JAMES BAY LITHIUM MINE

ENVIRONMENTAL IMPACT ASSESSMENT

CHAPTER 10: SURVEILLANCE AND MONITORING PROGRAM

JULY 2021 (VERSION 2)

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10 SURVEILLANCE AND MONITORING PROGRAM

10.1 ENVIRONMENTAL MANAGEMENT SYSTEM

Through its environmental policy, GLCI commits to implementing and applying a management system that will ensure the highest environmental standards are applied to its products, services and processes.

To facilitate fulfilling this commitment, the Corporate Environmental and Workplace Health and Safety Division has asked its Canadian representatives to implement an ISO-14001:2015-type environmental management system, with a view to subsequent certification.

The ISO-14001-type system puts environmental concerns at the forefront, and is not limited to legal compliance – it also strives to continuously improve environmental performance. All levels, functions, and decisional processes are invested in the company's environmental performance. One of the guiding principles is to establish a corrective action trigger zone between normal conditions and harmful conditions: more inspections and minor corrective actions, and fewer major corrective actions.

The comprehensive system will be developed and implemented for the period **of operation**. During the construction period, the environmental management rules will be integrated in the project execution plan (PEP). Thus, certain system elements planned **for the operation phase** will be implemented **during the** construction **phase**. Table 10-1 presents all of the elements in a 14001-type system, along with their implementation phase. Setting up an organized system also ensures better use of resources, a reduction in pollution and improved environmental performance, all of which contribute to a decrease in costs.

GLCI will also set up a system for receiving and managing complaints. Generally speaking, the procedure applied will be as follows:

- Any person who feels they have suffered prejudice and would like to file a complaint shall, within a reasonable amount of time after the alleged events, contact the person appointed by GLCI. The complainant may formulate their complaint using one of the following channels: online, by telephone, in person or in writing.
- GLCI will acknowledge receipt of all complaints and date them. GLCI will review the complaint, determine its admissibility in accordance with the procedure criteria to be established and will respond to all complainants. In collaboration with the complainant, GLCI will seek to find a solution and will ensure the complaints are followed up.
- Throughout the process, all documents associated with the complaint shall be kept in a complaint log. Complaints will also be handled confidentially by all stakeholders.

10.2 MONITORING COMMITTEE

As required under *An Act to amend the Mining Act* (section 101.0.3), GLCI will establish a monitoring committee to foster the participation of the communities involved in the project's execution. This committee will be created prior to the mine's construction and will remain active throughout its life, until such time as the works provided for in the mining site rehabilitation plan are fully completed.

The committee's membership will be determined as per the regulations established under the Act, and it will be comprised of at least one representative from the Eastmain Band Council, one from the business community, one from the community of Eastmain and one from the EIJBRG. Furthermore, the RE2 Tallyman or a member of his family will be **invited** to this committee.

Table 10-1 Implementation of the ISO-14001 system

Numbering ISO-14001:2015	System element	Type of document	Construction phase	Operation phase
4.1 – 4.3	Context of the organization	Manual		X
5.1	Leadership and commitment	Manual		X
5.2	Environmental policy	Page signed by upper management	X	X
5.3	Roles and responsibilities	PEP and manual	X	X
6.1.1	Planning – identification of risks and opportunities	Manual		X
6.1.2	Environmental aspects	Register of aspects		X
6.1.3	Compliance requirements	Register of legal requirements	X	X
6.1.4	Planning – actions	Manual		X
6.2	Environmental objectives	Register of objectives		X
7.1	Commitment to supply resources	Manual		X
7.2	Skills	Training matrix		X
7.3	Awareness	Integrated in the contracts Welcome session	X	X
7.4.1	Internal communication	Bulletin board Internal bulletin	X	X
7.4.2	External communication	Register	X	X
7.5	Documented information	System procedures		X
8.1	Operational proficiency	Operational procedures	X[1]	X[2]
8.2	Emergency response	EMP	X	X
9.1	Supervision	Documented inspections with references to legal requirements and issued authorizations	X	
9.1.1	Supervision, measure, analysis and assessment	Operational procedures and programs		X
9.1.2	Compliance assessment	Procedure		X
9.2	Internal audit	Procedure		X
9.3	Management review	Procedure		X
10	Improvement	Register of non-compliances and corrective actions	X	X

1 During construction, new and used hazardous materials management, waste materials management and spill management will be documented in procedures; compliance with these procedures will be integrated in inspections.
2 During operation, all activities with impacts or risks deemed to be significant will be documented in procedures.

GLCI is committed to preparing and making public an annual report of the monitoring committee's activities. The annual report, the contents of which will be more specifically defined in collaboration with the committee members, will include at least the following elements:

- Nature and number of activities carried out;
- Roles and mandates of the local stakeholders involved;
- Subjects and concerns addressed;
- Actions undertaken;
- Local stakeholders' level of satisfaction;
- Responses to the recommendations, as applicable.

10.3 ENVIRONMENTAL MONITORING

An environmental monitoring program describes the means and mechanisms implemented to ensure compliance with legal and environmental requirements. More specifically, the program targets compliance with the laws, regulations and other environmental considerations set out in the plans and specifications, as well as in the authorizations and permits issued by government authorities.

The environmental monitoring program helps to ensure work is progressing smoothly, and equipment and facilities are operating properly. It also ensures that any environmental disturbance caused by project execution is monitored. Environmental monitoring therefore is intended to ensure mitigation measures, conditions set out in the governmental authorizations, GLCI's commitments, as well as the requirements set out in laws and regulations are all followed.

Environmental monitoring will also be enforced during project implementation. GLCI will ensure this general environmental monitoring. Its responsibilities will include:

- Monitoring and overseeing all tasks that require preventive, mitigation or corrective measures with regards to the environment;
- Updating the environmental management system;
- Ensuring work is carried out in accordance with the laws, regulations and conditions set out in authorization certificates;
- Updating the storage and disposal condition follow-up logs for any hazardous waste materials required for the project;
- Monitoring the petroleum product refuelling procedures for project equipment;
- Managing and following procedures to follow in the event of an accidental spill, including monitoring the conditions for temporary stockpiling of contaminated soils, if applicable.

10.3.1 MONITORING PROGRAM DEVELOPMENT AND CONTENT

The preliminary environmental monitoring program presented hereunder will be completed at a later date, subsequent to receipt of authorization for project implementation. **The detailed monitoring program will be presented at the time of the request for the project's certificate of authorization. All information related to the analysis by the various governmental stakeholders (i.e. MELCC, IAAC, COMEX, CEC) will be known at that time, including all commitments resulting from the environmental assessment.**

Once GLCI has received authorizations for its project, discussions will be held with the RE2, VC33 and VC35 trapline tallymen and/or the Eastmain environmental services to determine their interest and willingness to be actively involved in the monitoring activities.

The final **monitoring** program will include:

- List of elements that require environmental monitoring;
- All measures and means planned to protect the environment;

- Consultation with involved stakeholders;
- 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);
- An intervention mechanism 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.

The complete monitoring program will include the following steps:

- **Consolidation of mitigation measures and commitments identified in the EIA;**
- **Consolidation of mitigation measures and commitments added during the ministerial consultation process (provincial and federal);**
- **Development of the monitoring schedule according to the critical construction and operation periods based on the schedule determined during the detailed engineering;**
- **Development of the monitoring schedule according to the type of work and the component to be monitored;**
- **Preparation of the monitoring files;**
- **Determination of the environmental lead's roles and responsibilities and their authority in this regard.**

The monitoring program will indicate the measures and means planned to ensure such monitoring at the time of its implementation. This program may be submitted to the competent authorities at their request. The monitoring program will be developed following the ministerial consultation process and once all the preventive, mitigation and control measures and the various commitments are known.

10.3.2 IMPLEMENTING THE MONITORING PROGRAM

The environmental monitoring program **will be** an activity that is part of the construction site procedures and must be documented like all other activities. The first step will consist in forming an inspection team that has experience with this type of project, so that they can adequately monitor execution of the work. Together with the contractors, the construction and environmental managers will organize numerous construction meetings, the first of which will take place at the very start of the work. One notable goal will be to inform and raise the awareness of personnel assigned to the construction site of the environmental and safety provisions that must be observed throughout the work period, as well as of the general functioning of supervision activities.

Before the start of work, the following activities **will be** performed:

- Verify that all necessary authorizations and permits have been obtained;
- Ensure that all contributors on the construction site have been informed of the environmental concerns and protective measures;
- Establish clear-cut roles and authority for each one, according to a hierarchical system, in preparation for unexpected or non-compliant situations, so that appropriate preventive and corrective measures can be applied;
- Establish measures that contributors will need to apply to protect the environment, according to their respective activities;
- Verify that the spill response plan is available and understood by all;
- Implement the programs and procedures to ensure the businesses' policies are followed;
- Implement the mechanisms to ensure compliance with the procedures in place.

GLCI will ensure regular monitoring during the construction phase. The environmental monitoring program must ensure that all environmental provisions specified in the plans, specifications and authorizations are followed[1].

The program will include regular construction site inspection, documentation control, preparation of reports and compliance with communication channels. Construction site supervision involves direct communication between the person responsible and all other personnel to ensure non-compliant situations are resolved efficiently and immediately, and that action is quickly taken in the event of an environmental emergency.

A process will be established to document and follow-up on construction activities, construction site observations, decisions on how to resolve non-compliant situations, corrective actions taken and results observed as a result of these actions and, lastly, preventive measures implemented to ensure that these non-compliances will not recur.

During the work, mitigation measures must be carefully applied, most particularly during work performed near waterways and bodies of water. Furthermore, throughout the work, GLCI may also identify improvements to make to mitigation measures while complying with environmental requirements, specifications, goals and objectives set out in the environmental impact assessment.

Generally speaking, GLCI will visit the work areas regularly, take note of the contributors' strict compliance with commitments, obligations, measures and other provisions, assess the quality and efficiency of the measures applied and note any non-compliances observed.

Since the specifications will indicate the various protection, prevention and control measures, they will form an integral part of the contract with the contractor responsible for the work. The environmental lead, supported by their team of inspectors, will be responsible for applying all the measures. Any failure to comply will be unacceptable and liable to various penalties.

Just as with the construction phase, an environmental monitoring program will be developed for the mine's site rehabilitation phase. The roles and responsibilities presented above will be the same during site rehabilitation work. Thus, as for the construction phase, the stakeholders involved will be consulted when the environmental monitoring program is developed for the site rehabilitation phase.

The monitoring programs will be integrated into an Environmental and Social Management Plan (ESMP), which specifies monitoring activities for all biophysical and human components related to the project (see section 10.4).

10.4 **MONITORING PROGRAMS** DURING OPERATIONS

As with the environmental monitoring program during construction, the detailed monitoring programs during operations will be finalized upon completion of the ministerial consultation processes at the provincial and federal levels. At that time, GLCI will consolidate all the monitoring commitments to which it has committed considering all the requirements requested into an Environmental and Social Management Plan (ESMP). The environmental monitor will use the detailed ESMP as an environmental guide. The purpose of this tool will be to integrate all applicable commitments and mitigation measures for each of the work sectors that require monitoring. The overall vision will then allow the efficient consolidation of all monitoring programs. The detailed monitoring programs will be submitted to the competent authorities for approval when applying for an environmental authorization and will be completed to their satisfaction. The elements of the monitoring programs are described below and will be improved as needed.

1 As requested by the Joint Assessment Committee in July 2020, the criteria that will be targeted for SS during construction work, the frequency and locations of sampling as well as the corrective measures that will be applied in the event of an overrun will be presented in the detailed monitoring program that will be developed once the ministerial consultation process is completed and all the preventive, mitigation and control measures and the various commitments are known. Runoff from leachable construction materials, such as waste rock, will be subject to specific monitoring and follow-up of ploblematic metals. Corrective measures to ensure compliance with the pollution prevention provisions of the Fisheries Act at all times will be presented where appropriate.

Once GLCI has received the project authorizations, discussions will be held with the RE2, VC33 and VC35 trapline tallymen and/or the Eastmain environmental services to determine their interest and willingness to become actively involved in the monitoring activities. RE2, VC33 and VC35 trapline tallymen who will be invited to sit on the monitoring committee, will also be informed of the results of the monitoring reports.

The environmental monitoring results will be presented in a report to the MELCC and the monitoring committee, which will distribute the results to the Eastmain, Waskaganish and Waswanipi communities. Environmental monitoring reports will also be published on the GLCI website.

GLCI is also committed to holding presentation and explanation sessions on the environmental monitoring results once or twice a year for the Eastmain, Waswanipi and Waskaganish Cree community members. The presentations may be in English and in Cree to ensure that everyone attending these sessions has a good understanding of the information presented. The tallymen will be consulted to determine the topics of discussion and the frequency of these meetings.

10.4.1 MONITORING WATER QUALITY

Water quality will be monitored to ensure compliance with the MDMER on the federal level, and D019 at the provincial level. An **effluent discharge objective (EDO)** monitoring program will also be defined.

10.4.1.1 METAL AND DIAMOND MINING EFFLUENT REGULATIONS (MDMER)

The MDMER, under the Fisheries Act, requires mines to conduct **environmental effects monitoring (EEM) for metal mines** as a condition for effluent authorization. The purpose of EEM is to assess the potential effects that effluents would have on fish, fish habitat and use of fish resources.

The study area covered by EEM will include all waterways exposed to the mine effluent (**CE2**), and a reference waterway located outside the mine's area of influence. **To do so, the stations used to determine the reference state will also be used (Map 6-8).** First, the water quality will be monitored (environment and effluent). This process will consist of three distinct activities:

- Characterization of the effluent;
- Sublethal toxicity test on the effluent at the final discharge point;
- Water quality monitoring, sampled from the exposed area near the effluent inlet point and final discharge point, in the reference areas, and in the selected sampling areas, within the context of the biological monitoring study.

Regarding the biological environment, the following activities will be undertaken:

- **Monitoring the fish population**: The purpose of this is to take measurements of the health indicators of the fish population in the exposed area and reference areas, in order to determine whether the mine's effluents have an effect on the fish. This study is required if effluent concentration in the exposed area is greater than 1% at 250 m from the final discharge point.
- **Monitoring the benthic invertebrate community**: The purpose of this is to determine whether the effluent has an effect on the fish habitat by sampling the benthic organisms in the exposed area and reference area.
- **Monitoring fish tissue**: This will assess whether mercury from the effluent is affecting the use of fishery resources. This monitoring is only necessary if total mercury concentration in the effluent is equal to or greater than 0.10 µg/L.

Concerning the water from the overburden and peat strorage facility , as opposed to what was planned in the initial project (2018) where the water was managed in a closed system independent of mine water, the water will now be collected and channelled to the main water management pond in compliance with the MELCC comment made in the analysis of the 2018 EIA, which favoured a single final effluent on the mine site. Therefore, the monitoring of the water quality will be ensured by the analysis of water from the main water management pond.

An EEM is conducted as follows: the effluent will be characterized four times per calendar year, with at least one month between characterizations. The first characterization will be done no later than six months following the date when the mine becomes subject to the MDMER. Sublethal toxicity tests are performed twice per calendar year for the first three years, and once per year thereafter. Water quality monitoring will be done no later than six months following the date when the mine becomes subject to the MDMER. It is performed four times per calendar year, with at least one month between tests.

The first EEM study plan will be presented no later than 12 months following the date when the mine becomes subject to the MDMER. The various other studies outlined will be performed in accordance with the terms and conditions of the study plan. Furthermore, the first interpretation report will be presented no later than 30 months following the date when the mine becomes subject to the MDMER.

10.4.1.2 MINING INDUSTRY DIRECTIVE 019

The mine will need to monitor the various parameters on a regular basis, according to the frequency established within the context of this directive, i.e. three times per week for SSes [Suspended Solids], once per week for the selected metals and once per month for acute toxicity. Furthermore, due to the fact that effluent volume exceeds 1000 m^3/day, the pH and flow rate will also need to be continuously recorded.

Each year, the mine will need to analyze or measure effluents during the month of July or August. Measurement and sampling of the parameters outlined for annual monitoring must be done over the course of the same day, and will replace the usual monitoring for that week. All results of the annual monitoring must be sent to the MELCC no later than September 30 of that year. It should be noted that the D019 requirements are usually included in the provincial authorization requirements.

10.4.1.3 EFFLUENT DISCHARGE OBJECTIVES (EDO)

GLCI will monitor the EDOs defined by the **MELCC**. The provisions for this monitoring program will be developed in conjunction with the **MELCC**.This program will include:

- the monitoring of phyco-chemical parameters subject to EDOs as well as chemical toxicity at a quarterly basis during the discharge period. For acute toxicity, the monitoring shall be carried out on a monthly.
- the presentation of exceedings of EDOs where appropriate, the cause of these exceedings, and the means taken by the Proponent to meet the EDOs, or to come as close as possible. This exercise shall help identify contaminants that presents no risk to the environment, possibly reducing the list of contaminants to monitor.

An analysis report on the monitoring of the effluent quality will be delivered to the MELCC after 3 years of exploitation and every 5 years thereafter. This report shall include a comparison between EDOs and the results obtained at the effluent, consistent with the document *Lignes directrices pour l'utilisation des objectifs environnementaux de rejet relatifs aux rejets industriels dans le milieu aquatique* and its addendum *Comparaison entre les concentrations mesurées à l'effluent et les objectifs environnementaux de rejet (OER) pour les entreprises existantes*.

10.4.2 MONITORING GROUNDWATER

OBJECTIVE

The groundwater monitoring program falls within the framework of the project. Under D019, a network of monitoring and collection wells must be set up around any facilities that could possibly affect groundwater quality. This network must include observation wells upstream and downstream of each facility at risk. Furthermore, since dewatering of the pit could affect the surrounding groundwater level, monitoring the changes in water level is also proposed.

STUDY AREA

The monitoring wells will be distributed upstream and downstream of the **mining waste rock stockpiles** (**16** sites), the pit (4 sites), the industrial sector (**4** sites) **and the explosives warehouse area (3 sites)**. They will be used for monitoring. Depending on the stratigraphic context, the wells will be dug either in the rock or unconsolidated deposits. Information regarding the proposed wells is found in Table 10-2 and their locations are illustrated on Map 10-1.

MONITORING ACTIVITIES

Monitoring activities will include:

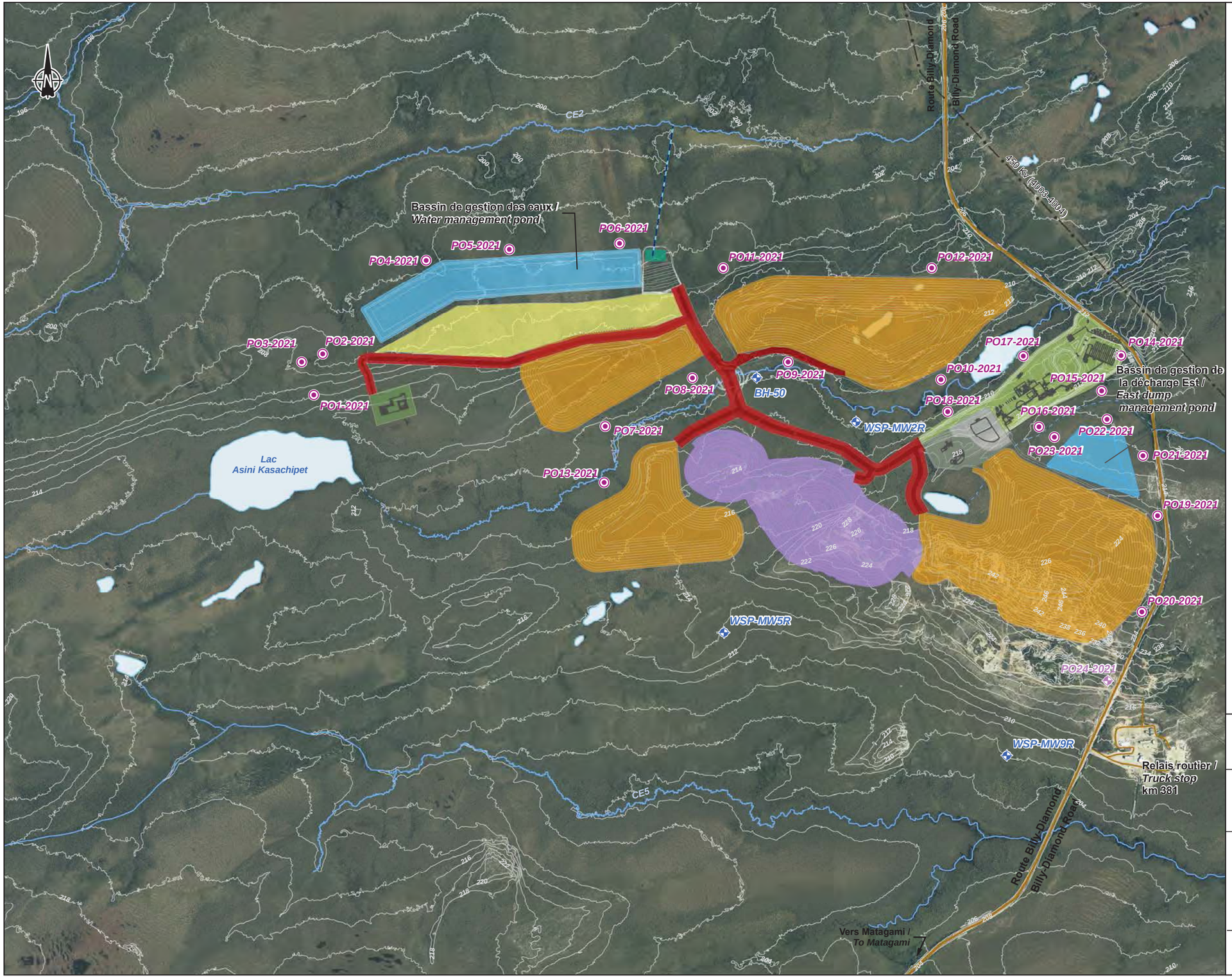
1 Monitoring groundwater quality
2 Monitoring water levels around the pit

Relevant details are presented hereunder.

Monitoring groundwater quality

The micropurge method with parameter stabilization will be used for sampling. This method allows sampling at a low flow rate, which provides a sample that is representative of the aquifer, while minimizing disturbances in the observation wells. Sampling will be done once the physicochemical parameters are stable. The pH, conductivity, temperature and dissolved oxygen data will be compiled regularly using a multi-parameter sensor each time an observation well is purged and whenever a sample is taken.

Water level readings will be taken during the sampling campaigns (spring and summer) in all wells sampled.



Suivi des niveaux des eaux / *Water level monitoring*

- Puits existant / *Existing well*
- Puits proposé / *New well*

Suivi de la qualité de l'eau / *Water quality monitoring*

- Puits proposé / *New well*

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

Composantes du projet / *Project Component*

- Effluent minier / *Mine effluent*
- Route / *Road*
- Usine de traitement de l'eau / *Water treatment plant*
- Secteur administratif et industriel / *Administrative and industrial sector*
- Fosse / *Pit*
- Halde à minerai / *ROM pad*
- Halde à stériles / *Waste rock stockpile*
- Halde à matières organiques et dépôts meubles / *Overburden and peat storage facility*
- Entrepôt à explosifs / *Explosives magazine*
- Cour d'entreposage / *Dry storage area*

GALAXY

Mine de lithium Baie-James / James Bay Lithium Mine

Carte / *Map* 10-1
Suivi des eaux souterraines /
Groundwater Monitoring

Sources :
Orthoimage : Galaxy, août / august 2017
General Arrangement, 2020
Données du projet / Project data : Galaxy 2021

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UTM, fuseau 18, NAD83

Juillet / *July* 2021

Dessin : A. Masson
Approbation : C. Martineau
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wsp

Table 10-2 Geographic coordinates of the wells for groundwater monitoring

Sector	ID	X UTM18 (m)	Y UTM18 (m)
Groundwater quality monitoring			
Explosives warehouse area	PO1-2021	355166.839	5790266.63
	PO2-2021	355138.336	5790357.32
	PO3-2021	355244.574	5790367.69
West stockpile pile sector - pond - overburden pile	PO4-2021	355845.726	5790857.42
	PO5-2021	356247.357	5790911.83
	PO6-2021	356781.138	5790940.34
	PO7-2021	356711.176	5790056.75
	PO8-2021	357133.537	5790289.95
North stockpile sector	PO9-2021	357594.765	5790367.69
	PO10-2021	358333.249	5790282.18
	PO11-2021	357281.234	5790821.14
	PO12-2021	358289.199	5790821.14
JB-1 Stockpile sector	PO13-2021	356705.994	5789784.67
industrial sector	PO14-2021	359203.882	5790398.78
	PO15-2021	359110.6	5790227.76
	PO16-2021	358807.433	5790054.16
	PO17-2021	358732.289	5790396.19
East Stockpile sector - temporary pond	PO18-2021	358366.934	5790126.71
	PO19-2021	359380.081	5789624.02
	PO20-2021	359304.937	5789160.2
	PO21-2021	359310.12	5789914.23
	PO22-2021	359136.511	5790090.43
	PO23-2021	358882.577	5790004.92
Water level monitoring			
Pit sector	WSP-MW5R	357283.955	5789061.02
	PO24-2021	359139.102	5788828.53
	WSP-MW9R	358650.813	5788466.24
	WSP-MW2R	357922.004	5790078.77
	BH-50	357442.243	5790292.23

Parameters to analyze were chosen according to site usage and include those required under D019. Sampling frequency will be twice per year, at summer low flow and spring freshet. The analytical program parameters will be:

- Petroleum hydrocarbons C_{10}-C_{50};
- Major ions (bicarbonates, calcium, carbonates, chlorides, fluoride, magnesium, potassium, sodium and sulfates);
- Dissolved metals (Ag, Al, As, B, Cd, Co, Cr, Cu, Fe, **Hg,** Li, Mn, Mo, Ni, Pb, Se, Sb, Sn, Sr, Ta, Ti, U, V, Zn);
- Nutrients (ammoniacal nitrogen, total Kjeldahl nitrogen, nitrates, nitrites, total phosphorus);
- Other parameters (total cyanides, total dissolved solids, total sulphurs);
- Field measurements (pH, electrical conductivity, temperature, dissolved oxygen, ORP).

A quality control program will be applied to confirm the validity of the various parameter measurement methods. At least 10% of samples will be taken in duplicate and sent to the laboratory for analysis and to verify that their results match the results of the original samples. Field and trip blanks will also be taken with each sampling campaign and sent to the laboratory. Field blanks and trip blanks will also be sampled during each campaign and sent to the laboratory.

Considering the groundwater at the study site could end up in surface water, the chemical analysis results will be compared to the criteria for resurgence in surface water, or RSW (résurgence dans les eaux de surface, or RES) set out in the Guide d'intervention: Protection des sols et réhabilitation des terrains contaminés from the **MELCC** (Beaulieu, 2016).

Moreover, RSW criteria for metals will be adjusted to a hardness of 10 mg/L, which is representative of the water in surrounding streams.

Given certain criteria (Cu, Ba, Mn, Zn) were exceeded when groundwater was sampled, background levels were assessed under D019. The results were presented in the specialized hydrogeology report (WSP, 2018*a*). In the event that they exceed the RES criterion, background levels assessed will be used as the criteria. Lastly, for parameters with no criteria, results will be compared to the values generally observed in the groundwater and concentrations obtained under the initial conditions.

Monitoring water levels around the pit

Piezometric variation will be continually monitored in certain wells using three levelogger-type sensors. A fourth barologger-type sensor will be used to measure atmospheric pressure. Three probes, installed in the pit sector, will enable temperature and water pressure to be measured. These sensors will monitor how pit dewatering affects the water levels near the surface waterways.

SCHEDULE

As soon as operation begins, sampling campaigns will be conducted twice per year, in the spring and summer. The program may be reassessed while it is in progress, in collaboration with the **MELCC**, according to the results obtained.

Water levels around the pit will be continuously monitored every hour. Sensor data will be able to be collected twice per year during the sampling campaigns.

10.4.3 MONITORING DRINKING WATER

OBJECTIVE

GLCI agrees to conduct water quality tests on the drinking water supply wells at the km 381 truck stop and at the well(s) supplying the administrative and industrial sector of the mine to characterize the water in the wells under initial conditions and during mine construction and operation. GLCI is committed to ensuring that no qualitative or quantitative impacts are observed in the truck stop well water. If there is an impact, GLCI will implement corrective actions to ensure an adequate supply of drinking water at the truck stop. These measures could include drilling a new well, on-site water treatment, or even a temporary supply of transported water.

STUDY AREA

The monitoring will concern the drinking water supply at the truck stop at km 381 and the well(s) supplying the mine's administrative and industrial sectors.

MONITORING ACTIVITIES

Monitoring will be carried out in compliance with the Regulation respecting the quality of drinking water (RRQDW). This Regulation's criteria reflect, for most parameters, the guidelines for drinking water quality in Canada.

Monitoring will also be performed on the well water quantity that could be affected by the possible drawdown of the groundwater table.

SCHEDULE

Monitoring will be conducted continuously during the construction phase but more regularly during the operation phase.

10.4.4 MONITORING SEDIMENT PHYSICOCHEMICAL QUALITY

OBJECTIVE

As an integral part of the fish habitat, GLCI undertakes to carry out sediment physicochemical quality monitoring. 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*.

STUDY AREA

The program will tie into the water quality monitoring, and the same stations sampled for the initial characterization will be used (Section 6.2.9 and Map 6-8). The existing stations have locations that will, or will not, be exposed to the expected effluent.

MONITORING ACTIVITIES

The same parameters as the initial characterization will be analyzed to compare the results before project start-up and during mine operation.

Station results will also be compared between stations that are exposed and not exposed to project activities. Specifics of the program will be proposed to the MELCC during application for a depollution attestation, and the program will be adjusted as required.

SCHEDULE

This sampling will be conducted during the operational phase in different years, the interval of which is to be determined with the MELCC. Sediment monitoring must be included as part of the EEM to meet federal requirements.

10.4.5 MONITORING VEGETATION AND WETLANDS SURROUNDING THE INFRASTRUCTURE

OBJECTIVE

In addition to areas directly affected by work, the development of the site and projected infrastructures will have an indirect impact on preserved plant communities. Construction of the mining infrastructures could modify the terrestrial and wetland plant communities in the vicinity; modification to the drainage patterns could also lead to modification in the hydrology of certain wetland areas.

This monitoring program will allow assessment of the project's indirect impacts on the terrestrial and wetland plant communities, as well as re-assessment, depending on results obtained, of the surface area that will need to be compensated. A monitoring report will be produced and mitigation measures enhanced, as needed.

STUDY AREA

The monitoring method will include the detailed inventory of vegetation in the survey plots located along the transects, in a 25-m band, in order to be able to discern a potential disturbance gradient.

MONITORING ACTIVITIES

Vegetation and hydrology of the plant communities will be monitored in a 25-m band around the mining infrastructures. The purpose of this monitoring program will be to document the following parameters:

- Characterization of vegetation in plant communities adjacent to mining infrastructures;
- Comparison with the composition of original vegetation in the plant community;
- Characterization of the hydrology of wetlands (hydrological and pedological indicators) adjacent to mining infrastructures;
- Comparison with original hydrological and pedological indicators;
- Identification of modifications in terms of composition and/or hydrology.

SCHEDULE

The first inventory will be carried out during the site construction phase, and monitoring will be conducted over a five-year period, on years 1, 3 and 5.

10.4.6 MONITORING TRANSPLANTATION OF CAREX STERILIS PLANTS

A population of *Carex sterilis* plants, **previously identified as a plant species "likely to be designated as threatened or vulnerable in Quebec" during the initial impact assessment**, will be **affected** by the mining infrastructure construction work. **However, this species was removed from this list in the most recent ministerial order published in the *Gazette officielle du Québec* on February 12, 2020. Therefore, this population will not be monitored.**

10.4.7 MONITORING OF THE INTRODUCTION AND SPREADING OF INVASIVE ALIEN PLANT SPECIES

OBJECTIVE

Construction work and activities associated with mine operations could contribute to the accidental introduction and spreading of invasive alien plant species (IAPS) on the territory.

STUDY AREA

Work and traffic areas on the mining site.

MONITORING ACTIVITIES

The monitoring program will aim to:

- Survey all areas where work takes place and machinery travels during the plant growth period (July and August) to identify possible IAPS;
- Mark out and characterize any IAPS colonies with a GPS and take photos;
- Identify the most appropriate control method, eradicate and manage the waste and soils contaminated by these plants to prevent subsequent spreading;
- If required, monitor the colony and its eradication for a three-year period.

SCHEDULE

Annual follow-up will take place to detect the presence of IAPS in areas affected by the work. Introduction and spreading of IAPS will be monitored every year during the mine construction, operation and rehabilitation phases. Once rehabilitation is complete, the area will be monitored one more time. An annual report will be produced and mitigation measures enhanced if significant issues associated with IAPS are detected.

10.4.8 MONITORING EFFECTIVENESS OF COMPENSATION PROJECTS FOR LOSS OF WETLANDS

If the compensation program for loss of wetlands includes arrangement, rehabilitation or creation of wetlands, specific monitoring programs will be developed to assess their effectiveness over the medium term. These projects will be subject to pre-approval from the **MELCC**.

10.4.9 MONITORING AIR QUALITY

OBJECTIVE

Air quality will be monitored within the context of the project. The purpose of the monitoring program is to measure the impact that mining activities have on the local air quality. This will be carried out in order to determine whether the mining operations are acceptable and compliant with applicable standards and criteria, i.e. those set out in the **MELCC**'s *Normes et critères québécois de qualité de l'atmosphère* [Quebec's atmospheric quality standards and criteria]. This program will primarily consist of sampling the ambient air.

STUDY AREA

A measuring station will be set up near the 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.** The exact location of this measurement station will depend on the direction of prevailing winds and other dust sources. The proposed location will be submitted to the **MELCC** beforehand for validation. A verification will be carried out to ensure that the ECCC and **MELCC** location criteria are met, i.e.:

- Minimum distance of 100 m from a waterway or body of water;
- Minimum distance of twice the height of any windbreak obstacles;
- Sampling points located at least 2 m from the ground;
- Measurements taken are representative of the study area's conditions.

The site selected will also need to be far enough from the Billy Diamond Highway and km 381 truck stop to ensure values obtained are representative of operations.

MONITORING ACTIVITIES

GLCI proposes monitoring total particulate matter (TPM), respirable suspended particulate matter (PM10), fine particulate matter (PM2.5) and crystalline silica from the start of operations. The monitoring will be modulated according to the results collected. A high-volume (Hi-Vol) sampler is recommended for the TPM analysis. Hi-Vol sampling will be for a 24-hour period from midnight to midnight the next day, and carried out for TPM once every six days. These samples will also be used to monitor exposure to certain metals. Metals with standards based on smaller average particle sizes will be first measured on total particulate. If standards are exceeded, then the size of the particles will then be measured.

The monitoring of respirable suspended particulate matter (PM10) and fine particulate matter (PM2.5) will be performed using a T640 type instrument or equivalent. This instrument is a nephelometer allowing the continuous measurement of PM10 and PM2.5 particles. It is listed on the USEPA's list of designated reference or equivalent methods[2].

The potential emission of NO_2 generated during blasting will be monitored mainly through the observation of blasting events. This monitoring is presented in the dust management plan and also includes the implementation of additional mitigation measures, if needed, that may lead to better management and reduced NO_2 emissions from blasting.

2 **https://www.epa.gov/sites/production/files/2019-08/documents/designated_reference_and-equivalent_methods.pdf (December 15, 2020 version)**

Monitoring of crystalline silica will be performed on particulate matter collected on filters by sampling PM4 using a PQ100 sampler. The PM4 fraction will be collected using a sampling flow rate and a selective head equipped with an appropriate cyclone (SCCA, 11.1 LPM). To achieve an adequate detection limit, sampling will be conducted over five days (7,200 minutes). Silica laboratory analyses will be performed in compliance with the NIOSH 7500 protocol.

All analyses will be performed in a MELCC certified laboratory. Methods used will comply with those developed by the CEAEQ [Centre d'expertise en analyse environnementale du Québec], whenever available. Several quality control and quality assurance (QC/QA) measures will be instituted within the framework of the sampling campaign to ensure results are representative and accurate.

SCHEDULE

The measurement station will be installed at the very start of operations and will run continuously throughout the site operation phase.

10.4.10MONITORING THE SOCIAL ENVIRONMENT

10.4.10.1 MONITORING THE SOCIOECONOMIC ENVIRONMENT

OBJECTIVE

The project will have positive benefits on training, jobs and the Cree communities' economy, most particularly the community of Eastmain. The proposed monitoring program is intended to qualify and quantify the economic benefits, and to evaluate the effectiveness of the measures implemented, and whether or not the community's expectations have been reached.

MONITORING ACTIVITIES

Monitoring the socioeconomic conditions will be based on documentary research and meetings with organizations and workers in the Eastmain community. With regard to documentary research, monitoring will be based on available data and statistics, most notably the following:

- Training programs, school clientele and success rate;
- Number of Cree employees at the mine, type and duration of jobs, and the workers' socioeconomic profile;
- Value of contracts won by Cree businesses;
- Data on the active population, employment rate and unemployment rate (Institut de la statistique du Québec [Quebec Statistics Institute], Statistics Canada, etc.).

Furthermore, meetings with stakeholders from Eastmain will provide an opportunity to obtain information on various aspects associated with training, jobs and contracts. Some of the organizations that could be met are:

- Council of the Cree Nation of Eastmain;
- Cree School Board;
- Wabannutao Eeyou Development Corporation (WEDC).

GLCI will also survey Cree workers at the mine to document their assessment of and experience with their jobs. A monitoring report will be produced each year.

SCHEDULE

The monitoring **will be performed annually. The data will also be included in the annual report. The data taken during the monitoring will be analyzed and will be the subject of specific reports every 10 years.**

10.4.10.2 MONITORING CURRENT USE OF LAND AND RESOURCES FOR TRADITIONAL PURPOSES

OBJECTIVE

The proposed monitoring program is intended to document and evaluate the effects that the project has on the practice of traditional activities of the RE2, **VC33, VC35 trapline tallymen** and the members of **their families**, as well as the effectiveness of the measures implemented. Frequent and regular contact will also be maintained with the RE2 trapline Tallyman to ensure that the mining activities do not hinder the territory users' activities, and to make any necessary adjustments.

Furthermore, other stakeholders may be consulted on the monitoring of certain specific issues. For example, the RE3 and R08 tallymen and the Waskaganish and Eastmain communities will be involved in monitoring traffic management and access to the camps and trails.

STUDY AREA

The territory in consideration corresponds to the study area illustrated on Map 6-22.

MONITORING ACTIVITIES

This monitoring is based on meetings with the RE2, **VC33, VC35 trapline tallymen** and members of **their families**. These meetings will provide an opportunity to update data and information collected during interviews conducted within the context of the EIA and to gather information regarding the current situation at the time of monitoring. Interviews will address the following subjects:

- Use and frequentation of the study area;
- Traditional hunting, fishing, trapping and other activities;
- Trails for snowmobiles and other modes of transport;
- Frequentation of the camps **and their quietness**;
- Problems using the territory;
- Accessibility to activity areas and travel;
- Assessment of the state of the resources;
- Changes that occurred and perceived effects;
- Assessment of measures implemented to mitigate the effects;
- **Effectiveness of the traffic management plan;**
- **Access to camps during hunting seasons**

SCHEDULE

Monitoring activities will be carried out according to the following schedule:

- Upon completion of construction;
- On the third, seventh, twelfth and last year of operation;
- One year after mine rehabilitation work has been completed.

If, after a few years of monitoring, no significant change is observed at the VC33 and VC35 traplines, monitoring will be limited to RE2 land users. It should be noted that VC33 and VC35 land users will still be able to contact the mine owner, if deemed necessary.

10.4.10.3 MONITORING QUALITY OF LIFE AND WELL-BEING

OBJECTIVE

Consultation activities carried out within the context of this environmental assessment brought to light the significance of the concerns that stakeholders who were interviewed expressed regarding quality of life and well-being in Cree communities. The monitoring program focuses on the population in the community of Eastmain. **GLCI will establish a monitoring committee before the project construction begins. Steps have been taken with the Cree Board of Health and Social Services of James Bay (CBHSSJB) for a representative of the organization to sit on the committee. The various users of the land will also be involved in this monitoring committee. As far as possible, GLCI will undertake to implement solutions to alleviate the social and/or health problems brought to its attention and regular monitoring will be performed. The details associated with the final social impact monitoring program, such as the target stakeholders, proposed activities, and issues to be monitored, will be specified after the project is authorized, before the construction period.**

MONITORING ACTIVITIES

The monitoring program will pertain to:

- Improving the quality of life of the members of this community;
- Tensions between the Cree population and mine workers;
- Social problems most notably associated with alcohol and drug consumption and compulsive gambling;
- **Sexual harassment problems;**
- Managing the enrichment of a portion of the community;
- Sense of loss and damage to cultural identity;
- Billy-Diamond highway users' diminished sense of security;
- Pressure on the health and social services systems.

This aspect will be based on meetings and discussion groups with stakeholders from the Eastmain community, which will allow the population an opportunity to express themselves regarding this aspect of the project.

Some of the organizations that could be met are:

- Council of the Cree Nation of Eastmain;
- Cree Board of Health and Social Services of James Bay;
- **Cree Women of Eeyou Istchee Association.**

Issues related to possible social problems such as sexual harassment, drug or alcohol use or safety issues will be addressed through investigation, discussion and meetings with GLCI employees and the liaison officer. A system for confidentially receiving and processing complaints will be implemented by GLCI before the start of construction, and will continue until mine closure. Complaints related to women's sense of well-being and safety can be addressed through this system. GLCI will ensure that these complaints are dealt with quickly and effectively. The human resources department will include at least one Cree woman who will monitor employee well-being, including that of Cree women.

SCHEDULE

Monitoring activities will be carried out according to the following schedule:

- Upon completion of construction;
- On the second, seventh, twelfth and last year of operation;
- One year after mine rehabilitation work has been completed.

10.4.10.4 TRADITIONAL FOOD

OBJECTIVE

Once the authorizations are obtained, GLCI is committed to developing a monitoring program for the quality of plants used by the Cree community as traditional food. The objective of this program will be to record any changes in the chemical composition of the main foods used by the community. The monitoring programs for the physical environment (water, air and sediment quality) will, therefore, complement the traditional food monitoring program and ensure compliance with environmental requirements.

MONITORING ACTIVITIES

This program will be developed in collaboration with the land's users to adequately target the species to be monitored. A preliminary version of the program will be developed and presented to the Eastmain, Waskaganish and Waswanipi communities for discussion.

The 24 metals analyzed in the leaves/needles, fruits, branches of six species sampled in the study area as part of the EIA 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.

The results of the physical environmental quality will be compared to the human health protection criteria. GLCI will ensure that additional mitigation measures are implemented quickly should they be required to ensure compliance with these criteria.

10.4.10.5 NOISE

OBJECTIVE

A noise monitoring program will be designed to ensure compliance with the NI 98-01 noise limits and the Health Canada recommendations in its document entitled "Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise" (January 2017).

The detailed monitoring plan will be developed once the project's detailed engineering is completed.

MONITORING ACTIVITIES

At least two measurements will be taken at measurement points C1 and C2 (workers' camp and truck stop). Depending on the updated modelling results, other measurement points may be added (notably sites used by Indigenous persons).

At each assessment point, a measurement station will be installed, consisting of a sound level meter (including a microphone) and an audio recorder. The measurements will be taken continuously over at least 24 hours during weather conditions suitable for environmental noise measurements. A report will summarize the measurement results, the data processing and analysis, the measured sound indices with or without recording, in third-octave frequency bands and sound indices as required. Mitigation measures will be proposed if noise limits are exceeded.

SCHEDULE

This sampling will be conducted during the operational phase in different years the interval of which is to be determined with the MELCC.

10.4.11 MONITORING WILDLIFE

GLCI plans on involving land users in all operations affecting wildlife resources on their territory. The James Bay Eeyou Istchee representatives, the Eastmain, Waswanipi and Waskaganish band councils or designated community members, the RE1, RE2, RE3, VC33, VC35 and R08 trapline tallymen or a representative that they will appoint respectively and Matagami representatives will sit on the monitoring committee, and their participation will be solicited to learn about the monitoring measures and participate in their improvement so that the activities will proceed in compliance with traditional knowledge and community acceptance.

10.4.11.1 MONITORING BEAVER

OBJECTIVE

Beaver is a concern for the Cree users of the territory. The beaver will be the subject of special monitoring. The monitoring objectives are to ensure the safety of the dams and the colony's health while considering the dynamics of the beaver habitat. The monitoring points will be located in the areas most at risk of causing problems to mining infrastructures or access roads.

MONITORING ACTIVITIES

The monitoring will be performed with a habitat inspection. The terrain surrounding the site being hard to navigate, drone inspection may be considered where required. If issues are noted, the condition will be reported to the monitoring committee and the tallyman will be contacted. A solution will then be discussed with an expert and the tallyman of the area in question to have the animals trapped or the problematic structures dismantled. Mitigation measures presented before will, therefore, be applicable for the management of beaver dams in the vicinity (i.e. UTT03: 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. CIR02: Secure sites that pose a risk to land users).

Information on beaver, as well as on other wildlife species of interest to Cree users, will be communicated to the monitoring committee where tallymen will be represented. This information will then be communicated to relevant tallymen.

SCHEDULE

Monitoring the presence of beaver will be carried out in parallel with the regular inspection of mine site facilities and the surrounding areas. Beaver dam inspections will be conducted at monitoring points previously identified during the initial inventory and likely every two weeks during the active season (frequency to be confirmed following the initial inventory). This interval is based on a control objective in cohabitation with the beaver colony.

10.4.11.2 MONITORING BIRD POPULATIONS

The main monitoring and surveillance activities for migratory birds likely to frequent the territory during the mine's construction, operation and restoration phases are presented. Particular attention is given to waterfowl, a species that is highly valued by the local community, and species at risk under the LEMV (Act respecting threatened or vulnerable species), SARA or COSEWIC recommendations.

USE OF PONDS

One of the issues for bird populations during mine operations is their use of the various ponds (retention and sedimentation). As previously mentioned, these ponds are not attractive environments for avian wildlife, as they do not offer a food source, unlike the surrounding lakes and ponds. However, to ensure this, inspection measures will be implemented as soon as the ponds are created, in conjunction with the water quality monitoring that will be conducted in compliance with the federal MDMER and the provincial D 019 (section 10.4.1 of the EIS), to document the possible presence of bird concentrations and, if necessary, quickly implement measures to minimize the use of these ponds by avian fauna (FAU 06).

A monthly inspection program of these ponds, distributed throughout the ice-free period, will allow for the recording and quantification of the possible presence of birds or other wildlife. The competent authorities will be consulted as required and, if necessary, appropriate mitigation measures applied. At first glance, acoustic scaring devices appear to be the best option (WSP, 2007). 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.**
- **The inspection shall 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.**

- The inspection 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 an individual qualified to identify birds. Data will be compiled in a record of which a copy will also be kept by GLCI. The wildlife record will be a part of the global inspection and monitoring reports that will be made available to the monitoring committee.
- 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.

USE OF BORROW PITS

An inspection of the use of borrow pits by wildlife will be conducted during bi-monthly rounds or site visits by the environmental monitor. The specific problem with borrow pits is mainly related to their potential use by nesting Bank Swallows. To target this specific issue, inspections would be staggered from mid-May to mid-August inclusively. The monitoring frequency shall be increased to one visit per week if Bank Swallow is observed at any of the sites.

Table 7.5 in Chapter 7 (FAU 07) identifies applicable mitigation measures should the inspected sites be used by Bank Swallows.

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

- The program will be implemented to verify the possible presence of Bank Swallow at the project's borrow pits.
- The inspection part of this program will be assigned to a competent individual (biologist or technician). This individual 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, the individual will report any violation to GLCI's management
- Site visits shall be conducted before opening a new borrow pit, and afterwards on a bi-monthly basis 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.
- All borrow pits selected for material extraction will be visited from mid-May to mid-August;
- To reduce the appeal of borrow pits for Bank Swallow nesting, 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, 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 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.

OVERALL MONITORING OF BREEDING BIRDS

For the purpose of documenting the actual impact of the mine on the breeding birds, five-year surveys can be carried out at various stages of operation until the follow-up monitoring of restoration work, starting from the fifth year of mine operation until the fifth year after its permanent closure.

Post-closure monitoring could also be conducted in conjunction with other required monitoring (e.g. vegetation recovery monitoring). These surveys will help document the effect of restoration on the natural habitats affected by forest fires on bird populations.

These breeding bird surveys could be conducted at listening stations visited during the 2017 survey, at several stations within the project footprint, and at selected restored sites as the project progresses.

10.4.11.3 MONITORING FISH AND FISH HABITAT

The MDMER, under the Fisheries Act, requires mines to conduct environmental effects monitoring (EEM) for metal mines as a condition for effluent authorization. The purpose of EEM is to assess the potential effects that effluents would have on fish, fish habitat and use of fish resources. Section 10.4.1 presents the specifics of this monitoring.

10.4.11.4 MONITORING OF SPECIES AT RISK

In addition to the monitoring programs presented in section 10.4.10.2 for avian populations, various environmental monitoring programs may be conducted for other major terrestrial animal species of special concern under the LEMV, SARA or COSEWIC recommendations.

BATS

A survey effort of 261 station nights was made to assess the use of the study area by bats, and all of the data collected was analyzed, which significantly exceeds provincial requirements for this (MRNF, 2008). Despite this survey effort, only 68 bat passages were recorded for all the stations, including three calls by bats of the Myotis genus, which is explained by the generally poor quality of the environment and the northern nature of the study site (WSP, 2018). Moreover, the project's impact on bats was deemed minor following the completion of the impact assessment.

For the purpose of documenting the impact of the project on bat species at risk, we propose five-year surveys carried out at various stages of mine operation until the monitoring of restoration work, starting from the fifth year of mine operation until the fifth year after its permanent closure. These surveys will also help document the effect of restoration on the natural habitats affected by forest fires on these mammals.

These surveys would be conducted using the same protocol and at the same sites as those examined during the 2017 survey, using six automated stations active during the breeding (early June to late July) and migration (mid-August to mid-October) periods. Locations surveyed in 2017, but rendered unsuitable by mine operations, would be replaced by an adjacent site with similar habitat.

However, although we propose monitoring this wildlife component, it is likely that the data collected would not be sufficient, given the low relative densities recorded, to assess the effectiveness of the mitigation measures implemented as part of the James Bay Lithium Mine project. Consequently, if the first three years of monitoring (years 1, 5 and 10) do not show significant differences in the use of the study area by bats — or suggest an increase in use — this monitoring could be discontinued with the MFFP's agreement.

CARIBOU AND WOLVERINE

Considering the low probability of wolverine presence in the study area, the extent of the territory it occupies, the small size of the area influenced by the mining project and the intensity of current human occupation in the sector, the James Bay Lithium Mine project will not affect this species.

Furthermore, the project is considered to have no significant effect on woodland caribou or their habitat. As previously mentioned, 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.

However, the Proponent commits to creating a joint work table (GLCI, Eastmain community and Waskaganish community) to discuss the caribou monitoring to perform. This monitoring could provide a more accurate picture of past and projected caribou use on the RE2, RE3, VC33, VC35, R08 traplines (and RE1 if needed). It would also allow for the collection of traditional knowledge concerning caribou habitat fragmentation. This monitoring would allow the development of adequate measures to mitigate the possible effects of the project on the harvesting of woodland and migratory caribou for current and future territory users. It will also help knowledge transfer in the communities about caribou and its "sensitive" status, to promote good Cree practices and the preservation of the resource for future generations, which could include a growing number of young hunters.

Furthermore, a boreal caribou module will be integrated into the mine's employee and subcontractor training, the objectives of which would be to educate them about the precarious nature of boreal caribou, develop their ability to distinguish potential signs of presence, and inform them of the control system and action plan in case of caribou presence and the importance of reporting any on-site caribou observations. Where applicable, these observations will be compiled in a wildlife record.

The proponent also plans to 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 Billy Diamond Highway.

SPECIES WITH SPECIAL STATUS

In addition to the monitoring program presented in Section 10.4.10.2, the purpose of the monitoring 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.

The monitoring 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. Nine of the forty-one 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 monitoring period. Listening stations will, therefore, be set up in habitats conducive to each of these species. If necessary, the five-year monitoring plan may evolve over time.

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; Environment Canada, 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.

For the purpose of documenting the actual impact of the mine project's infrastructure and operational activities on the breeding birds, we propose that five-year surveys be carried out at various stages of operation until the monitoring 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 Environmental Monitoring Committee as well as to the competent authorities within six months of collecting the data.

If problems with a bird species at risk are identified, the proposed measures shall be described in the follow-up reports and may be discussed and improved upon in consultation with the Environmental Monitoring Committee and the competent authorities.

10.5 POST-RESTORATION **MONITORING PROGRAM**

A monitoring program will be included in the site rehabilitation plan. The purpose of the monitoring program is to validate whether the measures applied to the site meet expectations. The following elements will be considered.

10.5.1 GEOTECHNICAL MONITORING

Subsequent to rehabilitation activities, a monitoring program must be implemented to validate the stability of the infrastructures left in place. The integrity of the waste rock stockpiles, the ROM pad and civil engineering work will be checked for erosion, movement, settling and cracking. Annual inspections will be conducted by an engineer for the first five years, and then periodically for the next ten years, at the frequency the engineer recommends.

10.5.2 MONITORING OF WATER QUALITY

Surface and groundwater quality monitoring will be required post-rehabilitation. A biannual groundwater monitoring 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 monitoring program. **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-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.**

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.

10.5.3 MONITORING OF VEGETATION RECOVERY

Monitoring of vegetation recovery on restored surfaces is required. The purpose is to ensure that the site rehabilitation activities helped to establish an adequate vegetation density to protect against erosion, and adequately revegetated areas disturbed by mining activities. The monitoring program will aim to characterize the plant cover and species composition in restored areas, and to identify signs of erosion. Monitoring will continue for five years.