PROJECT NO.: 191-01753-00

JAMES BAY LITHIUM MINE PROJECT

ANSWERS TO SECOND INFORMATION REQUEST (FIRST PART) RECEIVED FROM THE IMPACT ASSESSMENT AGENCY OF CANADA AS PART OF THE ENVIRONMENTAL REVIEW OF THE PROJECT

JUNE 2020

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GALAXY LITHIUM (CANADA) INC.

PROJECT NO.: 191-01753-00
DATE: JUNE 2020

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FOREWORD

As part of the review of the Environmental Impact Study (EIS) for the James Bay Lithium Mine Project, the Canadian Environmental Assessment Agency (CEAA)[1] submitted on November 30,2018 a request for additional information for its analysis of conformity. Aftewards, a first series of questions and comments was received on June 27, 2019. A precision request on the answers to the first series of questions was then received on November 12, 2019. A second precision request was received on January 8, 2020 to obtain more details on the information previously provided. Finally, a second series of questions and comments (first part) was received on March 27, 2020.

This document is the seventh addendum to the EIS of this project, the first addendum being the one submitted to the CEAA as part of the concordance phase (in February 2019), the second one being the one submitted to the MELCC in July 2019, the third being the answers to the CEAA on the first series of official questions (in September 2019), the forth and the fifth sudmitted to the CEAA (respectively in December 2019 and February 2020) to provide precisions on the first series of questions, the sixth submitted to the MELCC to answer their series series of questions and comments (May 2020).

In this document, the answers provided refers to the questions and comments from the Joint Assessment Committee established by the Impact Assessment Agency of Canada (IAAC) and the Cree Nation Government received on March 27, 2020 in a second information request (first part). The questions and comments are integrally presented in a box and in **bold type** to easily distinguish them in the text from the answers provided. A code and a number are associated with each of the questions or comments according to the original numbering used in the IAAC correspondence (CCE-1, CCE-2, etc.) for the questions and “Comment 1” for the comments) and with each of the answers provided (A-CCE-1, A-CCE-2, etc. for the questions and “A-C 1” for the comments) in order to facilitate any follow-up. Finally, the appendices supporting the answers to each of the questions or comments are also numbered according to the code and number to which they refer (A-CCE-1, A-C°1, etc.); as for maps, they are numbered according to the numerotation used in the French version.

Galaxy Lithium Canada Inc. (GLCI) continues its efforts to present a technically and economically viable project while minimizing the effects on the receiving environment. To do so, GLCI is currently working on optimizing the mine site development plan. The optimization work does not aim at modifying the entire mine site development plan but rather to make certain modifications to the development plan of the current project. This optimization, which takes into account all the comments made by the MELCC and the IAAC as well as by the Cree communities consulted since the start of the project, will help make the project even more acceptable from an environmental and social point of view.

Thus, it is possible that some questions cannot be answered entirely given that the optimization of the management plan is still in progress. However, GLCI undertakes to present the modifications made to its layout plan as soon as the information becomes available. These modifications will comply with environmental and social requirements and will address most of the questions whose answers provided so far could be considered incomplete. In addition, the optimized management plan will be presented in a document that will include the update of the impact assessment on the components affected by the optimizations to the management plan of the current project. This will clearly identify the improvements to the project from an environmental point of view.

NOTE TO THE READER

This document was translated from the original French version. Therefore, the French version constitutes the official version. In case of conflict of interpretation between the English and French versions, the French version prevails.

1 Impact Assessment Agency of Canada since August 28, 2019.

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1 PURPOSE OF THE PROJECT

1.1 REQUESTS FOR INFORMATION TO THE PROPONENT

CCE-1	**PURPOSE OF THE PROJECT IN THE JAMES BAY AREA AND ECONOMIC CONTEXT FOR LITHIUM** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 2.1 (Purpose of the project) and 5 (Consultation with Indigenous Nations and Concerns Raised).** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volume 1. Report prepared for Galaxy Lithium (Canada) Inc. Pages 2-2 and 2-5.** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nations of Eastmain, Waskaganish and Nemaska (October and December 2019, January 2020).** ***Background*** **In its Environmental Impact Assessment (EIA), the Proponent describes the project's purpose in section 2.3, noting in particular that "*the manufacture of lithium-ion batteries is the largest market for lithium. Hybrid and electric vehicles, portable electronic devices and renewable energy storage systems for homes and businesses are all applications that have grown significantly in recent years. [...] Considering the growing interest worldwide in adopting vehicles powered by new energies (electric and hybrid) and the implementation of mass energy storage systems made up of lithium batteries, demand for this metal is expected to grow strongly in years to come. [...] More specifically, the global demand for automobile batteries for electric vehicles will experience sustained growth until 2025, especially in China (Figure 2-1). Meanwhile, the energy storage market could double up to 12 times between now and 2030 (Figure 2-2)."*** **During the JAC's consultations on the EIA in October 2019, December 2019 and January 2020, the Cree communities of Eastmain, Waskaganish and Nemaska expressed concern about the proposal to carry out additional lithium mining projects in the James Bay area, since the only other lithium mining project currently under way is experiencing serious difficulties, as reported in the media.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Expand on the information provided concerning the rationale for another lithium mining project in the region. The Proponent is encouraged to include information regarding the economic context for lithium that explains the project's current economic feasibility in the projected time frames.**

A-CCE-1:

Galaxy Resources Limited is a current spodumene producer in Australia and is developing a lithium (salt solution) project in Argentina. The company, therefore, understands how to construct and produce as well as having a strong understanding of the global lithium market. The information available all point in the same direction; manufacturing of electric vehicles continues to grow at a significant rate and will continue to do so in the future, according to many independent organizations. Among other things, the International Energy Agency, in its annual review[2] forecasts a five-fold increase in the number of electric vehicles manufactured compared to the fourth quarter of 2019.

2 https://www.iea.org/reports/global-ev-outlook-2019.

It is true that the only project authorized in the James Bay Territory faced financial difficulties. Nemaska faced serious technical and financial problems during the execution of its project, which left the company in difficulty. GLCI has reviewed information on Nemaska in order to avoid repeating the same mistakes in the management and execution of its project. The deposit mined by Nemaska is still a high-quality deposit, with nearly 40 Mt of measured and indicated resources at 1.4% LiO_2.

The other project under study is a smaller deposit. Their web site mentions 26.8 Mt of indicated resources at 0.85% LiO_2. This is a low-grade deposit.

The Galaxy project deposit is a high-grade deposit with very good potential, approximately 40 Mt of indicated resources at 1.4% LiO_2. GLCI is confident that its project will come to fruition with good profitability.

2 ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

2.1 COMMENTS AND ADVICE FOR THE PROPONENT

Comment 1	**VARIANTS – LOCATION OF WASTE ROCK AND TAILINGS STOCKPILES** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 2 (Project Justification and Alternatives Considered).** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Pages 3-4 and 7-21.** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-8.** ***Comments and advice*** **The analysis of the options for the location of the waste rock and tailings stockpiles (Environmental Impact Assessment [EIA], p. 3-4) led to the selection of option 2. This selection was based in part on the preference of members of the Eastmain Cree community who attach traditional significance to creek CE5. However, option 1 would allow the huge retention capacity of the dewatered pit to be put to good use at the end of operations. The runoff water from the stockpile captured by the retention pond could then be channelled to the pit. A good portion of the percolating water under the stockpile would be drawn to the pit by the steep convergent hydraulic gradient. Since most of the leachable metal species in the stockpile should be mobilized in the first few decades after operation, the contact water most altered would be contained in the pit instead of being discharged directly into a stream. Since the pit filling time is estimated at 120 to 170 years (EIA, p. 7-21), the contact water would have a very long residence time before eventual decantation of the pit to the neighbouring streams. During that time, natural attenuation processes, such as the development of stratification in the pit water, could also reduce the impact of its eventual release into the environment.** **The Proponent is encouraged to re-examine the selection of the stockpile site, consider the positive environmental points detailed for option 1, and discuss the matter with the Cree community of Eastmain.**

A-C 1:

The design of the mine plan is currently being optimized. This optimization, which takes into account all the comments made by the MELCC and the IAAC as well as by the Cree communities consulted since the start of the project, will help make the project even more acceptable from an environmental and social point of view.

GLCI commits to presenting to all stakeholders, including the Cree community of Eastmain, the modifications made to its mine site development plan as soon as the information becomes available. These modifications will comply with environmental and social requirements and will address most of the questions whose answers provided so far could be considered incomplete. In addition, the optimized mine site development plan will be presented in a document that will include an update of the impact assessment on the components affected by the optimizations to the current mine site development plan. This will clearly identify the improvements to the project from an environmental point of view.

It is however possible to outline the main disadvantages related to option 1 compared to option 2 which was then retained, namely:

- Option 1 would affect the CE5 watercourse downstream of the stockpile; CE5 being a watercourse valued by the tallyman from the RE2 trapline.
- Option 1 being located near the truck stop; the majority of hauling activities would take place near the truck stop and would contribute to significantly increasing concentrations of atmospheric emissions and noise levels.
- Option 1 would affect the active goose hunting pond and beaver trapping on the CE5 river downstream.

3 HYDROGEOLOGY

3.1 REQUESTS FOR INFORMATION TO THE PROPONENT

CCEE-1	**TRANSIENT GROUNDWATER FLOW MODEL – POST-OPERATIONAL PERIOD** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 6.1.5 (Groundwater and surface water) and 6.2.2 (Changes to groundwater and surface water).** **WSP (August 2018). James Bay Lithium Mine. *Specialized Study on Hydrogeology.* Report prepared for Galaxy Lithium (Canada) Inc. Page 87.** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-23.** ***Background*** **In Question CEAA-23, the Proponent was asked to develop a transient groundwater flow model to study the restoration of the hydrogeological regime at the end of dewatering and its final steady state.** **On page 87 of the *Specialized Study on Hydrogeology*, the Proponent indicates that the steady-state digital simulations were completed to show the fully excavated mine after 16 years. Yet, in its answer to Question CEAA-23, the Proponent states that it modelled the transient groundwater flow for the post-operational period.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Submit the modelling of the transient groundwater flow for the post-operational period, describing the model and the results.**

A-CCEE-1:

The digital simulations on the transient-state were completed to represent the water level rise in the pit after the end of operations. The pit outlet is located at an elevation of approximately 209 m. The model used is the one used for the predictive simulation of pit dewatering. The following points show the changes that have been made to the model.

HORIZONTAL DISCRETIZATION

— No modification has been made to the horizontal discretization compared to the predictive model used to estimate the pit dewatering rates.

DEFINITION OF THE DIFFERENT LAYERS OF THE MODEL

— Layer 1 was raised to the 209 m elevation at the level of the pit. As Feflow software is designed to simulate the flow of groundwater, it was necessary to represent the lake as a unit.

HYDRAULIC PROPERTIES

— A total porosity of 1 (100%) was applied from the bottom of the pit to elevation 209 m to represent the lake that will be formed. The porosity of 1 makes it possible to represent an “empty” space and thus to let the layer fill. The remaining hydraulic properties of the model are identical to those of the predictive model.

BOUNDARY CONDITIONS

— The internal boundary conditions of the model have been modified to allow the water to rise to the level of the pit. Drain conditions were applied to the 209 m pit level elevation to simulate the estimated maximum elevation of the lake formed in the pit.

RECHARGE

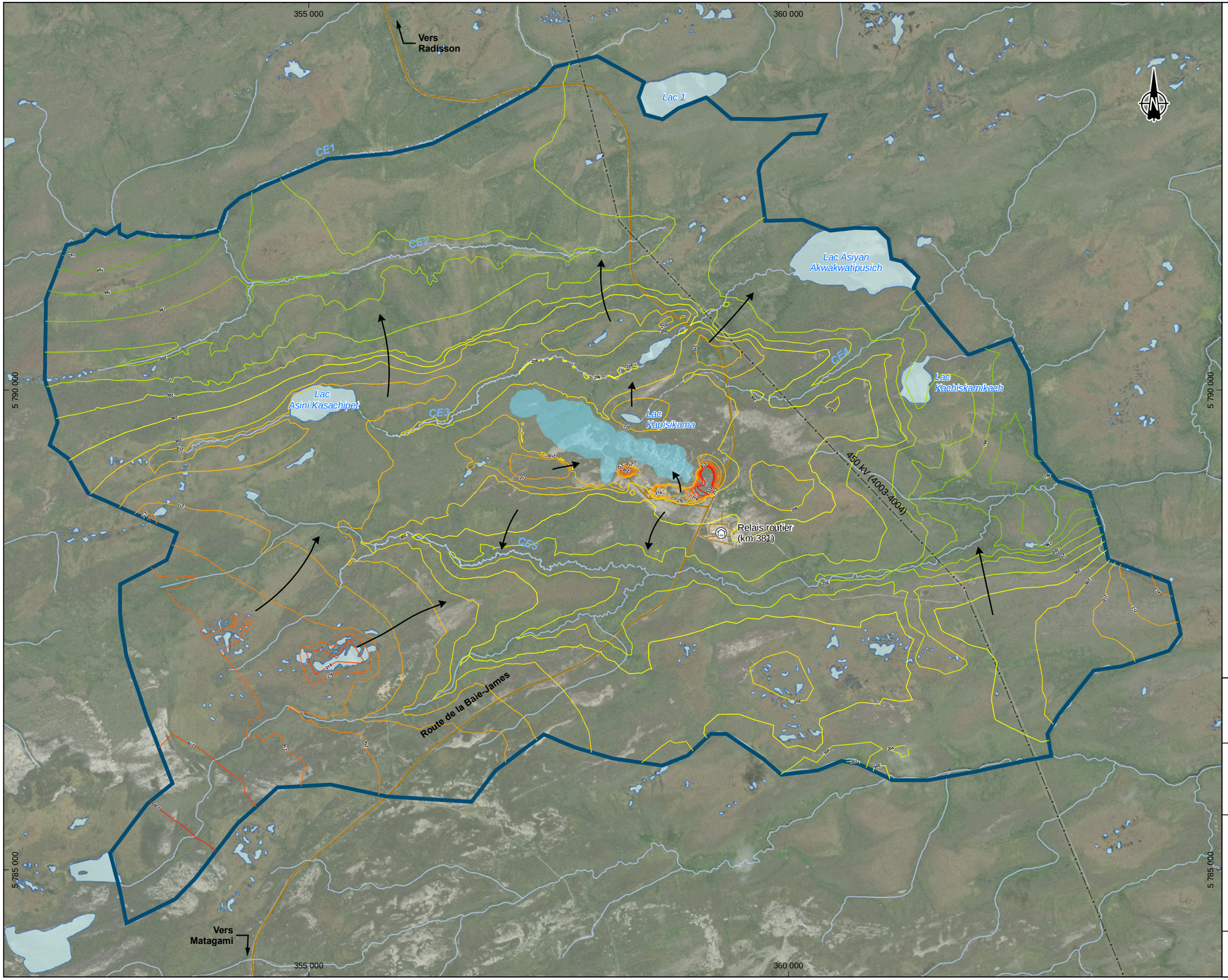
— In order to take into account the contribution of precipitations, the effective precipitation evaluated in section 4.2 of the specialized study on hydrogeology (WSP, 2018a) was used. A recharge of 345.7 mm per year was therefore applied at the lake level at the location of the pit.

— For the rest of the model, no changes have been made and the refill remains identical to that presented in the specialized study (WSP, 2018a).

RESULTS

The filling time of the pit was determined for the calibrated model but also for scenario 4 (model with the highest permeability in the pit) presented in the specialized study on hydrogeology (section 7.5 of the WSP, 2018a). Thus, the filling time of the pit is 172 years for the calibrated model and 111 years for the scenario 4 model. With the future outlet of the pit at an elevation of 209 m, a difference in load of approximately 11 m will be observed at the level of the pit. Map R-CCEE-1 shows the piezometry of the site when the water level in the pit has reached its maximum level. Although, the water level is lower than that observed in the pit sector before the works, it is noted that the direction of flow on the site will be similar to that observed before the works.

With Lake Kapisikama being at an elevation of 213 m, it will no longer be supplied by groundwater. Stream CE4 will always be supplied by groundwater. After 100 years (with the calibrated model), the reduction in the supply of groundwater to CE4 stream will be 35% (whereas the reduction planned is 53% at the end of the project, as presented in the specialized study on hydrogeology, section 8.4). After 170 years, the reduction in groundwater supply will be 25% compared to the initial state. This means that the reduction in groundwater supply will become less and less over time. In other words, the supply of groundwater will increase over time until equilibrium with the environment is reached. In addition, watercourse CE4 will always be supplied by surface water. Thus, the impact on the average flow of the CE4 watercourse is minor (less than 2% reduction, even during the operation of the pit).



Limite de la zone modélisée / *Limit of the modeled area*

Courbe piézométrique / *Piezometric contour* (m)

190
192
194
196
198
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208
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212
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216
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220
222

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

Infrastructures

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*

GALAXY

Mine de lithium Baie-James /James Bay Lithium Mine
Réponses aux questions du CCE (1ère) / Answer to CCE Requests(1st part)

R-CCEE-1
Carte piézométrique – Modèle prédictif calibré – Lac de la fosse à son niveau maximal /
Piezometric map –Calibrated predictive model – Pit lake at its maximal level

Sources :
Données du projet / Project data : Galaxy 2018
Canvec, 1 : 50 000, RNCan, 2015

0 400 800 m
UTM, fuseau 18, NAD83
(Équidistance des courbes / *Interval* : 2 m)

Dessin : A. Masson
Approbation : S. Bottier
191-01753-00_cRCCEE-1_wspT273_200605.mxd

wsp

CCE-2	**WATER BALANCE OF THE GROUNDWATER FLOW MODEL** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 6.1.5 (Groundwater and surface water) and 6.2.2 (Changes to groundwater and surface water).** **WSP (August 2018). James Bay Lithium Mine. *Specialized Study on Hydrogeology.* Report prepared for Galaxy Lithium (Canada) Inc. Table 30, page 77.** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-24.** ***Background*** **In Table 30 of the *Specialized Study on Hydrogeology* (WSP, August 2018), the Proponent presented a water balance for the calibrated steady-state groundwater flow model. The components of the water balance include inflow from storage and outflow to storage. However, by definition, in a steady-state flow, there is no change in storage. This error in the water balance may be due to a digital convergence problem. Hence, the calibrated groundwater flow model in section 7 of the *Specialized Study on Hydrogeology* is potentially erroneous.** **In Question CEAA-24, the Proponent was asked to explain the presence of storage terms in the water balance, but it did not provide the requested explanation. The use of storage terms must be explained for the mine site's hydrogeological context. If the water balance for the groundwater flow model is wrong because of the storage values, the Proponent must provide a revised groundwater modelling study, including a revised calibration and revised predictions for the environmental impacts due to pit dewatering.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Identify and correct the digital convergence problem associated with the added storage values in the water balance for the calibrated steady-state groundwater flow model, and adjust the results in sections 7 and 8 of the *Specialized Study on Hydrogeology* accordingly.**

A-CCE-2:

As indicated in the response to question ACEE-24, the model was run in transient mode until it reached a quasi-permanent state to facilitate digital convergence. The fact that the model has been run in transient unsaturated mode automatically implies storage parameters (parameter called Storage Capture (-) / Release (+) in Feflow calculated by the software by default). These values therefore do not represent a convergence problem in the water balance and have no influence on the results of the calibrated model. Given hydraulic loads of the observation wells as well as the stabilized flow rates of the watercourses, we consider that the model is calibrated and stable and allows predictive simulations to be made. There is therefore no need to correct the results of Sections 7 and 8 of the Specialized Study Report on Hydrogeology.

CCE-3	**WATER MANAGEMENT – INFRASTRUCTURE**
	References
	CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 6.1.5 (Groundwater and surface water) and 6.2.2 (Changes to groundwater and surface water).
	WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-27.
	Background
	In its answer to Question CEAA-27, the Proponent described the project's estimated water requirements based on the water balance with average precipitation.
	The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:
	A) Demonstrate, using an extreme dry scenario (drought with very little precipitation), that the project's water requirements would still be met, and that it would not be necessary to take water from neighbouring streams in the event of a drought.
	B) State whether a reserve water supply is planned in case of emergency or extremely dry conditions.

A-CCE-3:

A) and B)

The design of the mine site development plan is currently being optimized. The optimization, which considers all comments submitted by the MELCC, IAAC, and by Cree communities consulted since the start of the project, will result in changes to the water balance. GLCI commits to submitting all changes to the mine site development plan, including the updated water balance, as soon as information is available. A minimum extreme dry scenario, i.e., drought with very little precipitation, will then be presented to demonstrate that the project's water requirements will still be met, and that it will not be necessary to take water from neighbouring streams in the event of a drought. We will also indicate whether a reserve water supply is planned in case of emergency or extremely dry conditions.

4 HYDROLOGY

4.1 REQUESTS FOR INFORMATION TO THE PROPONENT

CCE-4

FLOW ESTIMATES AND EFFECTS OF CLIMATE CHANGE ON FLOWS AT THE END OF THE PROJECT

References

AC CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 6.1.6 (Project setting and baseline conditions – Fish and fish habitat) and 6.3.1 (Predicted effects on valued components – Fish and fish habitat).

JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Eastmain (December 2019).

Ministère des Transports du Québec (2014). *Manuel de conception des ponceaux*.

WSP (August 2018). James Bay Lithium Mine. *Specialized Study on Hydrogeology.* Report prepared for Galaxy Lithium (Canada) Inc. 37 pages+ appendices.

WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc.

Background

The method of estimating the project's effects on the hydrological regime is based on changes in watersheds and the mine's contributions at various stages of the mining cycle.

The method used to estimate flood flows is the rational method, described in the *Manuel de conception des ponceaux* (Ministère des Transports du Québec, 2014). This method requires the computation of variables such as the run-off coefficient and the watershed's time of concentration, which are not in the *Specialized Study on Hydrogeology* (WSP, August 2018). Consequently, it is impossible to determine whether the rational method was properly applied in this case. The flow results yielded by the rational method depend on the precipitation rate used in the calculations. The precipitation rate is in turn contingent on the watershed's time of concentration. To assess the flow calculations, the JAC needs more details about the methodology as well as the values of the run-off coefficient and the time of concentration of the watersheds affected by this project (watercourses CE2 to CE5).

Since this mining project has a life cycle of 16 to 21 years according to the Environmental Impact Assessment (WSP, October 2018), the Proponent should take the effects of climate change into consideration. In Table 7-9 of the EIA, the Proponent provides climate change projections for the project area in 2050 but fails to show how the projected changes are taken into account in the estimates of the project's effects on water flows. As the climate change projections indicate significant increases in total precipitation and in precipitation during extreme events, the Proponent must provide information about the method used to take the climate change projections into account in the flood flow estimates for the end of the project.

The flood flow estimates are important for the sizing of the dikes and berms, the dewatering capacity of the main pit, and the design of the bridge between the main pit and the various stockpiles. The flood flow estimates are also used in assessing the project's effects on water quality and the habitats of fish and other aquatic species.

The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:

A) Provide details of the method used to estimate the flood flows of the watersheds affected by this project (watercourses CE2 to CE5).

B) Provide the values of the run-off coefficient and the time of concentration used in the rational method for the watersheds affected by this project (watercourses CE2 to CE5).

C) Explain how the method used took the climate change projections into account in the flood flow estimates.

A-CCE-4:

The method used to estimate flood flows is the rational method, as described in the *Manuel de conception des ponceaux* (MTQ, 2014). The underlying equation used for this method is as follows:

$$Q = 0.278 * C * F_L * I * A$$

Where :

Q : is the peak flow (m^3/s);
C : is the run-off coefficient;
F_L : is a flood routing coefficient;
I : is the precipitation intensity (mm/h);
A : is the watershed area (km^2).

The run-off coefficient is determined on the basis of the average slope of the watershed and/or the main watercourse, soil type and vegetation cover. In this case, hydrological soil classification was determined based on the ecoforestry maps of the surrounding area and corresponding values published in the *Manuel de conception des ponceaux* (MTQ, 2014). As a result, it was considered as Class B soil. The vegetation cover (wooded, prairies, crops, urban) was determined using aerial photos. In this case, the watersheds are overwhelmingly wooded, including many lakes. The average slope of the watershed is determined from digital topographic maps. The flood routing coefficient reproduces the flood routing effect (reduced intensity, but increased duration) by wetlands. It mitigates the peak of run-off hydrograph by accounting for the proportion of lakes and swamps present in the watershed and their location with respect to the watercourse. The duration and intensity of the precipitation to be considered in the rational method depends on the watershed's time of concentration. IDF (Intensity-Duration-Frequency) data from the La Grande Rivière Airport station were used.

It should be noted that to estimate flood flows in the CE2 watercourse for future conditions, the maximum expected discharge rate of 0.352 m^3/s (maximum planned water treatment plant capacity) was added to the values obtained using the rational method.

A)

Table A-CCE-4-1 presents the key parameter values used in the rational method calculations for present conditions, while Table A-CCE-4-2 presents their values for future conditions. Note that the run-off coefficient Cp may seem low, as it is the average coefficient for the entire watershed, including lakes and swamps.

It should be recalled that the objective of the study was to obtain flow rates to compare current and projected conditions for assessing the project's effects, and not for sizing of structures (dikes, ditches, basins, pumping stations). The values should, therefore, not be considered as absolute, but only for comparative purposes.

Table A-CCE-4-1 Rational Method Parameters - Present Conditions

	CE2	CE3	CE4	CE5	CE6
% of lakes and swamps	58	29	7.4	28	27
Average C_p	0.09	0.12	0.14	0.12	0.12
T_c (h)	5.0	7.6	4.4	9.7	4.6
I 25 years (mm/h)	10.2	7.3	11.4	6.0	10.9
F_L	0.58	0.78	0.63	0.59	0.59

Table A-CCE-4-2 Rational Method Parameters – Operational Phase

	CE2	CE3	CE4	CE5	CE6
% of lakes and swamps	40	31	8.1	28	25.3
Average C_p	0.09	0.12	0.14	0.12	0.12
T_c (h)	5.0	7.6	4.4	9.7	4.6
I 25 years (mm/h)	10.2	7.3	11.4	6.0	10.9
F_L	0.58	0.78	0.63	0.59	0.59

B)

In the analysis of the project's impacts on the hydrology and hydraulics of the watercourses in the study area, climate change was not factored into the calculation of the presented flow. This decision was made to highlight the impacts of the project, by separating these impacts from the impacts due to climate change, which would occur even in the absence of the project. It should be noted that, as previously stated, the flows presented were not used to size structures (dikes, ditches, basins, pumping stations, culverts, etc.), since the flow calculations were not calculated at the mine site location, but downstream from the mine site.

As indicated in the impact assessment, based on the information available in the literature, it can be expected that extreme precipitation episodes will be more frequent and of greater intensity, resulting in an upward trend in peak flows due to extreme rainfall occurrences. Thus, for watercourses CE3, CE4, CE5 and CE6, climate change could reduce the impact of the project by mitigating the reduction in peak flows due to extreme rainfall occurrences presented in the impact assessment. However, for CE2 watercourse, the estimated increase in flow can be expected to be slightly higher than that presented in the impact assessment.

These qualitative considerations of the effect of climate change have been factored in assessing the project's impact. However, given the current level of information available about the effect of climate change in the region, a quantitative and highly accurate assessment of the impact of climate change is not realistic. Therefore, a more detailed analysis does not seem relevant for the purpose of assessing the project's impact on the flood flow of the watercourses in the study area.

As part of the mine site development plan optimization, the multiplicative factors used to factor climate change in the project design and water balance are taken from the moderate emission scenarios of Ouranos[3] Climate Portraits version 1.1. for the project region (northwestern James Bay) and for the 2041-2070 period.

3 https://www.ouranos.ca/climate-portraits/#/.

On average, for moderate emission scenario between 2041 and 2070, the total seasonal average precipitation is projected to increase by 19.3% in winter, 5.7% in spring, 3.5% in summer and 9.4% in autumn. These percentages will be applied to the monthly precipitation values, depending on the season. We consider this approach acceptable for assessing the impact of climate change on the water management system at the current stage of the project. This approach could be reviewed for the next engineering phase: climate change forecasts including seasonal change (shorter winters with less snow accumulation), increased evapotranspiration loss, as well as increased run-off coefficients for humid spells (due to increased precipitation). All of these factors have an impact on the water balance results.

5 WETLANDS

5.1 REQUESTS FOR INFORMATION TO THE PROPONENT

CCE-5	**EFFECTS OF WETLAND LOSS ON MIGRATORY BIRDS** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 6.1.4 (Riparian, wetland and terrestrial environments) and 6.2.3 (Changes to riparian, wetland and terrestrial environments).** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Sections 6.3.1 (Vegetation), 6.3.5 (Avifauna), 7.3.1 (Vegetation and Wetlands) and 7.3.5 (Avifauna).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-70.** ***Background*** **In its answer to Question CEAA-70, the Proponent indicates that 302 hectares of wetland will be destroyed by the project. A comprehensive, representative, detailed picture of the avian fauna using the wetlands would help document the effects and significance of the loss of wetlands for the habitat function for migratory birds.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Determine, for each migratory bird species likely to use the wetlands (including bird species at risk), the number of nesting pairs (average and maximum) per hectare that will be affected by the loss of each of the major types of wetlands and the surface area lost for each type.**

A-CCE-5:

For species likely to use wetlands, data collected from 31 stations in 2017 was used and classified into three types of wetlands, i.e. the open bogs (n = 19), the shrubby peatlands (n = 6) and the treed peatlands (n = 6). In total, 23 species were identified in these wetlands (Table A-CCE-5-1). Treed peatlands in the study area are characterized by a tree cover dominated by black spruce. This tree species, associated with the tamarack, is also found in shrubby peatlands where, only the shrub cover is present. In open bogs, the shrub layer, when present, is much lower and dominated by heaths. There is also herbaceous stratum in places.

Although open bogs are the type of wetland where the largest number of species was identified (20 species, 3.05 species/station), the species diversity is somewhat lower than in shrubby peatlands (12 species, 3.33 species/station). Treed peatland is the wetland type where the species diversity and the total number of species identified were the lowest (6 species, 2.00 species/station). In general, these environments are much more homogeneous and have a less diverse bird community.

Table A-CCE-5-1 Species Diversity in Wetlands Identified Across the Study Area

TYPE OF WETLAND	NUMBER OF LISTENING STATIONS	TOTAL SURFACE AREA OF WETLANDS IN THE STUDY AREA (HA)	NUMBER OF SPECIES IDENTIFIED	SPECIES DIVERSITY (NUMBER OF SPECIES/STATION)	
				Average	Standard Deviation
Open bog	19	1,211.81	20	3.05	2.04
Shrubby peatland	6	722.16	12	3.33	2.73
Treed peatland	6	786.72	6	2.00	1.55
Total	**31**	**2,720.69**	**23**	**2.90**	**2.09**

Other types of wetlands identified across the study area are wetland footprints (16.03 ha) and ponds (7.24 ha), for a total of 2,743.96 ha.

The density (indicated nesting pairs [IP/ha]) is similar in open bogs (4.69 IP/ha) and shrubby peatlands (4.46 IP/ha) (Table A-CCE-5-2). Similar to the species diversity, the treed peatland is the wetland type with the lowest density (2.44 IP/ha). The average number of nesting pairs impacted is 1,209 (max. of 3,610 nesting pairs) for all wetlands. On average, 706 nesting pairs will be impacted in open bogs, 293 in shrubby peatlands and 210 in treed peatlands.

Table A-CCE-5-2 Density and Nesting Pairs Impacted in Wetlands Identified within the Study Area

TYPE OF WETLAND	NUMBER OF LISTENING STATIONS	SURFACE AREA IMPACTED (HA)	DENSITY (IP/HA)		NUMBER OF NESTING PAIRS IMPACTED		
			Average	Standard Deviation	Minimum	Average	Maximum
Open bog	19	150.61	4.69	3.36	20	706	2,301
Shrubby peatland	6	65.75	4.46	3.46	12	293	805
Treed peatland	6	85.92	2.44	1.86	15	210	504
Total	**31**	**302.28**	**4.21**	**3.19**	**47**	**1,209**	**3,610**

Table A-CCE-5-3 presents the density (IP/ha) and the number of nesting pairs impacted for each species identified in the three types of wetlands. The White-throated Sparrow (densities ranging from 0.42 to 1.01 IP/ha) and the Dark-eyed Junco (densities ranging from 0.80 to 0.95 IP/ha) are the two most common species across the three types of wetlands. The white-throated sparrow is a generalist species that nests in mixed deciduous and coniferous habitats where stands have numerous openings and a dense shrub layer (Falls & Kopachena, 2020). The Dark-eyed Junco is found in habitats as diverse as coniferous and deciduous forests, stream banks and open woodlands (Nolan et al., 2020). Thus, the various wetlands present in the study area are suitable habitats for these two species.

In open bogs, the three most common species, in addition to the White-throated Sparrow (1.01 IP/ha) and the Dark-eyed Junco (0.80 IP/ha), are the Savannah Sparrow (0.50 IP/ha), the Lincoln's Sparrow (0.44 IP/ha) and the American Robin (0.30 IP/ha). The Savannah Sparrow nests in open herbaceous habitats such as fields, marshes and herbaceous peatlands (Wheelwright & Rising, 2020). Some open bogs in the study area, therefore, provide a suitable habitat for this species. The Lincoln's Sparrow uses wetlands where the shrub layer is dense (Ammon, 2020). This characteristic is found in some open bogs dominated by heaths. The American Robin nests in a variety of habitats (Vanderhoff et al., 2020) and may use open bogs for feeding.

In shrubby peatlands, the main species identified, in addition to the White-throated Sparrow (0.42 IP/ha) and the Dark-eyed Junco (0.95 IP/ha), are the Common Yellowthroat (0.64 IP/ha), the Wilson's Warbler (0.42 IP/ha) and the Winter Wren (0.42 IP/ha). The winter wren nests in forest habitats and may use shrubby peatlands as feeding area. The Common Yellowthroat and the Wilson's Warbler nest in locations where the shrub layer is mostly dense (Guzy & Ritchison, 2020; Ammon & Gilbert, 2020).

In treed peatlands, the Two-barred Crossbill (0.42 IP/ha), in addition to the White-throated Sparrow (0.74 IP/ha) and Dark-eyed Junco (0.74 IP/ha), is among the main species identified. The Two-barred Crossbill nests in treed environments generally dominated by spruce and tamarack (Benkman, 2020).

Only the Rusty Blackbird was identified as a special status species. It was exclusively observed in open bogs (0.23 IP/ha). The Rusty Blackbird nests in open wetlands such as peatlands, marshes, swamps and ponds (Avery, 2020; Environment Canada, 2014), which correspond to several potential habitats within the study area, primarily open bogs. On average, 35 Rusty Blackbird nesting pairs may be impacted by the project if we consider all the surveyed wetlands (Table A-CCE-5-3).

Table A-CCE-5-3 Density (IP/ha) and Nesting Pairs Impacted – Species Identified in Wetlands

SPECIES		OPEN BOG (N = 19)					SHRUBBY PEATLAND (N = 6)					TREED PEATLAND (N = 6)					TOTAL (N = 31)				
		Density (IP/ha)		Number of Nesting Pairs Impacted			Density (IP/ha)		Number of Nesting Pairs Impacted			Density (IP/ha)		Number of Nesting Pairs Impacted			Density (IP/ha)		Number of Nesting Pairs Impacted		
English Name	Latin Name	Avg.	Std. Dev	Min.	Avg.	Max.	Avg.	Std. Dev	Min.	Avg.	Max.	Avg.	Std. Dev	Min.	Avg.	Max.	Avg.	Std. Dev	Min.	Avg.	Max.
White-throated Sparrow	*Zonotrichia albicollis*	1.01	1.43	1	151	367	0.42	1.04	1	28	96	0.74	0.63	10	64	118	0.84	1.23	12	243	580
Dark-eyed Junco	*Junco hyemalis*	0.80	1.37	1	121	328	0.95	0.97	1	63	126	0.74	0.85	1	64	137	0.82	1.19	3	248	591
Savannah Sparrow	*Passerculus sandwichensis*	0.50	1.21	1	76	258	0.00	0.00	0	0	0	0.00	0.00	0	0	0	0.31	0.97	1	76	258
Lincoln's Sparrow	*Melospiza lincolnii*	0.44	0.56	1	66	150	0.21	0.52	1	14	48	0.00	0.00	0	0	0	0.31	0.52	2	80	199
American Robin	*Turdus migratorius*	0.30	0.49	1	45	119	0.00	0.00	0	0	0	0.00	0.00	0	0	0	0.18	0.41	1	45	119
Tree Swallow	*Tachycineta bicolor*	0.27	0.77	1	40	157	0.32	0.53	1	21	56	0.21	0.52	1	18	63	0.27	0.67	3	80	276
Rusty Blackbird	*Euphagus carolinus*	0.23	0.71	1	35	142	0.00	0.00	0	0	0	0.00	0.00	0	0	0	0.14	0.56	1	35	142
Common Yellowthroat	*Geothlypis trichas*	0.17	0.42	1	25	88	0.64	1.07	1	42	112	0.00	0.00	0	0	0	0.23	0.58	2	67	200
Hermit Thrush	*Catharus guttatus*	0.17	0.42	1	25	88	0.00	0.00	0	0	0	0.00	0.00	0	0	0	0.10	0.33	1	25	88
Swamp Sparrow	*Melospiza georgiana*	0.13	0.40	1	20	81	0.32	0.53	1	21	56	0.00	0.00	0	0	0	0.14	0.39	2	41	137
Cedar Waxwing	*Bombycilla cedrorum*	0.10	0.32	1	15	63	0.21	0.52	1	14	48	0.00	0.00	0	0	0	0.10	0.33	2	29	111
Two-barred Crossbill	*Loxia leucoptera*	0.07	0.29	1	10	54	0.21	0.52	1	14	48	0.42	0.66	1	36	93	0.16	0.43	3	61	195
Ruby-crowned Kinglet	*Regulus calendula*	0.07	0.29	1	10	54	0.21	0.52	1	14	48	0.00	0.00	0	0	0	0.08	0.32	2	24	102
Palm Warbler	*Setophaga palmarum*	0.07	0.29	1	10	54	0.00	0.00	0	0	0	0.11	0.26	1	9	31	0.06	0.25	2	19	86
Song Sparrow	*Melospiza melodia*	0.07	0.29	1	10	54	0.00	0.00	0	0	0	0.00	0.00	0	0	0	0.04	0.23	1	10	54
Le Conte's Sparrow	*Ammospiza leconteii*	0.07	0.29	1	10	54	0.00	0.00	0	0	0	0.00	0.00	0	0	0	0.04	0.23	1	10	54
Fox Sparrow	*Passerella iliaca*	0.07	0.29	1	10	54	0.00	0.00	0	0	0	0.00	0.00	0	0	0	0.04	0.23	1	10	54
Alder Flycatcher	*Empidonax alnorum*	0.07	0.29	1	10	54	0.00	0.00	0	0	0	0.00	0.00	0	0	0	0.04	0.23	1	10	54
Black-backed Woodpecker	*Picoides arcticus*	0.07	0.29	1	10	54	0.00	0.00	0	0	0	0.00	0.00	0	0	0	0.04	0.23	1	10	54
Wilson's Warbler	*Cardellina pusilla*	0.03	0.15	1	5	27	0.42	0.66	1	28	71	0.00	0.00	0	0	0	0.10	0.33	2	33	98
Winter Wren	*Troglodytes hiemalis*	0.00	0.00	0	0	0	0.42	0.66	1	28	71	0.00	0.00	0	0	0	0.08	0.32	1	28	71
Yellow-rumped Warbler	*Setophaga coronata*	0.00	0.00	0	0	0	0.11	0.26	1	7	24	0.00	0.00	0	0	0	0.02	0.11	1	7	24
Grey Jay	*Perisoreus canadensis*	0.00	0.00	0	0	0	0.00	0.00	0	0	0	0.21	0.52	1	18	63	0.04	0.23	1	18	63
Total		**4.69**	**3.36**	**20**	**706**	**2,301**	**4.46**	**3.46**	**12**	**293**	**805**	**2.44**	**1.86**	**15**	**210**	**504**	**4.21**	**3.19**	**47**	**1,209**	**3,610**

IP: Indicated nesting pair

The special status species is in bold.

Note: Where the high standard deviation results in the minimum being less than zero, one nesting pair has been assigned for each record of the species in a given environment.

Avg.: average, Sdt. Dev.: standard deviation, Min.: minimum, Avg.: average, Max.: maximum.

CCE-6	**DEFORESTATION PROHIBITION PERIOD**
	References
	CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 6.3.2 (Predicted effects on valued components – Migratory birds).
	WSP (February 2019). James Bay Lithium Mine. Supplement to the Environmental Impact Assessment – Response to Questions and Comments by the Canadian Environmental Assessment Agency (Concordance Phase). Report prepared for Galaxy Lithium (Canada) Inc. Answers to Questions CEAA-39 and CEAA-83, Appendix 2.
	WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Section 7.3.5 (Avifauna), pp. 7-57 to 7-59.
	WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-80.
	Background
	In its answer to Question CEAA-80, the Proponent states that deforestation will be prohibited from May 1 to August 15. According to Appendix A-22 (WSP, September 2019), which shows the work schedule, deforestation activities will be prohibited from June 1 to July 31. To properly document the impact of deforestation on avian fauna, clarifications from the Proponent are expected.
	The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:
	Clarify the dates of the period during which the Proponent will not carry out deforestation activities.

A-CCE-6:

The exact dates of the period during which the Proponent will not carry out deforestation activities is yet to be specified. Where possible, the period between May 1 and August 15 will be avoided. However, considering the technical constraints imposed by the territory, as well as the nesting period of species in the area and habitats impacted, this period may be shortened from June 1 to July 31. As early season species belongs mainly to groups of waterfowl and birds of prey in the mine project area, they will be little or not affected by deforestation activities.

In case this period of restriction cannot be complied with, the required authorizations shall be obtained through provincial and federal authorities prior to start of work. Mitigation measures may be implemented, such as scaring of birds before start of the nesting period, so the specimens avoid the areas selected for deforestation and monitoring of breeding evidence by a competent expert.

CCE-7	**CUMULATIVE EFFECTS ASSESSMENT FOR EACH AVIAN SPECIES AT RISK** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 6.6.3 (Cumulative effects assessment).** **CEAA (March 2018). *Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012*. Available online: https://www.canada.ca/en/impact-assessment- agency/services/policy-guidance/assessing-cumulative-environmental-effects-ceaa2012.html** **WSP (February 2019). James Bay Lithium Mine. Supplement to the Environmental Impact Assessment – Response to Questions and Comments by the Canadian Environmental Assessment Agency (Concordance Phase). Report prepared for Galaxy Lithium (Canada) Inc. Answers to Questions CEAA-47.** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Section 8 (Assessment of Cumulative Effects) and 8.5 (Projects, activities or events linked to valued components).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-83.** ***Background*** **In response to Question CEAA-83, the Proponent refers to its answer to Question CEAA 90, which concerns the cumulative impacts assessment for bird species at risk. The cumulative impacts assessment provided in response to Question CEAA-90 does not cover every species for which residual effects are predicted. Since each species faces unique circumstances, threats or issues, a cumulative effects assessment is required for each species separately.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Submit, for each bird species at risk that is or may be present in the study area, an analysis of the cumulative environmental effects (species by species), considering the information in the recovery programs, including identified population and distribution objectives, where available.** **Note: The Proponent is encouraged to consider the information provided in the CEAA's Technical Guidance: *Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012* (CEAA, March 2018). The Technical Guidance contains useful information on how to conduct the analysis, including how to select appropriate methods and indicators.**

A-CCE-7:

The study area for the analysis of the cumulative effects on the "bird species at risk" is the same as the study area for the chiroptera, i.e. a radius of 110 km around the project.

PROJECTS, ACTIVITIES OR EVENTS

The survey of past, present and future projects, activities and events that have had or may have an impact on bird species at risk are presented in Table 8-2 of the EIA (WSP, 2018b). These are the same projects, activities or events that may impact the chiroptera. The main elements that have had or may have a cumulative effect on the evolution of bird species at risk are detailed according to the below two themes:

- Modification and loss of habitats, and disturbance:
  - infrastructure and services;
  - use of the territory (hunting and fishing activities);
  - development of natural resources;
  - natural disturbances and other.
- Habitat and species protection:
  - wildlife or protected territory.

MODIFICATION AND LOSS OF HABITATS, AND DISTURBANCE

Infrastructure and Services

Most new infrastructure projects, linear or not, and their extension, results in changes and loss of habitats, as well as disturbance to terrestrial bird and, therefore, to species at risk too. Such is the case for projects related to the construction of main and secondary roads, of hydropower developments and to the construction and relocation of substations and power lines (construction of buildings, linear structures, flooding of land areas, human presence).

For example, the Eastmain-1-A-Rupert Project resulted in a decrease in passerine nesting pairs, as well as permanent local loss of terrestrial habitats and wetlands (Hydro-Québec Production, 2004). However, reservoirs such as the Eastmain-1 and Opinaca reservoirs can be favourable to the presence of other species such as waterfowl.

Some bird species are sensitive to roads (traffic, noise, etc.). Moreover, vehicles can cause fatal collisions (Villard et al., 2012). The main roads passing through the study area considered for the cumulative effects are the following: James Bay road, access road to the Eastmain Community, Némiscau-Eastmain-1 road, Muskeg-Eastmain-1 road, Muskeg-Sarcelle road, Sarcelle-Mine Éléonore road and various secondary roads. Other infrastructure, i.e., airports and landing runways, may also cause disturbance and even bird mortality.

Use of the Territory (hunting and sport fishing activities)

The use of territory for recreational purposes, i.e., outfitters, hunting and fishing activities, and the grant of rustic shelter or resort leases, may have resulted in a loss of habitat and increased disturbance for certain species of birds that nest in that habitat. It should be noted, however, that land use for recreational purposes is relatively low in the study area. The development of a permanent network of corridors (i.e., access roads to the infrastructure) may also have a negative impact on some migratory bird species, through nest predation and disturbance of certain species (Askins, 1994; Jordan, 2000). However, modification of selected habitats through the development of roads or trails can be favourable to certain species associated with open habitats. Waterfowl hunting and fishing activities (human presence on water bodies) are the main components that can induce an adverse cumulative impact on migratory birds in the study area.

Development of Natural Resources

The development of natural resources generally results in the modification and loss of nesting habitat (NABCI, 2012). Mining-related projects have the greatest potential impact on land bird populations across the territory.

However, it should be mentioned that only two active mining projects (i.e., the Éléonore and Nemaska Lithium Inc.'s Whabouchi mining projects) are located within the study area for cumulative effects on birds (110 km radius around the project site).

Forestry activities also have an impact on bird communities, causing loss of habitats for several species. It should be mentioned that forest clear-cuts are prohibited beyond the 51st parallel. Deforestation activities that took place in the study area are mainly related to work for various projects (e.g., reservoirs, dams, workers' camps, roads, power lines, etc.)

Natural Disturbances and Other

The impacts of natural disturbances do not strictly translate into a loss of nesting habitat. These disturbances also include forest fires and windfalls where various bird species or communities may settle in after the disturbance. Imbeau et al. (1999) suggest that recently disturbed areas are characterized by open habitat species associations. Forest fires are also said to be beneficial to certain special-status species such as the Common Nighthawk and the Olive-sided Flycatcher. Several major forest fires have occurred in the study area, notably the fire of 2013, which affected almost 15% of its surface area.

HABITAT AND SPECIES PROTECTION

Wildlife or Protected Territory

Certain events have led to the implementation of regulatory and legal provisions for the protection of species and their habitats, including:

- Migratory Birds Convention Act (1985, replaced by the Migratory Birds Convention Act, 1994), Migratory Birds Regulation and Regulation Amending the Migratory Birds Regulation (2002).
- Environment Quality Act (1972).
- Act Respecting the Conservation and Development of Wildlife (1993).
- Federal Policy on Wetland Conservation under the Canadian Environmental Assessment Act (1991).

The creation of a network of Bird Conservation Regions (BCRs) (1999) facilitates the implementation of conservation plans.

Some projects such as the development of national park reserves (e.g., Assinica), biodiversity reserves and protected areas may be indirectly beneficial to migratory birds through the protection of their habitats. The Assinica wildlife reserve is located south of the study area for the cumulative effects on the "bird species at risk" VC.

Baseline Condition

The BCRs are distinct eco-regions across North America of similar bird communities, habitats and resource management methods (NABCI, 2015). The BCRs are delimited by the Commission for Environmental Cooperation (CEC) and based on a flexible hierarchical framework of nested ecological units.

GLCI's mine project area is part of the BCR7, i.e., the Taiga Shield and Hudson Plains (Environment Canada, 2013a). However, the area for cumulative effect also covers the BCR 8 (Environment Canada, 2013b), i.e., the Boreal Softwood Shield, which is represents a large number of bird communities, particularly forest bird species. Considering the limited data available, the development of a baseline condition and the description of historical trends regarding the status of bird species at risk across the territory covered by the study area are based on data from the Quebec portion of the BCR 7 and 8 (Figures A-CCE-7-1 and A-CCE-7-2).

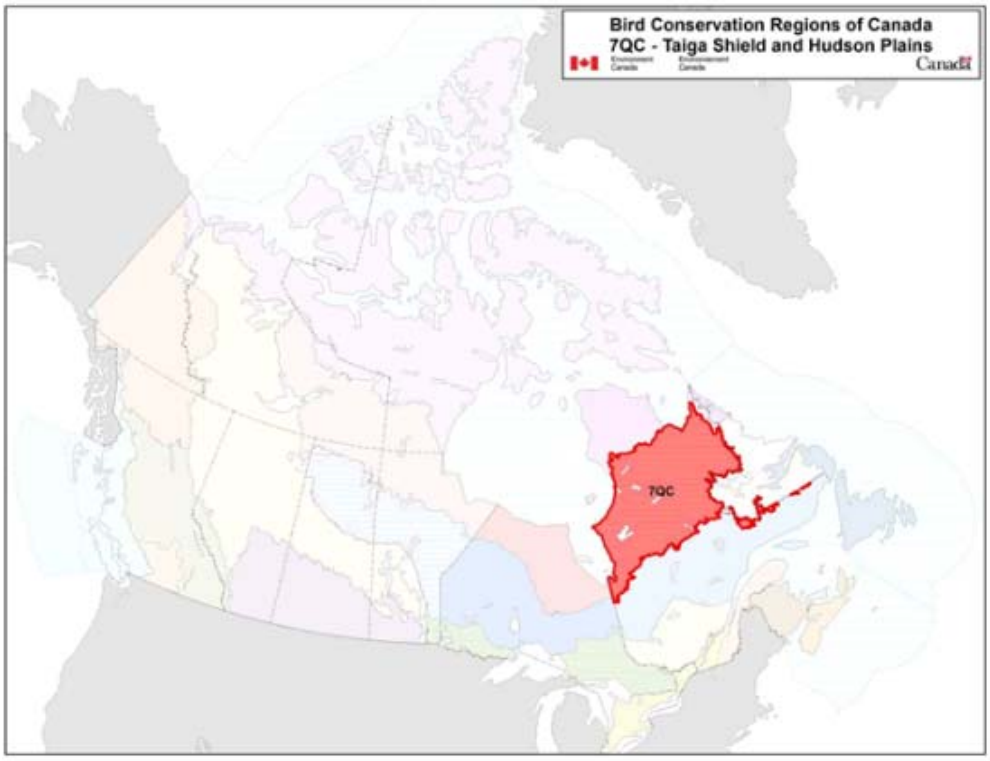


Figure A-CCE-7-1 Bird Conservation Region 7 (BCR 7)

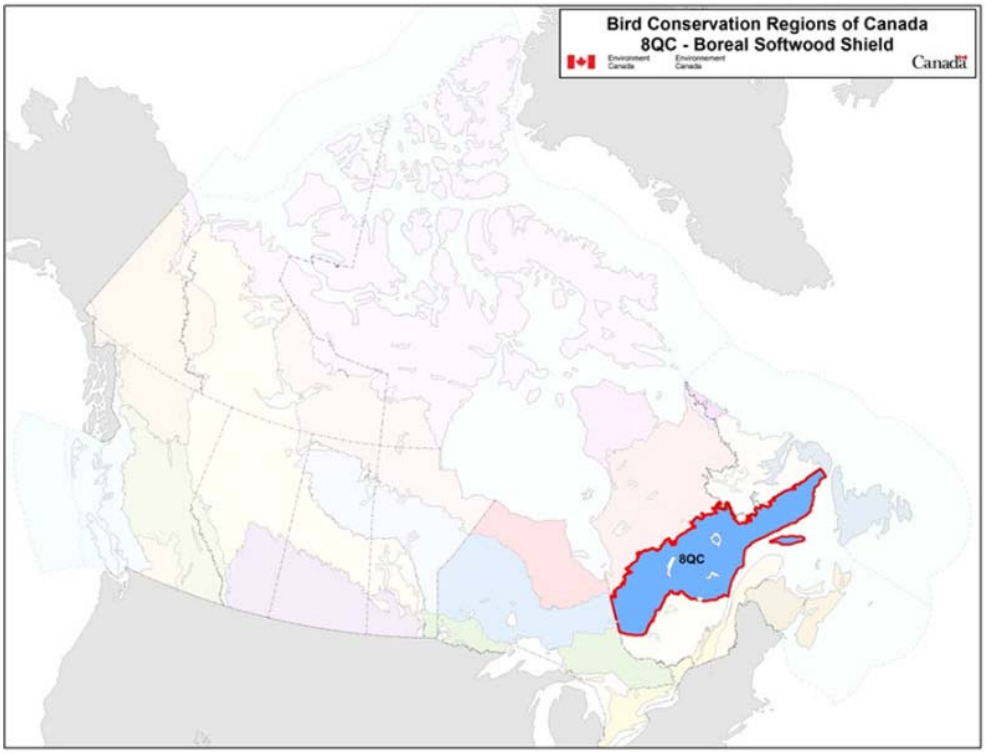


Figure A-CCE-7-2 Bird Conservation Region 8 (BCR 8)

Data to determine the status of bird species at risk across the cumulative effect study area date back to 1970 for the BCR 8 and 1989 for the BCR 7. These years were, therefore, selected as baseline conditions. The annual indexes for the BCR 8 and BCR 7 during the first year of inventory and the last year for which data is available (2017) are presented in Table A-CCE-7-1 (Smith et al., 2019). The annual index indicates the average number of specimens identified per inventory route.

The species selected are the ones listed in Table A-80-1 of the *Answers to Questions and Comments Received from the CEAA as part of the James Bay Lithium Mine Environmental Impact Study* submitted in September 2019, i.e., the Common Nighthawk, Short-eared Owl, Bank Swallow, Olive-sided Flycatcher, Canada Warbler, Red-necked Phalarope, Rusty Blackbird and Yellow Rail.

For BCR 7, the annual index of 1989 is higher than the one of 2017 for all species for which data is available. For BCR 8, the annual index of 2017 is lower than the one of 1970 for all species except Olive-sided Flycatcher for which the annual index of 2017 is slightly higher (Table A-CCE-7-1).

Table A-CCE-7-1 Annual Index of Special Status Species Across the BCR 7 in Canada and BCR 8 in Quebec for the First and Last Year of Inventory

SPECIES	BCR 7		BCR 8	
	Annual Index		Annual Index[1,2]	
	1989	2017	1970	2017
Common Nighthawk	0.10	0.03	0.09	0.07
Short-eared Owl	N/A	N/A	0.03 (1980)	0.03
Bank Swallow	N/A	N/A	17.90	0.98
Olive-sided Flycatcher	0.87	0.75	0.30	0.33
Canada Warbler	N/A	N/A	0.98	0.63
Red-necked Phalarope	0.47	0.07	N/A	N/A
Rusty Blackbird	3.93	2.97	0.32	0.07
Yellow Rail	N/A	N/A	N/A	N/A

Source: Environment Canada, 2013; Smith et al., 2019.
N/A: data not available.

BCR 7: The annual index across the BCR 7 in Canada was used since no data from the BCR 7 in Quebec was available. Also, no data was available for Short-eared Owl, Bank Swallow and Canada Warbler.

BCR 8: The annual index across the BCR 8 in Quebec was used, apart from two species for which data was unavailable. Thus, data from the BCR 8 in Canada was used for the Rusty Blackbird and Short-eared Owl. No data was available for Red-necked Phalarope and Yellow Rail.

Historical Trends

There is limited accurate data available to provide a baseline for the status of species at risk on the regional scale. Thus, data from the BCR 7 and 8 was used. It should be noted, however, that population trends are not available for some species in the BCR 7 (Table A-CCE-7-2). No data was available for the Yellow Rail and less data for the Red-necked Phalarope.

The Quebec portion of the BCR 7 is home to 45,000 Bank Swallows, 42,000 Olive-sided Flycatchers and 2,200,000 Rusty Blackbirds, which represents 10.4%, 45.9% and 94.5%, respectively, of the Quebec population (Table A-CCE-7-2). Thus, the core of the Rusty Blackbird breeding inventory is located in BCR 7.

The BCR 8 is home to 26,000 Common Nighthawks, 2,000 Short-eared Owls, 210,000 Bank Swallows, 39,000 Olive-sided Flycatchers and 220,000 Canada Warblers, which represents 88.9%, 5.4%, 48.4%, 42.6% and 4.1%, respectively, of the Quebec population (Table A-CCE-7-2). Thus, the core of the Common Nighthawk breeding inventory in Quebec is located in BCR 8.

Table A-CCE-7-2 Valued Land Bird Species According to their Status

SPECIES	POPULATION (NUMBER)				POPULATION RATIO				POPULATION TREND BCR 7 (%)[1]		POPULATION TREND BCR 8 (%)[2]	
	BCR 7-QC	BCR 8-QC	Quebec	Global	BCR 8-QC/ Global(%)	BCR-8-QC/ Quebec	BCR 7-QC/ Global(%)	BCR-7-QC/ Quebec	Short-term (2007-2017)	Long-term (1989-2017)	Short-term (2007-2017)	Long-term (1970-2017)
Common Nighthawk	0	26,000	29,250	21,687,388	0.1	88.9	0.0	0.0	-1.84	-4.37	1.76	-0.68
Short-eared Owl	0	2,000	37,000	605,854	0.3	5.4	0.0	0.0	N/A	N/A	-0.27	-0.71 (1980-2017)
Bank Swallow	45,000	210,000	434,000	7,911,294	2.7	48.4	0.57	10.4	N/A	N/A	-6.91	-6.00
Olive-sided Flycatcher	42,000	39,000	91,500	2,839,921	1.4	42.6	1.48	45.9	0.48	-0.62	0.11	0.19
Canada Warbler	0	220,000	456,900	2,598,487	8.5	48.2	0.0	0.0	N/A	N/A	2.71	-0.94
Red-necked Phalarope	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-6.22	-6.56	N/A	N/A
Rusty Blackbird	2,200,000	96,000	2,328,100	6,777,257	1.4	4.1	32.5	94.5	-0.82	-1.03	-3.59	-3.33
Yellow Rail	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

1 The population trend over here corresponds to the BCR 7 in Canada since no data was available for the BCR 7 in Quebec. No data was available for Short-eared Owl, Bank Swallow, Canada Warbler and Yellow Rail.

2 The population trend over here corresponds to the BCR 8 in Quebec except for two species for which population trend was not available. Thus, data from the BCR 8 in Canada was used for Short-eared Owl and the Rusty Blackbird. The size of the population was estimated in terms of indicated nesting pairs (IP).

Sources: Environment Canada, 2013; Partners in Flight Science Committee, 2019; Smith et al., 2019.

CUMULATIVE EFFECTS

The cumulative effects on the six special-status species selected are presented in this section.

COMMON NIGHTHAWK

The main causes for decline of Common Nighthawk are changes in insect populations, loss and modification of habitats, use of chemical products and climate change (Blancher et al., 2007; Nebel et al., 2010). Forest harvest and forest fires are also important factors associated with this decline (COSEWIC, 2007a).

Potential habitat is located not only within the infrastructure area (363.64 ha: 47.34 ha temporarily lost, and 316.30 ha permanently lost), but also outside this area, i.e., within the area considered for the cumulative effect assessment.

At least one nesting pair may use the study area. The development of infrastructure will result in loss of habitats for the species. Upon closure, remains of the mine may be used by the Common Nighthawk, until trees are big enough to close the forest cover. Eventually, when the restored habitats have reached maturity, the landscape composition should be similar to its initial state and be subjected to the natural dynamic prevailing in the region. In short, GLCI's mine project will have a positive impact on the Common Nighthawk in the restoration phase, due to the development of more open habitats than what was initially present. No effect is anticipated once restoration is finished and habitats have reached maturity.

The cumulative effect of the project on the species will be low since replacement habitats are available in the vicinity of the project and the project will create new habitats as well.

SHORT-EARED OWL

In general, the loss and alteration of the Short-eared Owl habitat (agriculture, urban and commercial development, power generation and mining operations), activities threatening birds, nests and eggs (pastureland, mowing and harvesting, pesticide use, collisions) and climate change are the greatest threats to the Short-eared Owl (Environment Canada, 2016).

Potential habitat is located within the infrastructure area (443.83 ha: 29.42 ha temporarily lost, 414.41 ha permanently lost). However, no bird was detected during inventories. It should be noted that large open bogs are available outside the infrastructure area. Thus, the cumulative effect on the Short-eared Owl will be low given the low impact of the project itself on the species.

BANK SWALLOW

The Bank Swallow nests in vertical banks with sand-silt substrates (COSEWIC, 2013b). The greatest threats to the Bank Swallow populations are: the loss of breeding and foraging habitat, especially through erosion, aggregate management activities, conversion of pastureland to cropland and afforestation, destruction of nests, climate change, widespread pesticide use, and threats during migration and on the wintering grounds (COSEWIC, 2013b).

The permanent loss of only 1.31 ha of habitat is projected. Since only a small area of potential habitat will be impacted by the project and the species was not detected during the inventories, the cumulative effect of the project on the Bank Swallow will be low, due to the small direct impact of the project on the species.

OLIVE-SIDED FLYCATCHER

Forest harvesting, forest fire management and wintering grounds alteration are contributing factors in Olive-sided Flycatcher population decline (Atman & Sallabanks, 2012; COSEWIC, 2007b). However, forest fires that occurred in the study area in the past may have been beneficial to the species. Since no sighting of the bird was reported, the cumulative effect of the project can be based on the loss of available habitat, which corresponds to 375.32 ha (22.91 ha temporarily lost and 352.41 ha permanently lost). However, no Olive-sided Flycatcher was detected during inventories, despite the fact that its song travels long distance. The cumulative effect of the project will, therefore, be low due to the small direct impact of the project on the species.

CANADA WARBLER

The primary threats to Canada Warbler include land conversion of breeding habitats, migration and wintering grounds, forest harvesting, removal of shrubs, energy and mining exploration and extraction, over browsing, reduced availability of insect prey, and collisions. The significance of each threat varies across Canada Warbler's geographical range (Environment Canada, 2015b). In total, 116 ha (17.91 ha temporarily lost and 98.11 ha permanently lost) of potential habitat will be impacted by the project. Since no other sighting of Canada Warbler was reported in the study area despite the fact that potential habitat is present, the cumulative effect of the project on the species is low. It should also be mentioned that the study area is located at the northern boundary of the Canada Warbler's nesting area.

RED-NECKED PHALAROPE

The greatest threats to Red-necked Phalarope include climate change, build-up of contaminants in the Arctic environment, increase in industrial activities, and denuding of vegetation caused by increasing Snow Goose populations (COSEWIC, 2014). The loss of potential habitat caused by the project is of the order of 352.41 ha (permanent loss only). However, it should be noted that based on the known range of the species, it would be surprising that the Red-necked Phalarope nests in the study area (QBBA, 2020). Breeding populations are found in the eastern and northern regions of Quebec. Thus, the cumulative effect of the project on the species is considered very low.

YELLOW RAIL

Loss or degradation of habitat, presence of exotic, invasive or introduced plant species, accidental mortality, and changes in ecological dynamics or natural processes are the major threats to the Yellow Rail (Environment Canada, 2013c). The loss of potential habitat caused by the project is of the order of 254.30 ha (permanent loss only). It should be noted that based on the known range of the species, it would be surprising that the Yellow Rail nests in the study area (QBBA, 2020). In northern Quebec, breeding populations are mainly found along the James Bay coast. Thus, the cumulative effect of the project on the species is considered very low.

RUSTY BLACKBIRD

The most serious threats to Rusty Blackbird include conversion of wetlands in wintering, migration and nesting grounds (south of the boreal region), deforestation, blackbird control programs, changes in surface hydrology, contamination of wetlands by mercury, wetland acidification, climate change, drying of wetlands, and diseases and parasitic infections (Environment Canada, 2014).

An estimated 35 Rusty Blackbird nesting pairs may be impacted by the project, more specifically in open bogs. In total, 352.41 ha (0.06 ha temporarily lost and 353.41 ha permanently lost) of potential habitat will be impacted. However, some pairs may nest on the periphery of the infrastructure area since several potential habitats are present there. Thus, the cumulative effect of the project on this species will be low.

MITIGATION MEASURES AND FOLLOW-UP

No additional mitigation measures or additional environmental follow-up is required for this component.

CCE-8	**MIGRATORY PROGRAM FOR PONDS USED BY MIGRATORY BIRDS**
	References
	CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 6.4 (Mitigation Measures) and 8.1 (Follow-up Program).
	WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Section 10.4 (Environmental Monitoring During Operations).
	WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answers to Questions CEAA-82 and CEAA-84.
	Background
	In its answer to Question CEAA-82, the Proponent presents a pond monitoring program. The Proponent plans to carry out a monthly monitoring program to determine how the ponds are being used by avian fauna and whether additional mitigation measures are needed. The Proponent rejects the option of installing acoustic scaring devices as a preventive measure because of the habituation potential.
	In its answer to Question CEAA-84, the Proponent indicates that monitoring and follow-up measures "may" be implemented for migratory birds. The Proponent must clearly specify what measures will be taken so that the significance of the residual effects can be documented. As indicated in the *Guidelines for the Preparation of an Environmental Impact Statement* (section 6.4, Mitigation Measures), "[mitigation] measures will be specific, achievable, measurable and verifiable, and described in a manner that avoids ambiguity in intent, interpretation and implementation. "
	The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:
	A) Outline a pond monitoring program to prevent and minimize the project's adverse effects on the migratory birds that use the ponds. The program must include all the mitigation and/or environmental monitoring measures that will be taken to minimize the contamination risks for the wildlife, especially the migratory birds, using the mining infrastructure.
	B) Demonstrate that monthly monitoring is sufficient to determine how the ponds are used by avian fauna and whether scaring measures are needed at appropriate times to minimize the effects on avian fauna frequenting the ponds.
	Note: The avian fauna monitoring program could be structured around bird life cycles and project activities to take account of factors such as pond freeze-over periods and nesting periods.

A-CCE-8:

A)

To remove any ambiguity regarding GLCI's intention to implement a pond monitoring program to prevent and minimize the project's adverse effects on the migratory birds that use the ponds, GLCI unequivocally commits to implement such a plan. The program outline is as follows:

- At a minimum, monitor the ponds on a bi-monthly basis during the ice-free period, i.e., approximately from mid-May to mid-November.
- Monitoring to be carried out through visits at the start and end of the day, when the visibility conditions are favourable for the observation and counting of birds that are likely to be found in the ponds.
- Monitoring shall be conducted by an individual capable of identifying and counting the specimens present. If such a resource is unavailable, the monitoring manager shall use the camera at his/her disposal to take pictures and forward them to someone qualified to identify birds. Data will be compiled in a log book which will, then, be a part of the global monitoring and follow-up reports that will be made available to the monitoring committee. A copy of this log book will also be kept by GLCI.
- Increase the frequency of visits to weekly basis, or more often as required, during the spring and fall migration periods.
- Where applicable, analyze the frequenting data of migratory birds to the sites in relation to the monitoring of pond water quality which will be an integral part of the global monitoring and follow-up program.
- In consultation with the competent authorities, if the use of ponds by birds is deemed as a threat to their health or survival, exclusion measures shall be implemented (e.g. sufficient number of acoustic scaring devices).
- If necessary, install one or more cameras as such that pictures can be viewed remotely, to facilitate site monitoring and control triggering of scaring devices.

B)

During the period when ponds are frozen and when birds are not present and given the relatively short duration of migratory stopovers, the proposed frequency of monitoring is bi-monthly. As mentioned in answer A-CCE-8A, the frequency will be weekly (or more often as required) during migration periods as to properly assess the extent of bird presence and whether or not scaring measures should be implemented. As a preventive measure, at least one mobile scaring device shall be kept handy on site at the start of the mine operations, so that it can be quickly set up if needed. Other devices may be included if warranted by the monitoring data and risk assessment.

CCE-9	**SUBMISSION OF A BANK SWALLOW (*RIPARIA RIPARIA*) MONITORING PROGRAM** ***References*** **CEAA (February 2018). Guidelines for the Preparation of an Environmental Impact Statement. Part 2, section 8.1 (Follow-up Program).** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment*. Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Section 10.4 (Environmental Monitoring During Operations).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review*. Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-84.**

Background

In its answer to Question CEAA-84, the Proponent indicates that it may monitor the use of quarries and borrow pits to document their use by the Bank Swallow (*Riparia riparia*) and determine the project's actual impact on avian fauna.

The Proponent states that the quarries and borrow pits may be monitored during monthly rounds or site visits by the Environmental Supervisor. If the quarries and borrow pits are being used by the Bank Swallow (*Riparia riparia*), operations in the section used by the birds may be suspended during the nesting season.

The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:

A) Demonstrate that monthly monitoring is sufficient to determine how the quarries and borrow pits are used by the Bank Swallow (*Riparia riparia*) and whether protective measures are needed at appropriate times to avoid destroying nests.

B) In the event that the Bank Swallow (*Riparia riparia*) nests in the quarries and borrow pits, specify the protection zone that will be put in place to safeguard the nests.

C) Referring to section 8.1 (Follow-up Program) of the Guidelines for the Preparation of an Environmental Impact Statement, provide a more detailed monitoring program similar to the final monitoring program.

Note 1: Information on best practices to avoid adverse effects on the Bank Swallow (*Riparia riparia*) in sandpits and quarries is available from the following web page: https://www.canada.ca/en/environment- climate-change/services/migratory-bird-conservation/publications/bank-swallow-riparia-sandpits- quarries.html.

Note 2: The avian fauna monitoring program could be structured around bird life cycles and project activities to take account of factors such as pond freeze-over periods and nesting periods.

A-CCE-9:

A)

Considering the short breeding season and the effort put in by the birds, upon arrival, to dig their nests, at least a bi-monthly monitoring will be more appropriate. Thus, bi-monthly monitoring will be done from mid-May to mid-August. The monitoring frequency shall be increased to one visit per week if Bank Swallow is observed at any of the sites.

B)

Should the planned nesting prevention measures (e.g. softening down of bench slopes) fail, an exclusion zone where operations are prohibited will be established, i.e., at a distance of at least 50 m from the nearest nest as soon as active nests are observed. This exclusion zone shall be in place until mid-August or until the person in charge of the monitoring program has confirmed the end of nesting period (no birds in the nest).

The colony protection zone may be expanded, for example, if the zone is deemed not large enough to sufficiently reduce disturbances or risk of collapse in the area used by the birds. The exclusion zone shall be reassessed and marked every week. Where appropriate, and on the recommendation of the person responsible for the monitoring program, a borrow pit or quarry may be temporarily discontinued in favour of another until the end of the breeding season.

C)

The proposed monitoring program to prevent adverse effects on the Bank Swallow from the use of borrow pits and quarries (by-catch) is outlined as follows. A final and more detailed program will be created at a later stage:

- The monitoring program will be implemented to verify the possible presence of Bank Swallow at the project's borrow pits and quarries.
- The inspection part of this program will be assigned to a competent individual (biologist or technician). He will be tasked with verifying the presence of birds, informing the machine operators of restrictions and methods to be used to protect the species, and making sure that these measures are implemented. Where necessary, he will report any violation to GLCI's management.
- Site visits shall be conducted before opening a new borrow pit or quarry, and afterwards on a bi-monthly basis from mid-May to mid-August.
- The frequency of monitoring will be increased to a weekly-basis, should a Bank Swallow be observed at one of the sites.
- All borrow pits and quarries selected for material extraction will be visited from mid-May to mid-August.
- To reduce the appeal of borrow pits and quarries for the nesting of Bank Swallow, the operators will be asked to maintain, at all times, a gradient of maximum 70 degrees at bench slopes that are being exploited. At the end of each day's operation at a borrow pit or quarry, the operator shall ensure that the slopes are profiled to a gradient of less than 70 degrees.
- In addition, each spring, before the end of April, the operator shall make sure that the slope gradient of borrow pits and quarries to be exploited in the following months is, indeed, less than 70%. If required, the operator shall reprofile the slopes before the birds are expected to return.
- Wherever possible, the operator will maintain an alternative unexploited Bank Swallow nesting area by developing a slope with a gradient of at least 70 degrees. This compensation measure will be mandatory as soon a site already used by a Bank Swallow colony becomes operational.
- Alternatively, if other sites suitable for operation are not available within a reasonable distance from the project and that development of an alternative nesting site nearby is impossible, an acoustic scaring device may be set up in the early spring to discourage the Bank Swallow colony from settling in an area to be exploited. However, no scaring device shall be used once a colony is established.

CCE-10	**MIGRATORY BIRD FOLLOW-UP PROGRAM** ***References*** **CEAA (February 2018). Guidelines for the Preparation of an Environmental Impact Statement. Part 2, section 8.1 (Follow-up Program).** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment*. Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Section 10.4 (Environmental Monitoring During Operations).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review*. Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-84.**

Background

In its answer to Question CEAA-84, the Proponent indicates that it may carry out general monitoring of migratory birds to document the project's actual impact on avian fauna.

On the basis of the information provided by the Proponent, the bird monitoring program seems more like a follow-up program. A follow-up program is designed to verify the accuracy of the environmental assessment predictions and to determine the effectiveness of the measures implemented to mitigate the project's adverse effects.

Residual effects are predicted for bird species at risk, and Environment and Climate Change Canada's view is that the follow-up program should pay special attention to each species at risk and take account of the elements of the recovery strategy (where available) for each species at risk concerned.

The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:

A) Outline a follow-up program for bird species at risk taking into account the recovery programs for each species concerned, including

- **the purpose and objectives;**
- **the parameters or elements that will be tracked, and the methodology or protocol that will be used (time, frequency, duration, location of sampling stations, etc.);**
- **when it will be implemented and how frequently results will be provided to the competent authorities; and**
- **the corrective or adaptive management measures that would be taken for each element tracked.**

B) Identify the bird species at risk that will receive special attention under the follow-up program proposed in A.

A-CCE-10:

A)

An outline of the follow-up program for bird species at risk is presented herein.

Purpose and objectives:

The purpose of the follow-up program for bird species at risk is to verify the predictions of the environmental assessment and to determine the effectiveness of the measures implemented to mitigate the project's adverse effects on these species. Its objectives include verifying the presence and the number of local populations of these birds, establishing trends over time and, if required, modifying the mitigation measures already in place or implementing additional measures to reduce the extent of the residual effects observed.

Tracked parameters or elements , and methodology or protocol used:

The follow-up program will mainly focus on species at risk whose habitat is found in the study area, as well as on favourable habitats that will gradually recover from recent forest fires and construction works of the project's infrastructure.

Survey effort, timelines and methods will be similar to those employed in 2017 to establish a baseline condition (WSP 2017, 2018), namely the listening station method (Blondel and al. 1970; EC, 1997, 2007) for terrestrial breeding birds and ground station surveying for waterfowl and aquatic bird nesting. In addition, protocols will be developed specifically for nighthawks (Regroupement QuébecOiseaux, 2015) and short-eared owls. Previously accessed monitoring stations that are available will be reused for the survey.

When it will be implemented and how frequently results will be provided to the competent authorities:

For the purpose of documenting the actual impact of the mine and its operation on the breeding birds, we propose that five-year surveys be carried out at various stages of operation until the follow-up of restoration work, starting from the fifth year of mine operation until the fifth year after its permanent closure. In this way, it will be possible to observe the evolution of local populations of bird species at risk and adjust mitigation measures, if needed. These surveys will also help document the effect of the gradual restoration of borrow pits, quarries and stockpiles, as well as natural habitats affected by forest fires on bird populations.

The results of these surveys shall be provided to the monitoring committee as well as to the competent authorities within six months of collecting the data.

Corrective or adaptive management measures that would be taken for each element tracked:

A priori, there are no pre-established corrective measures, since adaptive management requires intervention in response to the situation occurring on site at the time of follow-ups. Depending on the species in question and threats identified, possible measures may include forestry work or plantations to facilitate or accelerate restoration of favourable habitats, placing nesting boxes, or even modifying certain practices that could prove problematic for the species under consideration.

For all cases, the proposed measures shall be described in the follow-up reports and may be discussed and improved upon in consultation with the monitoring committee and the authorities having jurisdiction.

B)

As part of the EIS, 9 of the 41-bird species designated as "at risk" in Quebec were identified having a distribution area that either covers or nears the study area. These include the Hudsonian Godwit, Common Nighthawk, Short-eared Owl, Bank Swallow, Olive-sided Flycatcher, Canada Warbler, Red-necked Phalarope, Rusty Blackbird, and Yellow Rail. Particular attention will be paid to these species, without excluding new species that may be assigned a special status during the follow-up period. Listening stations will, therefore, be set up in habitats conducive to each of these species. If necessary, the five-year follow-up plan may evolve over time.

6 SPECIES AT RISK

6.1 REQUESTS FOR INFORMATION TO THE PROPONENT

To answer questions CCE-11, 12 and 13, it is essential to describe the status of boreal caribou so as to provide some background on the method used to prepare the answers. The challenges of describing the habitat based on various caribou needs with available data were outlined to the various stakeholders from IAAC, EC and the Cree Nation Government (CNG) during a teleconference meeting on May 8, 2020.

6.1.1 GENERAL BACKGROUND

The main challenge in answering questions CCE-11 to 13 is the description and mapping of the biophysical characteristics of the winter habitats frequented by boreal caribou to carry out their life processes as listed in Appendix H of the Caribou Recovery Strategy (Environment Canada, 2012). This exercise should be carried out within the project's area of influence in a 50-km radius to meet the Joint Assessment Committee requirements. These requests, related to the federal method of analyzing the impacts of a project on this species, present major challenges when answering them.

AVAILABILITY OF VEGETATION DATABASES

As mentioned in the answer to CEAA 86 (WSP, 2019), no ecoforestry database has been published by the Ministère des forêts, de la faune et des parcs (MFFP) for the territory to be covered. The information derived from photo interpretation and the vegetation inventory carried out by WSP, gives the best possible level of accuracy in terms of the footprint of the proposed mine and its 500 m area of influence in the periphery of the project.

For the area to be covered within a 50-km radius of the project, we have data from the Northern Quebec Forest Inventory Program (NFIP) or from the Land Cover, circa 2000-Vector (2009), which helps us to analyze and describe the biophysical characteristics of the different types of habitats frequented by Woodland Caribou to carry out their vital processes. However, these sources of information are less accurate as well and are not regularly updated, as is the case with the ecoforestry databases available for the territory further south. Nevertheless, the circa database seems to provide more details and, therefore, a better level of characterization compared to the NFIP, so as to interpret this data with regards to caribou habitat.

BIOPHYSICAL CHARACTERISTICS OF ESSENTIAL BOREAL CARIBOU HABITAT IN ECOZONES

The project site is located inside the south-east boundary of the Plains Ecozone (Figure A-CCE-11_13). However, the rare Woodland Caribou, which could frequent the project study area, belong to the local population (herd) known as the Nottaway herd inhabiting the territory north of Matagami. Moreover, according to the territory users, a few caribou may still be found along km 340 of the James Bay Highway. There may also be exchange of individuals between this population and that of Assinica, located further east. A report on a woodland caribou recovery study done by a work group from the *Comité scientifique du Nord-du-Québec* provides relevant scientific data, particularly regarding Nottaway and Assinica populations (Rudolph et al., 2012).

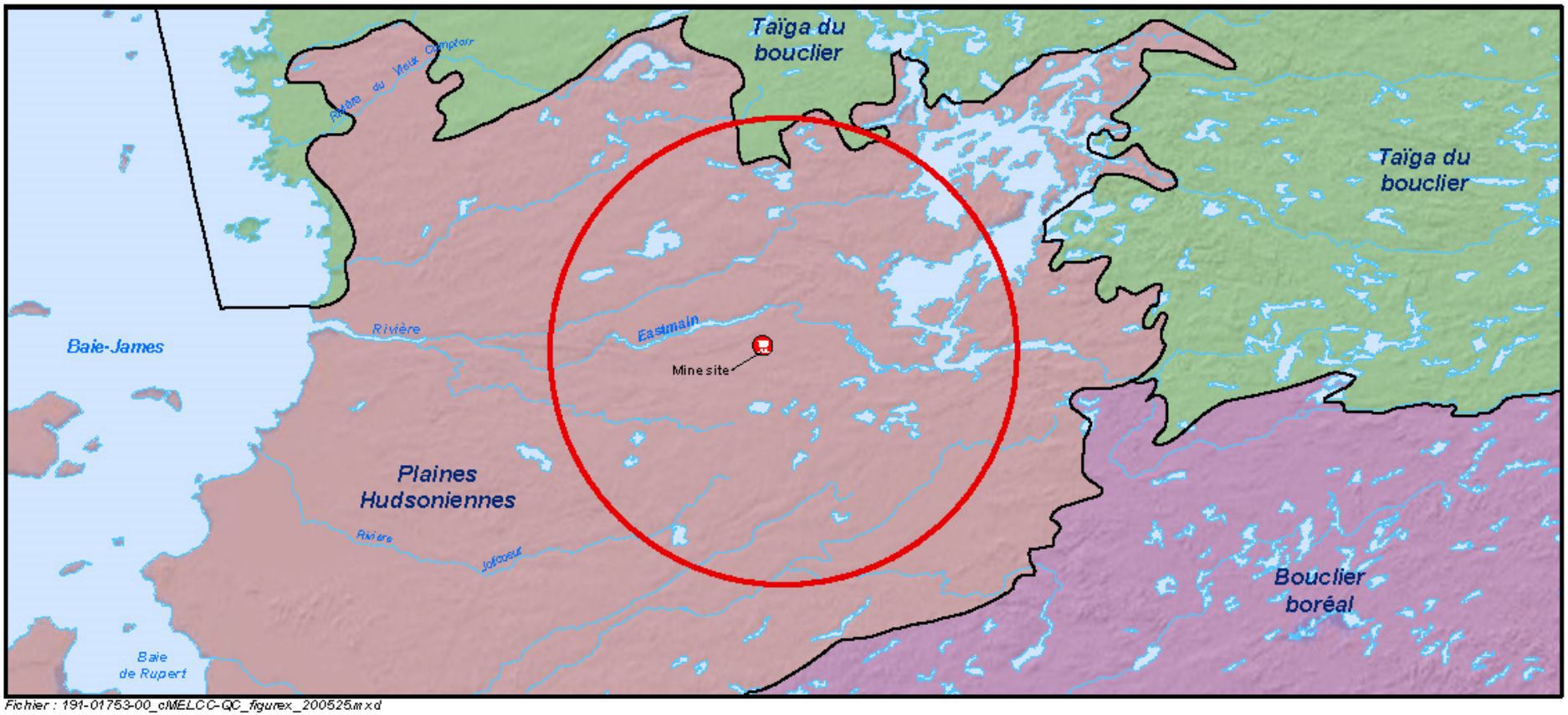


Figure R-CCE-11_13 Project Location according to Ecozones

Thus, the populations likely to frequent the area of the proposed mine site are mainly found in the central and eastern ecoregions of the Boreal Shield, while the project is based in the Hudson Plains Ecozone. It is, therefore, appropriate to consider the biophysical characteristics of the essential caribou habitat in these three ecozones (Table A-CCE 11_12_13).

The description of caribou habitat (Appendix H of the Caribou Recovery Strategy, Environment Canada, 2012) indicates criteria that are difficult to transpose with the available vegetation databases in the area. Winter is a critical time for woodland caribou as they search for nutritional resources. The biophysical characteristics of essential boreal caribou winter habitat, within the three ecoregions, that may be frequented by caribou of the Nottaway and Assinica populations are presented below.

Table A-CCE-11_12_13 Biophysical Characteristics of Essential Boreal Caribou Winter Habitat for the 3 Ecozones

ECOZONE	DESCRIPTION OF WINTER HABITAT
Hudson Plains	Dense and mature coniferous forests with lichens and wetlands. Peatlands dominated by open oligotrophic bogs and terrestrial lichens. Large plots of intermediate and mature black spruce, heavily shrubby muskegs and mixed coniferous stands, all are used in late winter.
Boreal Shield (central region)	Large areas of contiguous forest dominated by black spruce. Open coniferous forests or forests with less tree density, an abundance of terrestrial and arboreal lichens and low snow (e.g. shorelines) are also selected.
Boreal Shield (eastern region)	Wooded wetlands. Caribou use the upland tundra for resting. Mountainous areas. Dry and barren land, wetlands, mature coniferous forests with lichens, balsam fir stands, dense stands of spruce and mixed spruce-fir forests over 40 years old are selected in the southern regions. Caribou are observed near frozen bodies of water. By using mature forests, that are protected from harvesting, the probability of encountering wolves increases as they choose the same habitat in winter. Shallow snowy areas selected at the end of winter.

Source: Environment Canada, 2012

With respect to the biophysical characteristics listed above that are derived from the recovery strategy, the strategy itself states that:

> *"The biophysical characteristics vary between and within distribution areas. Since the biophysical characteristics outlined in the recovery strategy have been developed nationally for each ecozone and ecoregion and not for each local population, every provincial/territorial jurisdiction could or will develop over time a comprehensive description of the biophysical characteristics required for each distribution area."*

As such, information collected by the Government of Québec since the implementation of the recovery strategy, should first be considered when analyzing the biophysical characteristics of the essential caribou habitat of the populations likely to frequent the proposed mine site.

INFORMATION COLLECTED BY THE PROVINCE ON WOODLAND CARIBOU

The woodland caribou has been identified by the Government of Québec as a priority species and, as such, for the last three decades has been collecting data about the species. In fact, since 1990, numerous scientific studies have been carried out in Quebec, including about thirty master's or doctoral theses on the following four themes:

— Effects of Forest Management and Human Disturbance;

— Habitat Selection and Use;

— Population Dynamics;

— Effect of Predation.

It is on the basis of this new information that the recovery strategy for woodland caribou in Quebec was revised in 2013 (Équipe de rétablissement du caribou forestier du Québec, 2008 and 2013a) and the development of guidelines for managing woodland caribou habitat (Équipe de rétablissement du caribou forestier du Québec, 2013 b). The telemetry data acquired from 1998 to 2019 have provided additional information, in particular on the selection and use of habitats, which are used in these studies. It should also be noted that in 2018, the MFFP launched a major inventory and monitoring program of woodland caribou populations across their range using telemetry. The objectives of this program are to further develop information on the number of populations, their range, abundance and trend. This data constitutes the main indicators for assessing the self-sufficiency of these populations as prescribed in the recovery program for the species (Environment Canada, 2012) and in the caribou recovery plan. Ultimately, a monitoring for each population will be continued on a long-term. It is mainly on the basis of this new information, the most recent available at this time, that the analysis of the effects of the James Bay mine project was carried out as part of the EIS (WSP, 2018b).

As part of its strategy for creating protected areas and forest harvesting, Quebec's leading specialists, who possessed the scientific knowledge at the time[4], came together to conduct a major study on woodland caribou habitat selection in Quebec's boreal forest in order to prioritize the essential sectors to be protected for woodland caribou. This study highlighted the characteristics of habitats selected to ensure that the species' activities continue and thus, gain a better understanding of the caribou's needs. Habitat selection analyses helped spatialize sectors of suitable caribou habitat by determining the relative probability of caribou presence based on models that best describe habitat selection. In this study, the *James Bay* sector covers approximately 105,000 km^2 and corresponds to the distribution ranges of the local caribou populations (herds) known as Nottaway, Témiscamie and Assinica in the area subjected to forestry activities. Most of the caribou monitored in this sector were found in the area between the east side of James Bay and west of Lake Mistassini. This sector corresponds to the most indicative habitat, likely to be selected by the caribou that might frequent the area of the proposed mine. This study showed that the woodland caribou require a very large annual home range to meet its annual needs (often > 1,000 km²). Analyses of habitat selection in the above-mentioned study demonstrated the importance of different environments in establishing annual and seasonal home ranges for woodland caribou. It states that the results obtained were, by and large, consistent with what was previously documented by Québec (Courtois et al. 2008; Courbin et al. 2009; Hins et al. 2009). The key findings with respect to habitat selection are as follows:

— It is the **dry, barren** areas that have the greatest and constant influence on caribou use of an area, **both annually and seasonally**;

— **During winter,** caribou **seem to prefer dry, barren areas and coniferous stands aged 40 years and older,** with no significant distinction made between open or closed spruce and fir stands and other coniferous trees;

— **During winter, wetlands are widely selected** in areas having an abundance of wetlands; such areas were particularly sought-after in winter by caribou in the James Bay territory;

— **The mature coniferous stands aged 40 to 80 years and 80 years and older** are also sought after by caribou on **an annual and seasonal basis**;

6 BASTILLE-ROUSSEAU, G., C. DUSSAULT, S. COUTURIER, D. FORTIN, M.-H. STLAURENT, P. DRAPEAU, C. DUSSAULT and V. BRODEUR (2012). Sélection d'habitat du caribou forestier en forêt boréale québécoise, Québec, ministère du Développement durable, de l'Environnement, de la Faune et des Parcs, Direction générale de l'expertise sur la faune et ses habitats, 66 p.

- **Open coniferous trees** (percentage of cover between 25 and 40%) made up of spruce and fir stands are usually selected much more than the same closed stands, particularly on **an annual basis and during rutting**.
- **Wet barren lands were mainly selected during calving and rutting**, but caribou use appears to be limited since selection of wet barren areas decreased as their availability increased.
- **The young stands aged 5 to 40 years,** areas of fire, recent clear cuts, and mixed and deciduous forest stands **are hardly selected throughout the year.**

As stated in the EIS (WSP, 2018b), several authors acknowledge that woodland caribou prefer peatlands, mature coniferous stands containing lichens, and other lichen-rich sites when selecting habitat (Équipe de rétablissement du caribou forestier du Québec, 2013a). They are also known to avoid newly disturbed environments (Moreau et al., 2012). During summer, woodland caribou mainly inhabit coniferous forests that are more than 50 years old (Courbin et al., 2009; Hins et al., 2009; Lantin, 2003), peatlands and dry barrens (lichen tundra).

Maps have been drawn on a seasonal and annual basis to identify areas with characteristics sought after by caribou. According to the authors, the synthesis map created by combining habitat selection information covering different seasons is the closest representation of potential areas of occurrence for woodland caribou because it considers the most suitable sites that meet woodland caribou habitat needs on an annual basis. Based on the results of this study, a map of relative probability of woodland caribou occurrence, according to the habitat selection model developed by Leblond et al. (2015), was created. This map helps to identify areas where caribou habitat is of adequate quality. This map was included in the EIS (see Map 6-17 of the EIS) and it indicates that the project area, overall, has a moderate to low relative probability of woodland caribou occurrence.

Spatial distribution and habitat heterogeneity play an important role in adequately meeting boreal caribou needs on an annual cycle. The importance of large range areas to meet the needs of the caribou, especially in winter, is well known. The "large areas of contiguous forest" criterion is one of the biophysical characteristics of essential boreal caribou habitat in the Boreal Shield Ecoregion (central). The characteristics of the Boreal Shield Ecoregion (east) also include "large plots of intermediate and mature black spruce".

Recall that, in Quebec, the management strategy to protect woodland caribou is based on the conservation of large coniferous forest stands (Courtois et al. 2004, 2008). The results of the latest studies have shown the importance of maintaining a certain heterogeneity in the habitats within the range areas. The protection of range areas is mainly intended to protect winter habitats, which are also often selected during calving and rutting. It has been shown that the probability of woodland caribou occurrence varied from 40 to 48% in 100 km^2 range area and from 53 to 62% for 250 km^2 range area (Lesmerises, 2011). To achieve a 75% probability of occurrence, a minimum area of 500 km^2 is required while a maximum probability of occurrence is achieved with an area greater than 1,000 km^2. It also mentions that mature coniferous forests outside the range areas are also widely selected, especially during the rutting and juvenile rearing periods. Finally, the study concludes that the large area of land used annually by caribou indicates that the current size of the protected range areas proposed by Courtois et al. (2004), i.e. 250 km^2, is not sufficient to ensure the long-term conservation of woodland caribou.

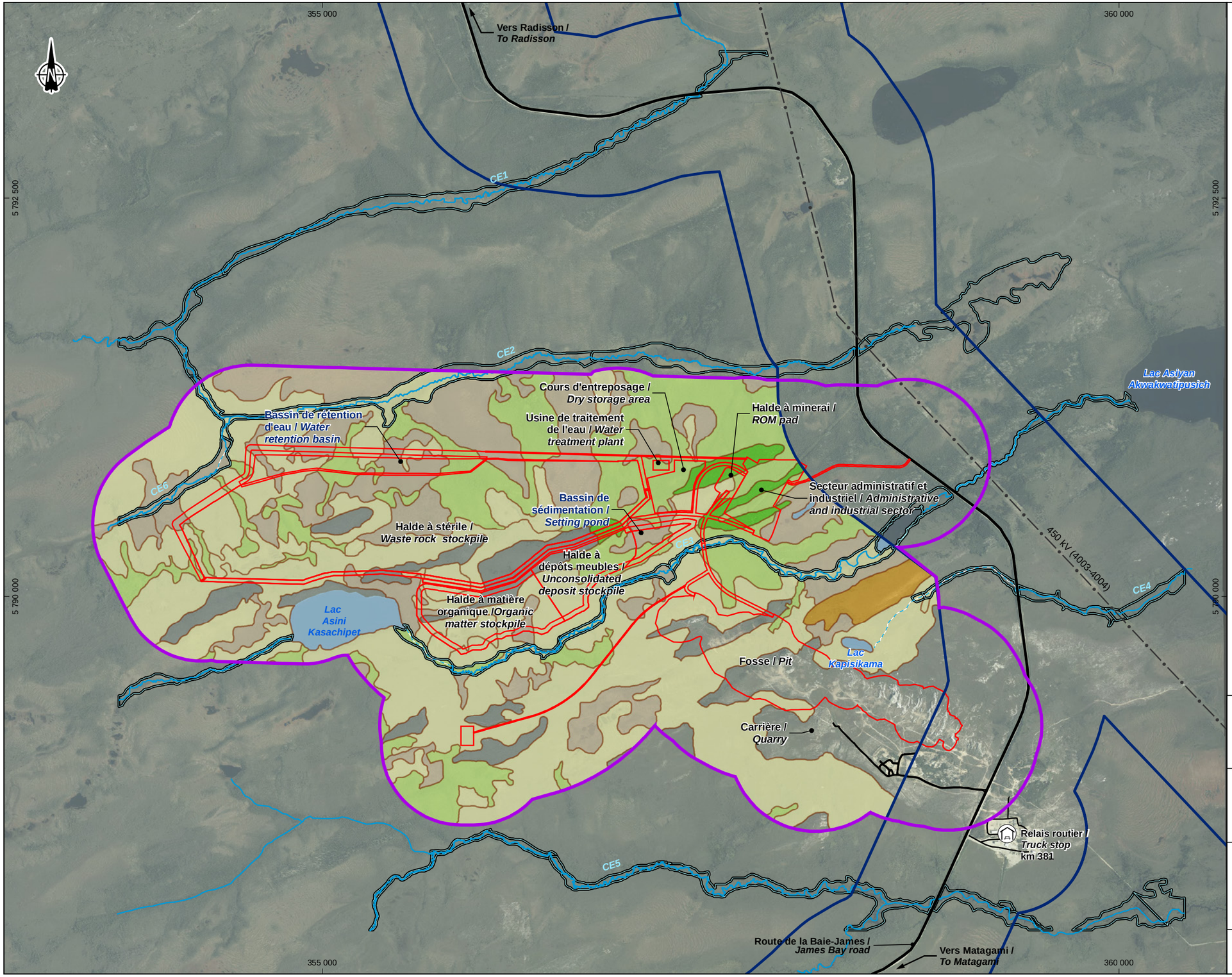
CCE-11	**MAPPING OF THE HABITAT OF THE WOODLAND CARIBOU, BOREAL POPULATION** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 6.1.8 (Project setting and baseline conditions – Species at risk) and 6.3.3 (Predicted effects on valued components – Species at risk).** **Environment Canada (2012). *Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada. Species at Risk Act* Recovery Strategy Series. Environment Canada, Ottawa. xi + 138 pp. Available online: *http://publications.gc.ca/collections/collection_2012/ec/En3-4-140-2012- eng.pdf*** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Section 6.3.2.1 (Large fauna).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-86.** ***Background*** **In its answer to Question CEAA-86, the Proponent indicates that there is no potential winter habitat for Woodland Caribou (*Rangifer tarandus caribou*), boreal population (boreal caribou), in the mine footprint or its 500-m area of influence. The Proponent's justification for this statement is that the spatial distribution of large-scale habitats does not particularly satisfy the criterion of large areas of contiguous forests, and that the topography of the area is generally uniform.** **The criteria used by the Proponent to justify the lack of potential winter habitat do not match the biophysical attributes of the winter habitats frequented by boreal caribou in carrying out their life processes listed in Appendix H of the caribou recovery strategy (Environment Canada, 2012).** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **A) Describe and map the habitats in the area of influence that have the biophysical attributes of the winter habitats frequented by the Woodland Caribou (Rangifer tarandus caribou), boreal population (boreal caribou), in carrying out their life processes listed in Appendix H of the caribou recovery strategy (Environment Canada, 2012).** **B) On the basis of the map produced in A, quantify the potential losses of winter habitat associated with the project and the potential losses associated with the buffer zone, and revise the assessment of the project's residual effects on boreal caribou.**

A-CCE-11:

The criteria used to describe the winter habitat have already been explained in the general background section. They are based on the latest studies of the species found in Quebec and are based on the characteristics of the central and eastern Boreal Shield ecozones identified in the recovery strategy (Environment Canada, 2012).

A)

In the mine's area of influence, a conservative approach is proposed to map the winter habitat: dry barren areas have been added to the large-scale habitat identified on the map presented in A-CEAA-86, corresponding to black spruce lichen forests and treed peatlands. These areas best match the characteristics of potential winter habitat for boreal caribou in this zone (Map R-CCE-11-A). However, we remain of the opinion that the probability of this habitat being used by the caribou, even without the mining project, is very low for the reasons already presented in the impact assessment and answers to the IAAC, which is, mainly due to the lack of favourable habitat.



Zone d'étude locale / *Local study area*

Zone de pertubation permanente / *Permanent disturbance zone*

Zone d'influence de la mine / *Zone of influence of the mine*

Zone de perturbation naturelle (feux de forêt) / *Natural Disturbance (forest fire)*

Composante du projet / *Project Component*

Infrastructures minières / *Mining infrastructure*

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*

Littoral des cours d'eau / *Watercourses shoreline*

Habitat potentiel en période hivernale / *Winter potential habitat*

Pessière noire à lichen / *Black spruce lichen forest*

Tourbière boisée / *Treed peatland*

Dénudé sec / *Dry barren land*

Habitat potentiel en période de mise bas, de post mise-bas et de rut / *Potential calving, post-calving and rutting habitat*

Tourbière arbustive / *Shrubby peatland*

Tourbière ouverte / *Open bog*

GALAXY

Mine de lithium Baie-James /James Bay Lithium Mine
Réponses aux questions du CCE (1ère) / Answer to CCE Requests(1st part)

R-CCE-11-A
Habitats potentiels pour le caribou boréal dans l'empreinte de la mine et sa zoned'influence de 500 m / *Potential habitats for boreal caribou in the footprint of the mine and 500 m zone of influence*

Sources :
Orthoimage: Galaxy, août 2017
Inventaire / Inventory: WSP 2017
Données du projet / Project data : Galaxy 2018

0 240 480 m
UTM, fuseau 18, NAD83

Dessin : A. Masson
Approbation : C. Martineau
191-01753-00_cRCCE-11-A_wspT276_caribou_200611.mxd

wsp

B)

Based on the approach presented above to describe the winter habitat, 235.3 ha would be located within the area of influence of the proposed mine and outside of permanent human interference (Table A-CCE-11-1). Of this area, 37 ha (3.3% of the area) was affected by recent fires. Thus, the surface area of these winter habitats undisturbed by recent fires comprises 198.3 ha, or 17.7% of the area of influence undisturbed by permanent human activities.

Shrubby peatlands and open bogs, which could represent habitats used during calving, post-calving and rutting periods, cover 216 and 506.6 hectares respectively, or 19.2% and 45.1% of the area of influence of the proposed mine, not disturbed by permanent human activities. Of these peatlands, 40.7% of the area has been affected by recent fires. Thus, the surface area of these peatlands unaffected by fire represents a total of 265.7 ha, or 23.7% of the area of influence of the proposed mine, not subjected to human disturbances.

Under a very conservative (precautionary) approach, it can be assumed that the project will disturb an additional 464 ha of boreal caribou habitat in the area of influence of the proposed mine. Of this surface area, approximately 150 ha would be associated with a change in the footprint of the proposed mine and 314 ha would be associated with a functional loss in the 500-m area of influence around the periphery of the proposed mine (Table A-CCE-11-1).

Table A-CCE-11-1 Analysis of potential winter habitat for boreal caribou in the portion of the proposed mine footprint and its 500-metre buffer zone undisturbed by permanent human factors

	Area of Influence (1,122.8 ha)						Mine Footprint 361.3 ha					
	Total		Disturbed by Fire		Undisturbed		Total		Disturbede by Fire		Undisturbed	
Potential winter habitat	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%
Black spruce lichen forest	17.6	1.6%	0.6	0.10%	17.0	1.5%	10.4	2.9%	0.6	0.4%	9.9	2.5%
Black spruce-moss stand	-				-		-				-	
Jack pine stand	-				-		-				-	
Wooded peatland	203.0	18.1%	36.4	3.2%	166.7	14.8%	77.6	21.5%	11.9	3.3%	65.7	18.2%
Dry barren	14.7	1.3%			14.7	1.3%	-					
Sub-total	***235.3***	***21.0%***	***37.0***	***3.3%***	***198.3***	***17.7%***	***88.0***	***24.4%***	***12.5***	***3.7%***	***75.5***	***20.7%***
Potential calving, post-calving and rutting habitat												
Shrubby peatland	216.0	19.2%	66.7	5.9%	149.3	13.3%	61.1	16.9%	20.1	5.6%	41.0	11.3%
Open bog	506.6	45.1%	390.1	34.7%	116.4	10.4%	140.7	39.0%	107.0	29.6%	33.7	9.3%
Sub-total	***722.5***	***64.4%***	***456.8***	***40.7%***	***265.7***	***23.7%***	***201.8***	***55.9%***	***127.1***	***35.2%***	***74.7***	***20.7%***
Total Annual Potential Habitat	**957.9**	**85%**	**493.8**	**44%**	**464.0**	**41%**	**289.8**	**80%**	**139.6**	**39%**	**150.2**	**41%**
Other areas not included as potential habitat												
Lake or puddle	21.3	1.9%			21.3	1.9%	-				-	
Rock outcrop	30.8	2.7%			30.8	2.7%	25.4	7.0%			25.4	7.0%
Anthropogenic	3.2	0.3%			3.2	0.3%	-				-	
Scrubland	95.0	8.5%			95.0	8.5%	42.3	11.7%			42.3	11.7%
Burnt area	14.6	1.3%			14.6	1.3%	3.7	1.0%			3.7	1.0%
Sub-total	***165.0***	***14.7%***			***179.6***	***14.7%***	***71.4***	***19.8%***	***0***	***0.0%***	***71.4***	***19.8%***
	1,122.8	**100.0%**	**493.8**	**44.00%**	**643.7**	**56.0%**	**361.3**	**100%**	**139.6**	**38.9%**	**221.7**	**61.1%**

CCE-12

MONITORING PROGRAM AND PROPOSED MITIGATION MEASURES TO MINIMIZE THE IMPACT ON THE WOODLAND CARIBOU AND ITS HABITAT

References

CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 6.3.3 (Predicted effects on valued components – Species at risk).

Environment Canada (2012). *Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada. Species at Risk Act* Recovery Strategy Series. Environment Canada, Ottawa. xi + 138 pp. Available online: *http://publications.gc.ca/collections/collection_2012/ec/En3-4-140-2012- eng.pdf*

WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Section 7.3.2 (Large fauna).

WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-88.

Background

In its answer to Question CEAA-88, the Proponent indicates that, although the aerial survey and the radio- tracking data show that the projected mine area is not used by the Woodland Caribou, there remains the possibility that the species frequents the area, especially in periods of greater mobility.

The Proponent plans, under a species-at-risk monitoring program, to make users aware of the Woodland Caribou's presence in the area. However, in response to Question CEAA-91, the Proponent opines that a monitoring program is not needed for caribou, because they are unlikely to frequent the area during the mine's life cycle.

If caribou are detected in the project area or the project's area of influence, mitigation measures should be taken to prevent the project's impact on the species. Those measures should be identified before the project starts and be spelled out in the monitoring plan. To properly document the significance of the residual effects, the JAC needs to know what measures the Proponent intends to put in place if the Woodland Caribou is present in the project area or the project's area of influence.

Moreover, the Proponent did not consider the impacts that disturbance (noise, light and vibration), increased risk of collision, and pollution will have on the Woodland Caribou, even though it was asked in Question CEAA-88 to describe all of the project's effects on the species and its habitat.

The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:

A) Provide an outline of the environmental monitoring program for species at risk that the Proponent intends to implement, especially for boreal caribou. The Proponent may refer to section 8 (Follow-up and Monitoring Programs) of the *Guidelines for the Preparation of an Environmental Impact Statement* to obtain a list of the elements that such a program should contain.

B) Identify the measures that will be taken to minimize the project's impact on the Woodland Caribou if individuals of the species are detected in the project area or the project's area of influence.

C) Revise and describe all of the project's impacts on the Woodland Caribou and its habitat, including disturbance, risk of collisions and pollution, and their potential consequences for the recovery strategy's objectives.

D) Revise the proposed mitigation measures and the description of the residual effects.

A-CCE-12:

A)

As mentioned in the EIS, the probability of caribou frequenting the area prior to the development of the mine is already very low. During construction and operation phases, considering the intensity of activities at the mine site and given that this species is known to avoid areas with human activities, it is unlikely that, if a caribou were to venture into the 500-m area of influence around the mining infrastructure, it would remain there for a long period of time. Thus, there is no monitoring program specifically designed for caribou. Studies have clearly shown that boreal caribou move faster as they approach a road they must cross (Lebon & al., 2013). The type of road also influences the reaction of boreal caribou, that is, they mostly avoid major roads (paved roads, categories 1 and 2) that are used intensively, preferring to use tourist trails and seasonal roads (Vistenes & al., 2008). This behaviour of avoiding roads is more pronounced in female caribou during calving and rearing period of their calves. According to a study, the impact of roads on woodland caribou is less significant during summer (June 21-September 14) on non-breeding females (St-Laurent, M.-H., Beauchesne, D. & Lesmerises, F., 2014). It is, therefore, possible that caribou would more likely frequent the project's area of influence during this period, if there is still a risk of caribou presence. During this period, employees will be made aware of the potential presence of caribou.

Despite the very low probability that caribou will frequent the project's area of influence, GLCI will still, as a precautionary measure, set up a communication system to inform truck drivers of any observations or signs of caribou presence on the road near the mine's area of influence and on the James Bay Highway.

As a precautionary measure to prevent collisions, GLCI will introduce a module on boreal caribou in the training of employees and subcontractors. The objectives of this training would be to educate them about the precarious nature of boreal caribou, build their ability to distinguish potential signs of presence, and inform them of the control system and action plan in case of caribou presence.

B)

If caribou are detected in the project area or the project’s area of influence, their presence will be reported to the Head of Operations and Environmental Coordinator. The plan is for the information to be verified and, if needed, for the employees potentially in contact with caribou to be informed of the situation so to increase their level of alertness and reduce the risks of disturbance or collision. The Wildlife Conservation Regional Office will also be notified. If Wildlife Conservation Officers, in collaboration with GLCI, determine that there is a risk to caribou in the mine area or along the ore transport road, GLCI will suggest the following changes to its operations to limit the risk of disturbance and collision until said risk is eliminated. For example:

— transport ore in convoys of several trucks to reduce frequent truck traffic.

Recorded observations of caribou in the area may be reported to the MFFP for incorporation in the ongoing migration monitoring of caribou fitted with telemetric satellite collars. It will therefore be possible to determine if one or more individuals are likely to stay near the mine’s area of influence during farrowing or wintering periods. If this is the case, exceptional measures will be agreed upon with the MFFP to mitigate the impacts on the caribou.

C)

Despite the low probability of this occurring, and as mentioned in the EIS, “zero risk” does not exist when it comes to the possibility of a vehicle colliding with caribou during the site preparation, and the construction and operation phases. To minimize the risk, areas with higher risks of collision with large mammals will be identified through adequate signage. It is also important to note that there will be no transport on the James-Bay Highway duting nighttime, which will significantly reduce the risk of collision.

Besides deaths resulting directly from transportation and traffic during preparation work, construction and operation work, some activities are likely to change the natural behaviour of boreal caribou, mostly causing them to avoid the area.

Movements of boreal caribou, if they venture into the project footprint or area of influence, could also be altered by artificial lighting, noise, dust and vibration during blasting and by human presence. To reduce these potential impacts, motorized equipment will be outfitted with high-performance mufflers in good condition to minimize noise disturbance. Blasting activities will take place during the day, thus minimizing disturbance at night.

Very few impacts due to light are expected on the boreal caribou. Based on current knowledge, there are no scientific studies that document the effect of light on boreal caribou. Chapter 4 of the “Recovery Strategy for the Woodland Caribou (*Rangifer tarandus* caribou), Boreal population, in Canada – 2012” determines a low to medium concern level related to noise and light disturbance.

As specified in the EIS regarding the impacts of light, in the context of the project, the environmental effects of artificial nocturnal light on the biological environment are considered insignificant due to the low level of light generated to the sky and the absence of light trespass at the limits of the local study area. However, specific measures will be applied to mitigate the effects of artificial nocturnal light on the human and biological environments.

Lights at the mine site will be directed towards the surface to be illuminated, which will limit light emission. As for light coming from transport vehicles, their direction towards the road results in a small emission of light outside of it, all the more so as the road linking the mine and the James Bay road near the km 381 truck stop is for all intents and purposes included in the mine right-of-way and, to the extent possible, the roadside will remain forested. As for dust, a management plan to minimize dust generated by waste rock and tailings handling work was developed. The plan is presented in Appendix A-CCE-30.

Obviously, the potential impacts of light cannot exceed the 500-m area of influence previously considered, whether it be for onsite lighting or lighting from ore transport trucks. This is also the case for dust emission. Therefore, no significant effect on boreal caribou is expected. It should be noted that boreal caribou avoid human disturbance and that the potential presence of caribou in the study area or near the project footprint is very unlikely. Current knowledge indicates that the species, whether it be woodland or migratory caribou, has made very little use of the study area over the past decade.

As mentioned in answers CEAA-28 and CEAA-30 (WSP, 2019), the study area offers poor habitat conditions due to its high disturbance rate and the fact that the species has very rarely occupied the study area over the past decade. Therefore, its actual probability of occurrence in the study area is considered insignificant in the short and medium terms.

Information collected from Cree communities in answer CEAA-31 of the concordance phase (WSP, 2019), confirms the low abundance of caribou within the study area. RE2 trapline land users mentioned that there are fewer and fewer migratory caribou across the territory and that no caribou were observed in 2018-2019. It seems that the migratory caribou is no longer in the area since fires have destroyed the forests (see answer CEAA-31). 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 (answer CEAA-31). A more recent consultation was conducted in December 2019 with Eastmain community land users to update information regarding the traditional knowledge on caribou. The tallymen interviewed (VC33 and VC35) confirmed that there had never been a large population of caribou in the area, even before the repeated disturbances due to fires.

However, in the unlikely event that caribou venture into the study area, employees will be educated on the importance of reporting any observation made. Where applicable, these observations will be compiled in a record. Even though the traditional usage of caribou has rarely been discussed throughout the various consultations (WSP, 2019a: answer CEAA-31), as soon as authorizations are obtained, the Proponent commits to creating a joint work table (GLCI, Eastmain community and Waskaganish community) to discuss caribou follow-up (answer CEAA 100 of the previous document). This sensitive component does not appear threatened by the project's construction and operation activities. Thus, no significant impact on caribou is anticipated.

The project's impacts described herein and their potential consequences for the recovery strategy's objectives are discussed in A-CCE-12-D.

D)

Although it remains unlikely that caribou be observed near the mining facilities, Table A-CCE-12-1 shows the assessment of potential impacts on boreal caribou and proposed mitigation measures based on the main threats and level of concern determined in the Recovery Strategy for the Woodland Caribou (*Rangifer tarandus* caribou), Boreal Population, in Canada – 2012 (Chapter 4 – Threats). While the project's impacts on boreal caribou are generally of minor significance (caribou are concentrated well to the south and south-east of the facilities and the project area habitat is of poor quality, see A-CCE-11 and 13), GLCI agrees, as a precautionary measure, to implement mitigation measures to reduce potential effects if caribou are reported near the mine site during the construction and operation phases. It should be noted that the majority of the mine site will be restored after the end of its operations and be revegetated to a natural state, similar to the original one (Appendix A-CCE-30). The implementation of the proposed mitigation measures will help reduce the intensity, extent, duration and significance of the residual impact on the boreal caribou for all sources of impact identified during the preparation work, and the construction and operation phases.

Following implementation of these measures, and taking into account that the caribou and its habitat are not found within the project's area of influence, the intensity of the impact is considered low. Its extent is local since the impacts under consideration will be mainly limited to the mine site or its area of influence. The duration is considered medium since the impact will extend to the entire mine life cycle, i.e., about 20 years. Overall, the significance of the impact on the boreal caribou is deemed minor. Thus, the project will have no significant residual impact on the boreal caribou for all project phases.

Table A-CCE-12-1 Assessment of Potential Impacts on Boreal Caribou and Mitigation Measures Based on Threats Identified in the Recovery Strategy

WOODLAND CARIBOU RECOVERY STRATEGY			
Threat	**Level of Concern1**	**Impact assessment**	**Mitigation Measure**
Habitat alteration (loss, degradation or fragmentation) as a result of human land-use activities	High	Intensity: Low Extent: Local Duration: Moderate-term Significance: Minor Probability of occurrence: High	Concentration of the mine site's fixed assets and infrastructure near the James Bay road and km 381 truck stop. Concentration of mine facilities in an area already permanently disturbed by existing infrastructure. Creation of a joint work table to discuss the possible caribou follow-up. Closure and reforestation of the road and mine site (closure phase).
Predation (increased efficiency of predators)	High	Intensity: Low Extent: Local Duration: Moderate-term Significance: Minor Probability of occurrence: Very low	Favour softwood species for reforestation during the closure phase.
Noise and light disturbance	Low to medium	Intensity: Low Extent: Local Duration: Moderate-term Significance: Minor Probability of occurrence: Low	Noise: Transport ore in convoys of trucks if caribou are present within the area of influence. Light: • Use fixtures that produce a simple lighting. • Direct the luminous flux towards the surface that needs lighting. • Limit, as much as possible, the period and duration where lights are used. • Install fixed lights to avoid light spilling out of the spaces to be illuminated. • Maintain a buffer zone to limit light from spilling out to surrounding areas.
Vehicle collisions	Low	Intensity: Low Extent: Local Duration: Moderate-term Significance: Minor Probability of occurrence: Very low	• in collaboration with the MFFP, contribute to monitoring the changes in Boreal Caribou local populations. • Employee training. • Internal (with employees) and external (with the MFFP) communication system. • Installation of signage along the James Bay road. If caribou are present: • Transport ore in convoys of trucks.

1 Level of concern: qualifies the level of concern for managing the threat for the recovery of the species, consistent with the population and distribution objectives. This criterion considers all other criteria in the table (Environment Canada, 2012).

CCE-13	**CUMULATIVE EFFECTS ON WOODLAND CARIBOU, BOREAL POPULATION**

References

CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 6.6.3 (Cumulative effects assessment).

Environment Canada (2012). *Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada. Species at Risk Act* Recovery Strategy Series. Environment Canada, Ottawa. xi + 138 pp. Available online: *http://publications.gc.ca/collections/collection_2012/ec/En3-4-140-2012- eng.pdf*

WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Section 8 (Assessment of Cumulative Effects) and 8.5 (Projects, activities or events linked to valued components).

WSP (February 2019). James Bay Lithium Mine. Supplement to the Environmental Impact Assessment – Response to Questions and Comments by the Canadian Environmental Assessment Agency (Concordance Phase). Report prepared for Galaxy Lithium (Canada) Inc. Answers to Questions CEAA-47.

WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answers to Questions CEAA-86, CEAA-88 and CEAA-90.

Background

In response to Question CEAA-88, the Proponent states that "the mining project will have no foreseeable impact on caribou and their habitat, either during construction or operation of the project and thus no potential impact on the objectives of the recovery strategy. "

In view of the information provided in the answers to Questions CEAA-86 and CEAA-88, Environment and Climate Change Canada is of the opinion that the project would have potential residual effects on boreal caribou. In particular, the project would result in the loss of 265.7 hectares of potential habitat (Table A-86- 3; WSP, September 2019). Consequently, the Proponent must carry out an assessment of the project's cumulative effects on boreal caribou.

The Proponent must submit an analysis that shows how the project's potential effects could combine with the effects of the other disturbances considered (past, existing, or future (certain or reasonably foreseeable)) over the entire study area, i.e., within a 50-km radius of the centre of the projected mine. At a minimum, the Proponent must consider existing natural and anthropogenic disturbance rates in the study area and reasonably foreseeable anthropogenic disturbances (including a 500-m buffer zone around all identified anthropogenic disturbances). An assessment should be conducted for each habitat type that has the biophysical attributes required by boreal caribou to carry out the life processes described in Appendix H of the caribou recovery strategy (Environment Canada, 2012). The Proponent should then be able to describe the consequences of the cumulative effects for the population and distribution objectives identified in the boreal caribou recovery strategy (Environment Canada, 2012).

The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:

A) Submit an assessment of the cumulative effects on Woodland Caribou taking into account the habitats within the 50-km study area that have the biophysical attributes required by caribou to carry out their life processes.

B) For the 50-km study area, describe the consequences of the cumulative effects for the population and distribution objectives identified in the Woodland Caribou recovery strategy, which are as follows:

- **Maintain the size of the local population.**
- **Maintain the state of the habitat in terms of area and types of undisturbed habitats to ensure the self-sufficiency of the local Woodland Caribou population. The goal is to maintain at least 65% undisturbed habitat and the availability of the biophysical attributes needed by the Woodland Caribou.**

A-CCE-13:

A)

As specified in the EIS, the current habitat disturbance rate was assessed across the study area, i.e. within a 50-km radius from the centre of the proposed mine, which amounts to an area of roughly 7,850 km^2 (Map 6-16 of the EIS). Overall, man-made features disturb 7% of the study area. The km 381 truck stop on the James Bay Highway, as well as the road itself, near the proposed mine, concentrate human activity and constitutes a significant source of disturbance for the woodland caribou habitat in this area.

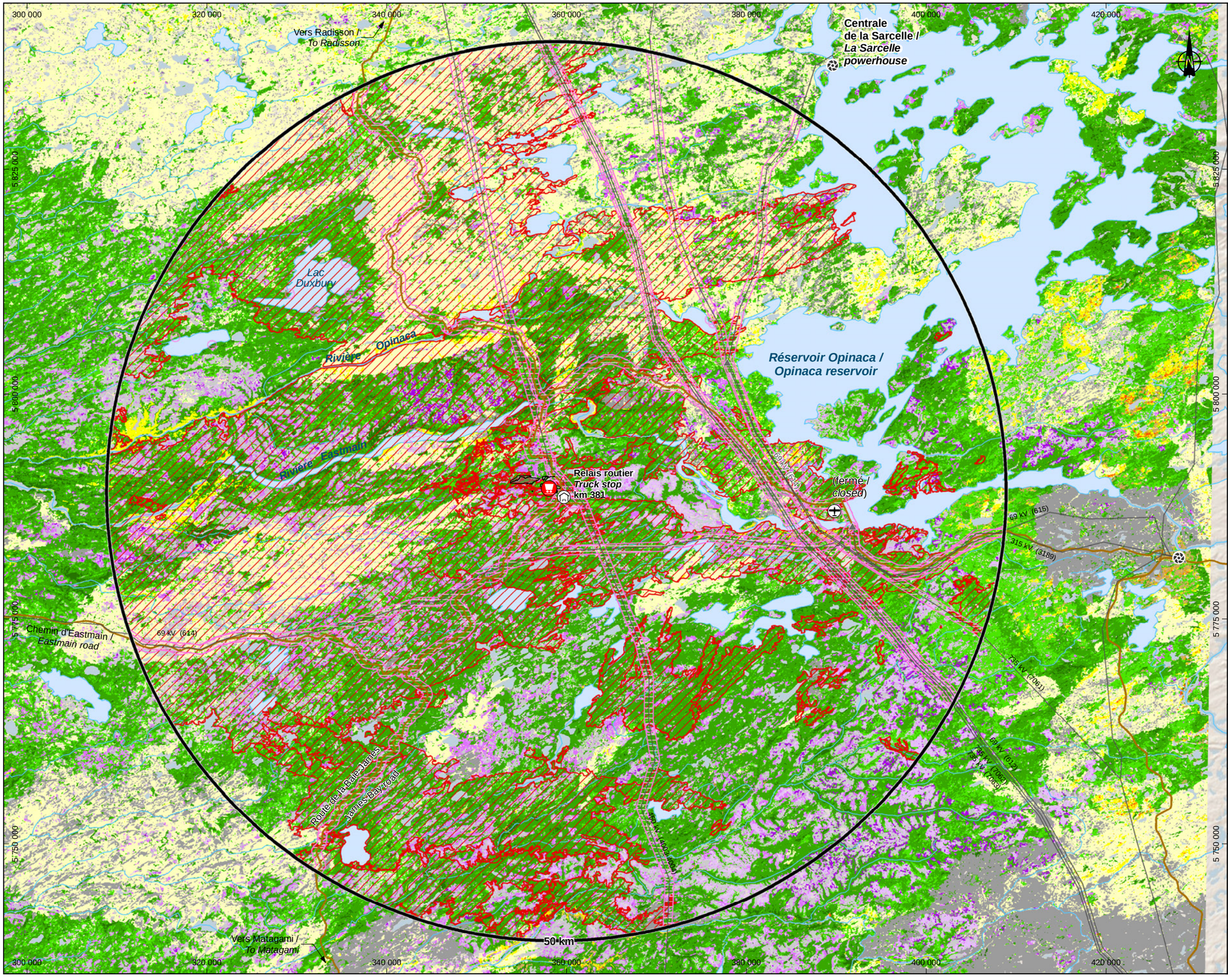
There are no forestry activities for industrial purposes in the study area, which preserves it from major human disturbances caused by the harvesting of wood substance and the presence of logging road networks. Human disturbances of the habitat are primarily associated with industrial areas (mines), hydroelectric production, linear structures (roads, power transmission lines) and with some land uses.

Section 8.5 of the EIS describes the key projects, activities or events linked to valued components. There are, to our knowledge, very few large-scale projects likely to be completed during the mine operation phase (approximately 20 years) across the study area representing a 50-km radius from the centre of the proposed mine. Therefore, foreseeable human activities, including the mining project, are unlikely to have significant impacts on the population and distribution objectives identified in the Recovery Strategy for the Woodland Caribou, Boreal population.

However, the main source of caribou habitat disturbance in the study area is of natural origin. It is associated with large forest fires that have affected the study area over the past 40 years. Fires alone have disturbed caribou habitat in the study area at a rate of 66%. These fire-burn areas overlap with the majority of areas disturbed by man-made features, such that the total percentage of disturbance (natural and human) in the study area is assessed at approximately 68%.

Habitat characteristics across the study area are presented on Map R-CCE-13-A to provide a picture of the current availability of the habitat based on circa 2000 (vector) database (2009). No quantitative assessment was conducted for each habitat type with the biophysical attributes required by boreal caribou to carry out their life processes and described in Appendix H of the Recovery Strategy for the Woodland Caribou, Boreal population. It would not be scientifically valid to carry out the assessment since it cannot provide an acceptable basis to demonstrate that caribou populations likely to frequent the area will be able or not to carry out life processes. In fact, to demonstrate that, it would be necessary to assess habitat availability across the population range, not the study area. It is nonsensical to ask to engage in such an exercise, which is more of the responsibility and jurisdiction of the Government of Quebec, or even in collaboration with university research institutions. To do so, it would first be necessary to update the range of local populations, specify the characteristics of each type of habitat selected by these populations to carry out their life processes in accordance with updated databases of the biophysical attributes of the habitat across the range. This would entail an update of the study on habitat selection for woodland caribou in Quebec's boreal forests and of the maps of boreal caribou probability of occurrence per local population.

However, Map R-CCE-13-A provides a qualitative assessment of the characteristics of the undisturbed environment within the study area that may provide suitable habitat conditions for boreal caribou. Large forest tracts have recently (from 2000 to 2016) been disturbed by forest fires, resulting in the reduced availability of habitats for the boreal caribou across the study area. In reality, the mosaic is fairly representative of the natural habitat regeneration cycle of the species governed by large fires which characterize northern Quebec. However, important undisturbed forest tracts remain mainly in the south and east parts of the study area. These residual tracts present good heterogeneity of the biophysical attributes required by boreal caribou to carry out their life processes. They include a high proportion of mature softwood stands of varying density, dry barrens, wetlands, and areas of lichens to satisfy boreal caribou needs all year round. In addition, these forest tracts are connected by undisturbed corridors which allows connectivity between them. This connectivity may also link the area's habitats with the main areas occupied by boreal caribou of the Nottaway population in the south and the Assinica population in the south-east.



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

Zone d'étude de la grande faune/ *Large mammal study area*

Perturbation naturelle (feux de forêt)/ *Natural Disturbance (forest fire)*

Perturbation anthropique (500 m) / *Anthropogenic disturbance (500 m)*

Végétation / *Vegetation*

Zone humide / *Wetland*

- Boisée / *Wooded*
- Arbustive / *Shrub*
- Herbacée / *Herbaceous*

Coniférien / *Conifers*

- Dense / *Dense*
- Ouvert / *Open*
- Clairsemé / *Sparse*

Feuillu / *Hardwood*

- Dense / *Dense*

Mixtes / *Mixed*

- Dense / *Dense*
- Ouvert / *Open*

Zone arbustive / *Shrub area*

- Grand / *Tall*
- Petit / *Small*

Autres / *Other*

- Plante herbacée / *Herbaceous plant*
- Briophites et lichens / *Bryophytes and lichens*
- Dénudé sec / *Dry bare soil*

Infrastructures / *Infrastructure*

- Relais routier / *Truck stop*
- Aéroport / *Airport*
- Centrale hydroélectrique / *Hydroelectric powerhouse*
- Route / *Road*
- Poste et ligne de transport d'énergie / *Substation and transmission line*

GALAXY

Mine de lithium Baie-James /James Bay Lithium Mine
Réponses aux questions du CCE (1ère) / Answer to CCE Requests(1st part)

RCEE-13-A
Perturbations naturelles et anthropiques de l'habitat potentiel du caribou forestier / *Natural and anthropogenic disturbances to the potential habitat of the woodland caribou*

Sources :
Worl Shaded Relief, ESRI
Feux de forêt /Forest fire, MFFP, Québec, 2018
Végétation, circa 2000-vectorielle, 2009
Inventaire / Inventory: WSP 2017
Données du projet / Project data : Galaxy 2018

0 425 850 m
UTM, fuseau 18, NAD83

Dessin : A. Masson
Approbation : C. Martineau
191-01753-00_cRCCE-13-A_wspT275_vege_caribou50m_200611.mxd

wsp

These forest tracks will not be affected by the project. Thus, there should be no cumulative effect on the boreal caribou habitat. However, this habitat has been disturbed by fire and past human development and may be disturbed again by future projects that are unknown at this time. The habitat lost due to the project is not considered quality habitat, but could be considered additional loss/fragmentation of habitat within the study radius. At the 50-km scale, the loss of habitat due to the project is less than 0.1% and is located in an area where the characteristics provide little quality to satisfy the caribou life history processes (see A-CCE-13-B below).

B)

As previously mentioned, and according to scientific and Cree traditional knowledge, the boreal caribou is not historically found in the study area. It is therefore unlikely that the project will have a significant impact on the size of populations that might frequent the study area. In fact, the study area is located north of the range of the Nottaway population.

As indicated in the EIS, the probabilistic approach applied by ECCC and updated in 2011 (Environment Canada, 2011) clearly showed that 70% of the variation recorded in recruitment of woodland caribou populations is explained by a single variable that encompasses the human and natural (forest fire) disturbance rates. Therefore, analysis of the habitat disturbance rate appears to be a relevant indicator to characterize current conditions of the habitat in the study area and contributes to maintaining the size of the local population.

With a highly conservative (precautionary) approach, the project would cause an additional disturbance over 464 ha of the boreal caribou habitat across the projected mine's area of influence. Of this area, approximately 150 ha would be associated with alteration in the projected mine footprint and 314 ha with a functional habitat loss in the 500-m area of influence, at its periphery (Table A-CCE-11-1). By assuming an additional disturbance of 464 ha, the disturbance rate of the 7,850 km^2 study area would increase by 0.056%. Even considering the mine's entire area of influence, which is currently undisturbed by human-made or natural features (approx. 644 ha), the percentage of disturbance across the study area would increase by 0.082%.

A certain portion of the burned areas probably has the potential for self-regeneration and can provide conditions suitable for the woodland caribou in the future. Looking at Map R-CCE-13-A, the western portion of the study area is dominated by fire-burn areas (from 1980 to 1989). Theoretically, these old areas affected by fire are no longer considered as disturbances to the woodland caribou habitat. However, the majority of these areas have been subjected to recent fires.

The ban on migratory caribou hunting in 2018 may also reduce accidental boreal caribou sampling in the overlapping area of the ranges of the two ecotypes and significantly contribute to maintaining the size of the boreal caribou populations likely to frequent the study area.

Finally, the consequences of the project's potential effects, which could be combined with past, current and future effects within the 50-km area, have no significant impact on maintaining the size of local populations located further south and preserving the current surface area of the habitat.

7 AIR QUALITY

7.1 REQUESTS FOR INFORMATION TO THE PROPONENT

CCE-14	**SOURCE DATA ON AIR QUALITY AND INFLUENCE OF FOREST FIRES** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 6.1.1 (Project setting and baseline conditions – Atmospheric, light and noise environment).** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Section 6.2.10 (Air quality).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-58.** ***Background*** **In response to Question CEAA-58 B concerning the impacts of forest fires on air quality in the region and at the project site, the Proponent indicates that the initial $PM_{2.5}$ concentration of 15 µg/m³ takes into account the impact of forest fires on the air quality in the study area for the projected mine site. To support its conclusion, the Proponent studied a single test case using the Playground Canada application developed with the BlueSky Framework (BSF) software suite. Developed in the United States, BSF models the atmospheric dispersion of forest fire smoke and provides an order of magnitude for potential concentrations in the air during forest fire episodes. However, the quality of the results depends in part on the quality of the meteorological and vegetation data used. The explanations provided indicate that the data used is not clearly representative of the site being studied. The default parameters suggested by the application were used for the test case studied. If U.S. data was used without adjustment for Canadian conditions, the quality of the results is affected, and the level of uncertainty is higher. The Proponent also states that the findings must be interpreted with caution.** **Moreover, smoke plumes typically generate very high $PM_{2.5}$ concentrations. According to some observation stations in Northern Quebec, $PM_{2.5}$ concentrations can reach several hundred µg/m³ at various times in the summer. By spreading forest fire observations over an entire year, it is possible to generate observed averages that are much lower than the averages that would be representative of such events. In the Proponent's response, the results appear to show high $PM_{2.5}$ concentrations close to the mine site, and the explanation provided to show that the $PM_{2.5}$ concentrations from forest fires are included in the average concentration of 15 µg/m³ does not appear to be supported.** **The influence of forest fires on air quality during the warm season should be taken into account in determining the initial concentrations of contaminants, including $PM_{2.5}$. On the basis of the information provided, the modelled concentrations appear to have been understated during summer months with forest fire episodes.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Take into account the influence of forest fires on air quality during the warm season, and incorporate those events into the design of the air quality monitoring and follow-up program, particularly for sensitive receptors (for example, put in place measures that will provide adaptive management during air quality deterioration events caused by forest fires).**

A-CCE-14:

With regards to representativity of the parameters that were used to configure the Playground Canada application, it is important to note that the user guide[5] mentions that "fuel loading" and "consumption" are determined using FWI-FBP model which was implemented using methodologies actually developed by Natural Resources Canada. It is, therefore, assumed that the parameters are adapted for a Canadian site, even though the BlueSky Framework (BSF) software suite was developed in the United States. Furthermore, it should be recalled that the Playground Canada application has been used for illustrating a case study to provide an order of magnitude for potential concentrations in the air during forest fires.

As for the concentrations measured by the observation stations in Northern Quebec, these can indeed reach several hundred µg/m³. However, attention should be drawn to the reported values, since they often refer to maximum hourly concentrations; whereas the values studied by WSP as mentioned in answer CEAA-58 correspond to daily average concentrations, so that a direct comparison can be made with the $PM_{2.5}$ standard determined over a 24-hour period.

That said, it is important to remember that the modelling activity mentioned in answer CEAA-58 mainly determined that, at a distance of approximately 50 km from the study site, an average fire of 75 km^2 could increase $PM_{2.5}$ concentration to the same level as the initial concentration used in the dispersion study, i.e., a daily average of 15 $\mu g/m^3$.

Furthermore, the statistics studied in answer CEAA-58 also indicate that an average of three fires are reported in this zone with a radius of 50 km. However, according to Section 202 of the Clean Air Regulation (CAR), the procedure for determining initial concentration uses the 98th percentile of the daily average concentrations, more than seven fires per year in this area could justify that the initial concentration used in the dispersion study was underestimated during summer months with forest fire episodes.

Thus, even considering additional fires of greater magnitude, which could increase the daily $PM_{2.5}$ concentration over 15 $\mu g/m^3$ even if these fires were further than 50 km from the site, using the 98th percentile of daily average concentrations removes these extreme values from the data set.

In short, based on the above explanation, the influence of forest fires on air quality can, therefore, be considered as being included in determining the initial concentrations of $PM_{2.5}$ when an initial concentration of 15 $\mu g/m^3$ is used. In this regard, the concentration is suggested by the MELCC for a project located in northern areas and far from other industrial sources in *Guide d'instructions – Préparation et réalisation d'une modélisation de la dispersion des émissions atmosphériques – Projets miniers*, which is also the case for this project currently under study.

Nonetheless, it should be noted that the conclusions presented in answer CEAA-58 should be interpreted cautiously since several assumptions were made in the analysis. In this context, it is noteworthy that the continuous monitoring of particulate matter proposed by GLCI becomes a key element for real-time analysis of ambient air quality conditions; both when the main contributors are from the mine and when the main contributor is a forest fire raging in the area. The modification or interruption of certain mining operations will, therefore, be adjusted based on these two sources of particulate matter.

5 http://firesmoke.ca/playground/assets/docs/canada/UserGuide.pdf

CCE-15	**SOURCES OF NITROGEN DIOXIDE (NO2) EMISSIONS** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 6.2.1 (Predicted changes to the physical environment – Changes to the atmospheric environment).** **WSP (October 2018). James Bay Lithium Mine. *Air Dispersion Modelling Study.* Report prepared for Galaxy Lithium (Canada) Inc. Section 2.2 (Substance modelled, p. 3) and Table 1 (p. 6).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-65.** ***Background*** **The nitrogen dioxide (NO_2) modelling results were updated and compared with the *Canadian Ambient Air Quality Standards* (CAAQS) established by the Canadian Council of Ministers of the Environment (CCME) for 2025. The one-hour CAAQS for NO_2 was exceeded for the construction phase and the operation phase. According to the results, the main sources of those exceedances were blasting with ANFO and the exhaust gases of mobile equipment.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Consider the sources of nitrogen dioxide (NO2) emissions, and propose additional mitigation measures, such as reduced idling and other attenuation actions.** **Note: Unlike Quebec's Clean Air Regulation, the Canadian Ambient Air Quality Standards (CAAQS) established by the Canadian Council of Ministers of the Environment do not have scope restrictions and apply to the entire project site.**

A-CCE-15:

Reduced idling of equipment has already been identified as a mitigation measure in Table 7-5 of the EIS. This measure has been added to the Dust Management Plan presented in Appendix A-CCE-16. Moreover, tracking potential NO_2 emissions during blasting operations has also been added to this management plan. These measures will help reduce NO_2 emissions due to the project.

CCE-16	**DUST MANAGEMENT PLAN** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 6.2.1 (Predicted changes to the physical environment – Changes to the atmospheric environment).** **WSP (October 2018). James Bay Lithium Mine. *Air Dispersion Modelling Study.* Report prepared for Galaxy Lithium (Canada) Inc. Section 4.10.1 (Atmospheric emissions).** **WSP (February 2019). James Bay Lithium Mine. Supplement to the Environmental Impact Assessment – Response to Questions and Comments by the Canadian Environmental Assessment Agency (Concordance Phase). Report prepared for Galaxy Lithium (Canada) Inc. Answers to Questions CEAA-34.** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-66 and Appendix A-66.**

Background

The Dust Management Plan (Appendix A-66; WSP, September 2019) addresses Question CEAA-66, on the whole. However, some information seems to be missing for the preliminary air quality follow-up program. Under this plan, only total particulate matter (TPM) will be tracked. Other substances that merit attention, such as $PM_{2.5}$ and PM_{10}, and dust deposition are not mentioned in the plan.

Yet, in the answers to Questions CEAA-69 and CEAA-134, Galaxy states that it plans to track total particulate matter (TPM), respirable suspended particulates (PM_{10}), fine particulates ($PM_{2.5}$) and crystalline silica as soon as operations begin. The Proponent also indicates that the tracking will be adjusted on the basis of the data collected.

In addition, according to section 7 of the Dust Management Plan (Appendix A-66; WSP, September 2019), the particulate matter recovered by the dust collectors will be disposed of in such a way as to minimize dispersion (page 13), but no further details are provided.

The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:

A) Expand the Dust Management Plan by incorporating specific information about the methods used to sample and analyze total particulate matter (TPM), respirable suspended particulates (PM_{10}), fine particulates ($PM_{2.5}$) and crystalline silica and about the frequency of the analyses as specified in the answer to Question CEAA-69 (WSP, September 2019).

B) Expand the Dust Management Plan by including a follow-up program for locations where the largest concentrations of dust are expected and which are identified as locations of concern (sensitive receptors).

C) Provide detailed clarifications on how the dust recovered by the dust collectors will be managed.

D) Develop and describe the planned tracking of toxic gases that may be generated during blasting (carbon monoxide and nitrogen dioxide).

A-CCE-16:

A)

An updated Dust Management Plan incorporating all the analytical methods specified in the answer to question CEAA-69 is presented in Appendix A-CCE-16.

B)

The follow-up program calls for the use of a station to provide an adequate picture of air quality at km 381 truck stop. In fact, this receptor is identified as being the sensitive receptor where higher concentrations of dust are expected according to the modelling. These measures will therefore provide a conservative portrait of any other receptor. Accordingly, GLCI does not plan to install a second measurement station for the time being.

C)

As described in the Dust Management Plan, the dust recovered by these dust collectors will be disposed of in such a way as to prevent its dispersion, in accordance with the regulations in force. More specifically, the dust recovered will be managed in such a way as to ensure compliance with Section 12 of the CAR, which states that particle emissions from the transfer, fall or handling of materials must not be visible more than 2 m from the emission point.

Dust from the dust collectors will be analyzed before determining how they will be managed. The analysis results will be compared to regulatory standards; they could be managed together with the concentrator residues, or with hazardous or non-hazardous residual materials. The decision as to how they will be managed will be made in collaboration with analysts from the regional MELCC.

D)

The tracking of potential NO_2 emission generated during blasting will be carried out mainly by observing blasting operations. No CO tracking is planned. NO_2 emissions mainly occur under sub-optimal detonation conditions. Larger rocks and weaker front displacements than projected will be signs that GLCI will look for to qualify the effectiveness of detonation of explosives. In case sub-optimal detonation conditions are observed or predicted, the following measures may be used as required to define blasting plans:

- use of dual detonators;
- use of electronic detonators;
- explosive composition adapted to the blasting conditions and site;
- adapted firing procedure;
- use of suitable type of explosive such as water-resistant explosives.

These measures, when appropriate, can be used to manage and reduce NO_2 emissions in the best possible way.

CCE-17	**WASHING OF CONCENTRATE TRANSPORT TRUCKS AND MITIGATION OF THE EFFECTS ON AIR QUALITY** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 4.4 (Presentation and organization of the environmental impact statement)** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Sections 4.4.1 (Transportation), 4.10.3 (Residual materials),4.12 (Concentrate transport to Matagami), 4.14 (Project execution), 7.4 (Impact on the social environment), 7.4.2 (Infrastructure) and 8.5 (Projects, activities or events linked to valued components).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-21.** ***Background*** **In Question CEAA-21 E, the Proponent was asked to indicate the mitigation measures necessary to reduce the impacts of truck transportation. Although the Proponent proposed some mitigation measures, Environment and Climate Change Canada believes that other measures could be added.** **The Proponent should include additional mitigation measures, such as the washing of concentrate transport trucks before they depart for Matagami to further reduce the quantity of dust emitted during truck transportation.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Determine whether washing the concentrate transport trucks is a technically and economically feasible mitigation measure.**

A-CCE-17:

Like all other GLCI-owned vehicles, the concentrate transport trucks will be washed when dirty. These trucks will travel on the James Bay Highway, and from the site entrance to the loading station. Since the concentrate is a profit-making product for GLCI, it will be properly loaded with minimal losses. GLCI does not benefit from the concentrate being spilled onto the truck or the road.

8 HUMAN HEALTH – TOXICOLOGICAL RISK ASSESSMENT

8.1 REQUESTS FOR INFORMATION TO THE PROPONENT

CCE-18 **VALIDATION AND TOXICOLOGICAL FOLLOW-UP**

References

CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 6.3.4 (Predicted effects on valued components – Indigenous peoples) and 8 (Follow-up and Monitoring Programs).

Chan L., Batal B., Receveur O., Sadik T., Schwartz H., Ing A., Fediuk K., Tikhonov C. and K. Lindhorst (2016). *First Nations Food, Nutrition and Environment Study (FNFNES): Québec City Results 2016*. Ottawa, University of Ottawa. Available online: *www.fnfnes.ca/docs/QC_English_June_18.pdf*, viewed on January 22, 2020.

Sanexen Services Environnementaux Inc. (2018). James Bay Lithium Mine Project. *Toxicological Human Health Risk Assessment.* Appendix CEAA-44, *Supplement to the Environmental Impact Assessment (Concordance Phase)*. Report prepared for Galaxy Lithium (Canada) Inc.

WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answers to Questions CEAA-106, CEAA-65 and CEAA-69.

WSP (February 2020). James Bay Lithium Mine. Answers to the Request for Additional Information Dated January 8, 2020 Received from the CEAA as Part of the Environmental Review of the Project. Report prepared for Galaxy Lithium (Canada) Inc. Appendix AD2-D-60/140-1.

Background

The Proponent uses the *Toxicological Human Health Risk Assessment* (TRA; Sanexen, 2018) to support its contention that environmental follow-ups on air, water and traditional foods are unnecessary. According to Health Canada, however, there are some weaknesses and uncertainties in the TRA, since it is based primarily on modelling data and does not consider the enhanced atmospheric dispersion of contaminants (Appendix AD2-D-60/140-1; WSP, February 2020) recommended by Environment and Climate Change Canada and the contribution of mine effluent. The latter shortcoming understates the contributions of substances in watercourses CE2 and CE5 and the human health risks.[1]

In response to Questions CEAA-106 and CEAA-69 (for particles in the air), the Proponent indicates that it will implement an environmental monitoring and follow-up program for relevant contaminants in the various media based on human health protection criteria. The Proponent provided no information about the program, except that it will take action if problems are observed. According to Health Canada, the purpose of such a program is to validate the assumptions made in the Environmental Impact Assessment and the accuracy of the modelling results before problems arise.

In the JAC's consultations, members of the Eastmain and Waskaganish communities expressed concern about the potential risk of water and traditional food contamination due to the project. They recommended regular follow-up to build trust and limit avoidance by users of the land. Follow-up on the project's possible effects on the taste and nutritional qualities (i.e., fat content) of beaver meat was also recommended to encourage participation by users of the land and leverage their knowledge in these areas.

The scientific literature on the subject is clear: intake of many nutrients improves when Indigenous people eat traditional foods, even in small quantities. As there is substantial food insecurity in First Nations communities (Chan et al., 2016), particularly in areas where prices are high for food sold in stores, access to traditional food should be valued and protected.

Lastly, on the basis of the answer provided to Question CEAA-65, exceedance of the Canadian Ambient Air Quality Standard for nitrogen dioxide (NO_2) is expected occasionally over periods of one hour. Since NO_2 is a no-threshold substance, health effects can occur at any level of exposure.

1: For example, exposure through consumption of traditional foods (since the surface water in watercourses CE2 and CE3 could expose wildlife to contaminants and that wildlife could be hunted or trapped for human consumption), or exposure through direct contact with surface water (ingestion, skin contact).

The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:

A) Outline an environmental monitoring and follow-up program for air, water (watercourses CE2 and CE3) and traditional food (including sampling sites and frequencies) based on human health protection criteria to validate the assumptions in the TRA (Sanexen, 2018). Selection of the contaminants to be tracked and monitored must be based on the geochemical characterization of the various mining materials that will produce mine effluents and on enhanced atmospheric dispersion (Appendix AD2-D- 60/140-1; WSP, February 2020), in addition to what is required under the regulations.[2] The program's human health protection criteria must be described and justified. The program must contain a description of how the environmental follow-up and monitoring data will be transmitted and how any exceedances will be dealt with.[3]

B) Specify whether the follow-up and monitoring program for traditional food will be developed in conjunction with the Cree communities. In addition to the relevant contaminants, indicate whether follow-up parameters for nutritional and organoleptic[4] quality will be considered and selected in conjunction with the Cree communities to prevent any resource avoidance.

C) Submit a program for tracking NO_2 during project construction and operation.

A-CCE-18:

A)

As mentioned in the EIS (Section 10.3), the environmental monitoring and follow-up program will be completed after receipt of project authorization, at the time of application for environmental authorizations. The program will include:

- list of elements that require environmental monitoring;
- all measures and means planned to protect the environment, including air quality, surface water quality, wildlife and use of traditional land related to traditional food;
- consultation with involved stakeholders, including Cree communities;

- detailed characteristics of the monitoring program wherever foreseeable (e.g. location of interventions, planned protocols, list of parameters measured, analysis methods used, completion schedule, human and financial resources allocated to the program);
- intervention mechanisms in the event of non-compliance with legal and environmental requirements;
- commitments with regards to filing monitoring reports (number, frequency and content);
- GLCI's commitments in terms of distribution of environmental monitoring results to the population affected.

Results of the environmental monitoring and follow-up program will be presented in a report to the MELCC and monitoring committee. The committee will then distribute the report to the Eastmain, Waskaganish and Waswanipi communities.

Air Quality Environmental Monitoring

The Air Quality Monitoring Program was updated and is outlined in the Management Plan presented in Appendix A-CCE-16. It includes all provincial and federal requirements.

Surface Water and Groundwater Quality Environmental Monitoring

GLCI commits to carrying out a physicochemical quality monitoring of surface water. This monitoring will comply with procedures described in the *Guide de caractérisation physicochimique de l'état initial du milieu aquatique avant l'implantation d'un projet industriel*. The monitoring program will tie into the sediment quality monitoring program: the same stations sampled for the initial characterization will be used. Specifics of the program will be presented during the application for a depollution attestation and the program will be adjusted as required.

GLCI commits to making sure the groundwater quality monitoring meets the requirements of D019 and of art. 4 et seq of the Land Protection and Rehabilitation Regulation. The groundwater monitoring program presented in Section 10.4.2 of the EIS details the projected monitoring. The detailed program will be proposed to the MELCC at the time of application for the certificate of authorization of the concentrator and adjusted as required.

GLCI has also undertaken to meet, in due course, the Effluent Discharge Objectives (EDO) enacted by the MELCC, for its effluent discharge. The basin water will be analyzed according to D019 standards and EDO parameters issued.

Traditional Food Monitoring

Monitoring meant to document the concentration of contaminants in vegetation over time in various areas surrounding the mine will be implemented and begin at the implementation of the project and continue after the site restoration. The detailed monitoring program will be presented when obtaining the environmental authorizations for the beginning of construction.

The 24 metals analyzed in leaves/needles, fruits and branches of six species sampled in the study area as part of the EIS will also be subjected to analyses for this monitoring. The same plant species will be targeted so that comparisons can be made of chemical element concentrations in plants and to assess the potential for contamination of traditional foods across the project area.

B)

A preliminary version of the program will be developed and presented to the Eastmain, Waskaganish and Waswanipi communities for discussion. At present, nutritional and organoleptic quality is not one of the parameters to be considered in the follow-up program.

C)

GLCI plans to track potential NO_2 emissions during blasting. Such tracking is presented in the Dust Management Plan (Appendix A-CCE-16). The plan also provides for the implementation of additional mitigation measures, if required, that may promote better management and reduction of blast-related NO_2 emissions.

Update to the air dispersion modelling is underway and will consider the optimized mine site layout plant. Additional measures will be considered in this updated version to further reduce the NO_2 emissions, and therefore, modelled concentrations.

9 HUMAN HEALTH – NOISE IMPACTS

9.1 REQUESTS FOR INFORMATION TO THE PROPONENT

CCE-19

SENSITIVE RECEPTORS IN THE HUMAN ENVIRONMENT

References

CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 6.3.4 (Predicted effects on valued components – Indigenous peoples) and 8 (Follow-up and Monitoring Programs).

WSP (February 2019). James Bay Lithium Mine. Supplement to the Environmental Impact Assessment – Response to Questions and Comments by the Canadian Environmental Assessment Agency (Concordance Phase). Report prepared for Galaxy Lithium (Canada) Inc. Answers to Questions CEAA-19- 1 and CEAA-19-2.

WSP (August 2018). James Bay Lithium Mine. *Noise Modelling Study.* Report prepared for Galaxy Lithium (Canada) Inc. Maps 3 to 6.

WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Map 6-22.

WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. 205 pages, maps and appendices.

Background

Maps 3 to 6 of the *Noise Modelling Study* (WSP, August 2018) show more sensitive receptors in the human environment than Map 6-22 of the *Environmental Impact Assessment* (WSP, October 2018). In its response to Question CEAA-19 on sound levels at key receptors in the *Supplement to the Environmental Impact Assessment* (WSP, February 2019), the Proponent considers only the two Cree camps located 5.4 km and 11.4 km from the mine. The noise-related health impacts could be assessed more effectively with a single map showing both the isophon contours and land use by the Cree communities (including all representative human receptors).

In addition, the increase in road traffic generated by the mine's activities was not considered in the *Noise Modelling Study* (WSP, August 2018). There will be a 54% increase in heavy vehicle traffic on the James Bay Highway during the project's construction and operation phases (WSP, September 2019).

The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:

A) Identify the type of location and the users of each sensitive receptor in the human environment on Maps 3 to 6 of the *Noise Modelling Study* (WSP, August 2018), and provide a rationale for excluding them as representative human receptors for the noise impacts assessment, where applicable.

B) Submit a single map showing both the isophon contours and land use by the Cree communities (including all representative human receptors).

C) Clarify whether the increase in road traffic was considered in the *Noise Modelling Study* (WSP, August 2018) and the *Environmental Impact Assessment* (WSP, October 2018) If not, update the modelling of noise levels at representative human receptors, accounting for all noise sources (point and linear sources).

D) Specify whether construction or transportation activities will take place at night. If so, assess the impact on "sleep disturbance" at the truck stop and any other relevant human receptor, and propose mitigation measures if necessary.

E) Outline a noise monitoring and follow-up plan (including sampling sites, sampling frequencies and target levels based on human health protection criteria), and describe how the data will be transmitted and how any exceedances will be dealt with. The noise monitoring and follow-up plan must provide the capability to validate the predictions for sites used by Indigenous people and adjust the mitigation measures if required.

A-CCE-19:

The C1 (workers' camp) and C2 (km 381 truck stop) receptors were considered to be sensitive receptors while the camps located along rivers CE5 and CE3 (purple stars) were not considered because they do not represent places of habitation or they are occupied in an irregular way or in a mobile way (therefore temporary). The sensitive receptors (other than C1 and C2) presented on Maps 3 to 6 are identified as AQU1 to AQU4, TRC1 and MOT1. The description of these receptors can be found in Table 29 of the atmospheric dispersion modelling report (WSP, 2018c) and is repeated here.

Table A-CCE-19-1 Description of receptors AQU1 to AQ4, TRC1 and MOT1

DESCRIPTION	RECEPTOR IDENTIFIER	X (M)	Y (M)	ELEVATION (M)	DISTANCE FROM APPLICATION LIMIT (KM)	CATEGORY
Valued watercourse	AQU1	357 543	5 798 645	149.0	1.0	Valued area
Valued watercourse	AQU2	356 295	5 798 942	147.0	0.44	Valued area
Valued watercourse	AQU3	353 946	5 777 245	233.0	0.48	Valued area
Valued watercourse	AQU4	354 644	5 782 067	222.0	0.7	Valued area
Hunting, trapping and fishing area	TRC1	356 079	5 792 548	201.0	0.13	Traditional activity
Snowmobile trail	MOT1	355 815	5 794 551	202.0	0.7	Traditional activity

B)

The noise modelling will be udpated to take into account the optimization of the mine site development plan. As requested, the results of the updated modelling will be presented on a map bringing together isophone curves and land uses by Cree communities, including all representative human receptors.

C)

The increase in road traffic was not considered in the noise modeling since this traffic occurs outside the limits of the mining lease that will be requested by GLCI. The noise modeling study carried out by WSP (2018d) targeted all activities, including mobile noise sources, that will be emitted on site property. Road noise on public highways is not usually considered unless there is a specific concern, or where a significant noise impact is expected. As mentioned above, the design of the mine site development plan is currently being optimized. The noise modelling will be updated to take into account the optimization of the mine development plan. As part of this update, the impact of the increase in road traffic will also be assessed for sensitive receptors identified near the mining project area.

D)

Construction activities will take place from 7 am to 6 pm, so there will be no overnight construction work. However, activities will take place day and night during operations. However, no transport activity is planned at night.

In the context of updating the noise modelling, sleep disturbance at the km 381 truck stop and for any other human receptor will also be considered. Mitigation measures will be proposed, if necessary. The results and proposed mitigation measures will be communicated to the federal authorities as soon as they are available.

E)

The noise monitoring program will be designed to ensure compliance with the NI 98-01 noise limits as well as the recommendations of Health Canada's " Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise" (January 2017). At minimum, measurements will be taken at C1 and C 2 measurement points (workers' camp and km 381 truck stop). Depending on the results of the updated modeling, other measurement points may be added (notably the sites used by Crees).

A measuring station composed of a sound level meter (including microphone) and an audio recorder will be installed at each evaluation point. The measurements will be carried out continuously over a period of at least 24 hours, during meteorological conditions suitable for measuring environmental noise. A report will summarize the measurement results, data processing and analysis, the sound levels measured with or without logging, in third octave frequency bands and sound levels if necessary. If noise limits are exceeded, mitigation measures will be proposed.

The detailed monitoring plan will be developed once detailed engineering of the project is complete.

CCE-20	**CONSIDERATION OF THE NOISE IMPACTS OF EXPLOSIONS ON HUMAN HEALTH**
	References
	CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 6.3.4 (Predicted effects on valued components – Indigenous peoples).
	WSP (August 2018). James Bay Lithium Mine. *Noise Modelling Study.* Report prepared for Galaxy Lithium (Canada) Inc.
	United States Environmental Protection Agency (US EPA) (1974). Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (Report No. 550/9- 74-004).
	International Organization for Standardization (ISO) (2003). ISO 1996-1:2003 Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures. Available online: http://www.iso.org/iso/catalogue_detail?csnumber=28633
	Health Canada (2017). *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise.* Available online: *www.canada.ca/en/health-canada/services/publications/healthy-living/guidance- evaluating-human-health-impacts-noise.html*, viewed on March 23, 2020.
	JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Waskaganish (October 2019) and Cree Nation of Eastmain (December 2019).

Background

On page 7-41 of the *Environmental Impact Assessment* (EIA), the Proponent states the following: "A simulation of sound propagation to assess the project's noise emissions with tailwinds was conducted in year 9 of the operation, the year when the production level would be the highest. Map 7-4 presents the iso- contours of noise as modelled during the operations. The detailed results of this modelling are presented in a separate study (WSP, 2018d)." The Proponent adds, "Considering all of the mine's emission sources, its maximum sound impact for the nearest sensitive receptor is assessed at 42 dBA (km 381 truck stop)."

In the EIA and the *Noise Modelling Study* (WSP, August 2018), the Proponent did not include a section specifically about explosion noise.

The JAC held consultations on the EIA with the Waskaganish and Eastmain communities in October and December 2019. In those consultations, the question of the noise impacts of explosions, particularly on the Cree camps, was raised a number of times.

The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:

A) Explain how explosion noise was considered in the noise impacts assessment and the simulations carried out for the *Noise Modelling Study* (WSP, August 2018). Specify in particular whether an appropriate adjustment was made in the percentage of people seriously bothered (% Highly Annoyed (HA)), and state whether other health effects indicators (e.g., sleep disturbance) were considered.

B) Indicate how the Proponent plans to provide land users with advance information about blasting schedules. If there are no plans to notify land users of the schedules in advance, provide an explanation for that decision.

Note to the Proponent: Since the annoyance caused by explosions may depend on the number of explosions per day, the frequency of explosions in a year and the number of years during which explosions are expected to take place, Health Canada recommends that the quantitative assessment of noise include applicable adjustments (weighting) for impulsive noise (i.e., noise from explosions) to provide a full understanding of the potential impacts that exposure to the expected noise levels have on human health. Health Canada also recommends adherence to ISO 1996-1:2003 guidelines in the case of blasting operations lasting more than one year and the U.S. EPA's methodology (US EPA 1974) for blasting over periods of less than one year.

A-CCE-20:

The modelling was carried out considering the worst-case scenario for noise emissions. During blasting, operations on the site will be stopped within a safety perimeter, which represents a less noisy situation than in a period of activity without blasting. In addition to stopping the activities during blasting, the duration of noise emissions from the explosion will last for a few seconds resulting in a loud thud sound, which is very different from the wideband noise of an open air explosion (e.g. cannon, rifle, pile driving or surface explosion). In the case of blasting in a quarry or mine, the explosion is confined to the rock. The explosive charge is located in the bottom of a drilled hole which is filled with wadding material (crushed stone) in order to contain the energy of the detonation in the rock to optimize fragmentation. To this end, the criteria used to characterize the wave caused by the explosion of a blast in a quarry or mine are generally air overpressure (low frequency shock wave) and vibration. The results for these criteria are detailed here:

AIR OVERPRESSURE

For sensitive areas for human, the Directive 019 criterion for the mining industry is 128 dB. Considering a maximum of 4 holes exploding in 8 ms, an area overpressure of 122 dB is calculated at the km 381 truck stop and 117 dB at the workers' camp. These calculations are carried out without consideration of thermal inversion or carrier wind, which can in some cases increase the noise level by around 10 dB. Consequently, when the detonations take place less than 800 m from the km 381 truck stop, they must be carried out in the absence of thermal inversion and of carrying wind.

VIBRATION

For structures and sensitive areas for human, the Directive 019 criterion of on the mining industry is 12.7 mm/s.

Considering a maximum of 4 holes exploding in 8 ms, the threshold is respected at the nearest structures, i.e. at the km 381 truck stop with 10.2 mm/s, at the plant with 9.3 mm/s and at the workers' camp with 4.4 mm/s. The use of a firing sequence that increases the number of holes exploding in 8 ms by more than 4 is not recommended and may cause the permitted threshold to be exceeded.

It should be noted that noise modeling, including vibrations and air overpressures related to explosions, will be updated to take into account optimizations of the mine site development plan. As soon as they are available, the results of the modeling will be communicated to the authorities.

B)

The monitoring committee will serve as a drop-off point for all information concerning the communities. The blasting times will therefore be communicated via the monitoring committee. Information panels indicating the blasting times will be put in place before the start and throughout the operation of the site. Information will be sent to the communities as well as to the km 381 truck stop.

9.2 COMMENTS AND ADVICE FOR THE PROPONENT

Comment 2	**INDICATORS OF NOISE IMPACTS ON HUMAN HEALTH** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 6.3.4 (Predicted effects on valued components – Indigenous peoples).** **WSP (August 2018). *James Bay Lithium Mine. Noise Modelling Study*. Report prepared for Galaxy Lithium (Canada) Inc. 31 pages+ appendices.** **Health Canada (2017). *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise*. Available online: www.canada.ca/en/health-canada/services/publications/healthy-living/guidance- evaluating-human-health-impacts-noise.htmlhtml, viewed on January 13, 2020.**

Comments abd advice

The *Noise Modelling Study* (WSP, August 2018) contains the following statement: [Translation] "Although there are no federal regulations in Canada regarding levels of noise generated by mining activities, in January 2017 Health Canada published a document entitled 'Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise'. A project's sound impact is assessed against the %HA (Highly Annoyed) index." According to Health Canada, the %HA (percentage of people highly annoyed) is one of several indicators.

AN UPDATE OF THE NOISE IMPACTS ASSESSMENT CONSIDERING ALL RELEVANT INDICATORS (HEARING LOSS, SLEEP DISTURBANCE, INTERFERENCE WITH SPEECH COMPREHENSION, NOISE COMPLAINTS, AND NOISE-RELATED HIGH ANNOYANCE; HEALTH CANADA, 2017) IS RECOMMENDED.

A-C 2:

As mentioned at the beginning of the document, the design of the mine site development plan is being optimized. As part of this optimization, the impact assessment on the components affected by the optimizations of the mise site developement plan will be updated. Thus, an update of the noise modeling will be carried out and the results will be used to update the assessment of the effects of noise. In addition to the% HA index previously used, sleep disturbance, interference with speech understanding and noise complaints, which are three indicators recommended by Health Canada (2017), will be taken into account in the analysis.

As for hearing loss, this index relates more to the health and safety of workers than to the environmental impact study. As mentioned in the EIS (WSP, 2018b), GLCI will comply with the highest national and international health and safety standards to protect its workers. An occupational health and safety policy and program will be put in place and presented to employees and contractors, to ensure the safety of workers. In particular, the wearing of adequate personal protective equipment will be required for all workers present on the mine site.

10 HUMAN HEALTH – AIR QUALITY

10.1 REQUESTS FOR INFORMATION TO THE PROPONENT

CCE-21	**METHODOLOGY FOR ASSESSING HUMAN HEALTH RISKS** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 6.3.4 (Predicted effects on valued components – Indigenous peoples).** **Sanexen Services Environnementaux Inc. (2018). James Bay Lithium Mine Project. *Toxicological Human Health Risk Assessment.* Appendix CEAA-44, *Supplement to the Environmental Impact Assessment (Concordance Phase)*. Report prepared for Galaxy Lithium (Canada) Inc.** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-104 A.** ***Background*** **In its answer to Question CEAA-104 A, the Proponent indicates that the crystalline silica concentrations re- modelled for enhanced atmospheric dispersion (WSP, September 2019) are not the same as the concentrations used to assess the human health risks (Sanexen, 2018).** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Provide an explanation for the fact that the crystalline silica concentrations used in the toxicological risk assessment (Sanexen, 2018) are not the same as the concentrations used for enhanced atmospheric dispersion modelling (WSP, September 2019).**

A-CCE-21:

The toxicological risk assessment was carried out in 2018 by Sanexen. The concentrations of crystalline silica that were used by Sanexen are those that had been modeled by WSP as part of the EIA (WSP, 2018b). However, in 2019, the atmospheric dispersion modelling was updated to reflect some changes to the project (including but not limited to: reduced emissions at the plant by lowering the concentrations of the main point sources below 20 mg / Rm^3, increased hauling truck payload from 64 tonnes (CAT 775) to 89 tonnes (CAT 777), and the addition of restrictions related to weather conditions during blasting). Thus, the results of this model (WSP, September 2019) gave concentrations of crystalline silica lower than the concentrations from the first model from 2018.

CCE-22	**AIR QUALITY IMPACT ASSESSMENT IN VIEW OF AIR QUALITY MODELLING UPDATES** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 6.3.4 (Predicted effects on valued components – Indigenous peoples).** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Section 7.2.5.** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-60.** **WSP (February 2020). James Bay Lithium Mine. Answers to the Request for Additional Information Dated January 8, 2020 Received from the CEAA as Part of the Environmental Review of the Project. Report prepared for Galaxy Lithium (Canada) Inc. Appendices AD2-60/140-1 and R-AD2-60/140-2.** ***Background*** **In response to Questions CEAA-60 and CEAA-140, the Proponent presents air quality models for transportation on the James Bay Highway (Appendix AD2-60/140-1; WSP, February 2020) and emissions from generators and the concrete plant (Appendix AD2-60/140-2; WSP, February 2020). To consider this new information in the project impact assessment, the Proponent must review its air quality impact assessment.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Review the air quality impact assessment for each phase of the project, including the human health impact due to project-related transportation activities. Where applicable, propose additional mitigation measures.**

A-CCE-22:

Air quality modelling is currently being updated to take into account the optimization of the mine site management plan which aims to minimize the effects on the receiving environment as much as possible. The results of this update will be presented as soon as they are available. On the basis of the results of this modelling, the assessment of the effects on air quality will be carried out for each phase of the project and will also include the effects on human health resulting from the transport-related activities caused by the project. Additional mitigation measures will be presented if necessary.

CCE-23	**DUST MANAGEMENT PLAN** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 6.3.4 (Predicted effects on valued components – Indigenous peoples).** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Section 7.2.5.** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-66** ***Background*** **In its answer to Question CEAA-66, the Proponent presents a Dust Management Plan. In particular, the Proponent describes the measures that will be taken to reduce dust and some improvements aimed at reducing the health effects.** **The Dust Management Plan must be designed so as to reduce dust deposition both in general and in the locations of those sensitive receptors specifically.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **A) Provide a map showing the locations of receptors sensitive to dust in relation to the mine.** **B) Specify how the dust tracking data mentioned in the Dust Management Plan will be made public. If there are no plans to make the data public, provide an explanation for that decision.** **C) Describe the methods that will be used to reduce dust emissions, clearly explaining how and when the mine's activities will be modified. The Proponent must ensure that the proposed mitigation measures are specific. For example, specify how the bulldozing of unloaded materials will be managed to prevent the spread of dust; indicate whether water jets will be used whenever the crusher is in operation; explain how work areas that require sprinkling will be determined during topsoil stripping, and how road sprinkling needs will be determined.**

A-CCE-23:

A)

Sensitive receptors identified in the vicinity of the mine site are mapped in Map B1-3 of the air dispersion modelling study (WSP, 2018c). A detailed description of these receptors is also provided in Section 5.6.3 of the study.

B)

As described in the Dust Management Plan, the follow-up results shall be submitted to the MELCC and also integrated in the reports to be submitted to the mine's environmental committee.

C)

The Dust Management Plan includes an adaptive mitigation management program. This program provides a framework for the implementation of additional mitigation measures and specifies when these measures will be implemented. It involves continuous tracking of particulate matter and will ensure compliance with the standards at all times. The mitigation measures that will be implemented are described in the overall Dust Management Plan. The effectiveness of mitigation measures can be verified by continuous tracking of particulate matter. The selection of measures will therefore be determined based on the experience gained during operations and tracking results.

11 INDIGENOUS ISSUES REGARDING THE PROJECT'S EFFECTS ON CREE COMMUNITIES AND THEIR CONCERNS

11.1 REQUESTS FOR INFORMATION TO THE PROPONENT

CCE-24	**ARRANGEMENTS FOR FISH BEFORE LAKE KAPISIKAMA DRIES UP** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 5 (Consultation with Indigenous Nations and Concerns Raised).** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Pages 6-97 and 7-56.** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Waskaganish (October 2019).** ***Background*** **In its Environmental Impact Assessment (EIA), the Proponent states that a compensation plan will be developed for the loss of habitat caused by the drying up of Lake Kapisikama, which has a population of yellow perch. The Proponent provides no details about what will happen to the fish before the lake dries up.** **The JAC held consultations on the EIA with the Waskaganish community in October 2019. In those consultations, the question of what will happen to the populations of fish in Lake Kapisikama was raised a number of times.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **A) Specify what will happen to the fish currently living in Lake Kapisikama and describe the stages in their capture and relocation or distribution to the Cree, as applicable.** **B) Specify how the Cree land users are expected to participate in this process and, if applicable, at what stage in the process. If there are no plans to have Cree land users participate in the process, provide an explanation for that decision.**

A-CCE-24:

A)

Since this lake will inevitably dry up, GLCI has committed to developing a compensation plan for any known loss of fish habitat (see NOR 16, Table 7-5 of the EIS). The plan will be presented to the DFO, MFFP and MELCC prior to the submission of applications for environmental permits. The applications shall include all required information on the projected compensation plan.

Although relocation of the population or their release in the watercourse downstream remains a solution, it should be recalled that fishing data (2012 and 2017) clearly reveals that this lake is not a preferential habitat for the yellow perch (WSP, 2018e). Lake Kapisikama is very unproductive and is rarely accessed by fish. This can be explained due to its isolation, shallow depths and high acidity. It seems unlikely that the yellow perch was introduced into the lake. The morphological characteristics and predominance of male fish could be a result of the poor quality of the habitat.

It may prove difficult and costly to find a habitat where the population could be relocated and still be allopatric. An alternative would be the capture and distribution of catches to the local population, so long as this solution is approved by the relevant government authorities, in which case the monitoring committee will participate in the consultation and involvement of the Cree community for fishing and distribution of catches.

If the only acceptable option for the DFO is relocation, effort shall be made to validate that yellow perch is indeed allopatric in Lake Kapisikama. For this purpose, fishing gear for smaller species will be used in combination with environmental DNA analysis methods. This last method could prove to be effective since the lake is isolated. Habitat will be characterized and search for a new optimal habitat for relocation shall be conducted. Based on the age structure of the receiving lake(s) and its specific composition, an adapted transfer plan will be developed and presented to the MFFP and DFO. Typically, for relocation, fish are first caught using trap nets and then confined to an area of the lake to be closed off with a seine net. Fish are then put in holding and transferred to the receiving body of water. This type of work has been carried out in the past, notably in lakes with Arctic char within the Romaine River watershed. At the same time, search for an existing habitat to be improved or for creating quality habitat for this species will be carried out. Subsequently, the specimens may be relocated to a similar existing or created habitat, depending on the compensation plan that will be submitted and approved by provincial and federal authorities. Six months after obtaining authorization, the community will be consulted on this subject to involve users of the territory. Of course, activities conducted within the territory, including compensation work, will be carried out in consultation with the tallymen of this sector.

B)

GLCI plans on involving Cree land users in all operations affecting wildlife resources on their territory. Thus far, GLCI has been transparent on this issue throughout the environmental assessment process. The monitoring committee will be informed of the various steps of the process that will be selected. Sitting on this committee will be: representatives of Eeyou Istchee James Bay; representatives, or designated members, of the Eastmain, Waswanipi and Waskaganish band councils; tallymen, or representatives designated by the tallymen, of traplines RE1, RE2, RE3, VC33, VC35 and R08; and representatives of Matagami. The participation of users will be requested through the monitoring committee to familiarize themselves with the compensation plan and make comments for its improvement, as well as through field activities so they are conducted in compliance with traditional knowledge and accepted by communities.

CCE-25	**USE OF THE LAND BY NON-INDIGENOUS PEOPLE, AND PRESSURE ON WILDLIFE RESOURCES** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 5 (Consultation with Indigenous Nations and Concerns Raised) and 6.3.4 (Project effects assessment – Indigenous peoples).** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc. Table 7-5.** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-98.** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Waskaganish (October 2019) and Cree Nation of Eastmain (December 2019).** ***Background*** **In its answer to Question CEAA-98, the Proponent explains that the standard work schedule of mine employees will not lend itself to hunting and fishing activities. It also states that firearms will be prohibited aboard aircraft flying workers to the mine site, and most workers will be flown in. However, the Proponent provides no information about how it plans to prevent employees travelling to the mine site by road from bringing firearms with them. In Table 7-5 of the EIA, the Proponent proposes mitigation measure UTT 04, "Prohibit hunting and recreational fishing for workers at the mine site", to limit the project's impacts on ongoing use of the land by the Cree communities.** **In the JAC's consultations on the Proponent's EIA in October and December 2019, the Eastmain and Waskaganish communities expressed concern about the arrival of large numbers of workers who might hunt and fish in the area. They noted that this could put increased pressure on wildlife resources. They also expressed apprehension about the potential effects on tallyman governance capacity and people's safety.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **A) State and describe what measures will be taken to prevent workers travelling to the mine site by road from bringing hunting and fishing equipment with them. If there are no plans for such measures, provide an explanation for that decision.** **B) State whether fishing equipment will be permitted on the Proponent's charter flights.**

A-CCE-25:

A)

Workers travelling to the mine site by road will be required to stop at the mine site entrance for identification. They will also have to declare that no hunting or fishing equipment is in their vehicle. As on most industrial sites, all incoming and outgoing vehicles will be searched.

B)

Fishing equipment will not be permitted on the Proponent's charter flights. Once mining operations are well established, and if employees request the right to fish, a plan may be discussed and developed in collaboration with one of the liaison committees.

CCE-26	**LAND AND RESOURCE USE – IMPACTS OF INCREASED ROAD TRAFFIC AND CURRENT USE BY THE CREE COMMUNITIES** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 5 (Consultation with Indigenous Nations and Concerns Raised) and 6.3.4 (Project effects assessment – Indigenous peoples).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-94.** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Waskaganish (October 2019) and Cree Nation of Waswanipi (February 2020).** ***Background*** **In its answer to Question CEAA-94, the Proponent provides clarifications on its traffic management plan and an assessment of the impacts of increased road traffic on land use by the Cree communities that have traplines on either side of the James Bay Highway. The Proponent states that users' tranquillity will be disrupted by the nuisance caused and that users will resume their activities after a period of adjustment. This assessment focuses mainly on user experience (tranquillity, access to camps, and risk of accidents); it does not specify whether the increased road traffic will have an impact on the species of interest hunted by the Cree.** **In the consultations on the Proponent's EIA, the Waswanipi community expressed concern about wildlife avoidance of the roads and adjacent areas due to the road traffic generated by the project. The Waskaganish community expressed apprehension about the impacts of increased road traffic on the beaver trapping that regularly takes place along the James Bay Highway. The Eastmain community told the JAC that beavers were often seen along the James Bay Highway and expressed concern about the impacts of road traffic on the species.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Assess the impacts that increased road traffic on the James Bay Highway will have on large fauna and on the beaver, a species valued by the Cree, considering in particular wildlife avoidance of the road and adjacent areas and the higher risk of collisions. Propose appropriate mitigation measures, where applicable.**

A-CCE-26:

Sections 7.3.2 and 7.3.3 of the EIS consider the risks of disturbance and collision due to transportation and traffic in the assessment of impacts on the large fauna, small fauna and herpetofauna for the construction and operation phases (WSP, 2018b).

Risk of collision with species (including beavers) found along the James Bay Highway already exists. With the increase in traffic due to the mine operations, accidental deaths by collisions with vehicles may be an occasional addition to the accidents currently recorded. The additional disturbance caused by the project activities, including road traffic, is likely to modify the natural behaviour of certain small and large fauna species and lead to their avoidance of affected areas. For some species, like bears and foxes, the risk of collisions may be greater, especially near the operation site, since they are attracted to food resources or household waste. To minimize this risk, workers will be made aware of the importance of not feeding animals or leaving food lying about so as not to attract wildlife, especially bears, near work areas. Mitigation measures to reduce the attractive nature of the site to wildlife, including bears, are presented in Answer CCE-36.

During the construction and operation phases, areas with the highest risk of collision with large fauna will be identified through adequate signage. Overall, standard mitigation measures presented in Table 7-5 of the EIA associated with traffic (CIR 01 to CIR 03), fauna (FAU 03 and FAU 05) and noise (SON 01), and which cover signage and traffic control, worker awareness to the presence of fauna, and reduction of vehicle noise, shall contribute to the mitigation of impacts due to transportation and traffic during the construction and operation phases (WSP, 2018b).

The impact of transportation caused by the project on the Nottaway woodland caribou herd was assessed in the response to QC2-28 from the MELCC (WSP, 2020). Even though the impact of the project on the average annual daily traffic (AADT) on the James Bay Highway represents a global increase of 17% (54% if we only consider heavy vehicles), the traffic flow on that road remains low. Map 6-17 (WSP, 2018) shows that the woodland caribou probability of occurrence is low along the entire James Bay Highway right-of-way, thus suggesting that the disrupted environments located on either side of the road are unsuitable for the woodland caribou. Therefore, the global 17% increase in AADT on this road will have no significant impact on the habitat fragmentation and disturbance of this caribou herd.

It appears that moose frequent roadside due to the presence of suitable habitats or certain resources, such as sodium and ponds, independent of the intensity of traffic (Laurian et al., 2012; Bartzke et al., 2014 and 2015). According to these studies, selection by the moose of habitats along roads varies with season, sex and tolerance of the animals (Laurian et al., 2012; Bartzke et al., 2014). In general, moose seem less sensitive to man-made linear features than caribou (Bartzke et al., 2014). However, moose appear rather reluctant to cross roads and rivers, particularly in forests, and generally prefer to move along these linear obstacles (Bartzke et al., 2015). Moreover, moose are very rare in the region (Morin, 2015).

Sightings of beaver reported alongside the James Bay Highway are not surprising given the presence of ditches and wetlands, and more importantly culverts, on either side of the road. These culverts are often used by beavers to raise, with dams, the water level. The presence of beaver near the road is inevitably associated with a risk of collision. Even though the traffic flow on the James Bay Highway remains low, the increased AADT due to the project is likely to result in an increased risk of collisions with beavers. However, the potential impact of increased traffic on roadside avoidance by beaver is much more difficult to assess. While habitats along this road are generally unfavourable to the caribou, they are much more favourable to the beaver (ditches, wetlands, culverts, young forest stands, etc.). The reaction of small fauna to the presence of roads varies depending on the species; some demonstrate a clear avoidance behaviour, while others are not affected (some are even more abundant near roads) (Fahrig & Rytwinski, 2009). To our knowledge, there is no study which documents the impact of traffic on beavers and possible avoidance behaviour exhibited by this species. However, considering the presence of favourable habitats to the beaver alongside the James Bay Highway, and the fact that traffic remains relatively low despite the increased traffic flow due to the project, no significant impact on beavers trapping activities that regularly take place along this road is anticipated.

In conclusion, results of the assessment of the project's impacts on the large and small fauna in terms of transportation and traffic are not modified. Considering the mitigation measures that will be implemented, the fact that there will not be any transport on the James-Bay Highway during nighttime and the fact that the traffic flow will remain low despite the impact of the project on the AADT on the James Bay Highway (WSP, 2018b and 2020), the intensity of the impact is considered low since it will only slightly affect the fauna components under study without truly changing their quality, range or use of the habitat. Despite the presence of the road and its current traffic flow, the fauna, including the beaver, already frequent habitats alongside said road. There will be a slight increase in disturbance, as well as in the risk of collisions, but without significantly changing the current situation. The extent is local since the impacts assessed will be mainly limited to the mine site and along the James Bay Highway. The effect will be felt on a very limited portion of the area's population. The duration is considered medium, since the impact will extend over the life of the mine, a period of approximately 20 years where the traffic increase due to the project will be effective. Thus, the residual impact is deemed minor (WSP, 2018b) and should not significantly modify the current range of the fauna species, nor the use of the territory by Cree communities for hunting and trapping activities, among others.

CCE-27	**LAND AND RESOURCE USE AND TRAFFIC MANAGEMENT PLAN** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 5 (Consultation with Indigenous Nations and Concerns Raised).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-94.** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Waskaganish (October 2019) and Cree Nation of Eastmain (December 2019).** ***Background*** **In response to Question CEAA-101, the Proponent states that it plans to install road signs but does not specify what signs, and the Proponent does not indicate what specific measures will be taken at the turnoff to the mine and the truck stop (reduced speed limits, speed bumps, pedestrian crossing with signals, etc.).** **The Proponent states in its EIA that most of the road traffic will be during the day, but does not specify whether all trucks will leave the mine at the same time. In the JAC's consultations, the Waskaganish community suggested that staggering truck departure times through the day should be considered. The community also expressed concern about traffic and higher risks of accidents at the truck stop, a key location for users. The Eastmain community asked what the maximum speed would be for trucks equipped with a speed controller.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **A) Clarify, to the extent possible, what road signs will be included in the traffic management plan.** **B) Specify what measures are planned to ensure people's safety in the key area around the turnoff to the mine and the truck stop.** **C) Specify the maximum speed of a truck equipped with a speed controller.** **D) Assess the feasibility of staggering truck departure times through the day, and if it is feasible, determine what the intervals would be, where applicable.**

A-CCE-27:

A)

The traffic management plan shall include the description of:

- on-site and off-site roads (width, number of lanes, speed limits, lighting and maintenance);
- on-site and off-site fleet frequency and loads;
- potential commuters to the site – suppliers, workers, contractors, visitors, transportation of concentrate;
- rules to be followed – training, procedures, signage, receipt and addressing complaints.

Signs to be installed on the road shall indicate transit points for heavy vehicles, i.e., access to the site and borrow pits. Signs will be installed at access locations and at distances normally recommended by the Ministère des Transports prior to heavy vehicle access. In addition, as indicated in response CCE-26, areas at greatest risk of collision with large wildlife will be indicated with appropriate traffic signs.

B)

The stretch of road between the site access and truck stop will effectively be a busy segment of the road. Precautionary signs should be sufficient to alert drivers to pay attention. The idea to reduce the maximum speed limit on this segment could be discussed with the SDBJ in due course.

C)

Since January 1, 2009, standard speed limiters are mandatorily activated and set to prevent vehicles from exceeding 105 km/h. This measure is for operators of heavy vehicles of all sorts whose trucks operate on Quebec roads. Even though the James Bay Highway is not part of the Ministère des Transports network, the same rules shall apply.

D)

There will be only one loading station and one exit scale for trucks carrying concentrate. Departure spacing of trucks should be equivalent to the time to fill the trucks, i.e., 15 to 20 minutes.

CCE-28	**LAND AND RESOURCE USE – IMPACT OF INCREASED ROAD TRAFFIC AND MINING OPERATIONS DURING GOOSE AND MOOSE HUNTING SEASON** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 5 (Consultation with Indigenous Nations and Concerns Raised) and 6.3.4 (Project effects assessment – Indigenous peoples).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-101.** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Waskaganish (October 2019).** ***Background*** **In response to Question CEAA-101, the Proponent states that it will perform its maintenance shut-downs, which last about 10 days, during the goose hunting season, but it does not specify whether it will liaise with the Eastmain community and whether a similar measure is planned for the moose hunting season. The Proponent also does not specify whether transportation activities will continue during the maintenance shut- downs.** **In the JAC's consultations on the Proponent's EIA, the Waskaganish and Eastmain communities expressed concern about the effects of the increased road traffic due to the project, particularly during the annual goose and moose hunting season.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **A) Specify whether transportation activities will continue during the goose hunting season and whether meetings will be held with the Eastmain community with a view to finding a better time.** **B) State whether one or more mitigation measures are planned specifically for the annual moose hunting season.**

A-CCE-28:

A)

Transportation activities from the mine site to Matagami will continue during the mine maintenance shut-downs. However, transportation will be greatly reduced since there will be no more production at the mine. The mine shut-down period shall be determined after discussions with the Eastmain community authorities in order to coordinate with the community's hunting seasons. Drivers will be alerted to the increased presence of land users and their families near the James Bay road during the goose and moose hunting seasons.

B)

Maintenance shut-downs could possibly be carried out during the moose hunting season in the fall. GLCI will have to determine the feasilibity according to the availability of the experts needed to conduct these shut-downs. Before setting this maintenance period (spring or fall), Cree authorities will be consulted for coordination with the community's hunting seasons.

CCE-29	**LAND AND RESOURCE USE – IMPACT OF INCREASED ROAD TRAFFIC AND BEAVER TRAPPING** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 5 (Consultation with Indigenous Nations and Concerns Raised) and 6.3.4 (Project effects assessment – Indigenous peoples).** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Waskaganish (October 2019) and Cree Nation of Eastmain (December 2019).** ***Background*** **In the JAC's consultations on the Proponent's EIA, the Waskaganish community expressed concern about the impacts of increased road traffic on the beaver trapping that regularly takes place along the James Bay Highway, not only for traditional purposes but also to prevent flooding on the highway. The issue of the safety of land users who park along the highway was also raised. In response to Question CEAA-101, the Proponent provides details of its traffic management plan, specifying that quarterly driver training and discussion meetings regarding driver safety, awareness and sensitive areas are planned.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Specify whether the quarterly awareness and training sessions for truck drivers will include information about the Crees' regular beaver-trapping activities in varying locations along the James Bay Highway.**

A-CCE-29:

The awareness and training sessions for truck drivers will also include information about the Crees' beaver-trapping activities along the James Bay Highway. It should also be noted that, if identified through the monitoring committee, additional topics will be added to the sessions to ensure greater safety for land users along the James Bay Highway.

CCE-30	**LAND USE AND LANDSCAPE – MINE REHABILITATION PLAN AND REVEGETATION** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 5 (Consultation with Indigenous Nations and Concerns Raised) and 6.3.4 (Project effects assessment – Indigenous peoples).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-102.** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Waskaganish (October 2019) and Cree Nation of Eastmain (December 2019).** ***Background*** **In its answer to Question CEAA-102, the Proponent does not explain why revegetation of the stockpiles would not occur gradually over the mine's life cycle. In the JAC's consultations on the Proponent's EIA, the Waskaganish community expressed concern that the revegetation included in the mine rehabilitation plan would only involve willow trees, which is apparently the case for other mining projects in the region. The community recommended that species similar to those which existed there before the mine be planted, or that conifer species also be selected. The EIA does not indicate which plant species the Proponent has chosen for this purpose.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Specify how the tallymen will be consulted on the selection of plant species that will be used to revegetate the site during the closure and rehabilitation phase or what plant species are planned at the moment, if any. If there are no plans to consult the tallymen, provide an explanation for that decision.**

A-CCE-30:

The complete closure plan is presented in Appendix A-CCE-30. It should be noted that this version is a first draft. Following the optimization of the mine site development plan, an update to the closure plan will be required. This update will be presented to the band council and relevant tallymen in the Eastmain community (see A-CCE-31). At this time, representatives will be asked to comment on the closure plan, including the plant species that will be used. Their suggestions will be incorporated into the plan or explanations provided if it is not possible to comply with these suggestions, if applicable.

It should be noted that the MERN conducts consultations with the indigenous communities before the issuance of the mining lease, including consultations regarding the closure plan. GLCI therefore has an advantage in consulting the Cree communities beforehand on its closure plan to ensure comments and suggestions of the tallymen are integrated and to avoid unnecessary delays in the issuance of the mining lease.

CCE-31	**LAND USE AND LANDSCAPE – MINE REHABILITATION PLAN, FUTURE CONSULTATIONS AND COMMUNICATION WITH THE EASTMAIN COMMUNITY** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 5 (Consultation with Indigenous Nations and Concerns Raised).** **WSP (December 2019). James Bay Lithium Mine. Answers to Precision Request on Answer to Questions (1st Series) Received from the Canadian Environmental Assessment Agency as Part of the Environmental Review of the Project Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-102.** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Eastmain (December 2019)** ***Background*** **In its clarification of the response to Question CEAA-102, the Proponent states that the RE2 Eastmain tallyman and his family recommended that the pit be backfilled with waste rock and notes that the recommendation is under consideration.** **In its December 2019 consultations on the Proponent's EIA with the Eastmain community, the JAC observed that various segments of the community, including the Band Council, the land users and the residents, had a range of concerns and questions about the mine rehabilitation plan.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Indicate how the final rehabilitation plan will be presented to the Band Council and the tallymen concerned in the Eastmain community for their information prior to its final submission. If there are no plans to share the plan with the Band Council and the tallymen concerned in the Eastmain community, provide an explanation for that decision.**

A-CCE-31:

The complete closure plan is presented in Appendix A-CCE-30. The latter will be subject to updates based on project optimizations, comments from relevant government analysts and representatives from surrounding communities. The closure plan will be presented to the Estmain community, through the band council and tallymen, for comments and to collect feedback on suggestions, impressions and concerns. The information will be incorporated into the final version of the closure plan.

CCE-32	**LAND USE AND LANDSCAPE – POST-CLOSURE PHASE AND WATER QUALITY** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 5 (Consultation with Indigenous Nations and Concerns Raised) and 8.1 (Follow-up Program).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-102.** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Waskaganish (October 2019) and Cree Nation of Eastmain (December 2019).**

Background

In section 10.5.2 of its EIA, the Proponent states the following: "Surface and groundwater quality [follow-up] will be required post-rehabilitation. A biannual groundwater [follow-up] campaign (summer and fall) will be carried out, and compliance criteria will be validated against those set out in D019. Furthermore, surface water effluent will also be the subject of a [follow-up] program." No details are provided concerning the frequency of post-rehabilitation surface water quality follow-up and the publication of follow-up results.

In its consultations with the Waskaganish community (October 2019) and the Eastmain community (December 2019), the JAC heard a number of concerns about water quality follow-up in the post-closure phase, particularly regarding access to the follow-up results.

The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:

A) Submit a preliminary schedule for the surface water and groundwater quality follow-up program for the closure and post-rehabilitation phase, specifying the planned frequencies to the extent possible.

B) Indicate how the follow-up results will be communicated to the Cree communities. If there are no plans to publish the results, provide an explanation for that decision.

A-CCE-32:

A)

Information currently available regarding the closure (post-operation) and post-rehabilitation follow-up program is presented in Chapter 5 of the preliminary closure plan in Appendix A-CCE-30. Details of the program will be submitted with the final closureplan. Post-operational environmental monitoring will be carried out for three years, from the time operations end until the completion of the restoration work, and comply with requirements of the D019, or equivalent at that time. Thereafter, post-environmental monitoring will be carried out for five years, as recommended by D019. The post-operation environmental monitoring will be carried out on a bi-monthly basis for 6 months, then monthly for 2.5 years, as recommended in D019. Finally, post-restoration monitoring will be carried out six times a year for 5 years.

B)

The results of the environmental monitoring will be sent to the MERN and the MELCC each year in the form of an annual report. Even if the monitoring committee is disbanded, the results will remain public and accessible to everyone. GLCI may send, upon request, a copy to interested band councils.

CCE-33 **LAND USE AND LANDSCAPE – POST-CLOSURE PHASE AND PEOPLE'S SAFETY**

References

CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 5 (Consultation with Indigenous Nations and Concerns Raised).

JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Eastmain (December 2019).

Background

In the JAC's consultations on the Proponent's EIA, the Eastmain community expressed concern about access to and future use of the pit in the post-rehabilitation phase by users who might frequent the area with vehicles of all types and get into accidents, especially since the pit would be readily visible from the truck stop.

The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:

Specify the measures that will be taken to secure the pit in each phase of the project, including the post-closure phase.

A-CCE-33:

The pit will not be present during the construction phase. Preparatory work for mining operations will begin towards the end of construction. During the operation phase, access to the pit will be strictly controlled; specific procedures developed at an appropriate time will be implemented to ensure everyone's safety and pedestrians will be prohibited in the vicinity of the pit, except for the geology team, who will follow all procedures rigorously.

Furthermore, during construction and operation phases, recreational users of the territory will not be allowed to access the mine site.

During the closure phase, the Mining Act stipulates strict rules for securing pits after mining operations have ceased. Section 4.5.2 of the Guide also deals with the rehabilitation of open-pit mines. These guidelines will be respected.

> ***4.5.2 OPEN PITS***
>
> *In the case of an open pit mine, the closure plan must include a cost-benefit analysis for backfilling the pit. Pits can be filled with unconsolidated deposits, mineral substances, tailings or waste rock. However, in order to be considered environmentally acceptable, the chemical and physical stability of the backfill must be demonstrated in the short and long term. The land must be levelled to blend with the surrounding topography and revegetated, unless the backfilled areas lie below the water table. In certain cases where the MERN deems the conditions suitable and an analysis has shown that backfilling is not possible, all access roads shall be condemned and a fence meeting MERN regulatory standards (chapter M-13.1, r. 2, Chapter IX, Division II) shall be erected around the pit.*
>
> *In some cases, the fence may be replaced by the following if the MERN deems the conditions suitable:*
>
> — *an embankment with a ditch in front. The embankment must be 2 m high and have an equivalent crest line, and it must be made of unconsolidated deposits or inert mineral substances. It must be located at a sufficient distance from the pit, have a ditch in front, and be designed on the basis of geotechnical considerations;*
>
> — *a barrier made of rocks with an average diameter of 1.5 m (and spaced no more than 30 cm apart). The barrier must be placed a sufficient distance from the pit and designed on the basis of geotechnical considerations.*
>
> *In all cases, the distance at which these measures must be installed shall be supported by a geotechnical study demonstrating the stability of the underlying ground.*
>
> *Signs warning of the danger should be posted around the pit at reasonable intervals to ensure visibility, at a distance that may not exceed 30 m (chapter M-13.1, r. 2, s. 104).*
>
> *Signs shall be made of non-corrosive metal and be at least 30 cm on each side. The background colour should not be white, and they must display the word "Danger."*
>
> *Where signage must be erected in places other than a fence, it must comply with the standards of the Ministère des Transports, de la Mobilité durable et de l'Électrification des transports du Québec. Signage should consider the wind strength and surface area of the sign.*

All open pit excavations (open pit mines) are subject to a stability study that must be presented to the MERN. The study must cover slope stability in the case of an unfilled excavation, or physical stability in the case of a backfilled pit (settling, risk of rotational and translational landslides, etc.). Stability studies and calculations must be signed by an engineer with recognized expertise and adequate knowledge in the field of mining geotechnics.

CCE-34	**LAND USE – PEOPLE'S SAFETY** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 5 (Consultation with Indigenous Nations and Concerns Raised).** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Eastmain (December 2019).** ***Background*** **In the JAC's consultations on the Proponent's EIA in the Eastmain community, residents voiced apprehensions about the safety of workers who might get lost in the area and asked what the Proponent's plans were in this respect. During the consultations, some participants mentioned that the RE2 tallyman would be a useful resource in the event that a worker or someone else became lost in the area.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Specify the proposed procedures or measures for limiting or monitoring the movements of project staff and visitors in the area and ensuring their safety as they move around the site. State how the tallyman would be involved in the event that a worker or someone else became lost in the area. If there are no plans to involve the tallyman, provide an explanation for that decision.**

A-CCE-34:

Workers will be housed at the site where there will be limited access. No worker will be allowed to leave the site for a leisurely stroll. It is possible that a marked trail may be laid out for recreational walks such as at the Éléonore, Raglan and Nunavik Nickel mines, but this is not part of the initial plans. Workers who will have to leave the site are mainly those tasked with environmental sampling. The procedure for working alone or in an isolated environment will apply to these tasks. This procedure has already been established during the pre-construction phase and will be adapted to the construction, operations, closure, restoration and post-rehabilitation phases. It requires working in teams of at least two people and making regular radio contact with an intervenor at the base site. When there is no contact, emergency unit will be sent.

If a worker were to break the rules and sneak off the site, the emergency plan would be immediately triggered to search for him or her.

For the moment, there are no plans to use the services of the tallyman during emergency response operations, but with the development of the emergency plan for other project phases, this could be an interesting option.

CCE-35	**NATURAL AND CULTURAL HERITAGE AND CREE CULTURE** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 5 (Consultation with Indigenous Nations and Concerns Raised) and 6.3.4 (Project effects assessment – Indigenous peoples).** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Eastmain (December 2019).** ***Background*** **In the JAC's consultations on the Proponent's EIA in the Eastmain community, Band Council representatives recommended that the Proponent organize, in conjunction with the Eastmain community, a ceremony on the future mine site, attended by community members, to honour and recognize Mother Nature and its components that will be adversely affected by the project. The community stressed that this event should be held before construction begins.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Indicate what actions are planned to organize a ceremony recognizing Mother Nature in conjunction with the Eastmain community. If there are no plans to act on the Eastmain community's request, provide an explanation for that decision.**

A-CCE-35:

Representatives from the Eastmain Nation Council have already informed GLCI about their recommendation to organize a recognition ceremony for Mother Nature on the future mine site before construction begins. The company is open to this suggestion and will collaborate with the Council members and other community representatives who could be appointed to organize this ceremony and to which the relevant trapline tallyman (RE2), his family members, the Chief and the Council members, as well as any other person that the Council deems appropriate to invite, will be at the very least invited.

CCE-36	**LAND AND RESOURCE USE – WILDLIFE SPECIES (EXCLUDING CARIBOU)** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 5 (Consultation with Indigenous Nations and Concerns Raised).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-99.** ***Background*** **In Question CEAA-99 B, the Proponent was asked to propose mitigation measures related to the modification of wildlife species' behaviours, particularly with regard to worker safety and the presence of black bears. The Proponent stated that it planned to implement measures to restrict access to the mine site and to domestic waste management facilities. However, it provided no details about the planned measures.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Specify what measures are planned to prevent wildlife intrusion into domestic waste management facilities.**

A-CCE-36:

These clarifications were requested in the letter of inquiry concerning the answers provided in the WSP document (September 2019) to which this question refers (see references cited above). Clarifications were outlined in the document submitted with the IAAC on December 23, 2019 (WSP, December 2019). The answer provided to this question is repeated herein and includes the requested clarifications:

Isolating the residual materials depot and restricting its access are the only mitigation measures planned. The administrative area of the mine site itself will be monitored and access will be restricted and controlled. Employees will be made aware that black bears may be attracted to the facility and the presence of food sources. Any animal adventuring near the facilities will be noted in the wildlife observation register and scaring measures will be planned. Thus, if a bear successfully enters the mine site, employees will be called upon to enter the buildings and scaring measures will be put in place to scare it away. If the individual did not respond adequately, the tallyman would be called to scare or kill the bear.

CCE-37	**LAND AND RESOURCE USE – JOINT WORK TABLE ON CARIBOU** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 1, section 4.2.2 (Community knowledge and Aboriginal traditional knowledge), and Part 2, sections 5 (Consultation with Indigenous Nations and Concerns Raised), 6.3.4 (Predicted effects on valued components – Indigenous peoples) and 6.4 (Mitigation Measures).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-100.** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Waskaganish (October 2019) and Cree Nation of Eastmain (December 2019).** ***Background*** **In its answer to Question CEAA-100, the Proponent commits to creating a joint work table (Proponent, Eastmain community and Waskaganish community) to discuss caribou follow-up. The Proponent indicates that the table will have a variety of mandates:** ***"This [follow-up] program will be used to get a clearer picture of the past and future use of RE2 RE3, VC33, VC35, R08 (and RE1 if required) traplines by the caribou. Cree knowledge regarding the fragmentation of the caribou habitat will also be documented thanks to the [follow-up] program. Appropriate mitigation measures for the project's potential impacts on the woodland and migratory caribou harvest for current and future land users will be developed. The program may contemplate means to communicate knowledge within communities regarding the caribou and its 'sensitive' status in order to promote good Cree practises and preservation of the resource for future generations (which could consist of an increasing number of young hunters). "*** **The JAC notes, however, that no concrete measures are proposed at this point in the planning process for this species valued by the Cree. It is unclear whether the Proponent plans to keep a record of caribou sightings near the mine site and what authorities or persons would be notified, if any.** **In the JAC's consultations on the Proponent's EIA, the Waskaganish community noted that caribou are very sensitive to changes in the environment, especially noise. The Eastmain community expressed concern about the caribou and the project's impact on their food.**

The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:

A) Specify whether there are plans to keep a record of caribou sightings near the mine site. If there are no plans to do so, provide an explanation for that decision.

B) State who will be informed of the sightings in the record, including the competent authorities and the Cree tallymen, where applicable.

C) Specify how the tallymen will be consulted periodically to find out whether they have recently seen any caribou on the traplines. If there are no plans to consult the tallymen, provide an explanation for that decision.

D) State how often meetings of the joint work table on caribou will be held during the project's life cycle and whether reports will be published following the meetings.

A-CCE-37:

A)

The caribou is currently on the list of animals subject to mandatory notification under the Act respecting the conservation and development of wildlife (*Loi sur la conservation et la mise en valeur de la faune*), which is included in GLCI wildlife contact procedure, which will be updated for each development phase of the project (Appendix A-CCE-37-A).

B)

GLCI's wildlife contact procedure states that the Director Corporate Affairs and Sustainability should inform the tallymen of all notifiable animal sightings and incidents. Should one or more caribou be sighted on the site, this information shall be immediately communicated to the Eastmain and Waskaganish Nation Councils by the liaison officer. Furthermore, as mentioned in the procedure, GLCI is subjected to Article 68 of the *Act respecting the conservation and development of wildlife*, under which injured or dead animals that are on the list of notifiable animals shall be reported to a wildlife protection officer and, if the officer deems it necessary, shall be turned over to him/her for confiscation. Lastly, the observations recorded via GLCI's wildlife contact procedure will be documented in the monitoring and environmental quality monitoring reports, which GLCI has undertaken to submit to the monitoring committee and publish on its website. Upon consultation with the members of the monitoring committee, if other procedures need to be adopted to meet their needs and expectations with respect to caribou observations, GLCI's wildlife contact procedure shall be modified.

C) and D)

As mentioned in the answer to question CEAA-97, the tallymen of traplines RE1, RE2, RE3, VC33, VC35 and R08, or a representative that they will appoint respectively, will be invited to sit on the monitoring committee that GLCI will set up after the mining lease is issued, along with representatives of Eeyou Istchee James Bay, representatives of the Eastmain, Waswanipi and Waskaganish band councils or designated community members, and representatives of Matagami. Caribou sightings, if any, will be shared at this meeting or through another committee.

CCE-38	**LAND AND RESOURCE USE – BEAVER** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 5 (Consultation with Indigenous Nations and Concerns Raised) and 6.3.4 (Project effects assessment – Indigenous peoples).** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volume 2: Main Report (Chapters 6 to 11), p 7-13.** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Eastmain (December 2019).** ***Background*** **In its EIA, the Proponent proposes mitigation measure UTT 03, "Conduct beaver dam inspections at regular intervals to identify any changes to the CE2 water level and flow, and notify the community of these changes."** **In the JAC's consultations on the EIA in the Eastmain community, some community members expressed concern about the fact that the Proponent's most recent beaver survey, conducted five years ago, was not recent. Some members recommended that a beaver survey be conducted annually. In general, the JAC notes that the community had a number of concerns about the species.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **A) Clarify what is meant by "regular intervals" by indicating how often beaver dam inspections will be conducted along the CE2 watercourse and whether there are plans to involve the RE2 tallyman in the inspections.** **B) Assess, in conjunction with the RE2 tallyman, the need for a new beaver survey on the trapline before construction begins. If there is no need, provide an explanation.** **C) Assess, in conjunction with the RE2 tallyman, whether intensive beaver trapping on the CE2 watercourse is necessary before construction begins, and if so, how it will be done.**

A-CCE-38:

A)

Beaver dam inspections will be carried out at monitoring points previously identified during the initial inventory (see section B of the response), most likely every 2 weeks during the active season (the frequency will be confirmed following the inventory initial). This interval is based on a control objective in cohabitation with the beaver colony. This inspection will be an integral part of the environmental monitoring and follow-up plan. The surveillance will aim to ensure the safety of the dams and the health of the colony while considering the vitality of the beaver's habitat. Monitoring points will be located in the areas with the greatest risk of causing problems with mining infrastructure or access roads. The RE2 tallyman will be involved in the development of the environmental monitoring plan and will be the person responsible for beaver dam inspections.

B)

During construction work on the mine, an inventory of the beaver colony and a characterization of dam structures will be carried out just prior to the implementation of the monitoring plan to determine the risks to mining infrastructure. The additional volume of water from the effluent will be considered during the inventory to assess the impact on the colony, in the state it is in at that time. If the risk level is judged to be zero for infrastructure, no inspection or control activity related to beaver or colony habitat will be required. However, if risks are identified it might be necessary to inspect targeted surveillance points, install water level control systems and perform controlled trapping in the area to maintain the health of the colony depending on the type of risk to be minimized (flood, breakdown of structures, drowning of the colony, etc.). The RE2 tallyman will be involved at all stages.

C)

The need for beaver trapping in watercourse CE2 will be determined in collaboration with the RE2 tallyman, following the inventory work discussed in response CCE-38B above. Intensive beaver trapping will not be carried out unless the colony is jeopardized due to an essential dam dismantling after the ice has frozen. In this unlikely event, the tallyman would be consulted and involved in the trapping activities. All beaver-related activities will also be presented to the monitoring committee.

CCE-39	**ARCHAEOLOGY** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 1, section 4.2.2 (Community knowledge and Aboriginal traditional knowledge), and Part 2, section 6.3.4 (Predicted effects on valued components – Indigenous peoples).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-117.** ***Background*** **In its answer to Question CEAA-117, the Proponent states that it has considered the information provided by Cree users of the RE2 trapline during its consultations, as well as summaries of interviews with the Crees who have lived there for generations, in its discussions leading to the delimitation of areas of archaeological potential. It is unclear to the JAC whether Eastmain Elders were asked to validate or improve on the findings of the study of archaeological potential in this process.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Clarify whether the Elders of the Eastmain community were consulted regarding past use of the land around km 381 of the James Bay Highway to validate or improve on the areas of archaeological potential that should be surveyed in 2020. If not, specify how they will be consulted, and submit an updated study of archaeological potential, if applicable. If there are no plans to consult the Eastmain Elders, provide an explanation for that decision.**

A-CCE-39:

The Elders were among the members of the families of the land users that were met since 2012. The interview grids used to conduct these conversations included questions about the location of birthplaces, burial sites, artifacts or former campsites that may have been observed in the past, thus providing insight into past land use around km 381. However, the areas of archaeological potential presented in the archaeological potential study that Arkéos carried out in August 2018 were never mentioned during these discussions, since consultation with stakeholders took place prior to the submission of this study.

Prior to the completion of the archaeological inventory that will be carried out before construction work, GLCI will validate the selected areas of archaeological potential with the archaeological experts of the Cree Nation Government and the tallyman of trapline RE2. The areas of archaeological potential could be adjusted if needed based on their comments.

Note that the tallyman of trapline RE2 will also be part of the field team that will carry out the inventory work.

CCE-40	**TRANSLATION INTO CREE** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 5 (Consultation with Indigenous Nations and Concerns Raised).** **Joint Assessment Committee consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Waskaganish (October 2019).** ***Background*** **In the JAC's consultations on the Proponent's EIA in the Waskaganish community, the issue of the importance of having a summary of the predicted environmental impacts in each phase of the project and the Proponent's promotional materials translated into Cree was raised.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Specify what documents have been translated into Cree so far, and state what translations are planned in the future.**

A-CCE-40:

So far, the only document that has been translated into Cree is the Summary of the Environmental Impact Study submitted to COMEX. In the future, it is possible that specific general operating procedures be translated, such as those regarding the waste materials management. As proposed in comment 5, explanatory workshops offered in Cree will be prepared to popularize the results of environmental monitoring, including the water quality monitoring.

CCE-41	**INEQUITY OF IMPACTS – PARTICIPATION BY WOMEN FROM THE EASTMAIN COMMUNITY** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 5 (Consultation with Indigenous Nations and Concerns Raised) and 6.3.4 (Project effects assessment – Indigenous peoples).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-116.** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Eastmain (December 2019).**

Background

In its answer to Question CEAA-116, the Proponent indicates that its follow-up program on the community's well-being and quality of life will include follow-up on the problem of sexual harassment, through interviews with mine employees conducted by the liaison officer. However, the Proponent does not plan to conduct any interview with women from the Eastmain community to flesh out the picture and the follow-up on this issue with persons in the main group likely to be harassed.

In the JAC's consultation with the representative of the women of the Eastmain community, it was mentioned that the women members of the community should have an opportunity to participate in discussions concerning development projects.

The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:

A) Specify how the follow-up program on the community's well-being and quality of life, which will involve follow-up on the problem of sexual harassment, will include participation by women from the Eastmain community through interviews. If there are no plans for participation by women from the Eastmain community, provide an explanation for that decision.

B) Describe the procedure for offering a seat on the mine's follow-up committee to a representative of the women of the Eastmain community so that they can participate and contribute throughout the project's life cycle. If there are no plans to provide a seat for a representative of the women of the Eastmain community, provide an explanation for that decision.

A-CCE-41:

A)

As mentioned in the answer to question CEAA-116, GLCI and Cree Women of Eeyou Istchee Association are currently working together to organize focus group discussion with women from the communities of Eastmain, Waskaganish and Waswanipi on various topics related to the project: job opportunities, creation and submission of curriculum vitae, training, project expectations, etc.[6] During this discussion, it is also planned to review the concerns of women from the community about the project and seek their recommendations. These focus group discussions will be held during pre-construction phase, thereby allowing GLCI to adjust the project as needed, based on feedback from the women.

These focus group discussions will continue during the construction period and at least twice during the operation period (after year 1 and year 3). This will help to follow up on concerns that will be documented as part of the follow-up program on the well-being and quality of life. The problem of sexual harassment could be discussed on these occasions.

B)

As mentioned in the answer to question CEAA-116, GLCI's human resources team will include a Cree woman who will also sit on the monitoring committee.

6 This however had to be put on hold due to COVID-19.

CCE-42	**INEQUITY OF IMPACTS – HARASSMENT** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 5 (Consultation with Indigenous Nations and Concerns Raised) and 6.3.4 (Project effects assessment – Indigenous peoples).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-116.** ***Background*** **In its answer to Question CEAA-116, the Proponent states that company policy prohibits harassment of any kind. The Proponent does not specify whether the work contracts of its employees and subcontractors contain provisions regarding zero tolerance of harassment of any kind, especially harassment of women.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Specify whether the work contracts of the Proponent's employees and contractors/subcontractors contain provisions regarding zero tolerance of any form of harassment, especially of women. If there no such provisions exist, provide an explanation for that decision.**

A-CCE-42:

The work contracts of employees and contractors mandated for the construction and operation periods have yet to be drawn up. GLCI commits to including provisions regarding zero tolerance of any form of harassment to anyone on the site, including women. All employees and contractors will be required to make a written commitment to abide by GLCI policies.

CCE-43	**INEQUITY OF IMPACTS – SAFETY OF PEOPLE AT THE TRUCK STOP** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 5 (Consultation with Indigenous Nations and Concerns Raised) and 6.3.4 (Project effects assessment – Indigenous peoples).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-116.** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Eastmain (December 2019).** ***Background*** **In its answer to Question CEAA-116, the Proponent indicates that it will not be able to monitor its employees' alcohol consumption at the truck stop, since it is a public place, but that discussions are under way with the Société de développement de la Baie-James (SDBJ) regarding appropriate surveillance and security at the truck stop.** **In the JAC's consultation with the representative of the women of the Eastmain community, the latter recommended that the truck stop not sell alcohol, that a road safety station similar to the one in Matagami be set up if the mining project is approved, and that video cameras be installed in prominent locations to help people using the truck stop feel safer.**

The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:

A) State whether the SDBJ has been contacted to discuss safety and security at the truck stop.

B) Propose potential measures, and describe the Proponent's contribution to making the truck stop a safe environment for all users.

A-CCE-43:

A)

As mentioned in the answer to question CEAA-116, the safety and surveillance at the truck stop is already part of GLCI's discussions with the SDBJ, and with whom the company is in regular and close contact. The corporation, which has been operating on the James Bay Territory for more than 40 years, has assured that it would manage its camp in a safe manner. This issue will remain at the heart of GLCI's concerns throughout the camp's operation and GLCI will ensure that the SDBJ also pays equal attention to it. GLCI's reporting procedure and complaint management system will help track this issue. If necessary, representatives of the SDBJ will be invited to participate occasionally in meetings of the monitoring committee to discuss the safety issues of people at the truck stop.

B)

Selling alcohol is currently prohibited at the truck stop and will remain prohibited. As already mentioned in the answer to question CEAA-116, sanctions stipulated by the SDBJ will be enforced against individuals who violate the camp's rules.

GLCI currently has and shall enforce a policy on its mine site that requires its employees, and those of its subcontractors and business partners, to be physically, mentally and emotionally fit to work and not endanger the welfare of their own or others (Appendix A-CCE-37-B). This policy requires, among other things, that supervisors or managers assess the ability of employees under their responsibility to work, either by observation or by means of tests.

GLCI currently controls it's mobile workforce identification at its mine site through its travel management procedure, where each trip of GLCI employees, or those of its subcontractors and business partners, to the site from any region of Quebec is recorded in a form issued to a supervisor or manager on site (Appendix A-CCE-37-C). This form includes, among other things, the date and time of arrival of the driver. This form, which is currently used for the pre-construction phase, will also be updated for the construction and operation phase. The current form, as well as any updated versions, can be submitted to the Council of the Nation of Eastmain if requested.

CCE-44 **CUMULATIVE EFFECTS ON CURRENT USE BY CREE COMMUNITIES**

References

CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, section 6.6.3 (Cumulative effects assessment).

WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answers to Questions CEAA-98 and CEAA-103.

Background

In its answer to Question CEAA-98, the Proponent does not state what it will do if there are complaints about potential cumulative effects of the project on the land. The Proponent indicates that it plans to develop procedures and processes later in conjunction with the follow-up committee. In its answer to Question CEAA-103, the Proponent does not state that it is open to proactively contacting other Proponents in the area if there are complaints that may involve cumulative effects.

The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:

Describe the preliminary approach that it will take if there are complaints about the project's cumulative effects, and specify whether this process will include direct contact with other companies or Crown corporations present in the area.

A-CCE-44:

As mentioned several times in the document that answers the Agency's questions, GLCI intends to set up a complaint management and follow-up system to ensure that the complaints are addressed quickly and effectively. Although the details of this system are not yet fully defined, as they will be worked out in collaboration with the members of the follow-up committee, GLCI will directly contact other companies or Crown corporations in the area if their intervention is required for addressing the complaint.

Moreover, GLCI does not have capacity or necessary authority to set up a conciliation structure that would bring together all the companies and Crown corporations present in the area to discuss problems arising from the complaints received and to assess how to deal with them. It considers that such a mechanism could be very effective and reiterates its openness to participate in it, in the same way that it agrees to participate in the regional committee for maximizing economic benefits (COMAX), as mentioned in the answer to question CEAA-92.

It should be noted that information sessions on the project will be organized twice a year in Eastmain, Waskaganish and Waswanipi with members of these communities and that a feedback on complaints will be made on this occasion.

11.2 COMMENTS AND ADVICE FOR THE PROPONENT

Comment 3

INTEGRATION AND RECRUITMENT OF CREE EMPLOYEES

References

WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc.

JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Eastmain (December 2019).

Comments and advice

In its EIA, the Proponent proposes mitigation measure ELR 05, "Implement mechanisms to integrate workers, particularly for members of Indigenous communities (information sessions, human resources representatives, employee assistance program, etc.).

In the JAC's consultation with the representative of the women of the Eastmain community, the latter recommended the establishment of informal support groups to break the isolation and promote retention of Cree employees (sewing, traditional cooking, etc.). The JAC recommends that the Proponent consider this advice in planning its project.

A-C 3:

As mentioned in the answer to CCE-41, focus groups with women will soon be held in the community of Eastmain in collaboration with the Cree Women of Eeyou Istchee Association when it is safe to do so. The measures to be introduced to break the isolation and promote retention of employees could be specifically discussed here. If it is recommended that informal support groups be set up, GLCI's Director of Community Relations will inform the human resources team accordingly so that this measure can be added to the one's planned for the next phases of the project development to integrate workers. Recall that GLCI shall include a Cree woman as a member of its human resources team. This person will mainly be responsible for measures to be taken in this regard.

It should be noted that the measures to be introduced by the human resources department will be reviewed throughout the project lifecycle and are subjected to change that consider all employees' needs.

Comment 4	**EDUCATING EMPLOYEES ON THE CREE WAY OF USING THE LAND** ***References*** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc.** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-98.** ***Comments and advice*** **On page 7-71 of its EIA, the Proponent indicates that non-Indigenous workers will be educated on the Cree communities' traditional practices, in part to foster the integration of Cree employees. In its answer to Question CEAA-98, the Proponent states the following: "*During the induction training, all the mine site workers will also be educated on the importance of complying with the existing regulations and applicable permits/licenses to obtain regarding the practice of hunting, fishing and trapping across the territory, should they want to practice such activities in the area during their days off*."** **In the JAC's consultations on the Proponent's EIA, the Waskaganish community recommended that workshops on intercultural exchanges between the Cree communities and the mine's employees be offered. The workshops could cover Cree history and culture and provide the workers with more detailed information about the Cree way of using the land and its resources respectfully (e.g., not killing a moose just for its antlers and leaving the meat to rot). The JAC recommends that the Proponent consider this advice in planning its project.**

A-C 4:

As stated in its EIA and reiterated in the answers to the Agency's questions, GLCI is in favour of implementing initiatives to educate workers on the traditional practices of Indigenous communities and the activities of Indigenous users of the territory. The induction training for new workers shall, amongst other things, include this as well. Furthermore, if the monitoring committee and the Council of the Nation of Eastmain wish to do so, these initiatives could include intercultural exchange workshops between the Cree communities and the mine's employees. Workshops could be held annually, starting from the first year of operation of the mine.

It should be noted that intercultural training will also be part of the continuing training that all GLCI employees will undertake to complete.

Discussions between GLCI and the Eastmain community on how to address this concern are still ongoing and will remain as an open discussion through life of project.

Comment 5	**LAND USE – PUBLICATION OF THE WATER QUALITY FOLLOW-UP RESULTS** ***References*** **WSP (October 2018). James Bay Lithium Mine. *Environmental Impact Assessment.* Volumes 1 to 3. Report prepared for Galaxy Lithium (Canada) Inc.** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-116.** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Waskaganish (October 2019) and Cree Nation of Eastmain (December 2019).** ***Comments and advice*** **In its EIA, the Proponent indicates that the environmental follow-up results will be made public by the company, but it does not specify whether the liaison officer or some other person proficient in Cree will play a role in disseminating the water quality follow-up results to the tallymen concerned. In its clarification of its response to Question CEAA-116, the Proponent states the following: "Environmental [follow-up] reports will be published on the Galaxy website and presented to respective trapline holders if requested."** **In general, the JAC observed that the water quality follow-ups for all phases of the project raised many concerns for the Cree communities. The VC33 tallyman told the JAC that he was afraid he would not have easy access to the results of the water quality follow-up programs. He said that a community liaison officer should explain the environmental follow-up results to the main tallymen concerned in simple terms in Cree to build trust and limit avoidance of the land.** **The JAC is aware that the mine follow-up committee, which includes the tallymen, will discuss the contents of the company's communications plan at the committee's initial meetings, and that this forum may provide an opportunity for the tallymen to state their future communications needs with respect to the project.** **The JAC recommends that the Proponent consider offering briefings to explain the environmental follow- up results, including the water quality results, in simple terms in Cree to the members of the mine follow-up committee, and that the Proponent canvass the tallymen on their preferences in that regard (follow-ups of interest and desired frequency).**

A-C 5:

GLCI is committed to carrying out presentation and explanation sessions of the environmental monitoring results once or twice a year, with members of the Cree communities of Estmain, Waswanipi and Waskaganish. Presentations could be made in English and in the Cree language to ensure that all those in attendance have a good understanding of the information presented. The tallymen will be consulted to determine the themes to be addressed and the frequency of these meetings.

Comment 6	**PARTICIPATION BY WOMEN FROM THE EASTMAIN COMMUNITY** ***References*** **JAC Consultations on the Proponent's Environmental Impact Assessment – Cree Nation of Eastmain (December 2019).** ***Comments and advice*** **In the JAC's consultations on the Proponent's EIA, the representative of the women of the Eastmain community stated that the women of Eastmain could assist in developing and delivering workshops on sexual harassment for mine employees if that option is accepted by the Proponent following its discussions with the Cree Women of Eeyou Istchee Association.** **The JAC is aware that the Proponent has entered into discussions with the Cree Women of Eeyou Istchee Association regarding sexual harassment, and it applauds the initiative. The JAC encourages the Proponent to consider the possibility of involving women from the Eastmain community if the idea of having sexual harassment workshops is accepted following the discussions.**

A-C 6:

GLCI takes note of this recommendation and will involve women from the Eastmain community if the need for sexual harassment workshops is identified following the focus groups to be held shortly with women from the community, as explained in the answer to question CCE-41.

GLCI's Equal Employment Opportunity and Harassment Policy clearly states that GLCI will not tolerate any form of harassment in the workplace and that managers and supervisors on site will be held accountable for compliance with this policy (Appendix A-CCE-37-D). Employees will also be required to abide by this company policy upon signing their contract. Lastly, employees who witness or are victims of sexual harassment behaviour or attitudes will be encouraged to report such behaviour through the GLCI's Whistleblower Policy (Appendix A-CCE-37-E).

12 ACCIDENTS AND MALFUNCTIONS

12.1 REQUESTS FOR INFORMATION TO THE PROPONENT

CCE-45	**ENVIRONMENTAL FOLLOW-UP PROGRAM** ***References*** **CEAA (February 2018). *Guidelines for the Preparation of an Environmental Impact Statement.* Part 2, sections 6.6.1 (Effects of potential accidents or malfunctions) and 8.1 (Follow-up Program).** **WSP (September 2019). James Bay Lithium Mine. *Answers to Questions and Comments Received from the CEAA as Part of the Environmental Impact Study Review.* Report prepared for Galaxy Lithium (Canada) Inc. Answer to Question CEAA-129.** ***Background*** **In response to Question CEAA-129 B, the Proponent indicates that the communications plan will be developed in due course. Consequently, the communications plan for accidents or malfunctions has not been developed yet.** ***The Joint Assessment Committee requests that Galaxy Inc. (the Proponent) to:*** **Submit a communications plan, or an outline of a communications plan, to be used in the event of an accident or a spill. The communications plan must indicate what approach will be taken for each type of accident and identify the persons to be contacted, including the RE2, VC33 and VC35 tallymen, and the Eastmain and Waskaganish environmental services.**

A-CCE-45:

The communication plan in the event of an accident or a spill during the construction and operation phases will be an integral part of the emergency response plan. To properly develop its emergency response plan, GLCI must carry out a risk assessment associated with its activities and facilities. This exercise is carried out for each phase of the project. As such, GLCI shall present the principal risks of accidents on its site, which could include, but are not limited to, spills such as of petroleum products, liquid or solid hazardous materials, gaseous emissions containing hazardous materials, and fires or explosions involving hazardous materials, erosion and collapse of dykes or retention structures, major accidents in the pit, etc. The factors likely to cause these accidents will also be listed, as well as the actions to be taken according to the severity level of each accident.

For each type of event (minor event, event having local impacts, or event having grave and/or long-lasting consequences), the intervention procedures are specified. Substances to be declared under the Environmental Emergency Regulations are also listed.

At the end of this process, an emergency measures plan is drafted in accordance with legal requirements and recognized best practices in the mining industry. As mentioned in the answer to question CEAA-129, the emergency measures plan for the operation phase will be prepared in conjunction with the Eastmain and Waskaganish Band Councils. The plan will include the following basic information:

— A list of GLCI's internal stakeholders, including a coordinator for emergency measures, along with their roles and responsibilities;

- A list of external stakeholders, which will include, at the very least, the community of Eastmain (including police and fire departments), Cree Board of Health and Social Services of James Bay, Environment Canada, MELCC, environmental contractors, Hydro-Québec, GLCI providers, etc.;
- Identifying the communication system in place (telephone, radio, location, etc.);
- A list of emergency telephone numbers (internal stakeholders, public safety, health, environment, environmental contractors, public utilities, etc.);
- A list of first aiders on site;
- Alert and notification procedures according to the type of emergency, with details of the responsible authorities;
- The procedure in case emergency measures plan is activated, which includes contacting external resources and any other communication measures (employees, public, etc.);
- The forms to be used in an emergency situation (data collection, emergency call, minute-by-minute follow-up, etc.).

The emergency measures plan shall also include a list of stakeholders with whom this plan will be shared. For GLCI, in addition to company personnel and responsible authorities such as the MDDELCC, Environment Canada and Cree Board of Health and Social Services of James Bay, this list shall also include the environmental services of Eastmain and Waskaganish, as well as the tallymen of traplines RE1, RE2, RE3, VC33 and VC35.

Risk assessment is carried out for each of the phases, i.e., pre-construction, construction, operation, restoration and post-restoration phase. Each time the emergency measures plan is revised, an update will be sent to the above-mentioned stakeholders. The monitoring and environmental quality monitoring reports that GLCI has committed to submit to the monitoring committee and publish on its web site will include a section where accidents and spills that have occurred and the actions taken to deal with them will be reported.

For the pre-construction phase, GLCI has implemented an emergency response plan and a spill management procedure which states that the Director of Community Relations inform its Cree partners of environmental incidents and their follow-up with the authorities (Appendix A-CCE-37-F). One of the requirements of this procedure also states that in the event of an incident, the Director of Community Relations also notifies the tallyman of trapline RE2 and the Council of the Nation of Eastmain. Both documents will be updated at each project phase and when necessary.

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— WSP. 2018c. *Mine de lithium Baie-James – Étude de modélisation de la dispersion atmosphérique*. Rapport préparé pour Galaxy Lithium (Canada) inc. 80 p. et ann.

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— WSP. 2019b. *Mine de lithium Baie-James. Réponses aux questions et commentaires reçus du MELCC dans le cadre de l'analyse de l'étude d'impact sur l'environnement.* Rapport produit pour Galaxy Lithium (Canada) inc. 1

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APPENDIX

A-CCE-16

PLAN DE GESTION DES ÉMISSIONS DE POUSSIÈRES **(IN FRENCH ONLY)**

MINE DE LITHIUM BAIE-JAMES

Plan de gestion des émissions de poussières

Version préliminaire - Mai 2020

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1 INTRODUCTION

1.1 Contexte et objectifs

Galaxy Lithium (Canada) inc. (Galaxy) est une filiale de Galaxy Resources Limited, l'une des plus importantes sociétés minières sur le marché du lithium. Galaxy exploite présentement un gisement et plusieurs autres projets de classe mondiale sont actuellement en développement, dont celui de la Baie-James.

Galaxy agit à titre d'initiateur du présent projet mine de lithium Baie-James, situé dans la région administrative du Nord-du-Québec. Le site minier à l'étude se trouve à environ 10 km au sud de la rivière Eastmain, à quelque 100 km à l'est de la Baie James, à la même latitude que le village d'Eastmain.

Le gisement prévoit l'exploitation d'une fosse de façon conventionnelle dont environ 2 millions de tonnes par année de pegmatites à spodumène seront extraites pour ensuite être dirigées vers un concentrateur. Outre ces installations, le site accueillera notamment des aires d'accumulation (mort-terrain, terre végétale, stériles/résidus, minerai, concentré), des bassins de rétention, des bâtiments administratifs et d'opérations, un campement pour les travailleurs, des garages et un site d'entreposage des explosifs. La période d'exploitation prévue est de 16 ans.

Galaxy s'engage à mettre en place un « **Plan de gestion des émissions de poussières** » comprenant un contrôle des émissions et un programme détaillé de suivi de la qualité de l'air.

Ce plan de gestion est présenté dans les sections suivantes. Celui-ci sera maintenu et mis à jour au cours de toutes les phases du projet, soit la construction, l'exploitation et la fermeture.

1.2 Responsabilité et mise en application

Un membre du personnel de Galaxy sera responsable du « Plan de gestion des émissions de poussières ». Bien que l'application des mesures de ce plan soit sous la responsabilité des responsables de chaque département, le responsable du plan aura pour mandat de leur communiquer les mesures prévues dans ce plan. De plus, il devra veiller à la mise à jour du plan selon l'évolution du projet et des constatations faites en cours d'opération. Le programme sera intégré au système de gestion du site.

Le personnel de Galaxy et ses sous-traitants seront informés et sensibilisés aux contenus de ce plan de gestion de manière à mettre en application les bonnes pratiques permettant de réduire les émissions atmosphériques sur le site de la mine de lithium Baie-James. Des formations sur les différentes procédures utilisées seront données au personnel et aux sous-traitants concernés.

1.3 Législations et exigences externes

Les principales exigences provinciales en matière de qualité de l'atmosphère sont définies par la *Loi de la qualité de l'environnement* (L.R.Q., chapitre Q-2) et, en particulier, via le *Règlement sur l'assainissement de l'atmosphère* (RAA) (R.R.Q., chapitre Q-2., r. 4.1). Plus précisément, le RAA définit des normes de qualité de l'atmosphère (R.R.Q., chapitre Q-2., r. 4.1 a. 196). Ces normes sont des seuils de références à respecter à la limite d'application des normes et critères.

De plus, le ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC) a publié un document intitulé *Normes et critères québécois de qualité de l'atmosphère.* En plus des normes de qualité de l'atmosphère du RAA, ce document présente un ensemble de critères établi afin d'évaluer les résultats de mesures de la qualité de l'air et également lors de l'étude de projets générant des émissions atmosphériques. Ces critères représentent des seuils de références à interpréter à la limite d'application des normes et critères. Il est important de noter que ces critères ne se retrouvent, pour l'instant, dans aucune loi et aucun règlement.

Les principales exigences provinciales en matière de qualité de l'atmosphère sont donc définies dans les documents suivants :

- *Loi de la qualité de l'environnement* (L.R.Q., chapitre Q-2);
- *Règlement sur l'assainissement de l'atmosphère* (R.R.Q., chapitre Q-2., r. 4.1);
- *Normes et critères québécois de qualité de l'atmosphère,* version 6. MELCC, 2018. Québec, Direction du suivi de l'état de l'environnement, ISBN 978-2-550-82698-9.

2 SOURCES D'ÉMISSIONS ATMOSPHÉRIQUES

La première phase du projet de la mine de lithium Baie-James sera la phase de construction comprenant la construction des infrastructures, la préparation du terrain et l'extraction de mort-terrain. Durant cette phase, les principales sources d'émissions découleront des activités suivantes :

- Décapage (sol arable et mort-terrain);
- Opération de forage;
- Dynamitage;
- Chargement et déchargement des matériaux;
- Boutage sur les haldes;
- Concassage de roche stérile pour l'aménagement du site (unité mobile);
- Transport des différents matériaux sur le site minier (routage).

Par la suite, durant la phase d'exploitation de la mine, l'extraction du minerai et des stériles et le traitement du minerai s'ajouteront aux activités de la phase de construction. Les activités d'agrandissement de la halde à stériles s'ajouteront également aux activités d'exploitation. Les principales sources d'émissions atmosphériques qui s'ajouteront relativement à la phase de construction sont :

- Dynamitage dans la fosse;
- Sources ponctuelles de l'usine de concentration;
- Expédition du concentré de spodumène;
- Concassage de roche stérile pour les activités d'agrandissement (unité mobile);
- Érosion éolienne des aires d'entreposage.

3 MESURES D'ATTÉNUATION COURANTES

La stratégie de gestion de Galaxy est d'appliquer continuellement des mesures d'atténuation courantes à l'ensemble de ses activités minières génératrices d'émissions atmosphériques, et ce, afin de répondre aux exigences suivantes :

- Limiter les effets individuels et cumulatifs d'émissions atmosphériques sur la qualité de l'air en périphérie du site;
- Contrôler et contenir les émissions sur le site;
- Minimiser les effets négatifs sur les écosystèmes du secteur;
- Respecter les normes de qualité de l'air.

3.1 Phase de construction

3.1.1 *Décapage (sol arable et morts-terrains)*

Le décapage sera limité au minimum afin d'éviter l'érosion éolienne sur les surfaces décapées. En effet, les opérations de décapage seront planifiées en fonction des besoins du plan d'exploitation.

Lorsqu'il sera possible de le faire, la couche arable sera enlevée pendant qu'elle est humide ou peu de temps avant qu'elle soit recouverte. L'arrosage des zones de travail pourra être effectué au besoin.

3.1.2 *Opérations de forage*

Les foreuses seront équipées de dispositif de dépoussiérage humide ou à sec. La poussière recueillie par ces appareils sera éliminée de manière à minimiser sa volatilité.

L'entretien mécanique des équipements sera effectué régulièrement afin de réduire les vibrations qui peuvent augmenter les émissions. Le système de dépoussiéreurs sera aussi vérifié régulièrement.

3.1.3 *Dynamitage*

Les charges et la superficie sautée vont être adaptées pour réduire les inconvénients. Des matériaux adéquats seront utilisés pour le bourrage des explosifs. La hauteur du bourrage final devra alors être adéquate, en toute circonstance, pour éviter le phénomène de débourrage.

Les opérations de dynamitage seront effectuées selon les règles de l'art par des spécialistes en dynamitage.

3.1.4 *Chargement et déchargement des matériaux*

La hauteur à laquelle le matériel est relâché ainsi que la distance sur laquelle il sera en chute libre seront gardées au minimum. De plus, puisque les matières particulaires s'accumulent généralement à proximité de la machinerie, le nettoyage et l'arrosage régulier, au besoin, des zones de travail seront effectués afin d'empêcher la resuspension de ces matières particulaires.

Autant que possible le basculage du mort-terrain et des stériles par les camions sur les haldes sera limité à une hauteur de 10 mètres pour minimiser les émissions de matières particulaires.

3.1.5 *Boutage sur les haldes*

Les opérations de boutage des matières déchargées seront gérées afin d'éviter la propagation des poussières.

3.1.6 *Concassage de roche stérile pour l'aménagement du site*

Le concasseur mobile sera positionné afin qu'il ne soit pas exposé aux grands vents. Les émissions seront limitées par l'utilisation de jets d'eau au concasseur.

3.1.7 *Transport des différents matériaux sur le site minier (routage)*

Le transport des matériaux sur les routes non pavées représente la plus grande source d'émission de matières particulaires du projet.

L'utilisation de matériaux non friables et présentant une bonne résistance à l'abrasion routière sera priorisée pour la construction et l'entretien des routes. L'entretien régulier des routes sera priorisé afin de maintenir une bonne surface de roulement et un faible taux de silt. Aucun matériel argileux ne sera utilisé pour la construction des routes et les matériaux ayant une faible teneur en silice seront favorisés.

Les émissions de poussières liées à la circulation dépendent de la vitesse des véhicules. Afin de limiter les émissions, Galaxy prévoit limiter la vitesse de circulation des équipements miniers de transport sur le site à 40 km/h.

Enfin, les émissions seront contrôlées par l'arrosage régulier des surfaces routières. Dans le cas où des épisodes de poussières seraient malgré tout observés, l'utilisation d'abat-poussière chimique sera considérée. Les produits chimiques hygroscopiques utilisés seront certifiés conformes par le Bureau de Normalisation du Québec à la norme BNQ 2410-300. Enfin, un programme de gestion de l'arrosage des routes sera mis en place. Celui-ci est présenté à la section 4.

3.1.8 *Utilisation de machineries*

L'utilisation de combustible par la machinerie consiste en une source d'émission de particules fines et de gaz de combustion. Afin de limiter ces émissions, il sera évité de laisser tourner inutilement les moteurs au ralenti.

3.2 Phase d'exploitation

La stratégie de gestion des émissions atmosphériques de la phase d'exploitation reprend intégralement les mesures d'atténuation identifiées pour les activités de la phase de construction qui seront poursuivies lors de l'exploitation. Il s'agit notamment des opérations de forage, du chargement et déchargement des matériaux, du boutage sur les haldes, du transport des différents matériaux sur le site minier (routage) et de l'utilisation de machineries. Seulement les mesures d'atténuation spécifiques à l'exploitation de la mine sont donc décrites aux sections suivantes.

3.2.1 *Dynamitage dans la fosse*

Les charges et la superficie sautée vont être adaptées pour réduire les inconvénients. Des matériaux adéquats seront utilisés pour le bourrage des explosifs. La hauteur du bourrage final devra alors être adéquate, en toute circonstance, pour éviter le phénomène de débourrage.

Pour éviter la dispersion des poussières (notamment de silice cristalline) hors du site minier, si nécessaire, le sautage sera restreint durant les périodes de grands vents ou lorsque les vents dominants peuvent transporter la poussière vers les zones sensibles (relais routier du km 381). Les zones sautées seront humidifiées pour que la dispersion des matériaux secs et fins déposés en surface par les activités de forage soit évitée.

3.2.2 *Sources ponctuelles de l'usine de concentration*

Le minerai sera transporté de la mine à ciel ouvert vers le circuit de concassage à trois étages comprenant un concasseur primaire, un concasseur à cône secondaire et un concasseur à cône tertiaire fermé avec un crible-classeur pour produire la taille de produit ciblée.

Le minerai concassé sera entreposé dans un dôme avant d'être acheminé au circuit de la séparation en milieu dense (SMD) de l'usine de concentration. Des systèmes de dépoussiérage seront installés au circuit de concassage.

Les dépoussiéreurs seront contrôlés quotidiennement (inspection visuelle) et nettoyés régulièrement. La poussière recueillie par ces appareils sera éliminée de manière à prévenir sa dispersion.

3.2.3 *Expédition du concentré de spodumène*

Afin de limiter les émissions liées à l'expédition du concentré de spodumène, les routes non pavées du site qui sont empruntées par les camions seront arrosées régulièrement. Dans le cas où des épisodes de poussières seraient malgré tout observés, l'utilisation d'abat-poussière chimique sera considérée. Les produits chimiques hygroscopiques utilisés seront certifiés conformes par le Bureau de Normalisation du Québec à la norme BNQ 2410-300.

3.2.4 *Concassage de roche stérile pour les activités d'agrandissement*

Des opérations de concassage et de criblage seront effectuées à la cour d'entreposage pour l'obtention des granulats nécessaires aux activités d'agrandissement. Le concasseur sera positionné afin qu'il ne soit pas exposé aux grands vents. Les émissions seront limitées par l'utilisation de jets d'eau.

3.2.5 *Érosion éolienne des aires d'entreposage*

Il est prévu que les haldes de roches stériles, de matière organique et de dépôts meubles seront revégétées. Tout au long des différentes phases du projet, la restauration progressive, particulièrement des pentes extérieures de ces haldes, sera favorisée lorsque possible afin de minimiser les émissions de matières particulaires générées par l'érosion éolienne.

Il est par contre important de rappeler que les précipitations et l'humidité contribuent au lavage des surfaces et à la cimentation des particules fines, en particulier lorsque les haldes sont principalement constituées de matériaux grossiers; ce qui est notamment le cas pour certaines haldes du projet de la mine de lithium Baie-James.

La circulation routière et les perturbations physiques des aires d'entreposages seront contrôlées et minimisées.

4 PROGRAMME DE GESTION DE L'ARROSAGE DES ROUTES

Étant donné que le routage sur le site minier a été identifié par la modélisation de la dispersion atmosphérique comme le plus important contributeur des émissions de matières particulaires, Galaxy prévoit le contrôle de ces émissions par l'arrosage régulier des routes non pavées.

Un programme de gestion de l'arrosage des routes sera donc mis en place afin d'effectuer un suivi de l'efficacité des mesures de contrôles prévues. La fréquence et l'intensité d'arrosage des routes seront conjuguées aux conditions météorologiques.

L'atténuation des émissions due à l'arrosage dépend de plusieurs facteurs; la quantité d'eau appliquée sur la route par unité de surface, le temps entre les arrosages, l'intensité du trafic et les conditions météorologiques pendant cette période. Or, l'efficacité de l'arrosage comme méthode d'atténuation des émissions

peut être estimée selon la règle empirique décrite dans le document Control of Open Fugitive Dust Sources (Cowherd et coll., 1988) et en utilisant le taux d'évaporation moyen spécifique au site de la mine de lithium Baie-James (ATLAS-1978 et EPA-2007).

Selon les opérations prévues, ce modèle théorique prévoit que les besoins quotidiens en eau pourront atteindre un volume de 300 m^3 en condition estivale, lors de journées sèches, afin d'atteindre l'efficacité de contrôle cible de 75 %. Cette quantité d'eau est estimée dans les conditions d'opération maximale, soit le scénario d'exploitation de l'année 9 à 42,3 kilotonnes par jour. Pour les segments les plus achalandés, l'intensité d'arrosage maximale requise représente 0,24 $l/m^2/h$.

Pour l'arrosage des routes du site minier, l'eau traitée provenant du bassin principal sera utilisée. Tel que présenté dans le bilan d'eau, le débit provenant de la fosse fournira en tout temps suffisamment d'eau pour les besoins d'arrosage.

Références :

- Cowherd, C, G. E. Muleski and J. Kinsey. *Control of Open Fugitive Dust Sources*, Kansas City, EPA-450/3-88-008. 1988.
- Environmental Protection Agency (EPA). United States Meteorological Data: Daily and Hourly Files to Support Predictive Exposure Modeling. 2007.
- Atlas hydrologique du Canada. Mean Annual Lake Evaporation. En ligne : [http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/67de4f04-855d-5d23-bb4a-2a270d1488d0.html] (22 janvier 2016). January 1, 1978.

5 PROGRAMME PRÉLIMINAIRE DE SUIVI DE LA QUALITÉ DE L'AIR

L'objectif du programme de suivi sera de mesurer l'impact des activités minières sur la qualité de l'air locale et régionale, et ensuite de déterminer la conformité et l'acceptabilité des activités minières par rapport aux normes et critères applicables présentés dans le document Normes et critères québécois de qualité de l'atmosphère, version 6 du MELCC (2018). Ce programme comprendra deux volets, soit l'acquisition de données météorologiques et l'échantillonnage de la qualité de l'air ambiant.

5.1 Station météorologique

Une station météorologique sera installée à court terme à un emplacement représentatif afin d'acquérir suffisamment de données pour déterminer le positionnement des stations d'air ambiant lors du démarrage du projet. Cette station permettra aussi de juger convenablement des conditions locales pour appuyer l'interprétation des mesures de qualité de l'air obtenues aux nouvelles stations qui seront installées dans le cadre du suivi de la qualité de l'air.

Les équipements utilisés, leurs modalités d'installation, la compilation des données météorologiques incluant la fréquence de mesure, le calcul des valeurs horaires ainsi que les étiquettes de données seront conformes aux normes édictées dans le

document Normes de gestion et d'exploitation des réseaux du Réseau météorologique coopératif du Québec.

Avant l'installation, la localisation de la station météo et les équipements prévus seront présentés au MELCC pour approbation dans un devis détaillé.

Les données météorologiques seront par ailleurs transmises au Ministère régulièrement via un site FTP ou selon un autre format défini par le Réseau météorologique coopératif du Québec.

5.2 Échantillonnage de la qualité de l'air ambiant

Le programme de suivi de la qualité de l'air repose principalement sur un échantillonnage de la qualité de l'air ambiant. Galaxy propose de faire un suivi des matières particulaires totales (PMT), des particules respirables (PM_{10}), des particules fines ($PM_{2.5}$), des métaux et de silice cristalline dès le début des opérations. Il est prévu de moduler ce suivi selon les résultats recueillis.

5.2.1 *Localisation des stations d'échantillonnage*

La position des stations d'échantillonnage sera déterminée de façon à dresser un portrait adéquat de la qualité de l'air en direction du relais routier du km 381. Le positionnement exact sera défini à partir des directions des vents dominants spécifiques au site, lesquelles seront obtenues à partir des données météorologiques de la station qui sera installée au site. Au préalable, la localisation prévue sera soumise au MELCC pour approbation.

Une vérification sera effectuée pour s'assurer de respecter les critères de localisation d'Environnement Canada et du MELCC, soit :

- situé minimalement à 100 m d'un cours d'eau ou d'une étendue d'eau;
- situé minimalement à deux fois la hauteur des obstacles brise-vent;
- situé de manière à ce que les points de cueillette ou les buses d'échantillonnages soient localisés à au moins 2 m du sol;
- situé de manière à ce que l'on puisse considérer les mesures réalisées comme représentatives de la zone à l'étude.

5.2.2 *Méthodes et fréquences d'analyses*

Pour l'analyse des matières particulaires, un appareil recommandé par l'US-EPA (« List of Designated Reference and Equivalent Method ») sera nécessaire, à savoir :

- Un échantillonneur à haut débit (Hi-Vol) (référence US-EPA : 40 CFR Part 50, Appendix B); modèle TE-5170 MFC de la compagnie Tisch-environmental ou équivalent;

- Un échantillonneur de type PQ-100PM10 ou l'équivalent, doté d'une tête sélective/cyclone SCCA ou l'équivalent

Pour les PMT, les échantillonnages à l'aide du Hi-Vol seront d'une durée de 24 heures de minuit à minuit le lendemain et réalisés une fois par six jours. Le suivi de l'exposition à certains métaux est également prévu à partir de l'analyse de ces échantillons. Les métaux dont les normes sont sur des distributions de particules de tailles inférieures, telles que le nickel, seront d'abord mesurés sur les particules totales. Dans le cas où des dépassements seraient observés, la mesure de ces tailles de particules sera envisagée.

Le suivi des particules respirables (PM_{10}) et fines ($PM_{2.5}$) se fera à l'aide d'un instrument de type T640 ou l'équivalent. Cet appareil est un néphélomètre permettant la mesure en continu des particules PM_{10} et $PM_{2.5}$. Il est inscrit à la liste des méthodes désignées de référence ou équivalentes de l'US-EPA[1].

Le suivi de la silice cristalline sera effectué sur les particules prélevées sur filtres par échantillonnages des PM4 à l'aide d'un échantillonneur de type PQ100. La fraction des PM4 sera collectée en utilisant un débit de prélèvement et une tête sélective dotée d'un cyclone approprié (SCCA ; 11,1 LPM). De manière à obtenir une limite de détection adéquate, les échantillonnages seront effectués sur une durée de 5 jours (7 200 minutes). Les analyses de silice en laboratoire seront effectuées en suivant le protocole NIOSH 7500.

Toutes les analyses seront réalisées dans un laboratoire agréé par le MELCC. Les méthodes utilisées seront en accord avec celles de référence, développées par le CEAEQ, si disponibles. Plusieurs mesures d'assurance qualité et de contrôle qualité (AQ/CQ) seront mises en place dans le cadre de la campagne d'échantillonnage pour assurer la représentativité et la précision des résultats.

Les fréquences d'échantillonnage sont présentées au tableau 1 alors que les méthodes d'échantillonnage et d'analyse sont résumées au tableau 2. Les fréquences seront modulées selon les résultats recueillis dès la première année d'exploitation. Les résultats des mesures seront transmis au ministère et la fréquence des suivis sera ajustée selon les résultats obtenus et soumise au MELCC pour approbation.

[1] https://www3.epa.gov/ttnamti1/files/ambient/criteria/AMTIC%20List%20Dec%202016-2.pdf.

Tableau 1 : Fréquences d'échantillonnage

Paramètre	Fréquence
Matières particulaires totales PMT (Hi-Vol)	1 fois / 6 jours (modulable selon les résultats)
Métaux[1] dans PMT (Hi-Vol)	
Particules respirables (PM_{10}) et fines ($PM_{2.5}$)	En continu
Silice cristalline	1 fois / 15 jours (modulable selon les résultats)

[1] Métaux : selon les Normes et critères québécois de qualité de l'atmosphère du MELCC (2018).

Tableau 2 : Méthodes d'échantillonnage et d'analyse

Paramètre	Méthode	Analyse
Particules totales (PMT)	US-EPA – Division AMTIC – Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air – Compendium Method IO-2.1 –SAMPLING OF AMBIENT AIR FOR TOTAL SUSPENDED PARTICULATE MATTER (SPM) CENTRE D'EXPERTISE EN ANALYSE ENVIRONNEMENTALE DU QUÉBEC. Détermination des particules : méthode gravimétrique, MA. 100 – Part. 1.0, Rév. 3, Ministère du Développement durable, de l'Environnement et des Parcs du Québec, 2010, 9 p.	Gravimétrie – différence de poids des filtres avant et après les prélèvements
Métaux dans PMT ***Selon le document Normes et critères québécois de qualité de l'atmosphère du MELCC (2018).***	US-EPA – Division AMTIC - Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air - Compendium Method IO-3.5 - DETERMINATION OF METALS IN AMBIENT PARTICULATE MATTER USING INDUCTIVELY COUPLED PLASMA/ MASS SPECTROMETRY (ICP/MS)	Extraction des métaux avec une solution d'acide nitrique et acide chlorhydrique et analyse par ICP-MS
Particules respirables (PM10) et fines (PM2.5)	US-EPA – Automated Equivalent Method - EQPM–0516–240 Analyseur en continu	Mesure selon une spectrométrie de la lumière diffusée
Silice cristalline	Protocole établi avec le MELCC avec tête d'échantillonnage de PM4 et débit de 11,1 LPM, Durée de 120 h analyse avec méthode NIOSH 7500.	Filtration, tête sélective de taille de particule, analyse par rayons X.

6 SUIVI DES ÉMISSIONS À LA SOURCE

En complément au programme de suivi de la qualité de l'air, les équipements représentant des sources d'émissions fixes seront échantillonnés. Les équipements faisant l'objet d'un suivi des émissions à la source seront ceux identifiés dans l'attestation d'assainissement.

Ce programme de suivi des émissions à la source respectera les exigences du MELCC précisées dans son Guide de caractérisation et de suivi de l'air ambiant (Couture 2005). L'échantillonnage sera effectué selon les modalités et les méthodes de référence prescrites dans le Guide d'échantillonnage aux fins d'analyses environnementales – Cahier 4 – Échantillonnage des émissions atmosphériques en provenance de sources fixes (MDDELCC, 2016).

Un rapport d'échantillonnage sera systématiquement produit et transmis au MELCC. Si l'analyse révèle un dépassement d'une valeur limite ou d'une norme d'émission, l'événement sera mentionné ainsi que les mesures correctrices appliquées.

7 SUIVI DES ÉMISSIONS DE NO_2 LORS DES DYNAMITAGES

Un suivi de l'émission potentielle de NO_2 généré lors des dynamitages sera réalisé principalement par l'observation des événements des sautages. Les émissions de NO_2 surviennent principalement lorsque les conditions de détonation sont sous-optimales. La présence de plus grosses roches et des déplacements de fronts plus faibles que projetés seront des signes suivis pour qualifier l'efficacité de détonation des explosifs. Advenant l'observation ou la prévision de conditions sous-optimales de détonation, les mesures suivantes pourront être mises de l'avant au besoin dans la définition des plans de sautage :

- Utilisation de double détonateur;
- Utilisation de détonateur électronique;
- Formulation d'explosif adapté aux conditions et au site du sautage;
- Procédure de mise à feu adaptée;
- Utilisation d'un type d'explosif adapté tel que des explosifs hydrofuges.

L'emploi au besoin d'une ou l'autre de ces mesures pourra favoriser la meilleure gestion possible des émissions de NO_2 et la réduction de celles-ci.

8 MAINTENANCE ET ENTRETIEN

Les équipements miniers seront inspectés régulièrement et les défectuosités seront réparées dans les plus brefs délais pour maximiser leur efficacité.

Les matières particulaires récupérées par les dépoussiéreurs seront disposées de façon à minimiser leur dispersion, en respect de l'article 12 du RAA qui mentionne que les émissions de particules provenant du transfert, de la chute ou de la

manutention de matières ne doivent pas être visibles à plus de 2 m du point d'émission.

Les pièces de rechange pour les principaux équipements d'atténuation seront conservées sur le site (pompes à eau, sacs filtrants, etc.).

9 PROGRAMME DE GESTION DES MESURES D'ATTÉNUATION ADAPTATIVES

Bien que la première stratégie de gestion de Galaxy soit d'appliquer continuellement des mesures de contrôle et d'atténuation courantes à l'ensemble de ses activités, certaines altérations des activités (activités ayant été identifiées comme occasionnellement problématiques selon les résultats de la modélisation de la dispersion atmosphérique) pourraient s'effectuer dans le cadre de la procédure d'alerte pour éviter les dépassements de norme.

Galaxy installera en effet un système qui va non seulement mesurer à partir de ses stations les concentrations dans l'air ambiant, mais transmettre à la salle de contrôle et générer des alarmes sous certaines conditions. Ainsi, une investigation spécifique sera réalisée dans les cas où le résultat obtenu (« rolling average ») atteint plus de 80% de la norme. Dans le cas où le résultat est relié à un évènement non connecté aux activités du site (ex. : feu de forêt ou autres), une note sera mise au dossier et le MELCC sera avisé. Dans le cas où l'investigation vise plutôt les activités de Galaxy, celles causant un haut niveau de particules seront identifiées et Galaxy procédera à l'application de mesures d'atténuation supplémentaires et à la modification ou à l'interruption de ces dernières.

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APPENDIX

A-CCE-30

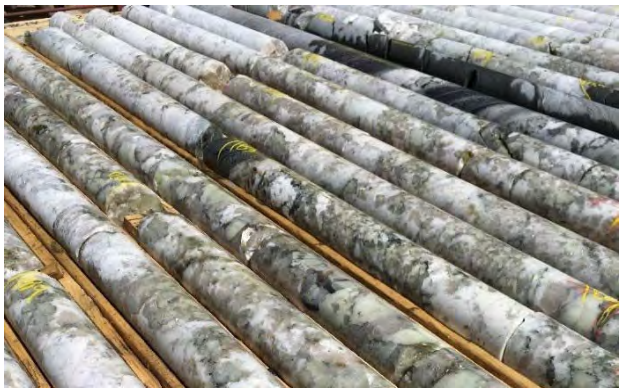
MINE CLOSURE PLAN – JAMES BAY LITHIUM MINE PROJECT (WSP, 2020)

GALAXY LITHIUM (CANADA) INC.
PROJECT NO.: 191-01753-00

MINE CLOSURE PLAN

JAMES BAY LITHIUM MINE PROJECT

MAY 2020



MINE CLOSURE PLAN

JAMES BAY LITHIUM MINE PROJECT

GALAXY LITHIUM (CANADA) INC.

PROJECT NO.: 191-01753-00
DATE: MAY 2020

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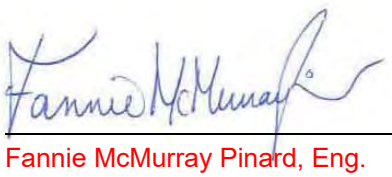

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The French version of this document constitutes the official version. In case of conflict of interpretation between the English and French versions, the French version prevails.

Reference to be included:

WSP. 2020. *MINE CLOSURE PLAN. JAMES BAY LITHIUM MINE PROJECT.* REPORT PRODUCED FOR GALAXY LITHIUM (CANADA) INC. 54 PAGES AND APPENDICES.

SUMMARY OF THE MINE CLOSURE PLAN

Galaxy Lithium (Canada) Inc. (Galaxy) is a subsidiary of Galaxy Resources Limited, a leading lithium mining company. Galaxy Resources Limited currently operates a spodumene mine in Australia and two projects are under development: one in Quebec (James Bay lithium mine project) and one in Argentina.

The James Bay lithium mine project involves the conventional pit mining of about 2 Mt of spodumene pegmatite per year to be sent to the ore processing plant. In addition to the pit, the site will house accumulation areas (overburden, waste rock/tailings, ore, concentrate), retention basins, an ore processing plant, industrial and administrative buildings, a workers' camp, workshops and warehouses and an explosives depot. The expected period of operation is 17 years.

The James Bay lithium mine project is located in the Superior geological province and is part of the Archean greenstone belt of the Eastmain Group. The rocks of this volcanic belt are mostly amphibolites and metasedimentary, metavolcanic rocks. Beneath the Eastmain Group rocks is the Auclair formation, composed of paragneiss intersected by spodumene pegmatite intrusions. The deposit at the James Bay lithium mine project consists of swarms of pegmatite dikes and lenses, each up to 150 m wide by 100 m long. All swarms are contained within a discontinuous corridor extending approximately 4 km long by 300 m wide.

Geochemical characterizations and kinetic testing of the ore, waste rock and tailings were carried out by WSP between 2018 and 2020. The results of these studies indicate that the ore, waste rock and tailings to be extracted from the James Bay lithium mine are considered leachable in the short term, but not leachable in the long term. These materials are also not potentially acid-generating (PAG) materials. In view of this, the waste rock and tailings piles and ore stockpile foundations must have a permeability lower than the 3.3 L/m²/d limit flow rate defined in Directive 019 for level A waterproofing measures. However, as these materials are non-leachable in the long term, waterproofing of the waste rock and tailings piles cover will not be required in the post-restoration period.

During mine operations, the following facilities will be developed at the site:

— a co-deposited waste rock and dried tailings pile;

— an overburden pile, included in the footprint of the waste rock and tailings pile;

— an ore stockpile;

— a water retention basin for the waste rock and tailings pile (water management pond);

— a raw water basin for the ore processing plant;

— a tailings loading and unloading area;

— a three-stage ore crushing circuit;

— an ore processing plant;

— a spodumene concentrate storage area (dome);

— a warehouse for storage of chemicals used in the ore extraction process;

— a residual materials management building;

— a building with storage areas and workshops;

— an administration building;

— a laboratory;

— a propane storage and distribution site, including a loading area, consisting of four above-ground tanks with a capacity of 110 kl each, located in the industrial area;

— a propane storage and distribution site, including a loading area, consisting of two above-ground tanks with a capacity of 110 kl each (to supply the workers' accommodation buildings);

— a diesel storage and distribution site, including a loading area, consisting of three above-ground tanks with a capacity of 80,000 litres each;

— an explosives warehouse;

— a guardhouse and a truck scale;

— a camp for the workers (assembled trailers);

— a 69 kV electrical substation;

— a diesel-powered emergency generator;

— parking lots;

— storage areas;

— a mechanical workshop.

A surface water drainage collection system will be constructed, and the collected water will be directed to the water management pond. Contact and dewatering water from the pit will also be directed to the water management pond.

All unconsolidated deposits and excavated topsoil will be placed on the unconsolidated deposit pile, except for surface soils that must be stripped for the development of the firebreak, which will be piled along the firebreak.

A waste rock and tailings storage area with a capacity of 72 Mm^3 and an ore storage area with a capacity of 50,000 t will also be developed in the northwestern part of the site and in the industrial sector, respectively.

The ore will be sent to an on-site processing plant where it will be subjected to several crushing and dense media separation circuits. The final product will consist of a 6% lithium oxide concentrate, which will be trucked off-site.

Explosives and detonator depots will be constructed to the west of the property. A cement plant will also be built in the industrial sector.

The protection, rehabilitation and restoration measures that will be applied at the James Bay lithium mine project site will include the restoration of the following infrastructures: road infrastructure, service and administrative buildings, accumulation areas, pit, work and storage areas and water accumulation ponds.

At the end of the mining operations, water will no longer be pumped out of the pit and the pit will gradually be flooded by the rising water table. A protective berm will be installed around the pit and danger signs will be installed. The waste rock, tailings and overburden pile will be graded and vegetated. Accumulation ponds will either be backfilled or converted to wetlands.

All buildings and infrastructure not required for post-closure monitoring will be transported off-site or dismantled by a certified contractor. Following dismantling, the areas affected by operation activities will be profiled to restore natural water flow and then vegetated.

During the post-restoration period, the structural integrity will be monitored annually for a minimum of five years. Furthermore, environmental monitoring to verify the quality of ground and surface water will be carried out six times a year for a minimum of five years. Agronomic monitoring to verify the resumption of vegetation will also be carried out for a minimum period of five years.

The work planned for the rehabilitation and restoration of the site is estimated at $29,359,506[1]. These costs include engineering costs (30%), monitoring costs and a contingency of 15%.

[1] In 2020 dollars.

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C	WATER BALANCE STUDY

LIST OF ABBREVIATIONS

CA:	Certificate of authorization
CBJNQ:	*Convention de la Baie-James et du Nord québécois*
CIDREQ:	*Centre informatique du registre des entreprises du Québec*
COMEX:	*Comité d'examen des répercussions sur l'environnement et le milieu social*
EC criteria:	*Eau de consommation* criteria from the Guide d'intervention (MELCC, 2019)
RES criteria:	*Résurgence dans l'eau de surface* criteria from the Guide d'intervention (MELCC, 2019)
EIA:	Environmental impact assessment
EPA:	Environmental Protection Agency
D019:	*Directive 019 sur l'industrie minière*
LQE:	*Loi sur la qualité de l'environnement*
MDDEFP:	*Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs*
MELCC:	*Ministère de l'Environnement et de la Lutte contre les changements climatiques*
MDDEP:	*Ministère du Développement durable, de l'Environnement et des Parcs*
RHM:	Residual hazardous materials
m^3/d:	Cubic metres per day
MABA:	Modified Acid Base Accounting
MEND:	Mine Environmental Neutral Drainage
MENV:	*Ministère de l'Environnement*
MERN:	*Ministère de l'Énergie et des Ressources naturelles*
SS:	Suspended solids
Mm^3:	Million cubic metres
Mt:	Million tonnes
Mt/y:	Million tonnes per year
NPAG:	Not potentially acid-generating
JBLMP	James Bay Lithium Mine Project
HDPE:	High-density polyethylene
PAG:	Potentially acid-generating/Acid generating potential
RMD:	*Règlement sur les matières dangereuses*
RPRT:	*Règlement sur la protection et la réhabilitation des terrains*
RSCTSC:	*Règlement sur le stockage et les centres de transfert de sols contaminés*
RSMPGNS	*Règlement sur les substances minérales autres que le pétrole, le gaz naturel et la saumure*
SDBJ:	*Société de Développement de la Baie-James*
SIMDUT:	*Système d'information sur les matières dangereuses utilisées au travail*

1 INTRODUCTION

1.1 CONTEXT

Galaxy Lithium (Canada) Inc. (Galaxy) is a subsidiary of Galaxy Resources Limited, a leading lithium mining company. Galaxy Resources Limited currently operates a spodumene mine in Australia and two projects are under development: one in Quebec (James Bay lithium mine project) and one in Argentina.

The James Bay lithium mine project (JBLMP) project involves the conventional pit mining of about 2 Mt of spodumene pegmatite per year to be sent to an ore processing plant. In addition to the pit, the site will house accumulation areas (overburden, waste rock/tailings, ore, concentrate), retention basins, administrative buildings, a workers' camp, workshops and warehouses and an explosives depot. The expected period of operation is 17 years.

The JBLMP is subject to the provincial environmental impact assessment and review procedure, as set out in section 153 of Chapter II of the *Loi sur la qualité de l'environnement* (LQE). Schedule A of the LQE lists the projects that are subject to the mandatory assessment and review process, including "all mining developments, including the additions to, alterations or modifications of existing mining developments." In conjunction with the LQE, Schedule 1 of Section 22 of the *Convention de la Baie-James et du Nord québécois* (CBJNQ) sets out a list of projects subject to the assessment process, including mining projects. The project is also subject to a federal environmental assessment, as required under section 13 of the Canadian Environmental Assessment Act (CEAA, 2012) (S.C. 2012, c. 19, s. 52; [Repealed, 2019, c. 28, s. 9]), since ore extraction will exceed 3,000 t/day (section 16(a)) and mill capacity will exceed 4,000 t/day (section 16(b) of the Regulations Designating Physical Activities [SOR/2012-147]). The project is being assessed at the federal level by the Impact Assessment Agency of Canada (IAAC) in conjunction with the Cree Nation Government (CNG) under the legislative requirements of the CEAA (2012) and in accordance with the spirit and objectives of the JBNQA.

As part of the analysis of the Environmental Impact Assessment (EIA) by government committees, the *Comité d'examen des répercussions sur l'environnement et le milieu social* (COMEX) required Galaxy to submit a complete mine closure plan in accordance with the *Guide de préparation du plan de réaménagement et de restauration des sites miniers au Québec* (MERN, 2017) (Guidelines).

WSP Canada Inc. (WSP) was mandated by Galaxy to prepare the mine closure plan of JBLMP in accordance with the Guidelines, to the extent possible, given the preliminary progress of the project. Note that since this version of the mine closure plan is intended to be presented only to COMEX following their specific request and not to the *Ministère de l'Énergie et des Ressources naturelles* (MERN), which is the entity responsible for evaluating and approving mine closure plans, this version should be considered preliminary and not official. Indeed, the JBLMP is currently not required to submit a mine closure plan, considering the current level of progress of the project and the fact that no activities requiring the approval of a mine closure plan are taking place nor are planned to take place on the site in the short term. As such, when the project situation warrants, Galaxy will formally submit a comprehensive mine closure plan to the MERN for assessment and approval. For the time being, this version of the mine closure plan has been prepared with the available information; the reader should consider that the design studies for the project's infrastructure are still in progress and that the design of several infrastructures is being optimized. Therefore, the description of the infrastructures presented in this document will be modified and improved when the official version of the mine closure plan will be issued.

1.2 OBJECTIVES

This mine closure plan was developed according to the requirements and recommendations of the *Guide de préparation du plan de réaménagement et de restauration des sites miniers au Québec* (MERN, 2017), with the information currently available. Since the infrastructure design studies for the project are still in progress and the design of several infrastructures is being optimized, the description of the infrastructures presented in this document is also subject to modification and improvement when the official version of the mine closure plan will be issued.

The restoration program described in this document covers the activities to be conducted during the operational phase. The mine closure plan will focus primarily on the following elements:

— protection, rehabilitation and restoration measures;

— post-restoration control and monitoring program;

— measures in the event of temporary suspension of activities;

— emergency measures plan;

— assessment of the cost of restoration work;

— assessment of the financial guarantee;

— restoration work schedule.

In order to facilitate readability of the document, the maps cited have all been grouped together and are presented at the end of this mine closure plan.

Given that this version is unofficial and is not submitted to the MERN for assessment and approval, the closure plan validation grid has not been completed. The official closure plan will be submitted to the MERN with the mining lease application, after the environmental permit is issued and before the first blast of ore extraction is scheduled.

2 BACKGROUND INFORMATION

2.1 IDENTIFICATION OF PROPONENT

2.1.1 PROPONENT

Name of proponent:	**Galaxy Lithium (Canada) Inc.**
Address:	2000 Peel Street, Suite 720 Montreal, QC H3A 2W5
Telephone:	1-514-558-1855
Website:	www.galaxylithium.com
Authorized representative:	Ms. Gail Amyot, Eng. M.Sc. CEA Environment, Health and Safety Director E-mail: gail.amyot@gxy.com

2.1.2 MANDATED CONSULTANT

Conceptual Mine Closure Plan:	**WSP Canada Inc.**
Address:	1135 Boul. Lebourgneuf Blvd. Québec, QC G2K 0M5
Telephone:	1-418-623-2254
Fax:	1-418-624-1857
Website:	www.wspgroup.com
Contact person:	Ms. Fannie McMurray Pinard, Eng.| Engineer E-mail: fannie.mcmurrayPinard@wsp.com

2.1.3 CIDREQ NUMBER

The code number of the *Centre informatique du registre des entreprises du Québec* (CIDREQ) assigned by the enterprise registrary for Galaxy Lithium (Canada) Inc. is 1167071928.

2.1.4 RESOLUTION OF THE BOARD OF DIRECTORS

The resolution of the Board of Directors authorizing Mr. Denis Couture, General Manager, to act on behalf of the organization is provided in Appendix A.

2.2 LOCATION OF THE MINE SITE

The JBLMP is located in the Nord-du-Québec administrative region. The mine site under study is located about 10 km south of the Eastmain River and about 100 km east of James Bay, at the same latitude as the Cree village of Eastmain. The Galaxy mining property (claims) is located on Category III lands under the CBJNQ. The land under mining claims is easily accessible by the James Bay Highway, which crosses the property near the Relay KM 381.

The geographical coordinates of the JBLMP are as follows (in the center of the property):

— northern latitude (NAD 83): 52°14'8"N;

— western latitude (NAD 83): 77°5'0"O.

The general location of the mine site is shown on Map 1.

2.3 LAND MINING PROPERTY

The JBLMP property includes 54 claims that cover about 2,164 hectares (ha). Galaxy Lithium (Canada) Inc. holds all these mining claims in partnership with Galaxy Lithium (Ontario) Inc. Galaxy may, at the appropriate time, prepare an application to acquire a mining lease to operate a mine and ore processing plant at the project site.

The active project mineral titles are shown on Map 2.

2.4 HISTORY OF THE SITE

Prospector Jean Cyr carried out the first work that revealed the presence of spodumene pegmatite in the area in 1964. He staked the area in 1966. The *Société de développement de la Baie-James* (SDBJ) acquired the exploration rights in 1974 and carried out various exploration work before transferring the rights again to Jean Cyr in 1986. The work carried out by the SDBJ in 1974 consisted of geological mapping of the area, as well as rock sampling and drilling. A total of 277 samples were collected and analyzed, with an average content of 1.7% LiO_2. The work revealed the presence of 45,000 m^2 of outcrops containing spodumene pegmatite in the form of dikes or lenses, which were concentrated in an approximately 4 km long east-west axis. Additional work was carried out by SDBJ in 1977 and consisted of a three-hole exploratory drilling campaign that totalled 383 m of drilling. Little work was carried out until the early 2000s.

In 2008, Géophysique TMC Inc. conducted an induced polarization and magnetometry geophysical survey at the request of Lithium One, the holder of the exploration rights on these properties. The magnetometer survey was conducted over a linear distance of 26.3 km with measurement points every 12.5 m, while the induced polarization survey was conducted continuously over a linear distance of 24.3 km. The survey lines were spaced 50 m apart and points were surveyed every 25 m using a high-precision GPS. The magnetic survey identified a diabase dike to the west of the currently planned pit location.

In 2008, 18 exploratory boreholes were also completed by Lithium One, each spaced 100 m apart on a rectangular grid covering an area of 180 ha. In 2009, a drilling campaign including 84 new exploratory boreholes, spaced 50 to 60 m apart, was carried out. This campaign identified new spodumene pegmatite dikes. In 2009 and 2010, rock samples were also collected in channel samples from surface outcrops of several pegmatite dikes. Fifty-three channels were made using diamond saws.

In 2017, Galaxy conducted a drilling campaign to better delineate the extension of the pegmatite dikes. Fan drilling was carried out to delineate the depth extension of known pegmatite west of the James Bay highway, and drilling was also carried out east of the highway in unexplored areas. During this campaign, 157 boreholes (totalling 33,339 m) were drilled, which uncovered new mineralized zones.

Also in 2017, spodumene pegmatite (ore) samples from 41 drill core samples totalling 400 kg were metallurgically tested to validate the proposed ore processing method and spodumene recovery rate. At the end of this test, the lithium recovery rate was 66% at a concentration of 6% Li_2O (Primero, 2019).

2.5 RESOURCES AND MINERAL RESERVES

According to SRK's 2010 Mineral Resource assessment (SRK Consulting, 2010), based on National Instrument 43-101 (NI-43-101) standards, indicated mineral resources to date have been calculated at 40,330,000 t of indicated lithium ore (Li_2O) at a concentration of 1.40%. These resources were calculated considering a cutoff grade of 0.62%, a metallurgical recovery rate of 70% and an extraction and processing cost of US$55 per tonne.

SRK also conducted a mineral reserve estimate for the deposit in 2010. Thus, a total of 33,860,000 t of probable mineral reserves of lithium ore at a grade of 1.34% would be extractable from the JBLMP deposit. This calculation takes into account a mill recovery rate of 66% and a cutoff grade of 0.62% Li_2O.

2.6 GEOLOGY AND MINERALOGY

2.6.1 REGIONAL AND LOCAL GEOLOGY

According to information from a feasibility study produced in 2019 (Primero, 2019), which is intended to be reassessed, and the project mineral resource assessment report (SRK Consulting, 2010), the James Bay lithium mine project is located in the Superior geological province and is part of the Archean greenstone belt of the Eastmain Group. The rocks of this volcanic belt are mostly amphibolites, metasedimentary and metavolcanic rocks. Beneath the Eastmain Group rocks is the Auclair formation, composed of paragneiss intersected by spodumene pegmatite intrusions. The non-intrusive rocks on the property show an east-northeast foliation and a subvertical dip, whereas the intrusions are rather massive.

The deposit at the James Bay lithium mine project consists of swarms of pegmatite dikes and lenses, each up to 150 m wide by 100 m long. All swarms are contained within a discontinuous corridor extending approximately 4 km long by 300 m wide. The surrounding rocks are composed of gneiss and banded gneiss, along with more felsic rocks such as dacite and quartzite, as well as metagabbro and granite, are also present on the property.

The pegmatite making up the James Bay lithium mine project deposit contains spodumene, which is found in crystals ranging in size from 5 cm to over 1 m in size. A total of 18 significant spodumene containing pegmatite dikes or lenses have been identified on the property. These orebodies are up to 60 m wide and 100 m long. Other mineralized dikes or lenses may be identified on site as exploration and definition work progresses.

2.6.2 MINERALOGY

Spodumene, constituting lithium ore, is found in pegmatite along with other minerals such as quartz, microcline, albite, muscovite, lepidolite, tourmaline and beryl. Spodumene is composed of lithium (8.03% Li2O), aluminum (27.40% Al2O3), silica (64.58% SiO2) and oxygen (51.59% O). Spodumene is a prismatic habitus mineral with a striated appearance and is often stretched perpendicular to the orientation of the pegmatite dikes on the property. It is whitish to greenish in colour and the crystals are millimetric to metric in size.

Spodumene can be altered to sericite, causing it to take on a brownish colour due to the presence of iron in the sericite. Thus, iron oxides are sometimes present, also within the pegmatite.

2.6.3 GEOCHEMICAL CHARACTERIZATION

WSP conducted a geochemical characterization of the ore, waste rock and tailings in 2018. Following this geochemical characterization, kinetic tests were conducted on waste rock and tailings, the results of which were published in 2019 (WSP, 2019). Finally, kinetic tests were also conducted on the ore and a waste rock unit (diabase) and the results were published in 2020 (WSP, 2020). These studies are presented in Appendix B.

JAMES BAY LITHIUM MINE PROJECT – SPECIALIZED STUDY ON GEOCHEMISTRY (WSP, 2018D)

In 2018, WSP carried out a geochemical characterization of the mine waste rock, ore, tailings and unconsolidated deposits that will be extracted, produced or reclaimed when the James Bay lithium mine project goes into production. The purpose of this characterization was to assess the leaching and acid generation potential of these materials on a limited number of samples, in order to initially evaluate the intervention measures required to minimize the environmental impact of mining the ore and waste rock.

In this study, samples of waste rock, tailings and ore were subjected to static analyses for available metal content, leaching tests (TCLP, SPLP, and CTEU-9) and tests to determine the potential for acid generation of these materials (MABA) and their radioactivity. The results for each type of material are presented below.

WASTE ROCK

A total of 81 waste rock samples were analyzed. All samples were analyzed for metal content and potential for acid generation, and samples with metal concentrations above the generic “A” criteria in the *Guide d’intervention – Protection et rehabilitation des terrains contaminés* (MELCC[2], 2019) (*Guide d’intervention*) were subjected to leaching tests. Samples were selected to represent the proportions of each of the lithologies (gneiss, banded gneiss, sterile pegmatite and basalt) that will be extracted from the waste rock and to have a sufficient number of samples from each of the lithologies for interpretation.

Analysis results indicate that 100% of the waste rock is considered “low risk” with respect to *Directive 019 sur l’industrie minière* (MDDEP[3], 2012) (D019). Furthermore, waste rock from all lithologic units would be leachable under the same guideline to varying degrees. Table 1 provides details for each of the units.

[2] Ministère de l’Environnement et de la Lutte contre les changements climatiques.
[3] Ministère du Développement durable, de l’Environnement et des Parcs.

Less aggressive leaching tests than the TCLP test, SPLP and CTEU-9, were also performed on the waste rock. The results of these tests indicated leaching of some metals, mainly arsenic, silver, barium, copper, manganese, nickel, lead and zinc. A higher leaching rate was obtained in CTEU-9 due to the very fine particle size (100 mesh) of the materials in this test, which can result in an increase in the specific surface area of the materials and a higher solubility of some metals. Moreover, the D019 criterion for arsenic was exceeded in this test for both I1G (4%) and V3B (80%). Although D019 does not recommend this test for the characterization of mine waste rock, these exceedances should still be taken into consideration since the field conditions are more amenable to neutral water than acid leaching. However, this particle size is far from that of the waste rock that will be piled at the site.

The results of the static acid generating potential test (MABA) indicated that the total sulfur concentration was less than 0.3% for 100% of the I1G and V3B waste rock samples analyzed; these samples are classified as NPAG for D019. However, 30% of the samples from unit M1 and 50% of the samples from unit M2 are classified PAG with respect to D019. Comparing the results with the criteria established by the URSTM and MEND, 70% of them are within the uncertainty zone, while 20% are considered PAG and 10% NPAG for unit M1. For samples from unit M2, 40% are within the uncertainty zone, 55% are considered PAG and 5% NPAG.

ORE

A total of 28 ore samples were analyzed in this study. All samples were analyzed for metal content and potential for acid generation, and samples with metal concentrations above the generic “A” criteria in the *Guide d’intervention* were subjected to leaching tests.

The results of these analyses, when compared to the criteria in Table 1 of Appendix II of D019, indicate that 96% of the ore samples submitted for analysis would be considered “low risk” material, based on the results of the static tests.

Furthermore, 83% of the samples would be leachable as manganese, 50% as zinc and 46% as copper. Finally, between 13% and 42% of the ore samples analyzed would be leachable as arsenic and/or barium and/or cadmium and/or nickel and/or lead. Less aggressive leaching tests than the TCLP test, including the SPLP and CTEU-9 tests, were also conducted on the ore samples. The results of these tests indicated leaching of some metals, including arsenic, silver, barium, copper, manganese, nickel, lead and zinc during the SPLP test. Furthermore, in the CTEU-9 test, results above the *Guide d’intervention* RES criteria were observed in all samples for copper, manganese, lead and zinc, with some exceedances for silver, arsenic and barium. The ore is therefore considered leachable based on the various leaching tests conducted during the study.

With respect to the results of the MABA static potential acid generation test, the results indicate that 79% of the ore samples are considered NPAG and 21% of them are considered PAG under D019. However, when comparing the MABA test results to the requirements specified in the MEND *Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials*, 64% of the ore samples would be considered NPAG and 36% of them would be within the uncertainty zone, while none of them would be considered PAG. Thus, under the applicable regulations, most of the ore from the James Bay lithium mine would be considered NPAG. However, according to MEND criteria, 36% of the ore samples would be located in the uncertainty zone with respect to its potential for acid generation, based on the static tests performed.

Table 2 presents a summary of the results.

Table 1 Summary of test results from waste rock samples

Unit	Metals >A	TCLP>RES	SPLP>RES	CTEU-9 >D019	CTEU-9>RES	PAG (D019)
Sterile pegmatite (I1G)	96%	Mn: 19/20 samples (95%)	Hg: 5/20 samples (25%)		Cu, Pb, Zn (100%)	0%
		Cu, Zn: 11/20 samples (55%)	Zn: 2/20 samples (10%)		Mn: 18/20 samples (90%)	
		Cd, Pb: 1/20 samples (5%)	Ag, Ba: 1/20 samples (5%)		As: 5/20 samples (25%)	
					Cd: 2/20 samples (10%)	
Gneiss (M1)	100%	Ba: 23/30 samples (77%)	Cu: 4/24 samples (17%)	As: 1/24 samples (4%)	Cu (100%)	30%
		Zn: 19/30 samples (63%)	Zn: 3/24 samples (13%)		Ba, Pb, Zn: 21/24 samples (88%)	
		Ni, Pb: 14/30 samples (47%)	Ag: 2/24 samples (8%)		Ag: 19/24 samples (79%)	
		Cd: 10/30 samples (30%)	Ni: 1/24 samples (4%)		Cd, Ni: 18/24 samples (75%)	
		Mn: 3/30 samples (10%)			As: 17/24 samples (71%)	
		As, Cu: 1/30 samples (3%)				
Banded gneiss (M2)	100%	Ba: 15/20 samples (77%)			Ag, Ba, Cd, Cu, Pb, Zn (100%)	50%
		Pb: 13/20 samples (65%)			As: 7/8 samples (88%)	
		Zn: 11/20 samples (55%)			Ni: 6/8 samples (75%)	
		Ni: 6/20 samples (30%)			Mn: 1/8 samples (13%)	
		Cd: 3/20 samples (15%)				
		Mn: 1/20 samples (5%)				
Basalt (V3B)	100%	As, Ba, Ni (100%)	As (100%)	As: 4/5 samples (80%)	As (100%)	0%
		Mn: 3/10 samples (30%)			Ba, Cu, Ni: 4/5 samples (80%)	
					Fluoride: 1/5 samples (20%)	

Table 2 Summary of static test results from ore samples

METALS >A	TCLP>RES	TCLP>D019	SPLP>RES	CTEU-9>RES	PAG (D019)
96%	As: 4/27 samples (15%)	As: 1/27 samples (4%)	Ag, As, Hg, Ni: 1/18 samples (5%)	Ag, As: ¼ samples (25%)	21%
	Ba: 10/27 samples (37%)		Cu, Zn: 2/18 samples (11%)	Mn: 3/4 samples (75%)	
	Cd: 11/27 samples (41%)			Cu, Pb, Zn: 4/4 samples (100%)	
	Cu: 11/27 samples (41%)				
	Mn: 20/27 samples (74%)				
	Ni: 5/27 samples (19%)				
	Pb: 7/27 samples (26%)				
	Zn: 12/27 samples (44%)				

TAILINGS

A total of 12 tailings samples were analyzed. All samples were analyzed for metal content and potential for acid generation, and samples with metal concentrations above the generic "A" criteria in the *Guide d'intervention* were subjected to leaching tests.

The results of these analyses, when compared to the criteria in Table 1 of Appendix II of D019, indicate that 100% of the tailings are considered "low risk" material and 100% are leachable in cadmium, copper, manganese and zinc, and 8% in mercury with respect to D019.

Less aggressive leaching tests than the TCLP test, including the SPLP and CTEU-9 tests, were also conducted on the ore samples. The SPLP test did not exceed the D019 or RES criteria of the *Guide d'intervention*. In the CTEU-9 test, all samples exceeded the *Guide d'intervention* RES criteria for silver, copper and mercury. As observed for ore and waste rock, the fine particle size required for this test appears to result in higher element mobility. The results are similar when compared to the requirements specified in the MEND *Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials*.

All of the 12 samples from I1G tested in the MABA static test had S_{total} concentrations of less than 0.3% and are, therefore, all classified as NPAG concerning D019. Furthermore, analysis of the difference between the gross neutralization capacity (NC) and the maximum potential acidity (MPA), as well as the NC/MPA ratio, confirmed that all samples analyzed are classified as NPAG, also according to URSTM and MEND criteria.

Thus, under the applicable regulations, the tailings to be produced at the James Bay lithium mine site would be considered NPAG, but leachable in cadmium, copper, manganese, mercury and zinc.

Table 3 presents a summary of the results.

Table 3 Summary of static test results from Tailings samples

Metals >A	TCLP>RES	SPLP>RES	CTEU-9>RES	PAG (D019)
100%	Cd: 4/12 samples (33%)		Ag, Cu, Hg (100%)	0%
	Cu, Mn: 12/12 samples (100%)			
	Hg: 1/12 samples (8%)			

JAMES BAY LITHIUM MINE PROJECT. COLUMN KINETIC TEST RESULTS (WSP, 2019A)

Column kinetic tests were performed on mine waste rock and tailings samples (WSP in 2019). A flush was performed weekly until week 4 and then every two weeks for a total period of 50 weeks. Two of the columns contained a waste rock sample, one kept saturated at all times and the other kept unsaturated between one flush and the next, while the third column contained a tailings sample and was kept unsaturated between one flush and the next.

The results of these tests are summarized below.

ACID GENERATING POTENTIAL

The results observed in the kinetic tests on the three columns resulted in the following observations regarding the acid generation potential:

- The pH of the leachate for all three columns remained between 7 and 8 for the first 20 weeks of the test and then stabilized between 6.25 and 7.01 until the end of the test.
- SO_4 concentrations remained between 5 and 10 mg/L for the majority of the test for both waste rock columns, while concentrations for the tailings column remained below 1 mg/L.
- The acidity measured in the leachate from all three columns remained near the detection limit throughout the test. Only one increase was measured at week 8 for the unsaturated waste rock (12 mg/L) and saturated waste rock (110 mg/L).
- Electrical conductivity was maximum at the beginning of the test and then reached a plateau around week 14 for the three columns, at about 15 µS/cm for the tailings column, 28 µS/cm for the unsaturated waste rock column and 35 µS/cm for the saturated waste rock column.
- The oxidation reduction potential varied throughout the test for all three columns but remained between 500 mV and 75 mV.

Therefore, based on the results obtained from these column kinetic tests, it appears that the acid generation potential of both the saturated and unsaturated waste rock and tailings is insignificant since the pH of all three columns was maintained between 6.25 and 8 throughout the test and the acidity in the leach water remained below the DL throughout most of the test, with similar results in all three columns.

The measured conductivity is also lower for tailings than for waste rock.

Concentrations of SO_4 in solution also remained stable throughout the test. It also appears that the SO_4 concentrations in the tailings leachate are lower than in the waste rock leachate. Tailings and waste rock are therefore considered non-acid generating.

COLUMN 1 – UNSATURATED TAILINGS

- Silver concentrations were above the RES criterion for the first six weeks of testing. They remained below the DL from week 8 onwards (note that the DL [0.00005 mg/L] was greater than RES [0.00003 mg/L] criterion). A value equal to the DL, and therefore greater than the RES criterion, was also obtained at week 46. Since this value is a point value and just above the DL, it is not considered to have a significant impact on water quality. It could also be a false positive from the laboratory.
- The D019 monthly average final effluent discharge concentration was exceeded in the initial analysis.
- The copper RES criterion was exceeded at weeks 0 to 18, 22 and 28. After week 28, concentrations remained below the RES criterion.
- Iron exceeded the D019 final effluent discharge maximum acceptable concentration in weeks 0 and 2 and exceeded the monthly average acceptable final effluent discharge concentration in weeks 1, 3, 4 and 6. Concentrations then gradually decreased, reaching a threshold near the DL around week 14.
- Manganese exceeded the RES criterion only between weeks 0 to 4. Concentrations reached a threshold near the DL as of week 14.
- Mercury exceeded the RES criterion primarily between weeks 0 and 14. As of week 16, concentrations remained below the DL (note that the DL [0.00001 mg/L] was greater than RES criterion [0.0000013 mg/L]).
- Lead exceeded the RES criterion in the first 6 weeks of testing. Concentrations stabilized near the DL as of week 10.
- Zinc exceeded the RES criterion during the first 14 weeks of testing. Concentrations stabilized near the DL as of week 16.
- The arsenic, barium and nickel tests did not exceed the RES criteria.
- The copper, nickel, lead and zinc tests did not exceed the D019 (average and maximum) final effluent discharge acceptable concentrations.

COLUMN 2 – SATURATED WASTE ROCK MIX

- Only the initial and week 1 analysis results were higher than the DL for silver. Concentrations subsequently remained below the DL (note that the DL [0.00005 mg/L] was greater than the RES criterion [0.00003 mg/L]).
- Arsenic exceeded the D019 final effluent discharge maximum acceptable concentration at week 3 and the monthly average acceptable concentration at weeks 2, 4, and 6. The RES criterion was also exceeded in weeks 3 and 4. Concentrations subsequently dropped to a threshold around week 24.
- Barium exceeded the RES criterion in the initial analysis. However, concentrations stabilize near the DL as of week 2.
- Copper exceeded the RES criterion in both the initial and week 1 analyses. However, concentrations stabilize below the RES criterion as of week 2.
- Iron exceeded the D019 final effluent discharge maximum acceptable concentration in the initial analysis and the monthly average concentration in week 1; however, concentrations stabilized near the DL starting in week 2.
- Mercury exceeded the RES criterion primarily between weeks 0 and 14. As of week 16, concentrations remained below the DL (note that the DL [0.00001 mg/L] was greater than RES criterion [0.0000013 mg/L]).
- Zinc exceeded the RES criterion only in the initial analysis. Concentrations then remained near or below the DL.

— The manganese, nickel and lead tests did not exceed the RES criteria.

— The copper, nickel, lead and zinc tests did not exceed the D019 (average and maximum) final effluent discharge acceptable concentrations.

COLUMN 3 – UNSATURATED WASTE ROCK MIX

— Silver concentrations were above the RES criterion for the first 12 weeks of testing. They remained below the DL from week 14 onwards (note that the DL [0.00005 mg/L] was greater than RES [0.00003 mg/L] criterion).

— Arsenic exceeded the D019 monthly average acceptable final effluent discharge concentration in weeks 4 and 6; concentrations remained below the D019 requirements thereafter.

— Barium exceeded the RES criterion at weeks 0, 2, 4, 5 and 10. However, concentrations stabilize near the DL as of week 14.

— Copper exceeded the RES criterion between weeks 0 to 12. However, concentrations stabilize below the RES criterion as of week 14.

— Iron exceeded the D019 final effluent discharge maximum acceptable concentration between weeks 0 and 12. Concentrations dropped to reach a threshold near the DL at week 14.

— Manganese exceeded the RES criterion only at weeks 2 and 4. Concentrations reached a threshold near the DL as of week 14.

— Mercury concentrations remained below the DL throughout the test, with the exception of the initial analysis (note that the DL [0.00001 mg/L] was greater than the RES criterion [0.0000013 mg/L]).

— Lead exceeded the RES criterion at weeks 2, 4 and 6. Concentrations stabilized near the DL as of week 10.

— Zinc exceeded the RES criterion during the first 12 weeks of testing. Concentrations stabilized near the DL as of week 14.

— The arsenic and nickel tests did not exceed the RES criteria.

— The copper, nickel, lead and zinc tests did not exceed the D019 (average and maximum) final effluent discharge acceptable concentrations.

Based on these results, although some metals were released in concentrations exceeding the RES criteria and/or the D019 final effluent discharge requirements, in most cases the release was limited to the first weeks of testing.

Therefore, in the case of the tailings column, the RES criteria and/or D019 final effluent discharge requirements were not exceeded after week 14, except copper, for which the exceedances ceased after week 28. For the unsaturated waste rock mix column, the RES criteria and/or D019 final effluent discharge requirements were not exceeded after week 12. For the saturated waste rock mix column, excluding mercury, the RES criteria and/or D019 final effluent discharge requirement exceedances were limited to the first weeks of testing, up to week 4.

Therefore, at the end of the test, unsaturated and saturated waste rock and tailings appear to exhibit similar behaviour over the test time scale. These results assume that the waste rock and tailings are potentially leachable in the short term, but that metal release is significantly limited and meets the applicable criteria and requirements (D019 and RES) after an average of 12 weeks. These materials can therefore be considered low risk according to D019 at the end of this period.

Table 4 presents a summary of the results.

Table 4 Summary of RES criteria and D019 final effluent requirement exceedances during column testing

Column	Parameter	D019[1, 2] exceedance	RES exceedance	Stabilization	D019 exceedance at end of test	RES exceedance at end of test
Column 1- Unsaturated tailings	Silver	-	Weeks 0 to 6, week 46 (0.00005 mg/L)	Week 8	-	No (DL > RES)
	Arsenic	Week 0 (avg.)	-	-	No	-
	Copper	-	Weeks 0 to 18, 22 and 28	Week 32	-	No
	Iron	Weeks 0 and 2 (max.) Weeks 1, 3, 4 and 6 (avg.)	-	Week 14	No	-
	Manganese	-	Weeks 0 to 4	Week 10	-	No
	Mercury	-	Weeks 0 to 14	Week 16	-	No (DL > RES)
	Lead	-	Weeks 0 to 6	Week 10	-	No
	Zinc	-	Weeks 0 to 14	Week 16	-	No
Column 2 – Saturated waste rock mix	Silver	-	Week 1	Week 2	-	No (DL > RES)
	Arsenic	Week 3 (max.) Weeks 2, 4 and 6 (avg.)	Weeks 3 and 4	Week 24	No	No
	Barium	-	Week 0	Week 2	-	No
	Copper	-	Weeks 0 and 1	Week 2	-	No
	Iron	Week 0 (max.) Week 1 (avg.)	-	Week 2	No	-
	Mercury	-	Weeks 0 to 14	Week 16	-	No (DL > RES)
	Zinc	-	Week 0	Week 2	-	No
Column 3 – Unsaturated waste rock mix	Silver	-	Weeks 0 to 12	Week 14	-	No (DL > RES)
	Arsenic	Weeks 4 and 6 (avg.)	-	-	No	-
	Barium	-	Weeks 0, 2, 4, 5 and 10	Week 14	-	No
	Copper	-	Weeks 0 to 12	Week 14	-	No
	Iron	Weeks 0 to 12 (max.)	-	Week 14	No	-
	Manganese	-	Weeks 2 and 4	Week 14	-	No
	Mercury	-	Week 0	Week 1	-	No (DL > RES)
	Lead	-	Weeks 2, 4 and 6	Week 10	-	No
	Zinc	-	Weeks 0 to 12	Week 14	-	No

JAMES BAY LITHIUM MINE PROJECT. COLUMN KINETIC TEST RESULTS – ORE AND DIABASE (WSP, 2020)

Column kinetic tests were conducted on an ore sample and a diabase sample, as the latter was being considered for use as backfill material on the site. A flush was performed every two weeks for a total period of 25 weeks. The two columns were kept unsaturated between flushes.

The results of these tests are summarized below.

ACID GENERATING POTENTIAL

Two test columns were monitored during the kinetic tests, an ore column and a diabase column, both of which were kept unsaturated during the test. The results observed during the kinetic test resulted in the following observations:

- The pH of the leachate from both columns remained near-neutral throughout the test, although slightly alkaline for the diabase column.
- SO_4 concentrations remained between 1 and 14 mg/L during the test for both columns.
- The acidity measured in the leachate from both columns remained below the detection limit throughout the test.
- Electrical conductivity was maximum at the start of the test for both columns and then stabilized around 20 µS/cm for the ore column and 30 µS/cm for the diabase column; these values are consistent with the reduction in dissolved metal concentrations in the leachate throughout the tests.
- The oxidation reduction potential varied throughout the test for both columns but remained between 500 mV and 70 mV.

Therefore, based on the results obtained from these column kinetic tests, it appears that the acid generation potential of both the ore and diabase is insignificant since the pH of both columns was maintained near neutral throughout the test and the acidity in the leach water remained below the DL throughout most of the test as well. Concentrations of SO_4 in solution also remained stable throughout the test.

Furthermore, oxidation/neutralization curves were conducted to evaluate the long-term acid generation potential of the two columns. This assessment was made by placing the cumulative magnesium, manganese and calcium (neutralizing minerals) loads on the y-axis, based on the cumulative sulphate loads on the x-axis. Furthermore, the initial total composition of neutralizing minerals as a function of the initial sulphate composition was placed on the graph. If the initial composition is above the oxidation/neutralization curve, it is assumed that the material will deplete its sulphur content before depleting its neutralizing mineral content. This is what is observed for the ore and diabase during testing. Ore and diabase are therefore considered non-acid generating.

LEACHING POTENTIAL

COLUMN 1 – ORE

- Silver concentrations remained below the DL from week 13 onwards (note that the DL [0.00005 mg/L] was great than the RES [0.00003 mg/L] criterion). Values above the DL were measured weeks 0, 6, 9 and 12.
- Mercury concentrations exceeded the DL at weeks 0, 2, 9 and 25 of the test (note that the DL [0.00001 mg/L] was greater than the RES criterion [0.0000013 mg/L]). Concentrations remained below the DL for all the other test weeks.
- The D019 final effluent discharge maximum acceptable concentration was exceeded at week 0 for the suspended solids (SS).

— Copper, lead and zinc concentrations remained below the RES criteria as of week 1 or 2 of testing.

— No exceedance of the RES criteria was obtained during the test for all other metals analyzed.

— No exceedances of (average and maximum) D019 final effluent discharge acceptable concentrations were obtained during the test.

COLUMN 2 – DIABASE

— The results of weeks 0, 1, 6, 9 and 11 were greater than the DL. Concentrations subsequently remained below the DL (note that the DL [0.00005 mg/L] was greater than the RES criterion [0.00003 mg/L]).

— Copper concentrations exceeded the RES criterion at weeks 0, 1, 3, 6, 7 and 16 but remained below the criterion as of week 17.

— Mercury concentrations exceeded the DL at weeks 0, 2, 3, 22 and 23 of the test (note that the DL [0.00001 mg/L] was greater than the RES criterion [0.0000013 mg/L]). Concentrations remained below the DL for all the other test weeks.

— Iron concentrations exceeded the D019 final effluent discharge maximum acceptable concentration at weeks 0 and 1 but remained below the latter as of week 2.

— The D019 final effluent maximum acceptable discharge concentration was exceeded between weeks 0 and 8 for the SS.

— Barium, cadmium, lead and zinc concentrations remained below the RES criteria as of week 4 of testing or earlier.

— No exceedance of the RES criteria was obtained during the test for all other metals analyzed.

— No other exceedances of (average and maximum) D019 final effluent discharge acceptable concentrations were obtained during the test.

Based on these results, although some metals were released in concentrations exceeding the RES criteria and/or the D019 final effluent discharge requirements, in most cases the release was limited to the first few weeks of testing, which is normal for this type of test. Therefore, for the ore column, no exceedance was observed after week 12 of the test, except for mercury (week 25). For the diabase column, exceedances of the applicable criteria stop after week 11, except for mercury (weeks 22 and 23) and a one-time result at week 16 for copper.

Therefore, mercury concentrations above the RES criterion (at the DL) were obtained at one point even at the end of the test for both columns. Since there does not appear to be a clear downward trend in mercury behaviour, the ore and diabase would be considered mercury leachable even after 25 weeks. These results assume that the ore and diabase are also potentially leachable, in the short term only, for some metals ([ore: silver, copper, lead, zinc], [diabase: silver, barium, cadmium, copper, iron, lead, zinc]). However, the release of metals is limited.

Table 5 presents a summary of the results.

Table 5 Summary of RES criteria and D019 final effluent requirement exceedances during column testing

Column	Parameter	D019[1, 2] exceedance	RES exceedance
Column 1 - Ore	Silver	-	Weeks 0, 6, 8, 9, 12
	Copper	-	Weeks 0 and 1
	Mercury	-	Weeks 0, 2, 3, 9, 25
	Lead	-	Week 0
	Zinc	-	Week 0
Column 2 – Diabase	Silver	-	Weeks 0, 1, 6, 7, 8, 9, 11
	Barium	-	Week 0
	Cadmium	-	Week 0
	Copper	-	Weeks 0, 1, 3, 6, 7, 16
	Iron	Weeks 0 and 1	-
	Mercury	-	Weeks 0, 2, 3, 22, 23
	Lead	-	Weeks 0, 1, 3
	Zinc	-	Weeks 0, 1, 3
	Suspended solids	Weeks 0 to 8	-

GALAXY LITHIUM PROJECT: UPDATE TO FACILITY WATER QUALITY MODELLING (WSP, 2019B)

Hydrogeochemical modelling was used to assess water quality at the main final effluent from the site, i.e., at the outlet of the tailings and waste rock pile settling pond, as well as water quality in the pit during the post-remediation period, once the pit has filled.

Initial modelling was performed in 2018 and considered only partial primary results from the waste rock and tailings kinetic tests, which were still in progress at the time the modelling was performed. The modelling was updated in 2019 considering the complete results of these kinetic tests over 50 weeks. Modelling was performed considering the site's water balance (Stantec, 2019a) and climate change.

The results show that the settling pond effluent pH is expected to remain between 7.5 and 7.9 and that effluent metal concentrations will also remain below the D019 recommended monthly average concentrations. However, the report notes that arsenic concentrations may occasionally (primarily during drier periods) exceed the D019 guidelines, which should be managed when this occurs.

Furthermore, the pit water quality modelling results show that the pit water quality will meet the D109 guidelines when the pit is filled. Note that arsenic concentrations may exceed the D019 guidelines when the pit begins to fill, but the concentrations will decrease as the pit fills.

2.7 VARIOUS AUTHORIZATIONS

At this stage of the project, Galaxy has not asked for any authorizations. However, Galaxy will require all the necessary authorizations at the different stages of the project.

3 SITE DESCRIPTION

The information contained in the following sections has been drawn primarily from a feasibility study produced in 2019 (Primero, 2019), which is intended to be reassessed, and the EIA (WSP, 2018a) for the James Bay lithium mine project, as well as information provided by Galaxy.

3.1 MINING METHOD

At present, it is estimated that the mine will be in operation for 17 years. Ore will be extracted from an open pit, which will measure approximately 2 km long on a northwest-southeast axis and approximately 500 m wide. Thus, the open pit will have a footprint of approximately 69.55 ha. Extracting the ore from the pit will involve the use of Cat 777 mine haul trucks and adapted mechanical shovels. The benches will have a total height of 20 m and will consist of two 10 m benches separated by a 9 m wide protective berm and will have a nominal angle of 75°. Additional 20 m wide berms will be installed in areas of the pit where portions of the ramp will be separated by more than 120 m. The total depth of the pit will vary between 160 m (sectors JB1 and JB3) and 260 m (sector JB2). Sectors JB1 and JB3 will be operated as whole pits, while sector JB2 will be designed as several small pits within this sector. JB2 and JB3 will share a common ramp between levels 151 and 212. The location of these areas is shown in Figure 1.

The proposed mining process considers that mining operations will be carried out from the upper spur of the deposit to the lower spur, passing through the mineralized zone. Trucks will transport the ore to the stockpiles located northeast of the pit. Trucks will also transport the waste rock mined to access the ore to the waste rock and tailings pile (co-deposited with the tailings), which will be located to the west of the ore stockpile. The mining phases are shown in Figures 2 to 6.

It is estimated that approximately 121 Mt of waste rock will be produced, and 33 Mt of ore will be mined over the years of mine operation (Primero, 2019). The waste rock will be composed of 98.9% gneiss and banded gneiss. Furthermore, approximately 5 Mt of overburden will be stripped to allow for the development of infrastructure. The annual quantities of material extracted and produced are presented in Table 6.

Table 6 Annual quantities of material extracted and produced from the James Bay lithium mine project

Year	Waste rock (Mt)	Ore (Mt)	Tailings (Mt)	Overburden (Mt)
Preproduction	0.3	0.0	0.046	0.1
1	5.0	2.0	1.654	0.4
2	5.0	2.0	1.700	0.6
3	5.1	2.0	1.700	1.0
4	7.7	2.0	1.700	1.1
5	11.1	2.0	1.700	0.1
6	11.4	2.0	1.700	0.4
7	11.1	2.0	1.700	0.6
8	11.1	2.0	1.700	0.1
9	11.1	2.0	1.700	-
10	9.3	2.0	1.700	-
11	8.2	2.0	1.700	-
12	5.4	2.0	1.700	-
13	5.4	2.0	1.700	-
14	5.4	2.0	1.700	-
15	3.5	2.0	1.700	-
16	2.8	2.0	1.700	-
17	2.2	1.4	1.178	-
TOTAL	**121.3**	**33.4**	**28.445**	**4.6**

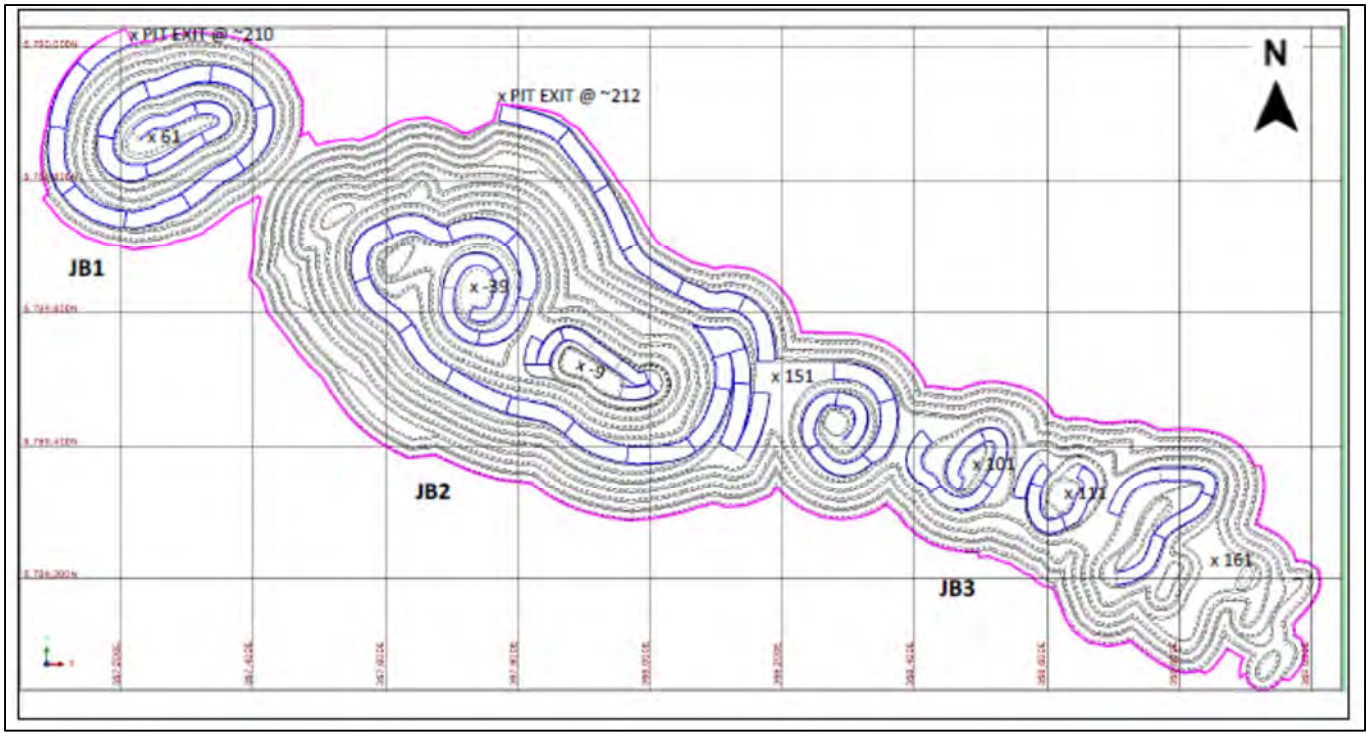

Figure 1 Plan view of the planned pit design, showing the three mining sectors JB1, JB2 and JB3.

Drawn from PRIMERO, 2019

3.2 ORE PROCESSING METHOD

The ore will be transported from the ore stockpile to a vibrating grate. The coarse particle size materials will then be fed to a primary jaw crusher and then pass through a multi-screen screener. The fractions to be re-crushed after this step will be screened and sent to secondary and tertiary crushers.

The crushed material will be conveyed to the ore separation circuit. Coarse particles will be separated from fine particles and ultra-fine tailings. Coarse and fine particles will be mixed with a ferrosilicon (FeSi) slurry. FeSi is added to the process as a thickener to help separate the spodumene from other lower density minerals. The ultrafine particles will be removed from the circuit and sent with the tailings.

Coarse particles will be conveyed to the coarse separation circuit. The particles with lower density in the first step will be removed from the circuit and sent with the tailings. The particles of the settling phase will be crushed again by a roller crusher (particles smaller than 1 mm will be sent with the tailings after this step) and then returned to the separation circuit. The floating particles will be sent to a secondary fine particle separation circuit, while the particles of the settling phase constitute the lithium concentrate and will be recovered for storage.

The fine particles will be sent to the fine particle separation circuit where they will be passed through a reflux classifier, which removes some of the micas from the material. Subsequently, the particles will be passed through two separation circuits; particles from the floating phase of the first circuit will be sent with the tailings, while particles from the settling phase will be sent to the second separation circuit. The particles from the settling phase of the second separation circuit will constitute the lithium concentrate, while the particles from the floating phase will be sent with the tailings.

The tailings recovered from the various steps of processing will be thickened using cyclones and filters and then transported to the tailings facility in the form of "cakes" for storage. The ferrosilicon will also be recovered during this stage using a magnetic recovery circuit for reuse in the process. Approximately 0.7 kg of ferrosilicon will be required to process one tonne of ore. Note also that hydrated lime and flocculant will be used in the treatment process. Approximately 2 kg of hydrated lime will be required to process one tonne of ore, while 0.005 kg of flocculant will be required per tonne of ore.

The on-site crusher will have the capacity to process 2 Mt of crude ore per year, producing approximatively 0.3 Mt of 6% lithium oxide concentrate. The concentrate will be sent to a transfer site in Matagami, then loaded into railway cars and transported by train to the Port of Trois-Rivières. From there, the concentrate will then be shipped elsewhere for transformation. It is estimated that the process will consume about 18.81 t of water per hour.

3.3 BUILDINGS AND FACILITIES

3.3.1 BUILDINGS AND SURFACE FACILITIES

The James Bay lithium mine will be an open-air operation. The surface facilities will be as follows:

— a waste rock and dried tailings pile;

— an overburden pile included in the footprint of the waste rock and tailings pile;

— an ore stockpile;

— a water retention basin for the waste rock and tailings pile (water management pond);

— a raw water basin for the ore processing plant;

— a tailings loading and unloading area;

— a three-stage ore crushing circuit;

— an ore processing plant;

— a spodumene concentrate storage area (dome);

— a warehouse for storage of chemicals used in the extraction process;

— a residual materials management building;

— a building with storage areas and workshops;

— an administration building;

— a laboratory;

— a propane storage and distribution site, including a loading area, consisting of four above-ground tanks with a capacity of 110 kl each, located in the industrial area;

— a propane storage and distribution site, including a loading area, consisting of two above-ground tanks with a capacity of 110 kl each (to supply the workers' accommodation buildings);

— a diesel storage and distribution site, including a loading area, consisting of three above-ground tanks with a capacity of 80,000 litres each;

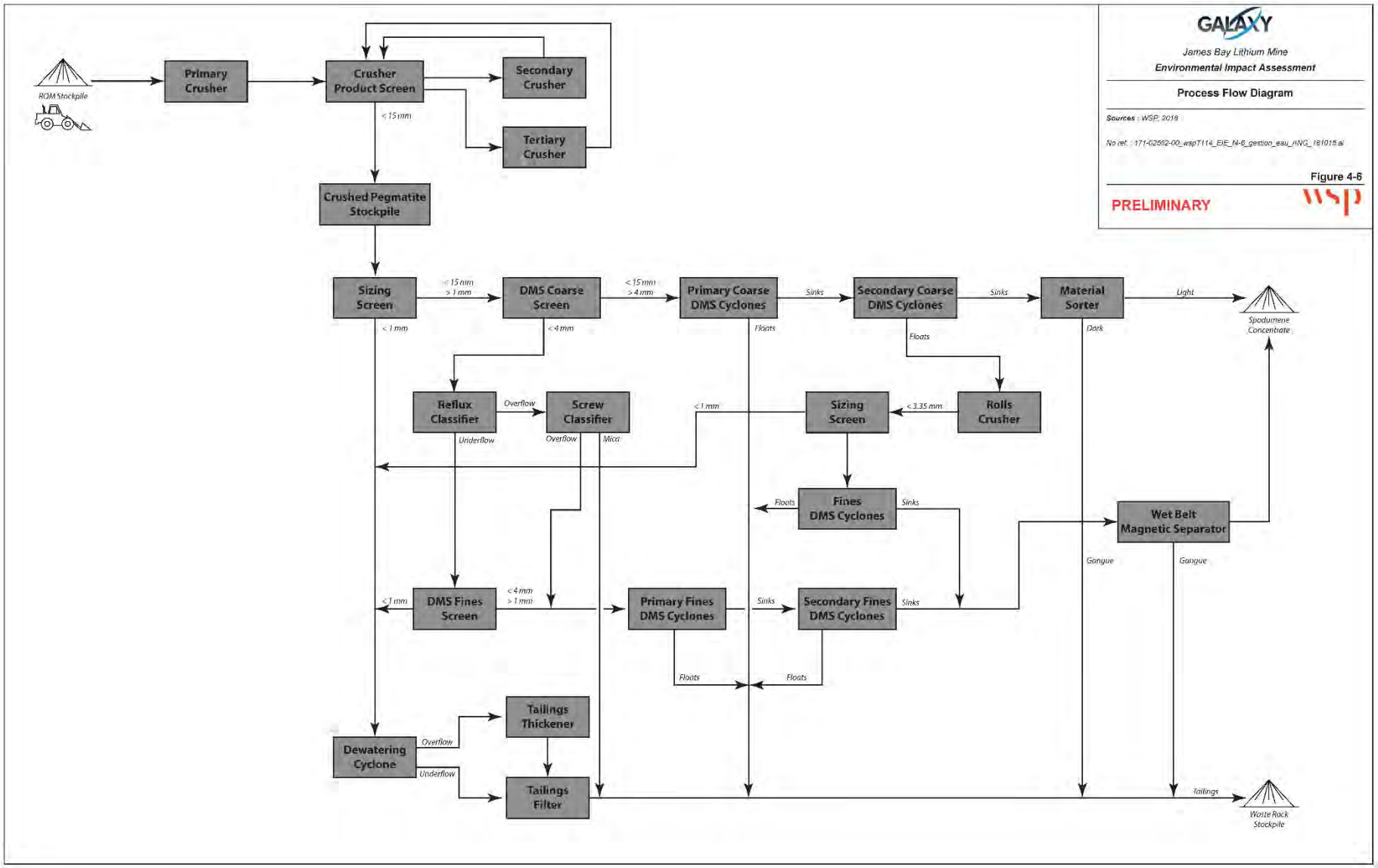

Figure 2 Ore processing plant process diagram

— an explosives warehouse;

— a guardhouse and a truck scale;

— a camp for the workers (assembled trailers);

— a 69 kV electrical substation;

— a diesel-powered emergency generator;

— parking lots;

— storage areas;

— a mechanical workshop.

Map 1 shows the general layout of the proposed facilities on the project site.

3.3.2 ELECTRICAL, TRANSPORTATION AND SUPPORT INFRASTRUCTURE

ELECTRICAL INFRASTRUCTURE

The site will be powered by a 69 kV overhead distribution line (line L-614) located 11 km south of the site. A secondary overhead power line will be connected to this distribution line to power the site. This overhead line will be relayed by Hydro-Québec's Muskeg electrical substation and then fed by the Némiscau electrical substation, located approximately 100 km southwest of the site.

The estimated electrical consumption for operating the ore processing plant is 8.2 MW.

TRANSPORTATION INFRASTRUCTURE

Employees working at the project site will be flown to the Eastmain Airport, which is owned by Transport Canada. It is anticipated that the airport will be expanded to allow for the transportation of more passengers to accommodate the needs of the project. However, since Galaxy does not own this airport, it is not considered part of the mining project.

On the project site, the main road will link the James Bay highway to the infrastructures. Furthermore, the haul roads built on the site will total 3 km and be 20.1 m wide. The other secondary roads on the site will total 1 km and will be 6 m wide. There will be no paved roads on the site.

SUPPORT INFRASTRUCTURE

A fibre optic cable will be installed to provide access to communications at the site. This cable will be connected to the Eeyou Communications Network from Relay KM 381. Therefore, the connection will be approximately 3.5 km long.

Several pieces of mining equipment will be required during the operation of the mine and the types and quantities are detailed in Table 7.

Table 7 List of mining equipment present on site

Machinery	
Type	**Number**
CAT6015 7 m^3 power shovel	2
CAT777 90 tonne trucks	14
CAT745C 39.5 tonne articulated trucks	2
Atlas Copco D65 drill rigs	4
CATD9 bulldozers	2
CAT834 bulldozers	2
CAT14M graders	3
CAT775 truck	1

3.4 ACCUMULATION AREAS

3.4.1 ORE ACCUMULATION AREAS

An ore storage area will be installed near the ore processing plant. This accumulation area will have a capacity of 50,000 t of ore and will cover an area of approximately 36,900 m^2. The maximum stockpile height will be 2.8 m on a 4H:1V slope. A protective berm will also be installed around the perimeter of the stack.

Since the ore is considered leachable on short term under the D019, the footprint of the ore stockpile will have to comply with level A waterproofing measures. Currently, it is planned that the bottom of the accumulation area will be covered with a high-density polyethylene (HDPE) geomembrane or natural waterproofing material and a drainage system, sealed with clay, will collect runoff water from the ore body and direct it to the water management pond via a pumping station. More details will be provided once the design of this accumulation area is completed.

3.4.2 WASTE ROCK AND TAILINGS PILE

It is currently planned that the waste rock and tailings will be co-deposited on the same accumulation area, which will be located northwest of the pit. The co-disposal method consists of constructing a mixed pile by mixing the two types of material, or alternating layers of one with the other. The waste rock and tailings will be dewatered and compacted as they are disposed of in the pile. The design of the interior layout for the placement of waste rock and tailings will be completed during the detailed engineering phase.

The design currently being considered, developed by Stantec (Stantec, 2019b), calls for the footprint of the facility to cover an area of approximately 208.97 ha and to accommodate a volume of 72 Mm^3 of dry waste rock and tailings (16.7 Mm^3 of tailings and 55.1 Mm^3 of waste rock). The total height of the structure will reach 90 m, an elevation of 290 m above mean sea level. The slope of the southern edge will have a 2.5H:1V configuration, while the slope of the northern edge will have a 3H:1V configuration.

Since waste rock and tailings are considered leachable in the short term, a consolidated natural clay foundation will form the base of the pit; larger quantities of natural clay will be imported in certain sectors to ensure compliance with level A waterproofing measures (Stantec, 2019b).

The clay foundation of the tailings pile will need to meet the infiltration rate of 3.3 L/m^2/d as defined in D019 for Level A waterproofing measures. The hydrogeological study will be reviewed once the new design of the waste rock pile has been completed.

The runoff will be collected by a network of clay-sealed ditches. A retention basin will also be adjacent to the accumulation area to collect runoff water.

The unconsolidated deposits present at the site of the pile will consist of peat on the surface, followed by silty clay, sand, cohesive clay and then non-cohesive clay. The design of the pile's foundation will ensure that the required infiltration rate is respected over the entire foundation.

The tailings will be coarse-grained, i.e., approximately 51.5% gravel, 44% sand and 4.5% fine particles (Stantec, 2019b). The moisture content of the filtered tailings, after drying, will be 11.4% (Stantec, 2019b). The filtered tailings will be compacted to form tailings disposal cells and compaction tests will be conducted before site construction. Furthermore, the waste rock will consist of blocks ranging in size from 30 to 900 mm, with an average of 250 mm.

As previously mentioned, the concept of the waste rock and tailings pile is under review. Consequently, the design criteria presented above will be reassessed and new design studies and criteria will be developed. Thus, the study prepared by Stantec and mentioned above will not be presented in this version of the closure plan. Final design studies will be incorporated to the official version of the closure plan that will be presented to the MERN at the appropriate moment. Stability analyses for the post-restoration period will also be conducted once the new design is completed, and the hydrogeological study will be validated against the new design.

3.4.3 OVERBURDEN ACCUMULATION AREA

The original plan was to construct a distinct overburden accumulation area and an adjacent settling pond. However, discussions during the authorities' analysis of the EIA resulted in the consideration of a different location for the overburden storage. A separate cell is currently being considered within the footprint of the waste rock and tailings pile to store the overburden. The overburden pile runoff can then be collected in the water management pond, resulting in only one final effluent at the site.

A new overburden pile is being designed and the study, once completed, will present the most recent design criteria, characteristics and stability analyses a required in the *Guide*.

This new design also considers that the overburden stripped for the construction of the fire-stop line located to the west and north of the site will simply be stored like a berm along the fire-stop line. This will reduce the volume of overburden that must be transported and stored on the pile, as well as reuse this soil for site restoration.

Non-organic soils will be separated from soils containing organic matter when the overburden is placed on the pile to facilitate the reuse of these materials during restoration. The overburden disposal site will be designed to allow adequate soil drainage since, among other things, the peat containing organic matter is water-laden. The footprint of the overburden pile must comply with level A waterproofing measures, as must the waste rock and tailings pile footprint.

3.4.4 CONCENTRATE DOME

The concentrate will be stored in a dome framed warehouse as it leaves the plant. A concrete slab will form the foundation of the dome. This will ensure that the concentrate will not be exposed to precipitation and will not come into contact with the ground. Trucks will be loaded from this location.

3.5 ON-SITE WATER MANAGEMENT

3.5.1 WATER BALANCE

The site is located in the Eastmain River watershed, which drains an area of approximately 46,000 km^2.

A water balance for the site was conducted in 2019 by Stantec (Stantec, 2019a) and is presented in Appendix C. Furthermore, Map 3 shows the site's hydrology and watershed boundaries.

A portrait of the hydrogeology of the site is presented in Map 4.

3.5.2 PONDS

Two ponds will be developed on the site.

WATER MANAGEMENT POND

It is currently planned that this basin will be located beside the waste rock and tailings accumulation area and will function as a retention basin for all site contact water. Thus, in addition to the waste rock, tailings and overburden pile drainage, the basin will also collect excess water from the ore processing plant, pit dewatering water, drainage ditches from the ore haul roads, industrial sector drainage and drainage from the explosives storage area. Water from these various areas will be pumped to the basin via pump stations, which are shown on Map 3.

This basin was designed to meet the D019 requirements (Stantec, 2019b). The bottom of the basin will be developed directly on the existing low-permeability rock or clay. The crest of the waterproof dikes, which will include a compacted clay core, will reach an elevation of 201.4 m. An emergency spillway will be installed on the west side of the basin. The invert of the emergency overflow will be constructed at elevation 200.4 m. The maximum operating level will be located at elevation 199.7 m, which will allow for a 1.5 m freeboard from the crest of the dikes, in accordance with D019. Thus, the maximum operating capacity will be 1.057 Mm^3.

In the event of additional water requirements, water from this basin could also supply the ore processing plant. Effluent from this basin will be monitored as per the D019 requirements. Currently, studies show that the effluent water quality will meet the D019 requirements. Therefore, there are no plans to install a water treatment unit on the site at this time. However, should the effluent exceed requirements, the basin will store the water until an adequate treatment unit is installed on-site.

As previously mentioned, the concept of the waste rock and tailings pile is under review. Consequently, the water management pond design might also be reassessed; thus the Stantec study mentioned above will not be presented in this version of the closure plan. Final design studies will be incorporated to the official version of the closure plan that will be presented to the MERN. Stability analyses for the post-restoration period will also be conducted once the new design is completed, and the hydrogeological study will be validated against the new design.

PLANT RAW WATER BASIN

The ore stockpile surface will slope gently and drain water to the northeast corner, where a sump and pump station will be installed. The ore stockpile drainage water will flow to the raw water pond. The pump station and water pipes will be sized to meet the expected flows.

This water will feed the ore processing plant on a priority basis.

3.5.3 DRINKING WATER SUPPLY SOURCE

The drinking water supply during the operating period will be provided by two or three groundwater wells and the water will be distributed through a network of underground pipes. The water will be treated prior to consumption. The drinking water requirements are estimated at 41 m^3 of water for 150 workers. As the number of required on-site workers has been increased to 280, the water requirements will be reassessed during the next stages of engineering.

3.5.4 DOMESTIC WASTEWATER

Domestic wastewater will be treated using a fluidized fixed biological culture process (moving bed biofilm reactor). This process allows the treated water to be discharged directly into the receiving environment. Furthermore, a second treatment system will also be installed to meet the phosphorus discharge standard at the end of the first process. The total wastewater discharge was estimated to be approximately 30,000 litres per day for 150 workers. As the number of required on-site workers has been increased to 280, the wastewater discharge quantities will be reassessed during the next stages of engineering.

3.5.5 RUNOFF WATER

A surface water runoff collection system will be developed to channel non-contact runoff to the final effluent. Waste rock and tailings pile runoff water and contact water from haul roads, the industrial sector and the explosives depot will be channelled to the adjacent water management pond via pump stations. Furthermore, ore stockpile runoff water will be directed to the raw water basin via a pump station.

3.5.6 PIT PUMP WATER

The water pumped to dewater the pit will be directed to the water management pond.

3.5.7 FINAL EFFLUENT

The final effluent from the site will be located north of the site in the CE2 watercourse. Effluent quality will be monitored during operation according to the recommended D019 parameters and frequencies. Based on hydrogeochemical modelling, the quality of the final effluent is currently considered to meet the D019 requirements during operation. In the event that the effluent does not meet the environmental requirements, Galaxy will install a water treatment unit on site, and no effluent will be discharged until analyses have proven that the discharged water meets the applicable requirements. Galaxy expects that the water would be accumulated in the water management pond during this period. A space has already been reserved to the east of the waste rock and tailings pile for the development of a potential water treatment unit, if required.

3.6 STORAGE AND DISPOSAL LOCATIONS

3.6.1 CHEMICAL, PETROLEUM AND EXPLOSIVE PRODUCTS

A diesel storage and distribution station will be constructed on the site. This will include three above-ground tanks with an 80,000-litre capacity each. Furthermore, a propane storage and distribution station, which will include two aboveground tanks with a capacity of 110 kl each, will also be constructed near the camp.

Storage areas for explosives and detonator will be constructed to the west of the pit. ANFO and emulsion bulk explosives will be used during the mining of the deposit. An external contractor will handle on-site management of explosives and will also be responsible for disposing of the explosives.

However, the quantity of explosives to be stored is not currently defined.

Agents used in the ore processing process will also be stored on site. Ferrosilicon will be stored in one-tonne bags, while hydrated lime will be stored in 20 kg bags. The flocculant used in the process will be stored in 25 kg bags. These products will be stored on the plant site under applicable requirements.

In the event of a chemical or petroleum spill, the situation will be managed under the applicable regulations.

3.6.2 NON-HAZARDOUS RESIDUAL MATERIALS

Non-hazardous residual materials will consist mainly of domestic waste. This domestic waste will be collected in duly identified bins and transported off-site in compliance with applicable regulations to a site authorized to receive it. The exact location for the disposal of non-hazardous residual materials is yet to be determined.

3.6.3 RESIDUAL HAZARDOUS MATERIALS

Hazardous residual materials, such as used oil or other materials as defined in the Regulation respecting hazardous materials, will be temporarily stored in separate, leak-proof containers identified at the location intended to receive the hazardous residual materials. These will be removed from the site regularly by an authorized carrier, then transported to a place authorized to receive them in accordance with the applicable regulations.

3.6.4 CONTAMINATED SOILS

In the event that soil becomes contaminated with petroleum hydrocarbons, the petroleum hydrocarbons and contaminated response equipment will be stored in separate, identified, leak-proof containers and transported to a site authorized to receive them.

4 REHABILITATION AND RESTORATION MEASURES

Restoration work will be carried out in accordance with the requirements of the *Guide de préparation du plan de réaménagement et de restauration des sites miniers au Québec* (MERN, 2017), the *Directive 019 sur l'industrie minière* (MDDEP, 2012) the *Guide d'intervention – Protection des sols et réhabilitation des terrains contaminés* (MELCC, 2019) and the *Règlement sur la protection et la réhabilitation des* terrains (RPRT) (c. Q-2, r. 37).

The protection, rehabilitation and restoration measures outlined below are intended to return the mine site to a satisfactory condition, i.e.:

— eliminate unacceptable health risks and ensure the safety of people;

— limit the production and spread of substances that could harm the receiving environment and, in the long term, plan to eliminate all forms of maintenance and monitoring;

— restore the site to a visually acceptable condition for the community;

— restore the infrastructure site to a condition compatible with future use.

All areas affected by operations will be restored. The areas considered in the restoration cost estimate are shown on Map 5.

4.1 CLIMATE CHANGE IMPACTS

Impacts from climate change are taken into account in the design of Project infrastructure. The occurrence of these changes should therefore not have any unexpected impacts. For example, an 18% increase in future rainfall intensity is considered when designing new water collection and retention infrastructure, in accordance with the recommendations of Mailhot et al. (2014) and MTMDET (2017). Furthermore, all water retention structures are equipped with an emergency overflow capable of evacuating the maximum probable flood and thus guaranteeing their long-term integrity.

Moreover, the conclusions and recommendations of various reference sources on climate change, such as Ouranos, a consortium on regional climatology and adaptation to climate change that compiles the results of numerous scientific studies on the issue, are taken into consideration when designing structures.

Similarly, the climate change impact will also be taken into account when restoring the site to ensure the long-term integrity of the infrastructure that will be left in place.

4.2 SITE SAFETY

4.2.1 SECURING ACCESS

The site access will already have been secured by a locked fence, the location of which is identified on Map 5. Water will no longer be pumped from the pit at the end of mining operations and the pit will be gradually flooded. The pit will be surrounded by a 2 m high berm, with a ditch built at its foot. Hazard signs will be installed every 30 m in compliance with Section 104 of the *Règlement sur les substances minérales autres que le pétrole, le gaz naturel et la saumure*.

4.2.2 ACCUMULATION AREA STABILITY

The design of the waste rock and tailings pile is under review. Once the design is completed, stability analyses for the operational and post-restoration periods will be conducted. These will be provided to the authorities when available.

4.3 BUILDING AND INFRASTRUCTURE DISMANTLING

When mining activities have ended, all buildings and infrastructure not required for post-closure monitoring will be transported off-site or dismantled by a certified contractor.

When buildings and infrastructure are dismantled, whether in the advanced exploration phase or upon the termination of mining operations, restoration work will include the following activities:

— concrete slabs will be broken and backfilled;

— the buildings will be dismantled;

— salvageable materials and equipment will be set aside and donated or sold on the salvage and used markets;

— the footprint of dismantled infrastructures will first be scarified to facilitate drainage and vegetation recovery, then covered with unconsolidated deposits before being revegetated;

— the geomembrane will be removed from the footprint of the ore accumulation area, then the footprint will be scarified to facilitate drainage and vegetation recovery, then covered with unconsolidated deposits before being revegetated;

— all service equipment, such as tanks, pipes and pumps, will be drained and cleaned. Cleaning water will be collected and treated (sedimentation and water-oil separation, if necessary) before discharge to the environment;

— any equipment containing oil or other liquids with potential for contamination, such as electrical equipment and vehicles, will be drained of liquids before disposal;

— all chemical products, residual and hazardous materials will be managed safely in accordance with current standards and regulations. All solid, liquid, pulp and sludge materials inside the buildings will be characterized, if necessary, and the location of their disposal will be approved by the on-site environmental management representative;

— areas likely to be contaminated will be analyzed. Contaminated soils will be removed and managed in accordance with current regulations;

— water pipes and pumps will be dismantled. Pipes that are in good condition will either be sold or kept for future reuse. Those whose useful life has ended will be disposed of under the provisions of the *Règlement sur l'enfouissement et l'incinération de matières résiduelles* (REIMR);

— surface water mains in the drinking water supply system will be removed while underground water mains will be cut below the ground surface, cleaned and left in place after the openings have been plugged. Electrical pumps and controls will be removed and, depending on their condition, either sold, kept for future reuse or discarded;

— domestic sewage collection facilities will be dismantled (cut below the ground surface and cleaned) and those in good condition will either be sold or kept for future reuse. Those whose useful life has ended will be disposed of under the provisions of the REIMR;

— road infrastructure that will still be used as part of post-operation and post-restoration monitoring will be maintained in place. Access to road infrastructure that will no longer be used will be blocked with concrete blocks. The roads will be scarified, covered with loose deposits and seeded.

4.4 EQUIPMENT AND HEAVY MACHINERY MANAGEMENT

At the end of mining operations, mobile equipment not required for rehabilitation and restoration work will be removed from the site to be resold or disposed of under applicable regulations.

Mechanical, electrical and hydraulic equipment, whether mobile or fixed, will be dismantled.

4.5 ACCUMULATION AREAS

4.5.1 COMPARATIVE ANALYSIS OF RESTORATION SCENARIOS

The mining infrastructure that will be left on-site at the end of the rehabilitation and restoration work is the pit and the waste rock and tailings pile. Therefore, since waste rock and tailings are non-acid generating and non-leachable over the long term, they are considered low risk for the post-operational and post-reclamation periods. For this reason, no specific mitigation or management measures are required for the restoration of the waste rock and tailings pile (i.e., no impervious cover, water catchment) to reach an environmentally satisfactory state. Rather, satisfactory conditions for this infrastructure will be achieved through adequate revegetation of the pile. Therefore, the assessment of possible restoration techniques will consist instead of a choice of revegetation method. For the time being, traditional revegetation techniques are being considered. The revegetation method may be refined as the project progresses.

Furthermore, two techniques were considered for pit restoration, either flooding alone (option 1) or the return of waste rock and tailings to the pit and flooding (option 2). The advantages of returning the waste rock and tailings to the pit consist mainly in reducing the surface area impacted by the activities, stabilizing the pit walls by filling the pit and, finally, reducing leaching for tailings with acid-generating characteristics. However, there are some drawbacks to this technique, including significant costs for transporting the material at the end of the mine life and a considerable volume of greenhouse gas emissions, as well as the need to store the material until it can be returned to the pit.

In this case, flooding the pit alone is considered the most appropriate restoration method for the following reasons:

— Since the waste rock and tailings are leachable in the short term, the pit bed must be sealed to level A standards and the contact water from these materials must be captured and managed. Therefore, since option 2 still requires that waste rock and tailings be stored until they are returned to the pit, an adequate foundation and water management system would still need to be developed and removed when operations are terminated.

— The mine operations will be carried out in several stages and will not allow for the gradual return of waste rock and tailings to the pit; this would imply significant costs during the restoration period. Furthermore, the current management of tailings and waste rock allows for the progressive restoration of the pit, which would not be possible under pit restoration option 2. Note that progressive restoration is encouraged by the Guide, where possible.

— Since the waste rock and tailings are non-acid generating and non-leachable in the long term, their presence in the accumulation area is not likely to cause any long-term environmental problems. Indeed, the accumulation area will be revegetated to be integrated into the site's environment. Moreover, there is no risk of creating environmental problems in the event of a cover failure, since waste rock and tailings are low-risk materials in the post-restoration period. In this respect, waste rock and tailings transported from the accumulation area to the pit could also have a significant impact on the environment, particularly due to emissions generated by the transportation and consumption of fossil fuels.

For all these reasons, the restoration method recommended for the pit is currently the flooding of the pit.

4.5.2 WASTE ROCK AND TAILINGS PILE

The waste rock and tailings pile will be restored progressively. Thus, the materials compacted when deposited will be graded to present slopes with a 3H:1V or 2.5 H:1V geometry. A 0.15 m thick layer of soil conducive to revegetation will be placed on the surface of the materials and then revegetated using sprayed seed. However, the waste rock and tailings pile revegetation method will be reassessed as the engineering of the site progresses, taking into account the choice of plant species, allowing for a sustainable recovery.

4.5.3 OVERBURDEN ACCUMULATION AREA

Materials stored on the overburden pile will be reused to restore accumulation areas and other sectors of the site where required. Thus, when the site is closed, no material will be left on the overburden pile. The footprint of the pile will be scarified and then revegetated using sprayed seeding. However, the waste rock and tailings pile revegetation method will be reassessed as the engineering of the site progresses.

4.5.4 ORE ACCUMULATION AREAS

At the end of activities, no ore will be left on site. The geomembrane, if any, will be removed from the stockpile footprint, which will be scarified and then revegetated using sprayed seeding. However, the waste rock and tailings pile revegetation method will be reassessed as the engineering of the site progresses.

4.5.5 PIT

At the end of activities, pit dewatering will stop, and pit water level will progressively rise until it reaches its natural level. Current hydrogeological studies show that the water level in the pit is expected to peak after 120 to 170 years (WSP, 2018b). The pit will be surrounded by a 2 m high berm, with a ditch built at its foot. Hazard signs will be installed every 30 m in compliance with Section 104 of the *Règlement sur les substances minérales autres que le pétrole, le gaz naturel et la saumure* (RSMPGNS).

4.6 WATER MANAGEMENT INFRASTRUCTURE

At the end of activities, all ditches that will not be useful in the post-restoration period will be backfilled and re-profiled and then revegetated. All areas where restoration work will take place will be profiled to allow for natural water flow and good drainage to avoid water accumulation.

The raw water basin will be characterized first. If the results comply with the applicable regulations, the water will be pumped and then released to the environment. Otherwise, the water will be pumped into the water management pond to be decanted and treated, if necessary.

The sludge accumulated at the bottom of the basins will first be characterized and then managed according to the applicable regulations. Thus, the sludge from the raw water basin will be excavated and transported to the waste rock and tailings pile. For cost estimation purposes, all sludge is assumed to contain only metals. If sludge is contaminated with petroleum hydrocarbons, the sludge would be transported to a licensed treatment facility. For this estimate of restoration costs, approximately 0.25 m of sludge has been assumed to have accumulated at the bottom of each of the ponds.

The raw water basin will then be backfilled, graded and revegetated.

The water management pond will be converted to a wetland after the bottom sludge has been dredged and placed on top of the waste rock and tailings pile. The dikes around the basin will be revegetated and the material will be pushed back into the basin to soften the inner slopes of the basin to meet a slope of 4H: 1V. Several wetland areas will be developed from the centre to the edge of the basin; deep water, shallow water, marsh, swamp and terrestrial. Plants adapted to each area, as well as seeding (swamp and terrestrial), will be introduced. A topsoil cover approximately 0.05 m thick will also be added to the marsh and swamp areas. The marsh will have a release point to the environment at the location of the basin's emergency overflow weir.

The emergency overflow will also be lowered so that the maximum water level that can be reached in the pond is below the natural ground surface. This overflow would be designed with a 1:10,000-year event recurrence.

4.7 TRANSPORTATION INFRASTRUCTURE

Once mining operations are terminated, the road infrastructure that will still be used for post-restoration monitoring will be left in place. However, all non-essential road infrastructure will be scarified, then covered with soil suitable for revegetation and vegetated. Site access will be secured with a fence already in place during the operation.

4.8 PETROLEUM AND CHEMICAL PRODUCTS AND HAZARDOUS AND NON-HAZARDOUS RESIDUAL MATERIALS

As the management of explosives on the site will be carried out by an external contractor, the contractor will also be responsible for disposing of the explosives remaining on-site at the end of operations. Furthermore, the contractor will be responsible for dismantling the explosives and detonator storage depots.

The diesel tank, propane tanks and their surface piping will be removed under the provisions of the *Code de construction* (c. B-1.1, r.0.01.01) and the *Code de sécurité* (c. B-1.1, r.0.01.01.1). Tanks will be sold, retained for future reuse, disposed of or returned to their owner, ensuring compliance with the provisions of the *Code de construction* (c. B-1.1, r.0.01.01).

If the tanks are not reusable, they will be disposed of under the provisions of the *Règlement sur l'enfouissement et l'incinération de matières résiduelles* (REIMR) or the *Règlement sur les matières dangereuses* (RMD).

The majority of the buildings will be dismantled only at the end of the operation phase. Although a large number of materials can be recovered, the dismantling of buildings and infrastructure will require the disposal of a volume of all types of debris.

Generally speaking, materials resulting from the demolition of a building or infrastructure are not hazardous materials as defined in the RMD (c.Q-2, r.32;), unless they are contaminated on the surface by hazardous materials as defined in section 4 of this regulation. Therefore, if the materials resulting from the demolition of a building or infrastructure are not hazardous materials or "classed" as hazardous materials under the RMD, they will be managed as residual materials under the REIMR (c.Q-2, r.6.02).

It is important to specify that adequate cleaning of dismantling materials "classed as hazardous materials" must be carried out to decontaminate them if necessary. Materials deemed decontaminated according to the prescribed standards or criteria may be reused, recycled or recovered under certain conditions. The materials still contaminated will have to be considered as materials classed as hazardous materials and will be disposed of in a centre authorized by the MELCC.

Finally, off-site handling and transportation of residual materials and hazardous residual materials will be carried out in accordance with the applicable laws and regulations.

4.9 LAND REHABILITATION

At the end of mining activities, a land characterization study will be carried out as prescribed by section 31.51 of the LQE. Galaxy will take the necessary measures under the provisions of the LQE and the RPRT if this characterization reveals the presence of contaminants beyond the criteria established by the regulations.

One main activity covered by Section IV of the LQE will have been carried out on the site at the time of closure, namely the extraction or processing of other metal ores (SCIAN code 21229).

Secondary activities covered by Section IV of the LQE will also have been carried out on the site, namely electricity distribution (transformer station only) (SCIAN code 221122), operation of fuel distribution stations (user station) and other motor vehicle repair and maintenance services SCIAN code 811199).

Therefore, the environmental characterization of the site must be carried out in compliance with Section IV of the LQE.

Generic “C” criteria from the *Guide d’intervention* will be considered as the site criteria since the site is dedicated to activities. The results of the specialized natural background soil level study (WSP, 2018e) will also be used in the restoration of the site.

5 POST-RESTORATION CONTROL AND MONITORING PROGRAM

The post-operation and post-restoration monitoring programs are presented below. Details of the program will be submitted with the final mine closure plan. The post-restoration monitoring program will be implemented following the restoration work, while the post-operation environmental follow-up will be carried out between site closure and full restoration of the site. It is proposed that this program be carried out over 5 years, as recommended in D019 for low-risk mine waste accumulation areas. The contact information for the person in charge of the monitoring programs is:

Person in charge: Ms. Gail Amyot
Environment, Health and Safety Director
E-mail: gail.amyot@gxy.com
Telephone: 1-514-558-1855

5.1 STRUCTURAL INTEGRITY CONTROL

The only structures that will remain on the site after restoration are the flooded open pit, the vegetated waste rock and tailings pile and the water management pond that has been converted to a wetland.

A follow-up on the integrity of these structures will be carried out, consisting of an inspection conducted annually for a minimum of five years. The objective of the inspection will be to ensure the presence of adequate drainage on the site and the integrity of the pit safety barrier and the emergency overflow of the basin. Furthermore, additional inspections may be conducted following extreme hydrological events. The program will also include a waste rock and tailings pile inspection to identify any situation that could compromise the stability and integrity of the structure.

Inspections will be carried out by a geotechnical engineer. The objective of the inspections will be to ensure that the integrity of the infrastructure and protective measures are maintained. If any failure is observed, corrective measures will be applied.

After five years of satisfactory results, the inspection program or frequency of inspections may be reviewed. In either case, operations personnel present after the restoration will be on-site to ensure the proper functioning of the facilities. Any maintenance needs identified as a result of the inspections will be carried out as soon as possible.

5.2 AGRONOMIC MONITORING

The agronomic monitoring will be carried out over 5 years during the post-restoration period and will take the form of annual inspections.

Inspections will mainly consist of a visual assessment of various parameters, such as plant condition, percentage of areas showing vegetative recovery, soil erosion, etc. Where appropriate, booster fertilizers will be applied, and reseeding will be carried out.

An inspection report will be sent to the MERN annually over the first five-year period. Following the five years, if corrective measures are required to bring the site to a satisfactory state, the duration of the monitoring could be extended if necessary.

5.3 ENVIRONMENTAL MONITORING

The main objective of environmental monitoring will be to verify groundwater quality and water quality at the final site effluent. The program will also aim to ensure the effectiveness of restoration measures.

Post-operational environmental monitoring will be carried out for three years, from the time operations end until the completion of the restoration work. Thereafter, post-restoration environmental monitoring will be carried out for five years, as recommended by D019. The post-operation environmental monitoring will be carried out on a bi-monthly basis for 6 months, then monthly for 2.5 years, as recommended in D019. Finally, post-restoration monitoring will be carried out six times a year for 5 years.

During the environmental monitoring, it is currently considered that eight observation wells will be sampled to verify the quality of the groundwater in the vicinity of the facilities at risk, such as accumulation areas and petroleum tanks. However, the exact location of the observation wells has not yet been defined. The observation wells will be positioned in compliance with D019 and will be located upstream and downstream of the at-risk facilities. Samples will also be taken from the final site effluent to validate its quality. Note that during the post-restoration period, the final effluent from the site will be located at the outlet of the water management pond overflow, which will then have been converted to a wetland.

The parameters monitored will be those presented in D019. The results of the environmental monitoring will be sent to the MERN and the MELCC each year in the form of an annual report.

6 EMERGENCY PLAN

Galaxy's current emergency prevention and response plan will be adapted for closure and restoration work and then for post-closure activities. This plan will identify potential incidents, thresholds and alert procedures, response procedures for each potential incident and the responsibilities at each stage. The plan will also present human and institutional resources, lists of available equipment and materials, modes of communication during and after an event and post-mortem procedures to assess the event control and corrective measures and update the emergency plan if necessary.

The person responsible for the emergency plan will be the person in charge of environmental monitoring. The plan will be revised regularly so that the information transmitted is constantly updated as the project evolves. The emergency plan will detail the risks, preventive measures and measures to be taken in the event of an accident. During the closure work, site access will continue to be controlled and only persons with appropriate health and safety training will be allowed to work on the sites. The contact information for the person in charge of health and safety is as follows:

Name of proponent: **Galaxy Lithium (Canada) Inc.**

Address: **2000 Peel Street, Suite 720**
Montreal, QC H3A 2W5
Telephone: 1-514-558-1855
Website: http://www.gxy.com/

Authorized representative: **Ms. Gail Amyot, Eng.**
Environment, Health and Safety Director
Telephone: 1-514-558-1855
E-mail: gail.amyot@gxy.com

During the closure and restoration period, the main incident risks currently identified are:

— risk of mobile equipment collisions or rollovers;

— risk of equipment fire;

— risk of instability during the dismantling of certain facilities;

— risk of petroleum product spills or leaks;

— risk of forest fire.

Should one of the events listed above occur, the emergency plan measures would be implemented.

In the post-restoration period, the risk of accidents will be reduced. Indeed, since there will no longer be any regular activity on the site, all accidents caused by human intervention will have a very low probability of occurrence. The main incidents currently identified are:

— vandalism;

— risk of accumulation area instability;

— risk of a pit wall collapse.

Should these events occur, a local alert would be issued. Communication may take place through the environmental monitoring officer, but will ultimately be directed to the Galaxy crisis management coordinator, who will appoint a response officer on site.

7 MEASURES IN THE EVENT OF TEMPORARY SUSPENSION OF ACTIVITIES

Under sections 224 and 226 of the Mining Act, in the event of a temporary suspension of activities for a period of six months or more, the MERN and the MELCC will be notified and Galaxy undertakes to send certified copies of the mining work plans and installations within four months following the suspension of activities.

In accordance with the MERN Guidelines for preparing mine closure plans, during a temporary suspension of operations lasting six months or more, Galaxy will implement security measures. These measures are intended to restrict access to the mine site and the various facilities, as well as to maintain effluent quality control and ensure the physical and chemical stability of the various accumulation and storage areas. The following measures will be applied during a temporary cessation of mining activities:

— site access will be prohibited. Fencing at the entrance to the site will restrict access to the various facilities on-site and help ensure site security;

— a protective berm will be installed around the pit in compliance with regulations;

— “Danger” signs will be installed around the pit;

— breaches will be made in the water management pond dikes;

— an environmental monitoring program will be carried out, including sampling and analysis in compliance with the LQE requirements.

8 ECONOMIC AND TIME CONSIDERATIONS

8.1 COST ASSESSMENT OF RESTORATION

Sections 112 and 113 of the RSMPGNS stipulate that a financial guarantee in an amount corresponding to the anticipated costs of carrying out all the work set out in the operator's site rehabilitation and restoration plan must be paid by the operator referred to in paragraph 1 of the first subsection of section 232.1 of the *Loi sur les mines*.

However, this version of the mine closure plan is only submitted to the COMEX, following their specific request, and not to the MERN, which is the entity responsible for assessing and approving mine closure plans. Thus, this version should not be considered official. Furthermore, Galaxy is currently not required to submit a mine closure plan for the JBLMP, considering the current level of progress of the project and the fact that no activities requiring the approval of a mine closure plan are taking place or are planned to take place on the site in the short term.

Therefore, only a general estimate of the site restoration costs is presented in the following sections. Detailed restoration costs will be presented in future versions of the mine closure plan. The official closure plan will be submitted to the MERN with the mining lease application, after the environmental permit is issued and before the first blast of ore extraction is scheduled.

8.1.1 RESTORATION COSTS

The capital and summary costs for site closure, including engineering fees as well as monitoring and contingency costs, are estimated at approximately $19,390,315.

The amount of a potential financial guarantee will have to correspond to the anticipated costs for the delivery of all the work planned in the site rehabilitation and restoration plan, consisting of the sum of the closure costs and monitoring costs, to which will have been added engineering fees of 30% and a contingency of 15%. The total amount is thus estimated at approximately $29,359,506[4].

Post-operation and post-restoration monitoring and maintenance costs are related to monitoring the integrity of the infrastructure, as well as agronomic and environmental monitoring (monitoring of reseeding, sampling and analysis of groundwater and final effluent, preparation of annual reports). These activities will continue throughout the post-operation monitoring (3 years) and post-restoration monitoring (5 years).

However, these costs remain approximate and representative of the engineering and conceptual progress, in the context that this version of the mine closure plan was prepared at the request of COMEX and will not be submitted for evaluation to the MERN. A subsequent version will be prepared as required by the project context for submission to and approval by the MERN.

[4] In 2020 dollars.

8.2 RESTORATION WORK SCHEDULE

The schedule for delivering the restoration work is shown in Table 8. It was developed based on existing information and current mine planning. It will, of course, be reviewed periodically as work progresses and changes occur.

Table 8 Restoration work schedule

Activities	Post-operation period			Post-restoration period				
	Years							
	1	2	3	1	2	3	4	5
Environmental studies (characterization, rehabilitation plan, demolition and dismantling plan, permits, etc.)	x	x						
Removal or demolition of surface facilities	x	x						
Cleaning and emptying of service equipment	x							
Securing the site	x							
Removal of electrical lines and associated equipment			x					
Excavation, disposal and/or treatment of contaminated solids and excavated residual materials		x						
Excavation and disposal of sludge from basins		x						
Dismantling and filling of basins		x						
Final restoration of the tailings and waste rock pile	x							
Restoration of the overburden pile footprint			x					
Restoration of the ore stockpile footprint	x							
Profiling of final site		x						
Addition of vegetation cover and seeding throughout the site			x					
Post-operation environmental monitoring	x	x	x					
Monitoring of the integrity of the structures, environmental and post-restoration agronomic monitoring				x	x	x	x	x

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CARTES

355 000

360 000

5 790 000

Bassin de rétention de la halde à stériles, résidus et mort-terrain/ *WRTSF Pond*

Effluent final / *Clean Water Discharge*

Emplacement pour éventuelle unité de traitement des eaux / *WTP*

Usine à ciment / *Concret Batch Plant*

Halde à minerai / *Rom Pad*

Camp

Usine de traitement du minerai/ *Process Plant*

Halde à stériles, résidus et mort-terrain / *Waste and Dry Stacked Tails*

Fosse / *Pit*

Lac Asini *Kasashipet*

Lac Asiyan *Akwakwatipusich*

Entrepôt d'explosifs / *Explosives Magazine*

Entrepôt des détonateurs / *Detonators Magazine*

200m Blast Radius

500m Blast Radius

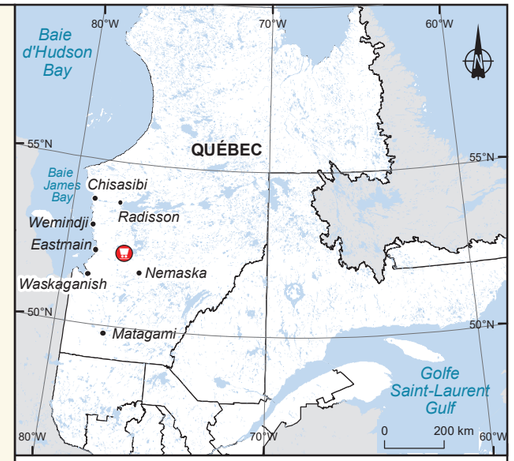
Ligne électrique 450 kV (Hydro-Québec) / *450 kV DC Line (Hydro-Québec)*

Ligne d'alimentation 69 kV / *69 kV OH Feed to Plant*

Route de la Baie-James / *James Bay Road*

Relais routier / *Truck Stop* Km 381

CE1 CE2 CE3 CE4 CE5 CE6



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

Limites du site / *Site Limits*

Composante du projet / *Project Component*

Infrastructures

Hydrographie / *Hydrography*

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

Cours d'eau / *Stream*

Infrastructures / *Infrastructure*

Relais routier / *Truck stop*

Route principale/ *Principal road*

Ligne de transport d'énergie / *Transmission line*

GALAXY

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

Plan de restauration / *Restoration Plan*

Localisation générale et plan d'aménagement anticipé du projet de mine de lithium Baie-James

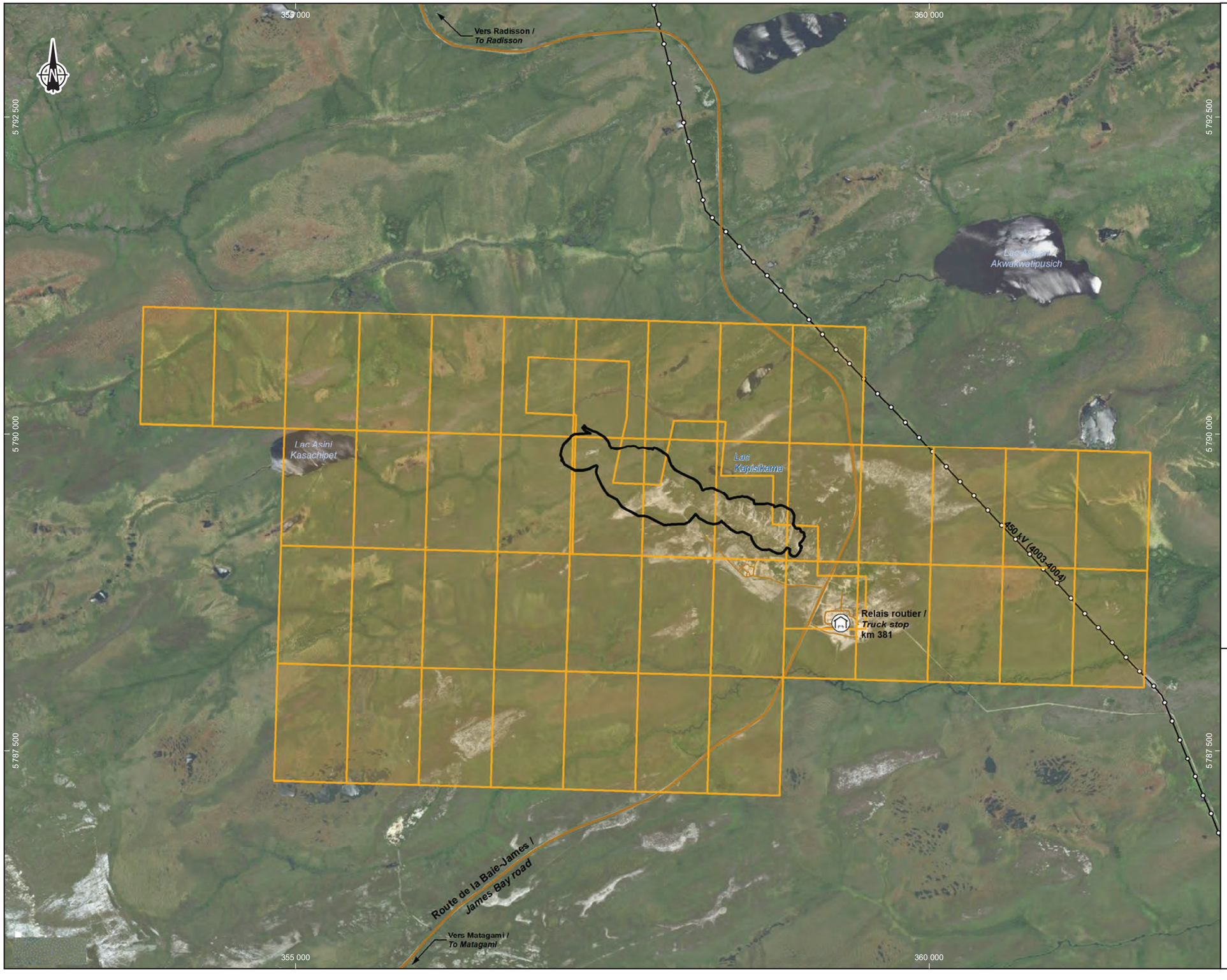
Sources :
CanVec, 2017
Données du projet / Project data, Galaxy, 2017

Cartographie / Mapping : WSP
No Ref : 191_01753_00_PR_c1_loc_200414.mxd

0 250 500 m
UTM 18, NAD83

Carte / *Map* 1

wsp



Contour de la fosse / *Open pit*

Propriété des claims / *Claim Owner*

Galaxy

Infrastructures / Infrastructure

Relais routier / *Truck stop*

Route principale / *Main road*

Route d'accès / *Access road*

Ligne de transport d'énergie / *Transmission line*

GALAXY

Projet de mine de lithium Baie-James /
James Bay Lithium Mine Project
Plan de restauration / *Restoration Plan*

Titres miniers et droits de surface associés au projet de mine de lithium Baie-James

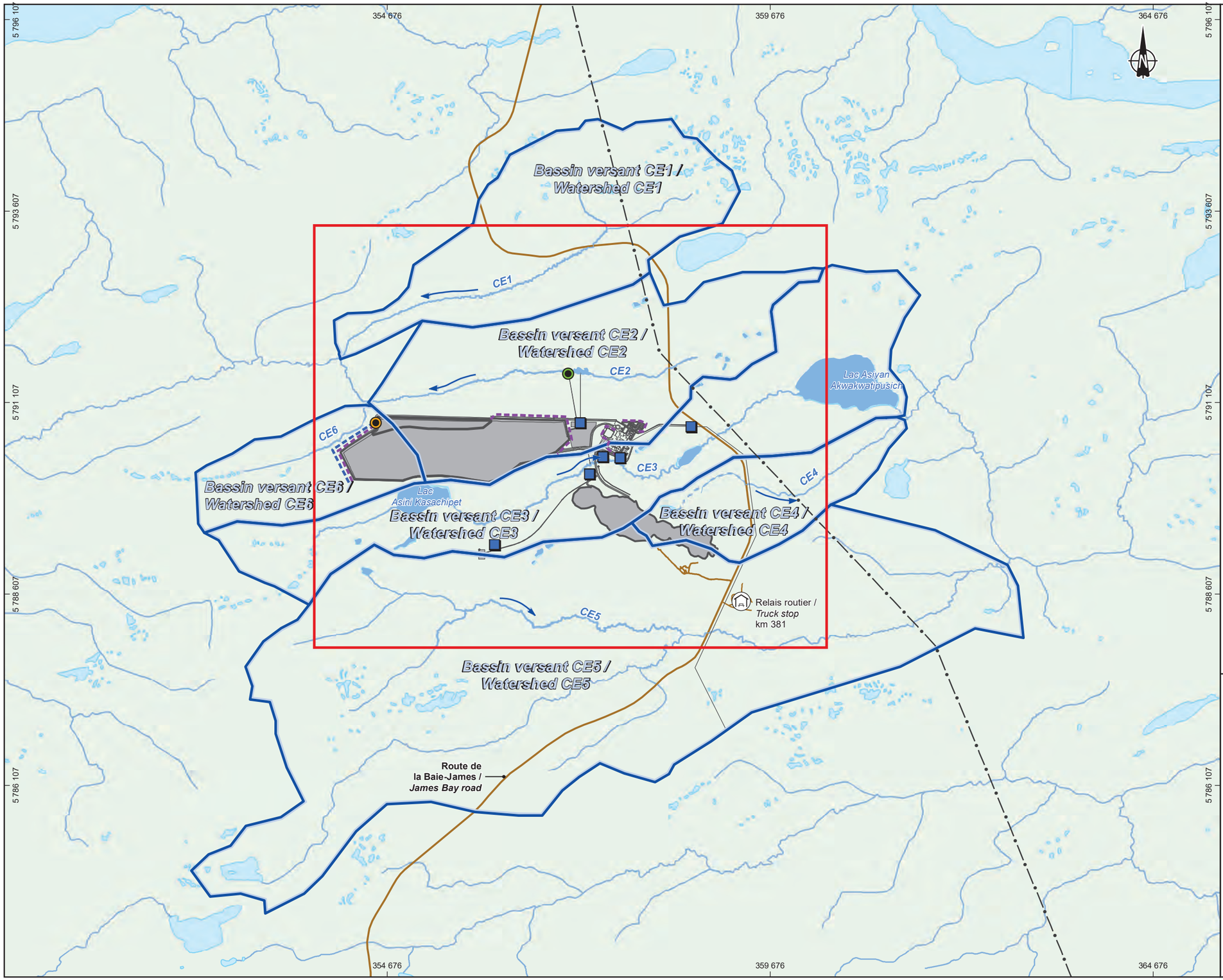
Sources :
Othoimage : Microsoft Bing (ESRI, 2017)
Gestim : MRNF Québec, 200330

No Ref : 191_01753_00_PR_c2_claims_200414.mxd

0 300 600 m
UTM 18, NAD83

Carte / *Map* 2

wsp



Limites du site / *Site Limits*

Infrastructures / Infrastructure

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

Hydrographie / *Hydrography*

- Effluent final / *Final Effluent*
- Déversoir d'urgence / *Emergency Spillway*
- Station de pompage / *Pumping Station*
- CE3 — Numéro de cours d'eau / *Stream number*
- Cours d'eau / *Stream*
- Fossé d'eau de contact
- Fossé d'eau propre
- Sens d'écoulement de l'eau / *Direction of water flow*
- Plan d'eau / *Waterbody*
- Bassin versant / *Watershed*

GALAXY

Projet de mine de lithium Baie-James /
James Bay Lithium Mine Project
Plan de restauration / *Restoration Plan*

Hydrologie du projet de mine de lithium Baie-James

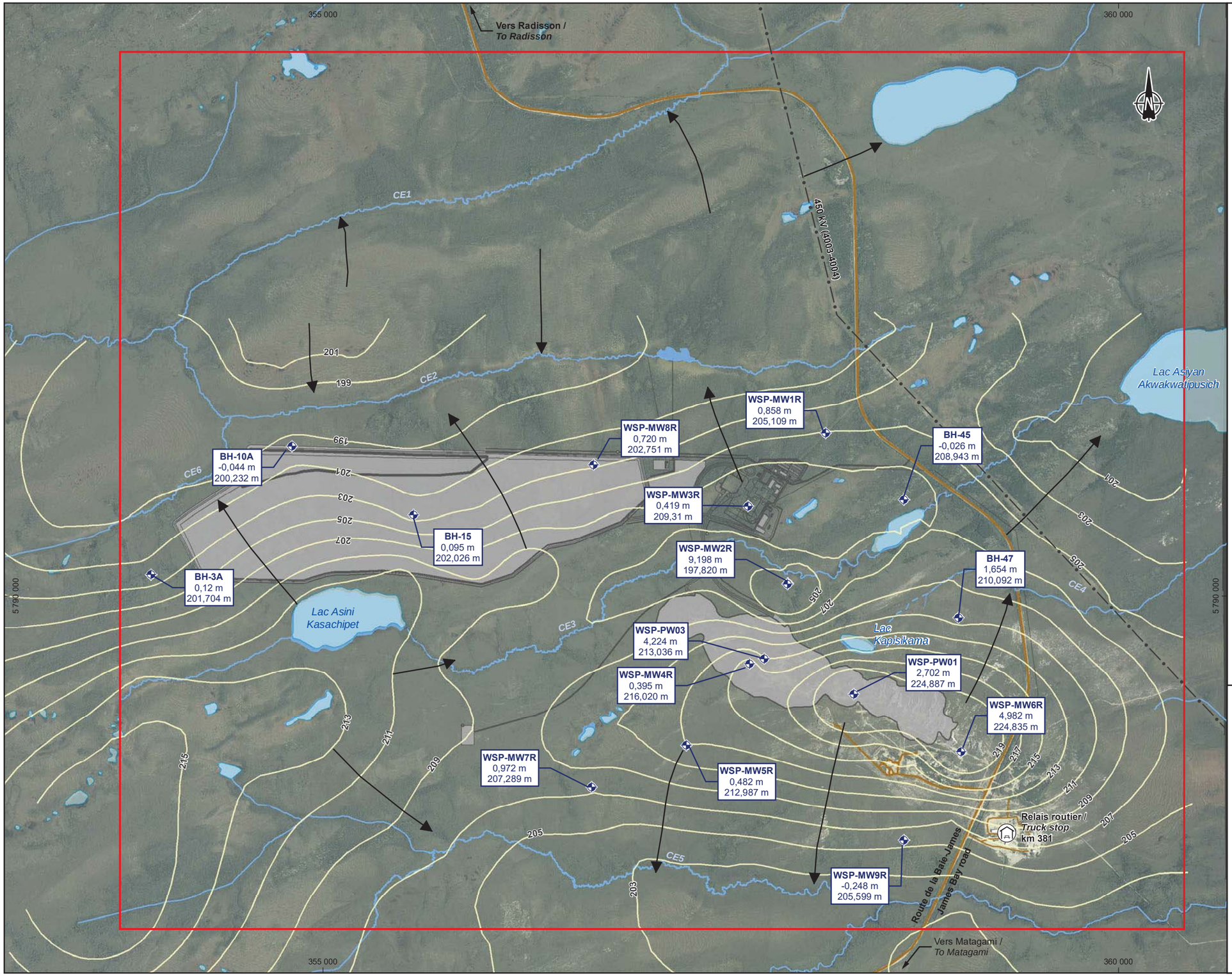
Sources :
Image, Bing Maps Aerial
Inventaire / Inventory, WSP 2017

No Ref : 191_01753_00_PR_c3_BV_200414.mxd

0 500 1 000 m
UTM 18, NAD83

Carte / *Map* 3

wsp



Limites du site / *Site Limits*

Puits d'observation / *Observation well*

Nom du puits d'observation / *Name of observation well*

BH-45
-0,026
208,943 m

Profondeur du niveau d'eau p/r sol / *Water level depth from ground*

Élévation piézométrique (m) / *Piezometric elevation (m)*

Courbe piézométrique / *Piezometric contour*

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

Infrastructures / *Infrastructure*

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

Projet de mine de lithium Baie-James /
James Bay Lithium Mine Project
Plan de restauration / *Restoration Plan*

Hydrogéologie et puits présents sur le site du projet de mine de lithium Baie-James

Sources :
Orthoimage : Galaxy, août / august 2017

Piézométrie, WSP 2018

No Ref : 191_01753_00_PR_c4_hydrogeo_200414.mxd

0 240 480 m
UTM 18, NAD83

Carte / *Map* 4

wsp

355 000

360 000

5 790 000

CE1

CE2

CE3

CE4

CE5

CE6

Effluent final / *Final Effluent*

Obstruction d'accès au site / *Site Access Blocked*

Ligne électrique 450 kV (Hydro-Québec) / *450 kV DC Line (Hydro-Québec)*

Lac Asiyan / *Akwakwatipusich*

Lac Asini / *Kasashipet*

Berme de protection/ *Protection Berm*

Ligne électrique démantelée / *OH Feed Dismantled*

Route de la Baie-James / *James Bay Road*

Relais routier / *Truck Stop*
Km 381

Limites du site / *Site Limits*

Zone de restauration / *Restoration Area*

Bassin aménagé en milieu humide / *Pond converted into wetland*

Bassin remblayé et végétalisé / *Backfilled and vegetated pond*

Halde à stériles, résidus et mort-terrain végétalisée / *Vegetated WRTSF*

Voies de circulation et secteur industriel végétalisés / *Vegetated industrial area and roads*

Fosse ennoyée / *Flooded pit*

Hydrographie / *Hydrography*

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

Cours d'eau / *Stream*

Infrastructures / *Infrastructure*

Infrastructure

Relais routier / *Truck stop*

Route principale/ *Principal road*

Ligne de transport d'énergie / *Transmission line*

GALAXY

Projet de mine de lithium Baie-James /
James Bay Lithium Mine Project
Plan de restauration / *Restoration Plan*

Restauration / *Restoration*

Sources :
CanVec, 2017
Données du projet / Project data, Galaxy, 2017

Cartographie / Mapping : WSP
No Ref : 191_01753_00_PR_c5_restauration_200414.mxd

0 250 500 m
UTM 18, NAD83

Carte / *Map* 5

wsp

APPENDIX

A

RESOLUTION OF THE BOARD OF DIRECTORS

GALAXY LITHIUM (CANADA) INC

BN 830 753 315

("Company")

CIRCULATING RESOLUTION OF DIRECTORS

25 October 2018

Approval of Environmental Impact Assessment

Background

The Company has prepared an Environmental Impact Assessment for the James Bay Lithium Mine (EIA). A draft EIA has been submitted to the board of Directors for approval. Once approved, the EIA will be submitted to various regulatory authorities in Canada for review and approval.

Resolution

In accordance with the Company's constitution, IT IS HEREBY RESOLVED that:

1. The draft EIA submitted to the board of Directors be and is hereby approved; and
2. Mr Anthony Tse, Mr Brian Talbot and Mr Denis Couture are each authorized individually to finalise, execute and lodge with all relevant government departments and agencies an Environmental Impact Assessment on terms materially consistent with the draft EIA submitted to Directors, together with any ancillary forms and documentation contemplated in, or necessary to give effect to the intent of, the EIA (together with any other document or instruments incidental or related to an ancillary document and the transactions contemplated by each ancillary document).

Signed:

Anthony Tse

APPENDIX

B

GEOCHEMICAL CHARACTERIZATIONS