmain River, which could be disrupted. People interviewed consider that sturgeon is more sensitive to disturbance to the environment than humans and that they could feel vibrations in the water which cannot be felt by humans.

In the study area, the only current artificial lighting at night comes from the km 381 truck stop. It emits very little light and the effect it has on the night sky fades quickly as you drive away from it. Some changes are expected since artificial lighting will be added to Galaxy's facilities during construction.

During the consulting activities that took place from 2017-2018, SDBJ's representative expressed a concern that the mining activities, from the start of construction through the end of rehabilitation, may affect the km 381 truck stop's drinking water supply, sourced from artesian wells on its property. It should also be noted that Cree territory users also draw their drinking water from the same location when they stay at their camps. There are two drinking water sources in this location. Construction activities are not likely to affect the drinking water supply at the km 381 truck stop.

As for surface water, current conditions measured in the study area are representative of natural environments, even though they have quite high acidity levels and contain certain metals due to the presence of peatlands, the nature of the rock and unconsolidated deposits. At the sampling stations inventoried, the surface water is generally unaffected by human activity. No change to the surface water quality is anticipated during construction. The risks of accidental spills remain, but Galaxy's emergency response plan allows for those to be dealt with quickly, if such an event were to occur. It should be noted that Cree land users expressed concern regarding risks of accidental spill given the raised topography of the mine in relation to the Eastmain River. They fear its potential contamination, as well as contamination of other smaller creeks (especially the CE5 creek, which is an area valued by users), peatland and groundwater, which users believe could occur through infiltration. They also fear the impacts of a potential contamination on wildlife and fish resources. They raised questions on the efficiency of the treatment of water discharged via effluents and mention that even treated, discharged water will not be of same quality as initially. Still on the subject of project impacts on surface and groundwater, Cree land users are concerned by the impacts on water flow.

The tranquility of the area, especially the Cree camps located around the mining site itself, could also be affected by mine construction activities. People who are used to performing traditional activities in the projected infrastructure sector could find their safety compromised by the site's new use. During consultations with Cree land users, they raised concerns on the safety, both on the road (accidents, road degradation) and regarding break-ins at the camps because of the presence of workers. However, the Cree territory users and workers at the km 381 truck stop will be able to view the survey and environmental monitoring reports that will monitor the status of the situation in terms of water, air, noise and soil. Furthermore, beginning with the construction phase and throughout the entire project period, mechanisms will be put in place so that worrisome situations can be reported to and handled by Galaxy.

IMPACT ASSESSMENT

The intensity of this impact is deemed to be low due to the activities specific to the construction phase, which will produce less disturbance. Furthermore, the mitigation measures will decrease the potential negative effects. The scope of the expected residual effects is deemed to be very limited, since they will likely only be felt by Cree territory users who access certain specific sectors around the mining site, as well as the dozen or so workers and visitors at the km 381 truck stop. The duration is short. Thus, the significance of the impact on the perception of the physical environment during the construction phase is considered to be **minor**.

Cree land users consider that adverse effects during the construction period will be felt within a greater perimeter than what has been used for the air quality and noise modelling studies. Moreover, impacts of construction activities on their negative perception of the environment and water quality will continue over time since they consider these changes irreversible. Thus, according to their assessment, despite a low intensity, the extent of residual impacts would be local and of long-term, and therefore of medium significance.

OPERATION PHASE

SOURCES OF IMPACT

- Presence and operation of the pit.
- Other infrastructure in operation.

— Management of ore, overburden and waste rock.
— Water management.
— Transportation and traffic.

MITIGATION MEASURES

Mitigation measures PER 01, UTT 02, CIR 04 and VIE 01 must be applied, as well as the measures intended to decrease atmospheric emissions (AIR 01 to AIR 05), noise (SON 01), water contamination (QUA 01 to QUA 05, QUA 07 to QUA 13), night-time lighting (LUM 01 to LUM 03), vibrations and air overpressure (VIB 01 to VIB 04), as well as all relevant standards (NOR 2 to NOR 9, and NOR 11 to NOR 14). These are set out in Table 7-5.

IMPACT

During operations, the activities are likely to result in more disturbances than during the construction phase, affecting the perception of the quality of the atmospheric environment, lighting and noise, underground and surface water, as well as vibrations felt by Cree who use the areas surrounding the mine, km 381 truck stop workers and visitors. As stipulated for the construction phase, the number of Cree territory users in the mining sector will be decreased with establishment of an area closed to traditional activities.

The impacts described for the construction phase are similar to those for the operation phase. Thus, air quality will be altered by mining operations since an increase in suspended particulate matter will change the air properties. However, results of the air dispersion modelling survey show that the standard will be met at the sensitive receptors. As for noise, the modelling survey demonstrates that noise levels during operations (under the worst operating conditions) will be compliant (WSP, 2018*d*). Thus, noise levels will increase, but will still be acceptable. For the construction period, the RE2, VC33 and VC35 land users consider that project impacts on the air quality and noise environment will be felt within a greater perimeter than the one used for modelling. They also have concerns about dust accumulation on the vegetation and its infiltration in the soil, as well as the impacts on the quality of wildlife resources associated with the ingestion of said vegetation. Others have observed deformities on moose and attributed the situation to radiations emitted by power lines near their feeding area. They also fear the impacts of noise on bird migration routes.

Because of its remote location, sources of vibration in the study area are nearly non-existent. Vibrations will occur when blasting takes place in the pit. The vibration thresholds at the km 381 truck stop and other sensitive areas surrounding the pit will be acceptable. When the values calculated were close to the limits, mitigation measures were added to ensure the thresholds were not exceeded. However, some may still feel vibrations when blasting occurs. As previously mentioned, the Cree land users fear that vibrations emitted may have an impact on sturgeon given the presence of a new spawning site on the Eastmain River, which could be disrupted. People interviewed consider that sturgeon is more sensitive to disturbances to the environment than humans and that they could feel vibrations in the water which cannot be felt by humans.

In the study area, the only current artificial lighting at night comes from the km 381 truck stop. However, some changes are anticipated since artificial lighting will be added to Galaxy's permanent facilities, in addition to that needed for operations.

As previously indicated, SDBJ had expressed a concern that mining activities may affect the km 381 truck stop's drinking water supply. The specialized hydrogeology report demonstrated that groundwater lowering associated with the pit will be minimal where the wells are located (WSP, 2018*a*). In that respect, Galaxy has agreed to monitor the groundwater levels and verify the results of the hydrogeological modelling.

According to the INSPQ, the issues of water quality, quantity and access are the Cree's primary concerns (INSPQ, 2014). These concerns were also voiced during consultation activities (Chapter 5). To that end, the creeks in the study area were subjected to chemical analyses (water and sediments) within the context of a specialized study on aquatic habitat (WSP, 2018*e*). The creeks in question run from east to west, toward the Eastmain River. They hydrographic system in the local study area represents a very low percentage of the Eastmain River's watershed (0.1% total). During operations, run-off water from the entire site will be captured and channelled to water retention

basins. This water will then undergo WTP treatment, if necessary, before it is discharged into the environment. Under future conditions, water quality will be ensured by means of a monitoring program. Furthermore, D019, MDMER and EDO requirements will also be met. As mentioned for the construction phase, Cree land users expressed concerns regarding risks of accidental spill given the raised topography of the mine in relation to the Eastmain River. They fear its potential contamination, as well as contamination of other smaller creeks (especially the CE5 creek, which is an area valued by users), peatland and groundwater, which users believe could occur through infiltration. They also fear the impacts of a potential contamination on wildlife and fish resources. They raised questions on the efficiency of the treatment of water discharged via effluents and mention that even treated, discharged water will not be of same quality as initially. Still on the subject of project impacts on surface and groundwater, Cree land users are concerned by the impacts on water flow.

As is the case during the construction phase, the tranquility of the premises, especially in the Cree camps located around the mining site itself, could also be affected by mine activities. People who are used to performing traditional activities in the projected infrastructure sector could find their safety compromised by the site's new use. The communication measures implemented during the construction phase will continue throughout the operation phase; the survey and environmental monitoring reports will also be available during this period. For safety purposes, the area closed to traditional activities that is established in collaboration with the tallyman during the construction phase will be maintained.

CEAA-16 **Document the potential negative impacts of the various components and concrete activities of the project (for every phase) on the established or potential section 35 Aboriginal rights, including the related titles and interests. This assessment must compare Aboriginal rights and related titles and interests which will be determined under future conditions, with and without the project. The perspectives of Indigenous Nations that may potentially be affected should be included once they have sent them to the proponent.**

A-16 Since questions CEAA 16-17-18 cover the same aspects, only one answer will be provided (see A-18).

CEAA-17 **Document the measures intended to mitigate the potential negative impacts of the project on established or potential section 35 Aboriginal rights, including their titles and interests. The measure should be prepared as particular commitments that clearly describe how the proponent plans to implement them and they may require much more than simple mitigation measures developed to counter potential negative environmental impacts.**

A-17 Since questions CEAA 16-17-18 cover the same aspects, only one answer will be provided (see A-18).

CEAA-18 **Document all potential negative impacts on established or potential section 35 Aboriginal rights, including their related titles and interests that were not completely mitigated or subject to accommodation as part of the environmental assessment and the Indigenous consultation. Also take into account the negative consequences that could result from residual and cumulative environmental impacts. The perspectives of Indigenous Nations that will potentially be affected should be included once they have sent them to the proponent.**

A-18 Since questions CEAA 16-17-18 cover the same aspects, only one answer will be provided.

Rights of the Cree Nation across the project territory are the subject of several agreements with the federal and provincial governments. Hunting, fishing and trapping top the list of Cree Nation rights under the James Bay and Northern Quebec Agreement, one of the Nation's key agreements signed in 1975.

Section 7.4.1 of the EIA assesses the impacts of the project on the everyday use of the land and resources for traditional purposes, mainly focusing on hunting, fishing and trapping. Mitigation measures to reduce impacts are also presented, as well as residual impacts. Section 7.4.4 covers the impacts on the quality of life and well-being, including the feeling of loss and damage to the Cree cultural identity. Mitigation measures and residual impacts are also presented.

SECTION 6.1 PROJECT SETTING AND BASELINE CONDITIONS

Section 6.1.1 Atmospheric, Light and Sound Environment

CEAA-19-1 Describe the ambient noise levels at key receptor points, including Cree community camp sites.

A-19-1 Ambient noise levels were not measured at the Cree community camp sites. These camps are located at distances ranging from 5.4 to 11.4 km from the project central point (-77,097635; 52,244697) as the crow flies. From such a distance, the noise impact of Galaxy Lithium operations would be virtually non-existent (i.e. the 45 dBA contour line is reached well before the Cree camps). Therefore, these receptors were not considered in the simulations.

The main source of ambient noise in the area is traffic on the James Bay Road. Noise peaks observed at points 3 and 6 (see graphs and map presented in Appendix CEAA-19-1) are associated with the passage of vehicles. Between the passage of vehicles, the noise level decreases to approximately 35 dBA. The impact of traffic noise decreases with distance from the road.

CEAA-19-2 The study must include the geographic extent of sound sources and temporal variations.

A-19-2 The geographic extent of traffic noise depends on two key variables. The first variable is the intensity of the noise source, i.e. the speed of vehicles and flow of traffic. The greater the intensity of the noise source, the greater the geoprahic extent. The second variable is the intensity of the existing ambient noise, other than the one generated by traffic. The greater its intensity, the smaller the geographic extent due to the masking effect caused by other noise sources (e.g. birds singing, leaves rustling in the wind, etc.). To summarize, if we consider a day during winter, without noise and where there are no birds nor insects, the geographic extent will be much greater than during a windy day or in the presence of birds or insects noise. According to sound surveys, we can expect that the geographic extent of traffic noise will be smaller than 1 km for most of the time since the noise impact of the James Bay Road is relatively low at the P1, P2 and P4 measurement points which are approximately 600 m from the road.

Unless traffic greatly increases, the noise level caused by the James Bay Road should remain the same through time. Reference noise variations mainly result from the season and weather conditions. As explained in the previous paragraph, the sound environment will vary depending on weather conditions, including the wind (leaves rustling) or rain and noise of wildlife (animals, birds and insects). The expected increase in road traffic is of about 0.6 dBA, which is inaudible. An increase of 100%, which represents double the traffic, would equal to an increase of 3 dBA, which is starting to be audible.

Section 6.1.4 Riparian and Wetland Environments

CEAA-20 Present Indigenous traditional knowledge on the characterization of the shoreline, banks, current and future flood-risk areas, and wetlands. If no information was provided by the Indigenous Nations, indicates it.

A-20 No specific question regarding Indigenous traditional knowledge on the characterization of the shoreline, banks, current and future flood-risk areas, and wetlands was asked to people interviewed as part of the public consultations. However, certain opinions were shared during consultation regarding wetlands. Land users are concerned by the fact that the proposed project is located within a wet area meaning that environmental concerns are even greater considering the sensitivity of wetlands. This sector is an important source of water located within the Eastmain River watershed. Accidental spills in wetlands are hard to control and contamination can spread over a large territory. Elders also mentioned that such contamination happened in the remote landfill area and on the Québec Lithium mining project site. Galaxy agrees with opinions expressed and has, among other things, planned the following mitigation measures:

- VEG 07: Build a clay berm all along the stripped areas as to prevent drainage of peatlands on the periphery of infrastructure;
- NOR 14: Maintain a riparian protection area of 10 to 15 m, depending on the side slope, around wetlands, watercourses and bodies of water in accordance with the Protection Policy for Lakeshores, Riverbanks, Littoral Zones and Floodplains, section 3.1 and 3.2;
- NOR 15: Develop a compensation project for the loss of wetlands or water in accordance with the Act respecting compensation measures for the carrying out of projects affecting wetlands or bodies of water, section 2.

Section 6.1.5 Groundwater and Surface Water

CEAA-21 Map the boundaries of the watershed (map 6-7) on a larger scale (e.g., the Eastmain River watershed).

A-21 Mapping of watershed boundaries, which locates the boundaries of the Eastmain River watershed and Opinaca River watershed, can be found in Appendix CEAA-21. This map was produced from Map 6-7 of the EIA, but on a larger scale.

CEAA-22 Provide the bathymetric surveying results for all the water bodies where these surveys were conducted (WSP, 2018. Étude spécialisée sur l'habitat du poisson).

A-22 Except for Asiyan Akwakwatipusich Lake, only a brief bathymetry (ad hoc measurements taken with an echosounder) was conducted across the water bodies. These measurements were used to determine the average and maximum depth of the inventoried water bodies, that is Asiyan Akwakwatipusich, Asini Kasachipet, and Kapisikama lakes and Sans-Nom 1 pond. Data is presented in Tables 27 to 31, as well as Table 33 of the Aquatic Habitat Baseline Sector Study (*Étude spécialisée sur l'habitat aquatique*) (WSP, 2018). A map was produced for Asiyan Akwakwatipusich Lake since a detailed bathymetry was conducted. The map is presented in Appendix CEAA-22.

CEAA-23 Present the complete results of the characterization of sediment in Lac Asiyan Akwakwatipusich conducted in 2012, and provide the raw data.

A-23 Complete results of the characterization of sediments conducted in 2012 are presented in Table 22 of the Aquatic Habitat Baseline Sector Study (*Étude spécialisée sur l'habitat aquatique*) (WSP, 2018) and laboratory certificates are provided in Appendix B of the same study (station S5, 2012).

Section 6.1.6 Fish and Fish Habitat

CEAA-24 Provide the details of the characterization of watercourses by homogenous segment.

A-24 The details of the characterization of watercourses by homogenous segment are presented in the Aquatic Habitat Baseline Sector Study (*Étude spécialisée sur l'habitat aquatique*) (WSP, 2018) for all inventoried creeks, that is CE1, CE2, CE3, CE4 and CE5. Data can be found in pages 50 to 54 of the study.

Characterization was conducted based on a photointerpretation assessment, validated using drone-taken video images. Site visit was then carried out to validate data collected and to take in situ measurements. Generally speaking, the conditions of characterized creeks are very homogenous along the segments visited (see Map 2 of the Aquatic Habitat Baseline Sector Study, WSP 2018). Observed variations are all explained in the text. A table is also presented in Appendix CEAA-24.

CEAA-25 Describe the existing structures that hinder the free passage of fish like the CE3 and CE4 watercourse culverts located under James Bay Road and indicate if, under the current conditions, free passage of fish is possible at that location. Photographs D-54 and D-80 of the Specialized Study on Aquatic Habitat (WSP, 2018) does not confirm that fish can pass through these culverts.

A-25 New photographs are presented to illustrate the condition of culverts on the CE3 and CE4 creeks at the time of collection of on-site data (Figures 25-1 and 25-2).

According to on-site observations, the culvert located on CE3 appears to be allowing passage of fish (Figure 25-1). Flow inside the culvert presents no characteristics which could hinder the free passage of fish. However, the culvert located on CE4 is obstructed (Figure 25-2) which makes the passage of fish uncertain.

Figure 25-1: Photo CE3, view from west

Figure 25-2: Photo CE4, view from east

Section 6.1.7 Migratory Birds and Their Habitat

CEAA-26 Provide the complete results of the bird survey conducted in 2012 and 2017, particularly by providing the raw data (air survey, point counts, etc.).

A-26 Raw data of bird survey conducted in 2012 and 2017 are saved on a CD. Two CDs were attached to the hard copy submission of this report to the CEAA as arranged with Pierre-Olivier Émond on February 7, 2019.

Section 6.1.8 Species at risk

CEAA-27 **Make and present the list of all the species at risk and of special concern that are present or potentially present in the study area by consulting various lists of species with particular statuses (Committee on the Status of Endangered Wildlife in Canada [COSEWIC] and Schedule 1 of the Species at Risk Act). It should include but not be limited to:**

- **Short-eared Owl;**
- **Rusty Blackbird;**
- **Canada Warbler**
- **Common Nighthawk**
- **Olive-sided Flycatcher;**
- **Bank Swallow;**
- **Boreal and Migratory Caribou;**
- **Wolverine;**
- **Bats: Tri-Coloured Bats, Little Brown Myotis and Northern Myotis.**

A-27 See A-28. Both questions are closely related.

CEAA-28 **Using the ranges and descriptions of habitats, particularly those located directly or indirectly in the areas affected by the work, analyze whether the species at risk and of special concern are likely to be present. If this is the case, decide whether additional surveys are necessary to determine if the species are present or not.**

A-28 Questions 27 and 28, which are closely related, will be answered here.

We analyzed the real potential of the species at risk or of special concern being present in the area by prioritizing species whose known range intersects with the study area and whose habitat can in fact be found within the study area.

First, assessment of the lists of species with particular statuses (Committee on the Status of Endangered Wildlife in Canada [COSEWIC] and Schedule 1 of the Species at Risk Act), as well as the known ranges of these species, does not suggest the addition of other species than those considered in Table 28-1. Also, this review led to leaving out the Canada warbler from the list provided by the CEAA since the study area is located beyond its known range (AONQ, 2019). The study area is outside the known range of the Tri-coloured bat which is why this species was also excluded. According to the Recovery Strategy for the Tri-coloured Bat (Environment Canada, 2015), the project study area is located more than 500 km north of the known Tri-coloured bat range. Other sources located the northern boundary of its range at a degree of latitude even further south (Tremblay and Jutras, 2010; Jutras et al., 2012). The species was also not documented during the inventory conducted in 2017 (refer to Section 6.3.6. of the EIA).

Table 28-1: Status and Current Probability of Presence of the Species at Risk and of Special Concern Within the Study Area

Species	SRA Status	COSEWIC Status	Potential Presence Based on the Range and Habitat Availability	Current Probability of Presence
Short-eared owl	Special concern	Special concern	Yes	Low, based on the current availability of prey
Rusty blackbird	Special concern	Special concern	Yes	Confirmed
Canada warbler*	Threatened	Threatened	No	Zero, since beyond the known range
Common nighthawk	Threatened	Special concern	Yes	Confirmed
Olive-sided flycatcher	Threatened	Special concern	Uncertain	Low, since at the boundary of the known range
Bank swallow	Threatened	Threatened	Yes	High
Boreal (woodland) caribou*	Threatened	Threatened	Possible	Low, based on the current habitats available
Migratory caribou*	None	Endangered species	Possible	Low, based on the current habitats available
Wolverine*	Special concern	Special concern	Possible	Low, based on the current availability of prey
Tri-coloured bat*	Endangered species	Endangered species	No	Zero, since beyond the known range
Little brown myotis	Endangered species	Endangered species	Yes	Presence of the Myotis genus confirmed
Northern myotis	Endangered species	Endangered species	Yes	Presence of the Myotis genus confirmed

* Species at risk and of special concern that are not selected as potentially present given their known range or the current state of habitats available within the study area.

The project study area is located in the overlapping area of the ranges of the boreal (woodland) and migratory caribou of the Leaf River population (Couturier et al., 2004). Therefore, animals of these two designatable units are likely to be present in the project study area. However, several authors acknowledge that the boreal and migratory caribou prefer peatlands, mature softwood stands with lichen and other sites full of lichen during the winter (COSEWIC, 2014a; COSEWIC, 2017). Caribou are sensitive to disturbances and are known for avoiding recently disturbed areas (Moreau et al., 2012; COSEWIC, 2014a; COSEWIC, 2017). As specified in Section 6.3.2.1 of the EIA, the location of the projected mine represents one of the sectors in the study area that is most disturbed by human and natural elements. For example, within a 5-km radius from the centre of the mine, approximately 92% of the area is disturbed. Fires have disturbed approximately 90% of this sector while human factors generate 26% of the disturbances. Within a 10-km radius from the centre of the mine, 86% of the area is disturbed. Fires cover approximately 85% of the latter while human disturbances are responsible for approximately 17%. Fires initially reduce the forest habitats available to the caribou since they cause the loss of mature softwood stands and of lichens, as well as create obstacles (Thomas and Gray, 2002); Dalerum et al., 2007; Dzus et al., 2010). The study area offers poor habitat conditions for woodland caribou due to its high disturbance rate. The regeneration of vegetation, and therefore the rehabilitation of the caribou habitat, is likely to take longer than the project duration. Despite the potential presence of caribou in the study area, or near the project boundaries, current knowledge indicates that the species, either the woodland or migratory caribou, has very seldom used the study area over the past decade (see section 9.3.2.1 of the EIA). Therefore, the probability of caribou being in the areas directly or indirectly affected by work does not appear to be significant.

Based on what little information is available on its known range, the wolverine is also potentially present within the study area. However, during a systematic survey over 100,000 km^2 in the Abitibi and James Bay Lowlands natural province in 2006, only two potential wolverine track networks were identified some dozen kilometres from La Sarre and Matagami (Fortin, 2006; COSEWIC, 2014b; Environment Canada, 2016). The wolverine is a solitary animal and primarily a scavenger, whose survival relies on the availability of abundant food resources (COSEWIC, 2014b; Environment Canada, 2016). It thrives in ecologically intact areas, where prey and other carnivore species are common and diverse (COSEWIC, 2014b). Food is an integral part of the wolverine habitat components (Cardinal, 2004). The habitats must have an adequate year-round supply of food, mainly consisting of smaller prey such as rodents and snowshoe hares, and the carcasses of large ungulates, like moose, caribou, and muskox (COSEWIC, 2014b). The reduction of ungulates, an important winter prey base, also likely contributed to their range contraction (COSEWIC, 2014b). Therefore, in the project region, the only two ungulate species likely to ensure the presence of wolverines are the caribou and the moose. As mentioned in the previous section about caribou, and in Section 6.3.2.1 of the EIA for the moose, the study area offers poor habitat conditions for the wolverines given the level of disturbance of natural environments. Wildlife inventories conducted in 2017 show that prey for the wolverine (breeding birds, small rodents; Environment Canada, 2016) is also seldom found in the study area (refer to Sections 6.3.2.3 and 6.3.5.2 of the EIA). Therefore, the real potential of the wolverine being present in the study area is deemed insignificant in the absence of sufficient abundance and diversity of prey.

We believe that inventories conducted as part of this project cover all species listed in question CEAA-27, as well as the potential habitats of species considered. The habitats inventory and characterization work, including the area directly affected by the project, appears to be sufficient to assess the likely presence of these species without needing to conduct additional inventories.

CEAA-29 **Describe the dwellings, seasonal movements, movement corridors, habitat requirements, critical habitats, general life history, regional abundance and distribution of species at risk and of special concern likely to be in the study area or affected by the project, including the recovery strategies, action plans and management plans.**

A-29 CEAA-29 and CEAA-30, which are closely related, will be answered together.

CEAA-30 **Map the potential habitat of all species at risk and of special concern present and potentially present in the study area.**

A-30 CEAA-29 and CEAA-30, which are closely related, will be answered together.

As for questions CEAA-27 and CEAA-28, we assessed the potential of the species at risk or of special concern being present in the area by prioritizing species whose known range intersects with the study area and whose habitat can in fact be found within the study area. This first led to leaving out the Canada warbler, the tri-coloured bat, the caribou and wolverine from the list provided by the CEAA. As mentioned in answer CEAA-28, the study area is located beyond the known Canada warbler and tri-coloured bat ranges. For the caribou, the study area offers poor habitat conditions due to its high disturbance rate. Also, the species has very rarely occupied the study area over the past decade. The real probability of caribou being present in the study area was deemed non-significant (see answer CEAA-28 for further details). Similarly, given the small quantity of prey, an integral part of the wolverine habitat, the probability of finding this species is considered negligible (see answer CEAA-28 for further details).

Maps were produced to quantify surface area of potential habitats within the study area for selected species, as well as the surface area of habitats located within the project boundaries which may be destroyed. Surface areas are presented in Table 30-1. Maps 30-1 to 30-6 show the location of potential habitats.

Table 30-1: Potential Habitats of Species at Risk or of Special Concern Present or Potentially Present in the Study Area and Surface Areas Directly Impacted by the Project

Species	Habitat Characteristics	Study Area (ha)	Surface Area Within the Project Boundaries (ha)
Short-eared owl	A wide variery of unforested habitats are used by the short-eared owl, including arctic tundra, grasslands, peatlands, marshes, fallow pastures, and occasionally fields planted with row-crops. Preferred nesting sites are dense grasslands and toundra with areas of sand-sage. Although short-eared owls clearly prefer open habitats, it is thought that the primary factor influencing local habitat choice (in summer and winter) is food abundance.	3,460.56	443.83
Rusty blackbird [1]	The breeding habitat of the rusty blackbird corresponds closely to the boreal forest. Within this biome, its habitat is characterized by forest wetlands, such as slow-moving streams, peatlands, sedge meadows, marshes, swamps, beaver ponds and pasture edges. In woodlands, the blackbird rarely ventures into the forest itself. In winter, it occurs primarily in damp woodlands and cultivated fields.	2,961.95	352.41
Common nighthawk[1]	The breeding habitat of the common nighthawk is varied and includes open habitats where the ground is devoid of vegetation, such as sand dunes, beaches, logged areas, burned-over areas, forest clearings, rocky outcrops, rock barrens, prairies, peatlands and pastures. It also occurs in conifer forests with or without deciduous trees. From the start of European settlement, the common nighthawk probably took advantage of newly opened habitats created by massive deforestation in eastern Canada and United States. The apparition of gravel roofs contributed to the expansion of its habitat across North America.	2,667.34	363.63
Olive-sided flycatcher	Olive-sided flycatcher is most often associated with open areas containing tall trees or snags for perching. The species sallies for prey (flies out to catch prey, insects, and returns to perch). Open areas may be forest openings, forest edges near natural openings (such as rivers or swamps) or human-made openings (such as logged areas), burned forest or open to semi-open mature forest stands. There is evidence that birds nesting in harvested habitats experience significantly lower breeding success than those nesting in natural openings. Generally, forest habitat is either coniferous or mixed coniferous. In the boreal forest, suitable habitat is more likely to occur in or near wetland areas. It would seem that although the amount of old-growth forest has obviously decreased over the past century or more, the amount of habitat attractive to olive-sided flycatcher could be remaining more or less constant since forest harvest continues to create openings favoured by the birds. Recent studies indicate that these areas are less conducive to breeding.	3,308.00	375.31
Bank swallow	The bank swallow breeds in a wide variety of natural and artificial sites with vertical banks, including riverbanks, lake and ocean bluffs, aggregate pits, road cuts, and stock piles of soil. Sand-silt substrates are preferred for excavating nest burrows. Breeding sites tend to be somewhat ephemeral due to the dynamic nature of bank erosion. Breeding sites are often situated near open terrestrial habitat used for aerial foraging (e.g., grasslands, meadows, pastures, and agricultural cropland). Large wetlands are used as communal nocturnal roost sites during post-breeding, migration, and wintering periods.	9.27	0

Table 30-1: Potential Habitats of Species at Risk or of Special Concern Present or Potentially Present in the Study Area and Surface Areas Directly Impacted by the Project (Cont'd)

Species	Habitat Characteristics	Study Area (ha)	Surface Area Within the Project Boundaries (ha)
Little brown myotis	The little brown myotis breeds in a wide variety of habitats depending on its needs and on seasonal change. Hibernacula are essential to the species. Generally, hibernacula are underground openings (abandoned mines, grottos, wells, tunnels, etc.) featuring suitable conditions (temperatures between 2 and 10 °C, humidity level >80%). For summering areas, the myotis uses rocky crevasses, mature trees (mainly larger trees in early process of decomposition) and buildings as daytime and/or maternity roost sites. Females tend to form maternity colonies when suitable sites are available. Chiroptera are highly mobile and can travel significant distances each night to reach foraging sites. These sites are places where high concentrations of insects can be found, such as ponds, swamps, bodies of water, mature forests. It should be noted that chiroptera are opportunist, meaning that they go from a foraging site to another depending on insect emergence. Bats get food from a wide variety of habitats depending on prey availability.	943.55	116.22
Northern myotis	Much like the little brown myotis, the northern myotis uses underground openings as hibernaculum. It basically shares the same type of daytime and maternity roost, and foraging sites as the little brown myotis although the northern myotis prefers forest sites for foraging.	943.55	116.22

1 Presence confirmed during inventories.

Information on the residency, seasonal travel, travel corridors, habitat requirements, key habitats and biological cycle, abundance and regional range of species at risk and of concern potentially present in the study area or affected by the project is extensively described in the status reports and recovery strategies of the targeted species as requested in question CEAA-29. Table 30-2 presents a summary of information known for the study area. Habitat requirements are presented in Table 30-1.

Table 30-2: Information Known on Species at Risk and of Concern Present or Potentially Present in the Study Area Regarding their Regional Abundance, Residency, Biological Cycle, Seasonal Travel and Travel Corridors

Species	Residency	Seasonal Travel	Travel Corridor	Biological Cycle	Regional Abundance and Distribution
Short-eared owl	Summer	Spring and fall migration	Unknown locally	Potential breeder locally	Not specified
Rusty blackbird	Summer	Spring and fall migration	Unknown locally	Presence confirmed and potential breeder locally	Not specified
Common nighthawk	Summer	Spring and fall migration	Unknown locally	Presence confirmed and potential breeder locally	Not specified
Olive-sided flycatcher	Summer	Spring and fall migration	Unknown locally	Potential breeder locally	Not specified
Bank swallow	Summer	Spring and fall migration	Unknown locally	Potential breeder locally	Not specified
Little brown myotis	Summer [1]	Spring and fall migration	Unknown locally and undetected during inventories	Presence of the Myotis genus is confirmed locally	Not specified
Northern myotis	Summer	Spring and fall migration	Unknown locally and undetected during inventories	Presence of the Myotis genus is confirmed locally	Not specified

1 No hibernaculum was found in the study area (Section 6.3.6.3. of the EIA).

355 000

360 000

5 792 500

5 790 000

Vers Radisson /
To Radisson

CE1

CE2

CE3

CE4

Lac
Asini
Kasachipet

Lac
Kapisikama

Lac Asiyan
Akwakwatipusich

450 kV (4003-4004)

Relais routier /
Truck stop
km 381

Route de la Baie-James /
James Bay road

Vers Matagami /
To Matagami

Zone d'étude locale / *Local study area*

Habitat potentiel du hibou des marais /
Potential habitat of short-eared owl

Infrastructures / *Infrastructure*

Route principale / *Main road*

Route d'accès / *Access road*

Ligne de transport d'énergie / *Transmission line*

Relais routier / *Truck stop*

Hydrographie / *Hydrography*

CE3 Numéro de cours d'eau / *Stream number*

Cours d'eau permanent / *Permanent stream*

Cours d'eau à écoulement diffus ou intermittent /
Intermittent or diffused flow stream

Peuplements terrestres / *Terrestrial Vegetation*

Affleurement rocheux / *Rock outcrop*

Arbustaie / *Scrubland*

Aulnaie crispé / *Alder forest*

Dénudé sec / *Dry barren land*

Brûlis / *Burnt area*

Végétation terrestre dans l'emprise /
Terrestrial vegetation in right-of-way

Peuplements humides / *Wetland*

Plan d'eau / *Waterbody*

Tourbière arbustive / *Shrubby peatland*

Tourbière boisée / *Treed peatland*

Tourbière ouverte / *Open bog*

Végétation humide dans l'emprise /
Wetland in right-of-way

GALAXY

Mine de lithium Baie-James / *James Bay Lithium Mine*

Étude d'impact sur l'environnement /
Environmental Impact Assessment

Habitat potentiel du hibou des marais /
Potential Habitat of Short-Eared Owl

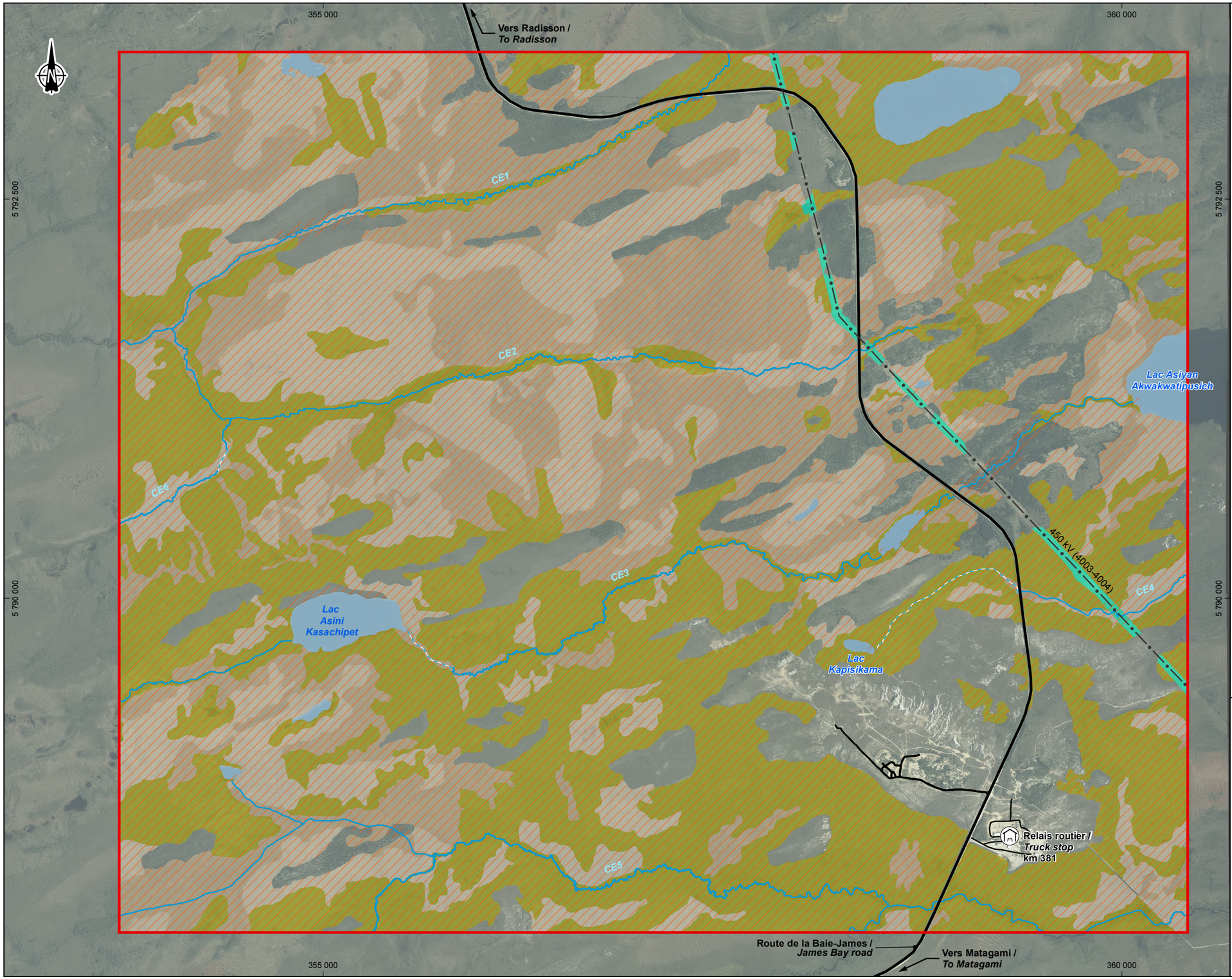
Sources :
Orthoimage: Galaxy, août 2017
Inventaire / Inventory: WSP 2017

No Ref : 171-02562-00_cACEE-30-1_wspT209_hibou_190130.mxd

0 240 480 m
UTM 18, NAD83

Carte / *Map* ACÉE 30-1

wsp



Zone d'étude locale / *Local study area*

Habitat potentiel pour le quiscale rouilleux /
Potential habitat of rusty balckbird

Infrastructures / *Infrastructure*

Route principale / *Main road*

Route d'accès / *Access road*

Ligne de transport d'énergie / *Transmission line*

Relais routier / *Truck stop*

Hydrographie / *Hydrography*

CE3 Numéro de cours d'eau / *Stream number*

Cours d'eau permanent / *Permanent stream*

Cours d'eau à écoulement diffus ou intermittent /
Intermittent or diffused flow stream

Plan d'eau / *Waterbody*

Peuplements humides / *Wetland*

Tourbière arbustive / *Shrubby peatland*

Tourbière boisée / *Treed peatland*

Tourbière ouverte / *Open bog*

Végétation humide dans l'emprise /
Wetland in right-of-way

GALAXY

Mine de lithium Baie-James / *James Bay Lithium Mine*
Étude d'impact sur l'environnement /
Environmental Impact Assessment

Habitat potentiel du quiscale rouilleux/ *Potential Habitat of Rusty Blackbird*

Sources :
Orthoimage: Galaxy, août 2017
Inventaire / Inventory: WSP 2017

No Ref : 171-02562-00_cACEE-30-2_wspT210_quiscale_190131.mxd

0 240 480 m
UTM 18, NAD83

Carte / *Map* ACÉE 30-2

wsp

355 000

360 000

5 792 500

5 790 000

Vers Radisson /
To Radisson

CE1

CE2

CE3

CE4

CE5

CE6

Lac
Asini
Kasachipet

Lac
Kapisikama

Lac Asiyan
Akwakwatipusich

450 kV (4003-4004)

Relais routier /
Truck stop
km 381

Route de la Baie-James /
James Bay road

Vers Matagami /
To Matagami

Zone d'étude locale / *Local study area*

Habitat potentiel pour l'engoulevent d'Amérique /
Potential Habitat of Common Nighthawk

Infrastructures / *Infrastructure*

Route principale / *Main road*

Route d'accès / *Access road*

Ligne de transport d'énergie / *Transmission line*

Relais routier / *Truck stop*

Hydrographie / *Hydrography*

CE3 Numéro de cours d'eau / *Stream number*

Cours d'eau permanent / *Permanent stream*

Cours d'eau à écoulement diffus ou intermittent /
Intermittent or diffused flow stream

Peuplements terrestres / *Terrestrial Vegetation*

Affleurement rocheux / *Rock outcrop*

Arbustaie / *Scrubland*

Dénudé sec / *Dry barren land*

Pessière noire à lichen / *Black spruce lichen forest*

Brûlis / *Burnt area*

Peuplements humides / *Wetland*

Tourbière arbustive / *Shrubby peatland*

Tourbière ouverte / *Open bog*

GALAXY

Mine de lithium Baie-James / *James Bay Lithium Mine*
Étude d'impact sur l'environnement /
Environmental Impact Assessment

Habitat potentiel de l'engoulevent d'Amérique / *Potential Habitat of Common Nighthawk*

Sources :
Orthoimage: Galaxy, août 2017
Inventaire / Inventory: WSP 2017

No Ref : 171-02562-00_cACEE-30-3_wspT211_engoulevent_190130.mxd

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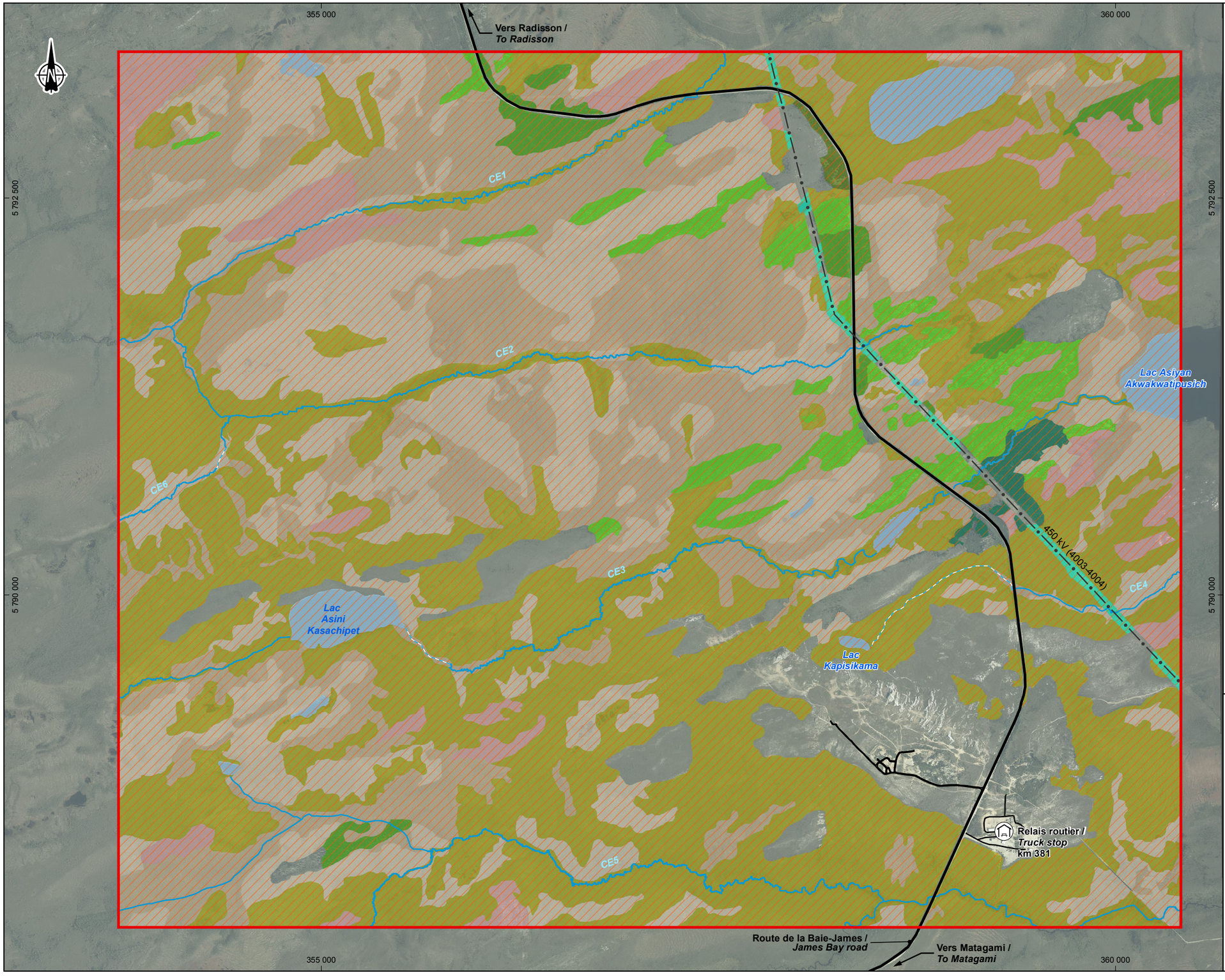
Carte / *Map* ACÉE 30-3

wsp



Zone d'étude locale / *Local study area*

Habitat potentiel du Moucherolle à côtés olive / *Potential Habitat of Olive-sided flycatcher*

Infrastructures / *Infrastructure*

- Route principale / *Main road*
- Route d'accès / *Access road*
- Ligne de transport d'énergie / *Transmission line*
- Relais routier / *Truck stop*

Hydrographie / *Hydrography*

- CE3 — Numéro de cours d'eau / *Stream number*
- Cours d'eau permanent / *Permanent stream*
- Cours d'eau à écoulement diffus ou intermittent / *Intermittent or diffused flow stream*

Peuplements terrestres / *Terrestrial Vegetation*

- Boisé / *Woodland*
- Pessière noire à lichen / *Black spruce lichen forest*
- Pessière noire à aulnes / *Black spruce alder forest*
- Pinède grise / *Jack pine forest*
- Brûlis / *Burnt area*

Peuplements humides / *Wetland*

- Plan d'eau / *Waterbody*
- Tourbière arbustive / *Shrubby peatland*
- Tourbière boisée / *Treed peatland*
- Tourbière ouverte / *Open bog*
- Végétation humide dans l'emprise / *Wetland in right-of-way*

GALAXY

Mine de lithium Baie-James / *James Bay Lithium Mine*
Étude d'impact sur l'environnement / *Environmental Impact Assessment*

Habitat potentiel du Moucherolle à côtés olive / *Potential Habitat of Olive-Sided Flycatcher*

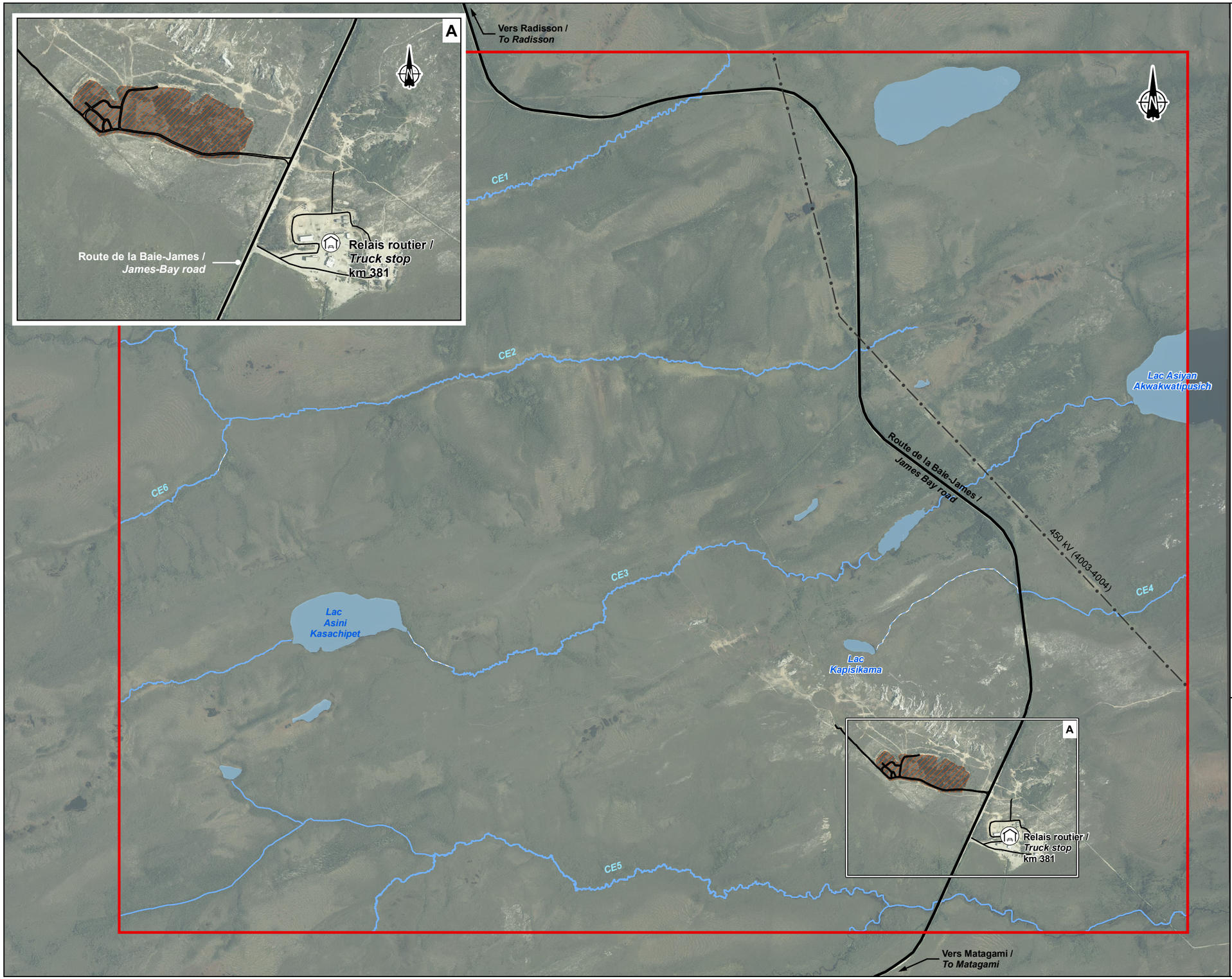
Sources :
Orthoimage: Galaxy, août 2017
Inventaire / Inventory: WSP 2017

No Ref : 171-02562-00_cACEE-30-4_wspT212_moucherolle_190130.mxd

0 240 480 m
UTM 18, NAD83

Carte / *Map* ACÉE 30-4

wsp



Zone d'étude locale / *Local study area*

Habitat potentiel de l'hirondelle de rivage / *Potential habitat of Bank swallow*

Infrastructures / *Infrastructure*

Route principale / *Main road*

Route d'accès / *Access road*

Ligne de transport d'énergie / *Transmission line*

Relais routier / *Truck stop*

Hydrographie / *Hydrography*

CE3 Numéro de cours d'eau / *Stream number*

Cours d'eau permanent / *Permanent stream*

Cours d'eau à écoulement diffus ou intermittent / *Intermittent or diffused flow stream*

Plan d'eau / *Waterbody*

Peuplements terrestres / *Terrestrial Vegetation*

Anthropique / *Anthropogenic*

GALAXY

Mine de lithium Baie-James / *James Bay Lithium Mine*

Étude d'impact sur l'environnement /
Environmental Impact Assessment

Habitat potentiel de l'hirondelle de rivage / *Potential Habitat of Bank Swallow*

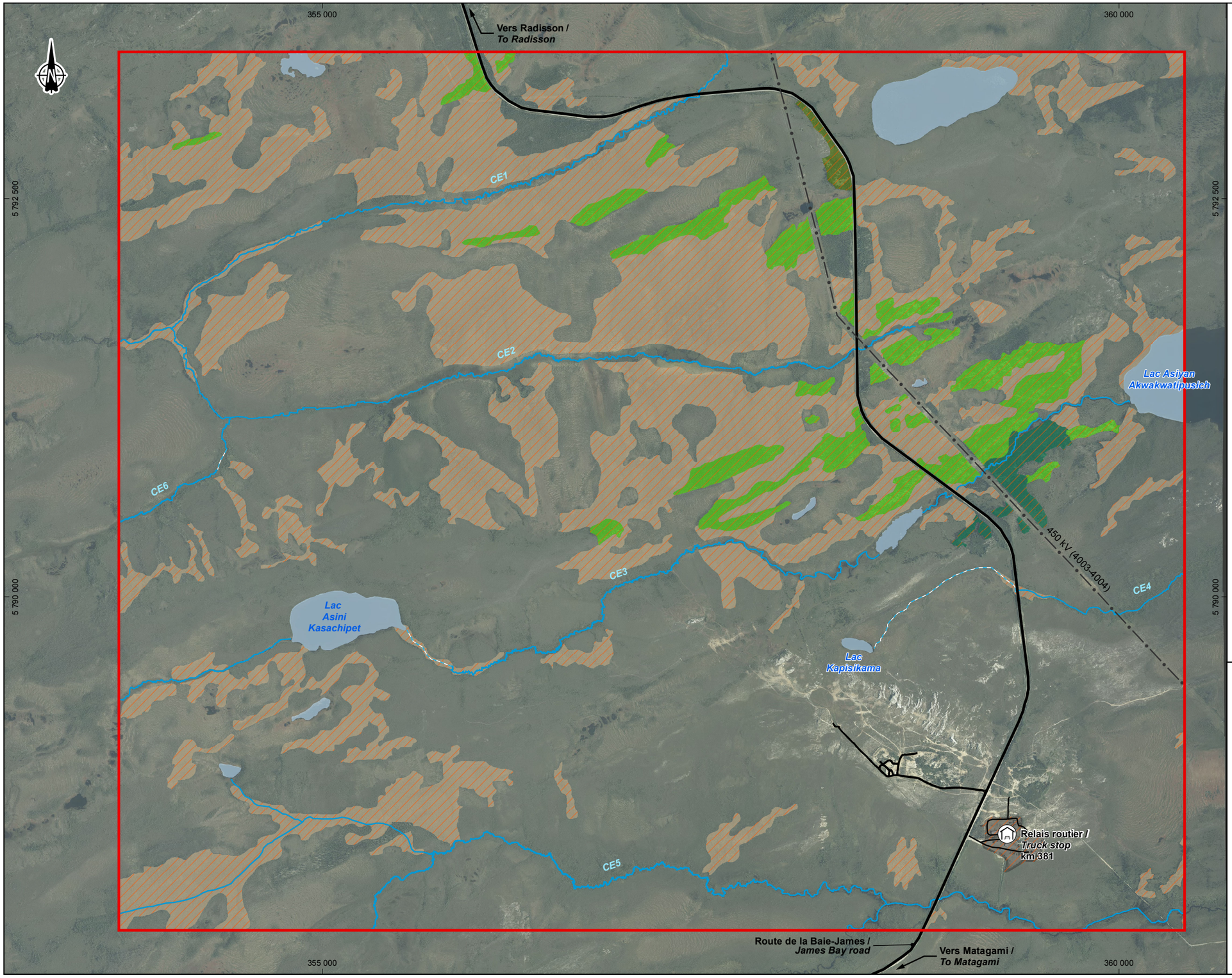
Sources :
Orthoimage: Galaxy, août 2017
Inventaire / Inventory: WSP 2017

No Ref : 171-02562-00_cACEE-30-5_wspT213_hirondelle_190131.mxd

0 240 480 m
UTM 18, NAD83

Carte / *Map* ACÉE 30-5

wsp



Zone d'étude locale / *Local study area*

Habitat potentiel de repos et de reproduction de la petite chauve-souris brune et de la chauve-souris nordique / *Habitat (roost sites) of Little Brown Myotis and Northern Myotis*

Infrastructures / *Infrastructure*

- Route principale / *Main road*
- Route d'accès / *Access road*
- Ligne de transport d'énergie / *Transmission line*
- Relais routier / *Truck stop*

Hydrographie / *Hydrography*

- CE3 — Numéro de cours d'eau / *Stream number*
- Cours d'eau permanent / *Permanent stream*
- Cours d'eau à écoulement diffus ou intermittent / *Intermittent or diffused flow stream*
- Plan d'eau / *Waterbody*

Peuplements humides / *Wetland*

- Tourbière boisée / *Wooded bog*

Peuplements terrestres / *Terrestrial Vegetation*

- Boisé / *Woodland*
- Pessière noire à lichen / *Black spruce lichen forest*
- Pinède grise / *Jack pine forest*
- Anthropique / *Anthropogenic*

GALAXY

Mine de lithium Baie-James / *James Bay Lithium Mine*

Étude d'impact sur l'environnement / *Environmental Impact Assessment*

Habitat potentiel de repos et de reproduction de la petite chauve-souris brune et de la chauve-souris nordique / *Habitat (roost sites) of Little Brown Myotis and Northern Myotis*

Sources :
Orthoimage: Galaxy, août 2017
Inventaire / Inventory: WSP 2017

No Ref : 171-02562-00_cACEE-30-6_wspT214_chauve-souris_190131.mxd

0 240 480 m
UTM 18, NAD83

Carte / *Map* ACÉE 30-5

wsp

CEAA-31 Describe:

1. the use of navigable waters by members of Indigenous Nations;

A-31-1 Based on information collected from RE2 trapline and VC33 and VC35 land users, watercourses of the study area on which Crees navigate as part of traditional activities are (see Map CEAA-31, Appendix CEAA-31):

- Eastmain River up to Weir #5 (except Mantuwataw Rapids which can be avoided using a portage path);
- Nistam Siyachistawach Lake (South-west of the study area);
- Amiskw Matawaw Lake (South-west of the study area);
- Miskimatao River (South-west of the study area);
- East section of CE5 creek, river can be reached from James Bay Road and leads up to Eastmain River (East of the study area).

Navigation on the last two watercourses was seldom conducted over the past few years. It should be noted that no expected change is likely to impact navigable waters of the study area.

2. past, present and future traditional uses of caribou;

A-31-2 Despite the potential presence of caribou in the study area, or near the project boundaries, current knowledge indicates that the species, either the woodland or migratory caribou, has very seldom used the study area over the past decade. The traditional usage of the caribou was rarely discussed throughout the various consultations.

Caribou hunting was probably more popular in the past than it is now given the current small population. RE2 land users mentioned that there are fewer and fewer migratory caribou across the territory and that no caribou were observed last year. It seems that the migratory caribou is no longer in the area since fires destroyed the forests (caribou was hunted along the Eastmain River). The woodland caribou is sometimes observed south of the RE2 trapline (west of the James Bay Road). According to one user, this area would be the north boundary of the woodland range. However, the species is not observed every year. Caribou hunting across the territory should not be a very significant activity in the future, until revegetation occurs anyway.

3. recreational uses;

A-31-3 Land users like to spend weekends or have short stays at the camp, even if no hunting activity is planned. Line fishing, perceived as a recreational activity in comparison with net fishing, is also performed.

4. burial sites;

A-31-4 There are no documented burial sites within the project area. Certain locations were identified further downstream along the Eastmain River.

5. cultural landscapes;

A-31-5 This aspect was addressed through the valued areas as part of consultations (see Section 6.4.6.1 of the EIA). It emerges that three key areas (Eastmain River, CE5 creek and the area formed of several lakes in the vicinity of Amiskw Matawaw Lake) are valued by the RE2 land users given the abundance of resources which continue to provide for their needs, and their attachment to the location for generations (see Map 6-22 of the EIA).

Even though the Eastmain River was diverted in 1980, it could still represent a significant cultural landscape for Crees. Its great popularity in the past and importance as a key navigable waterway (historical site and place of subsistence for past generations) imply a strong attachment to this river which

is still popular thanks to its resources. The transfer of sites of memory is still active based on information collected during consultations.

6. locations, objects or items that are sacred, ceremonial or have cultural importance.

A-31-6 According to the information provided by the First Nations, there are no locations, objects nor items that are sacred or ceremonial in the study area. However, certain areas have a greater cultural importance, due to attachment to the territory, in regard to the cultural, historical and subsistence aspects, and where knowledge is transferred (valued areas, see section 6.4.6.1 of EIA).

CEAA-32 Indicate how the Nations' comments and the Indigenous traditional knowledge were used to establish the baseline conditions of the natural and cultural heritage.

A-32 As mentioned in Section 4.16.2 "Actions that Comply with Sustainable Development Principles" of the EIE, many additional activities involving the First Nations were conducted associated with the natural and cultural heritage, including:

- Interviews with tallymen of traplines and their families as to document the use of land and resources;
- Document review regarding traditional know-how, more specifically medicinal plants;
- Visual simulations which integrates components valued by land users.

Land users were also interviewed on the presence of sites of archaeological interest, or other sites valued for their natural and cultural heritage. Since no archaeological site or built environment of interest was identified by Cree users in this area, no information on this matter was documented in the baseline conditions of the natural and cultural heritage.

However, the study area affects valued areas that land users wish to protect either because of the abundance of certain resources or because of the strong generational attachment to the territory. The information provided by Crees regarding the valued areas is presented in Section 6.4.6.1 Current Use of Land and Resources for Traditional Purposes.

SECTION 6.2 PREDICTED CHANGES TO THE PHYSICAL ENVIRONMENT

Section 6.2.1 Changes to the Atmospheric, Sound and Light Environment

CEAA-33 Include the ozone in the modelling study/Discuss the ozone emission potential based on predicted NOx and VOC concentrations for the project if located in a zone with potentially high ozone concentration.

A-33 Ground-level ozone is an air pollutant likely to induce adverse effects on human health, the well-being or the ecosystem. Ozone is also a major component of smog. Ground-level ozone is called a secondary pollutant because it is not directly emitted in the atmosphere, but through the chemical transformation of two primary pollutants, nitrogen oxides (NOx) and volatile organic compounds (VOCs). These two components come from natural sources as well as human activities.

In Quebec, standards regarding ground-level ozone are laid down by MELCC's Clean Air Regulation (CAR). The Canadian Council of Ministers of the Environment (CCME) has also established Canadian Ambient Air Quality Standards (CAAQS). Table 33-1 presents these standards (averages for 1 hour and 8 hours periods).

Operations conducted as part of the James Bay Lithium Mine project will produce NOx and VOC emissions. Activities associated with burning of the various fuels for the mine operation (mining equipment, propane for heating and use of explosives) represent sources of primary pollutants and are likely to lead to an increase in ozone concentrations.

Table 33-1: Standards and Criteria for Ozone

Substance	Acronym/ Formula	Period	Statistics	Threshold (µg/m³)	Type of Threshold	Authority/ Organization
Ozone	O_3	1 hour	1st maximum	160	Standard	MELCC
		8 hours	1st maximum	125	Standard	MELCC
		8 hours	98.9 percentile [1]	122	CAAQS	CCME
1	3-year average of the annual 98.9 percentile daily maximum 8-hour average mobile concentrations.					

The assessment of the potential increase in ozone concentrations is quite different than the air dispersion modelling study submitted with the James Bay Lithium Mine project environmental impact assessment since ozone is a secondary pollutant. A dispersion model considering the chemical transformation, namely a photochemical grid model, is required. In its current form, the AERMOD model, required by governmental authorities for air dispersion studies, cannot process these complex phenomena and is therefore unable to estimate ozone concentrations.

Within this context, the impact of the project on ground-level ozone concentrations likely to be found in the study area was assessed on a comparative basis. Data from six stations (Table 33-2) part of the *Réseau de surveillance de la qualité de l'air du Québec* (RSQAQ) and the National Air Pollution Surveillance Program (NAPSP) was assessed (Table 33-3) to characterize the receiving environment since no ozone data is available. According to the assessment of continuous measurements from the stations, which are located in regions representative of the study site, compared to other stations currently available, ozone concentrations approach the threshold limits, but generally comply with MELCC and CCME standards (Table 33-4).

The *Radisson* station, located approximately 175 km north of the site, is the station that best represent the study area and has the lowest ozone concentrations. However, the station is new and has only been available for measurements since November 29, 2017, meaning that only a month's worth of data is available. It is not possible to get a proper assessment of this sector given the small quantity of data. The analysis of 2018 data, when available, shall allow for a better representation of the area.

The *Labrador City* station is representative of a northern environment not far from major mining operations (IOC, Mont-Wright, Bloom Lake). This station provides a similar portrait than what is expected when the James Bay Lithium Mine project will be in operation. However, it is not representative in terms of ozone concentrations measured since it is located in the vicinity of three mines whose production is about 10 times that of the James Bay Lithium Mine project and Wabushi project. Thus, concentrations from the project site shall be less than those recorded at *Labrador City* station.

Data shows that ozone concentrations are below standards and similar to concentrations at other stations located nearby forest industries. It is expected that operation of the James Bay Lithium Mine will not result in an increase of ground-level ozone concentrations above MELCC and CCME standards.

Table 33-2: Ozone Continuous Measurement Stations Examined

Station	Type of Industry in Proximity	Latitude	Longitude	Distance to Project (km)	Data Available
Radisson	Hydro-Québec	53.7	-77.7	175	2017-11-29 to 2017-12-31
Lac-Edouard	Forest Sector	47.6	-72.3	750	2015-2017
Chapais	Forest Industry	49.8	-75.0	350	2015-2016
Senneterre	Forest Industry	48.4	-77.2	425	2015-2017
Pémonca	Forest Industry	48.8	-72.7	600	2015-2017
Labrador City	Mining Industry	52.9	-66.9	1,100	2015-2016

Table 33-3: Ozone Concentration Statistics

Station	Ozone Concentration (µg/m^3) [1]			
	1 hour		8 hours [2]	
	Maximum	98 Percentile	Maximum	98.9 Percentile
Radisson	81.6	-	79.5	-
Lac-Edouard	135.1	92.2	125.7	109.8
Chapais	120.2	90.6	112.3	93.6 [3]
Senneterre	131.3	93.7	123.8	104.9
Pémonca	126.7	91.9	118.0	103.1
Labrador City	127.1	100.5	114.3	101.5 [3]

[1]: Concentrations presented are the average of data available for each year.
[2]: Concentrations presented are the 8-hour average *mobile* concentration. The percentile is calculated based on daily maximum data.
[3]: 99 percentile data was presented for these stations since 98.9 percentile values are not available from NAPS data.

Table 33-4: Comparison of Ozone Concentration Measured with Threshold Values

Station	Threshold Value Percentage					
	1 hour		8 hours			
	RAA		RAA		CCME	
	Maximum	98 Percentile	Maximum	98.9 Percentile	Maximum	98.9 Percentile
Radisson	51%	-	64%	-	65%	-
Lac-Edouard	84%	58%	101%	88%	103%	90%
Chapais	75%	57%	90%	75%	92%	77%
Senneterre	82%	59%	99%	84%	101%	86%
Pémonca	79%	57%	94%	82%	97%	85%
Labrador City	79%	63%	91%	81%	94%	83%

CEAA-34 Provide the Primero report (2018) that includes the dust management plan.

A-34 Despite phrasing used in the impact assessment of October 2018, the Primero report (2018) does not include a specific section on dust management. However, the report refers to dust suppression systems for work on the site and on access roads connecting the infrastructure (e.g. between the water treatment plant, waste rock stockpile and dike) and presents dust extractors in the list of projected equipment.

Primero (2018) report is attached to Appendix CEAA-34.

Section 6.2.3 Changes to Riparian, Wetland and Terrestrial Environments

CEAA-35 Present the changes to the waterfowl habitat, given its importance, particularly for traditional hunting.

A-35 The fire of 2013 affected a major part of the trapline, causing a decrease in the presence of resources and thus their hunting. However, with the revegetation and gradual return of resources, users are slowly resuming their usual activites and plan on continuing in the future.

Various locations in the study area are visited for goose hunting, mainly east of the James Bay Road. This activity mainly takes place in the vicinity of bodies of water, including former borrow pits which have become attractive to the goose, at certain lake outlets and at stream crossings along the James Bay Road. Close to a dozen of these sites was noted across the study area of the social environment (grouped per sector on Map 6-22 of the EIA). In spring,

users often spend close to one month goose hunting on the trapline with family members. In fall, hunting is carried out more sporadically, generating less interest or family gatherings. The tallyman has plans for a goose hunting pond project on the Eastmain River (close to the sturgeon spawning ground community project). The increasing number of hunters on the trapline calls for the need to develop new hunting areas.

According to land users:

- Geese should not be too strongly affected by blasting, but rather by the reopening of the Opinaca airport, if applicable;
- Geese can suffer from accumulation of pollution on the ground (notably dust/melting snow);
- Noise and smell caused by the mine will have a repulsive effect on geese nearby the site where hunting activities take place;
- Geese should not be greatly disrupted by noise. They are used to it as they arrive from heavily populated and industrialized areas in the south;
- Mine operations could however have a local impact on the bird migration route by altering the availability and usage of staging and foraging areas in the vicinity of the site.

CEAA-36 Present the changes to the animal and plant species habitat, including those that are important in the context of the current use of resources by non-Indigenous Peoples.

A-36 Anticipated changes to the existing animal and plant species habitat are presented in Section 7.3.1 of the EIA. This section deals with the direct and indirect impacts of the project on the vegetation and wetlands. Changes to the habitat are also described in the assessment of impacts on the fauna (Sections 7.3.2 to 7.3.6 of the EIA). Changes to the habitat mainly correspond to a loss or modification to the habitat associated with the project footprint.

Impacts on the use of resources by non-Indigenous people, mainly hunting (goose and moose) and fishing activities associated with changes to the habitat are the same as those mentioned for the Indigenous people (use of resources for traditional purposes, Section 7.4.1 of the EIA), but are less significant since:

1. There is a smaller number of non-Indigenous people hunting and fishing in the study area;
2. Non-Indigenous people hunt and fish as a hobby while hunting, fishing and harvesting is an important source of food for Indigenous people. These activities hold a greater traditional meaning for them as well (way of living).

SECTION 6.3 PREDICTED IMPACTS ON VALUED COMPONENTS

Section 6.3.2 Birds and Their Habitat

CEAA-37 Detail the delivery timeline by describing the time of year, frequency and duration of activities associated with the project. The project activities that will be conducted during the critical nesting period must be identified and the mitigation measures that will be implemented for all activities to minimize the potential impacts on migratory birds must be detailed.

A-37 Currently, there is no detailed delivery timeline for the project. It is impossible to identify at this point in time activities that will be performed during the nesting period of bird species. However, as mentioned in Section 7.3.5 of the EIA, deforestation is prohibited between June 1 and July 31 (FAU 02 mitigation measures).

All mitigation measures to implement as to limit potential impacts on birds are presented in Section 7.3.5 of the EIA.

Certain activities during the **Construction and Operation phases**, notably deforestation and soil stripping, are likely to impact birds. Mitigation measures SUR 01, SUR 02, SUR 03 and SUR 04 shall contribute towards minimizing the surface area affected. During the breeding season, measures FAU 02, SON 01, LUM 01 to LUM 03 will help reduce disturbance and risks of bird, eggs and nest by-catch. Protection measures QUA 05, QUA 08, QUA 09, NOR 07 to NOR 09, NOR 13, NOR 14 and VEG 01 shall contribute towards mitigating the potential impacts of work on waterfowl and other aquatic birds or shorebirds. Mitigation measures LUM 01 to LUM 03 shall reduce the impact of lighting on nocturnal birds.

Table 37-1 (taken from Table 7-5 of the EIA) presents a list of mitigation measures that will be undertaken during the construction and operation phases of the project as to limit potential impacts on birds.

Table 37-1: Bird Mitigation Measures – Construction and Operation Phases

Code	Description
Profile and Ground Surface	
SUR 01	Mark out the boundaries of the planned earthworks, restrict the areas of deforestation and soil stripping as well as cutting areas to the footprint of the required infrastructure (road, pits, stockpiles, basin, etc.).
SUR 02	Mark out access, paths and work areas before undertaking work, and prohibit parking and movement of machinery and vehicles outside of those areas.
SUR 03	Rehabilitate watercourse banks disturbed by the work as early as possible to minimize erosion and sedimentation. If it is impossible to permanently stabilize disturbed surfaces before winter, implement temporary protection measures.
SUR 04	In watercourse crossing areas, perform deforestation work immediately before construction to minimize erosion.
Fauna	
FAU 02	Deforestation activities between June 1 and July 31 are prohibited to limit impacts on fauna.
Ambient noise	
SON 01	Ensure that motorized equipment (trucks, loaders, bulldozers, backhoes, etc.) are equipped with efficient silencers and are in good condition.
Artificial light at night	
LUM 01	Restrict the emission of light toward the sky using fixtures that produce a simple and uniform lighting that would meet the real lighting needs with a luminous flux that would be directed toward the surface to be illuminated.
LUM 02	Limit the period and duration of the use of the lights at night.
LUM 03	Install fixed lights to avoid light spilling out of the spaces to be illuminated and pay attention to the orientation of portable lights and lighting from mobile sources.
Soil, water, and sediment quality	
QUA 05	Restore the waste rock stockpile on a continuous basis to reduce the transport of suspended solids (revegetation) and to limit the leaching of materials and, if necessary, their soil infiltration.
QUA 08	Limit the transport of fine particles in the water environment beyond the immediate work area by an effective means (sediment traps, sediment barriers, turbidity curtain, etc.).
QUA 09	Build a temporary bridge for machinery if crossing a watercourse is required. Set up bridging or an ice-bridge when building a trail across a watercourse or fish habitat (ref. NOR 05).
NOR 07	Surround mining infrastructure pits so that drainage and runoff are transported to a basin and then treated as needed before being released into the environment. In addition, runoff outside activity areas shall be captured by drainage pits, built around the components of the mine site to prevent these waters from encountering sources of contamination (dilution prohibited). Reference: D019, section 2.1.5.
NOR 08	Before discharging effluent water, ensure it will be done in accordance with the standards. Reference: Metal and Diamond Mining Effluent Regulations, sec. 4 and Schedule 4 and D019, section 2.1.1.1.
NOR 09	In the event of an accidental spill, stop the leak as soon as it is spotted, contain the product and recover it using suitable equipment (absorbent sheets, flanges, drain covers, etc.). Immediately notify the Minister. Excavate contaminated soil, place it in a sealed container and dispose of it in accordance with the hazardous materials management program. Advocate for quicker interventions to prevent deep infiltration. Reference: Environment Quality Act, Sec. 21 and Regulation respecting hazardous materials, Sec. 9.

Table 37-1: Bird Mitigation Measures – Construction and Operation Measures (cont'd)

Code	Description
Vibrations and overpressure	
NOR 13	Comply with the maximum distances and loads during blasting to adhere to the criteria of D019 and the threshold guidelines regarding the use of explosives in or near Canadian fisheries waters. Reference: D019, section 2.4.2 and Fisheries Act, para. 35(2) and Guidelines for the use of explosives in or near Canadian fisheries waters, p. 6, paragraphs 8 and 9.
Vegetation and wetlands	
VEG 01	Carry out tree clearing to direct their fall into the areas to be cleared. Do not leave any logging residues in watercourses and areas not affected by the work.
NOR 14	Maintain a riparian protection area of 10 to 15 m, depending on the side slope, around wetlands, watercourses, and waterbodies. Reference: Protection Policy for Lakeshores, Riverbanks, Littoral Zones and Floodplains, Sec. 3.1 and 3.2.

For the **Rehabilitation phase**, mitigation measures SUR 01, SUR 02, SUR 03 and NOR 01 shall contribute towards minimizing the impacts of work while limiting the footprint of infrastructure to be dismantled and restored (mine pits, stockpiles, basin, etc.). Measures FAU 02, SON 01, LUM 01 to LUM 03 will also help reducing disturbance and risks of bird, eggs and nest by-catch. Measures QUA 07, QUA 08, NOR 14 and VEG 01 shall contribute towards mitigating the potential impacts of work on waterfowl and other aquatic birds or shorebirds.

Table 37-2 (taken from Table 7-5 of the EIA) presents a list of mitigation measures that will be undertaken during the rehabilitation phase of the project as to limit potential impacts on birds.

Table 37-2: Bird Mitigation Measures – Rehabilitation Phase

Code	Description
Profile and ground surface	
SUR 01	Mark out the boundaries of the planned earthworks, restrict the areas of deforestation and soil stripping as well as cutting areas to the footprint of the required infrastructure (road, pits, stockpiles, basin, etc.).
SUR 02	Mark out access, paths and work areas before undertaking work, and prohibit parking and movement of machinery and vehicles outside of those areas.
SUR 03	Rehabilitate watercourse banks disturbed by the work as early as possible to minimize erosion and sedimentation. If it is impossible to permanently stabilize disturbed surfaces before winter, implement temporary protection measures.
NOR 01	Restore work areas and stockpiles by levelling surfaces, covering them with natural soils, scarifying or seeding them to support revegetation. Stabilize reworked areas, embankment slopes, overburden stockpiles, etc., as work progresses. Reference: D019 for rehabilitation phase
Fauna	
FAU 02	Deforestation activities between June 1 and July 31 are prohibited to limit impacts on fauna.
Ambient noise	
SON 01	Ensure that motorized equipment (trucks, loaders, bulldozers, backhoes, etc.) are equipped with efficient silencers and are in good condition.
Artificial light at night	
LUM 01	Restrict the emission of light toward the sky using fixtures that produce a simple and uniform lighting that would meet the real lighting needs with a luminous flux that would be directed toward the surface to be illuminated;
LUM 02	Limit the period and duration of the use of the lights at night.
LUM 03	Install fixed lights to avoid light spilling out of the spaces to be illuminated and pay attention to the orientation of portable lights and lighting from mobile sources.

Table 37-2: Bird Mitigation Measures – Rehabilitation Phase (cont.)

Code	Description
Soil, water, and sediment quality	
QUA 07	Carry out development work likely to alter the water quality of watercourses outside the snowmelt period (April 15 to June 15).
QUA 08	Limit the transport of fine particles in the water environment beyond the immediate work area by an effective means (sediment traps, sediment barriers, turbidity curtain, etc.).
Vegetation and wetlands	
VEG 01	Carry out tree clearing to direct their fall into the areas to be cleared. Do not leave any logging residues in watercourses and areas not affected by the work.
NOR 14	Maintain a riparian protection area of 10 to 15 m, depending on the side slope, around wetlands, watercourses, and waterbodies. Reference: Protection Policy for Lakeshores, Riverbanks, Littoral Zones and Floodplains, Sec. 3.1 and 3.2

CEAA-38 Describe the impacts of avifauna's potential use of various pools of water on the mining site.

A-38 Two open basins are projected (Map 4-8, Volume 1, EIA). The first basin drains the overburden stockpile (organic matter and unconsolidated deposits). Clean runoff water shall collect and settle in this basin before being discharged in the CE3 creek. The second basin is located north of the tailings stockpile. The quality of water collected at this location is not yet defined at this moment since kinetic tests are still underway. A preliminary answer is presented in A-75. Water of this basin shall be treated as to meet relevant criteria, standards and objectives (D019, REMDM, EDO) before discharge in CE2.

It should be noted that this basin will not be very attractive to the avifauna. The long and narrow basin will be bordered by an access road and no food source appropriate for the avifauna shall be present, during the first few years of operations anyway. Natural bodies of water which are not, or only slightly, impacted by anthropogenic activities can be found nearby, which limits the potential for use of the mining site basins in favour of surrounding lakes and ponds. Measures (probably ultrasounds) to scare the birds shall be implemented if they land on the basins to rest and that their presence is more than just occasional or for a short period.

CEAA-39 Describe the direct negative impacts of possible losses of habitats on migratory birds, including the diversity and abundance of the species.

A-39 Following inventories conducted as part of the project, a low diversity associated with a low abundance were observed in general. Considering the small area of quality habitat affected by the project, direct negative impacts on migratory birds are viewed as minor. Details regarding the bird impact assessment are presented in Section 7.3 of the EIA.

Section 6.3.3 Species at Risk

CEAA-40 Describe the potential impacts of the project for each species at risk and of special concern that are present or potentially present in the study area while taking into account the information in the existing recovery strategies or management plans.

A-40 Table 40-1 presents the potential impacts of the project for each species at risk and of special concern that are present or potentially present in the study area. Section 7.3.5 of the EIA details the impacts of the project on the birds, including precarious species. Section 7.3.6 of the EIA presents the detailed impacts of the project on the chiroptera, including the little brown myotis and the northern myotis. This information is summarized and further supplemented in the table below.

Table 40-1: Potential Impacts of Project on Species at Risk and of Special Concern that are Present or Potentially Present in the Study Area

Species	Potential Project Impacts
Short-eared owl	As specified in A-30, the loss of 443.83 ha of habitat suitable for nesting or presence of the short-eared owl will occur as a result of the project. However, it is thought that the primary factor influencing local habitat choice (in summer and winter) is food abundance (COSEWIC, 2008; Environment Canada, 2018). The density of micromammals is extremely low in the study area greatly disrupted by recent forest fires, which suggests that the short-eared owl is not likely to be nesting in the area in the short-term, that is until the natural environment and small mammal populations are restored. The species was not documented during inventories conducted as part of the project. Generally, the main threats to the species, including disruption by human activities, habitat loss and alteration due to the drainage of wetlands, urban expansion and intensive agriculture, increased nest depredation (as a result of habitat fragmentation), collisions with vehicles, utility lines, and barbed wire fences, as well as the use of pesticides such as organochlorine (COSEWIC, 2008; Environment Canada, 2018) are absent or of minor importance in the project area. Considering the probability of the owl being present in the area and anticipated mitigation measures (refer to Section 7.3.5), the potential impacts of the projet on the species are deemed insignificant.
Rusty blackbird	As indicated in A-30, the loss of 352.41 ha of habitat suitable for the nesting or presence of the species will occur as a result of the project. However, the most serious threats to the rusty blackbird are thought to be on the wintering grounds floodplains forests of the Mississippi Valley for agricultural or residential purposes (COSEWIC, 2008). Rusty blackbird populations are probably affected by programs for Bird Control in Horticultural Crops which have been underway in the southeastern United States since 1970. The degradation of wetlands and the invasion of these areas by dominant species, such as the red-winged blackbird, can also threaten the rusty blackbird (COSEWIC, 2008; Environment Canada, 2015a). Although additional loss of habitat could happen within the breeding areas due to the alteration of wetlands and the creation of hydropower reservoirs, we consider that overall, main threats to the species are absent or of minor importance within the project area. Considering the projected mitigation measures (see Section 7.3.5), the potential impacts of the project on the species are deemed insignificant.
Common nighthawk	As mentioned in A-30, the loss of 363.63 ha of habitat likely suitable for nesting and presence of the species will occur as a result of the project. Still, stripped lands following mine operations and disposal of tailings could potentially contribute to the expansion of areas suitable for nesting. Causes of the decline of the common nighthawk have not been identified, but it may be partly related to a general decline in insect populations, the common nighthawk main prey (COSEWIC, 2007a). The decrease in several species of aerial insectivores is believed to be due in part to the decrease in food sources from large-scale pesticide spraying programs. The loss and alteration of the habitat, including reforestation of abandoned agricultural fields and harvested forests, fire suppression, intensive agriculture and the gradual reduction of buildings with flat gravel covered rooftops, may also have contributed to the decline observed in certain areas. The increase in predators, such as domestic cats, striped skunks, raccoons, common crows and common ravens may play a role in the decline of the species, especially in urban areas. Other factors may include collisions with motor vehicles and climate change (COSEWIC, 2007a; Environment Canada, 2016a). Overall, main threats to the species are absent or of minor importance within the project area. Considering the projected mitigation measures (see Section 7.3.5), the potential impacts of the project on the species are deemed insignificant.
Olive-sided flycatcher	As mentioned in A-30, the loss of 375.31 ha of habitat likely suitable for nesting and presence of the species will occur as a result of the project. The species is most often associated with open areas containing tall trees or snags for perching required for foraging (COSEWIC, 2007b). Habitat alteration and loss may be a contributing factor in population declines. Olive-sided flycatchers are generally associated with sparse canopy cover, suggesting that they may respond positively to forest management such as timber harvest. Recent studies suggest that there is significantly lower nest success in harvested stands compared with fire origin stands. Habitat alteration and loss on wintering grounds may also be a significant threat for this species. Another possible cause of continued population decline could be a general reduction in insect prey, either on the breeding or wintering grounds. Similar population decline has occurred in a wide range of aerial insectivore bird species (COSEWIC, 2017b; Environment Canada, 2016b). Overall, main threats to the species are absent or of minor importance within the project area. In fact, even though the project area is located at the north boundary of the olive-sided flycatcher breeding area, the habitat and forest fires in recent years appear to be favourable to the species, although it has not been detected during inventories of 2012 and 2017. Considering the projected mitigation measures (see Section 7.3.6), the potential impacts of the project on the species are deemed insignificant.

Table 40-1: Potential Impacts of Project on Species at Risk and of Special Concern that are Present or Potentially Present in the Study Area (Cont'd)

Species	Potential Project Impacts
Bank swallow	As mentionned in A-30, no habitat likely suitable for nesting and presence of the species is present within the project boundaries. The bank swallow breeds in a wide variety of natural and artificial sites with vertical banks, including riverbanks, lake and ocean bluffs, aggregate pits, road cuts, and stockpiles of soil. Sand-silt substrates are preferred for excavating nest burrows (COSEWIC, 2013). Although no single threat appears responsible for the decline of the bank swallow, cumulative effects from several sources may be driving the decline. Loss of breeding and foraging habitat is apparent, especially through erosion control projects, flood control (dams), aggregate management activities, conversion of pastureland to cropland and afforestation (COSEWIC, 2013). The destruction of nests during aggregate excavation may also pose a significant threat in some areas. Climatic changes may reduce overwinter survival or reproductive potential, while widespread pesticide use may cause decreases in the abundance or diversity of flying insects (COSEWIC, 2013). Threats during migration and on the wintering grounds are largely unknown, but may be critical in understanding the species' decline. Locally, the creation of large reservoirs across the James Bay area may have destroyed formerly used nesting sites. However, steep riverbanks and sand banks, such as quarries and borrow pits excavated for construction of roads and dikes, provide a large quantity of potential nesting sites. Overall, main threats to the species are absent or of minor importance within the project area. It should be noted that the species was not detected during inventories conducted in the study area in 2012 and 2017. The potential impacts of the project on the species are deemed insignificant.
Little brown myotis	As mentionned in A-30, the loss of 116.22 ha of habitat likely to include daytime and/or maternity roost sites will occur as a result of the project. Second to the white-nose syndrome, habitat loss is the greatest threat to the little brown myotis and the northern myotis according to the Recovery Strategy for the Little Brown Myotis and Northern Myotis (Environment Canada, 2015b). The loss of habitat is therefore the greatest project impact for both species. The potential of daytime and/or maternity roost sites being present within the study site is limited given the recent forest fires and reduced diameter of trees. The very small presence of bats of the genus Myotis within the site, highlighted by the inventory conducted in 2017 (see Section 6.3.6.2 of the EIA), demonstrates the poverty of habitats complying with the species' needs. It should be noted that there are many replacement habitats of equal or greater quality in terms of daytime, maternity and foraging roost sites on the regional scale. Thus, the loss of habitat will probably translate into a shifting of populations to these alternative sites. Considering the very small presence of bats of the genus Myotis across the site, the poor quality of habitats available and the projected mitigation measures, the potential impacts of the project on the little brown myotis and the northern myotis populations are deemed insignificant.
Northern myotis	

CEAA-41 Describe all the mitigation measures that will be implemented for each species at risk and of special concern that are present or potentially present in the study area and that risk being affected by the project while considering the information in the existing recovery strategies or management plans.

A-41 Wildlife mitigation measures can also be implemented for species at risk since they will benefit from the mitigation of anticipated effects. Following the assessment for the presence of preferential habitats for species at risk potentially present on the site (A-27 to A-30), it appears that no additional mitigation measure targeting the species at risk or of concern is required.

CEAA-42 Present the Indigenous Nations' perspectives regarding the impacts of the project on caribou.

A-42 During consultations with land users, it was mentioned that the migratory caribou is much less present in the area than before. The species has not been observed since fires devastated forests of the area. The woodland caribou can sometimes (but not every year) be observed south of the RE2 land, more than 15 km from the project site. According to one user, this sector is the north boundary of the woodland caribou range. No impact of the project on the migratory and woodland caribou was raised during consultations.

Section 6.3.4 Indigenous Peoples – Current Uses

CEAA-43 Describe and analyze the following elements:

1. any changes or modifications to access areas used for traditional purposes, including the development of new roads, deactivation or reclamation of access roads and changes to waterways that affect navigation;

A-43-1 Roads planned for the project are:

- an access road to the site (length: 810 m) connected to James Bay Road;
- a road connecting the water treatment plant, tailings stockpile area and dyke (length: 1,650 m);
- a road up to the explosives warehouse (length: 1,690 m).

The new roads shall not result in significant changes to access to the territory since they will not be available to users. For safety reasons, a zone where traditional activities will be excluded shall be established in the vinicity of the mining site before start of work in partnership with the tallyman of the RE2 trapline. However, during site rehabilitation, users may be interested in keeping these roads to have a better access to the territory for trapping or hunting. This point was not discussed during consultations.

Project activities will not affect navigable waters of the study area. No change to the Eastmain River nor the Miskimatao River are anticipated. Also, anticipated changes to the CE5 creek, which is rarely used for navigation, are not significant enough to impact navigation.

2. how timing of project activities (e.g., construction, blasting, or discharges) has the potential to interact with the timing of traditional practices, and any potential impacts resulting from overlapping periods.

A-43-2 The detailed work schedule is still undefined as this stage of the project. To facilitate adjustment of land users' traditional practices with regards to new conditions of the project, users shall be notified ahead of the start and execution of work. Galaxy will make sure to educate construction workers regarding the Cree traditional lifestyle and Cree land users practices. Disturbances caused by increase in traffic on the James Bay Road shall be mitigated thanks to a traffic management plan which will include the addition of signage indicating the site and requiring compliance with speed limits. In addition, for security reasons, prior to the start of work, an exclusion zone for traditional activities will also be established near the mine site, in collaboration with the RE2 trapline tallyman. Site infrastructure which poses risks (mine pit, fuel tanks, etc.) shall also be secured. An annual calendar of the main traditional activities shall be established with the representatives of the Cree community and time slots for production stoppages based on their participation in these activities shall be set.

Section 6.3.4 Indigenous People – Human Health Related to Changes to the Environment

CEAA-44 Justify whether or not it is necessary to assess the risk of contamination of locally produced foods and justify the exclusion of certain contaminants in the assessment, if applicable.

A-44 An assessment of toxicological risks to human health prepared by Sanexen Services Environnementaux Inc. (2018) is presented in Appendix CEAA-44.

CEAA-45 Describe and analyze the following elements:

1. the potential impacts on the quality of various sources of drinking water and water for recreational use for each stage of the project. It is advised to also consider the impacts on the physical parameters that can affect the treatment process of drinking water. If a change in water quality is expected, assess the impacts on the quality of water and human health.

A-45-1 The quality of the sources of drinking water will not be affected by the project activities. Regarding the quality of water for recreational use, no significant change is anticipated.

2. the impacts of noise on the health of Indigenous Peoples (hunting camps).

A-45-2 Cree camps are located 5.4 km to 11.4 km from the project site as the crow flies. From that distance, the noise impact of Galaxy Lithium operations would be virtually non-existent (i.e. the 45 dBA contour line is reached well before the Cree camps).

Section 6.3.4 Indigenous People – Natural and Cultural Heritage

CEAA-46 Assess the environmental impacts of the project on the natural and cultural heritage, constructions, locations or important things with respect to history, archaeology, paleontology and architecture for Indigenous Nations.

A-46 No construction or important things with respect to history, archaeology, paleontology and architecture was documented within the study area by users. Also, RE2 trapline users identified three key valued areas (Eastmain River, CE5 creek and the area formed of several lakes in the vicinity of Amiskw Matawaw Lake) given the abundance of resources which continue to provide for their needs, and their attachment to the location for generations (see Map 6-22 of the EIA). When conducting public consultations, Eastmain community Representatives wished to suggest a major part of the RE2 trapline be recognized by the Quebec government as a protected area according to the *Natural Heritage Conservation Act*. However, no project infrastructure is located within the boundaries of these areas. Therefore, no effect of the project is anticipated in that regard.

SECTION 6.6 OTHER IMPACTS TO CONSIDER

Section 6.6.3 Cumulative Impacts Assessment

CEAA-47 Complete the cumulative impacts analysis by integrating all the species at risk and of special concern present and potentially present in the study area and likely to be affected by the project.

A-47 A cumulative impacts analysis is presented in the EIA (Chapter 8). Valued components for the analysis came down to certain species of chiroptera which are present within the sector and are threatened by the white-nose syndrome (WNS). This threat means that chiroptera are weaker to the cumulative effects than any other faunal component within the study area (Section 8.4 of the EIA).

The assessment of the presense or potential presence of additional species at risk, likely to be affected by the project are presented in A-28, A-29, A-30. Effects of the project for each species at risk or of concern present or potentially present in the study area are described in A-40. These species were not selected as valued components for the assessment of cumulative effects due to the low potential of their presence and the low abundance of individuals within the area. For the two species whose presence was confirmed (rusty blackbird and common nighthawk), they were not selected for the assessment of the cumulative effects since the integrity of their populations is not threatened and that the main threats are absent or of minor importance within the area. As explained in Table 47-1, the project shall result in no significant cumulative effects on these species. The assessment of cumulative effects presented in EIA remains unchanged.

Table 47-1: Cumulative Effects on Species at Risk or of Concern Present or Potentially Present in the Study Area

Species	Potential Cumulative Effects
Short-eared owl	As explained in Table 40-1, it is unlikely that the short-eared owl will nest in this area in the short-term. The species was not documented during inventories conducted as part of the project. Also, known threats to the species are absent or of minor importance in the project area. The potential cumulative effects on this species are considered insignificant since it is very likely that the project will result in no additional effect on the species, adding to the regional threats already known.
Rusty blackbird	Despite the loss of habitat (CEAA-30) caused by the project, greatest threats to the rusty blackbird are absent from the study area. Even though additional loss of habitat could occur within breeding areas, main threats to the rusty blackbird are absent or of minor importance in the project area, for the most part. The potential cumulative effects on this species are considered insignificant since it is very likely that the project will result in no additional effect on the species, adding to the regional threats already known.
Common nighthawk	As mentioned in A-30, habitat likely suitable for nesting and presence of the species will be lost as a result of the project. However, the project may also contribute to the expansion of areas suitable to nesting. Main threats to the common nighthawk are absent or of minor importance in the project study area. The potential residual effects of the project on the species are considered insignificant. Their addition to other threats in the region is insignificant.

Table 47-1: Cumulative Effects on Species at Risk or of Concern Present or Potentially Present in the Study Area (cont.)

Species	Potential Cumulative Effects
Olive-sided flycatcher	As mentioned in A-30, habitat likely suitable for nesting and presence of this species will be lost as a result of the project. Known threats to the olive-sided flycatcher are absent or of minor importance in the project study area. Despite forest fires in the recent years which could be favorable to the species, it was not observed during inventories of 2012 and 2017. Potential residual effects of the project on the species are considered insignificant. Their addition to other threats in the region is insignificant.
Bank swallow	As mentioned in A-30 and A-40, no habitat likely suitable for nesting or the presence of the bank swallow is present within the project boundaries. The species was not detected during inventories conducted as part of the project. Historically, it is possible that the large reservoirs within the James Bay area destroyed nesting areas previously used, but overall, the main threats to the species are absent or of minor importance within the project study area. Therefore, the potential effects of the project on the species are considered insignificant. Their addition to other threats in the region is insignificant.
Little brown myotis	As mentioned in A-30, habitat likely to include daytime and/or maternity roost sites will be lost as a result of the project. The very small presence of bats of the genus Myotis within the site, highlighted by the inventory conducted in 2017 (see Section 6.3.6.2 of the EIA), demonstrates the poverty of habitats complying with the species' needs. Considering the very small presence of bats of the genus Myotis across the site, the poor quality of habitats available and the projected mitigation measures, the potential impacts of the project on the little brown myotis and the northern myotis populations are deemed insignificant.
Northern myotis	

CEAA-48 Indicate whether the Indigenous Nations were consulted during the final decision on valued components and the appropriate boundaries to use to assess the cumulative impacts. If applicable, explain how their comments were taken into account.

A-48 Cumulative effects were broadly addressed during consultations with RE2, VC33 and VC35 land users. Users described the effects they were experiencing or had experienced because of past projects. Chapter 8 of the EIA regarding the cumulative effects takes into account these elements.

Sections 8.4, 8.4.2.2, 8.5.3, 8.5.4.1, 8.6.2.4, of Chapter 8 were changed as to better represent comments submitted by the Cree people. These changes are underlined in the text below.

8.4 IDENTIFICATION OF VALUED COMPONENTS

As indicated in Schedule 2 of the *Canadian Environmental Assessment Act* (which refers to subparagraph 5(1) a) and subsection 5(3)), the valued components to be considered when assessing a project's cumulative effects could include:

- fish and fish habitat;
- migratory birds;
- species at risk;
- all other relevant components.

According to the MDDELCC guideline for the project, the valued components to consider when assessing cumulative effects should be associated with project issues, namely:

- use of the territory by the Cree population;
- the region's socioeconomic situation;
- the community's use of the sector for cultural purposes;
- recreational and tourism activities, particularly sport hunting and fishing;
- the plant and wildlife species at risk;
- the wildlife and its habitat;
- climate change.

Furthermore, and still as per the MDDELCC guideline, the impact of the workers' presence on wildlife must be taken into consideration, as must the repercussions this presence could have on future hunting and fishing by the Cree population. On another note, the traditional knowledge of the communities concerned must be included when assessing cumulative environmental effects.

As part of this specific project, two VCs were selected for an analysis of cumulative effects; the Chiroptera (bats, a species at risk) and traditional use of the territory by the Cree. It bears noting that fish and birds were not selected, due to few individuals and limited varieties having been identified during the field inventories. The moose inventory also attested to a similar trend. The effects of the project were thus assessed as minor and only slightly likely to influence the VCs on a larger scale. In addition, the interviews with socioeconomic stakeholders of the James Bay region indicated that there were no recreational and tourism activities practised by non-Indigenous people and no cultural activities near the site. It should be noted that RE2 trapline Cree users indicated that moose hunting and fishing activities were sometimes performed by non-Indigenous people on the Eastmain River and nearby the James Bay Road. There are, however, boat launches, the closest of which is 9 km from the mining site.

Even though the overall project impact on bats is judged to be minor, this species was nonetheless selected as a VC for the analysis of cumulative effects, chiefly for the reasons indicated hereafter. Firstly, the presence of bat species with a special status in the project zone was confirmed during the 2017 inventories, as was their low numbers. Secondly, the presence and rapid spread of the WNS in Québec, now heralded as the key factor behind the decline of bat populations in northeastern North America (section 8.5.5), has made bats more vulnerable to cumulative effects than any other wildlife species found in the area being studied. Comparatively, the common nighthawk, in spite of having a special status and its presence in the project zone having been confirmed, was not selected as a VC, given that its overall population is not threatened to the same extent as that of the bats. Furthermore, mitigation measures implemented during the project have allowed for curtailing the negative effects on this species.

The traditional use of the territory by the Cree was also selected as a VC for the analysis of cumulative effects, given that this use is linked to project issues, was identified as a concern during the public consultations, and will be somewhat significantly impacted by the project (impact of medium importance during the construction and operation phases). Also, other specific activities (past and future) have had, are having and will have an effect on this component. Comparatively, traffic, in spite of impacting the quality of life and having been noted as a concern during the public consultations, was not selected as a VC. In fact, the project will require that 25 additional trucks travel over the road network each day during the operation phase; according to the traffic statistics compiled by the SDBJ (section 8.5.3), this represents an increase of 16% in the number of vehicles travelling on these roads.

8.4.2.2 TRADITIONAL USE OF THE TERRITORY BY INDIGENOUS PEOPLES

The traditional use of the territory by the Eastmain Cree VC refers to the overall traditional practices, which mainly include the hunting, fishing and trapping activities of desired species, but also all other activities using the territory and its resources for ritual or social purposes.

Although use of the territory by the Cree has evolved over the years, this fundamental component of their culture is still as important as ever because of its heritage value. As a result, the link the Cree have with the recognized ancestral territory remains essential, above all, to the transmission of their culture to future generations. It is important to note the sturgeon spawning ground project located at the eastern corner of the road and the Eastmain River. The community fears that the project will have an impact on the future spawning ground and wishes to make sure there will be none. Given the distance of the projected spawning site from the project, no impact is anticipated.

From the 1980s onwards, the Cree witnessed important changes to the territory they occupied. These are linked to energy development, involving several diversions of watercourses and the establishment of Hydro-Québec dams, and to mining development. The year 1980 was therefore selected as past temporal scoping and the future scoping was set at 2028. It is very difficult to make projections beyond this scope based on the existing documentation (master plan, development strategies, etc.).

Moreover, the analysis of the cumulative effects on this VC covers the overall territory frequented by the Eastmain Cree. The considered territory extends over almost 240 km from Eastmain village. The width of the considered territory extends from 40 to 95 km (Map 8-2).

8.5.3 USE OF THE TERRITORY BY NON-INDIGENOUS PEOPLE

This theme covers sport fishing and hunting activities and the associated recreation infrastructure. These involve primarily use of the territory by non-Indigenous people.

Since 1980, development of the James Bay Road has resulted in increased recreational activities within the territory (tourism, sport fishing and hunting), especially since the opening of the James Bay Road to non-Indigenous people in 1986. However, these activities have remained concentrated primarily in the southern portion of James Bay and east of the Robert-Bourassa hydroelectric facilities. In 1991, a follow-up done to evaluate the impact of sport fishing and hunting on animal populations recorded nearly 11,000 vehicles at the entrance to the James Bay Road (Hydro-Québec Production, 2001). Traffic statistics compiled by the SDBJ showed 56,139 recorded trips on the James Bay Road in 2014 and 55,632 in 2017 (personal communication with the SDBJ, 2018).

Some activities, such as snaring of hares, trapping, and fishing of sturgeon and whitefish, are reserved exclusively for beneficiaries of the JBNQA throughout the territory. Hunters and fishers who are not JBNQA beneficiaries are subject to the laws and regulation in force in the territory and must hold a sport hunting or fishing licence from the Québec Government, applicable on all Category III land. Before April 1, 2018, and since 2002, different regulations applied to the hunting sectors of Weh-Sees Indohoun (WSI) and Eastmain, in which the project is located. To hunt and fish on Category I and II lands, authorization must have been issued by the Band Councils concerned.

In the past, recreational hunting and fishing activities in the project sector were practised mostly by Hydro-Québec workers involved in building the Eastmain-1-A and Sarcelle hydroelectric projects, and the Rupert River diversion. However, there are far fewer of these workers since construction work associated with the Eastmain-Sarcelle-Rupert complex finished, and the MFFP believes that the vast majority of these workers have left the territory. However, according to Cree users interviewed during consultation activities in 2018, non-Indigenous people hunt (moose) and fish on the territory. These activities are performed along the James Bay Road, notably at the intersection of the Eastmain River, and on certain lakes not far from the road.

According to the Québec Original website (Tourisme Québec), there are three outfitters within a 150-km radius of the project site, but it is possible that some small Cree outfitters were not recorded. Some families have opened outfitter's camps, or plan to do so to offer guided hiking, hunting and fishing trips (Goldcorp, Not dated). However, little information is available on this matter. During the 2017–2018 consultation conducted for this EIA, a very preliminary outfitting project was mentioned by users of trapline VC35. This trapline is located northeast of the project, on the north shore of the Eastmain River.

According to the EIA of the Whabouchi mining project (Nemaska Lithium, 2013), a series of land rights were issued to non-Indigenous people by MERN in the Whabouchi mining project. About 10 km north of the project site, there is a vacation lot lease. Including this lease, 16 vacation lot leases are located within the borders of the study area of the cumulative effects on use of the territory. (Map 8-2) Some 20 km northeast of the study area there is a vacation lot lease for rustic shelters. Including this lease, there are three vacation lot leases for rustic shelters in the study area.

8.5.4.1 WILDLIFE RESERVES, SANCTUARIES AND BIODIVERSITY RESERVES

No wildlife reserve is located within the study areas of cumulative effects.

On the other hand, biodiversity reserves are planned within the JBNQA territory. The primary objective of these planned reserves is to maintain biodiversity in the terrestrial environment. For each biodiversity reserve planned, a conservation plan is developed. Within biodiversity reserves, mining activities and forest management are prohibited. The end date of temporary protection varies from one reserve to the next, and ranges between 2018 and 2025.

The planned Paakumshumwaau-Maatuskaau biodiversity reserve follows a proposal by the Cree community of Wemindji who want to preserve the watersheds of the Vieux-Comptoir and Des Peupliers rivers, a territory that has traditionally been used by the Cree Nation for over 3,500 years (Gouvernement du Québec, 2010). Located roughly 32.5 km north of the Cree village of Eastmain, the planned reserve is located outside the study area of the cumulative effects of land use, but falls within that for bats. The temporary protection of the reserve is slated to end on June 11, 2020.

When conducting public consultations in the summer of 2018, Eastmain community Representatives wished to suggest a major part of the RE2 trapline be recognized by the Quebec government as a protected area according to the *Natural Heritage Conservation Act*.

8.6.2.4 CUMULATIVE EFFECTS

According to the impact assessment, the project would have a moderate residual effect on Cree land use. For Cree users, the loss of tranquility in the area surrounding the project could lead to avoidance of some popular areas or disruption of traditional activities. It should be noted that there will be a permanent worker camp at the mine site, which is on the RE2 trapline, and that it will house 150 employees during the operating period. The presence of these mainly non-Indigenous workers may cause Cree users to worry about contamination or disturbance of the natural environment and animal and fish populations. Mine activities may create the same kind of fears. These concerns could eventually lead to avoidance of certain areas near the mine or a decrease in harvesting of certain animal or fish species. It should be noted, however, that Galaxy will not allow mine workers to hunt or fish. During consultations with Cree land users, they raised concerns on the safety, both on the road (accidents, road degradation) and regarding break-ins at the camps because of the presence of workers.

Of the previous projects on the territory, those that most affected land use near the project site are the diversion of the Eastmain River and the creation of the Eastmain 1 reservoir and Eastmain-Sarcelle-Rupert complex. The COMEX report (2013) on the public consultations held following construction of the Eastmain-1-A and Sarcelle powerhouses and the Rupert diversion states that, without denying the project's significant impacts on the territory and its inhabitants, the proponent took the necessary measures to mitigate the residual effects to an acceptable level. It states that one of the most important issues for the Crees in all the James Bay development projects reviewed by COMEX is protection of the Cree traditional way of life as it evolves. In that light, it considers that the real challenge is to ensure the Crees can continue to practise their traditional activities and can adapt to the altered environments. The changes brought about by the new hydroelectric developments (Eastmain-1 and Eastmain-1-A/Sarcelle/Rupert) may lead to a decline in some species and an increase in others as nature seeks to return to equilibrium in the coming years. At the same time, the Cree population is growing (from 2,500 at the beginning of the 20th century to over 17,700 today[3]), and non-Indigenous people are showing an ever-increasing interest in hunting and fishing on the territory. "At this rate, the environment and natural resources may no longer be able to meet the population's needs as they did in the past. New solutions must be found to prevent overharvesting of wildlife" (COMEX, 2013).

Among the current or future projects that could affect land use by the Eastmain community are the Rose lithium-tantalum mining project by the Critical Elements Corporation. The anticipated effects of this project on land and resource use are quite similar to those of this project: disruption of hunting, trapping, gathering practices and firewood collection, and changes to access to the territory. Once the various mitigation measures were put in place (hunting and fishing ban), the residual effect on land and resource use was evaluated as low and non-significant.

The completion of the Rose lithium-tantalum project will change current land and resource use, particularly within the RE1 traplines, which are used by many members of the Eastmain community. Located 60 km northwest of the proposed Rose mine, the present project affects RE2 users, including those who had to adapt their use of the land to the Eastmain River diversion in 1980. This group expressed fears about the project's effect on sturgeon, which was greatly impacted by the diversion. Tallymen of traplines nearby (VC33 and VC35) also raised concerns that echoed those of RE1 and RE2 users, particularly with respect to the effects on hunting grounds (section 5.5.1). It should also be noted that one user (VC35) mentioned that, even though ressources available had greatly decreased since the advent of hydropower projects on the territory, he was still able to harvest traditional food (mainly fish, beaver, moose and goose), including along the Eastmain River. He also indicated that moose were starting to come back in the area following construction of the Eastmain-Rupert-Sarcelle Complex. These Eastmain users are therefore especially affected by changes on their traplines and fear that the areas available will be disrupted again. Although the territory is still vast and can support the displacement of harvesting activities (hunting, fishing, trapping), the Crees must invest time and resources to search for and adapt to new harvesting sites.

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3 Crees residing and not residing in Cree communities.

Users worry about the risk of contamination of resources and the water system as well as an increase in cancer rates due to contaminants in the food chain. They emphasize that contaminated animals move around the territory. They also worry about contamination of vegetation (medicinal plants, berries or plants consumed by the wildlife), especially by dust, and snow which percolates into the ground. This worry is even greater among Cree users located between the three mines (or projected mines). They also fear that additional projects will be implemented in the vicinity.

Some fear that the project will exacerbate the impacts of other sources. For example, many expressed concern that the project is detrimental to the regeneration of vegetation in the area, which is only beginning to recover after the 2013 forest fires, saying that beaver no longer tastes the same since the construction of James Bay Road because of the pollution, and are afraid that the situation will gradually worsen. Moreover, the trapline tallymen attributed deformities observed on moose to the use of certain herbicides within the right-of-way of existing power lines and worry that this type of product will continue to be used. Thus, power lines in development across the territory may increase the risk for certain land users and cause a loss of activity area. Some users feel that the power lines have an impact on the wildlife and vegetation due to radiation. They also avoid these areas in fear of electrical shock. Broadly speaking, users interviewed during consultations consider that the projected effects of the mine are minimized and that they will be felt more stongly in the future.

Deforestation related to construction of the mine and its infrastructure will result in the loss of more land for users, although as a result of legislation, it will be revegetated in the long run (about 30 years) and likely be usable again for hunting, gathering and trapping. However, some users interviewed wonder if the ressources may still be contaminated many years after the project.

With respect to natural disturbances, forest fires have caused, and are likely to cause, temporary disruptions to traditional Cree activities and even material losses for some members of the community.

Although individually, the project and each of the other projects on the territory may have overall low residual effects on the VC land use for traditional purposes by the Crees, they each result in changes to parts of the traplines (increased traffic, noise and light disturbances, changes in air and water quality, pressure on the resource, avoidance of the area and land loss) which, cumulatively, can disrupt Cree activities in the long run. However, although the projects mentioned will change the way these activities are practised on the territory, they will not prevent their continuation.

The cumulative effect on land use is limited to a small area. It will be especially felt by families who use the trapline where the project is located (RE2). The cumulative effect on this VC could increase with completion of the potential mining projects in the area, despite taking Cree users into consideration in the various compensation plans and mitigation measures planned. Noise, light, dust, increased traffic, loss of wildlife habitat and related traditional activities will affect a growing number of users for each new project on the territory, especially since the number of users is expected to continue growing.

Several major forest fires have occurred in the study area, particularly the fire of 2013, which affected a large part of Eastmain land. Temporary loss of land has an adverse effect on this VC.

With respect to the project in relation to other past sources of impact, particularly the major hydroelectric projects and forest fires, the cumulative effect on the Crees' current use of the land and resources is considered of low intensity, point-like in extent and long-term in duration; therefore, low. The cumulative effect of the project on Cree use of the land for traditional purposes is therefore non-significant.

CEAA-49 Complete table 7-13 to add the residual impacts subsequent to implementing the proposed mitigation measures. See Appendix 1 of the Guidelines for an example.

A-49 The methodology of the the impact assessment presented in Section 7.1.3 of the EIA indicates that:

> "Impact assessment consists in determining, during the various stages of the project, the significance of the anticipated impacts on the physical, biological and social environment. This assessment considers measures incorporated at project design, in addition to applicable mitigation and improvement measures, and focuses on impacts that persist following application of these measures, that is, residual impacts."

Table 7-13 presents a summary of residual effects. The table includes a description of potential impacts, mitigation measures and assessment of the impact. The title of the column should read “Residual Impact Assessment” and not “Impact Assessment”. We considered that it was not necessary to redo Table 7-13 by adding a “Residual Impact” column after the “Mitigation Measures” column since the residual impacts are the same as the potential impacts but with a reduced (i.e. mitigated) intensity, scope or duration, depending on the case.

Table 7-13, with the modified column title, is presented below.

Table 7-13: Assessment of Residual Impacts

Environmental Component	Project Phase	Potential Source(s) of Impact	Description of Impact	Mitigation Measures and/or Applicable Standards	Residual Impact Assessment			Significance of Residual Impact
					Intensity	Extent	Duration	
Physical environment								
Soil	Construction	• Site preparation and infrastructure construction • Hazardous and waste materials management	• Risk of soil erosion • Risks of soil contamination due to the potential leak of petroleum products or accidental spills of hydrocarbons or other products	SUR 01 to SUR 04, QUA 01 to QUA 04, QUA 08 to QUA 13, NOR 02 to NOR 04 and NOR 09	Low	Local	Short	Minor
	Operation	• Management of ore, overburden and waste rock • Hazardous and waste materials management	• Risks of soil contamination due to the potential leak of petroleum products or accidental spills of hydrocarbons or other products	SUR 01 and SUR 02, QUA 01 to QUA 05, QUA 10, QUA 12, NOR 02 to NOR 04, NOR 09 and NOR 10	Low	Local	Moderate	Minor
	Rehabilitation	• Dismantling of infrastructures • Hazardous and waste materials management	• Risk of soil erosion • Risks of soil contamination due to the potential leak of petroleum products or accidental spills of hydrocarbons or other products	SUR 02, QUA 01 to QUA 04, QUA 07, QUA 08, QUA 12, NOR 01 to NOR 04, and NOR 10	Low	Local	Short	Minor
Hydrogeology	Construction	• Site preparation and infrastructure construction. • Water management.	• Alteration of runoff flow patterns, surface and groundwater on the periphery of infrastructure	SUR 01, SUR 02, QUA 01 to QUA 04, QUA 10, and QUA 11	Low	Isolated	Short	Minor
	Operation	• Presence and operation of the pit. • Management of ore, unconsolidated deposits, and waste rock. • Other infrastructure in operation. • Water management.	• Water table drawdown due to pit dewatering • Alteration of runoff flow patterns, surface and groundwater on the periphery of infrastructure	QUA 06 and NOR 06	Moderate	Local	Long	Moderate
	Rehabilitation and post-rehabilitation	• Dismantling of infrastructures. • Pit rehabilitation. • Water management.	• Natural flooding of pit • Alteration of runoff flow patterns, surface and groundwater on the periphery of infrastructure	QUA 06	Moderate	Local	Long	Moderate
Hydrological regime	Construction	• Site preparation and infrastructure construction. • Water management.	• Localized change in the natural flow of surface waters • Possible increase in surface runoff due to a decreased infiltration caused by soil compaction	SUR 01, SUR 03, SUR 04, QUA 07, QUA 09, QUA 11, NOR 01, NOR 05, NOR 07, NOR 14, and NOR 15	Low	Isolated	Short	Minor
	Operation	• Presence and operation of the pit. • Other infrastructure in operation. • Management of ore, unconsolidated deposits, and waste rock. • Water management.	• Encroachment of drainage basins in the study area by project infrastructure decrease their surface area. • Changes in mean and low flows of watercourses in the study area due to pit dewatering. • Changes in the water levels of watercourses in the study area	SUR 01, QUA 05, UTT 03, NOR 01, NOR 05, NOR 07, NOR 08, NOR 14, and NOR 14	Moderate	Local	Long	Moderate
	Rehabilitation and post-rehabilitation	• Dismantling of infrastructures. • Pit rehabilitation. • Water management.	• Localized change in the natural flow of surface waters	SUR 03, QUA 07, QUA 09, QUA 11, and NOR 01	Moderate	Isolated	Long	Moderate

Table 7-13: Assessment of Residual Impacts (cont.)

Environmental Component	Project Phase	Potential Source(s) of Impact	Description of Impact	Mitigation Measures and/or Applicable Standards	Residual Impact Assessment			Significance of Residual Impact
					Intensity	Extent	Duration	
Water and sediments	Construction	• Site preparation and infrastructure construction. • Water management. • Hazardous and waste materials management. • Transportation and traffic.	• Risk of change in the quality of water and sediments related to the spreading of ice melters in the winter • Risks of contamination of water and sediments due to the potential leak of petroleum products or accidental spills of hydrocarbons or other products	QUA 01 to QUA 04, QUA 08 to QUA 13, NOR 02 to NOR 04, and NOR 07 to NOR 09	Low	Local	Short	Minor
	Operation	• Presence and operation of the pit. • Other infrastructure in operation. • Management of ore, unconsolidated deposits, and waste rock. • Water management. • Hazardous and waste materials management. • Transportation and traffic.	• Risk of contamination of water and sediments by metal leaching and by the ingress of contaminated water under the waste rock stockpile • Risks of contamination of water and sediments due to the potential leak of petroleum products or accidental spills of hydrocarbons or other products	QUA 01 to QUA 06, QUA 12, NOR 02 to NOR 04, NOR 06, and NOR 09	Low	Local	Moderate	Minor
	Rehabilitation	• Dismantling of infrastructures. • Pit rehabilitation. • Water management. • Hazardous and waste materials management. • Transportation and traffic.	• Risk of changes in the quality of water and sediments related to the spreading of ice melters in the winter • Risk of contamination of groundwater by metal leaching and by the ingress of contaminated water under the waste rock stockpile • Risks of groundwater contamination due to the potential leak of petroleum products or accidental spills of hydrocarbons or other products	QUA 01 to QUA 04, QUA 07, QUA 08, QUA 10 to QUA 12, SUR 03, NOR 01 to NOR 04, NOR 09, and NOR 10	Low	Local	Short	Minor
Atmosphere	Construction	• Site preparation and infrastructure construction. • Hazardous and waste materials management. • Transportation and traffic.	• Deterioration of the quality of the atmosphere by gaseous compounds and total particulate matter limited to the site and its immediate environment.	AIR 01 to AIR 05, and NOR 11	Low	Local	Short	Minor
	Operation	• Presence and operation of the pit. • Other infrastructure in operation. • Management of ore, unconsolidated deposits, and waste rock. • Hazardous and waste materials management. • Transportation and traffic.	• Increase in concentrations of particulate matter and metals in the air • Increase in greenhouse gas emissions	AIR 01 to AIR 05, and NOR 11	Low	Local	Moderate	Minor
	Rehabilitation	• Dismantling of infrastructures. • Pit rehabilitation. • Hazardous and waste materials management. • Transportation and traffic	• Deterioration of the quality of the atmosphere by gaseous compounds and total particulate matter limited to the site and its immediate environment.	AIR 01 and AIR 02, and NOR 11	Low	Local	Short	Minor
Artificial light at night	Construction	• Site preparation and infrastructure construction. • Transportation and traffic.	• Temporary emission of artificial light into the sky and work site limits, which is likely to disturb nocturnal landscapes and have an impact on the biological and social environments on the periphery.	LUM 01 to LUM 03	Low	Local	Short	Minor
	Operation	• Presence and operation of the pit. • Other infrastructure in operation. • Management of ore, unconsolidated deposits, and waste rock. • Transportation and traffic.	• Changes in light at night by adding artificial light could cause local changes in the brightness of the sky and generate light trespass	LUM 01 to LUM 03	Low	Local	Moderate	Minor
	Rehabilitation	• Dismantling of infrastructures. • Transportation and traffic.	• Temporary emission of artificial light into the sky and work site limits, which is likely to disturb nocturnal landscapes and have an impact on the biological and social environments on the periphery.	LUM 01 to LUM 03	Low	Local	Short	Minor

Table 7-13: Assessment of Residual Impacts (cont.)

Environmental Component	Project Phase	Potential Source(s) of Impact	Description of Impact	Mitigation Measures and/or Applicable Standards	Residual Impact Assessment			Significance of Residual Impact
					Intensity	Extent	Duration	
Physical environment (cont.)								
Ambient noise	Construction	• Site preparation and infrastructure construction. • Transportation and traffic.	• Increased ambient noise levels at the work site.	SON 01 and NOR 12	Low	Local	Short	Minor
	Operation	• Presence and operation of the pit. • Other infrastructure in operation. • Management of ore, overburden and waste rock. • Transportation and traffic.	• Increased ambient noise levels due to mining activities	SON 01 and NOR 12	Low	Local	Short	Minor
	Rehabilitation	• Dismantling of infrastructures. • Pit rehabilitation. • Transportation and traffic.	• Increased ambient noise levels	SON 01 and NOR 12	Low	Local	Short	Minor
Vibrations and overpressure	Construction	• Site preparation and infrastructure construction.	• Vibrations and overpressure generated during blasting when the construction quarry is in operation.	VIB 01 to VIB 04 and NOR 13	Low	Local	Short	Minor
	Operation	• Presence and operation of the pit	• Vibrations and overpressure generated during blasting when the pit is in operation.	VIB 01 to VIB 04 and NOR 13	Low	Local	Short	Minor
	Rehabilitation	• No impact.						
Biological environment								
Vegetation and wetlands	Construction and operation	• Site preparation and infrastructure construction. • Presence and operation of the pit. • Management of ore, overburden and waste rock. • Transportation and traffic. • Hazardous and waste materials management.	• Direct alteration and loss of natural environments (land and wetland environments) as a result of the work • Indirect impacts on plant communities preserved through development of the site and planned infrastructure.	VEG 01 to VEG 07, SUR 01 to SUR 04, QUA 01 to QUA 05, QUA 10 to QUA 12, NOR 02 to NOR 04, NOR 10 and NOR 15	Moderate	Local	Moderate	Moderate
	Rehabilitation	• Transportation and traffic. • Dismantling of infrastructures.	• Potential introduction of invasive alien plant species	VEG 02, VEG 03 and VEG 06, QUA 01 to QUA 04, QUA 10 to QUA 12 NOR 01, NOR 02 to NOR 04 and NOR 10	Overall positive impact			
Large fauna	Construction and operation	• Site preparation and infrastructure construction. • Presence and operation of the pit. • Other infrastructure in operation. • Management of ore, overburden and waste rock. • Transportation and traffic. • Hazardous and waste materials management. • Economic development and presence of workers.	• Incidental mortality of large fauna individuals that may occasionally occur due to collisions with vehicles during preparation, construction and operation work • Alteration of the natural behaviour of large fauna and its movements	SUR 01 to SUR 04, FAU 03, FAU 05, SON 01, CIR 01 to CIR 03 and LUM 01 to LUM 03	Low	Local	Moderate	Minor
	Rehabilitation	• Dismantling of infrastructures. • Transportation and traffic. • Economic development and presence of workers.	• Alteration of the natural behaviour of large fauna and its movements	FAU 03 and FAU 05, SON 01, CIR 01 to CIR 03 and LUM 01 to LUM 03	Low	Local	Short	Minor

Table 7-13: Assessment of Residual Impacts (cont.)

Environmental Component	Project Phase	Potential Source(s) of Impact	Description of Impact	Mitigation Measures and/or Applicable Standards	Residual Impact Assessment			Significance of Residual Impact
					Intensity	Extent	Duration	
Biological environment (cont.)								
Small fauna and herpetofauna	Construction and operation	• Site preparation and infrastructure construction. • Presence and operation of the pit. • Other infrastructure in operation. • Management of ore, overburden and waste rock. • Water management. • Transportation and traffic. • Hazardous and waste materials management.	• Loss of approximately 397 ha of land and wetland habitat specific to small fauna and herpetofauna • Mortality of small fauna and herpetofauna individuals and small mammal species • Risks of natural environment contamination, mainly because of the potential leak of petroleum products or accidental spills from equipment • Disturbance of small fauna and herpetofauna individuals, mainly due to noise, night-time lighting, dust, vibrations and human presence • Risks of collision related to site traffic	SUR 01 to SUR 04, QUA 01 to QUA 05, QUA 07 to QUA 13, AIR 01, AIR 02, LUM 01 to LUM 03, SON 01, VEG 01, VEG 02, FAU 02 and FAU 05, NOR 02 to NOR 05, NOR 08, NOR 09 and NOR 14	Low	Local	Moderate	Minor
	Rehabilitation	• Dismantling of infrastructures. • Water management. • Hazardous and waste materials management. • Transportation and traffic.	• Disturbance of small fauna and herpetofauna individuals, mainly due to noise, night-time lighting, dust, vibrations and human presence • Risks of collision related to site traffic	SUR 02, SUR 03, QUA 01 to QUA 04, QUA 07 to QUA 13, AIR 01, AIR 02, LUM 01 to LUM 03, SON 01, VEG 02, FAU 01 and FAU 05, NOR 01 to NOR 05, NOR 08, NOR 09 and NOR 14	Low	Local	Short	Minor
Ichthyofauna	Construction	• Site preparation and infrastructure construction. • Water management. • Hazardous and waste materials management. • Transportation and traffic.	• Risk of changes to the natural flow of water that may alter fish habitat to a certain degree • Risk of accidental spills of petroleum hydrocarbons associated with machinery use	SUR 01, SUR 03, SUR 04, QUA 01 to QUA 04, QUA 07 to QUA 13, NOR 02 to NOR 05, NOR 09 and NOR 13 to NOR 16	Low	Isolated	Short	Minor
	Operation	• Presence and operation of the pit. • Water management. • Hazardous and waste materials management.	• Loss of fish habitat • Risk of accidental spills of petroleum hydrocarbons associated with machinery use	SUR 01, SUR 03, SUR 04, QUA 01 to QUA 04, QUA 06 to QUA 13, NOR 02 to NOR 09 and NOR 13 to NOR 16	Low	Local	Moderate	Minor
	Rehabilitation and post-rehabilitation	• Dismantling of infrastructures. • Water management. • Transportation and traffic.	• Limited change to the natural flow of surface waters and increase in suspended solids in water • Risk of accidental spills of petroleum hydrocarbons associated with machinery use	SUR 02 to SUR 04, QUA 01 to QUA 04, QUA 07 to QUA 13 and NOR 01 to NOR 09	Low	Isolated	Long	Minor
Avifauna	Construction and operation	• Site preparation and infrastructure construction. • Presence and operation of the pit. • Other infrastructure in operation. • Management of ore, overburden and waste rock. • Water management. • Transportation and traffic.	• Loss of approximately 397 ha of land and wetland habitat specific to avifauna • Risk of incidental bird mortality due to incidental take • Risks of collision related to site traffic • Mortality of avifauna individuals • Alteration of the natural behaviour of birds and their movements • Disturbance of avifauna individuals, mainly due to noise, night-time lighting, dust, vibrations and human presence • Risks of natural environment contamination, mainly because of the potential leak of petroleum products or accidental spills from equipment	SUR 01 to SUR 04, FAU 02, SON 01, LUM 01 to LUM 03, QUA 05, QUA 09, QUA 08, NOR 07 to NOR 09, NOR 13, NOR 14 and VEG 01	Low	Local	Moderate	Minor
	Rehabilitation	• Dismantling of infrastructures. • Transportation and traffic.	• Alteration of the natural behaviour of birds and their movements	SUR 01, SUR 02, SUR 03, NOR 01, FAU 02, SON 01, LUM 01 to LUM 03, QUA 07, QUA 08, NOR 14 and VEG 01	Low	Local	Short	Minor

Table 7-13: Assessment of Residual Impacts (cont.)

Environmental Component	Project Phase	Potential Source(s) of Impact	Description of Impact	Mitigation Measures and/or Applicable Standards	Residual Impact Assessment			Significance of Residual Impact
					Intensity	Extent	Duration	
Biological environment (cont.)								
Bats	Construction and operation	• Site preparation and infrastructure construction. • Presence and operation of the pit. • Management of ore, overburden and waste rock. • Other infrastructure in operation. • Transportation and traffic.	• Direct and indirect habitat loss • Potential mortality of tree bat species if present during deforestation activities • Disturbance of wetlands (peatlands) potentially resulting in greater movements to alternative feeding sites • Changes to the habitat structure potentially changing bats' use of the area • Disturbance of local bat populations, mainly due to noise, night-time lighting, dust, vibrations and human presence. • Risks of natural environment contamination, mainly because of the potential leak of petroleum products or accidental spills from equipment	SUR 01, SUR 02, AIR 02, SON 01, VEG 02, FAU 02 and FAU 04, NOR 07 to NOR 09 and NOR 13	Low	Local	Moderate	Minor
	Rehabilitation	• Dismantling of infrastructures. • Transportation and traffic.	• Disturbance of local bat populations, mainly due to noise, night-time lighting, dust, vibrations and human presence. • Risk of bat mortality that may occur during the dismantling of buildings, wells or exploration drifts used as roosts by bats (day and/or maternity and/or winter roost).	SUR 02, AIR 02, SON 01, VEG 02 and FAU 04	Low	Local	Short	Minor
Social environment								
Current use of land and resources for traditional purposes	Construction	• Site preparation and infrastructure construction. • Transportation and traffic. • Economic development and presence of workers.	• Temporary disruption of the traditional activities of Cree users on territory in the study area • Loss of use of portions of the territory where mining infrastructure will be located for the practice of certain traditional activities (e.g., berry picking and beaver trapping)	UTT01 to UTT03, CIR01, CIR02 and CIR04, AIR 01 to AIR 05, SON 01, LUM 01 to LUM 03 and VIB 01 to VIB 04	Moderate	Local	Short	Moderate
	Operation	• Presence and operation of the pit. • Other infrastructure in operation. • Management of ore, overburden and waste rock. • Water management. • Transportation and traffic. • Economic development and presence of workers.	• Disruption of the traditional activities of Cree users on territory in the study area • Loss of use of portions of the territory where mining infrastructure will be located for the practice of certain traditional activities (e.g., berry picking and beaver trapping)	UTT01 to UTT04, CIR01, CIR02 and CIR04, AIR 01 to AIR 05, SON 01, LUM 01 to LUM 03 and VIB 01 to VIB 04	Moderate	Local	Moderate	Moderate
	Rehabilitation	• Dismantling of infrastructures. • Water management. • Transportation and traffic. • Economic development and presence of workers.	• Disruption of the traditional activities of Cree users on territory in the study area	UTT01 to UTT04, CIR01, CIR02 and CIR04, AIR 01 to AIR 05, SON 01, LUM 01 to LUM 03 and VIB 01 to VIB 04	Low	Local	Short	Minor

Table 7-13: Assessment of Residual Impacts (cont.)

Environmental Component	Project Phase		Potential Source(s) of Impact	Description of Impact	Mitigation Measures and/or Applicable Standards	Residual Impact Assessment			Significance of Residual Impact
						Intensity	Extent	Duration	
		Social environment (cont.)							
Infrastructure	Construction	•	• Transportation and traffic. • Economic development and presence of workers.	• Increased traffic on James Bay Road	CIR 01 to CIR 04, VIB 01 and NOR 13	Low	Regional	Short	Minor
	Operation	•	• Transportation and traffic. • Economic development and presence of workers.	• Increased traffic on James Bay Road	AIR 03, VIB 01 to VIB 04, CIR 01 to CIR 04 and NOR 13	Low	Regional	Short	Minor
	Rehabilitation	•	• Transportation and traffic. • Economic development and presence of workers.	• Increased traffic on James Bay Road	CIR 01 to CIR 04	Low	Regional	Short	Minor
Perception of physical environment	Construction	•	• Site preparation and infrastructure construction. • Water management. • Transportation and traffic.	• Risk of disturbances related to changes in air quality, artificial light at night and noise, and groundwater and surface water quality that may affect Cree users of the territory who practise activities in the mine sector or workers at the km 381 truck stop and its patrons.	PER 01, UTT 02, CIR 04, VIE 01, AIR 01 to AIR 05, SON 01, QUA 01 to QUA 05, QUA 07 to QUA 13, LUM 01 to LUM 03, VIB 01, NOR 2 to NOR 5, NOR 9, NOR 11, NOR 13 and NOR 14	Low	Isolated	Short	Minor
	Operation	•	• Presence and operation of the pit. • Other infrastructure in operation. • Management of ore, overburden and waste rock. • Water management. • Transportation and traffic.	• Risk of disturbances related to changes in air quality, artificial light at night and noise, and groundwater and surface water quality that may affect Cree users of the territory who practise activities in the mine sector or workers at the km 381 truck stop and its patrons.	PER 01, UTT 02, CIR 04 and VIE 01, AIR 01 to AIR 05, SON 01, QUA 01 to QUA 05, QUA 07 to QUA 13, LUM 01 to LUM 03, VIB 01 to VIB 04, NOR 2 to NOR 9 and NOR 11 to NOR 14	Moderate	Isolated	Short	Minor
	Rehabilitation	•	• Dismantling of infrastructures. • Water management. • Transportation and traffic. • Economic development and presence of workers.	• Risk of disturbances related to changes in air quality, artificial light at night and noise, and groundwater and surface water quality that may affect Cree users of the territory who practise activities in the mine sector or workers at the km 381 truck stop and its patrons.	PER 01, UTT 02, CIR 04, VIE 01, AIR 01 to AIR 03, SON 01, QUA 01 to QUA 05, QUA 07 to QUA 13, LUM 01 to LUM 03, NOR 1 to NOR 9, NOR 11, NOR 12 and NOR 14	Low	Isolated	Short	Minor
Quality of life	Construction	•	• Site preparation and infrastructure construction. • Transportation and traffic. • Economic development and presence of workers.	• Feeling of loss and damage to the Cree cultural identity • Decreased sense of safety among James Bay Road users • Cree workers' difficulty integrating into the working environment	UTT 01, CIR 01 and VIE 01 to VIE 06	Low	Regional	Short	Minor
	Operation	•	• Presence and operation of the pit. • Other infrastructure in operation. • Management of ore, overburden and waste rock. • Transportation and traffic. • Economic development and presence of workers.	• Feeling of loss and damage to the Cree cultural identity • Decreased sense of safety among James Bay Road users • Cree workers' difficulty integrating into the working environment	UTT 01, CIR 01, VIE 01 to VIE 06, ELR 07 and ELR 08	Moderate	Regional	Moderate	Moderate
	Rehabilitation	•	• Dismantling of infrastructures. • Pit rehabilitation. • Transportation and traffic. • Economic development and presence of workers.	• Feeling of loss and damage to the Cree cultural identity • Decreased sense of safety among James Bay Road users • Cree workers' difficulty integrating into the working environment	UTT 01, CIR 01 and VIE 01 to VIE 06	Low	Regional	Short	Minor

Table 7-13: Assessment of Residual Impacts (cont.)

Environmental Component	Project Phase	Potential Source(s) of Impact	Description of Impact	Mitigation Measures and/or Applicable Standards	Residual Impact Assessment			Significance of Residual Impact
					Intensity	Extent	Duration	
Social environment (cont.)								
Local and regional economy	Construction	• Economic development and presence of workers.	• Increased local demand for goods and services • Hiring of local workforce • Development and enhancement of local and regional expertise	ERL01 to ERL06	Positive impact			
	Operation	• Economic development and presence of workers.	• Local demand for goods and services • Hiring of local workforce • Development and enhancement of local and regional expertise	ERL01 to ERL08	Positive impact			
	Rehabilitation	• Economic development and presence of workers	• Local demand for goods and services and for workforce • Hiring of local workforce	ERL01 and ELR03 to ERL06	Positive impact			
Heritage and archaeology	Construction	• Site preparation and infrastructure construction.	• Fortuitous discovery of remains of archaeological or historical interest	ARC01 and NOR17 to NOR19	Low	Isolated	Long	Minor
	Operation	• Presence and operation of the pit. • Management of ore, overburden and waste rock.	• Fortuitous discovery of remains of archaeological or historical interest	ARC01 and NOR17 to NOR19	Low	Isolated	Long	Minor
	Rehabilitation	• No anticipated impact.						
Landscape	Construction	• Site preparation and infrastructure construction. • Transportation and traffic.	• Transformation of the character of the landscape and change to observers' visual field	SUR 01 to SUR 04, AIR 01, AIR 03 and AIR 05	Low	Local	Short	Minor
	Operation	• Presence and operation of the pit. • Management of ore, overburden and waste rock. • Other infrastructure in operation. • Transportation and traffic.	• Transformation of the character of the landscape and change to observers' visual field	SUR 01 to SUR 04, AIR 01, AIR 03 and AIR 05	Moderate	Local	Long	Moderate
	Rehabilitation	• Dismantling of infrastructures. • Pit rehabilitation. • Transportation and traffic.	• Potential impacts on landscape and visual field	SUR 02, AIR 01, AIR 03 and PAY 01	Low	Local	Short	Minor

2 ADDITIONAL RECOMMENDATIONS

The following elements are not required to allow the Agency to begin analyzing the EIA. However, it is information that will be required upon a first additional information request at the EIA technical review stage.

However, some answers are provided in the following sections.

PART 1 – KEY CONSIDERATIONS

SECTION 3.2.3 SPATIAL AND TEMPORAL BOUNDARIES

Section 4.4 Presentation and Organization of Environmental Impact Assessment

CEAA-50 **When possible, include the layering of the project's key components on the maps.**

A-50 Modified maps will be presented as part of the request for additional information of the EIA technical review stage.

CEAA-51 **Indicate the location of the following components on map 4-1:**

- **LETI;**
- **concrete batch plant;**
- **warehousing area for dangerous materials and waste;**
- **infrastructure related to manufacturing and storing explosives (emulsion storage, detonator storage, garage, etc.);**
- **power line within the boundaries of the project area;**
- **fibre-optic line within the boundaries of the project area.**

A-51 Map 4-1 shall be modified as part of the request for additional information of the EIA technical review stage.

PART 2 – CONTENT OF ENVIRONMENTAL IMPACT STATEMENT

SECTION 1.4 REGULATORY FRAMEWORK AND THE ROLE OF GOVERNMENT

CEAA-52 **The Fisheries Act**

The regulatory framework presented does not include any mention of the Fisheries Act, aside from applying the MDMER. However, subsection 35(1) stipulates that "No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery." The proposed project will likely cause impacts on fish and their habitat, particularly on the decrease or increase in surface or groundwater watershed into watercourses near the project. An authorization issued by the DFO under subparagraph 35(2)(b) of the Fisheries Act may therefore be required for this project if it is determined that the expected impacts will translate into serious harm within the meaning of the Fisheries Act. This authorization must be identified in Sections 2.4.2.2 and 2.4.3.2 of the EIS.

A-52 Yes, these elements will be added if it turns out that this authorization is required.

CEAA-53 The Explosives Act

The EIS indicates that there will be a storage of emulsion and ammonium nitrate for blasting needs and therefore emulsion in bulk will be pumped on site. The emulsion pumping from the fuelling tanker to the silo and from the silo to the mobile manufacturing facility constitutes explosive manufacturing activities according to the Explosives Act, as is the case for the production of the ammonium nitrate and diesel oil mixture. A garage with a cleaning room may also be required on site to maintain the mobile facilities. Since the explosive supplier will need a manufacturing licence pursuant to subsection 7(1) of the Explosives Act, this authorization must be identified in Section 2.4.3.2 of the EIS.

A-53 Yes, this authorization will be added.

CEAA–54 The Navigation Protection Act

Transport Canada is still not able to decide whether the project will require an order under the Navigation Protection Act, but if authorization is necessary, it must be identified in Sections 2.4.2.2 and 2.4.3.2 of the EIS.

A-54 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

SECTION 2.2 ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

CEAA-55 Waste rock dumps, tailings and overburden

Justify the choice of locations for the discharge of waste rock and tailings while considering the potential impact of each option on the quality of groundwater and surface water including the acid drainage and metal leaching challenges. The analysis of the variations must also include an analysis of the characteristics of leaching during waste rock and tailings management in a co-disposal versus separate disposal.

A-55 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

CEAA-56 Energy sources options

Complete the assessment of energy sources options, particularly including the option of powering the mobile generators with solar panels.

A-56 Minutes of meeting prepared by Tugliq Energy Co. are presented in Appendix CEAA-56.

CEAA-57 Provide the preliminary study conducted by the specialized firm Tugliq.

A-57 Tugliq conducted a premilinary study of the various energy sources to power the project. A letter by Tugliq is presented in Appendix CEAA-56.

SECTION 3.1 PROJECT COMPONENTS

CEAA-58 **Present more detailed and complete information about the sealing measures of the bottom of dumps and contact water drains.**

A-58 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

CEAA-59 **Specify the mechanical works referred to in Section 4.4.2 of the EIS and indicate where it is planned to be done.**

A-59 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

SECTION 3.3 PROJECT ACTIVITIES

Water and Wastewater Management Facility and Septic Tanks

CEAA-60 **Provide a description of the location of the peripheral ditches and the location of watersheds on map 3-1.**

A-60 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

CEAA-61 **Describe the physical layout of the effluents on watercourses CE2 and CE3 (type of structure and dimensions, work method for construction, temporary works, work period and duration, etc.).**

A-61 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

CEAA-62 **Create a detailed map on an appropriate scale of the water flow on the site and for every phase of the project. All relevant structures must be identified in it, including the various sedimentary or retention basins, dumps and sampling stations for water quality monitoring. Ensure that the map reflects the water flow returning to the same infrastructure it came from.**

A-62 For the construction phase, refer to answers A-9 to A-11. For the operation phase, all available information is presented in the EIA.

CEAA-63 **Describe the mine water flow north of the waste rock dump and the main sedimentation basin.**

A-63 For the construction phase, refer to answers A-9 to A-11. For the operation phase, all available information is presented in the EIA.

CEAA-64 **Provide more information on the drainage trenches indicated in Section 4.8.2 of the EIS, particularly their role and their locations.**

A-64 For the construction phase, refer to answers A-9 to A-11. For the operation phase, all available information is presented in the EIA.

Linear Infrastructure and Types of Structure Used for Stream Crossings

CEAA-65 **Describe the bridge planned to get across the CE3 watercourse (dimensions, scope, design, work methods, temporary works, work period and duration, etc.).**

A-65 The bridge planned to get across the CE3 creek is a bridge with river bank footings. No piles will be in the water.

Construction or reflection of existing roads and access roads

CEAA-66 **Indicate which entity will be responsible for planning and implementing improvements to the James Bay Road like adding turn lanes and clarifying the role of the proponent (Galaxy Lithium) for this work.**

A-66 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

SECTION 5 CONSULTATION WITH INDIGENOUS NATIONS AND CONCERNS RAISED

CEAA-67 **Cree Nation of Eastmain**

- **Re-contact the tallyman of lot RE1 to confirm whether his interest in being consulted is still the same as it was in 2011–2012;**
- **Consult the tallyman of lot RE3. It is located within the study area, and on the same watershed of the projected mine.**

A-67 The tallyman of the RE1 trapline was consulted in 2012 since his territory was part of the 2012 study area. However, boundaries of the study area have changed since 2012 and his territory is now outside the study area. Although we have not re-contacted the tallyman, he participated to the meetings organized by Galaxy since 2012.

The tallyman of the RE3 trapline was not consulted since his territory is located outside the study area, more than 10 km from the project.

Here is additional information regarding the tallymen consulted. The tallymen of VC33 and VC35 were consulted even though their territories are located outside the study area. Historically, the tallyman of VC33 is related to the tallyman of RE2. This means VC33 land users perform traditional activities on RE2 as well. The tallyman of VC35 is affected by the Eleonore mine and is concerned by the Galaxy project.

CEAA-68 **Describe how the various mitigation measures proposed by the Nations were treated by the proponent and why they were not chosen, if applicable.**

A-68 Mitigation measures proposed by the Nations, and how they were treated by the proponent, are presented in Table 68-1.

Table 68-1: Mitigation Measures Proposed by the First Nations

Theme	Mitigation Measure or Suggestion Made by Stakeholders	Considered (C), Considered in Part (CP), Not Considered (NC), Not Answered (NA)
Impacts on the environment	The Eastmain Cree First Nation Council should list impacts of commissioned lithium mines to assess the scope of impacts for such operations.	NA: Measure intended for the First Nations Council.
	Measures are necessary for dust control.	C: Implement the following mitigation measures (Table 7-5 of the EIA): • AIR 01: Regularly water roads, work areas, and stockpiles by moistening them to prevent resuspension and dust emission. • AIR 02: Avoid unnecessary engine idling to reduce noise and disturbances from exhaust gas, smoke, dust, or any other contaminants likely to come from the machinery. • AIR 03: Limit the vehicle speed on the various sites as well as for mine operations. • AIR 05: Optimize stripping according to the real needs of the operation so as not to overexpose unused stripped surfaces in relation to wind erosion and/or to restrict, as needed, access to these surfaces if they are not used during long periods of time.
	If the project is approved, environmental tests must be conducted every week or every month to monitor water quality and the presence of contaminants in the environment.	C: Through the implementation of an environmental monitoring program during the construction phase (Section 10.3 of the EIA), of environmental monitorings during operations (Section 10.4 of the EIA) and of post-rehabilitation monitorings (Section 10.5 of the EIA), as well as the PER 01 measure. Make sure surpervision and environment quality monitoring reports are available
Give hiring priority to Cree workers in Eastmain	• The Eastmain Cree community wants to have the priority for all types of jobs required throughout project (accommodation, construction, transportation, aviation, services, etc.). • Jobs must be available for Indigenous people. Qualifications for the jobs must be posted ahead of time as to plan training of members of the community, including the youth. • Galaxy should provide jobs to local contractors.	C: Implement the following mitigation measures (Table 7-5 of the EIA): • ELR 01: Establish a regional purchasing policy that would prioritize local and regional companies in the competitive bidding process where the skill and price are competitive. • ELR 03: Prioritize hiring local workers. • ELR 04: Develop a memorandum of understanding and partnership agreement for Indigenous participation in the project. • ELR 06: Establish a communication plan to announce to local stakeholders the positions to be filled at the mine. Galaxy also commits to organizing training programs in partnership with the HRDC so that Cree workers can have access to jobs at the mine.
Professional ethics and standards endorsed by Galaxy which could be a barrier for Indigenous workers	• Galaxy must develop a training workshop or program to prepare future Indigenous workers so they comply with professional ethics and standards implemented by the mining company. • A Cree Representative must be identified for liaison between the Cree workers/community and the mining company in case of dispute. The liaison officer or mediator shall mitigate problems.	C: Implement the following mitigation measures (Table 7-5 of the EIA): • ELR 04: Develop a memorandum of understanding and partnership agreement for Indigenous participation in the project (agreement on impacts and benefits). • ELR 05: Implement mechanisms to integrate workers, particularly for members of Indigenous communities (information sessions, human resources representatives, employee assistance program, etc.). • VIE 01: Establish an ongoing dialogue with the public through an internal community relations group and communication program. • VIE 02: Establish and implement a code of ethics for workers.
Training	• Galaxy should work together with the Cree school board and the HRDC to develop training programs. • These training programs should be provided to the community to ensure success of students. • Galaxy shall start training of community members without delay and maintain the training programs established with a long-term perspective. • It would be interesting to conduct a survey of the youth to assess their interest in regard to the mining industry and training programs they would be interested to. • Training opportunities shall be properly advertised within the community.	C: Galaxy works with the Cree school board and the HRDC for the training and professional development of the Eastmain population. Galaxy will encourage training institutions to provide training within the community. Training programs within the community will commence following the issue of provincial and federal environmental authorizations.
Work and culture	Establish cultural diversity workshops and set up a code of ethics to respect.	C: Galaxy has policies on employment equity and sexual harassment on the workplace, which commits the company in regard to gender equity, sexual orientation, family status, domestic responsibilities, race, impairment, political or religious beliefs, and age. This commitment shall translate into the integration of intercultural events in the company's disciplinary process, the preparation of an intercultural training component within the orientation program and the hiring of a Cree liaison officer. Implement the following mitigation measures (Table 7-5 of EIA): • VIE 02: Establish and implement a code of ethics for workers. • ELR 05: Implement mechanisms to integrate workers, particularly for members of Indigenous communities (information sessions, human resources representatives, employee assistance program, etc.). • UTT 01: Ensure workers are aware of traditional practices of Indigenous communities and activities of Indigenous users of the territory.

Table 68-1: Mitigation Measures Proposed by the First Nations (Cont'd)

Theme	Mitigation Measure or Suggestion Made by Stakeholders	Considered (C), Considered in Part (CP), Not Considered (NC), Not Answered (NA)
Labour dispute	• Appoint a representative to mediate between the community and the mine. • Construction of a *sabtuan* (large gathering tent) at the workers camp could be a great initiative. • A cultural village should be developed at the workers camp.	C: Implement the following mitigation measures (Table 7-5 of the EIA): • ELR 05: Implement mechanisms to integrate workers, particularly for members of Indigenous communities (information sessions, human resources representatives, employee assistance program, etc.). • UTT 01: Ensure workers are aware of traditional practices of Indigenous communities and activities of Indigenous users of the territory. • VIE 01: Establish an ongoing dialogue with the public through an internal community relations group and communication program.
Sexual harassment	• Galaxy shall organize a workshop on sexual harassment intended for Indigenous and non-Indigenous people. • A grievance procedure shall be implemented to ensure support to victims of sexual harassment. After a while, a liaison officer or mediator shall contact the victims for follow-up. The agent shall be a woman to facilitate thrust.	C: Implement the following mitigation measures (Table 7-5 of the EIA): • ELR 05: Implement mechanisms to integrate workers, particularly for members of Indigenous communities (information sessions, human resources representatives, employee assistance program, etc.). • UTT 01: Ensure workers are aware of traditional practices of Indigenous communities and activities of Indigenous users of the territory. • VIE 01: Establish an ongoing dialogue with the public through an internal community relations group and communication program.
Enhancement of mining knowledge	• Galaxy could invite a chemical engineer, or someone well acquainted with operations of a lithium mine, to the community to talk about mining operations and answer questions. • A course on mining operations is also requested as to understand each stage of the procedure and to be able to identify impacts.	C: Introductory course on mining operations and lithium was provided to the Eastmain community on July 11, 12 and 13, 2018. Other information sessions on the project development are planned.
Business/partnership (partnership with the Eastmain community for the mine development)	• A mutual relationship or partnership shall be established between Galaxy, the Eastmain First Nation Council and the WEDC.	C: Galaxy wants to establish a partnership link with the community and is working to that end. The following mitigation measure is presented in Table 7-5 of the EIA: • ELR 04: Develop a memorandum of understanding and partnership agreement for Indigenous participation in the project.
Fair trade contributing to the enrichment of the community while complying with its values	• Establish a fair trade with a business model which will contribute to the enrichment of the community while complying with its culture and values.	CP: This element will be developed after permitting. The following mitigation measures are still provided in Table 7-5 of the EIA: • ELR 01: Establish a regional purchasing policy that would prioritize local and regional companies in the competitive bidding process where the skill and price are competitive. • ELR 07: Regularly update forecasts regarding the duration of operations and announce in advance the closure of the mine.
Boom and bust phenomenon and its impacts	• Diversify economic activities and services to face the boom and bust phenomenon resulting from the mining project.	C: Galaxy is working with the community so it benefits from positive economic and social impacts. The project development will be in accordance with reality of the mining industry, i.e. the development is designed with the mine life cycle in mind. Preparation for mine closure will be done throughout the development. The following measures will also be implemented (Table 7-5 of the EIA): • ELR 01: Establish a regional purchasing policy that would prioritize local and regional companies in the competitive bidding process where the skill and price are competitive. • ELR 02: Offer training programs to fill mine positions. • ELR 03: Prioritize hiring local workers. • ELR 06: Establish a communication plan to announce to local stakeholders the positions to be filled at the mine. • ELR 07: Regularly update forecasts regarding the duration of operations and announce in advance the closure of the mine. • ELR 08: Develop an Employee Assistance Program to provide closure transition support (e.g. reclassification assistance committee for workers).
Workers' traditional activities	• Galaxy should grant leave to Cree workers in spring for goose hunting and in fall for moose hunting.	C: Implement the following mitigation measure (Table 7-5 of the EIA): • VIE 05: Establish with the representatives of the Cree community an annual calendar of the main traditional activities and set time slots for production stoppages based on their participation in these activities.
Use of territory by non-Indigenous people	• Galaxy should consider setting up a special hunting and fishing zone, such as the Weh Sees Indohoun special zone established for Hydro-Québec projects. • Galaxy should set up a security patrol to prevent non-Indigenous workers from hunting or fishing, or stealing equipment, on the Eastmain territory.	C: Implement the following mitigation measure (Table 7-5 of the EIA): • UTT 04: Prohibit hunting and recreational fishing for workers at the mine site.
Traffic, transportation and roads	• Use electric cars to reduce pollution from mine operations	C: Information is presented in Section 3.5 of the EIA: For hauling and road transport vehicles as well as heavy equipment (excavators, power shovels, etc.), the international supply of electrical engines was assessed as to reduce GHG emissions. Finds out models required for the project are not available in Canada at the present time. The mobile fleet, including pick-up trucks, will be diesel-powered and a few pieces of equipment will use electric engines (on a trial basis) if they become readily available in Canada before construction works of the project start.

Table 68-1: Mitigation Measures Proposed by the First Nations (Cont'd)

Theme	Mitigation Measure or Suggestion Made by Stakeholders	Considered (C), Considered in Part (CP), Not Considered (NC), Not Answered (NA)
Impact of increased traffic on the James Bay Road on driving conditions	• Local radio advertisement for traffic of heavy equipment or large trucks.	C: Implement the following mitigation measure (Table 7-5 of the EIA): • CIR 01: Establish a traffic management plan, including the addition of signage.
Investment in maintenance of James Bay Road	• Plan road pavement resurfacing once mine is completed.	NC: Galaxy will not directly pay for maintenance of the road. It shall pay taxes to the governmental authorities.
Transportation of chemical products	• Supervision of transportation of chemical products.	C: There will be few hazardous products on the site. Diesel will be the main product being transported on the road. Its transportation will be monitored and done in accordance with the applicable regulation.
Reopening of the Opinaca airport	• Pave the road leading to the Opinaca airport in the event of its reopening as to minimize dust. Install road signs along the road to limit speed. • Close the road leading to the Opinaca airport which goes along the VC35 trapline as to not disturb land users. Workers shall make a detour to avoid the camp.	NC: Galaxy is still considering this opportunity as part of its project optimization procedure.
Economy – Benefits for the community	• Galaxy should contribute to the community by offering sponsorships or scholarships. • Galaxy should also support Cree companies, such as a solar panel company of Waskaganish, Creenewable Energy, by using and advertising their products.	CP: Distribution of benefits will have its own section in the agreement with Eastmain community (Impact and Benefit Agreement).
Galaxy policies regarding alcohol and drug use on the mine site and at the workers camp	• Galaxy shall develop a policy regarding alcohol and drug use on its mine site and at the workers camp. • Education regarding alcohol abuse is required within communities, notably for the youth, to ensure professional success. • Require that people working on the mine, particularly people working with machinery or driving trucks, be tested for drug use. All workers should be tested before start of their work shift.	CP: Implement the following mitigation measures (Table 7-5): • VIE 02: Establish and implement a code of ethics for workers. • VIE 03: Prohibit alcohol consumption in the worker camp at the site.
Demands on the community health services	• Galaxy should have a pharmacy, nursing staff, doctor and emergency transportation service on site. • Galaxy should invest in the community health services and in accommodation for the additional personnel.	C: No demand on the Eastmain health services is anticipated. Galaxy will operate autonomously on its site; a nurse will be on-site at all times and an ambulance will be available.
Revenue management	• Provide courses on the management of personal finances.	C: Galaxy is open to the idea of providing support for the management of workers' finances.
Benefits for Cree workers	• Cree workers should have access to benefits such as insurance, family allowance, etc. They should not pay tax on their salary. • Galaxy could establish good work schedules, such as 14 days of work/14 days of rest or 14 days of work/10 days of rest.	CP: Cree workers' work schedule and benefits will be discussed in negotiations on the Impact and Benefit Agreement with the Eastmain community.
Impact of workers absence on their families	• A schedule consisting in 7 days of work and 7 days at home could be suitable for women with young children. A schedule consisting in 14 days of work and 14 days at home could be favourable for women with older children, but they will need a lot of support from their family. • Galaxy should set up a benefit for Indigenous workers with dependent children. • Galaxy could consider contributing to certain school programs given the impact the project will have on children.	CP: Cree workers' work schedule and benefits will be discussed in negotiations on the Impact and Benefit Agreement with the Eastmain community.
Environmental monitoring and follow-up	• Conduct a study before start of blasting operations as to establish a reference state for appropriate monitoring of potential environmental impacts.	C: The reference state was established as part of the EIA (Chapter 6 of the EIA). A preliminary environmental monitoring program was also developed in the EIA. It shall be improved after obtention of environmental authorizations.

CEAA-69 **Ensure to get the consent of the users of the territory to publish the maps showing the valued sectors for traditional gathering grounds and location of hunting camps and cabins.**

A-69 During consultations with Indigenous communities, we have the land users and discussion group participants systematically sign a consent form at the start of the interview. This form indicates if the participant wishes for certain information to remain confidential. That is why the map presenting components of the human environment, found in the EIA, only shows valued areas without specifying species harvested. Furthermore, users can comment and validate minutes of the meetings

Other people interviewed during consultations are either socioeconomic stakeholders who accept meeting as part of their work or discussion group participants who are paid and accept that information they provide will be used as part of the study.

SECTION 6.1 PROJECT SETTING AND BASELINE CONDITIONS

Section 6.1.1 Atmospheric, Light and Sound Environment

CEAA-70 **Explain how the information from the reference study on the sound level dating back to 2011 is still representative to support the analysis.**

A-70 Sound levels from 2011 are representative of sound levels in 2018 since measurement conditions in 2011 are similar to those of 2018. There has been no change to the physical or geographical environment, and no new industry was developed in the vicinity of the measurement points. According to SDBJ's traffic reports, there has been no increase in traffic on the James Bay Road. The total number of vehicles compiled is 56,139 for 2014 and 55,632 for 2017.

Section 6.1.2 Geology and Geochemistry

Geochemical Characterization of Mine Material

CEAA-71 **Describe the material used (particle size, pre-treatment, humidity, dryness, representative sampling) and the methods applied to assess the reliability of the results.**

A-71 All analyses are performed by laboratories certified by the MELCC and that follow protocols established by standardization offices. The requested information can be found within the analysis procedures.

CEAA-72 **Baseline concentrations of contaminants of concern within environments Analyze the arsenic speciation testing to predict its mobility and toxicity. These studies and analyses should be conducted in the water, soil and sediments for the watersheds from the LETI to the CE5 watercourse.**

A-72 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

Geochemical Characterisation of Leaching Potential

CEAA-73 **Provide the results of the chemical and geochemical analyses of construction materials and a map presenting the types of lithology as presented in the geochemical study.**

A-73 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

CEAA-74 **Provide the results of the analyses that support the observation that the overburden is barely leachable, particularly the results of the static tests. Indicate if kinetic tests will be required for the ore and the overburden. If not, please explain the reasons.**

A-74 Results of the analyses are all presented in the document titled "Expert Study on Geochemistry" prepared by WSP in July 2018 as part of this Project. Column kinetic tests are recommended in Section 9.1. Such tests were undertaken in May 2018 to observe the behaviour of overburden. Information available to date can be found in the appendix presented in CEAA-75.

CEAA-75 **Provide the results of the kinetic tests started in May 2018 to predict the mobility of concerning contaminants.**

A-75 The engineering brief presented in Appendix CEAA-75 provides results of the kinetic tests available up to now.

CEAA-76 **Demonstrate that the sampling conducted for wet standpipe tests is representative of waste rock and tailings.**

A-76 See A-75.

CEAA-77 **Given the significant concentrations of arsenic in the waste rock and ores, conduct a comprehensive assessment of the potential for leaching into receiving environments.**

A-77 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

Section 6.1.5 Groundwater and Surface Water

CEAA-78 **Préciser la nature (souterraine ou surface) et l'usage des autres sources d'eau potable identifiées sur la carte 6-22 et décrire leur potentiel d'utilisation future.**

A-78 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

CEAA- 79 **Intégrer le sens d'écoulement des cours d'eau sur les cartes représentant le réseau hydrique.**

A-79 Maps presented in A-10 and A-21 show the direction of the water flow.

SECTION 6.2 PREDICTED CHANGES TO THE PHYSICAL ENVIRONMENT

Section 6.2.1 Changes to the Atmospheric, Sound and Light Environment

CEAA-80 **When modelling the air dispersion of contaminants, include:**

- **the emissions from truck motors and dust generated by transport (coming-going) between the mine and Matagami;**
- **the emissions from the generators (indicate their number and location);**
- **the emissions from the concrete plant and related equipment (e.g., dust extractor, material storage area, etc.).**

Estimate their contribution to the overall atmospheric emissions.

If applicable, document and justify not including all construction and operation activities in the model.

A-80 Modelling of the air dispersion shall be modified to add emissions from mobile equipment, other than vehicles (generators and concrete plant) on the site and satisfy CEAA's request. An analysis is being prepared as to see if the additional contribution of emissions from truck motors and dust generated by transport (coming-going) between the mine and Matagami will be perceptible in the modelling. This analysis will be provided to the CEAA once it is finished.

6.2.2 Changes to groundwater and surface water

CEAA-81 **Table 7-3 presents the expected interrelated impacts. However, the overall impact of the project on the quality of the surface water during various phases of the project is not presented, several important sources of impact like the release of mining effluents into receiving waters, is not indicated.**

A-81 Environmental Discharge Objectives (EDO) are expected for design of the water treatment plant. Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

CEAA-82 **Describe and quantify:**

- **the impacts caused by mine water on the quality of receiving waters in the project's study area;**

- **the impacts potentially caused by the leaching and risk of acid drainage into waste rock dumps/tailings and overburden.**

A-82 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

SECTION 6.3 PREDICTED IMPACTS ON VALUED COMPONENTS

CEAA-83 Describe the direct and indirect impacts in a specific manner while considering the various groups of birds (waterfowl, shorebirds, land birds, etc.).

A-83 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

SECTION 6.6 OTHER IMPACTS TO CONSIDER

6.6.1 Impacts of potential accidents or malfunctions

CEAA-84 Document the potential impacts, specifically those on the species at risk that are present and potentially present in the study area, and assess the consequences that an accidental spill following a jetty failure would have on these species and their habitats.

A-84 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

CEAA-85 Anticipate the losses incurred in various types of habitats and estimate the number of migratory birds that would be impacted following an accidental spill.

A-85 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

6.6.3. Cumulative impacts assessment

CEAA-86 Justify the choice of the longer temporal scope, which is set for 2028.

A-86 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

OTHER CONSIDERATIONS

CEAA-87 Order under the Navigation Protection Act

According to the information in the EIS, Transport Canada is unable to decide if the project will require an order under the Navigation Protection Act. This will depend on the determination of the navigability and uses of Lac Kapisikama and other watercourses affected by the project.

Revalidate the question of navigability with Cree communities and present a detailed account of the consultations (dates, names of people, minutes, etc.). Provide clarifications on the following three points for each watercourse and lake affected by the project:

1. **The public's use for navigation: Information on current use: Is there information (e.g, evidence) confirming the current use of the waterway by the public for navigation purposes? Either as an internal water body or as an element of a navigation network extending beyond the boundaries of the waterway? Provide details or attach a copy of the studies/reports.**
2. **Prior use: Is there information (e.g. evidence) confirming the use of the waterway by the public for navigation purposes in the past? Either as an internal water body or an element of a navigation network extending beyond the boundaries of the navigable path? Provide details or attach a copy of the studies/reports.**

3. **The public's interest in the waterway as a water body: Is there a reasonable probability of the public using the waterway for navigation purposes? Is there evidence attesting that the public is likely to want to use this waterway as a water body (e.g., Does a public consultation suggest that, due to local development, the public has concrete plans to use the waterways for boating so that the waterway in question may be used as a water body?).**

A-87 Answer to this question will be provided at the time of the request for additional information during the EIA technical review stage.

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APPENDIX

APPENDIX 1 :

LETTER FROM THE CEAA (NOVEMBER 30, 2018)

Agence canadienne d'évaluation environnementale
Canadian Environmental Assessment Agency

901-1550, ave d'Estimauville
Québec (Québec) G1J 0C1

901-1550 d'Estimauville Avenue
Quebec, QC G1J 0C1

November 30, 2018 **EMAIL**

Ms. Gail Amyot
Galaxy Lithium (Canada) Inc.
2000 Peel Street,
Room 720
Montréal, Quebec H3A 2W5

Dear Ms. Amyot:

SUBJECT Request for additional information to begin analyzing the Environmental Impact Statement for the James Bay Lithium Mine Project

On October 30, 2018, the Canadian Environmental Assessment Agency (the Agency) received the Environmental Impact Statement (EIS) and the summary of the EIS prepared by WSP for the James Bay Lithium Mine Project (the project).

After assessing the conformity of these documents with the EIS Guidelines of February 21, 2018, the Agency, in co-operation with the Federal Environmental Assessment Committee, determined that some information was missing. This information is essential to beginning the technical review of the EIS.

In Appendix 1 of this letter, you will find the sections of the Agency's Guidelines for which information is required. Please refer to the description of the sections in the Guidelines for details on the requested information. When all the information required in Appendix 1 is provided, the Federal Environmental Assessment Committee will begin its technical review.

In Appendix 2, you will find a list of additional recommendations. We are sending it to you now because this information will be required upon a first additional information request at the technical review stage of the EIS.

Indigenous consultations

We would like to inform you that the Agency reassessed the obligation to consult, which led to the inclusion of Waskaganish and Waswanipi Cree Nations in the Agency's consultation on this project. We ask that you have a discussion with these two Nations to get their perspectives and the information required in Section 5 of the Guidelines.

…2/

Furthermore, please also take these two Nations into account when considering the impacts of environmental changes on Indigenous Peoples (Sections 6.1.9 and 6.3.4) and the cumulative impacts (Section 6.6.3).

Please contact me by email at pierre-olivier.emond@canada.ca or by telephone at 418-454-5893 for clarifications on this information request. We are also available for a meeting to discuss it with you.

Yours sincerely,

<Original signé par>

Pierre-Olivier Émond
Project Manager – Quebec

Attached: Appendix 1 – Information required to begin the technical review
Appendix 2 – Additional recommendations

c.c. [by email]: Annaig Kervella, Fisheries and Oceans Canada
Catherine Gaudette, Transport Canada
Isabelle Vézina, Health Canada
Kaitlin Lloyd, Cree Nation Government
Marie-Ève Lenghan, Natural Resources Canada
Sylvain Martin, Environment and Climate Change Canada

Appendix 1 – Information required to begin the technical review
Sections of the EIS Guidelines issued by the Agency

Part 1 – Key considerations
Section 4.5 Summary of Environmental Impact Statement
In the summary of the Environmental Impact Statement for each of the valued components, include an overview of the expected changes to the environment and their main potential environmental impacts on the valued components. Table 13 alone: Summary of residual impacts is not sufficient.

Moreover, the summary should reflect all changes or additions made to the EIS subsequent to this correspondence.

Part 2 – Content of the Environmental Impact Statement
Section 2.2 Alternative means of carrying out the project
Assess the alternative means of carrying out the project for the following components:

- location of the mine infrastructure and its operations, particularly the ore processing plant, the administrative and support facilities, workers' camps, the garage, the storage of explosives and the septic facilities, including the service buildings for disinfection and phosphorous dosing;
- location of discharge points of the final effluents.

Section 3.1 Project components
These elements are part of the designated project and must be considered in the project description and analysis of its impacts:

- borrow pits;
- concrete batch plant;
- warehousing area for dangerous materials and waste;
- infrastructure related to manufacturing and storing explosives (emulsion storage, detonator storage, garage, etc.);
- transportation of concentrate to the Matagami transloading facility;
- power line within the boundaries of the project area;
- fibre-optic line within the boundaries of the project area.

Consider all these components of the project when analyzing the cumulative impacts.

Describe the leakage and spillage detection systems of petroleum equipment or reservoirs or detection systems of leakage from waste rock piles/tailings sites or polishing and treatment ponds.

Provide the document entitled: *Detailed map of surface deposits and identification of potential borrow source* (WSP, 2018).

Section 3.3 Project activities

3.3.1 Site preparation and construction

Site clearing, stripping and excavation

Describe and map the surfaces that must be deforested on the entire project site. Specify and identify all the buffer zones that will be added to the area to deforest, clear, excavate or level.

Water management

Present a section regarding water management during the construction phase and the details of infrastructure constructions and permanent and temporary systems.

Provide a map illustrating the development of the infrastructure during the construction phase, including the relevant details on an appropriate scale. This map should show the trajectory (the direction of the flow, pumping stations, feeder drains, etc.) of all water on the site.

Include detailed information on the effluent treatment systems during the construction phase and on their capacity to treat different types of contaminants in the water.

3.3.3 Decommissioning and abandonment

Describe the ownership, transfer and control of various elements of the project.

Describe who will have the responsibility of supervising and maintaining the integrity of the remaining structures.

Section 5 Consultation with Indigenous Nations and concerns raised

Present the components valued by Indigenous Nations and explain how they will be considered in the EIS.

Present their perspectives on:

- the use of harvested plants and berries for nutritional or medicinal purposes;
- the effectiveness of the mitigation and accommodation measures;
- the cumulative impacts of the project on the use of the territory for traditional purposes;
- the review of the archaeological potential conducted as part of the project.

Describe how Indigenous traditional knowledge was included in the Environmental Impact Statement (including the methodology, the baseline conditions and the analysis of the impacts for all components valued by Indigenous Peoples, including the archeological potential) (also see Part 1 – Section 4.2.2 of the Guidelines for more information).

Document the potential negative impacts of the various components and concrete activities of the project (for every phase) on the established or potential section 35 Aboriginal rights, including the related titles and interests. This assessment must compare Aboriginal rights and related titles and interests which will be determined under future conditions, with and without the project. The perspectives of Indigenous Nations that may potentially be affected should be included once they have sent them to the proponent.

Document the measures intended to mitigate the potential negative impacts of the project on established or potential section 35 Aboriginal rights, including their titles and interests. The measure should be prepared as particular commitments that clearly describe how the proponent plans to implement them and they may require much more than simple mitigation measures developed to counter potential negative environmental impacts.

Document all potential negative impacts on established or potential section 35 Aboriginal rights, including their related titles and interests that were not completely mitigated or subject to accommodation as part of the environmental assessment and the Indigenous consultation. Also take into account the negative consequences that could result from residual and cumulative environmental impacts. The perspectives of Indigenous Nations that will potentially be affected should be included once they have sent them to the proponent.

Section 6.1 Project setting and baseline conditions

6.1.1 Atmospheric, light and sound environment

Describe the ambient noise levels at key receptor points, including Cree community camp sites.

The study must include the geographic extent of sound sources and temporal variations.

6.1.4 Riparian and wetland environments

Present Indigenous traditional knowledge on the characterization of the shoreline, banks, current and future flood-risk areas, and wetlands. If no information was provided by the Indigenous Nations, indicate it.

6.1.5 Groundwater and surface water

Map the boundaries of the watershed (map 6-7) on a larger scale (e.g., the Eastmain River watershed).

Provide the bathymetric surveying results for all the water bodies where these surveys were conducted (WSP, 2018. *Étude spécialisée sur l'habitat du poisson).*

Present the complete results of the characterization of sediment in Lac Asiyan Akwakwatipusich conducted in 2012, and provide the raw data.

6.1.6 Fish and fish habitat
Provide the details of the characterization of watercourses by homogenous segment.

Describe the existing structures that hinder the free passage of fish like the CE3 and CE4 watercourse culverts located under James Bay Road and indicate if, under the current conditions, free passage of fish is possible at that location. Photographs D-54 and D-80 of the Specialized Study on Aquatic Habitat (WSP, 2018) does not confirm that fish can pass through these culverts.

6.1.7 Migratory birds and their habitat
Provide the complete results of the bird survey conducted in 2012 and 2017, particularly by providing the raw data (air survey, point counts, etc.).

6.1.8 Species at risk
In order to describe the habitats conductive to all species that are potentially present in the study area:

- Make and present the list of all the species at risk and of special concern that are present or potentially present in the study area by consulting various lists of species with particular statuses (Committee on the Status of Endangered Wildlife in Canada [COSEWIC] and Schedule 1 of the *Species at Risk Act*). It should include but not be limited to:
    - Short-eared Owl;
    - Rusty Blackbird;
    - Canada Warbler
    - Common Nighthawk
    - Olive-sided Flycatcher;
    - Bank Swallow;
    - Boreal and Migratory Caribou;
    - Wolverine;
    - Bats: Tri-Coloured Bats, Little Brown Myotis and Northern Myotis.
- Using the ranges and descriptions of habitats, particularly those located directly or indirectly in the areas affected by the work, analyze whether the species at risk and of special concern are likely to be present. If this is the case, decide whether additional surveys are necessary to determine if the species are present or not.
- Describe the dwellings, seasonal movements, movement corridors, habitat requirements, critical habitats, general life history, regional abundance and distribution of species at risk and of special concern likely to be in the study area or affected by the project, including the recovery strategies, action plans and management plans;
- Map the potential habitat of all species at risk and of special concern present and potentially present in the study area.

6.1.9 Indigenous Peoples
Describe:

- the use of navigable waters by members of Indigenous Nations;
- past, present and future traditional uses of caribou;
- recreational uses;
- burial sites;
- cultural landscapes;
- locations, objects or items that are sacred, ceremonial or have cultural importance.

Indicate how the Nations' comments and the Indigenous traditional knowledge were used to establish the baseline conditions of the natural and cultural heritage.

Section 6.2 Predicted changes to the physical environment
6.2.1. Changes to the atmospheric, sound and light environment
Include the ozone in the modelling study.

Provide the Primero report (2018) that includes the dust management plan.

6.2.3. Changes to riparian, wetland and terrestrial environments
Present the changes to the waterfowl habitat, given its importance, particularly for traditional hunting.

Present the changes to the animal and plant species habitat, including those that are important in the context of the current use of resources by non-Indigenous Peoples.

Section 6.3 Predicted impacts on valued components
6.3.2 Birds and their habitat
Detail the delivery timeline by describing the time of year, frequency and duration of activities associated with the project. The project activities that will be conducted during the critical nesting period must be identified and the mitigation measures that will be implemented for all activities to minimize the potential impacts on migratory birds must be detailed.

Describe the impacts of avifauna's potential use of various pools of water on the mining site.

Describe the direct negative impacts of possible losses of habitats on migratory birds, including the diversity and abundance of the species.

6.3.3 Species at risk
Describe the potential impacts of the project for each species at risk and of special concern that are present or potentially present in the study area while taking into account the information in the existing recovery strategies or management plans.

Describe all the mitigation measures that will be implemented for each species at risk and of special concern that are present or potentially present in the study area and that risk being affected by the project while considering the information in the existing recovery strategies or management plans.

Present the Indigenous Nations' perspectives regarding the impacts of the project on caribou.

6.3.4 Indigenous Peoples
Current uses
Describe and analyze the following elements:

- any changes or modifications to access areas used for traditional purposes, including the development of new roads, deactivation or reclamation of access roads and changes to waterways that affect navigation;
- how timing of project activities (e.g., construction, blasting, or discharges) has the potential to interact with the timing of traditional practices, and any potential impacts resulting from overlapping periods.

Human health related to changes to the environment
Justify whether or not it is necessary to assess the risk of contamination of locally produced foods and justify the exclusion of certain contaminants in the assessment, if applicable.

Describe and analyze the following elements:

- the potential impacts on the quality of various sources of drinking water and water for recreational use for each stage of the project. It is advised to also consider the impacts on the physical parameters that can affect the treatment process of drinking water. If a change in water quality is expected, assess the impacts on the quality of water and human health.
- the impacts of noise on the health of Indigenous Peoples (hunting camps).

Assess the environmental impacts of the project on the natural and cultural heritage, constructions, locations or important things with respect to history, archaeology, paleontology and architecture for Indigenous Nations.

Section 6.6 Other impacts to consider
6.6.3 Cumulative impacts assessment
Complete the cumulative impacts analysis by integrating all the species at risk and of special concern present and potentially present in the study area and likely to be affected by the project.

Indicate whether the Indigenous Nations were consulted during the final decision on valued components and the appropriate boundaries to use to assess the cumulative impacts. If applicable, explain how their comments were taken into account.

Section 7 Summary of environmental impacts assessment

Complete table 7-13 to add the residual impacts subsequent to implementing the proposed mitigation measures. See Appendix 1 of the Guidelines for an example.

Appendix 2 – Additional recommendations

The following elements are not required to allow the Agency to begin analyzing the EIS. However, it is information that will be required upon a first additional information request at the EIS technical review stage.

Part 1 – Key considerations

Section 4.4 Presentation and organization of Environmental Impact Statement

When possible, include the layering of the project's key components on the maps.

Indicate the location of the following components on map 4-1:

- *LETI*;
- concrete batch plant;
- warehousing area for dangerous materials and waste;
- infrastructure related to manufacturing and storing explosives (emulsion storage, detonator storage, garage, etc.);
- power line within the boundaries of the project area;
- fibre-optic line within the boundaries of the project area.

Part 2 – Content of Environmental Impact Statement

Section 1.4 Regulatory framework and the role of government

The *Fisheries Act*

The regulatory framework presented does not include any mention of the *Fisheries Act*, aside from applying the MDMER. However, subsection 35(1) stipulates that "No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery." The proposed project will likely cause impacts on fish and their habitat, particularly on the decrease or increase in surface or groundwater watershed into watercourses near the project. An authorization issued by the DFO under subparagraph 35(2)(b) of the *Fisheries Act* may therefore be required for this project if it is determined that the expected impacts will translate into serious harm within the meaning of the *Fisheries Act*. This authorization must be identified in Sections 2.4.2.2 and 2.4.3.2 of the EIS.

The *Explosives Act*

The EIS indicates that there will be a storage of emulsion and ammonium nitrate for blasting needs and therefore emulsion in bulk will be pumped on site. The emulsion pumping from the fuelling tanker to the silo and from the silo to the mobile manufacturing facility constitutes explosive manufacturing activities according to the *Explosives Act*, as is the case for the production of the ammonium nitrate and diesel oil mixture. A garage with a cleaning room may also be required on site to maintain the mobile facilities. Since the explosive

supplier will need a manufacturing licence pursuant to subsection 7(1) of the *Explosives Act*, this authorization must be identified in Section 2.4.3.2 of the EIS.

The *Navigation Protection Act*
Transport Canada is still not able to decide whether the project will require an order under the *Navigation Protection Act*, but if authorization is necessary, it must be identified in Sections 2.4.2.2 and 2.4.3.2 of the EIS.

Section 2.2 Alternative means of carrying out the project
Waste rock dumps, tailings and overburden
Justify the choice of locations for the discharge of waste rock and tailings while considering the potential impact of each option on the quality of groundwater and surface water including the acid drainage and metal leaching challenges. The analysis of the variations must also include an analysis of the characteristics of leaching during waste rock and tailings management in a co-disposal versus separate disposal.

Energy sources options
Complete the assessment of energy sources options, particularly including the option of powering the mobile generators with solar panels. Provide the preliminary study conducted by the specialized firm Tugliq.

Section 3.1 Project components
Present more detailed and complete information about the sealing measures of the bottom of dumps and contact water drains.

Specify the mechanical works referred to in Section 4.4.2 of the EIS and indicate where it is planned to be done.

Section 3.3 Project activities
Water and wastewater management facility and septic tanks
Provide a description of the location of the peripheral ditches and the location of watersheds on map 3-1.

Describe the physical layout of the effluents on watercourses CE2 and CE3 (type of structure and dimensions, work method for construction, temporary works, work period and duration, etc.).

Create a detailed map on an appropriate scale of the water flow on the site and for every phase of the project. All relevant structures must be identified in it, including the various sedimentary or retention basins, dumps and sampling stations for water quality monitoring. Ensure that the map reflects the water flow returning to the same infrastructure it came from.

Describe the mine water flow north of the waste rock dump and the main sedimentation basin.

Provide more information on the drainage trenches indicated in Section 4.8.2 of the EIS, particularly their role and their locations.

Linear infrastructure and types of structure used for stream crossings
Describe the bridge planned to get across the CE3 watercourse (dimensions, scope, design, work methods, temporary works, work period and duration, etc.).

Construction or reflection of existing roads and access roads
Indicate which entity will be responsible for planning and implementing improvements to the James Bay Road like adding turn lanes and clarifying the role of the proponent (Galaxy Lithium) for this work.

Section 5 Consultation with Indigenous Nations and concerns raised

Cree Nation of Eastmain

- Re-contact the tallyman of lot RE1 to confirm whether his interest in being consulted is still the same as it was in 2011–2012;
- Consult the tallyman of lot RE3. It is located within the study area, and on the same watershed of the projected mine.

Describe how the various mitigation measures proposed by the Nations were treated by the proponent and why they were not chosen, if applicable.

Ensure to get the consent of the users of the territory to publish the maps showing the valued sectors for traditional gathering grounds and location of hunting camps and cabins.

Section 6.1 Project setting and baseline conditions
6.1.1 Atmospheric, light and sound environment
Explain how the information from the reference study on the sound level dating back to 2011 is still representative to support the analysis.

6.1.2 Geology and geochemistry
Geochemical characterization of mine material
Describe the material used (particle size, pre-treatment, humidity, dryness, representative sampling) and the methods applied to assess the reliability of the results.

Baseline concentrations of contaminants of concern within environments
Analyze the arsenic speciation testing to predict its mobility and toxicity. These studies and analyses should be conducted in the water, soil and sediments for the watersheds from the LETI to the CE5 watercourse.

Geochemical characterisation of leaching potential
Provide the results of the chemical and geochemical analyses of construction materials and a map presenting the types of lithology as presented in the geochemical study.

Provide the results of the analyses that support the observation that the overburden is barely leachable, particularly the results of the static tests. Indicate if kinetic tests will be required for the ore and the overburden. If not, please explain the reasons.

Provide the results of the kinetic tests started in May 2018 to predict the mobility of concerning contaminants.

Demonstrate that the sampling conducted for wet standpipe tests is representative of waste rock and tailings.

Given the significant concentrations of arsenic in the waste rock and ores, conduct a comprehensive assessment of the potential for leaching into receiving environments.

6.1.5 Groundwater and surface water
Specify the nature (ground or surface) and the use of other sources of drinking water identified on map 6-22 and describe their potential use in the future.

Include the direction of the water flow on the maps representing a water system.

Section 6.2 Predicted changes to the physical environment
6.2.1 Changes to the atmospheric, sound and light environment
When modelling the air dispersion of contaminants, include:

- the emissions from truck motors and dust generated by transport (coming-going) between the mine and Matagami;
- the emissions from the generators (indicate their number and location);
- the emissions from the concrete plant and related equipment (e.g., dust extractor, material storage area, etc.).

Estimate their contribution to the overall atmospheric emissions.

If applicable, document and justify not including all construction and operation activities in the model.

6.2.2 Changes to groundwater and surface water
Table 7-3 presents the expected interrelated impacts. However, the overall impact of the project on the quality of the surface water during various phases of the project is not presented, several important sources of impact like the release of mining effluents into receiving waters, is not indicated. Describe and quantify:

- the impacts caused by mine water on the quality of receiving waters in the project's study area;
- the impacts potentially caused by the leaching and risk of acid drainage into waste rock dumps/tailings and overburden.

Section 6.3 Predicted impacts on valued components
6.3.2 Birds and their habitat
Describe the direct and indirect impacts in a specific manner while considering the various groups of birds (waterfowl, shorebirds, land birds, etc.).

Section 6.6 Other impacts to consider
6.6.1 Impacts of potential accidents or malfunctions
Document the potential impacts, specifically those on the species at risk that are present and potentially present in the study area, and assess the consequences that an accidental spill following a jetty failure would have on these species and their habitats.

Anticipate the losses incurred in various types of habitats and estimate the number of migratory birds that would be impacted following an accidental spill.

6.6.3. Cumulative impacts assessment
Justify the choice of the longer temporal scope, which is set for 2028.

Other considerations

Order under the *Navigation Protection Act*

According to the information in the EIS, Transport Canada is unable to decide if the project will require an order under the *Navigation Protection Act*. This will depend on the determination of the navigability and uses of Lac Kapisikama and other watercourses affected by the project.

Revalidate the question of navigability with Cree communities and present a detailed account of the consultations (dates, names of people, minutes, etc.). Provide clarifications on the following three points for each watercourse and lake affected by the project:

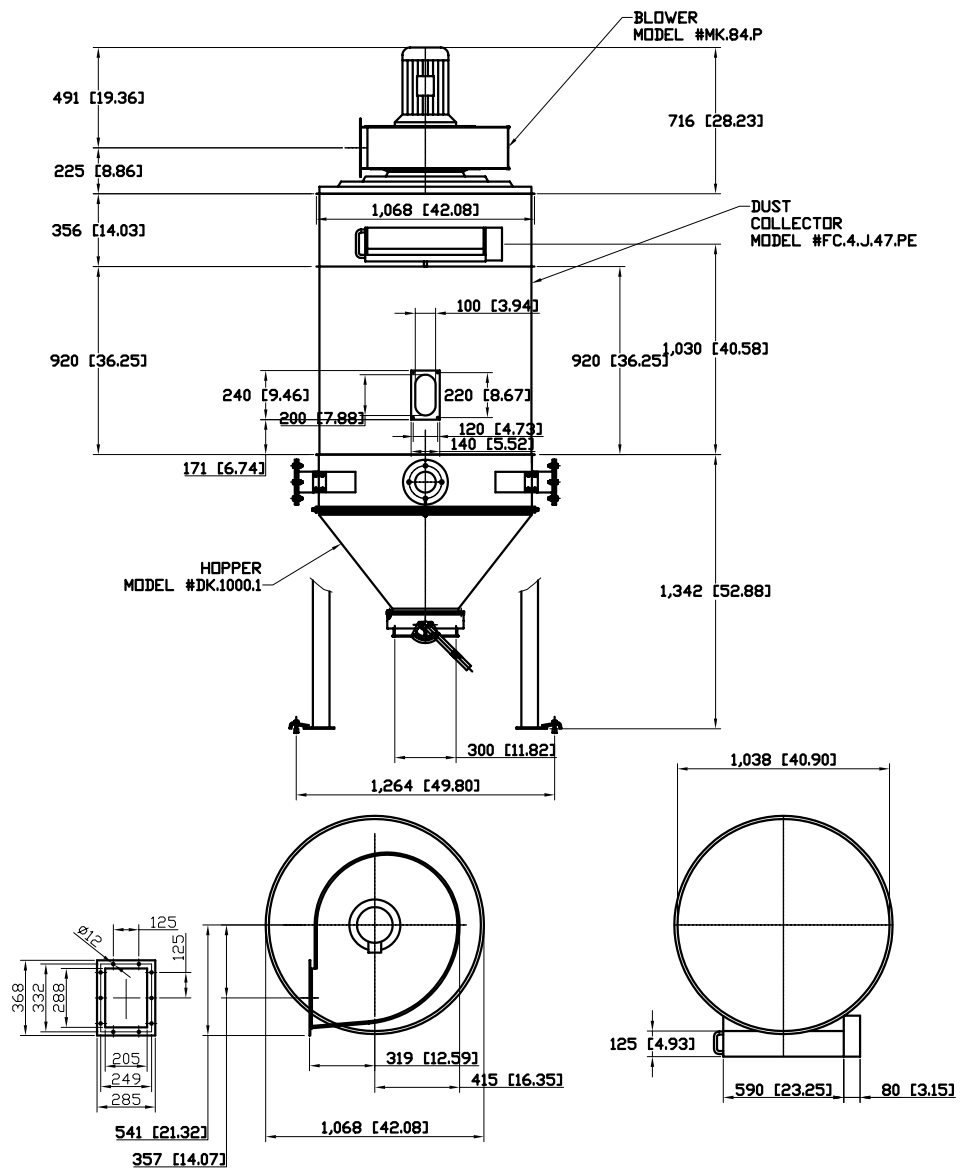
1. The public's use for navigation: Information on current use: Is there information (e.g, evidence) confirming the current use of the waterway by the public for navigation purposes? Either as an internal water body or as an element of a navigation network extending beyond the boundaries of the waterway? Provide details or attach a copy of the studies/reports.

2. Prior use: Is there information (e.g. evidence) confirming the use of the waterway by the public for navigation purposes in the past? Either as an internal water body or an element of a navigation network extending beyond the boundaries of the navigable path? Provide details or attach a copy of the studies/reports.

3. The public's interest in the waterway as a water body: Is there a reasonable probability of the public using the waterway for navigation purposes? Is there evidence attesting that the public is likely to want to use this waterway as a water body (e.g., Does a public consultation suggest that, due to local development, the public has concrete plans to use the waterways for boating so that the waterway in question may be used as a water body?).

APPENDIX

CEAA-4



ZONE	REV	DESCRIPTION	DATE	APPROVED

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS IN INCHES.

TOLERANCES:
FRACTIONS: ±1/32"
.XXX DECIMALS ±0.005
.XX DECIMALS ±0.015
ANGLES ±1/2°

DECA CONTRACT # Q-05471

DECA VIBRATOR CO.
BRIDGEVIEW, IL. 60455

T. WILLIAMS MACHINERY CORP.
EDMONTON, AB., CANADA
ROUND DUST COLLECTOR W/CARTRIDGE FILTER, BLOWER & HOPPER

DRAWN BY: RRH	DWG NO. DV-05471-1	0
CHK'D. BY:		
SCALE: FULL	DATE: 01-12-06	SHEET 1 OF 1

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APPENDIX

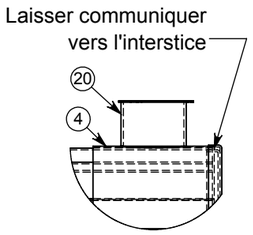
CEAA-6

R8114GC-84586

1x S601CHDP84586L 118po

Date de livraison

RÉSERVOIR DE STOCKAGE HORS-SOL CYLINDRIQUE HORIZONTAL À CONFINEMENT SECONDAIRE INTÉGRAL POUR PRODUITS PÉTROLIERS SELON SPEC. CAN/ULC-S601-14



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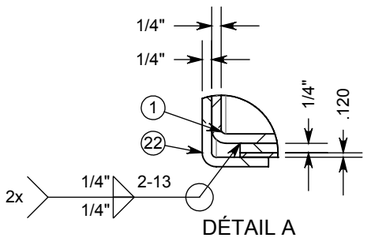

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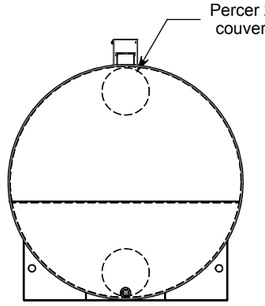

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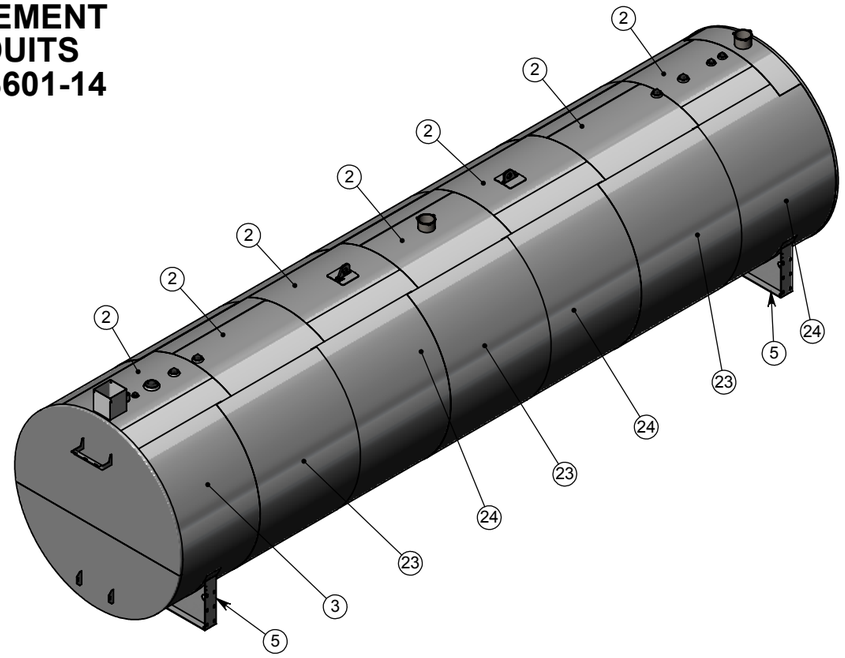

Nomenclature pour R8114GC-84586-AA-00						
No.	Qté.	Fab	Mat	Description	No. Pièce	Inv
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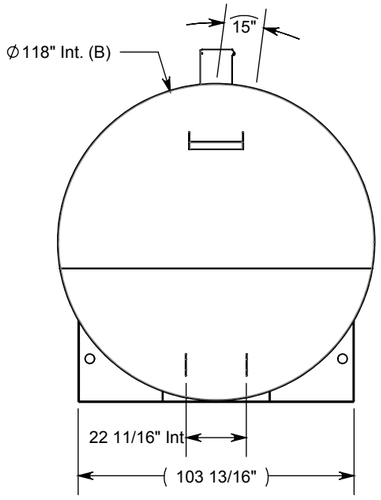
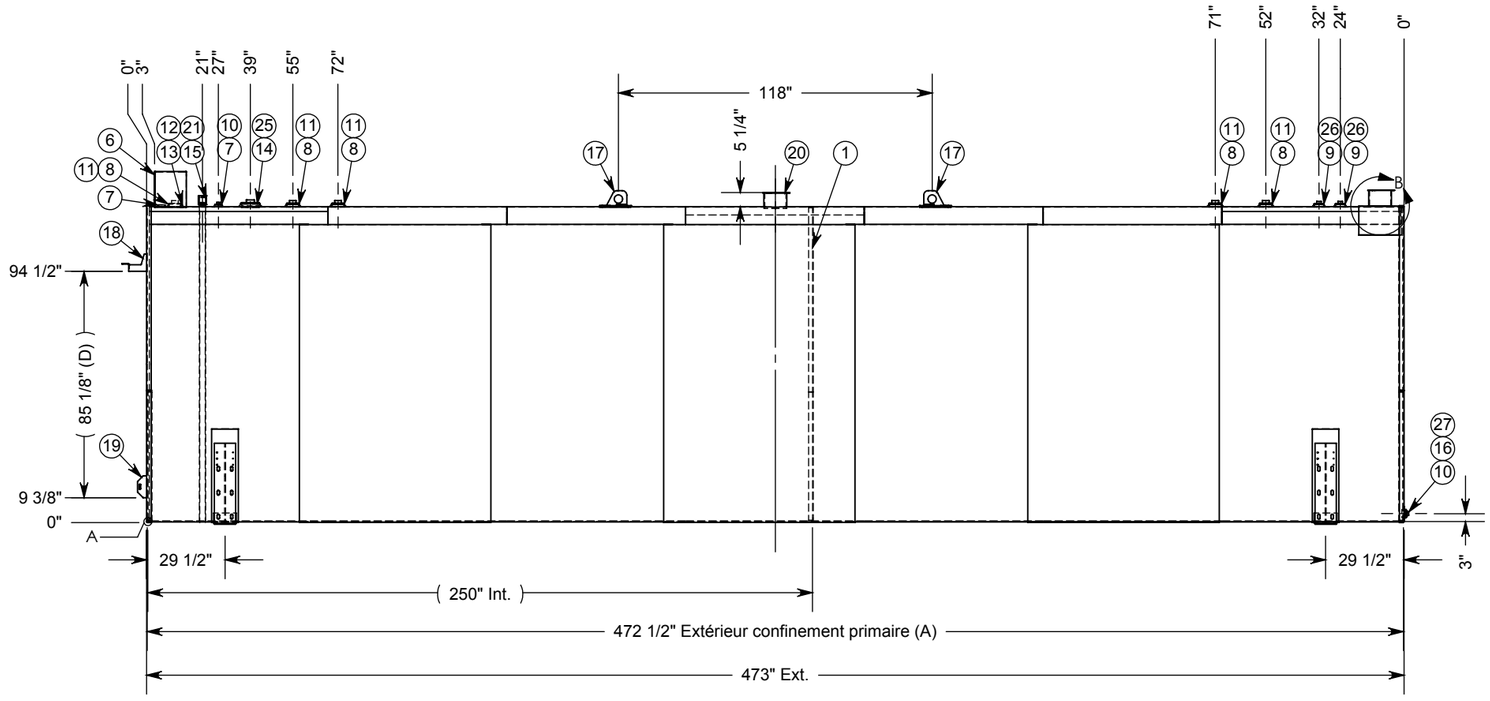
2	7	D	Acier 44W	Corps à recouvrement 118"	R8114GC-84586-AA01-00	
3	1	At	Acier A1011 CS	Doublure à 300° 0.120" [3] x 315" [8001] x 60" [1524]	R8114GC-84586-AA02-00	
4	1	D	Acier	Doublure d'intégral 100% 73" [1854] x 16" [406]	R8114GC-84586-AA13-00	
5	2	S	Acier	Patte Ø118" [2997]	R8114GC-84586-AAB-00	
6	1	D	Acier	Col antidéversement 12" [305] x 12" [305] pour réservoir de Ø118"	R7301-A01-12-12-118	I
7	2	C	Acier	Bride à souder NPT 2" [51]	R6019-2_000	I
8	5	C	Acier	Bride à souder NPT 4" [102]	R6019-4_000	I
9	2	C	Acier	Bride à souder NPT 3" [76]	R6019-3_000	I
10	2	C	Fonte	Bouchon M NPT 2" [51]	R6007-2_000	I
11	5	C	Fonte	Bouchon M NPT 4" [102]	R6007-4_000	I
12	2	C	Fonte	Bouchon M NPT 3/8" [10]	R6007-0_375	I
13	2	C	Acier Astm 865	Demi-bague cl. 150 NPT 3/8" [10]	R6003-0_375	I
14	1	C	Acier	Bride à souder dessous courbé NPT 6" [152]	R6046-6_000	I
15	1	C	Acier	Bague Cl. 3000 NPT 2" [51]	R6034-2_000	I
16	1	C	Acier	Demi-bague cl. 3000 NPT 2" [51]	R6026-2_000	I
17	2	S	Acier 44w	Crochet de levage S601 Type 2 16 501 - 22 000 gal.	R7511-A-16501-22000	
18	1	D	Acier	Support palier	R7553-00	I
19	2	D	Acier	Fixation support passerelle	R7206-A03-00	I
20	2	S	Acier 44w	Base de l'évent d'urgence 8"	R7404-AA-8_000	I
21	1	At	Acier A53	Tuyau Ced 40 fileté à un bout NPT 2" [51] x 120" [3048]	R8114GC-84586-AA05-2_000	
22	2	S	Acier	Couvercle en 2 parties 0.25" [6] x Ø119.239" [3029]	R8114GC-84586-AAC-00	
23	3	At	Acier A1011 CS	Doublure à 300° 0.120" [3] x 315" [8001] x 72" [1829]	R8114GC-84586-AA10-00	
24	3	At	Acier A1011 CS	Doublure à 300° 0.120" [3] x 315" [8001] x 72" [1829]	R8114GC-84586-AA09-00	
25	1	C	Fonte	Bouchon M NPT 6" [152]	R6007-6_000	I
26	2	C	Fonte	Bouchon M NPT 3" [76]	R6007-3_000	I
27	1	D	Acier	Renfort pour bague Cl. 3000 2" [51] 11g	R7413-A01-CL3000-2_000-0_120	I





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84 586 Litres Ø118"	1x
Capacité réelle : 84 586 Litres [18 606 gal. imp.]	Poids à vide: 22937 lbs [10404 kg]

Déplacement à vide seulement

Matériau du réservoir : Acier A1011 CS

	Épaisseur	Minimum requis
Têtes :	0.250" [6.4]	0.221" [5.6]
Corps :	0.250" [6.4]	0.221" [5.6]
Doublure des têtes :	0.250" [6.4]	0.221" [5.6]
Doublure du corps :	0.120" [3.0]	0.110" [2.8]

Finition extérieure : Décapage au jet de sable SP-SSPC6
Apprêt époxy gris 3 - 4 mils sec
Finition uréthane blanc 2 - 3 mils sec

Finition intérieure : Nettoyage seulement

Projet : R8114GC-84586

INDUSTRIES Desjardins
Les Industries Desjardins Ltée
79 rue Principale
St-André (Québec) G0L 2H0

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Unités : Pouces [mm]

Tolérances non spécifiées:
Longueur du réservoir : +/-2"
Diamètre du réservoir : +/-1/2"
Position des accessoires : +/-1/4"

Créé le :	Par :
2018-11-26	DriveWorks

Approuvé par :

Client :

Échelle :	Feuille :	No dessin :	Rev.:
1:57	1 de 1	R8114GC-84586-AA	-

Révisions

Rev.	Description	Date	Par

APPENDIX

CEAA-7

PROJECT NO.: 171-02562-01

DETAILED MAP OF SURFACE DEPOSITS AND IDENTIFICATION OF POTENTIAL BORROW SOURCES

JAMES BAY LITHIUM MINE

APRIL 2018

wsp

DETAILED MAP OF SURFACE DEPOSITS AND IDENTIFICATION OF POTENTIAL BORROW SOURCES

JAMES BAY LITHIUM MINE

GALAXY LITHIUM (CANADA) INC.

PROJECT NO.: 171-02562-01
DATE: APRIL 2018

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Collaborators	Geneviève Philibert Joanie Tremblay
Cartography and geomatics	Annie Masson
Text editing	Linette Poulin, Administrative Assistant

Reference to be cited:

WSP. 2018. *DETAILED MAP OF SURFACE DEPOSITS AND IDENTIFICATION OF POTENTIAL BORROW SOURCES. JAMES BAY LITHIUM MINE*. REPORT PRODUCED FOR GALAXY LITHIUM (CANADA) INC. 21 PAGES ET APPENDICES.

TABLE OF CONTENTS

TABLE OF CONTENTS

1 INTRODUCTION

1.1 CONTEXT

As part of the development of the James Bay Lithium Mine Project, Galaxy Lithium (Canada) Inc. commissioned WSP Canada Inc. (WSP) to produce a map of surface deposits and to identify potential borrow sources (i.e. borrow pits and quarries) aiming to provide a complement to the geotechnical study and to support the planning of the infrastructures design.

The main objective of the mandate is therefore to perform a stereoscopic (3D) analysis of high resolution aerial photographs of the study area. Using a geomorphological analysis, this method allows to characterize the nature of surface deposits and landforms, as well as to identify areas offering a good potential for borrow material and to estimate the exploitable volumes.

More specifically, the objectives of the study are to:

- using a stereoscopic analysis, characterize surface deposits within the study area to target the most favorable areas for borrow material search;
- using stereoscopic vision, identify and characterize (i.e. composition, thickness, area and volumes of materials, access, constraints, probability codes, etc.) borrow sources (i.e. borrow pits and quarries) that offer the greatest potential for exploitation;
- produce a map to locate the identified borrow sources including the associated probability ratings and the proposed access to build.

2 DESCRIPTION OF PHYSICAL ENVIRONMENT

The study area is located in the James Bay lowlands. This region is characterized by a slightly undulating terrain which height varies between 200 and 215 m. The substratum is composed of Archean age rocks belonging to the Superior Province. The study area includes two sub-provinces: the Némiscau sub-province, in the south, and the La Grande sub-province in the north. The studied territory is mainly composed of metasedimentary rocks such as paragneiss and schist, as well as mafic and intermediate volcanic rocks such as basalt, andesite, volcaniclastic rocks and locally alkaline volcanic rocks. Lesser igneous rocks such as granite and granodiorite are also found (SIGEOM, 2018). The rock outcrops in a few places in the form of small, isolated buttresses, but it is usually covered with sediments of variable thickness inherited from the last glaciation and the events that followed.

In the region, the cover of glacial materials is rather discontinuous and is present in the form of crag-and-tails, which are landforms characterized by a trail of till deposited sheltered from rocky protuberances. These shapes are elongated and oriented along an OSO-ENE axis, which indicates the direction of the regional ice flow. The till of the area is characterized by very dense material with no apparent structure and by the sporadic presence of sand and gravel lenses. The composition of glacial deposits largely reflects basement lithology, which is dominated by gneiss and granite (Hardy, 1976).

Deglaciation began around 8,000 BP and led to the invasion of the Tyrell postglacial sea approximately 7,000 BP years ago throughout the study area. During the marine transgression, the glacial deposits were reshaped on the surface and were covered with deep-sea marine deposits. These deposits, mainly clayey, form plains found below the maximum marine limit of 290 m. Then, during the marine regression phase, about 3,000 BP years ago, glacial and marine deposits were covered with a thin layer of littoral and prelittoral deposits. These sediments have an essentially sandy granulometric composition. During the marine regression, waves and currents helped to reshape and wash away glacial deposits. The till has been washed out of its finest particles leaving an abundance of blocks on the surface. Finally, the poor drainage conditions of the clays favored the formation of large peat bogs.

3 METHODOLOGY

3.1 LITERATURE SEARCH

The study began with a review of the existing and available literature to better understand deposition processes in the region and to effectively guide the search for borrow sources. This information has allowed to directly target favorable sectors. The documents consulted are the existing surface deposit maps, as well as the information available in the public or scientific domain. The photos were also analyzed simultaneously with other satellite images available in the public domain (Google Earth), in order to visualize the territory in a more global way. Other existing and available cartographic documents, such as maps from the Geological Survey of Canada (GSC) or the Department of Energy and Natural Resources (MERN), have also been used as references and tools for decision support. Finally, the borehole logs made in winter 2018 were consulted; they allowed to validate the photo-interpretation and confirmed the estimated type and thickness of materials.

3.2 STEREOSCOPIC VISION ANALYSIS

The study area has been delineated according to the coverage of aerial photographs available for the project. The interpretation was made from 20-cm photos taken in 2017. Each of the photos was associated with an orientation model, which made it possible to visualize in stereoscopy (3D) and to adequately characterize the surface deposits. A digital terrain model (DTM) has also been generated from LiDAR data at a resolution of 1 m, to define the interpretation. The stereoscopic characterization of the surface deposits and borrow sources were realized in 3D directly on the screen, using cartographic software (i.e. ArcGIS and PurView) where the data were recorded in a "shapefile" format, according to the method developed over the years by WSP. The nature of the deposits, their thickness over rock, as well as any other information of interest have been noted in the shapefiles database (Appendix 1).

3.2.1 CRITERIA TO RESPECT FOR THE RESEARCH OF BORROW MATERIAL

The search for potential borrow sources was concentrated within the area covered by the photos, which is an area of 8,428 ha. For the purposes of the work, the analysis was oriented towards finding sand, sand and gravel, till, clay and rock. The sites offering the best potential have been delimited and characterized considering the quality of the material.

During the search for materials by photo-interpretation, several criteria were considered. Initially, research was focused as close as possible on the infrastructure to be built (i.e. plant, pit, dump, etc.) to facilitate the transportation of materials and minimize associated costs. Areas where a certain amount of material could be recovered as a result of the work related to the opening of the pit or the preparation of the dump site were also suggested. Although some of these areas have environmental constraints (e.g. proximity to wetlands), they have been proposed since they are located in areas where the integrity of the physical environment will be compromised anyway by the construction of the projected infrastructures.

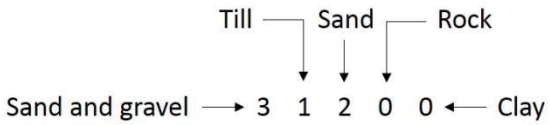
In addition, environmental constraints that may legally and technically impede the exploitation of borrow sources have also been taken into account. Thus, according to the localization standards cited in the regulations regarding quarries and sand pits (Chapter Q-2 r.7) of the Environment Quality Act (EQA), a distance of 75 m has been maintained between the limits of potential sources of borrowing and water environments (i.e. watercourses, water bodies and wetlands). However, it is important to consider that the law is currently under review and that this distance will eventually be subject to change.

Constraints relating to the human environment have also been taken into account. Thus, in order to meet the restrictions imposed by the EQA, searches were carried out more than 70 m from the James Bay Road for quarry sites and 35 m for borrow pits. In addition, a distance of 150 m for the borrow pits and 600 m for the quarries was maintained in relation to the infrastructure of the km 381 road relay.

Finally, paths have been proposed to access the borrow pits from existing roads and taking into account the various technical and environmental constraints.

3.2.2 TYPE OF MATERIAL

Probability codes have been specified for each type of materials likely to be contained in the charted banks. The code is defined by five digits. The nature of the material is determined by the order of presentation. The first number from the left corresponds to a mix of sand and gravel; the second to till (i.e. a hetero-granulometric mixture of sediments from silt to block), the third to sand, the fourth to rock and the fifth to clay.



3.2.3 PROBABILITY CLASSES

The numbers in the code correspond to the following probability classes:

0: none

1: less than 25%

2: 25% to 50%

3: 50% to 75%

4: more than 75%

Thus, in the previous example, the code "31200" means that there is, in the borrow pit:

- between 50% and 75% probability that the material is sand and gravel;
- less than 25% probability that the material is a diamicton;
- between 25% and 50% probability that the material is sand;
- no probability that the material is rock;
- no probability that the material is clay.

The area and thickness of the deposits were calculated directly from the geographic information system. For each of the potential borrow sources, the volume of material was estimated by multiplying the area of the borrow source to the estimated thickness of the exploitable deposit.

4 RESULTS

4.1 SURFACE DEPOSITS

Stereoscopic analysis allowed the interpretation of the surface materials throughout the study area. The results of the photo-interpretation are presented in the following text and illustrated on Map 1.

Rock is present in several places in the study area. It is generally outcropping to form small hills or isolated buttresses, or is covered with thin (<2 m) and discontinuous veneer of till, clay or peat. It is found mainly in the southern portion of the study area, as well as in the central-east and northwest. On the rest of the territory, the rock is hidden under a sediment cover of variable thickness.

In general, the cover of glacial materials is little present and rather discontinuous in the mapped territory. The few identified till deposits form ridges with an elongated morphology. It is crag-and-tail, i.e. deposits shaped in the direction of glacial flow set up sheltered from rocky buttresses. Thus, during the last glaciation, the west-southwest ice flow facilitated the accumulation of glacial deposits on the southwest slopes of the rock. The thickness of the till ridges generally varies between 2 and 6 m, although the deposits become thinner (<2 m) closer to the rock buttresses on which they rest. The passage of the sea has helped to reshape the glacial materials and has washed the till of its finer particles, leaving in place a sandy or sandy-gravelly matrix with an abundance of surface blocks.

On the lower terrain between rocky crests and till, lies a layer of marine clay deposits. Its thickness varies between 2 and 6 m according to the boreholes done in winter 2018. A layer of sand of variable thickness deposited in a littoral and sublittoral environment, during the withdrawal of the sea, generally covers the clay deposits. However, sand and clay are very rarely exposed. Indeed, several peat bogs have developed on the poorly drained surface of clay deposits. They are open, shrubby or woody bogs and fens. They are vast and very numerous, so that they cover nearly 72% of the mapped territory. Some peat bogs have also developed in the depressions of the rock and till. The abundance of these wetlands is indicative of poor soil drainage and indicates that the groundwater level is near the surface.

4.2 BORROW SOURCES

In general, the main constraints to the exploitation of borrow sources in the study area are related to the abundance of wetlands and the presence of rocky outcrops. In fact, the presence of peat bogs on nearly 72% of the study area is the main constraint to the exploitation of the borrow pits both legally and technically. According to the localization standards cited in the regulation regarding quarries and sand pits (Chapter Q-2 r.7) of the EQA, a distance of 75 m must be maintained between the limits of potential borrow sources and any water environment (i.e. watercourses, water bodies and wetlands), which considerably limits the exploitation in some areas. Additionally, the presence of peatlands developed on the surface of the clayey plain reflects poor drainage conditions and indicates that the groundwater level is close to the surface. Consequently, the thickness of potentially exploitable material is rather low or even inexistent, since according to the law, the exploitation floor must be at least 1 m above groundwater level.

In addition, the presence of rock is also a constraint to the exploitation of borrow pits. The rock is exposed in many places, particularly in the southern and central-eastern portions of the study area. Rock outcrops indicate that volumes of potentially exploitable loose material are relatively small.

Despite the constraint imposed by physical environment, the stereoscopic vision analysis allowed to identify **15 potential borrow pits** and **7 potential quarries**. The characteristics of each suggested borrow sources are presented in Table 1 (potential borrow pits) and Table 2 (potential quarries); their localisation as well as the proposed access path are illustrated on Map 1.

Table 1 **Characterization of Potential Borrow Pits**

Potential Borrow Pit	Coordinates UTM zone 18N		Material	Probability Code	Thickness (m)	Area (m²)	Estimated Volume (m³)	Access to Build		General Comments
	x (m)	y (m)						Lenght (km)	Comments	
BE-01	353,498	5,786,211	Sand	21311	4	79,065	315,000	2.2	Flat topography, intersects peaty soils of low bearing capacity (Ptm / CM) over 100 m.	The boundaries of the operating area are located at >75 m from any wetlands. Presence of rock outcrop nearby.
BE-02	354,808	5,785,997	Thin till (<2 m) over rock	13121	2	84,656	170,000	0.8	Flat topography, good bearing capacity, thin till (<2 m) on rock, minimal shaping required. The proposed access is attached to an existing 420 m long road that joins the James Bay Highway. The quality of the existing road will have to be validated on the field to ensure the passage of heavy vehicles.	The boundaries of the operating area are located at >75 m from any wetlands. Presence of rock outcrop nearby.
BE-03	357,278	5,787,061	Till (2 to 6 m) over rock	13121	3	138,172	415,000	0.2	Flat topography, good bearing capacity, till (2 to 6 m) on rock, minimal shaping required.	The boundaries of the operating area are located at >75 m from any wetlands. A distance of 35 m has been maintained from the James Bay Highway.
BE-04	360,071	5,792,936	Thin till (<2 m) over rock	13121	2	61,581	123,000	2.2	Flat to slightly undulating topography, intersects peaty soils of low bearing capacity over 300 m.	The boundaries of the operating area are located at >75 m from any wetlands. Presence of rock outcrop nearby.
BE-05	360,458	5,793,063	Sand (2 to 6 m) over clay	11312	4	85,660	343,000	2.5	Flat to slightly undulating topography, intersects peaty soils of low bearing capacity over 300 m.	The boundaries of the operating area are located at >75 m from any wetlands. Presence of rock outcrop nearby.
BE-06	357,551	5,790,814	Sand	10312	2	80,835	162,000	0.5	Flat topography, intersects peaty soils of low bearing capacity over 260 m.	Located within the limits of the projected plant. The boundaries of the operating area are located within 75 m of a peat bog. A certain volume of sand could be recovered during the construction of the infrastructures.
BE-07	357,614	5,790,544	Sand (2 to 6 m) over rock	10322	1	71,913	71,000	0.3	Flat topography, intersects peaty soils of low bearing capacity over 400 m. The proposed access is attached to an existing 350 m long road. The quality of the existing road will have to be validated on the field to ensure the passage of heavy vehicles.	Located within the limits of the projected plant. The boundaries of the operating area are located within 75 m of a peat bog. A certain volume of sand could be recovered during the construction of the infrastructures. The depth of the rock is uncertain in some places.
BE-08	356,370	5,790,203	Sand	10312	1.5	151,925	227,000	1.8	Flat topography, intersects peaty soils of low bearing capacity over 660 m.	Located within the limits of the projected dump. The boundaries of the operating area are located within 75 m of a peat bog. A certain volume of sand could be recovered during the construction of the infrastructures.
BE-09	355,584	5,790,256	Sable	10312	1	169,192	169,000	2.7	Flat topography, intersects peaty soils of low bearing capacity over 810 m.	Located within the limits of the projected pit for the mine. The boundaries of the operating area are located within 75 m of a peat bog. A certain volume of sand could be recovered during the construction of the infrastructures.
BE-10	355,131	5,790,464	Sand (2 to 6 m) over clay	10312	1.5	36,823	55,000	3.7	Flat topography, intersects peaty soils of low bearing capacity over 1 km.	Located within the limits of the projected dump. The boundaries of the operating area are located within 75 m of a peat bog. A certain volume of sand could be recovered during the construction of the infrastructures.
BE-11	354,807	5,790,126	Sand (2 to 6 m) over clay	10312	1	90,791	90,000	4.4	Flat topography, intersects peaty soils of low bearing capacity over 810 m.	Located within the limits of the projected pit for the mine. The boundaries of the operating area are located within 75 m of a peat bog. A certain volume of sand could be recovered during the construction of the infrastructures.
BE-12	357,808	5,789,459	Till (2 to 6 m) over rock	13110	2	68,728	137,000	0	No access to build. Take advantage of existing roads. The quality of the existing road will have to be validated on the field to ensure the passage of heavy vehicles.	Located within the limits of the projected pit for the mine. The boundaries of the operating area are located within 75 m of a peat bog. A certain volume of till could be recovered from the opening of the pit. The deposit is adjacent to a rocky ridge (projected mine). The depth of the rock is uncertain in some places.

Table 1 Characterization of Potential Borrow Pits (continued)

Potential Borrow Pit	Coordinates UTM zone 18N		Material	Probability Code	Thickness (m)	Area (m^2)	Estimated Volume (m^3)	Access to Build		General Comments
	x (m)	y (m)						Lenght (km)	Comments	
BE-13	358,661	5,789,068	Sand (2 to 6 m) over rock	11411	4	13,835	55,000	0	No access to build. Take advantage of existing roads. The quality of the existing road will have to be validated on the field to ensure the passage of heavy vehicles.	Extension of an existing borrow pit located east of the technical landfill. Located within the limits of the projected pit for the mine. A certain volume of sand could be recovered from the opening of the pit. The boundaries of the operating area are located at >75 m from any wetlands. The deposit is adjacent to a rocky ridge (projected mine). The depth of the rock is uncertain in some places.
BE-14	359,031	5,788,952	Sand (2 to 6 m) over rock	11411	5	11,350	56,000	0	No access to build. Take advantage of existing roads. The quality of the existing road will have to be validated on the field to ensure the passage of heavy vehicles.	Extension of an existing borrow pit located east of the technical landfill. The extension area is located approximately 270 m NW of the km 381 road stop. The boundaries of the operating area are located at >75 m from any wetlands. The deposit is adjacent to a rocky ridge. The depth of the rock is uncertain in some places.
BE-15	358,444	5,789,067	Sand (2 to 6 m) over rock	11411	3	5,968	17,000	0	No access to build. Take advantage of existing roads. The quality of the existing road will have to be validated on the field to ensure the passage of heavy vehicles.	The boundaries of the operating area are located at >75 m from any wetlands. Located directly to the NW of the technical landfill. The proposed site is adjacent to the technical landfill. A distance of 35 m was maintained from the technical landfill path.

Table 2 **Characterization of Potential Quarries**

Potential Quarry	Coordinates UTM zone 18N		Material	Probability Code	Thickness (m)	Area (m²)	Estimated Volume (m³)	Access to Build		General Comments
	x (m)	y (m)						Lenght (km)	Comments	
CA-01	354,745	5,783,329	Rock	01041	5	54,000	270,000	0.2	Very short access, slightly undulating topography, rocky terrain, good bearing capacity.	The boundaries of the operating area are located at >75 m from any wetlands. Rock lithology must be validated to check the acidity of the rock.
CA-02	356,068	5,783,263	Rock	01041	15	167,000	2,505,000	1.9	Lowly rugged topography, essentially rocky terrain, intersects peaty soils (Ptm / R) of low bearing capacity over 240 m.	The boundaries of the operating area are located at >75 m from any wetlands. Rock lithology must be validated to check the acidity of the rock.
CA-03	354,918	5,784,826	Rock with veneer of thin (<2 m) and discontinuous till	01041	5	37,000	185,000	0.1	Very short access, slightly undulating topography, rock terrain with thin, discontinuous till veneer, good bearing capacity.	The boundaries of the operating area are located at >75 m from any wetlands. A distance of 70 m has been maintained from the James Bay Highway. Rock lithology must be validated to check the acidity of the rock.
CA-04	353,839	5,784,964	Rock	01041	10	63,000	630,000	0.9	Flat topography, intersects peaty soils (Ptm / CM) of low bearing capacity over 850 m.	The boundaries of the operating area are located at >75 m from any wetlands. The passage of the access through vast peat bog is hardly avoidable. Access to this site would be preferable in winter. Rock lithology must be validated to check the acidity of the rock.
CA-05	360,424	5,790,575	Rock with veneer of thin (<2 m) and discontinuous till	01041	4	63,000	252,000	1.1	Undulating topography, intersects peaty soils (Ptm / R, Ptm / CM) of low bearing capacity over 150 m.	The boundaries of the operating area are located at >75 m from any wetlands. Rock lithology must be validated to check the acidity of the rock.
CA-06	359,666	5,791,725	Rock	01041	6	64,000	384,000	1.1	Flat to slightly undulating topography, intersects peaty soils (Ptm / R, Ptm / CM) of low bearing capacity over 300 m.	The boundaries of the operating area are located at >75 m from any wetlands. Rock lithology must be validated to check the acidity of the rock.
CA-07	354,033	5,793,719	Rock with veneer of thin (<2 m) and discontinuous till	01041	10	332,000	3,320,000	1.9	Lowly rugged topography, essentially rocky terrain, the access passes outside the study area, intersects peaty soils of low bearing capacity over 350 m.	The boundaries of the operating area are located at >75 m from any wetlands. Rock lithology must be validated to check the acidity of the rock.

5 SYNTHESIS AND RECOMMENDATIONS

The stereoscopic vision analysis of surface material in the study area allowed a better understanding of the deposition processes in the region. This information has allowed to effectively guide the search for borrow sources and to directly target favorable sectors. In total, **15 potential borrow pits** and **7 potential quarries** were identified.

5.1 BORROW PITS

In general, the main constraint to the exploitation of borrow sources in the study area is related to the abundance of wetlands. Indeed, peat bogs cover nearly 72% of the study area. The presence of peatlands developed on the surface of the clayey plain reflects poor drainage conditions and indicates that the groundwater level is close to the surface. Consequently, the thickness of potentially exploitable material is relatively small. Additionally, the presence of numerous peatlands constraint the exploitation of the borrow sources both legally and technically. According to the localization standards cited in the regulation regarding quarries and sand pits (Chapter Q-2 r.7) of the EQA, a distance of 75 m must be maintained between the limits of potential borrow sources and any water environment (i.e. watercourses, water bodies and wetlands), which considerably limits the exploitation in some areas. However, it is important to consider that the law is currently under review and that this distance will eventually be subject to change. Consequently, it will be possible to study the potential of exploiting new borrows sources if needed.

In addition, the presence of rock outcrops particularly in the southern and central-eastern portions of the study area indicates that volumes of potentially exploitable loose material are relatively small. Despite the constraint imposed by physical environment, the stereoscopic vision analysis allowed to identify **15 potential borrow pits**.

Some of the proposed sites (**BE-06**, **BE-07**, **BE-08**, **BE-09**, **BE-10**, **BE-11**, **BE-12** and **BE-13**) are located nearby or even directly within the boundaries or the projected infrastructures (i.e. plant, pit, dump, etc.). These borrow pits correspond to areas where a certain amount of material could potentially be recovered during construction work. Although some of these pits present environmental constraints (i.e. proximity to wetlands) and material volumes may be low in some areas, the exploitation of these borrow pits appears to be the option to prioritize as they are located in areas where the integrity of the physical environment will be compromised anyway by the construction of the planned infrastructures.

The site **BE-14** also seems to be an interesting option. It corresponds to the extension of an existing pit, located directly south of the projected mine. Before considering the opening of a new site, it seems more advantageous to extend the operating area of an existing sand pit.

In the case where new borrow pits would have to be opened, the sites **BE-02** and **BE-03** seem to be interesting options. They are located a little further from the developments associated with the project, but the access paths to build are short since these sites are located along the James Bay Road. In addition, the proposed paths cross till terrain with good bearing capacity.

The presence of rocky outcrops near several of the proposed sites (i.e. **BE-01**, **BE-02**, **BE-04**, **BE-05**, **BE-07**, **BE-12**, **BE-13** and **BE-14**) should be considered. It is likely that the thickness of exploitable materials will be uneven if the underlying rock profile is very irregular. It is a possibility that the potential volumes may be lower than estimated. Ground Penetrating Radar (GPR) surveys would confirm available volumes.

Overall, the identified sites are relatively easy to access. However, peat bogs are difficult to avoid and some of the accesses to build often cross peat lands with low bearing capacity. Road shaping will therefore be required to ensure the passage of machinery and requests for exemptions may be necessary.

5.2 QUARRIES

Seven (7) potential quarries have been suggested. The boundaries of each proposed exploitation areas meet the minimum distance of 75 m required from any water environment (i.e. wetlands, streams and water bodies) and 70 m from the James Bay Road.

Based on stereoscopic observations, sites **CA-01**, **CA-03**, **CA-05** and **CA-06** appear to be the most promising. Sites **CA-05** and **CA-06** offer interesting options because of their proximity to the planned infrastructures for the project. However, the proposed for access paths cross peat lands of low theoretical bearing capacity over distances of about 150 m (CA-05) and 480 m (CA-06). Sites **CA-01** and **CA-03** also offer interesting options as they are located directly aside of the James Bay Road. The access paths to be built are very short and cross essentially rocky terrains offering a good bearing capacity.

Sites **CA-02**, **CA-04** and **CA-07** promise large volumes of materials, but they are located a little further away from the projected infrastructures and accesses to build are longer. In addition, for the site **CA-04**, a large peatbog punctuated with ponds will have to be crossed to reach to the quarry. For this reason, if the opening of this site is considered, it is recommended that the exploitation be done in winter when peat is frozen to facilitate access and ensure the safety of workers during transport.

The lithology of the bedrock is difficult to identify by photo-interpretation and, consequently, it is impossible to determine the acidity level of the rock at the proposed sites. According to the geological data available on the SIGEOM website, rocks of three different origins can be found in the study area, namely igneous, sedimentary and volcanic. Igneous rocks (granites and granodiorites) are generally characterized by a relatively high level of acidity. Sedimentary and metasedimentary rocks (paragneisses and shales) tend to be rather basic. Are also found in smaller quantities, detrital sedimentary rocks such as polygenic conglomerates which acidity level can be very variable. Finally, there are volcanic rocks (basalts, andesites and volcaniclastics) that are generally alkaline or considered intermediate. However, information from SIGEOM remains inaccurate at the scale of the mine project. For this reason, tests will have to be conducted to validate the composition and the acidity level of the substratum.

5.3 RECOMMENDATIONS

Finally, it should be noted that the volumes of materials calculated in this study remain an estimate based on the analysis of aerial photographs and that field surveys are recommended in order to validate the quality and thickness of the materials and the level of the groundwater. Such surveys would enhance the level of reliability of the information and confirm the thickness of potentially exploitable materials for the purpose of filing the application for the certificate of authorization (CA). It will also be important to perform the field surveys (e.g. vegetation, streams, wildlife habitat) required to file a complete CA application. These field inventory requirements will be specified during the development of the CA application.

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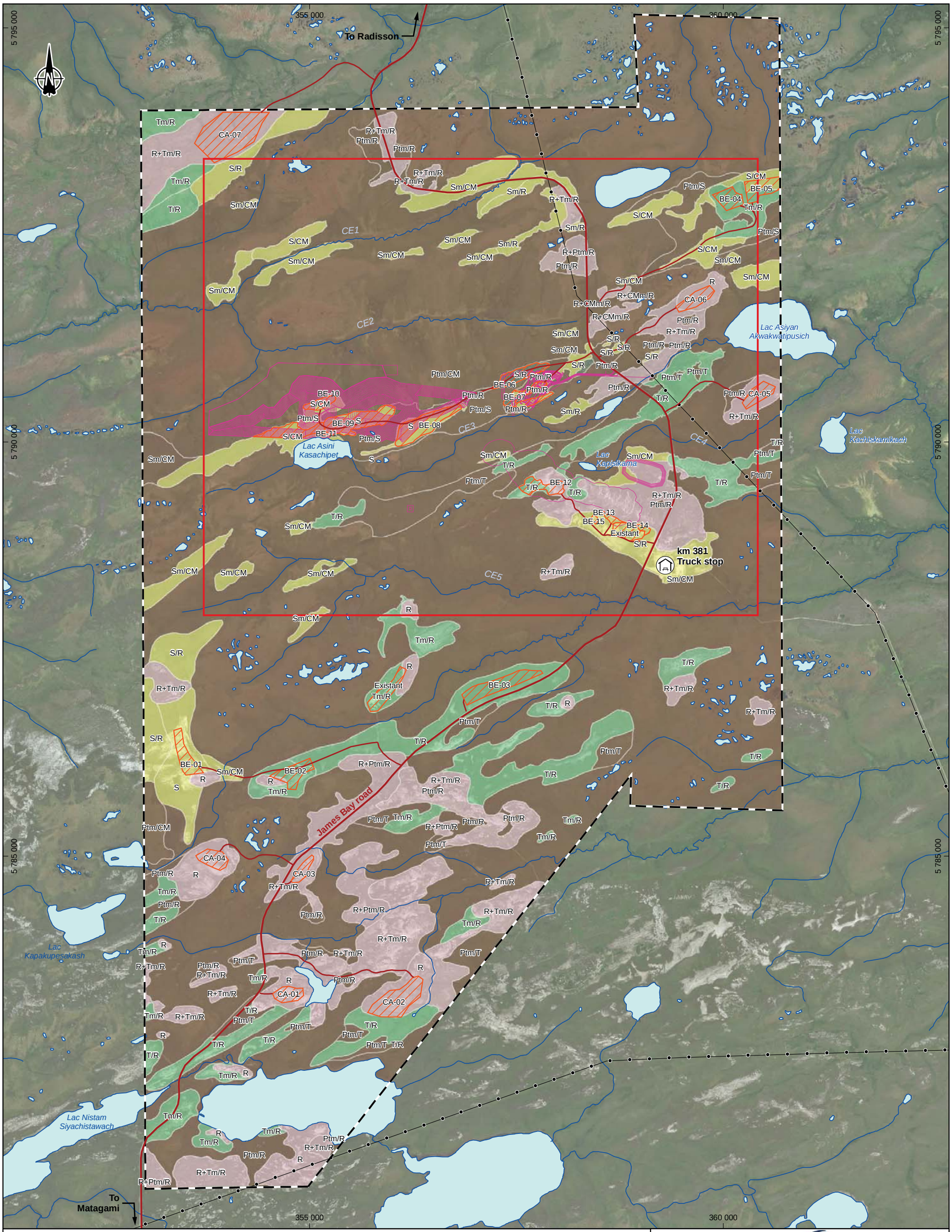
MAP



- Limit of the photo-interpreted area

Infrastructure

- Principal road
- Access road
- Transmission line

Project Components

- Potential borrow sources
- Projected Infrastructure

Superficial Deposits

- R — Rock
- R+CMm/R — Rock with veneer of thin (<2m) and discontinuous clay
- R+Tm/R — Rock with veneer of thin (<2m) and discontinuous till
- R+Ptm/R — Rock with veneer of thin (<2m) and discontinuous peat
- S — Sand
- S/CM — Sand (2 to 6 m) on clay
- S/R — Sand (2 to 6 m) on rock
- Sm/CM — Thin sand (<2 m) on clay
- Sm/R — Thin sand (<2 m) on rock
- T/R — Till (2 to 6 m) on rock
- Tm/R — Thin till (<2 m) on rock
- Ptm/CM — Thin peat (<2 m) on clay
- Ptm/R — Thin peat (<2 m) on roc
- Ptm/S — Thin peat (<2 m) on sand
- Ptm/T — Thin peat (<2 m) on till

GALAXY

James Bay Lithium Mine
Geotech

Distribution of surface materials and borrow pits

Sources :
Orthoimage : World Imagery, ESRI, 2017
Photo interpretation : WSP 2018

No Ref : 171-02562-01_wspT077_geotech_c1_mat_sur_180416.mxd

0 450 900 m
UTM 18, NAD83

Map 1

wsp

APPENDIX

1 GENERAL CONDITIONS AND LIMITATION OF STEREOSCOPIC CHARACTERIZATION

General conditions and limitation and stereoscopic characterization

Geomorphological mapping and estimation of thicknesses, volumes and composition surface deposits as well as identification of potential borrow pits, wetlands, watercourses and other environmental constraints arising from stereoscopic characterization provide information on the physical, biological and human environments. These analyzes are based on the expertise and experience of the professional, who uses a series of criteria based on the principles of geomorphological and ecological sciences, in order to provide a tool for planning and decision support for engineering or environmental projects. Normally, the success rate for field validations is > 85%.

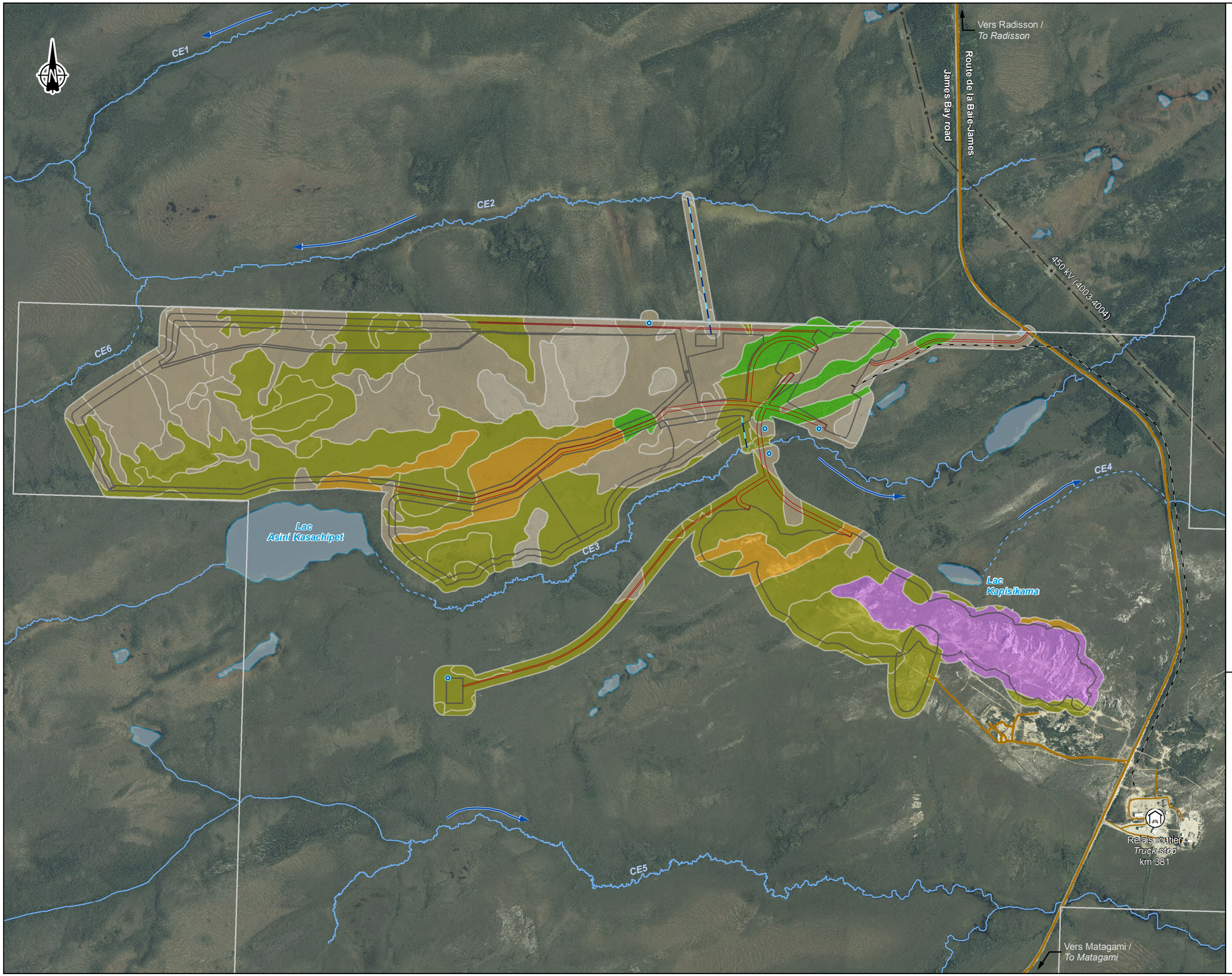
However, the recipient of this service must consider that the resolution and accuracy of the results are directly related to the specific needs and objectives of each project. These objectives make it possible to determine, at the beginning of the project, the scale of the analysis work or the minimum polygon area at which the work is to be done.

However, the accuracy of the cartographic product depends on certain limitations or constraints out of the control of professionals in geomorphology. Indeed, the level of certainty of the work depends on the resolution, the quality of the aerial photographs or the satellite images available, georeferencing (checkpoint surveyed on the ground), or the season of the shooting. For example, the presence of a snow cover may mask surface deposits, or the presence of leaves in the trees can prevent from seeing properly a stretch of stream or correctly delineate the contours of a wetland.

In all cases, since stereoscopic characterization is only one step in the methodological approach of geomorphology and arises from a work in front of the screen, it becomes necessary that the professional who carried out the work can validate the results using field control points and other tools at its disposal (eg. drilling, geophysical surveys). Adding information from other tools available to the geomorphologist therefore increases the accuracy, the level of certainty and reduces the risk of errors. The recipient of the service must therefore assume a certain level of certainty depending on whether or not he considers this methodological step.

APPENDIX

CEAA-8



Limite de propriété / *Property limit*

Composantes du projet / *Project Component*

- Route / *Road*
- Effluent minier / *Mine effluent*
- Station de pompage / *Pumping station*
- Câble de fibre optique / *Optical fiber cable*
- Infrastructures minières / *Mining Infrastructure*

Peuplements terrestres / *Terrestrial Vegetation*

- Affleurement rocheux / *Rock outcrop*
- Arbustaie / *Scrubland*
- Pessière noire à lichen / *Black spruce lichen forest*
- Anthropique / *Anthropogenic*

Peuplements humides / *Wetland*

- Tourbière arbustive / *Shrubby peatland*
- Tourbière boisée / *Treed peatland*
- Tourbière ouverte / *Open bog*

Infrastructures / *Infrastructure*

- Route principale / *Main road*
- Route d'accès / *Access road*
- Ligne de transport d'énergie / *Transmission line*
- Relais routier / *Truck stop*

Hydrographie / *Hydrography*

- CE3 Numéro de cours d'eau / *Stream number*
- Cours d'eau permanent / *Permanent stream*
- Cours d'eau à écoulement diffus ou intermittent / *Intermittent or diffused flow stream*
- Plan d'eau / *Waterbody*
- Sens d'écoulement de l'eau / *Direction of water flow*

GALAXY

Mine de lithium Baie-James / James Bay Lithium Mine

Étude d'impact sur l'environnement /
Environmental Impact Assessment

Milieux terrestres et humides affectés / *Affected terrestrial and wetlands*

Sources :
Orthoimage : Galaxy, août / august 2017
Données du projet / Project data : Galaxy, 2018
Fosse, carrière et entreposage des explosifs /
Pit, quarry and explosives magasine : Mining Plus, 2018
Secteur administratif et industriel et aire de minerai /
Administrative and industrial sector and ROM pad : Primero, 2018

No Ref : 171-02562-00_cACEE-08_wspT206_debois_190129.mxd

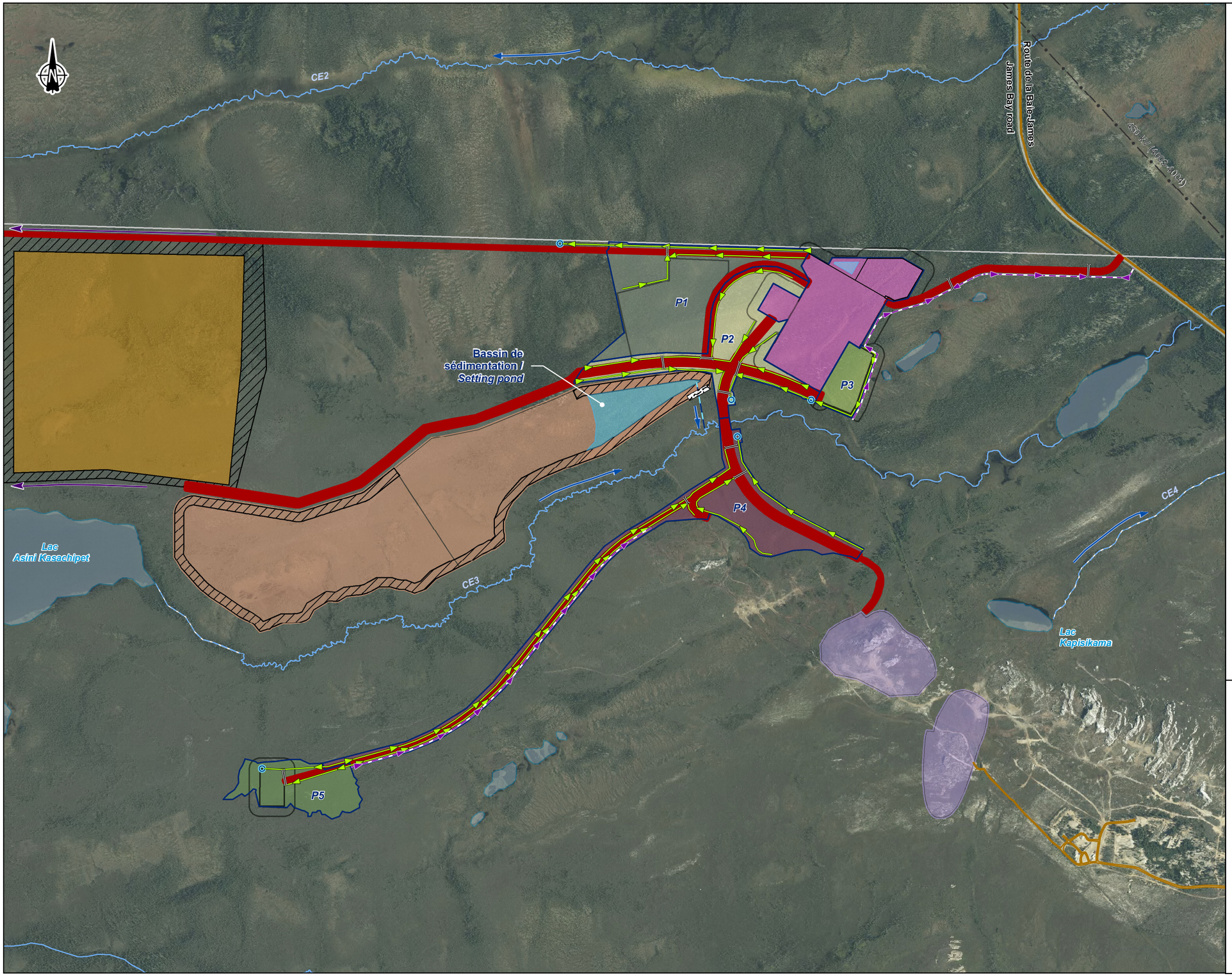
0 185 370 m
UTM 18, NAD83

Carte / *Map* ACÉE 8

wsp

APPENDIX

CEAA-10



Limite de propriété / *Property limit*

Composantes du projet / *Project Component*

Fossé de dérivation de l'eau propre / *Clean water diversion ditch*

Fossé d'eau de contact / *Contact water ditch*

Ponceau / *Culvert*

Autre fossé de dérivation / *Other derivation ditch*

Secteur de pompage P1 / *P1 pumping sector*

Secteur de pompage P2 / *P2 pumping sector*

Secteur de pompage P3 / *P3 pumping sector*

Secteur de pompage P4 / *P4 pumping sector*

Secteur de pompage P5 / *P5 pumping sector*

Secteur de pompage industriel et administratif / *Industrial and administrative pumping sector*

Secteur de pompage de la halde à stérile / *Waste rock stockpile pumping sector*

Secteur de pompage de la fosse / *Pit pumping sector*

Secteur de pompage des haldes à mort-terrain / *Overburden stockpiles pumping sector*

Bassin de sédimentation / *Settling pond*

Route / *Road*

Station de pompage (les eaux y sont pompées vers le bassin de sédimentation) / *Pumping station (water is pomped into the setting pond)*

Digue et berme / *Dike and berm*

Zone tampon pour la protection d'incendie / *Buffer area for fire protection*

Barrière à sédiment et boudins absorbants / *Sediment barrier and absorbent beads*

Infrastructures / *Infrastructure*

Route principale / *Main road*

Route d'accès / *Access road*

Ligne de transport d'énergie / *Transmission line*

Hydrographie / *Hydrography*

CE3 Numéro de cours d'eau / *Stream number*

Cours d'eau permanent / *Permanent stream*

Cours d'eau à écoulement diffus ou intermittent / *Intermittent or diffused flow stream*

Plan d'eau / *Waterbody*

GALAXY

Mine de lithium Baie-James / James Bay Lithium Mine

Étude d'impact sur l'environnement / *Environmental Impact Assessment*

Infrastructures de gestion de l'eau en phase de construction / *Water Management Infrastructure in the Construction Phase*

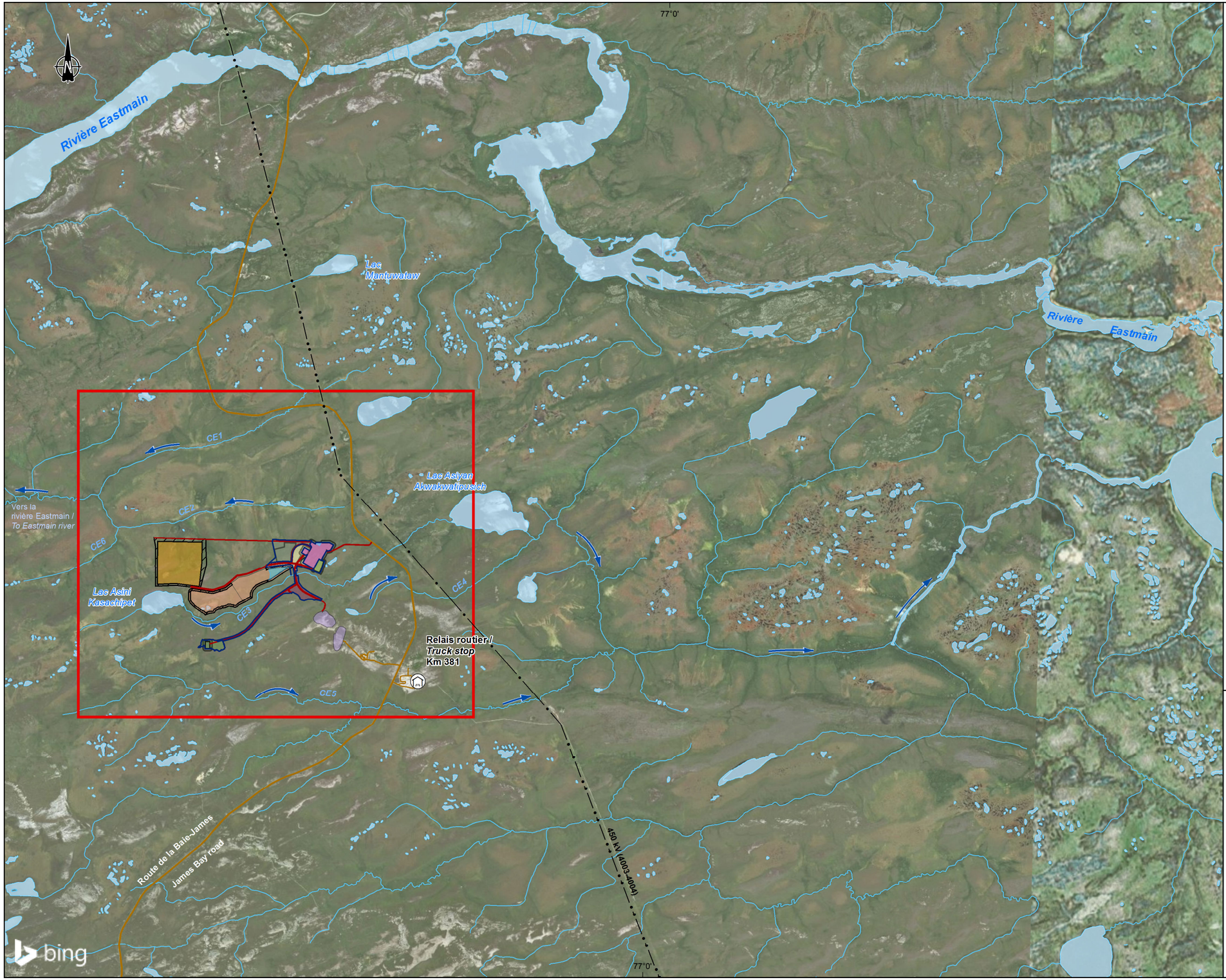
Sources :
Orthoimage : Galaxy, août / august 2017
Données du projet / Project data : Galaxy, 2018

No Ref : 171-02562-00_cACEE-10-1_wspT215_eau_constr_190208.mxd

0 125 250 m
UTM 18, NAD83

Carte / *Map* ACÉE 10-1

wsp



Composantes du projet / *Project Component*

- Secteur de pompage P1 / *P1 pumping sector*
- Secteur de pompage P2 / *P2 pumping sector*
- Secteur de pompage P3 / *P3 pumping sector*
- Secteur de pompage P4 / *P4 pumping sector*
- Secteur de pompage P5 / *P5 pumping sector*
- Secteur de pompage industriel et administratif / *Industrial and administrative pumping sector*
- Secteur de pompage de la halde à stérile / *Waste rock stockpile pumping sector*
- Secteur de pompage de la fosse / *Pit pumping sector*
- Secteur de pompage des haldes à mort-terrain / *Overburden stockpiles pumping sector*
- Bassin de sédimentation / *Settling pond*
- Route / *Road*
- Station de pompage / *Pumping station*
- Digue et berme / *Dike and berm*
- Zone tampon pour la protection d'incendie / *Buffer area for fire protection*

Infrastructures / *Infrastructure*

- Route principale / *Main road*
- Route d'accès / *Access road*
- Ligne de transport d'énergie / *Transmission line*

Hydrographie / *Hydrography*

- CE3 Numéro de cours d'eau / *Stream number*
- Cours d'eau permanent / *Permanent stream*
- Cours d'eau à écoulement diffus ou intermittent / *Intermittent or diffused flow stream*
- Plan d'eau / *Waterbody*
- Sens d'écoulement de l'eau / *Direction of water flow*

GALAXY

Mine de lithium Baie-James / *James Bay Lithium Mine*

Étude d'impact sur l'environnement / *Environmental Impact Assessment*

Gestion de l'eau en phase de construction / *Water Management in Construction Phase*

Sources :
Canvec, 1 : 50 000, RNCan, 2015
BDGA, 1 : 1 000 000, RNCan, 2011
Terres de catégorie / Category land : Carto-Média, 2001
Inventaire / Inventory : WSP, 2018

Cartographié par / mapping by : WSP

No Ref : 171-02562-00_cACEE-10-2_wspT216_gestion_eau2_190207.mxd

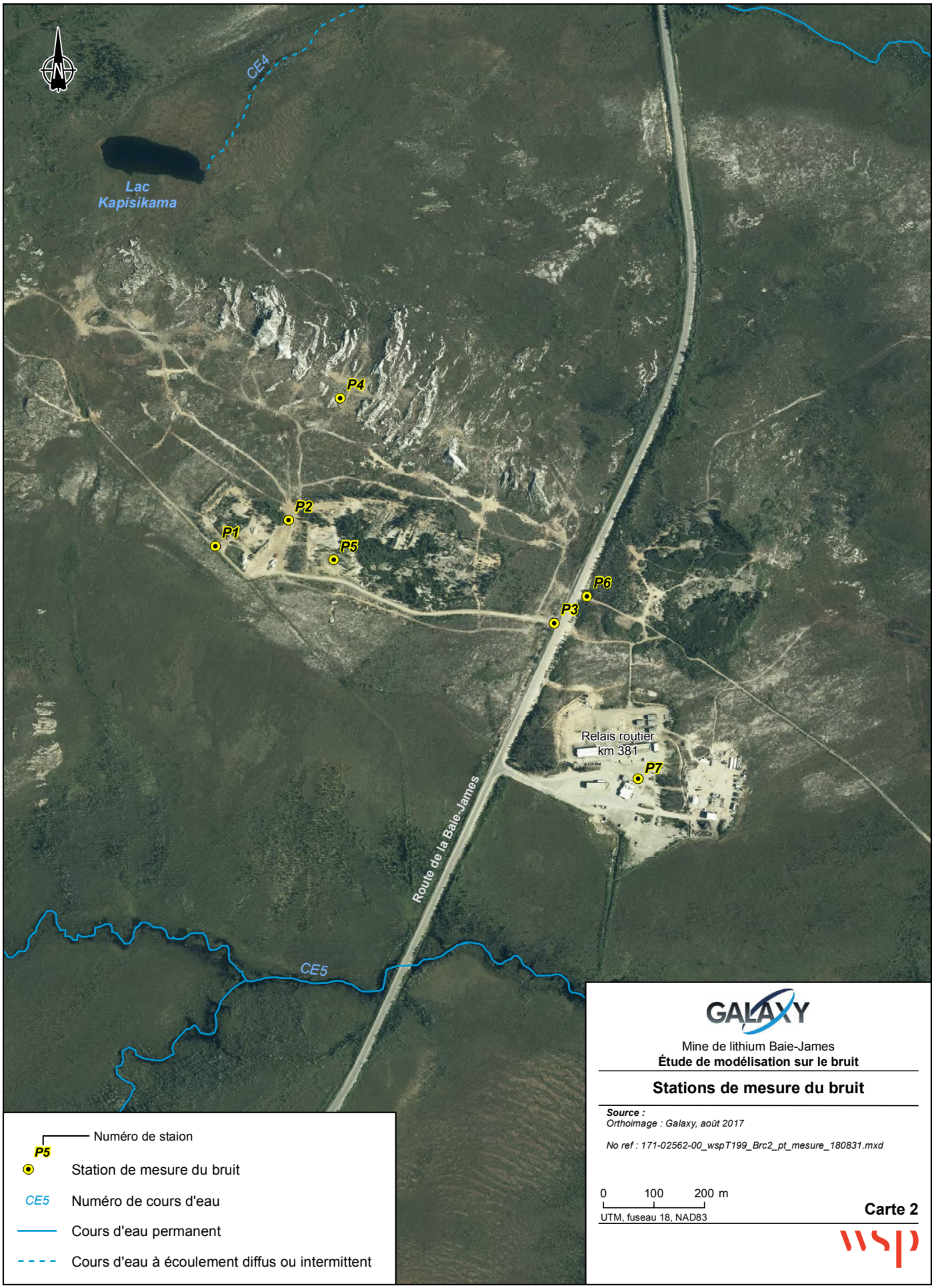
0 0,65 1,3 km
UTM 18, NAD83

Carte / *Map ACÉE 10-2*

wsp

APPENDIX

CEAA-19-1



GALAXY

Mine de lithium Baie-James

Étude de modélisation sur le bruit

Stations de mesure du bruit

Source :
Orthoimage : Galaxy, août 2017

No ref : 171-02562-00_wspT199_Brc2_pt_mesure_180831.mxd

0 100 200 m

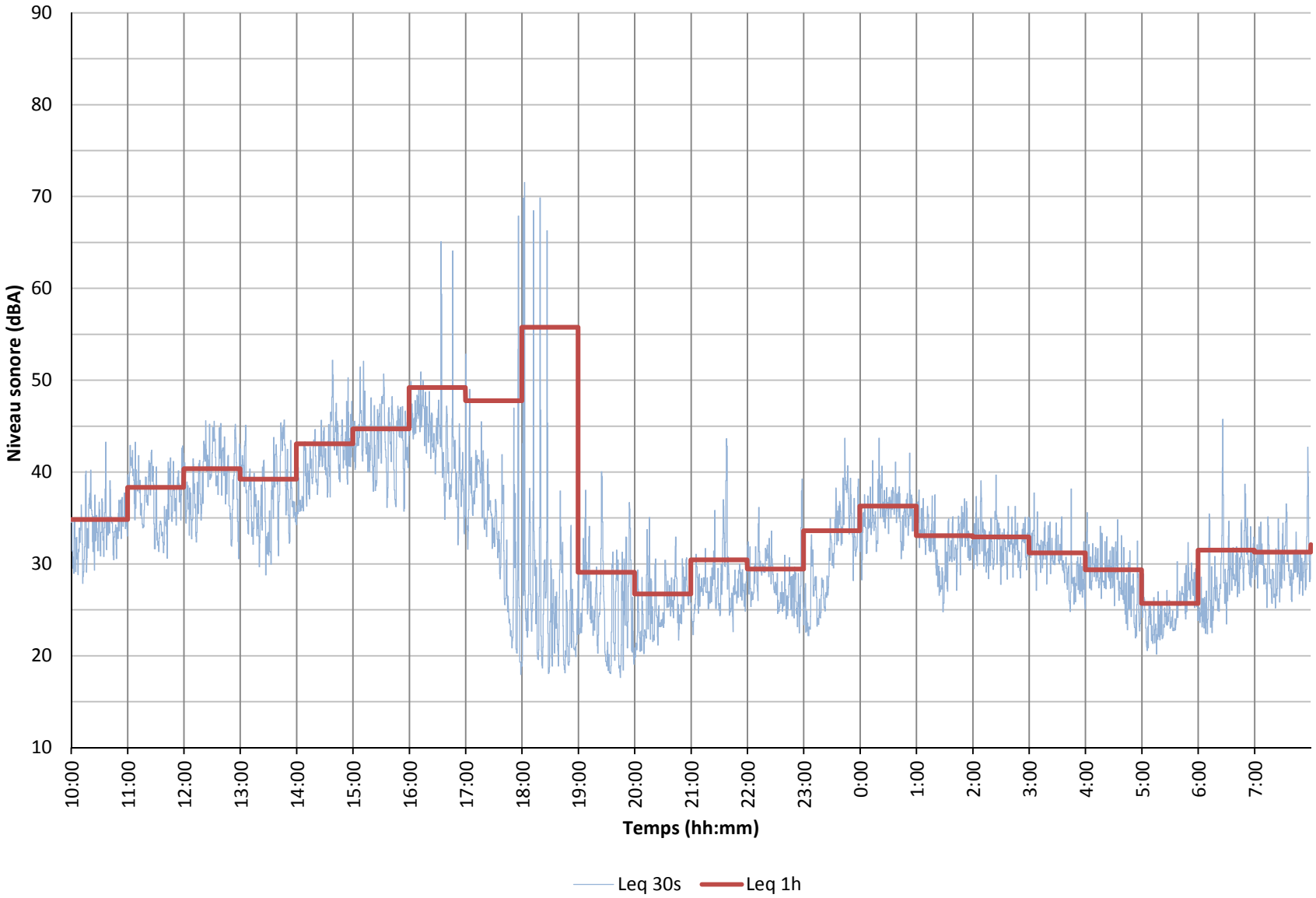
UTM, fuseau 18, NAD83

Carte 2

wsp

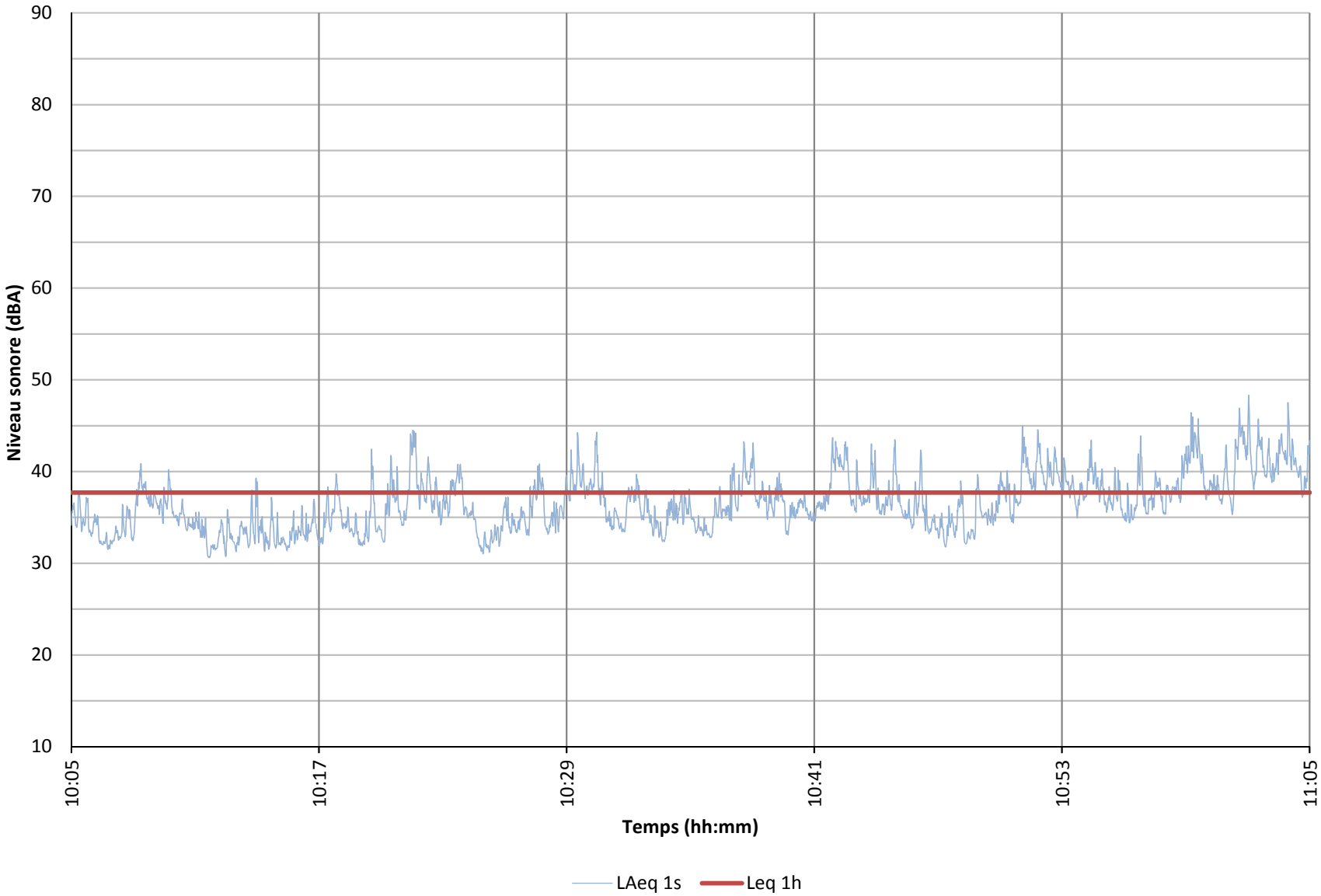
Résultats des mesures sonores au point 1

du 7 au 8 octobre 2011



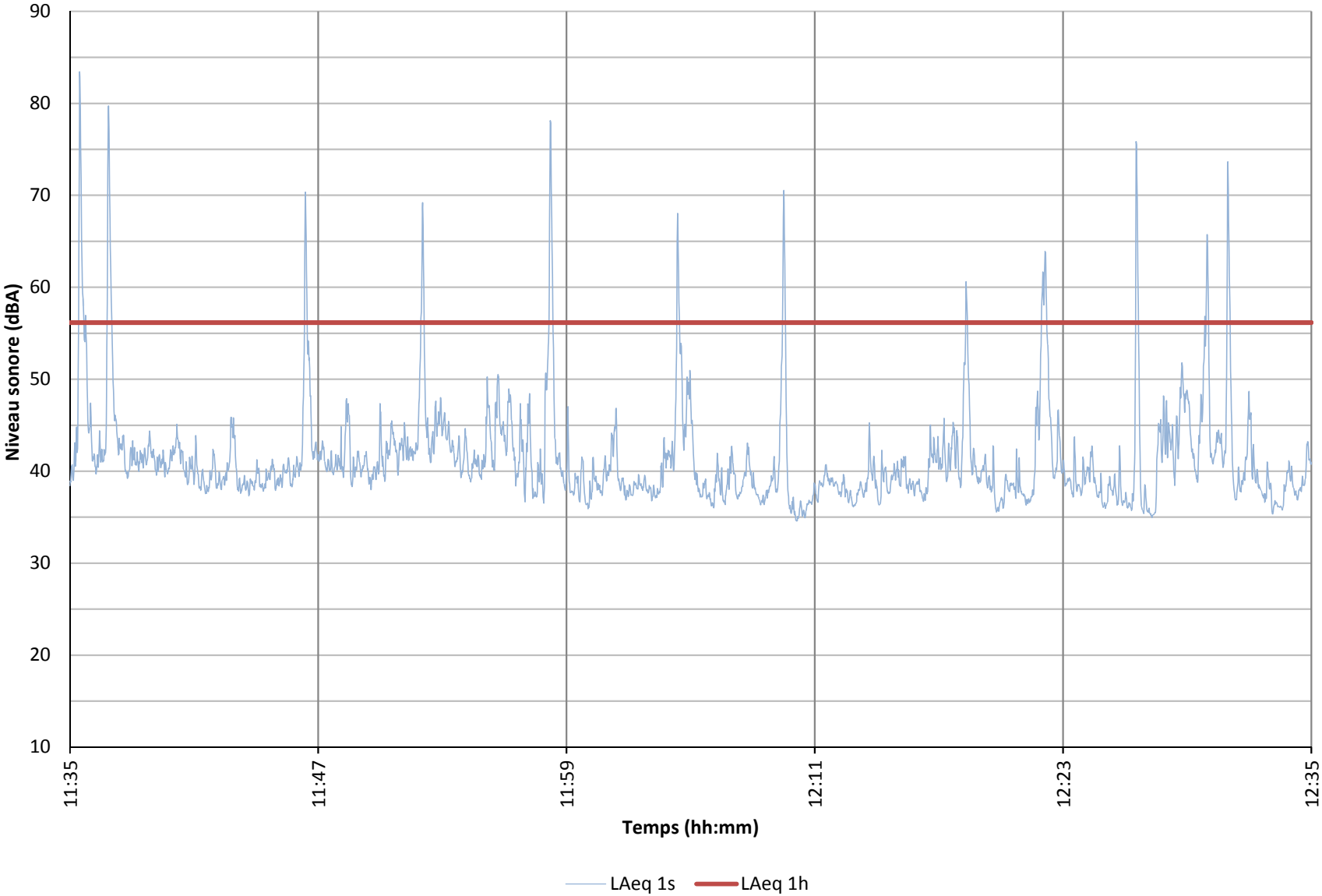
Résultats des mesures sonores au point 2

7 octobre 2011



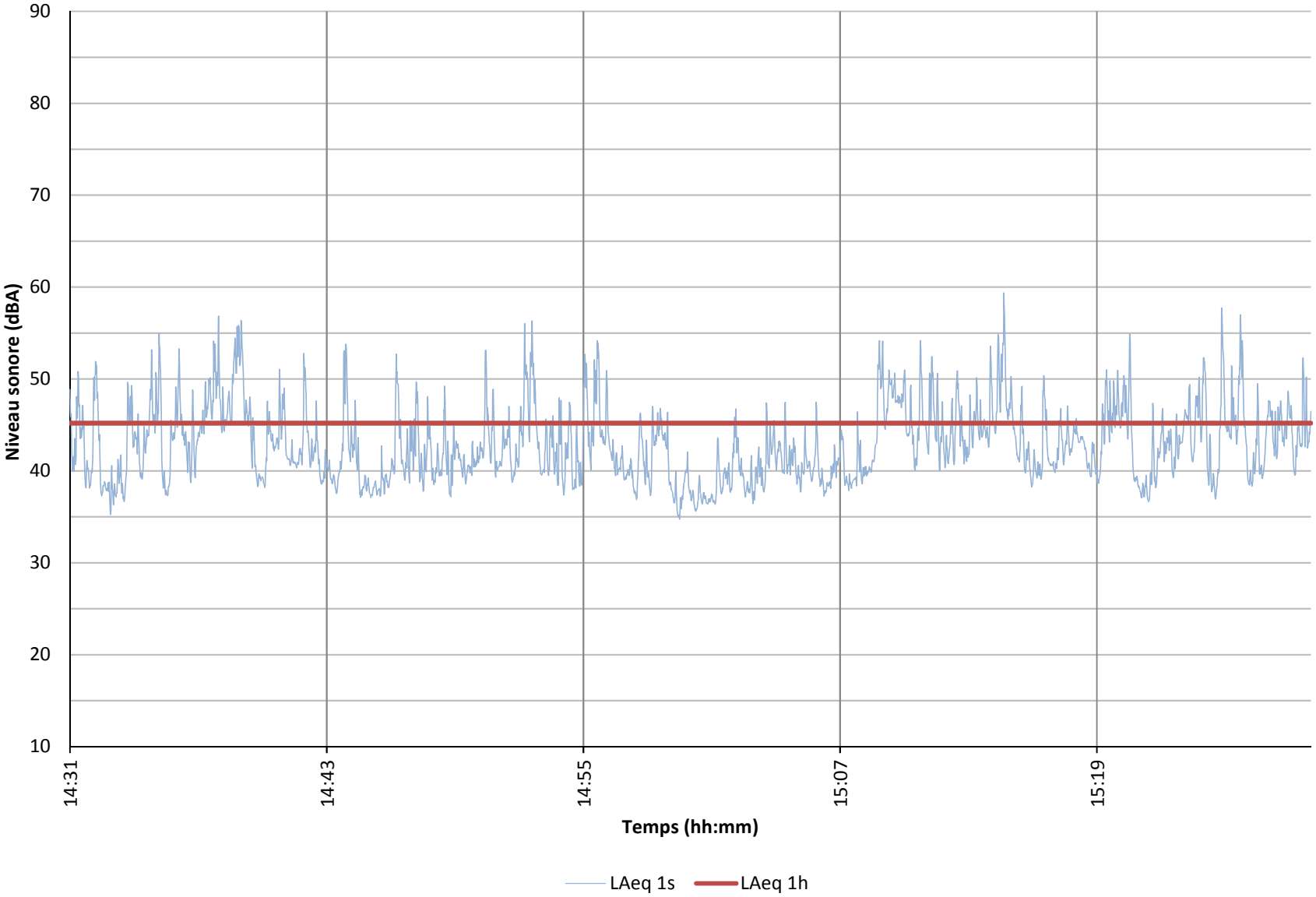
Résultats des mesures sonores au point 3

7 octobre 2011



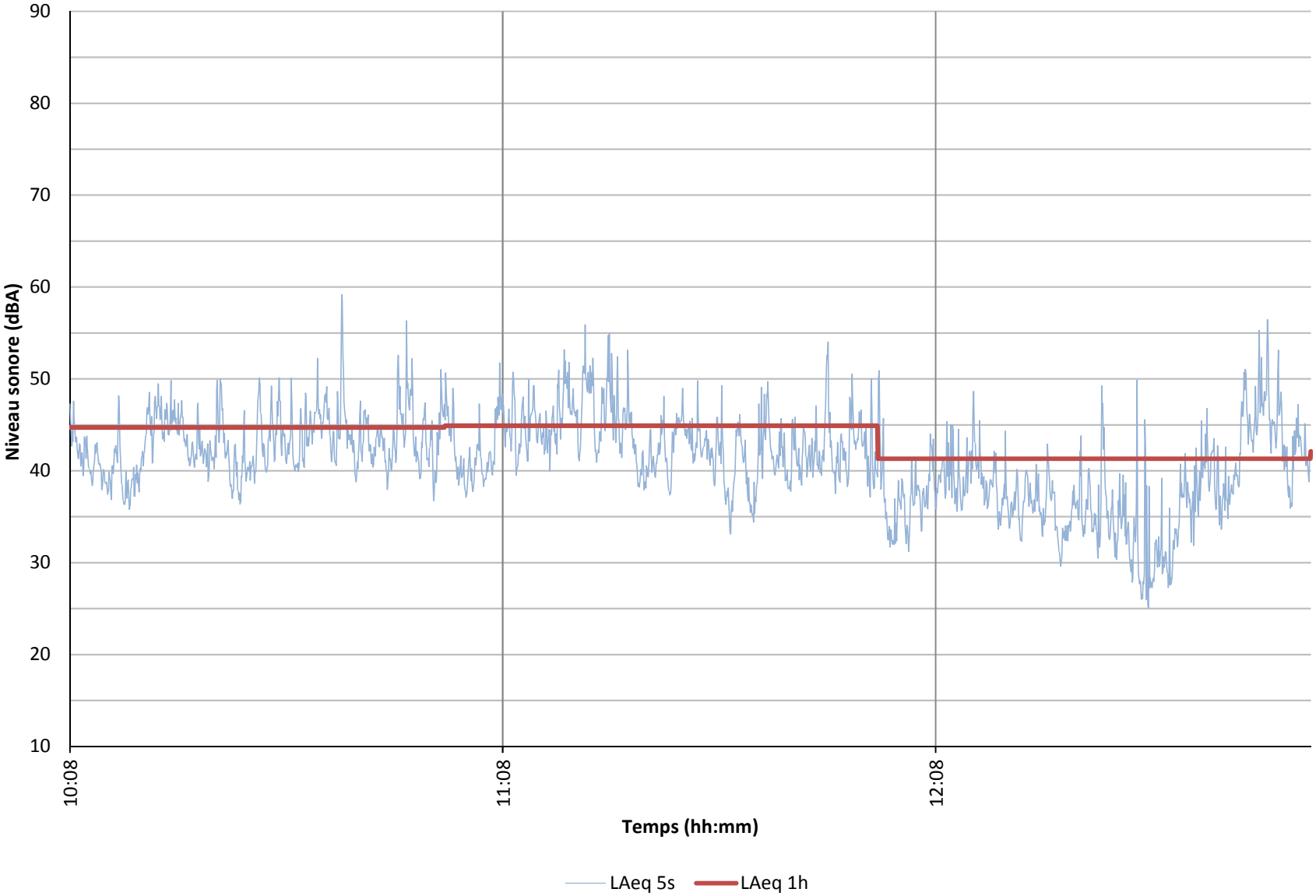
Résultats des mesures sonores au point 4

7 octobre 2011



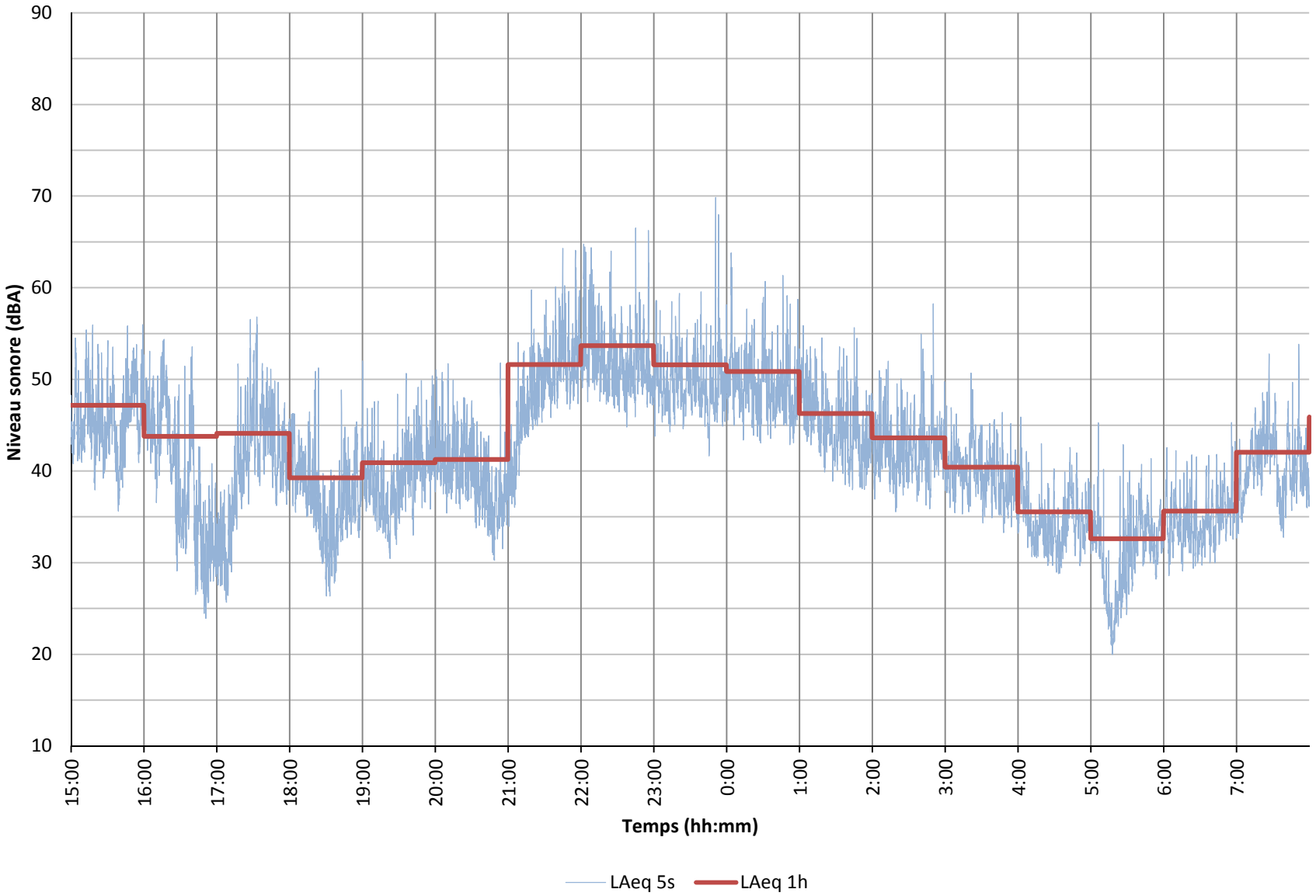
Résultats des mesures sonores au point 5 (10:08-13:00)

8 octobre 2011



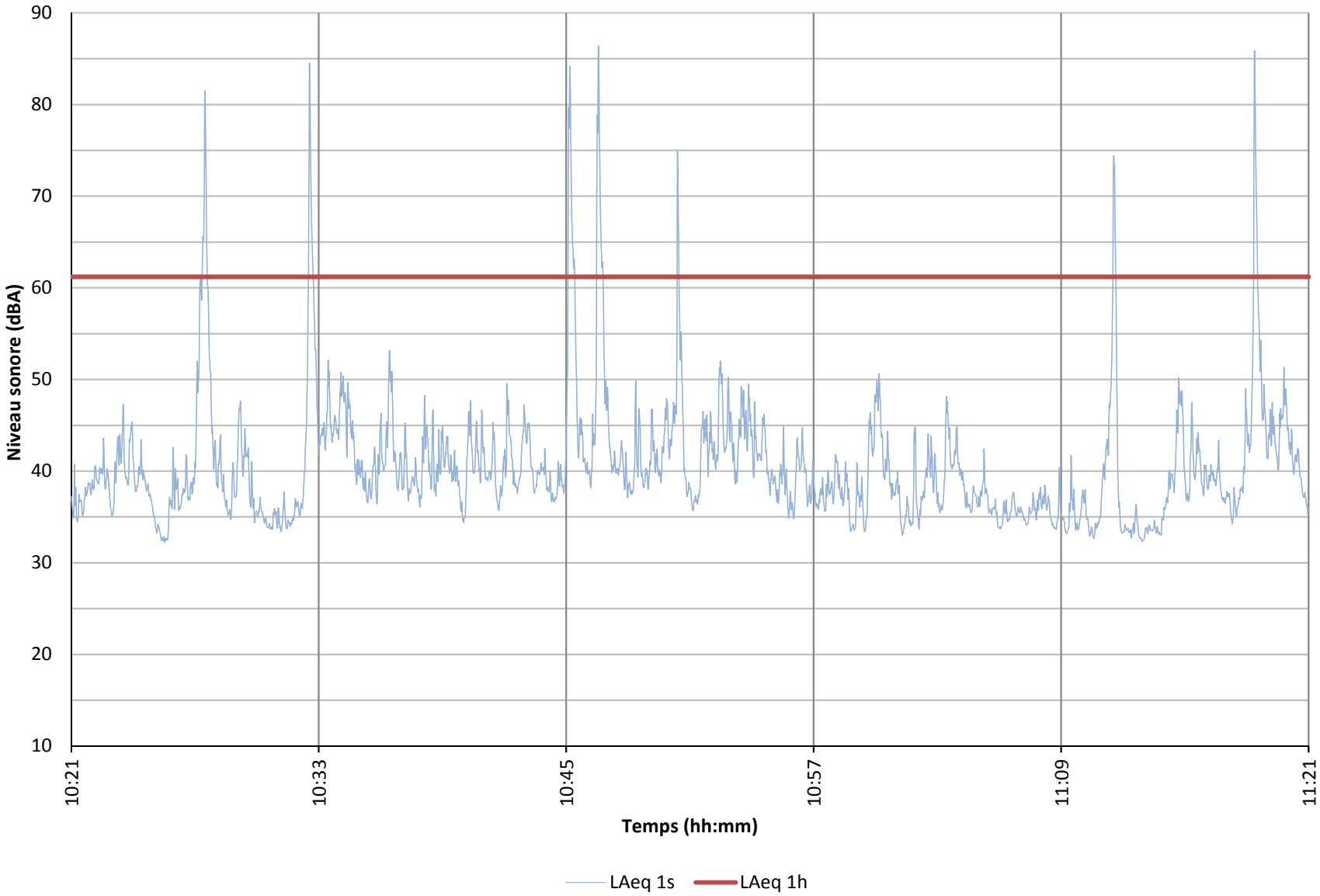
Résultats des mesures sonores au point 5 (15:00-8:00)

du 8 au 9 octobre 2011



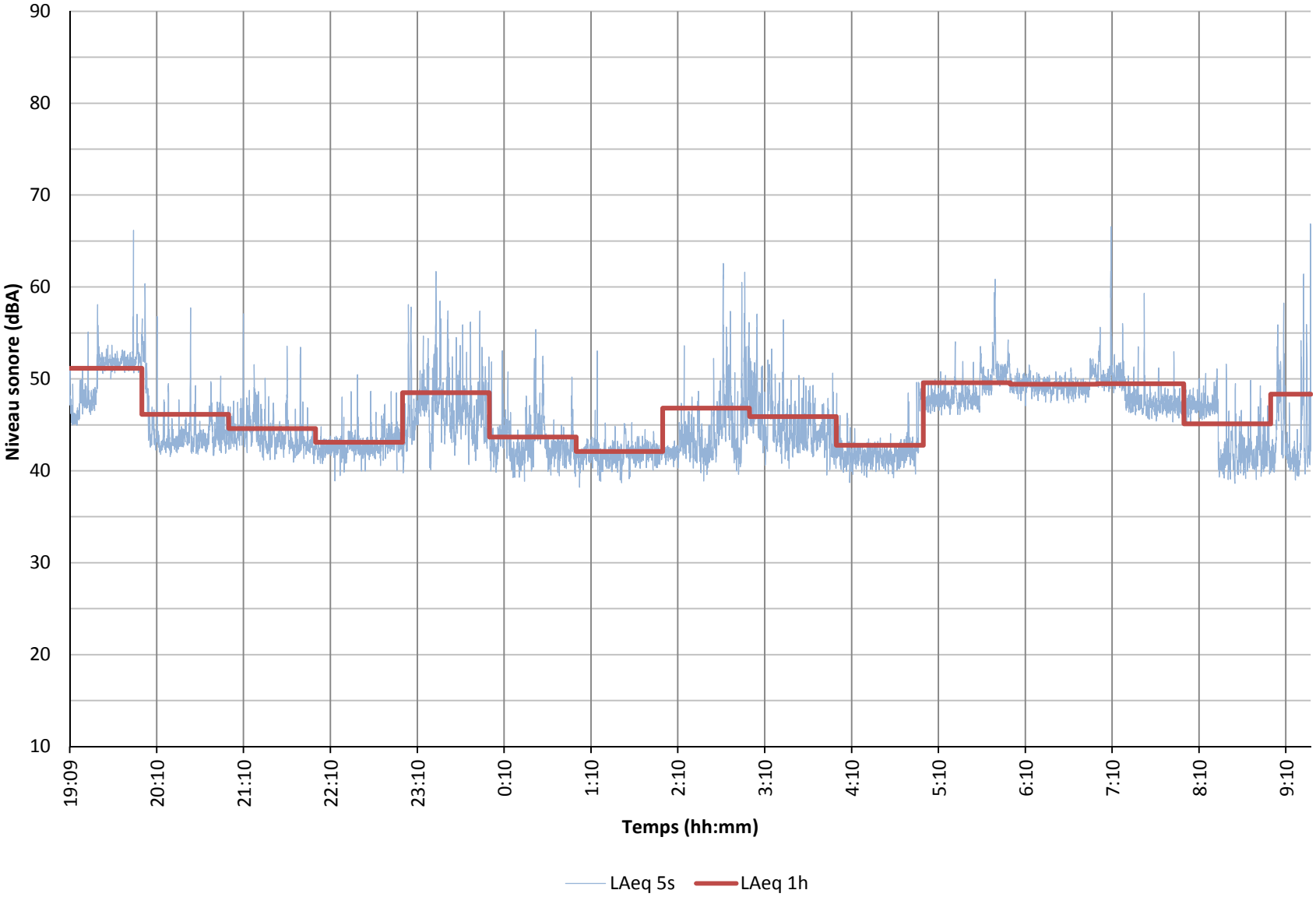
Résultats des mesures sonores au point 6

8 octobre 2011



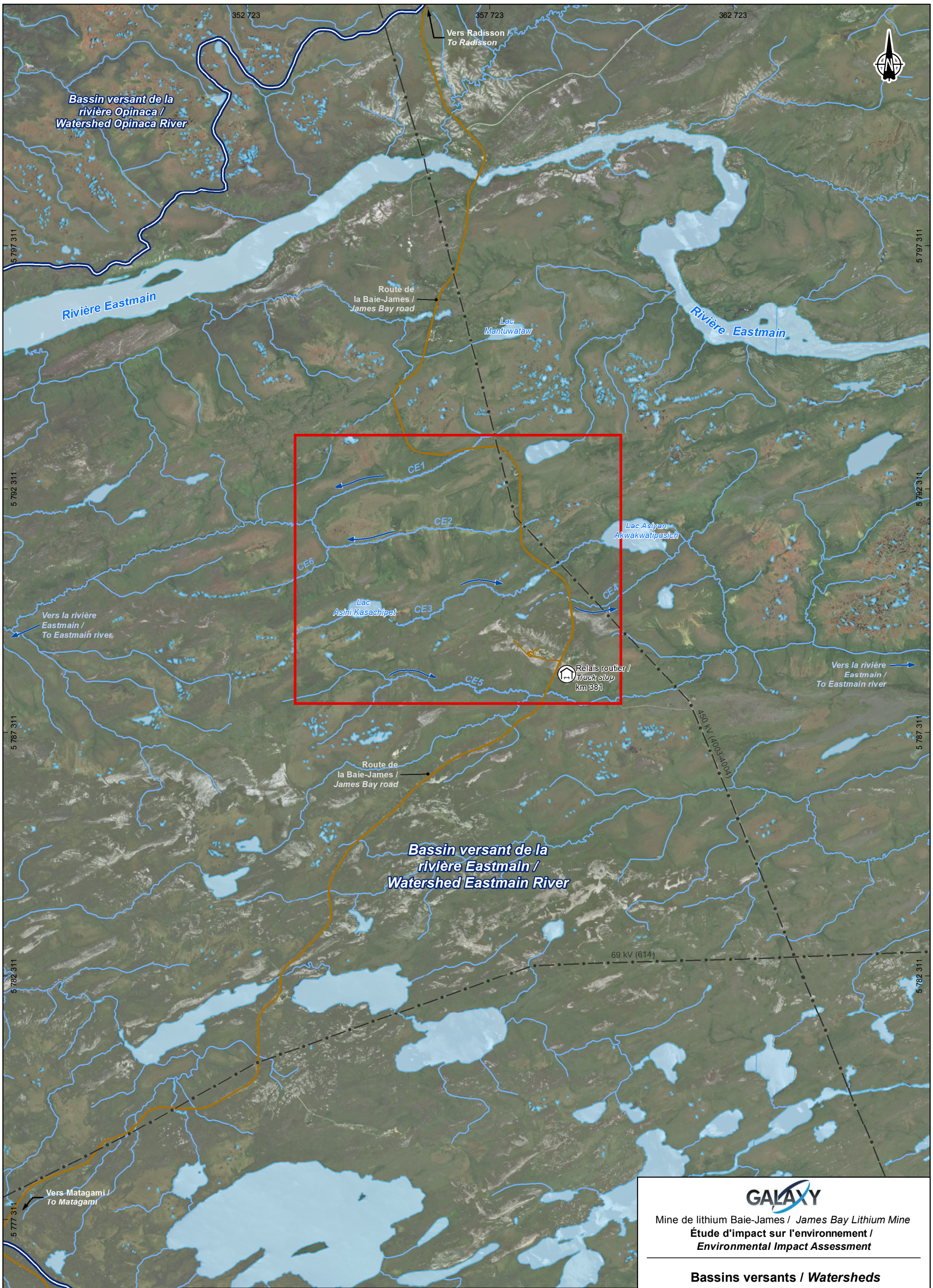
Résultats des mesures sonores au point 7

du 9 au 10 octobre 2011



APPENDIX

CEAA-21



Zone d'étude locale / *Local study area*

Hydrographie / *Hydrography*

Bassin versant / *Watershed*

CE3 Numéro de cours d'eau / *Stream number*

Cours d'eau permanent / *Permanent stream*

Cours d'eau à écoulement diffus ou intermittent / *Diffused or intermittent flow stream*

Plan d'eau / *Waterbody*

Sens d'écoulement de l'eau / *Direction of water flow*

Infrastructures / Infrastructure

Route principale / *Main road*

Route d'accès / *Access road*

Ligne de transport d'énergie / *Transmission line*

Relais routier / *Truck stop*

GALAXY

Mine de lithium Baie-James / *James Bay Lithium Mine*

Étude d'impact sur l'environnement /
Environmental Impact Assessment

Bassins versants / *Watersheds*

Sources :
Image, Bing Maps Aerial
Inventaire / Inventory, WSP 2017
Bassin versant / Watersheds: MDDELCC, 2018

No Ref : 171-02562-00_cACEE-21_wspT205_BV_190207.mxd

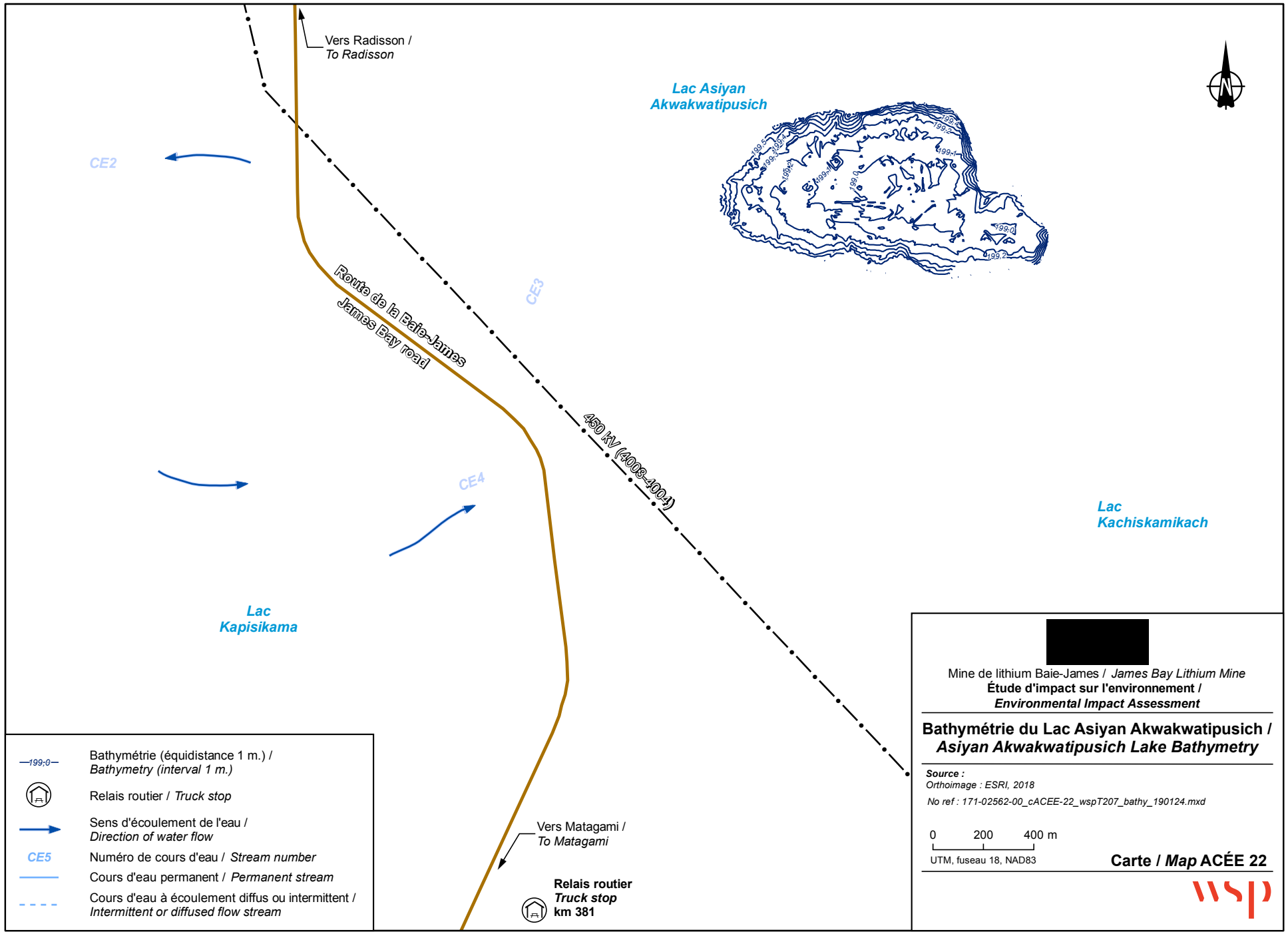
0 750 1 500 m
UTM 18, NAD83

Carte / *Map* ACÉE 21

wsp

APPENDIX

CEAA-22


Vers Radisson /
To Radisson
Lac Asiyan
Akwakwatipusich
CE2
CE3
CE4
Route de la Baie-James
James Bay road
450 kV (4003-4004)
Lac
Kachiskamikach
Lac
Kapisikama
Vers Matagami /
To Matagami
Relais routier
Truck stop
km 381
199;0
Bathymétrie (équidistance 1 m.) /
Bathymetry (interval 1 m.)
Relais routier / Truck stop
Sens d'écoulement de l'eau /
Direction of water flow
CE5
Numéro de cours d'eau / Stream number
Cours d'eau permanent / Permanent stream
Cours d'eau à écoulement diffus ou intermittent /
Intermittent or diffused flow stream
[redacted]
Mine de lithium Baie-James / James Bay Lithium Mine
Étude d'impact sur l'environnement /
Environmental Impact Assessment
Bathymétrie du Lac Asiyan Akwakwatipusich /
Asiyan Akwakwatipusich Lake Bathymetry
Source :
Orthoimage : ESRI, 2018
No ref : 171-02562-00_cACEE-22_wspT207_bathy_190124.mxd
0 200 400 m
UTM, fuseau 18, NAD83
Carte / Map ACÉE 22
wsp

APPENDIX

CEAA-24

Tableau R-24a **Substrat (présence)**

Cours d'eau	Segment	Date	TypeMilieu	ProfondeurMax	Faciès	Vitesse_Moy	Galet	Caillou	Sable	Limon	MO (peu)	MO	FraiePotentielle	Fosse_Nb	Valeur_Alevin	Valeur_Juvénile	Notes
CE1	S1 - S2	2017-09-09	Cours d'eau	0,9	Méandre	0,03	x	x		x			Non	0	Faible	Faible	Bel habitat, potentiel pour la truite mais manque de vitesse.
CE2	S1 - S2	2017-09-09	Cours d'eau	1,5	Méandre	0,01				x	x		Non	0	Faible	Faible	Potentiel moyen pour le brochet.
CE3	S1 à S7	2017-09-07	Cours d'eau	150	Méandre	0,01						x	Non	0	Faible	Faible	Site homogène sans variation.
CE4	S1 à S3	2017-09-13	Cours d'eau	3	Méandre	0,01			x	x	x		ND	0	Faible	Faible	Cours d'eau recouvert d'arbustes et de sphaignes près du lac aux perchaudes. Nombreux méandres.
CE5	S1 - S2	2017-09-07	Cours d'eau	100	Chenal	0						x	Non	0	Faible	Faible	

Tableau R-24b Caractérisation des rives, de la transparence et LHE

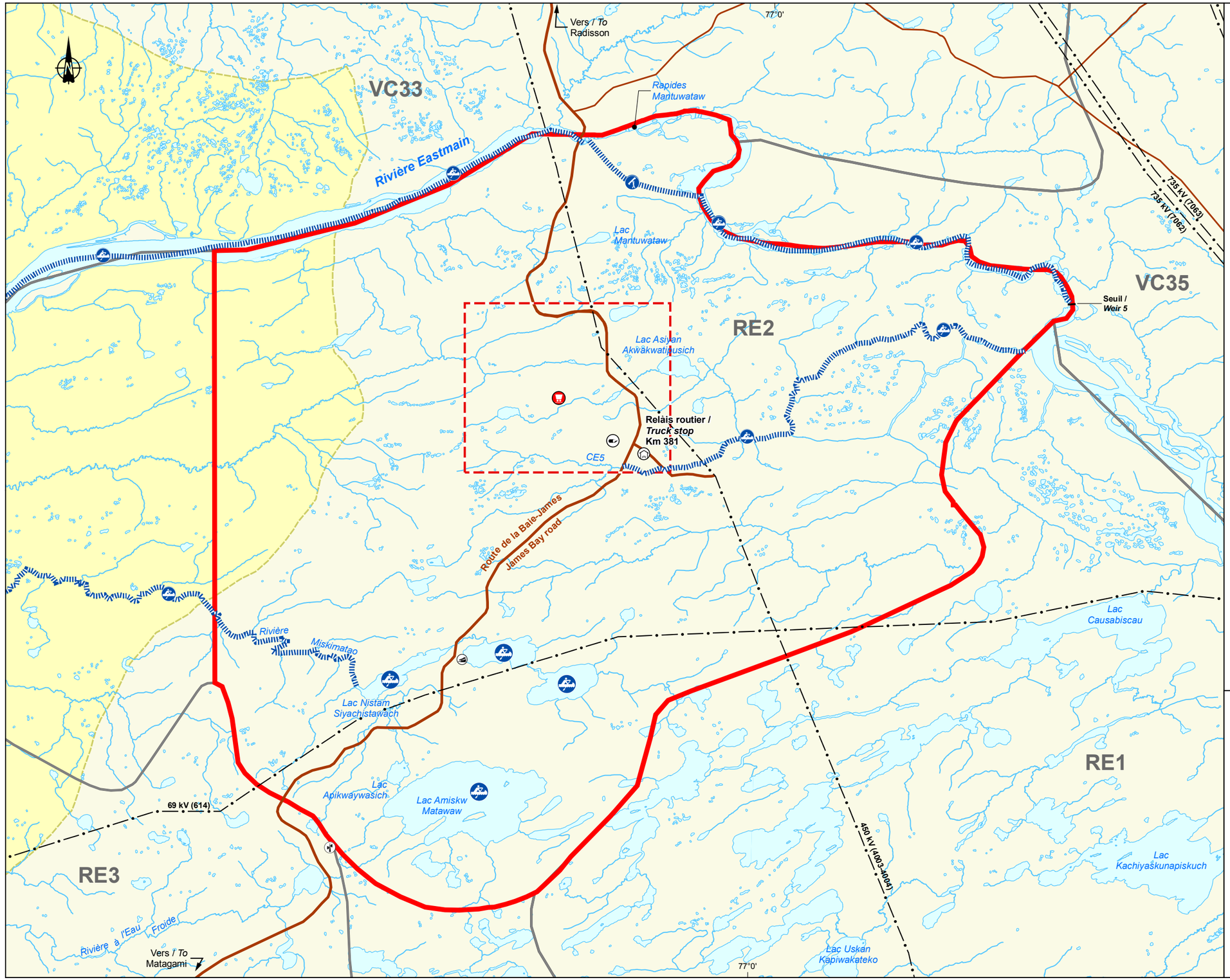
Cours d'eau	Segment	Date	TypeMilieu	Rive_Talus_Gauche_Hauteur	Rive_Talus_Droite_Hauteur	Rive_Droite_Surplomb	Rive_Gauche_Surplomb	Rive_Gauche_Erosion	Rive_Droite_Erosion	Secchi_Apparition	Secchi_Disparition	LHE_Hauteur	LHE_RiveGauche_largeur	LHE_RiveDroite_largeur
CE1	S1 - S2	2017-09-09	Cours d'eau	0,6	0,7	0	0	0	0	0,35	0,35	0,6	1,5	1
CE2	S1 - S2	2017-09-09	Cours d'eau	0,2	0,2	0	0	0	0	0,4	0,4	0,2	3	5
CE3	S1 à S7	2017-09-07	Cours d'eau	0,1	0,1	0	0	0	0	0,25	0,25	0	5	50
CE4	S1 à S3	2017-09-13	Cours d'eau	0,4	0,5	0,1	0,1	0	0			0,3	0,2	0,1
CE5	S1 - S2	2017-09-07	Cours d'eau	0,2	0,1	0	0	0	0	0,25	0,3	0	50	999

Tableau R-24c Caractérisation de la végétation

Cours d'eau	Segment	Date	TypeMilieu	Vegetation_ Feuillue_Gauche	Vegetation_ Feuillue_Droite	Vegetation_ Conifère_Droite	Vegetation_ Conifère_Gauche	Vegetation_ Arbuste_Gauche	Vegetation_ Arbuste_Droite	Vegetation_ Éricacée_Droite	Vegetation_ Éricacée_Gauche	Vegetation_ Herbacée_Gauche	Vegetation_ Herbacée_Droite	Vegetation_ Tourbière_Droite	Vegetation_ Tourbière_Gauche	Vegetation_ Immergée	Vegetation_ Émergeante	Vegetation_ Flottante	Abri_ StructuresAquatiques	Abri_Rive	Abri_ PlantesAquatiques
CE1	S1 - S2	2017-09-09	Cours d'eau	0	0	0,08	0,02	0,4	0,6	0,2	0,1	0,1	0,05	0,9	1	0,1	0,2	0	0,05	0,4	0,1
CE2	S1 - S2	2017-09-09	Cours d'eau	0	0	0	0	0,05	0,03	0	0	0,95	0,9	0,5	0,5	0	0,3	0	0	0	0
CE3	S1 à S7	2017-09-07	Cours d'eau	0	0	0	0	0	0	0,02	0,12	0,9	0,9	1	0,8	0	0	0	0	0	0
CE4	S1 à S3	2017-09-13	Cours d'eau	0	0	0,2	0,05	0,4	0,4	0,3	0,25	0,3	0,7	0,4	0,7	0	0,1	0	0,1	0,6	0
CE5	S1 - S2	2017-09-07	Cours d'eau	0	0	0	0,08	0	0	0,02	0,05	0,85	0,95	1	1	0	0	0	0	0	0

APPENDIX

CEAA-31



Projet mine de lithium Baie-James / *James Bay lithium mine Project*

Infrastructures / *Infrastructure*

- Route principale / *Main road*
- Route d'accès / *Access road*
- Ligne de transport d'énergie / *Transmission line*
- Relais routier / *Truck stop*
- Tour de télécommunication / *Telecommunication tower*
- Lieu d'enfouissement en territoire isolé (LETI) / *Remote landfill*
- Rampe de mise à l'eau / *Boat ramp*

Eaux navigables / *Navigable water*

- Parcours de navigation / *Navigation route*
- Portage / *Portage*

Limites / *Limits*

- Zone d'étude du milieu humain / *Social environment study area*
- Zone d'étude locale / *Local study area*
- Terre de catégorie II / *Category II land*
- RE2 — Terrain de trappage / *Trapline*

[redacted]

Mine de lithium Baie-James / *James Bay Lithium Mine*
Étude d'impact sur l'environnement /
Environmental Impact Assessment

Eaux navigables / *Navigable Water*

Sources :
Canvec, 1 : 50 000, RNCan, 2015
BDGA, 1 : 1 000 000, RNCan, 2011
Terres de catégorie / Category land : Carto-Média, 2001
Inventaire / Inventory : WSP, 2018

Cartographié par / mapping by : WSP

No Ref : 171-02562-00_cACEE-31_wspT208_navig_190207.mxd

0 1,25 2,5 km
UTM 18, NAD83

Carte / *Map ACÉE 31*

[redacted]

APPENDIX

CEAA-34

PRIMERO REPORT "PROJECT DEFINITION DOCUMENT 15118-REP-PM-102" - PRESENTED IN A SEPARATE DOCUMENT

APPENDIX

CEAA-44

SANEXEN REPORT "ÉVALUATION DES RISQUES TOXICOLOGIQUES À LA SANTÉ HUMAINE" - PRESENTED IN A SEPARATE DOCUMENT

APPENDIX

CEAA-56

TUGLIQ Energy Co.
2060 De la Montagne, Suite 401
Montréal, (Québec)
Canada, H3G 1Z7

April 14th, 2018

Power Supply of the James Bay Mine

To: Gail Amyot
Director of Health, Safety and Environment
Galaxy Resources Limited

TUGLIQ performed a high-level assessment of different sources of energy to supply the Galaxy Resources Limited's James Bay mine. Wind and solar energy were compared to connecting on the Hydro Québec's grid.

The average wind speed in the area ranges from 7 to 7.5 m/s. It is considered a good resource and it is economically viable when compared to building new generating asset from other sources. It cannot be considered a source of firm power.

The solar irradiance ranges between 1100 to 1200 kWh/m^2 in the area. It is considered a poor to average resource and is not economical when compared to building new generating assets from other sources. It cannot be considered a source of firm power.

The nearby grid connection is in the vicinity of the mine. Large hydroelectricity dams nearby are operated by Hydro Quebec. Industrial tariffs are very attractive in the Quebec province and this is considered an economical option when compared to building new generating asset from other sources. It can be considered a source of firm power.

With a Life of Mine expected between 15 and 20 years, preliminary results concluded that connecting the mine to the nearby grid is the preferred solution, delivering the lowest cost of energy to the mine.

We remain at your disposal for any additional enquiries

Best Regards,

<Original signé par>

Nicolas Séguin
Director of Business Development and Projects

Mobile : +1 514-216-5546
Email : nseguin@tugliq.com

APPENDIX

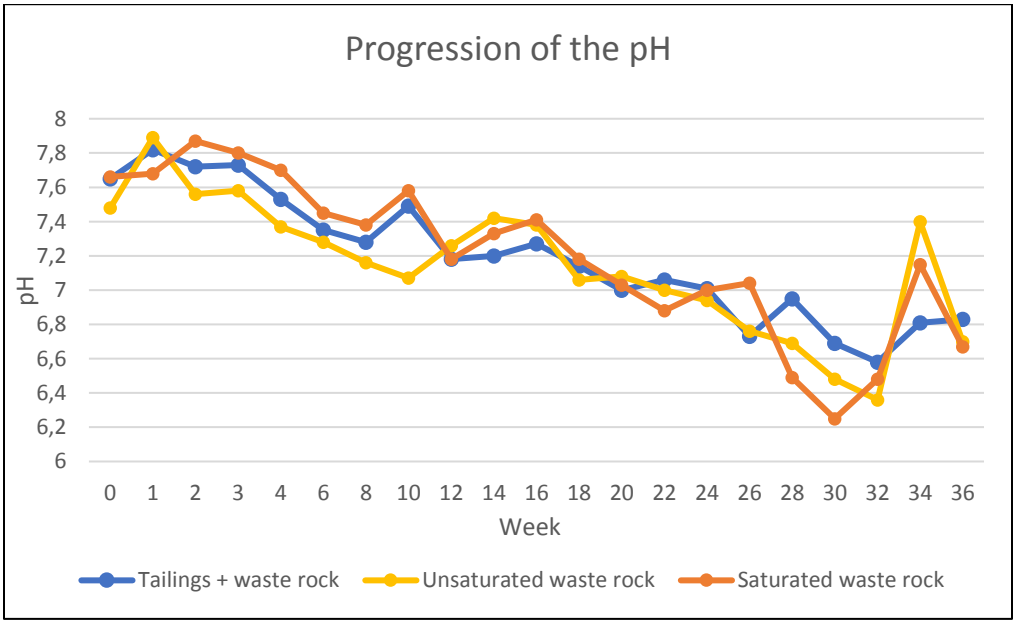
CEAA-75

PRELIMINARY TECHNICAL ASSESSMENT

TO:	Gail Amyot
FROM:	Fannie McMurray Pinard, Eng. / Steve St-Cyr, Eng.
SUBJECT:	Summary analysis – Kinetic testing – Lithium Mine, Baie-James – First 36 weeks
PROJECT N°:	171-02562-00
DATE:	February 19, 2019

1. PROGRESSION OF THE PH

During the first 26 weeks of testing, the pH remained between 6.7 and 7.9 for all three columns. The pH shows a downward trend starting at the initial test until week 30/32. A sharp increase is observed at week 34. However, the laboratory reported that due to maintenance on the water supply line, tap water was mistakenly used to perform the flush on week 34; this may explain the rise in the pH value. On the previous week, week 32, the pH seemed to stabilize. By week 36, the pH seemed to be moving back towards the value of week 32, for all three columns. However, it will be necessary to wait for the next results to rule on the clear tendency of the pH. For now, the three columns do not produce acid leachate.



1135, boulevard Lebourgneuf
Québec (Québec)
G2K 0M5 Canada

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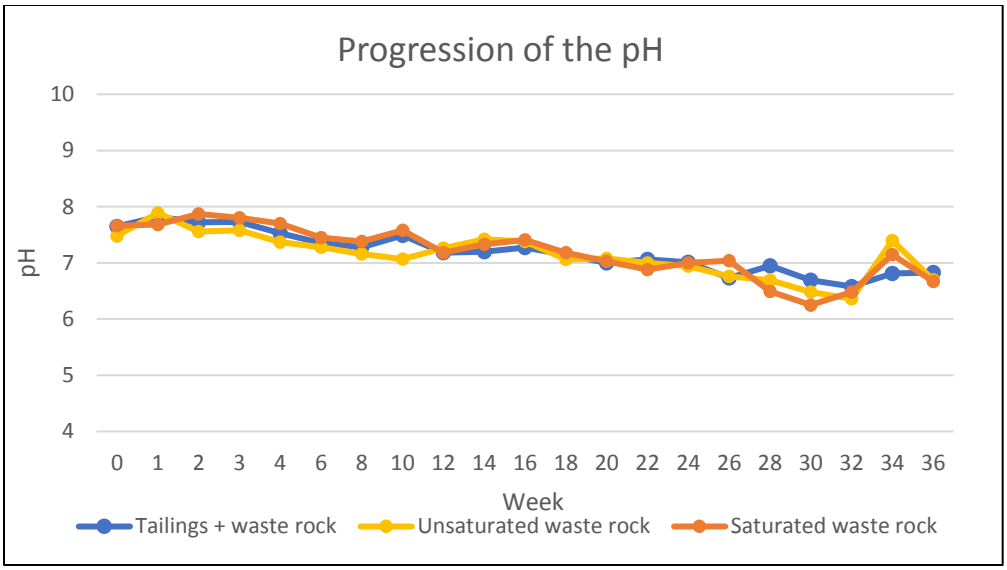
www.wsp.com

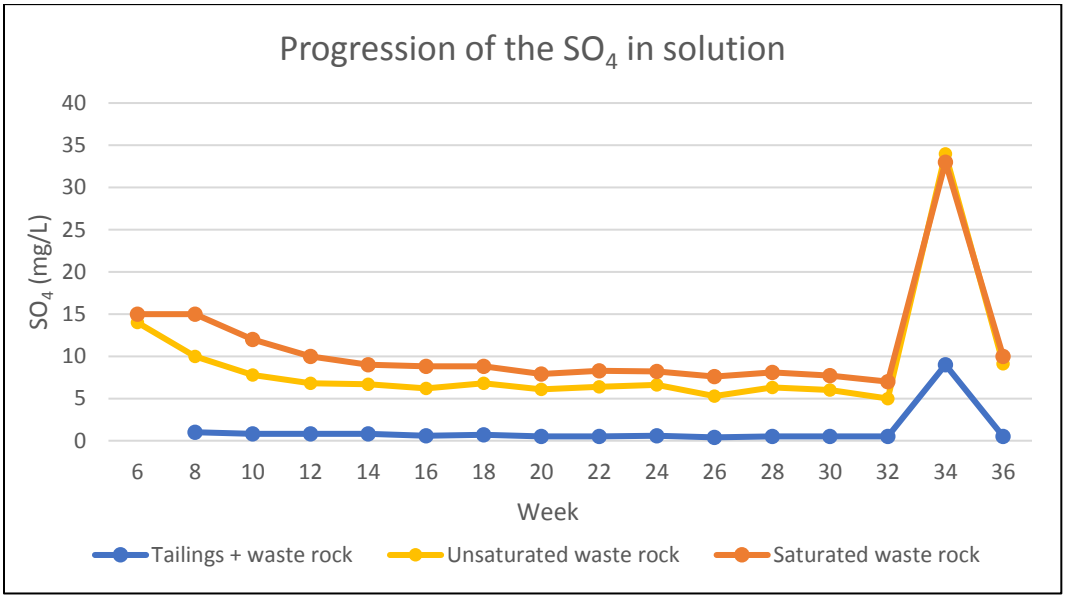


2. PROGRESSION OF THE SO_4 IN SOLUTION

The SO_4 concentrations in solution were measured starting on week 6 or 8 of the testing. They remained constant and near zero for the tailings and waste rock column.

The SO_4 concentrations in solution for the saturated and unsaturated waste rock columns followed the same trend, a gradual decrease in concentrations between week 6 and 14, followed by a relatively stable plateau. However, the laboratory reported that due to maintenance on the water supply line, tap water was mistakenly used to perform the flush on week 34; this may explain the peak of SO_4 concentrations seen on week 34.

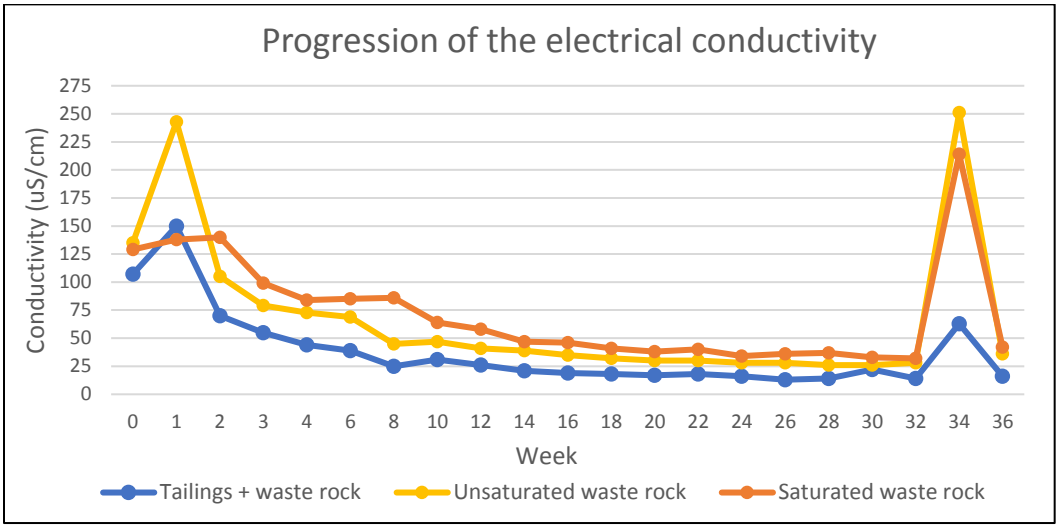
The next testing weeks will allow to observe if the SO_4 concentrations in solution continue to stabilize.



3. PROGRESSION OF THE ELECTRICAL CONDUCTIVITY

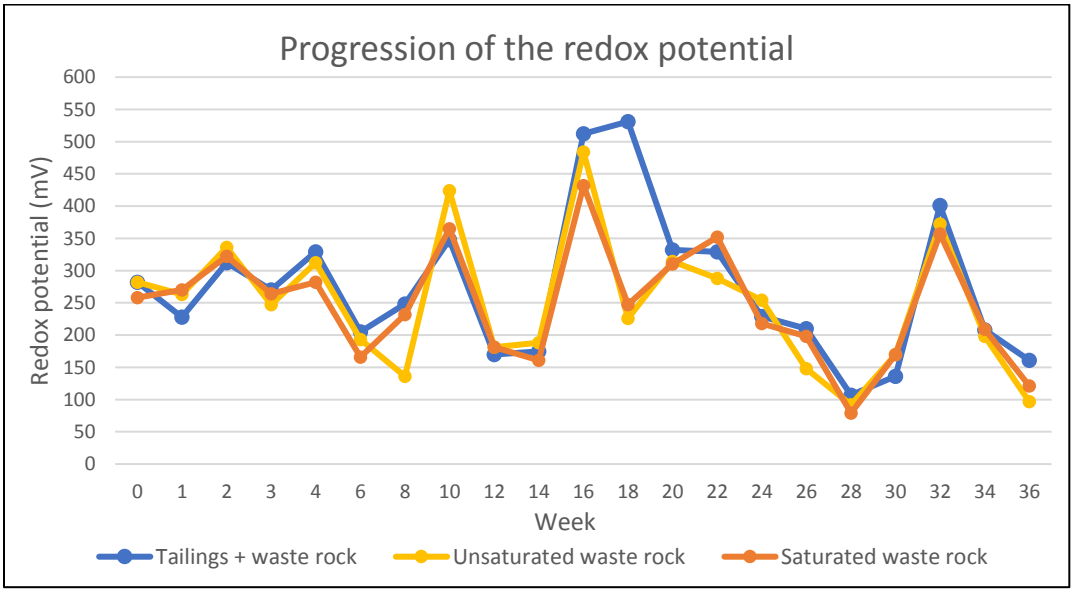
An increase in the electrical conductivity was observed on the first week of testing for all three columns. In the weeks that followed, the conductivity decreased gradually and plateaued around 25 uS/cm on week 14 for all three columns. These values are relatively consistent with the pH values measured during the tests. However, the laboratory reported that due to maintenance on the water supply line, tap water was mistakenly used to perform the flush on week 34; this may explain the peak in electrical conductivity seen on week 34.

The next testing weeks will allow to observe if the electrical conductivity continues to stabilize.



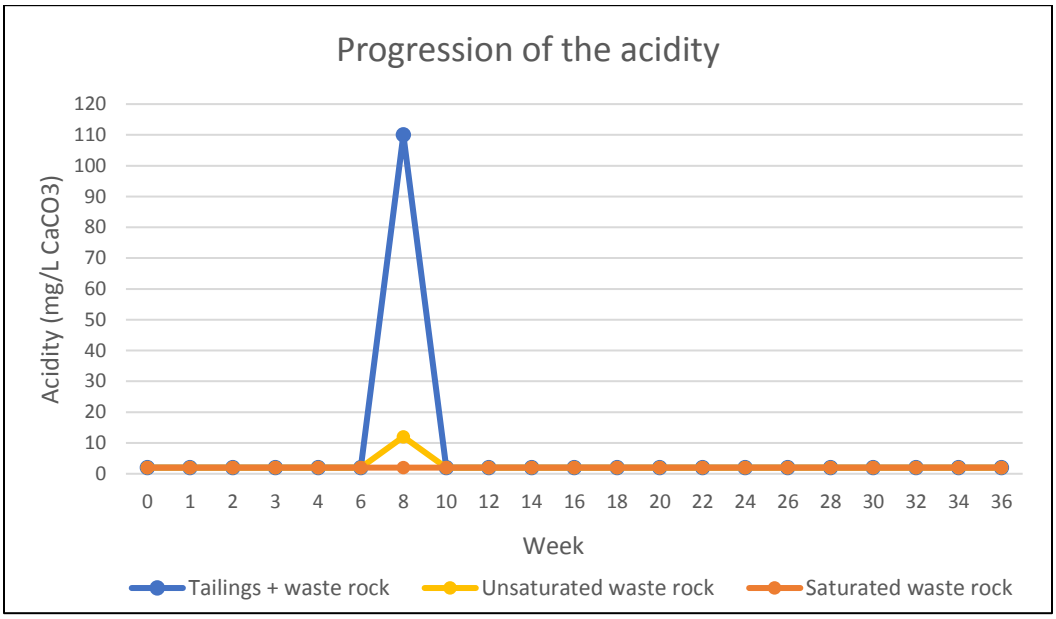
4. PROGRESSION OF THE REDOX POTENTIAL

The oxidation-reduction (redox) potential remained relatively stable, between 250 and 350 mV, until week 6 where it decreased to 150-200 mV. Peaks were noted on week 10, 16 and 22 for all three columns, and once more on week 18 for the tailings and waste rock column. A decrease of the redox potential was observed between week 22 and 28 and a rise was observed on week 32.



5. PROGRESSION OF THE ACIDITY

The acidity remained beneath the laboratory's limit of detection throughout the testing for the three columns except on week 8, where a rise to 12 mg/L and 110 mg/L of $CaCO_3$ was noted for the unsaturated waste rock and for the tailings and waste rock columns respectively.



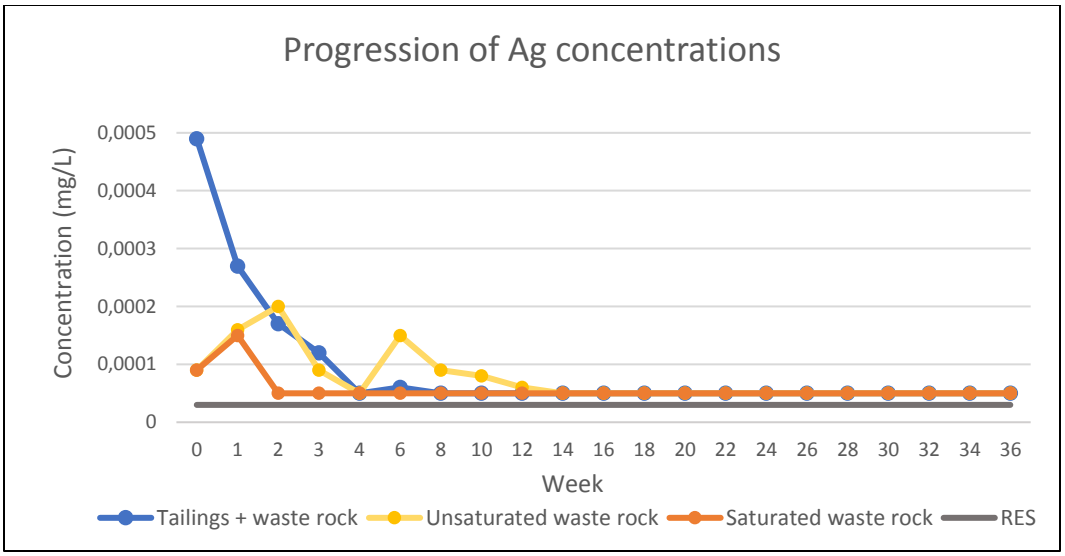
6. PROGRESSION OF THE METAL CONTENT

Only normed metals (D019 et RES) were analysed in addition to lithium, which was analysed only as a reference. For values below the laboratory's lowest limit of detection (LOD), a value equal to the LOD was attributed to generate the graph. At the time of writing this technical note, the data made available were only for the first 25 weeks of testing.

6.1 Silver

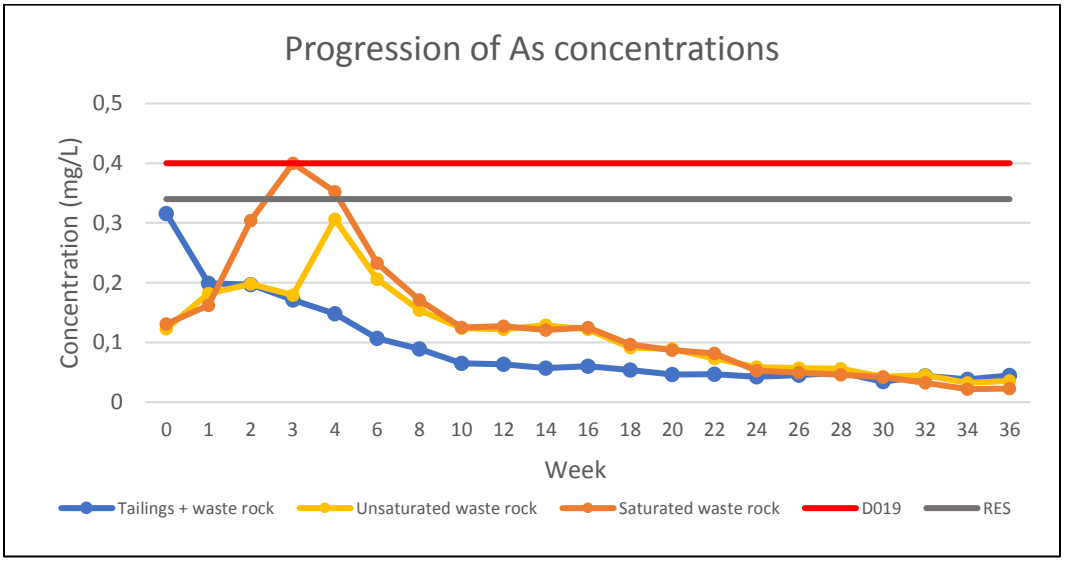
The quantities of leached silver remained above the RES criterion throughout the testing for the tailings and waste rock and the unsaturated waste rock mixes. The concentrations seemed to reach a plateau just above the RES value on week 4 for the tailings, and on week 8 for the unsaturated waste rock. However, in the case of the tailings, this plateau corresponds to the LOD.

The concentrations of leached silver for the saturated waste rock exceeded the RES criterion only in the initial analysis and that of the first week. These values are probably due to the reaction to contact between the metal and the water when put into solution. Subsequently, the values remained below the laboratory's lowest limit of detection.



6.2 Arsenic

The concentrations of leached arsenic remained beneath the D019 criterion at all times in the final effluents, except on week 3 for the saturated waste rock column. For that same column, values above the RES criterion were observed on week 3 and 4. All the other values remained below the RES criterion for the three columns. The distributions of the three columns seem to tend towards a plateau starting at week 10.

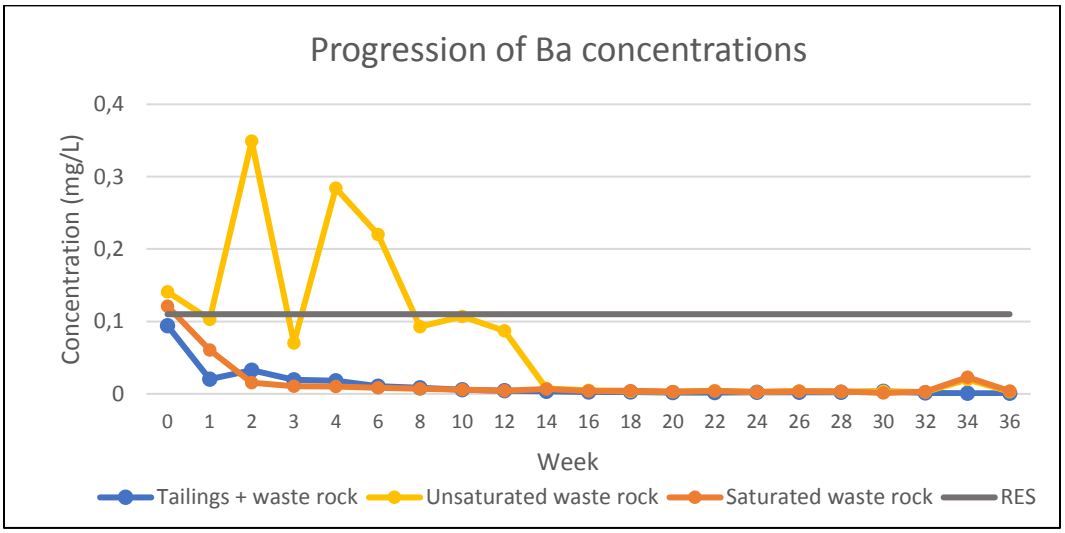


6.3 Barium

The concentration of leached barium for the tailings and waste rock and for the saturated waste rock remained near or under the laboratory's LOD throughout the testing, except in the initial analysis.

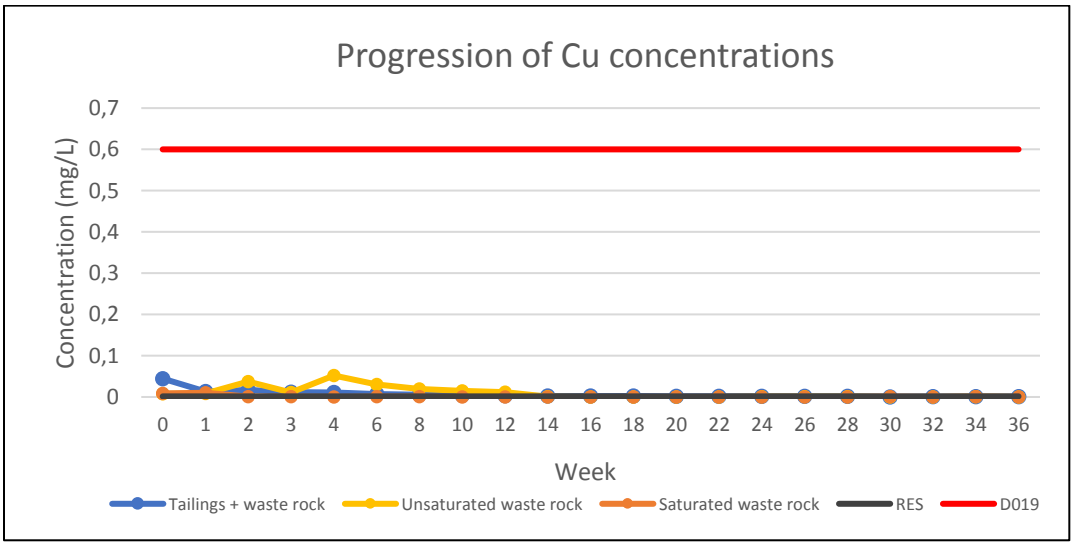
For the unsaturated waste rock, the results exceeded the RES criterion in the initial analysis and on week 2, 4 and 6. From week 14 onwards, all the results remained below the laboratory's lowest limit of detection.

A slight increase was observed on week 34; the laboratory reported that due to maintenance on the water supply line, tap water was mistakenly used to perform the flush on that week. This may explain the slight increase in barium concentrations observed on week 34.



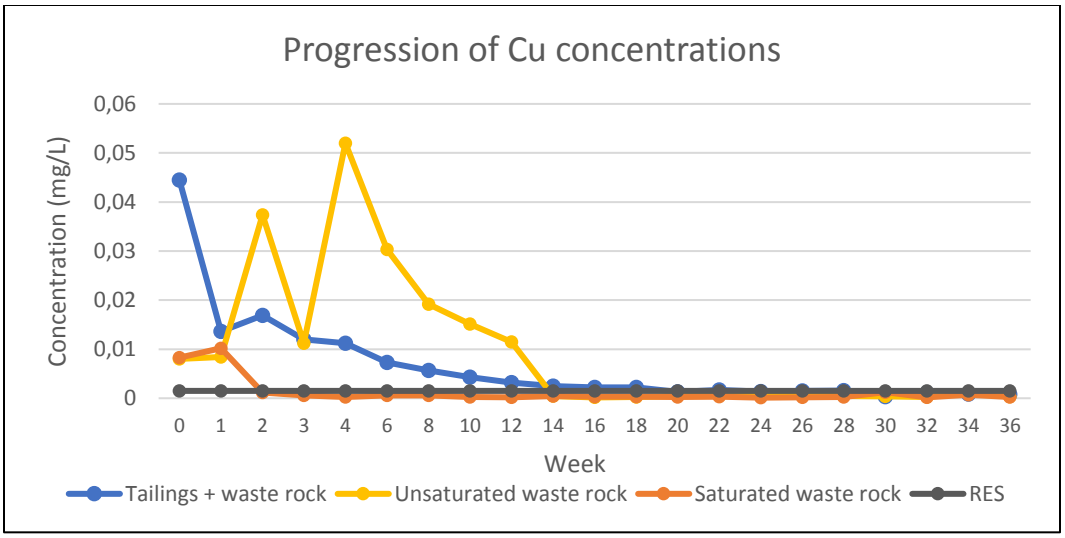
6.4 Copper

The concentrations of leached copper remained beneath the D019 at the final effluent throughout the testing for all three columns.



The concentrations of copper in the tailings and waste rock and in the unsaturated waste rock remained above the RES criterion most of the time. On week 24, the results for these two columns moved below the RES criterion.

The copper concentrations for the saturated waste rock column were above the RES criterion at the initial analysis and on the first week of testing, but decreased beneath the criterion afterwards.

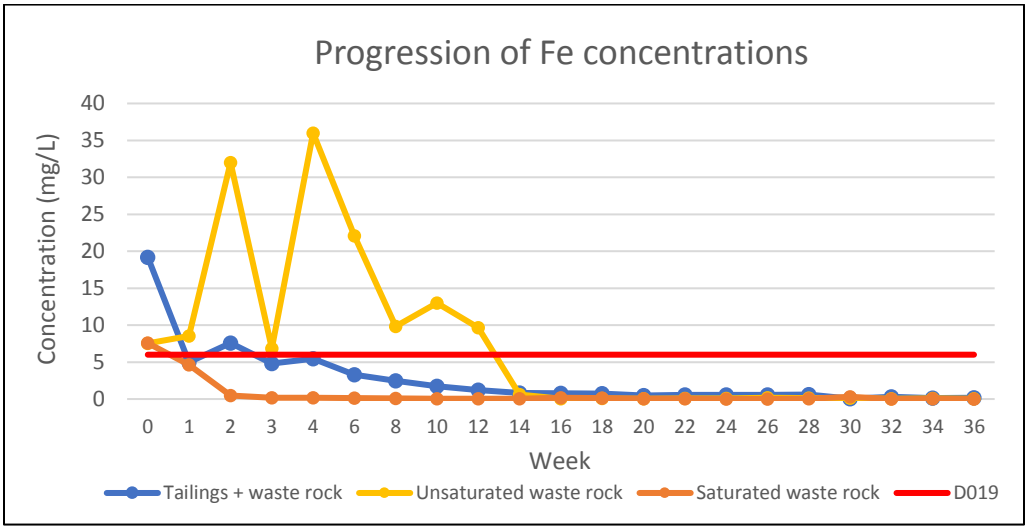


6.5 Iron

The concentrations of leached iron for the unsaturated waste rock column remained above the D019 criterion at the final effluent until week 12. The results stabilized below the criterion afterwards.

The iron values for the saturated waste rock exceeded the D019 criterion in the initial analysis, but remained beneath the criterion subsequently.

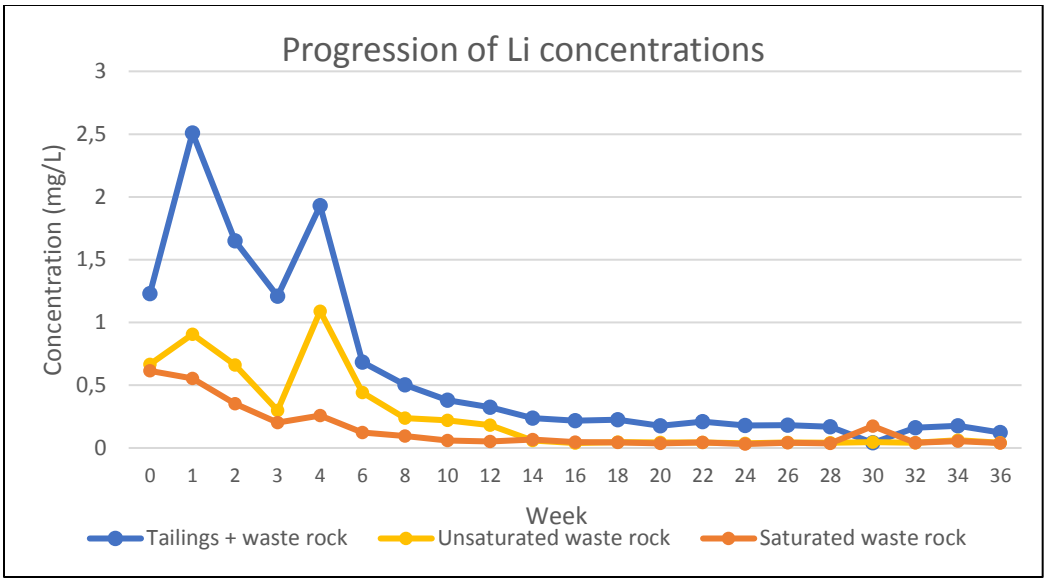
For the tailings and waste rock column, exceedances above the D019 criterion were observed in the initial analysis and on week 2. The results plateaued around week 6.



6.6 Lithium

The lithium concentrations in the leachate tended to plateau around week 6 for all three columns. The tailings and waste rock column showed values 3.5 times greater than the other two at the beginning of the testing.

Rises were observed in all columns on week 1 and 4.



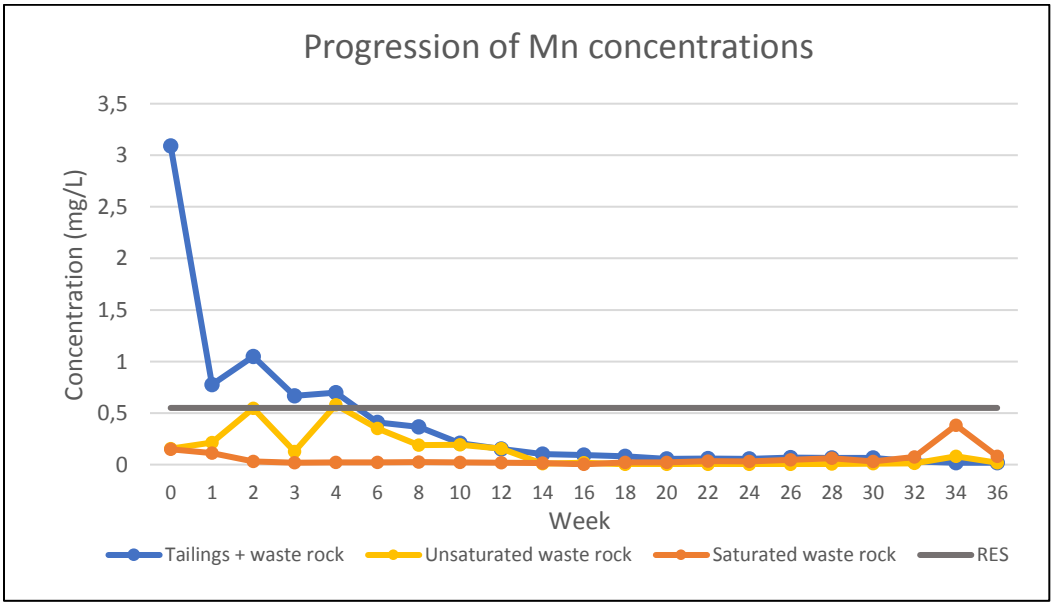
6.7 Manganese

The concentrations of leached manganese for the unsaturated waste rock remained near or under the laboratory's LOD throughout the testing, thus below the RES criterion.

Exceedances of the RES criterion were noted on week 4 for the tailings and waste rock column. Only one exceedance of the RES criterion was observed for the unsaturated waste rock column on week 4.

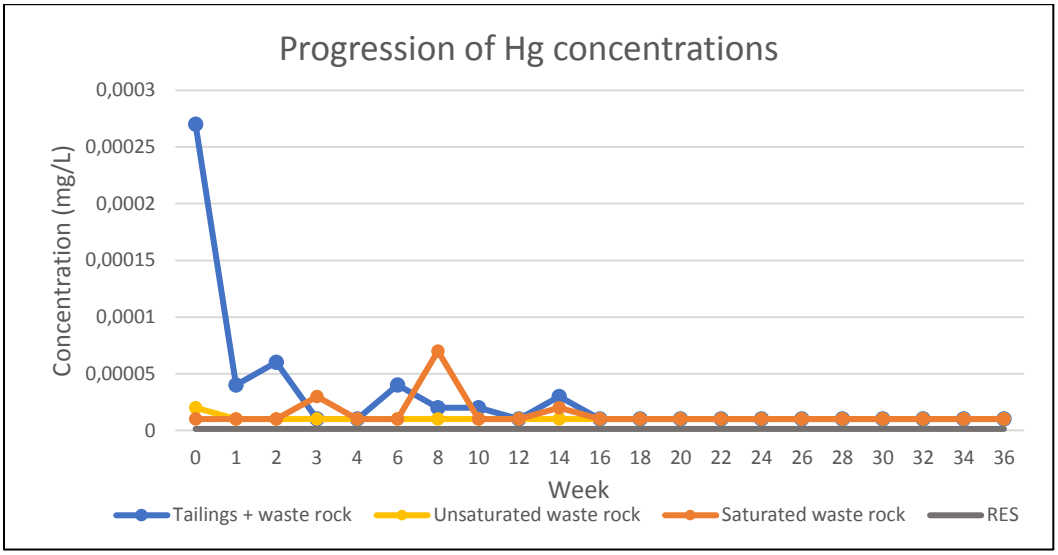
All three columns seemed to plateau around the laboratory's LOD as of week 6 or 8.

The laboratory reported that due to maintenance on the water supply line, tap water was mistakenly used to perform the flush on week 34; this may explain the slight increase in concentrations observed on that week.



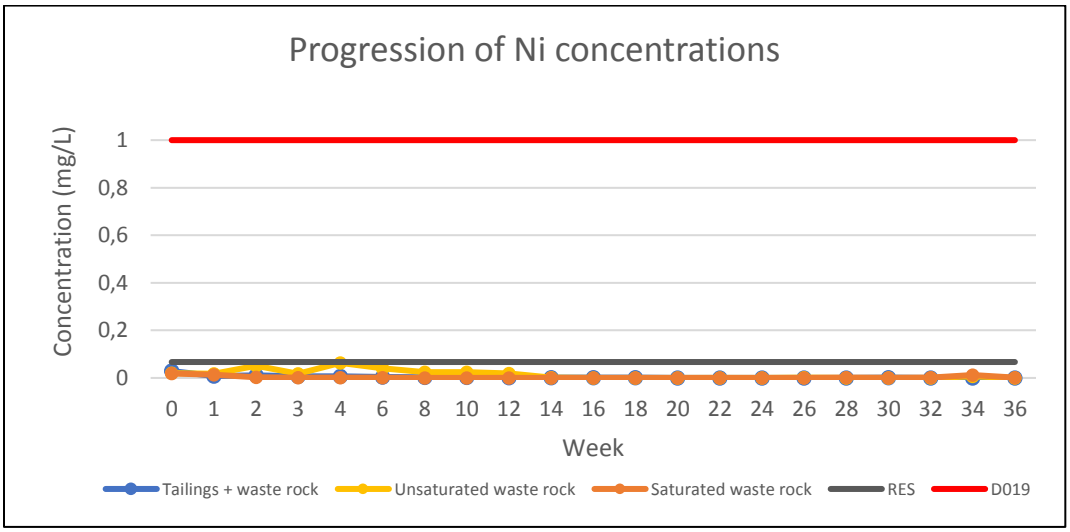
6.8 Mercury

Because of the small value attributed to the RES criterion for mercury, the concentrations of mercury for the three columns remained above the criterion or under the laboratory's LOD which is higher than the RES criterion throughout the testing. Yet, the concentrations of leached mercury stabilized as of week 16.



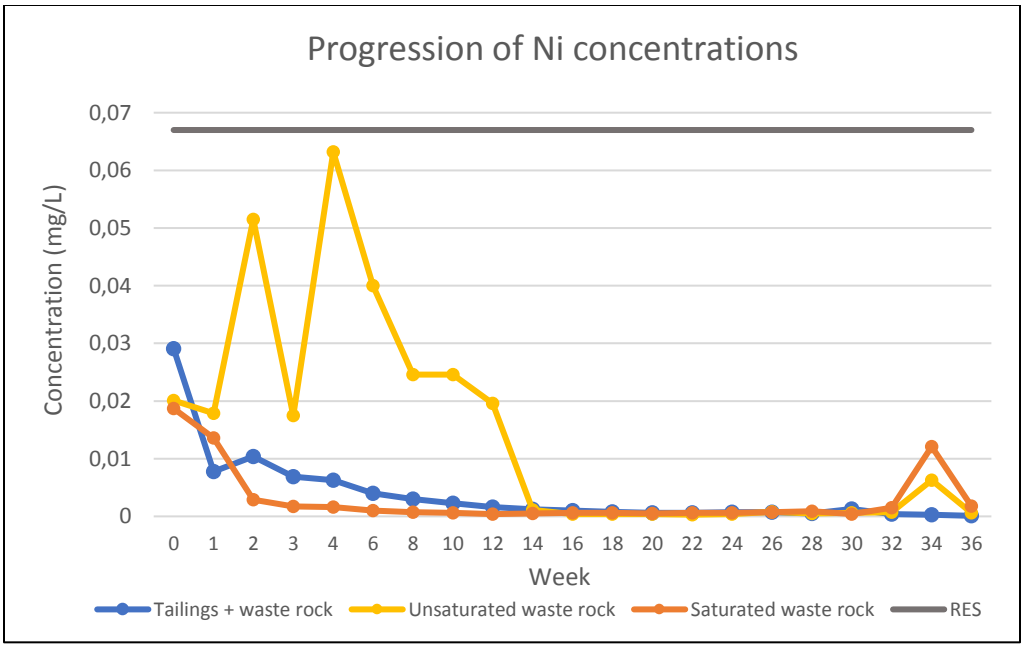
6.9 Nickel

The concentrations of nickel remained below the D019 criterion at the final effluent throughout the testing for all three columns.



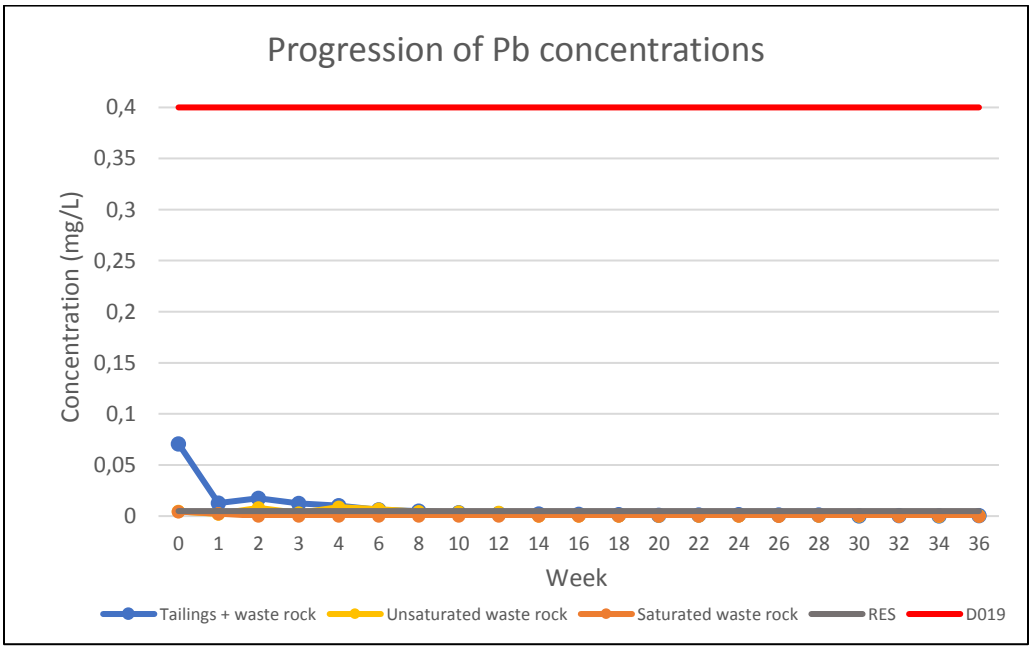
The nickel concentrations also remained underneath the RES criterion. For the tailings and waste rock and the saturated waste rock columns, the values reached a plateau rapidly from week 2. For the unsaturated waste rock column, two peaks were noted on week 2 and 4. The concentrations then reached a plateau on week 14.

The laboratory reported that due to maintenance on the water supply line, tap water was mistakenly used to perform the flush on week 34; this may explain the slight increase in concentrations observed on that week.



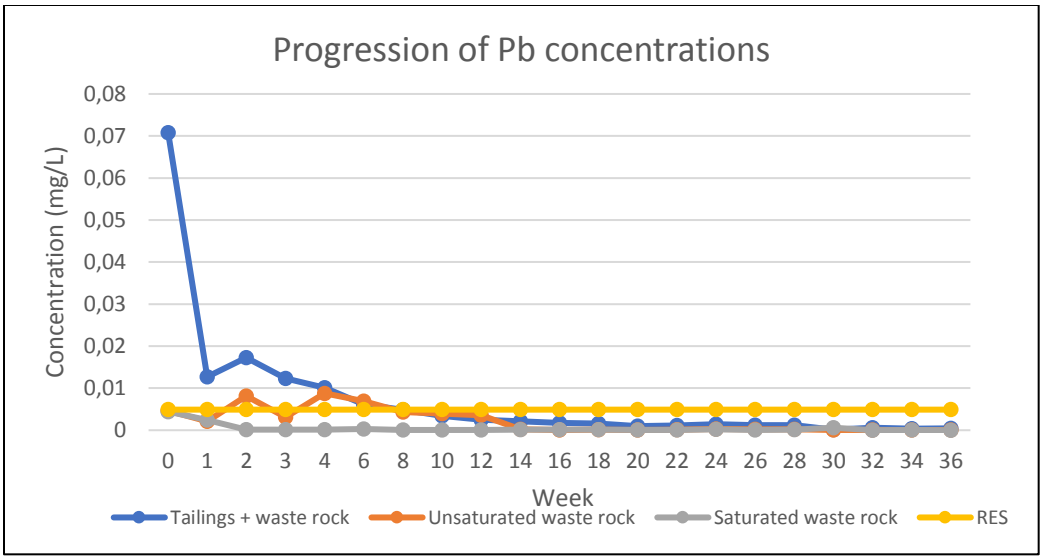
6.10 Lead

The concentrations of leached lead remained below the D019 criterion at the final effluent throughout the testing for all three columns.



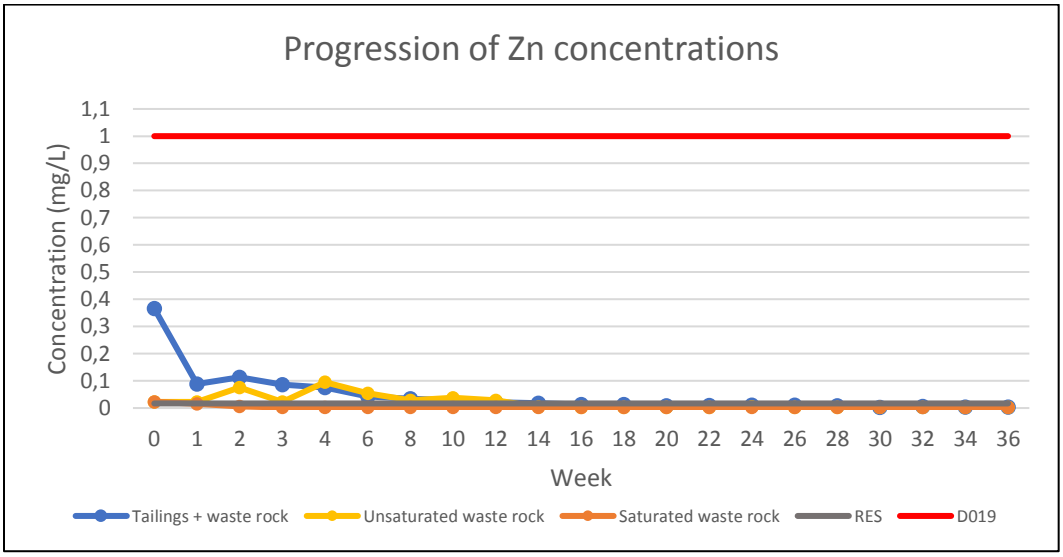
The concentrations in lead for the leachate of saturated waste rock also remained underneath the RES criterion throughout the testing.

The concentrations of leached lead for the unsaturated waste rock showed values exceeding the RES criterion on week 2, 4 and 6, while the tailings and waste rock leachate showed exceeding values until week 6. The two columns reached a plateau around week 6.



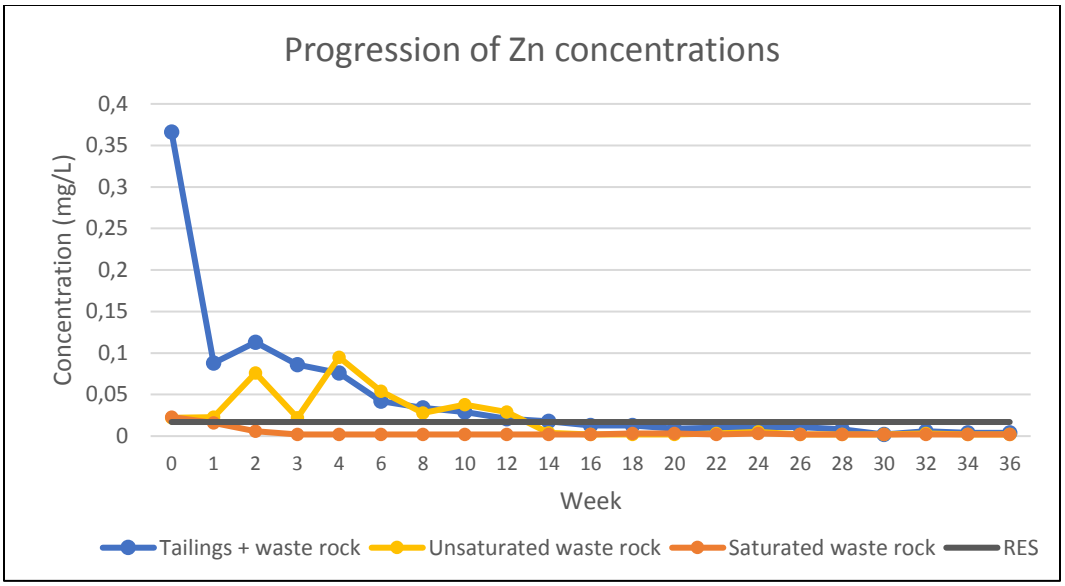
6.11 Zinc

The concentrations of leached zinc remained beneath the D019 criterion at the final effluent throughout the testing for all three columns.



The concentrations in zinc for the leachate of saturated waste rock also remained below the RES criterion throughout the testing, except at the initial analysis.

The concentrations of leached lead for the unsaturated waste rock and the tailings and waste rock showed values exceeding the RES criterion throughout the tests, except on week 14 for the unsaturated waste rock. Nevertheless, the two columns reached a plateau around week 6.



7. CONCLUSION

The following tables present a summary of all the results gathered to date.

The pH values were maintained between 6.7 and 7.9 until week 26, which demonstrates that the acid production is limited for all three columns. However, the pH has shown a downward trend since the beginning of the testing, until week 32. On week 34, the laboratory reported maintenance work on the water supply line, which induced tap water to be used mistakenly to perform the flush on that week. This explains the significant pH increase observed at that point. The pH level will have to be monitored closely in the coming weeks to understand its progression.

The acidity levels of the leachate remained below the laboratory's LOD throughout the testing for all three columns, except on week 8 for the tailings and waste rock and the unsaturated waste rock columns. The tailings and waste rock column is the column which showed the highest acidity value.

The physicochemical properties seem to affect the release of certain types of metal. In fact, increases in the oxidation-reduction potential were observed on weeks 2, 4, 10, 16, 18 and 22. Furthermore, the pH displayed decreasing values on weeks 2, 10, 18 and between weeks 22 to 28.

A trend is noticed for the unsaturated waste rock column. Indeed, rises in metal concentrations are mainly recorded on weeks 2 and 4 for silver (weeks 2 and 6), arsenic, barium, copper, iron, lithium (weeks 1 and 4), manganese, nicked, lead and zinc.

This trend is also noticeable for the tailings and waste rock column, but at a lower intensity. On the other hand, the saturated waste rock column does not appear to follow a trend for most of the metals studied.

Summary table - Week 14
Physicochemical properties
Galaxy project
N/Ref. : 171-02562-00

	pH	Conductivity	Oxidation-reduction (redox) potential	Acidity
1 - Tailings and waste rock mix				
Particularity	Min value on week 26, max value on week 1. Drops on week 8, 12, 20 and 26.	Max value on week 1. Plateau around 20 uS/cm.	Average around 250 mV, peaks on week 2, 4, 10, 16 and 18 (max).	Near or below LOD (2 mg/L CaCO3). Peak at 110 mg/L CaCO3 on week 8.
2 - Unsaturated waste rock				
Particularity	Min value on week 22, max value on week 2. Drops on week 8, 12 and 22.	Max value on week 1. Plateau around 25 uS/cm.	Average around 250 mV, peaks on week 2, 4, 10 and 16 (max).	Near or below LOD (2 mg/L CaCO3). Slight increase at 12 mg/L CaCO3 on week 8.
3 - Saturated waste rock				
Particularity	Min value on week 26, max value on week 2. Drops on week 2, 10, 18 and 26.	Max value on week 2. Plateau around 50 mV.	Average around 250 mV, peaks on week 2, 4, 10 and 16 (max).	Near or below LOD (2 mg/L CaCO3).

Summary table - Week 14
Metal concentrations
Galaxy project
N/Ref.: 171-02562-00

	Silver	Arsenic	Barium	Copper	Iron	Lithium	Manganese	Mercury	Nickel	Lead	Zinc
1 - Tailings and waste rock mix											
D019 exceedings											
Y/N	N/A	No	N/A	No	Yes	N/A	N/A	N/A	No	No	No
Period (weeks)	N/A	-	N/A	-	0, 2	N/A	N/A	N/A	-	-	-
RES exceedings											
Y/N	Yes	No	No	Yes	N/A	N/A	Oui	Yes	No	Yes	Yes
Period (weeks)	0-24	-	-	0-24	N/A	N/A	0-4	0-24	-	0-6	0-16
Comments	LOD > RES criterion. Plateau starting on week 4.	Tends to plateau around week 10.	Near or below LOD except on week 0.	Seem to stabilize near the RES criterion starting on week 14.	Plateau starting on week 6.	Values higher than waste rock columns by 3,5 factor. Plateau starting on week 6.	Plateau near the LOD around week 8.	LOD > RES criterion. High initial value, peaks on week 6 and 14, stabilizes a little over LOD afterwards.	Plateau near the LOD around week 6.	High initial value. Plateau starting on week 6.	Plateau below the RES criterion starting on week 16.
2 - Unsaturated waste rock											
D019 exceedings											
Y/N	N/A	No	N/A	No	Yes	N/A	N/A	N/A	No	No	No
Period (weeks)	N/A	-	N/A	-	0-13	N/A	N/A	N/A	-	-	-
RES exceedings											
Y/N	Yes	No	Yes	Yes	N/A	N/A	Yes	Yes	No	Yes	Yes
Period (weeks)	0-24	-	0, 2, 4, 6, 10	0-14	N/A	N/A	4	0-24	-	2, 4, 6	0-14
Comments	LOD > RES criterion. Plateau starting on week 2.	Tends to plateau around week 10.	Plateau starting on week 14.	Reach a plateau below ther RES criterion starting on week 14.	Plateau starting on week 14.	Plateau starting on week 6.	Plateau near the LOD around week 6.	LOD > RES criterion. Near LOD throughout testing.	Peaks on week 2 and 4. APlateau starting on week 14.	Plateau starting on week 6. Small peaks on week 2 and 4.	Plateau below the RES criterion starting on week 14.
3 - Saturated waste rock											
D019 exceedings											
Y/N	N/A	Yes	N/A	No	Yes	N/A	N/A	N/A	No	No	No
Period (weeks)	N/A	3	N/A	-	0	N/A	N/A	N/A	-	-	-
RES exceedings											
Y/N	Yes	Yes	Yes	Yes	N/A	N/A	No	Yes	No	No	Yes
Period (weeks)	0-24	3-4	0	0-1	N/A	N/A	-	0-24	-	-	0
Comments	LOD > RES criterion. Plateau starting on week 8.	Tends to plateau around week 10.	Near or below LOD except on week 0.	Below LOD since week 2.	Below LOD since week 3.	Plateau starting on week 6.	Near or below LOD throughout testing.	LOD > RES criterion. Near LOD throughout testing, except for peaks on week 3, 8 and 14.	Plateau near the LOD around week 2.	Near or below LOD throughout testing.	Near or below LOD throughout testing.

Continuous exceeding
Exceedings to consider
Exceedings to monitor

To conclude, the unsaturated waste rock column demonstrated the highest number of exceedances of the applicable criteria, and is the column which seemed most affected by the changes in physicochemical properties (wetting-drying cycle). Specifically, concentrations of iron above the D019 criterion were reached as far as week 12 of testing. However, the metal leaching trends seemed to stabilize below the applicable criteria for most of the other metal.

The tailings and waste rock column also exposed several exceedances, including concentrations exceeding the D019 criterion for the leached iron at the initial analysis and on week 2. However, the metal leaching tends to decrease and concentrations seemed to be stabilizing beneath all applicable criteria for most metal analyzed.

The saturated waste rock column displayed a small number of exceedances of the applicable criteria. The metals for which concentrations exceedances were noted tended to stabilize beneath the applicable criteria after a few weeks of testing.

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