SNC·LAVALIN

The Broadview Project

Terms of Reference

Canada Golden Fortune Potash Corp.

Environment & Geoscience

12 | 02 | 2018

Report > Rev. 1
Internal ref. 631260

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Executive Summary

Canada Golden Fortune Potash Corporation (CGFPC) is proposing to develop a new one million tonne per year greenfield solution potash mine, referred to as the Broadview Project. The project is located on CGFPC's KL 280 potash lease in the southeastern portion of the Saskatchewan potash district. CGFPC has retained SNC-Lavalin Inc. (SNC-Lavalin) to prepare these Terms of Reference (TOR) for the preparation of an Environmental Impact Statement (EIS) for the Broadview Project. The TOR outlines what information will be gathered during the Environmental Impact Assessment (EIA) for the project and how it will be presented in the EIS.

The EIS will describe the project in detail, including its location, need, alternatives, infrastructure, processes, inputs and outputs, schedule, and ancillary developments. The mine will include a plant site and a mine well field for potash extraction. The plant site will include the processing plant, administration buildings, maintenance building, equipment and parts storage, tanks area, raw water pond, tailings management area (TMA), product storage, rail loadout, security, and parking. All infrastructure will be described. The solution mining process and mine well fields will be described. The main mining and processing activities will include injection and solution recovery, evaporation and crystallization, product drying and screening, product compaction, and product storage and shipping. CGFPC is proposing to use groundwater from the Hatfield Valley Aquifer to supply raw water to the mine. The water source will be described in the EIS.

CGFPC has commenced a public engagement program to provide relevant information in a clear, concise manner to stakeholders, government representatives and regulatory agencies for the purpose of gathering positive support and addressing potential concerns raised about the proposed project. The engagement program includes identification of stakeholders, a project information package mail-out, a public engagement website, public open houses, and meetings with municipal, First Nations, and Métis representatives.

The anticipated components of the environment which will undergo effects assessment studies in the EIS include the:

- Atmospheric environment, including air and acoustics;
- Hydrogeological environment;
- Terrestrial environment, including soils, vegetation, and wildlife and wildlife habitat;
- Aquatic environment, including hydrologic setting, wetlands, and fish and fish habitat; and
- Human environment including the socio-economics, traffic assessment, and heritage resources.

Each assessment will include baseline data collection (desktop or desktop and/or field), data analysis, an effects assessment, effects mitigation, monitoring, and identification of residual effects. Effects that cannot be mitigated may require offsetting. All baseline data collection will be completed in accordance with applicable industrial, federal and provincial standards. Numerical data will be included in spreadsheet format (e.g. .xlsx), and spatial data will be included in a project-specific GIS database. Data collected can be used to compare future data from the site to estimate the level of project effects. Each baseline assessment will be incorporated into the EIS. Specific actions that will be taken to avoid, minimize and offset negative effects will be outlined.

The effects assessments will focus on Valued Ecosystem Components (VECs), which are aspects of the natural and socio-economic environment that are valued because of their ecological, scientific, resource, socio-economic, cultural, health, or aesthetic importance and which have a potential to be adversely affected by the project. VECs will be refined during the Environmental Impact Assessment process and by the project experts, as well as consultation with regulators and stakeholder engagement.

Effects will be evaluated using a stepwise approach. This begins with characterization of the interaction between the project and the VEC with respect to the nature of the interaction, location, and magnitude. First and foremost, avoidance will be implemented where possible. Where effects cannot be avoided, mitigation measures are identified and incorporated into the project design. Mitigation measures will be determined using best practices and in collaboration with the Ministry of Environment (MOE). Residual effects are effects that remain after applying the proposed mitigation. These effects will be evaluated for significance with respect to the direction, geographic extent, magnitude, duration, frequency, likelihood and reversibility. A preliminary list of potential effects to VECs includes:

- Loss of sensitive habitat including wetland habitat and native prairie;
- Loss of protected plant species;
- Disturbance to wildlife species and migratory birds;
- Effects of topsoil removal and soil salinization;
- Changes to surface drainage and hydrologic effects;
- Ground subsidence;
- Effects of brine on surficial groundwater;
- Sustainability of brine injection into deep formations;
- Effects of air emissions;
- Effects of increased traffic;
- Effects on land use;
- Effects on heritage resources;
- Effects on First Nation and Métis communities;
- Effects of accidents and malfunctions, such as spills; and
- Effects of linear developments, including roads, rail spurs, and pipelines.

CGFPC will prepare Environmental Monitoring, Management, and Protection Plans that will be utilized during construction, operation and closure. The specifics of the plans will be determined in conjunction with MOE. CGFPC will also prepare a conceptual decommissioning and reclamation (D&R) plan and proposed financial assurance. Progressive reclamation will be completed during operation where possible, and final reclamation and closure will be completed once mining operations have ceased.

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Figures

Tables

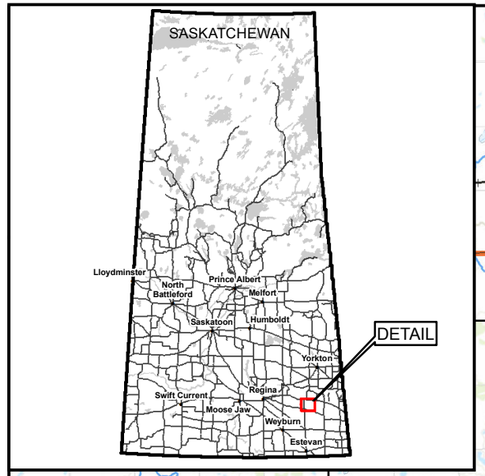
Attachments

1 Introduction

Canada Golden Fortune Potash Corporation (CGFPC) is proposing to develop a new one million tonne per year greenfield solution potash mine, referred to as the Broadview Project. The project is located on CGFPC's KL 280 potash lease in the southeastern portion of the Saskatchewan potash district (**Figure 1.1**). CGFPC has retained SNC-Lavalin Inc. (SNC-Lavalin) to prepare these Terms of Reference (TOR) for the preparation of an Environmental Impact Statement (EIS) for the Broadview Project. The TOR outlines what information will be gathered during the Environmental Impact Assessment (EIA) for the project and how it will be presented in the EIS.

1.1 Proponent

The EIS will provide a general description of the proponent and identify the owner and contact person for the project. It will also identify the qualifications of the consultant preparing the EIS.



LEGEND

- RAILWAY
- HIGHWAY
- WATERCOURSE
- WELL FIELD
- PLANT SITE
- KL 280
- RURAL MUNICIPALITY
- WATERBODY
- WATERBODY (INTERMITTENT)

NOTES

1. COORDINATE SYSTEM: NAD 1983 UTM ZONE 13N.
2. BASE CADASTRAL DATA ADAPTED FROM HER MAJESTY IN RIGHT OF SASKATCHEWAN OR INFORMATION SERVICES CORPORATION OF SASKATCHEWAN, SASKADMIN2013, SASKGRID2013.
3. CADASTRAL BOUNDARIES ARE FOR INFORMATIONAL PURPOSES ONLY AND SHOULD NOT BE CONSIDERED SUITABLE FOR LEGAL, ENGINEERING, OR SURVEYING PURPOSES.
4. TOPOGRAPHIC FEATURES OBTAINED FROM CANVEC V12.0 DATASET, NATURAL RESOURCES CANADA EARTH AND SCIENCES SECTOR CENTRE FOR TOPOGRAPHIC INFORMATION, 2013-09-30.
5. HIGHWAYS AND ROADS OBTAINED FROM THE NATIONAL ROAD NETWORK SASKATCHEWAN EDITION 6.0 DATASET, 2012-09-28.
6. RAILWAYS OBTAINED FROM THE NATIONAL RAILWAY NETWORK SASKATCHEWAN EDITION 1.0 DATASET, 2012-11-07.

REFERENCE DRAWINGS

DWG No.	DESCRIPTION

REVISIONS

REV	DATE	DESCRIPTION	DES	DRN	APP
		ISSUED FOR REVIEW			

0 1,250 2,500 5,000 METRES

SCALE: 1:150,000

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CLIENT	PROJECT LOCATION
CANADA GOLDEN FORTUNE POTASH CORPORATION	BROADVIEW PROJECT

TITLE

KL 280 LOCATION

DES BY	GP	DRN BY	KVG	CHK BY		DATE	2018 02 12	
SIZE	11x17	FIG No.	1.1	DWG No.	631260-E-02-E-004			REV PA

Path: \\SLI1653\Projects\CGFPC\624190 EIA_KP437\4.0 Execution\4.5 GIS and Drawings\GIS\DRAWINGS\TOR\631260-E-02-E-004(TOR Location Plan).mxd

1.2 Environmental Impact Statement Content

The EIS is a statement of CGFPC's conclusions and commitments regarding the proposed Broadview Project. The EIS will be considered by the MOE in making the decision of whether or not to approve the project. It will provide sufficient information so conclusions can be reached regarding the potential environmental effects. Efforts will be focused on data collection and interpretation related to the environmental components which are likely to experience the most significant effects.

The EIS will be available for public review and written such that non-specialists can comprehend it. A glossary of technical terms will be included. External sources will be referenced appropriately.

Engineering and geosciences work reported in the EIS will comply with the requirements of *The Engineering and Geoscience Professions Act*. Work undertaken by qualified persons will be highlighted and credentials included.

CGFPC will use the suggested Table of Contents for the EIS from the Government of Saskatchewan (2014a) as a guide, but may build upon/modify the template (Appendix A).

The EIS will include the following:

- An outline of the provincial and federal (if applicable) environmental assessment requirements for the project, a summary of applicable federal, provincial and municipal legislation, and a list of potential permits/approvals/licences/authorizations required for construction and operation.
- A detailed description of the proposed project including the project's spatial and temporal boundaries, including all components, infrastructure, and activities, inputs and outputs, schedule, alternatives, and ancillary projects. Detailed drawings will also be included.
- A description of all engagement activities with local communities, First Nation and Métis communities, government agencies, the general public and other interested stakeholder organizations. The results of the activities will also be discussed, including responses to public concerns.
- A list of Valued Ecosystem Components (VECs) that will be considered during the EIA as well as justification for their selection.
- An assessment of each VEC, including site-specific baseline data, an environmental effects assessment of both project-specific and regional effects, mitigation and monitoring, residual effects and cumulative effects. The effects assessment will use a semi-quantitative approach to categorize effects and will consider the duration, magnitude and reversibility of effects. Residual effects will be identified and assessed for significance. Cumulative impacts will also be assessed.
- Documentation of all methodologies and assumptions for each baseline investigation.
- A conceptual decommissioning and reclamation plan and proposed financial assurance.
- A commitments register outlining each commitment made to prevent or mitigate environmental effects.

1.2.1 Executive Summary

An executive summary will be prepared for the EIS. The summary will avoid the use of technical terminology. It will briefly describe the project and major findings of the EIS, with an emphasis on the overall summary of project effects and mitigation measures. It will briefly touch on:

- Purpose of the development;
- Project alternatives;
- Public engagement and First Nations/Métis engagement program.
- Potential for short and long term environmental effects, including spills/malfunctions/accidents;
- Cumulative effects;
- Significance of residual effects;
- Mitigation measures;
- Decommissioning and reclamation; and
- Monitoring program.

1.3 Regulatory Requirements

1.3.1 Saskatchewan Environmental Assessment

As per section 7.5 of *The Environmental Assessment Act*, approval from the Minister of Environment (the Minister) is required to proceed with any project considered a "development" under the Act. CGFPC expects that the project will be considered a "development" pursuant to section 2(d) of *The Environmental Assessment Act* and as such, Ministerial approval is contingent upon completion of a provincial Environmental Impact Assessment (EIA) and the submission of an EIS under the Act.

Prior to undertaking the EIA, CGFPC has prepared a draft TOR for submission to the Environmental Assessment (EA) Branch for approval. The TOR outlines the information that will be gathered during the EIA and how it will be presented and evaluated in the EIS. CGFPC plans to proceed with the EIA once the TOR has been approved by the EA Branch.

These TOR have been prepared in accordance with the Guidelines for the Preparation of the TOR (Government of Saskatchewan 2014a) and are being submitted following the Technical Proposal (TP) for the proposed development. The TOR defines the scope of work for the EIS which includes the following:

- A commitment to providing a clear and detailed description of the project including spatial and temporal boundaries;
- A plan outlining the engagement activities with local communities, First Nation and Métis communities, government agencies, the general public and other interested stakeholder organizations;
- A list of (VECs that will be considered during the EIA;
- A commitment to providing baseline information, impact assessment, mitigation and residual effects for each VEC;
- An outline of the baseline information that will be collected during the EIA and methods for collecting this data;

- An outline of impact assessment methods and a commitment to evaluation of project impacts;
- A commitment to developing mitigation measures and monitoring programs;
- A commitment to developing a decommissioning and reclamation plan; and
- A commitment to developing a detailed commitments register along with a plan for reporting and follow-up activities.

1.3.2 Federal Environmental Assessment

A federal EA is not anticipated for the Broadview Project. Potash mines are not considered designated physical activities under the Regulations Designating Physical Activities (SOR/2012-147) under the *Canadian Environmental Assessment Act, 2012*. However, Environment and Climate Change Canada (ECCC) is currently conducting a review of the *Canadian Environmental Assessment Act, 2012*, and other federal environmental legislation. Their goal is to develop new processes which may include legislative, regulatory, or policy changes. The specific details and schedule of the changes to the federal environmental assessment process are not known at this time.

1.3.3 Other Permits

The EIS will include a list of all required provincial and federal approvals, permits and licences that will regulate the project if approved. The EIS will also include any letters of approval that may have been issued by government agencies for the project.

1.4 Scope of the Assessment

1.4.1 Spatial

The EIS will describe the spatial boundaries where environmental effects may occur. These boundaries are expected to vary for each environmental component. The EIS will include the legal location of the project within the KL 280 potash lease, as this is still to be determined. It will also include maps showing the location of the project and study areas for the effects assessment relative to nearby communities and other projects.

1.4.2 Temporal

The temporal scope of the assessment includes project construction, operation and decommissioning. The EIS will outline the expected time periods for each of these phases where effects are assessed.

2 Project Description

CGFPC is proposing to develop a new one million tonne per year solution potash mine. The TOR will provide a clear and detailed description of the proposed project through construction, operation, and decommissioning.

It will include appropriately scaled maps and/or drawings of project components and activities. Maps will include a graphic scale, north arrow, a small-scale depiction of the project area in relation to the province, and a legend. A GIS shapefile, in NAD 1983 CSR98 UTM Zone 13N of the project's spatial boundaries, will be included with the digital submission.

2.1 Location

The location of the project and study areas will be described using legal land locations, UTM coordinates and maps.

2.2 Mineral Resource

Details on the mineral resource will be presented, including stratigraphy and the nature, depth and thickness of the potash units. Exploration programs conducted to date will be described, including drilling programs and geophysical surveys.

2.2.1 Mining and Surface Rights

This section will discuss the land dispositions and identify whether the project is subject to any land claims agreements.

2.3 Construction

Activities and infrastructure associated with project construction will be described and displayed on figures/maps. Temporary facilities and infrastructure may include trailers, maintenance and storage areas, laydown areas, sewage and wastewater management, water and power supply, waste storage, etc. This section will also consider site preparation and borrow locations. The construction schedule and expected workforce will be presented. The environmental management/protection measures for the various construction activities, including storage and handling of hazardous substances, will be described.

2.4 Mining

2.4.1 Mining Method

The EIS will describe the mining methods used to recover potash in detail, as well as the conceptual mining development plan and layout. Solution mining is currently the preferred method, where wells will be used to pump heated water through the ore body to dissolve the highly soluble potash, and the brine solution will be brought to the surface. The production rate is currently estimated to be on the order of one million tonnes of potash per year. Each mining phase will be described in detail, including cavern development, primary mining, secondary mining, and cavern closure.

2.4.2 Site Infrastructure and Layout

The location of the proposed development, including all on-site and off-site surface infrastructure, will be described and presented on a map, including:

- Mine well field pads;
- Well field pipelines and services running from the process plant to the well field;
- Processing plant;
- Product storage and loadout;
- Tailings management area (TMA);
- Access road;
- Rail loop and spur;
- Service building complex (garage, shop, warehouse, mine dry, offices, control room, and other ancillary facilities);
- Raw water pond and water distribution system;
- Electrical substation and power distribution;
- Natural gas distribution system and on-site fuel storage; and
- Parking lot and security building.

The EIS will also contain the conceptual design and drawings for the site infrastructure.

The storage and distribution of all fuel, reagents, and hazardous substances will also be described. The descriptions will include the type, volume, and location of any hazardous substances as well as handling, maintenance, and mitigation measures.

2.4.3 Processing

The EIS will describe the processing methods used to recover the ore from the brine, including: evaporation and crystallization; debrining; product screening and compaction; and product storage and loadout. Process diagrams will be provided. The ancillary process systems will also be described, including process steam, compressed air, and cooling systems.

2.4.4 Tailings Management Area

Sodium chloride and gypsum from the process plant will be managed in the TMA, and excess brine from process will be disposed via deep well injection. The EIS will outline the TMA plan, including salt storage, brine tanks/ponds, and dam/control structures. A geotechnical evaluation was completed to evaluate the salt pile height and factor of safety.

The input parameters provided by CGFPC were somewhat different (including gypsum) than that for the existing potash mines in Saskatchewan, due to differences in the ore mined and the process used to separate the potash from the ore. Further, CGFPC have indicated that filtered tailings will be transported to the TMA using conveyor, as opposed to hydraulic deposition conducted at other mine sites. These differences result in a TMA that has reduced consideration of storage and reclaim needs for brine produced during the process, as nearly all brine produced from production is recovered and reclaimed in the process before tailings are transported to the TMA.

The TMA dykes will be designed considering the current MOE requirements and the following criteria:

- Minimum top width of seven metres to accommodate traffic requirements;
- Minimum stability factor of safety of 1.3, as required by Saskatchewan Ministry of Environment;
- Freeboard height based upon applicable standards;
- Flood storage capacity based upon the design Probable Maximum Flood (PMP); and
- Erosion protection requirements.

Considerations for ‘staged’ construction of the TMA will be provided, since a TMA of sufficient size to provide storage of waste for the life of the mine site may not immediately be required. By staging the construction of the TMA, less environmental impact could occur and costs for construction may be reduced due to the time value of money.

The TMA development plan includes:

- Estimates of surface storage with time;
- Estimates of brine reclaim volumes;
- Estimated elevations of the TMA so that pumping infrastructure may be selected and priced for the mine site;
- Estimates for phased construction methodology;
- Preliminary layout sketches for the TMA, including layout of control structures (dykes-for the salt tailings and gypsum tailings areas; and
- Initial estimates of earthwork quantities and costs for construction of TMA control structures.

2.4.5 Water Balance

The EIS will include a detailed water balance that estimates water requirements, use of recycled water, and wastewater while considering inputs from precipitation and management of site runoff.

2.4.6 Brine Injection

The EIS will include the preliminary design of the deep injection well(s) and modelling of brine disposal into the disposal horizon. The modelling of deep well injection will include the following scope:

- Construct a numerical model that incorporates the local stratigraphy and proposed deep brine injection system for the project;
- Develop a “best estimate” model of pre-mining conditions for the model domain;
- Model the deep brine injection field over the operating mine life to model the effects of brine injection on the disposal horizon including other facilities;
- Develop predictive models for long-term brine injection into the decommissioning period; and
- Compile a report documenting the numerical modelling.

2.5 Project Schedule

The anticipated schedule for all phases of the project will be presented, along with a Gantt chart showing project milestones. This will include the anticipated timing and duration of project design, regulatory permitting, construction, operation, and decommissioning, as well as regulatory permitting.

2.6 Emissions and Waste

Expected emissions include air emissions, noise, salt, gypsum, wastewater, and solid waste.

The facilities air emissions will be described, including the type, number, location of source emissions and abatement equipment, as well as an estimate of total air emissions. The EIS will also describe noise management, including requirements for hearing protection.

Detailed wastewater, brine and salt tails management plan will be presented. CGFPC’s plan to store, handle and dispose of all waste, including industrial waste, domestic waste, sanitary waste, and hazardous and regulated waste will be described.

2.7 Alternatives

The EIS will present all technically and economically feasible alternative options for carrying out the project and the factors considered when evaluating the alternatives. These will be presented on a map, where relevant, and shown in relation to features such as surface water features, nearby communities, residences, etc. These may include alternatives for mine site and TMA location, alternatives to the preferred water source, and alternatives to mining/processing methods. The rationale for the site location will be discussed as well as assessment criteria (environmental, engineering, economic, etc.) and reasons for rejecting the alternatives. Various design options will be described in enough detail to illustrate the advantages and disadvantages of each, and will reflect on the potential differences in environmental effects. Justification will be included for the preferred alternatives.

2.8 Utilities and Services

The EIS will provide a general description and schedule of all utilities and services, and associated ancillary projects, including proponent-owned and those owned by third parties. Ancillary projects include related projects whose planning, construction and/or operation are outside the scope of the EIS and may be proposed by another proponent. Any utilities and services proposed by another proponent will be subject to separate reviews under *The Environmental Assessment Act*. The EIS, however, will outline the major environmental effects resulting from the ancillary projects. The Broadview Project is expected to include the following utilities/services and associated ancillary projects:

- Transmission line;
- Natural gas supply;
- Raw water supply;
- Rail spur line;
- Communications lines;
- Potential borrow pits; and
- Potential municipal road or highway upgrades.

2.8.1 Water Source

The EIS will provide a description of the water source. CGFPC is proposing to use water from the Hatfield Valley Aquifer, approximately 40 km north of the site. A two-week pump test was conducted, where approximately 42,000 m^3 of water was produced and discharged to a nearby wetland. The recovery was also monitored for two weeks. Preliminary modelling shows that the aquifer can provide water for the proposed 50-year mine life with limited drawdown on the aquifer. The analysis and reporting for this project is being completed. CGFPC is in discussions with SaskWater to provide water for the Broadview Project.

2.9 Site Security

The EIS will describe the security measures in place for access to the mine site.

2.10 Statement of Need

The EIS will provide rationale outlining the need for the project and describe the associated benefits in contrast to the adverse effects. Benefits will be described, including jobs, training, employment and business opportunities, and royalty and tax benefits to the municipal, provincial and federal governments.

2.11 Occupational Health and Safety

The EIS will provide a brief description of the proposed occupational health and safety program for the project and address potential concerns (e.g. exposure to chemically treated potash dust in the mill). The occupation health and safety program for all project phases will comply with *The Saskatchewan Employment Act, The Occupational Health and Safety Amendment Act, 2012*, and The Occupational Health and Safety Regulations, 1996. CGFPC is committed to excelling in health and safety performance.

3 Engagement Plan

CGFPC has developed a community engagement plan to ensure interested or affected stakeholders are informed of the proposed project and given the opportunity to provide feedback that can be incorporated into project planning. Community engagement is an integral part of the Environmental Assessment process for developments within Saskatchewan under *The Environmental Assessment Act*. In order to receive ministerial approval, proponents are requested to demonstrate a sufficient level of effort to advise and seek feedback on the interests and concerns stakeholders may have with a proposed development.

CGFPC's community engagement plan includes appropriate and empathetic engagement approaches used to encourage stakeholder feedback during information sharing, private, and public meetings. It includes phased engagement activities for both public and First Nations/Métis engagement. The overall objectives of the engagement program include.

- Ensure interested groups are informed of the proposed project and environmental assessment;
- Obtain feedback to identify concerns and ideas that can be incorporated into project planning;
- Create and maintain good working relationships with stakeholders so sustainable decisions regarding aspect of project planning, project construction and project operation can be made; and
- Provide opportunities for current and future relationship building with stakeholders.

First Nations and Métis engagement will also focus on collecting data on traditional knowledge and land use in the region.

Engagement activities will be phased where:

- Phase I was completed from Q1 to Q2 2017 to engage stakeholders early in the EIA process. CGFPC introduced the project and its alternatives, described the EIA and engagement process, received feedback including concerns and ideas that can be incorporated into project planning, and addressed concerns about the project. Phase I has been completed.
- Phase II was completed from Q4 2017 to Q1 2018 to engage stakeholders during the EIA process and to provide additional information regarding location of the plant site and well field and where the proposed utilities would come from. CGFPC continued to share updated information about the project, outcomes of the Phase I engagement, outcomes of the impact assessment, continued to obtain feedback including concerns and ideas that can be incorporated into project planning, and address concerns about the project. Phase II has been completed.
- Phase III is scheduled for Q2 2018 to engage stakeholders near the completion of the EIA process. CGFPC will provide information to stakeholders collected during Phase I and II and continue to obtain feedback including concerns and ideas that can be incorporated into project planning and design.

3.1.1 Identification of Stakeholders

Community engagement includes all stakeholders with an interest in, or who may potentially be impacted by the Broadview Project. These may include nearby communities and rural municipalities, regulatory bodies, landowners, and First Nations and Métis groups. Recognized stakeholders are presented in **Table 3.1**. Identified First Nations and Métis groups include Indian Reserve (IR) Chiefs and Council as well as Regional Métis Nation Directors with titled land, political jurisdiction boundaries or potential traditional knowledge or traditional land-use in proximity to the proposed project. Stakeholder identification will be an ongoing process and other stakeholders will be included as the project progresses.

Table 3.1 Stakeholders included in the community engagement program

Stakeholders	Approximate Distance to KL 280
Rural Municipality	
RM of Kingsley No. 124	within KL 280
RM of Chester No. 125	within KL 280
RM of Elcapo No. 154	borders KL 280
RM of Wolseley No. 155	borders KL 280
Community*	
Village of Glenavon	3.0 km
Town of Grenfell	10.4 km
Town of Broadview	9.5 km
Town of Kipling	13.4 km
Village of Windthorst	11.9 km
Town of Wolseley	15.5 km
Unincorporated Community of Peebles	6.8 km
Unincorporated Community of Candiac	10.5 km
Regulatory Agency	
SaskWater	regulatory agency
Ministry of Environment	environmental regulator
Water Security Agency	water regulator
First Nation and Métis Owned-Land	
Kahkewistahaw	9.0 km
Ochapowace	9.8 km
Carry the Kettle	5.7 km
Cowessess	within KL 280
Sakimay	19.4 km
Flying Dust	38.0 km
Métis Eastern Region IIa	judicial boundary near KL 280
Métis Eastern Region III	KL 280 within judicial boundaries

**Distances measured from edge of RMs and KL 280*

3.1.2 Project Notification

3.1.2.1 Packages

CGFPC provided project notification packages to the RMs of Kingsley, Chester, Elcapo and Wolseley, the Towns of Grenfell, Broadview, Wolseley and Kipling, the Villages of Glenavon, and Windthorst, and the First Nation and Métis groups (Carry the Kettle, Kahkewistahaw, Ochapowace, Cowessess, Sakimay, Flying Dust, Métis Eastern Region IIa and Métis Eastern Region III) in January of 2017. Distributed project notification packages included information about the project, the environmental assessment process, and the public engagement program. The packages also included a location map, link to the public engagement website, and contact information for CGFPC.

3.1.2.2 Letters

CGFPC distributed 2,450 project notification letters through Canada Post distribution service on 31 January 2017. The letters provided introductory information about the project, the environmental assessment process, and the public engagement program. The letters also included a location map and link to the public engagement website. Letters were distributed to all mailboxes (houses, apartments, farms and businesses) in the following communities:

- Town of Broadview
- Village of Glenavon
- Town of Grenfell
- Town of Kipling
- Candiac (unincorporated community)
- Peebles (unicorporated community)
- Village of Windthorst
- Town of Wolseley

3.1.3 Engagement Website

A public engagement website for the Broadview Project was activated on 2 February 2017 (www.broadviewproject.ca). The website provides company profiles for CGFPC, shares information about the project, and features a contact portal for stakeholders to provide feedback and questions related to the project. The website is being updated regularly as the project progresses. Software associated with the website will log the number of website visits and all information collected from the website will be compiled for inclusion in the EIA. Information on the project is also available on CGFPC's website at www.goldenpotash.com.

3.1.4 Meetings

3.1.4.1 Phase I Meetings

3.1.4.1.1 Rural Municipality & Town Council Meetings

Between March and June 2017, CGFPC met with: the RMs of Kingsley, Elcapo, Chester, and Wolseley; the Towns of Broadview, Grenfell and Wolseley; and the Villages of Windthorst and Glenavon. The meetings were used to introduce the project, answer questions on the project, discuss the provincial environmental assessment process, and introduce project representatives from CGFPC and SNC-Lavalin.

3.1.4.1.2 First Nation Meetings

Between March and June 2017, CGFPC held meetings in with the Kahkewistahaw, Cowessess, Carry the Kettle, Sakimay, and Flying Dust First Nations to introduce Chief and Councils to the project. A meeting was also held with the Director of the Métis Nation Eastern Region III and CGFPC continues to attempt to schedule a meeting with the Director of the Métis Nation Eastern Region IIa.

3.1.4.1.3 Regulatory Agency Meetings

CGFPC met with the MOE and Water Security Agency (WSA) on 19 October 2017 and SaskWater on 20 October 2017 to present preliminary results of the groundwater sourcing study. CGFPC and SNC-Lavalin met with the MOE and WSA again on 15 November 2017 to introduce the proposed project, establish a working relationship, as well as understand key expectations. Subsequent meetings have been held with SaskWater to provide project updates and to continue discussions on the project's water source and delivery.

3.1.4.2 Phase II and III Meetings

CGFPC met with all stakeholders again during the Phase II meetings from November 2017 through January 2018, and also met with the Ochapowace First Nation. CGFPC will schedule Phase III meetings from March through May 2018. The results of the Phase II and III meetings will be presented in the EIS.

3.1.5 Open Houses

Three rounds of open house information sessions are being held in multiple locations in the project region. Each open house is being held at a public venue (community hall/town hall) as informal, drop-in style events with information displayed on posters, a PowerPoint presentation, and hand-outs. Open house advertisement posters are being placed in various locations in the communities at least one week in advance of each open house as well as on the engagement website. Advertisement ads for the open houses are also being placed in multiple local newspapers and the Regina Leader Post for two weeks prior to each open house.

Attendees of each open house receive an information hand-out and are encouraged to read the information panels on display. Project representatives are on hand to answer questions and provide additional information when required. Feedback forms are available to all open house attendees

and contact information for engagement officers (email address, website, and phone numbers) are being provided for feedback collection purposes.

3.1.5.1 Phase I Open Houses

The Phase I open houses were completed in 2017 (**Table 3.2**). The open houses were advertised as outlined in **Table 3.3**. Public open house notifications were also placed on numerous community websites and Facebook pages (**Table 3.3**). Phase I open house materials, including advertisements, posters, a PowerPoint presentation, an information hand-out, and a questionnaire.

Table 3.2 Phase I open houses

Community	Date	Number of Attendees	Number of Completed Questionnaires
Town of Broadview	25-Apr-2017	58	15
Town of Grenfell	26-Apr-2017	69	8
Town of Kipling	2-May-2017	25	1
Village of Glenavon	3-May-2017	17	5
Town of Wolseley	19-Jun-2017	23	8

Table 3.3 Phase I open house advertisements

Community	Date
Advertisements	
Regina Leader Post	Saturday 22-Apr-17 Saturday 29-Apr-17
Grenfell & Broadview Sun Express	24-Apr-17 week edition 1-May-17 week edition
Kipling The Citizen	24-Apr-17 week edition 1-May-17 week edition
Indian Head-Wolseley News	24-Apr-17 week edition 1-May-17 week edition
White City/Emerald Park Community Newsletter	24-Apr-17 week edition 1-May-17 week edition
Websites/Facebook	
Town of Grenfell	
Town of Broadview	
Town of Kipling	
Town of Wolseley	
Village of Glenavon	
RM of Chester	
RM of Elcapo	
RM of Kingsley	

3.1.5.2 Phase II and III Open Houses

Phase II open houses were held in January 2018 in the same communities as Phase I. CGFPC will schedule Phase III open houses in March/April 2018.The results of the Phase II and III open houses will be presented in the EIS.

3.1.6 Stakeholder Feedback

Stakeholders will have the opportunity to provide feedback and ask questions throughout the entire process. Stakeholder feedback is being collected in a variety of ways including; feedback forms provided to all attendees during publically held information sessions; verbally at open houses and meetings; by emailing or phoning engagement advisors; and through the contact portal feature located on the public engagement website. Feedback collected throughout the process is being documented in a detailed communication log.

3.1.6.1 Phase I Stakeholder Feedback

3.1.6.1.1 Rural Municipality and Town Meetings

Overall the project was received favorably during RM and Town meetings. General questions included: the viability of the mine, water source, transportation of the product, mineral rights, land acquisition, investments, mine site and distance to well pads, tailing management areas, and job opportunities. Main concerns expressed included: the mine site location and footprint, timeline, water source, water use, pipelines, air pollution, residual effects, land acquisition, road traffic, tailings, power and employment.

3.1.6.1.2 First Nation Meetings

Feedback obtained during meetings with First Nation communities including interest in economic, business, and job opportunities as well as Impact Benefit Agreements. Primary concerns expressed included the environment, adverse effects to First Nation treaty rights, and water use. Some of the communities indicated they have internal environmental and consultation policies they would like followed. Some communities also expressed that they would like continued engagement.

3.1.6.1.3 Open Houses

Approximately 169 members of the public attended the four open houses (**Table 3.2**). Overall the project was received favorably by those in attendance. Feedback obtained from the open houses via questionnaires, verbal communication, and follow-up emails were generally positive. Primary concerns expressed to the project representatives were mainly related to water sourcing, water usage, mine facility location, and mining by-products (tailings). Other concerns expressed during the open houses included the potential increase of traffic and noise to rural communities and the potential increase of human population during the construction phase of the project. Project representatives explained that the results of water sourcing and potential mine site location studies, which are currently in progress, will be presented to the public in future open houses (Phase II – fall 2017). Project representatives further explained that mitigation and monitoring measures will be in place to ensure these effects are minimized.

3.1.6.1.4 Individual Correspondence

Approximately 12 members of the public contacted CGFPC, including people with land in KL 280, with questions or comments on the project. Overall the feedback obtained from these individuals was positive. People were interested in learning more about the project and its schedule, as well job and subcontractor opportunities. Concerns expressed were related to water sourcing, general environmental impacts, and why the project was named after the Town of Broadview rather than closer towns (Grenfell).

3.1.6.2 Phase II and III Stakeholder Feedback

Phase II and III feedback will be presented in the EIS.

3.1.7 Engagement Documentation

CGFPC is keeping detailed tracking records of all engagement activities, as well as a tracking table of the concerns, issues, and suggestions raised by the various stakeholders. A detailed response will be provided for all concerns, issues and suggestions in the EIS.

3.2 Duty to Consult

The Crown has a legal obligation to consult with First Nations and Métis communities in advance of decisions or actions that may adversely impact Treaty and Aboriginal rights, such as the right to hunt, fish and trap for food and carry out traditional uses. Should the duty to consult (DTC) be triggered for the Broadview Project, the province will assign CGFPC various procedural aspects of consultation to assist the province in fulfilling its DTC (Government of Saskatchewan 2014b). If required, CGFPC will conduct consultation activities in accordance with the provincial guidance material (Government of Saskatchewan 2010 and 2014b). The consultation program would be conducted with these objectives:

- Assist with fulfilling the Crown's legal obligation to consult with First Nations and Métis communities;
- Request feedback from First Nations and Métis communities throughout the process to identify local and regional concerns and ideas that can be incorporated into project planning; and
- To respect and protect Treaty and Aboriginal rights by ensuring, through the consultation process and subsequent decisions, that negative impacts on these rights and uses are avoided, minimized or mitigated and rights are accommodated, as appropriate (Government of Saskatchewan 2010).

CGFPC would establish a database to record all consultation activities to be maintained throughout the consultation program. Results of the DTC program would form an integral part of the EIA and fully documented in the EIS, along with the measures CGFPC would take to address the concerns of First Nations and Métis communities.

4 Valued Ecosystem Components

The effects assessment will focus on Valued Ecosystem Components (VECs) which are aspects of the natural and socio-economic environment that are valued because of their ecological, scientific, social, cultural, economic, archaeological, or aesthetic importance and which have a potential to be affected by the project. Identification and selection of VECs will be based on scoping of direct and indirect pathways and the effects of the project on a VEC. The pathways will be used to inform the selection of VECs for the assessment. Potential VECs will be identified through a detailed assessment of the study area and potential project interactions and through discussions with local, provincial and federal agencies, local landowners, stakeholders, and aboriginal groups. Candidate VECs will be evaluated to determine if they are relevant and a final list will be compiled for assessment.

Table 4.1 presents a preliminary list of VECs and VEC categories that will be considered for the project. VECs will be refined and/or expanded during the EIA process and by the project experts, as well as discussions with regulators and stakeholder engagement.

Table 4.1 Preliminary list of Valued Ecosystem Components (VECs)

VEC Category	VEC
Atmospheric environment	- Air quality - Sound quality - Climate (greenhouse gases)
Groundwater	- Groundwater quality - Groundwater quantity
Surface water	- Water quality - Water quantity - Existing drainage patterns
Soils	- Soil capability to support agriculture/plant communities - Soil quality
Terrain	- Existing topography
Wetlands	- Wetland quality - Wetland quantity
Vegetation	- Native prairie habitat - Listed species
Wildlife and wildlife habitat	- Wildlife habitat - Breeding birds, migratory birds, upland birds, water birds - Listed species
Heritage resources	- Archaeological and sacred sites
Socio-economics	- Land and resource use - Employment and economy - Traffic - Aesthetics
First nation and Métis communities	- Traditional land use - Traditional territory - Employment and business opportunities

5 Environmental Assessment of Valued Ecosystem Components

5.1 Effects Assessment Approach

Effects will be evaluated using a stepwise approach. This begins with characterization of the interaction between the project and the VEC with respect to the nature of the interaction, location, and magnitude. First and foremost, avoidance will be implemented where possible. Where effects cannot be avoided, mitigation measures are identified and incorporated into the project design. Mitigation measures will be determined using best practices and in collaboration with MOE. Residual effects are effects that remain after applying the proposed mitigation. These effects will be evaluated for significance with respect to the direction, magnitude, spatial extent, duration, frequency, reversibility, and likelihood. Worst-case and accidental scenarios will also be evaluated. The following is a preliminary list of potential effects that will be addressed:

- Air emissions;
- Effects of brine on near surface groundwater;
- Sustainability of brine injection into deep formations;
- Effects of topsoil removal and soil salinization;
- Loss of sensitive habitat including wetland habitat and native prairie;
- Loss of protected plant species;
- Disturbance to wildlife species and migratory birds;
- Changes to surface drainage and hydrologic effects;
- Ground subsidence;
- Effects on land use;
- Effects on local traffic;
- Effects on heritage resources;
- Effects on First Nation and Métis communities;
- Effects of accidents and malfunctions, such as spills;
- Effects of extraction of large volumes of surface water; and
- Effects of linear developments, including roads, rail spurs, and pipelines.

The above list is not necessarily complete and the EIS will include a complete assessment of project effects.

5.1.1 Environmental Risk Assessment Endpoints

An understanding of environmental endpoints and receptors affected by the proposed mine site is an integral component to a successful EIA. As part of the EIA, a conceptual risk-based model for environmental risk assessment (both human health and ecological) under the proposed land use and operating conditions will be completed. The risk assessment will provide the framework for risk-based management and monitoring of future operations and associated impacts. The model will follow general risk assessment guidance outlined by the Saskatchewan MOE together with relevant provincial and federal guidelines (e.g. Canadian Council of Ministers of the Environment [CCME], Health Canada, and Environment and Climate Change Canada).

5.1.2 Significance of Residual Effects

Residual effects are effects that remain after implementation of mitigation measures. The significance of residual effects will be evaluated by identifying each effect's magnitude, geographic extend, duration, frequency, reversibility and likelihood of occurrence for the construction, operation, and decommissioning phases of the project.

5.1.3 Cumulative Effects

The cumulative effects assessment will consider the anticipated residual environmental effects of the project in combination with other past, present and/or reasonably foreseeable future projects or activities in the area. In particular, deep well injection capacity, subsidence, water use, energy demands, and greenhouse gas emissions will be addressed from a cumulative perspective. Any projects considered in the cumulative effects assessment will be shown on a map.

5.1.4 Impacts of the Environment on the Project

The EIS will include a discussion of how the natural environment could affect the proposed project and the implications on VECs (e.g. severe weather events, climate change, forest fires). The effects assessment will include proposed mitigation measures.

5.2 Effects Assessment

The anticipated components with effects assessments in the EIS are:

- Atmospheric environment, including air and acoustics;
- Hydrogeological environment;
- Terrestrial environment including terrain, soils, vegetation, wildlife, and wildlife habitat;
- Aquatics environment including hydrology, wetlands, fish, and fish habitat; and,
- Human environment including socio-economics and heritage resources.

Each assessment includes baseline data collection (desktop and/or desktop and field), data analysis, an effects assessment, effects mitigation, monitoring, and identification of residual effects. Effects that cannot be mitigated may require offsetting. All baseline data collection is being completed in accordance with applicable provincial and federal standards. Numerical data will be included in spreadsheet format (e.g. .xlsx). Data collected can be used to compare future data from the site to estimate the level of project effects. Each baseline assessment will be incorporated into the EIS. Specific actions that will be taken to avoid, minimize and offset negative effects will be outlined. GIS technology plays a critical role in the environmental assessment process. Accordingly, a project-specific database within a GIS system will be developed to manage the data collected during the course of the project. All baseline assessments will utilize GIS mapping for desktop review, field planning and surveys, and reporting using ESRI's ArcGIS Desktop software. All data obtained that is geographically referenced is being inputted into the GIS for use in map creation for the EIS.

Detailed methodologies for the various baseline study components are included in the following sections. Much of the desktop and field data collection has been completed and the impact assessment is ongoing.

5.2.1 Atmospheric Environment Assessment

The ongoing atmospheric environment assessment includes climate, air, and noise assessments. Baseline meteorological and air quality data is being compiled to represent the climatic setting and expected ambient air quality in the region. This data will be used to aid in air quality dispersion modelling and emissions reduction recommendations. Baseline noise data was collected and will be incorporated into a noise model, along with predicted project noise levels to determine if nearby receptors will exceed Permissible Sound Levels and required mitigation.

5.2.1.1 Climate

Baseline climate data was collected to characterize the climatic setting. Data collection included compilation of regional Environmental and Climate Change Canada (ECCC) data as well as installation of an on-site meteorological station. Regional climate data was obtained from three nearby ECCC weather stations: the Kipling, Whitewood and Broadview stations. The stations were chosen because of their proximity to the project site and their long periods of record. The ECCC climate normals were obtained for a thirty-year period (1981 to 2010) for temperature and precipitation, and wind data was compiled for a five-year period (2011 to 2015) using the hourly ECCC data. An on-site HOBO RX3000 weather station was installed within the KL 280 potash lease for a little over a one-year period (August 2015 to October 2016) to collect site-specific data that will be compared to the regional data.

5.2.1.2 Air Quality and Dispersion Modelling

An air quality assessment and dispersion modelling will be completed to assess the air emissions associated with the operation of the proposed project. In Saskatchewan, air quality is regulated through The Environmental Management and Protection (Saskatchewan Environmental Code Adoption) Regulations, which require Industrial Source Facilities to ensure the ambient air quality standards set out by Saskatchewan Ambient Air Quality Standards (SAAQS) and emission limits under the Saskatchewan Emission Limit Standards are met.

5.2.1.2.1 Ambient Air Quality

Baseline ambient air quality data was collected to support air dispersion modelling for the proposed project. Data collection included compilation of regional Southeast Saskatchewan Airshed Association (SESAA) data as well as installation of an on-site air quality station.

Ambient air quality data from the regional Southeast Saskatchewan Airshed Association (SESAA) Stoughton air quality station was obtained for the most recently available five-year period. The Stoughton air quality station collects air quality data on an hourly basis for SO_2, NO, NO_2, NO_X, H_2S, $PM_{2.5}$, rain, temperature, and wind speed and direction. SNC-Lavalin averaged the hourly data to match the averaging periods used by the air quality objectives and standards, and compared to the Saskatchewan Ambient Air Quality Objectives (SAAQO) (Government of Saskatchewan 2016).

An on-site ambient air quality station data for a one-year period to collect particulate matter ($PM_{2.5}$ and total suspended particulate [TSP]), SO_2, and NO_2.

On-site baseline ambient air quality data was collected for a little over a one-year period from August 2015 to October 2016, including particulate matter ($PM_{2.5}$ and total suspended particulate [TSP]), SO_2, and NO_2. Data was collected using two particulate matter (BGI Omni FT Ambient Air Samplers Model P/N 5004) units (to collect $PM_{2.5}$ and total suspended particulate [TSP]) and one passive air sampling system (PASS, Maxxam Analytics) station (to collected SO_2 and NO_2).

A dustfall monitoring program was conducted to collect baseline dustfall deposition data within the study area. Dustfall, or settleable particulates, are particles 10 micrometres (µm) and larger. These particles may be suspended in the air temporarily but have enough mass to be deposited on the ground, in contrast to smaller, suspended particles which may remain in ambient air indefinitely. Dustfall samples were collected from four locations in during four sampling events (spring, summer, fall and winter). Dustfall collection was conducted according to ASTM (2004) for the collection of settleable particulate matter. Results will be calculated from a standardized ASTM formula and reported in g/m^2 per 30-day period.

5.2.1.2.2 Dispersion Modelling

Construction and peak operation emissions inventories are being developed, including both fugitive sources (e.g. road dust, erosion) and process and mobile equipment emission sources. Emissions of SO_2, NO_X, CO, VOCs, particulate matter with aerodynamic diameter < 2.5 µm ($PM_{2.5}$), and total suspended particulate (TSP) will be calculated. These are based on activity data including planned production and equipment and any relevant emissions standards and/or guidelines.

A summary evaluation of industrial emissions (including greenhouse gases [GHGs]) in the region is being completed based on industry submissions to ECCC's National Pollutant Release Inventory (NPRI). The emissions from more distant sources and from agricultural and residential sources will be accounted by natural background obtained from the SESAA Stoughton station or from conservative regional background concentrations provided by MOE.

The emissions inventories developed as part of the baseline will allow for determination of appropriate mitigation strategies for both criteria air contaminants (CACs) and GHGs. Air and dust emissions have the potential to effect local soil, cropland, vegetation, wildlife, fish and wildlife habitat and surface water quality. Inventories will be developed following current best practices in Canada acknowledging both emissions models as well as emissions data supplied by the Canadian government. The inventories will be compiled into a database to facilitate development of emissions scenarios for mitigation evaluation. An air dispersion simulation of the construction and peak operations phases of the project will be conducted, using an accepted Provincial regulatory model (AERMOD) and in accordance with Saskatchewan air quality modelling guidelines (MOE 2012).

An air dispersion model is being developed using topographical, land use, and surface and upper meteorological data. A modeling domain was chosen centered at the processing plant; the maximum domain size took into account model limitations to correctly predict ground-level concentrations at longer distances. The model uses standard estimates, generally considered to be reasonable worst-case scenario emission levels, where necessary.

This modelling will estimate pollutant concentrations (ground level Point of Impingement [POI] concentrations) for the proposed facility air emissions. These estimated POI concentrations, beyond the property boundary, are added to background air quality data. Emissions from existing regional industrial and warehouse/storage facilities within the modelling domain, if any, will be included in the modelling and results will be presented for three cases:

- Baseline emission (containing natural background and existing industrial sources emissions);
- Broadview Project emissions (plant and mine emissions); and
- Application emission (baseline and project).

The modelling is being performed using multi-tier Cartesian grid specified in Saskatchewan air quality modelling guidelines (MOE 2012). Special receptors (i.e. nearest residences, recreational areas, sensitive environmental areas, etc.) were identified and used in the dispersion model.

Model predictions will be generated for all averaging periods required by the Saskatchewan Ambient Air Quality Standards and applicable standards from other jurisdictions. Quality assurance (QA) and quality control (QC) procedures will be implemented throughout the assessment process and will include senior or peer review. The main component of the QA process is a detailed senior or peer review of the model set-up, input parameters, calculations and results.

A comprehensive air quality assessment report will be prepared and included in the EIS. The report will include a description of the modelling approach, identification of all relevant model inputs, a summary of the project and regional emissions, a site plan with locations of emissions, description of meteorology leading to relatively high concentrations, results of modelling and monitoring, and conclusions on the effects of the project on local air quality. The report will also recommend emission reduction measures.

5.2.1.3 Greenhouse Gas Emissions Assessment

A GHG emissions assessment is being conducted to estimate the project's GHG emissions as kilotonnes of carbon dioxide equivalent (CO_2e). Specifically, GHG emission estimates associated with different project activities / sources and GHG emission forecasts for different stages of operation will be predicted. Any measures to mitigate project GHG emissions and their expected impacts on reduction of emissions will be discussed in the EIS. The estimated GHG emissions will be compared to similar facilities in addition to provincial and federal emissions. Mitigation measures, such as the use of energy efficient technology, will be identified.

5.2.1.4 Noise Impact Assessment

A Noise Impact Assessment (NIA) is being completed to assess the noise effects associated with the operation of the proposed project. The NIA predicts the noise effects of normal operations of the proposed facility on receptors nearest to the proposed site to determine if further management or mitigation measures are required. The Alberta Noise Control Directive (AER 2007) is being used as a guideline for the completion of the NIA, as Saskatchewan does not currently have guidelines. Baseline noise monitoring was conducted at locations surrounding to characterize the existing daytime and nighttime noise levels.

Noise modelling will predict the sound propagation from those sources and the resultant sound levels at the receptors and a comparison of those levels to the Permissible Sound Levels (PSLs) will form the basis of the NIA. If estimated noise levels at any receptors exceed the PSL, mitigation will be proposed.

5.2.2 Hydrogeologic Assessment

Several hydrogeological studies have been or are being completed for the EIS to establish the overall hydrogeological framework for the study area, aid in site selection and TMA design, assess potential effects to near surface groundwater, recommend mitigation measures, and model/design brine disposal via deep well injection. These studies include:

- Hydrogeological desktop study;
- Hydrostratigraphic drilling, instrumentation, and testing;
- Geotechnical / supplemental hydrogeological drilling, instrumentation and testing;
- Conceptual TMA development plan;
- Groundwater flow and contaminant transport modeling to assess impacts; and
- Numerical modeling of deep well injection to assess impacts.

5.2.2.1 Hydrogeological Desktop Study

A desktop compilation of the hydrogeology in the vicinity of the project was completed to establish the hydrostratigraphic framework and provide recommended areas (based on available information) for the main surface facilities associated with the mine site. Areas were identified to optimize the location of the main surface facility based on the anticipated geotechnical and hydrogeological properties of the soils, with the overall goal of minimizing potential long-term subsurface impacts and associated liabilities. This study focused on the environmental hydrogeology associated with the shallow Quaternary-aged stratigraphy only (from the Upper Cretaceous bedrock shale to the surface). The areas identified for further investigation were perceived to have the best natural barriers to brine migration.

5.2.2.2 Hydrostratigraphic Drilling, Instrumentation, and Testing Investigation and Supplemental Drilling Instrumentation and Testing

Site-specific hydrostratigraphic drilling, instrumentation, and testing was completed as part of the surface facilities siting and assessment of potential effects to near surface groundwater. This investigation was used to determine the Quaternary–aged stratigraphy and establish baseline groundwater conditions at the site. The investigation provided data to feed into the 2D numerical modelling of groundwater flow and contaminant transport to evaluate the performance of the surface storage of salt wastes and proposed mitigation strategies. The information obtained during this investigation will also help refine the hydrogeological and geotechnical design considerations and costing with respect to surface facilities.

Ten deep stratigraphic boreholes were drilled in the vicinity of two potential locations for the main surface facilities. These boreholes were drilled to the Pierre Formation shale, which is the base of "fresh" groundwater exploration in the area and the first stratigraphic marker horizon. Cuttings and Shelby samples were collected for carbonate and Atterberg limit testing to characterize the till horizons and for hydraulic conductivity of the materials within 30 m of surface. Geophysical logging was also completed to assist in the characterization and targeting of vibrating wire piezometers in the prominent aquifer units observed in each borehole. The vibrating wire piezometers were used to assess groundwater flow directions. Ten shallow testholes were also drilled to better characterize the shallow oxidized Saskatoon Group sediments and provide baseline water chemistry, hydraulic conductivity and water levels for this horizon.

A supplemental geotechnical / hydrogeological investigation was completed to confirm the proposed plant and TMA location and for preliminary geotechnical design considerations. Monitoring wells were installed in the shallow oxidized Saskatoon Group sediments as well as within sand units encountered in the 20 m to 30 m depth range. The monitoring wells provided baseline water chemistry, hydraulic conductivity and water levels for these units.

5.2.2.3 Conceptual TMA Development Plan

A conceptual TMA development plan was developed as an input for the groundwater flow and contaminant transport modelling required for the EIS. TMA dykes will be designed considering the current MOE requirements and was sized based upon CGFPC's materials estimate. This data was used to prepare a conceptual TMA layout for the 50-year facility.

5.2.2.4 Groundwater Flow and Contaminant Transport Modelling

The information from the site-specific hydrogeological drilling, instrumentation and testing programs and the conceptual TMA development plan feeds into numerical modelling of groundwater flow and contaminant transport. Given the small size of the TMA, 2D groundwater flow and contaminant transport model is being conducted for submission in the EIS. The results of this modelling will be used to assess the impacts, mitigation and risk to receptors using "worst-case" hydrostratigrpahy (shallow, thin intertill aquifers).

5.2.2.5 Numerical Modelling of Deep Well Injection

The preliminary design of the deep injection well(s) and modelling of brine disposal into the disposal horizon will be completed, and will include an assessment of cumulative effects.

5.2.3 Terrestrial Environment Assessment

A terrestrial assessment is being completed to: provide a description of the landscape properties, soils, provincially/federally listed species occurrence data, vegetation and wildlife inventories, and wetland habitat; identify potential effects of the proposed project; and recommend measures to mitigate those effects.

A desktop analysis of the regional ecological features and listed species records has been completed. Field surveys were conducted in 2015 and 2016 and included targeted surveys for the presence of provincially/federally listed species and their associated habitats. Sensitive habitat areas, such as wetlands, native prairie, and locations of rare species were classified and digitally mapped in the field. All field-level surveys were led by professionals with significant experience designing and completing the required surveys and knowledge of the local environment and regulations regarding species expected to occur in the project area. Species detection surveys will follow protocols by the Saskatchewan Ministry of Environment (MOE), Alberta Environment and Parks (AEP), and Environment and Climate Change Canada (ECCC). All permits for completing species detection were obtained prior to survey initiation. Specific assessments components are described below.

5.2.3.1 Terrain and Soils

A desktop terrain and soils assessment is being completed to define terrain and soil conditions within the vicinity of the proposed project. The soil mapping will assist with management of soils during construction, operation, and future reclamation planning. Potential effects to terrain soils will be assessed, including effects from changes to landscape, soil removal, and contamination. Appropriate mitigation measures will be proposed.

5.2.3.2 Terrestrial and Wetland Vegetation

A desktop review of biological information was conducted to describe regional ecosystem characteristics and identify sensitive habitat types and provincially and federally listed plant species. Listed species habitat requirements, community associations, and occurrence data were cross-referenced with local landscape and soil properties to identify locations capable of supporting local populations and focus survey efforts in the field.

SNC-Lavalin compiled an inventory of all vascular plant species and communities occurring within the study area in 2015 and 2016. Census surveys of all habitats present within the local study area were performed in conjunction with protected plant species surveys over spring and summer visits in 2015 and 2016. Wetlands were classified according to Stewart and Kantrud's (1971) Classification of Natural Ponds and Lakes in the Glaciated Prairie Region. Protected plant surveys were conducted in conjunction with the floristic inventory census surveys over two seasonal visits (spring and summer) during different flowering periods in 2015 and 2016 to maximize detectability. Surveys were conducted according to the protocols developed by the Saskatchewan Ministry of Environment (MOE 2015a), the SKCDC (2014), the Alberta Native Plant Council (ANPC 2012), and the Canadian Wildlife Service (Henderson 2009).

Data collected during the terrestrial and wetland vegetation assessment will be used to identify potential effects and minimize those effects through appropriate mitigation, such as avoidance, setbacks, revegetation, and offsetting. Specific mitigation and offsetting will be determined in coordination with the Ministry of Environment.

5.2.3.3 Wildlife and Wildlife Habitat

The wildlife and wildlife habitat assessment included a desktop analysis followed by field surveys during peak wildlife activity periods. The desktop data was cross-referenced with local landscape properties to identify locations capable of supporting local populations and focus field survey efforts.

Rapid assessment wildlife surveys were conducted while crews were conducting the rare plant and wetland classification surveys in the spring and summer of 2015 and 2016. SNC-Lavalin also conducted species detection surveys for amphibians (including northern leopard frogs), yellow rail (*Coturnicops noveboracensis*), common nighthawk (*Chordeiles minor*), and breeding and migratory birds (avian point counts) to determine presence/absence of these species in 2016. These species detection surveys were chosen because they are aimed at identifying listed species in Saskatchewan that have the potential to occur in the area, and have standardized survey protocols published by the Saskatchewan Ministry of Environment. These surveys are also useful because they are aimed at detecting listed or protected species that are not usually detected during routine biological surveys because of their nocturnal or reclusive nature. Surveys were conducted in accordance with the Amphibian Auditory Survey Protocol (MOE 2014a), the Yellow Rail Survey Protocol (MOE 2014b), the Common Nighthawk Survey Protocol (MOE 2015b), and the Grassland Birds Survey Protocol (MOE 2014c). During all surveys, observations of protected wildlife species encountered were compiled.

Data collected during the wildlife and wildlife habitat assessment will support the effects assessment and the mitigation of those effects through appropriate mitigation measures, such as avoidance and setbacks. Specific mitigation and offsetting will be determined in coordination with the MOE.

5.2.4 Aquatic Environment Assessment

5.2.4.1 Hydrology Assessment

A detailed hydrology assessment is being completed to characterize the baseline surface water regime in the proposed development area. The assessment will identify any potential effects to surface water resources from changes to drainage or the release of contaminants (e.g. brine, hazardous substances). The assessment includes a desktop analysis, a field investigation, and a surface water impact assessment.

The desktop analysis included a review of regional topography data, satellite imagery and historical climate and stream flow data. The desktop review provides an overview of the associated drainage catchments as well as an insight into precipitation and surface water flow characteristics of the region. Digital topography data acquired from FlySask was used to develop site-specific contour maps of the project area, and establish local and regional study areas. Local sub-catchments were delineated based on the digital elevation model created from the topographic data. The drainage basins were used to develop preliminary drawings for the required field investigations.

A field investigation was conducted to verify the data from the desktop analysis for local areas, visually inspect on-site drainage conditions, and acquire information on hydrologic features. Existing surface water features including key culverts, watercourses and wetlands were identified with approximate location details and photographs, and overall site drainage collected for use in the analysis and reporting. The information collected during the field investigation and topographic survey will be used to finalize surficial drainage paths and watershed delineation for the study area. A surface water impact assessment will be completed using topographical, hydro-meteorological, and other water management data.

In order to characterize baseline water quality variations, surface water sampling locations were identified and grab samples were collected during spring, summer, and fall seasons. Field, trip and equipment blanks were collected for quality assurance/quality control (QA/QC) purposes. Field parameters (i.e. pH, conductivity, temperature) were also collected to characterize in-situ water chemistry. The samples were analyzed for routine water chemistry, trace metals, herbicides, PCBs, and coliforms.

Sediment quality data of the nearby water bodies were collected as baseline data to understand the water quality associated with water constituents that settle or bind to sediment particles. Sediment sampling was completed at both upstream and downstream locations of the Pipestone Creek and wetlands within the study area. The samples were analyzed for particle size, a general chemical suite, and trace metals.

Pipestone Creek is the closest major watercourse to the proposed project; however, CGFPC plans to site mine infrastructure such that significant runoff from the site to the Pipestone Creek is not expected. The development site will be limited to a relatively small area in comparison with the size of the Pipestone Creek basin. In order to assist with characterization of local streamflow conditions of Pipestone Creek, a streamflow gauge station has been set up and the flow is being monitored at a downstream location close to the study area. For comparison purposes, a regional analysis will be conducted to further characterize site runoff contributions based on the publically available regional streamflow data. Time series data for at least 15-years from selected Environment and Climate Change Canada (Water Survey of Canada) hydrometric gauging stations located in the area with similar hydrologic conditions will be analyzed to develop trend lines for flows versus gross and effective drainage areas. The regional curves will be used to estimate flows of Pipestone Creek reach in the study area and un-gauged sub-catchments. The data generated from the regional analysis will be used to estimate the key flow events (i.e. 2-year and 100-year return period peak flows).

A hydrological model is being developed to identify potential project impact in the local sub-catchments for a design flood (i.e. 100-year event). The catchment characteristics and meteorological data were used as input to this model. The impact analysis will include a pre-development and post-development conditions evaluation to identify the project impacts. Potential surface water system impacts will be identified, including the potential changes in the surficial water drainage paths and peak flows. The hydrological model will assist with the implementation of appropriate mitigation measures.

Point Probable Maximum Precipitation (PPMP) is an important design storm parameter for tailings pond operations. The PPMP will be estimated for the development area to aid in designing major water/brine management systems for the project.

5.2.4.2 Subsidence Analysis

In parallel to the surface water study, a separate analysis of subsidence and its effects on surface water is being conducted for the proposed project. Surface subsidence is expected to occur as a creep of the deeply situated salt rocks causes slow cavern closure and deformation of the rocks toward the mined caverns. A model will be developed to estimate the maximum potential subsidence expected to occur over the influence area of mining after the operations period, as well as subsidence at 10, 20, 30, 40 and 50 years mine life. The model will consider that the total cavern or mined volume will eventually be expressed on the surficial topography as an equivalent volume of surface subsidence. The subsidence distribution pattern depends mainly on the geometry of the cavern, and on the rock properties in the overburden rock above the cavern. In the case of having multiple caverns with a given grid pattern, the subsidence contribution from each cavern is additive, thus the subsidence at a specific surface location will be the collective contribution from several caverns (Van Sambeek and Leo 2000). The model will provide an estimate of subsidence distribution over the influence area of mining.

Subsequently, site surface water regimes will be delineated for each of the pre-subsidence and post-subsidence topographic scenarios. A comparative assessment of the two scenarios will be used to identify potential impacts to infrastructure and the surficial environment. Mitigation measures will be recommended to minimize any significant subsidence impact to the environment as required.

The results of the surface water impact assessment will be compiled into a report and included in the EIS submission. The report will also include GIS maps showing topography, drainage patterns, subsidence analysis and a visual description of any recommended mitigation measures.

5.2.4.3 Fish and Fish Habitat

A fish and fish habitat assessment was completed to identify potential effects. The assessment includes a desktop analysis and a field-level investigation of Pipestone Creek, two tributaries to Pipestone Creek, and two oxbow lakes.

A desktop review was conducted to describe fish and fish habitat in the region and assist with the selection of appropriate fish sampling methods. Field level surveys included habitat assessments and fish capture activities. Habitat assessments were conducted to identify riparian zones, substrate types, flow velocities, approximate water depths, and vegetation cover. Creek flow and habitat connectivity between Pipestone Creek and the tributary origins was also assessed. Fish habitat quality was classified as simple, moderate or complex. Fish captures were conducted over spring, summer and fall 2016 and included electrofishing, gill netting, and minnow trapping. All captured fish were documented (e.g. species, number of individuals, length class) and released.

Data collected during the fish and fish habitat assessment will support the effects assessment and the mitigation of those effects through appropriate mitigation measures.

5.2.5 Human Environment

5.2.5.1 Heritage Resources Assessment

A Heritage Resource Impact Assessment (HRIA) was conducted in accordance with *The Heritage Property Act (1980)*. The project area was referred to the Heritage Conservation Branch (HCB) of Saskatchewan Parks, Culture and Sport for review, and the HCB responded with a requirement for an HRIA on approximately 9% of the land included in the referral.

The baseline description of heritage resources in the region was compiled using available information to assess the area's heritage potential. Baseline data collection included obtaining existing HRIA reports and Saskatchewan Archaeological Resource Records (SARRs) from the Archaeological Resource Management Section (ARMS) of the HCB. The HRIA was conducted in accordance with Archaeological Resource Investigation Permit 15-124. Transects across areas of native parkland with archaeological potential were walked and shovel tests were excavated in areas with the potential for buried archaeological resources. Heritage resources that were identified during the assessment were further assessed using additional tests, mapping, and surface examination and reported to the HCB. The HCB provided a letter of outlining requirements for further testing if the project has the potential to affect the heritage site with moderate archaeological significance.

5.2.5.2 Socio-economic Assessment

A desktop socio-economic assessment will consider potential effects of the project on land and resource use, employment and business opportunities, and community services and infrastructure. The desktop review will include research on the economy, population, infrastructure and services, community well-being, and domestic and commercials land and resource use. The following will be included in the socio-economic assessment:

- Potential effects to land and resource use will be assessed and will include a discussion of adjacent land use and access, commercial industries (agriculture, mining, and oil and gas), hunting, trapping and sport fishing areas, traditional land use, tourism and recreational land use, and parks and other protected areas;
- Potential effects to the economy, employment and business opportunities will be assessed and will include a discussion of the anticipated number of direct and indirect jobs created by the project during construction and operation, and the expected annual contribution to the local communities during the construction and operation;
- Potential effects to the social components will be assessed and will include a discussion of demographics, community services and infrastructure, and public safety and well-being; and
- Potential employment opportunities, including any targets and strategies for employing Aboriginal groups.

5.2.5.3 Traffic Impact Assessment

A traffic impact assessment is being conducted to determine the incremental traffic impact of the proposed mine facility on the surrounding roads and highways, and determine potential road improvements to accommodate site generated traffic. The traffic impact assessment will include multiple scenarios including traffic during construction and operation. The traffic impact assessment will include the following:

- Collect average annual daily traffic volumes in the vicinity of the project through Saskatchewan Ministry of Highways and Infrastructure or RMs. Where traffic data is missing, traffic counts could be conducted on roads in the area (e.g. Highway 1, 47, 48 and Grid Road 616).
- Analysis of current traffic operations (e.g. Highway 1, 47, 48 and Grid Road 616) will be conducted using methodology in the 2010 Highway Capacity Manual. The levels of service on the existing roads will be established as a baseline condition.
- Future background traffic will be forecast for the opening year of the mine operation by apply growth rates based on historical traffic and/or population growth in the area.
- Site traffic generated by the mine operation will be estimated based on traffic generation indicators such as tonnage and number of employees. The site generated traffic will be distributed and assigned to the road network.
- A traffic analysis will be conducted to determine future traffic operation on highways in the area (e.g. Highway 1, 47, 48, and Grid Road 616). The traffic analysis will be conducted both with and without the site generated traffic to determine the incremental traffic impact created by the mine operation. Intersections in the vicinity of the project that are anticipated to operate at a poor level of service will be identified.
- Based on the traffic analysis, improvements to affected roads will be recommended. The road improvements will consider both traffic operation and safety.
- Alternative access road options will be developed as part of the traffic assessment. Traffic service criteria will be defined to quantify the pros and cons of the alternatives.
- A traffic impact report will document the methodology, existing conditions, traffic forecasts, operations analysis, road improvements, findings and recommendations. Potential mitigation measures include monitoring and maintenance of roads, as well as installation of traffic lights, turning lanes, and warning signs as required.

6 Environmental Protection and Monitoring Plan

6.1 Environmental Management and Protection Plan

CGFPC will prepare an Environmental Management and Protection Plan that outlines specific environmental management and protection and contingency measures that will be utilized during construction, operation and closure. The specifics of the plan will be determined in conjunction with MOE.

6.2 Emergency Response Plan

CGFPC will prepare an Emergency Response Plan for construction and operation.

6.3 Environmental Monitoring

The EIS will outline plans for environmental monitoring and reporting during construction, operation and decommissioning. The purpose of the monitoring program will be to:

- Document and compare effects predicted in the EIS with actual effects;
- Monitor the effectiveness of mitigation and compensation measures;
- Support the development of other mitigation and compensation measures, if required; and
- Confirm compliance with regulatory requirements.

It will include monitoring methods, frequency, sampling locations and parameters. The monitoring program will be refined in consultation with the regulatory agencies during licensing and will be subject to periodic reviews/updates. The monitoring program will include annual reporting to government agencies. It is expected to include the following:

- Monitoring containment system stability and performance of the TMA, brine storage, and other hazardous substances storage;
- Monitoring of pipelines containing brine or hazardous substances;
- Monitoring of roads affected by increased traffic volumes to identify any maintenance requirements;
- Monitoring the success of any required habitat restoration or species transplants;
- Monitoring for air emissions;
- Monitoring for soil contamination from brine migration and salt dust;
- Monitoring of groundwater and surface water;
- Subsidence monitoring; and
- Monitoring injection wells.

The above list is not necessarily complete and the EIS will include a complete assessment of project effects, mitigation measures and monitoring.

Anticipated reporting requirements to the various government agencies will be discussed, including an annual report to the EA Branch as outlined by Government of Saskatchewan (2014a).

7 Decommissioning and Reclamation

7.1 Conceptual Decommissioning and Reclamation Plan

The EIS will include a conceptual decommissioning and reclamation (D&R) plan. The D&R plan will be developed in consultation with the regulatory agencies during licensing and will be subject to periodic reviews/updates during operations. It will be prepared in accordance with applicable sections of the Mineral Industry Environmental Protection Regulations (1996), well as current legislation and industry best practices. The plan will include:

- Objectives of the decommissioning and reclamation, including identification of post-operational land use options for the site;
- D&R procedures, such as progressive decommissioning where possible;
- An evaluation of alternate decommissioning options;
- D&R plan for all surface and underground infrastructure;
- Post- D&R land use options;
- D&R schedule (approximate);
- Environmental impacts which will be mitigated during D&R;
- Environmental impacts which will remain post D&R;
- Post-decommissioning monitoring; and
- Estimate of D&R costs, as well as estimate of financial assurance.

The plan will also include a discussion of care and maintenance of the facility if temporary suspension of operations were to be required. This would likely involve environmental monitoring, operation of critical equipment, maintenance, and site security.

7.2 Financial Assurance

The EIS will include a proposed financial assurance for D&R as required by the Mineral Industry Environmental Protection Regulations. The assurance will be determined in consultation with MOE.

8 Commitments Register

A detailed commitments register table will be prepared which outlines all specific avoidance, mitigation, monitoring, and reporting commitments that will be conducted to minimize or eliminate environmental effects resulting from the project. Commitments will be specific, measureable, achievable, reportable.

The register will be updated with any terms and conditions put forward by the Minister if the development is approved. Commitments outlined in this register will eventually be incorporated into future management plans for the project, including any environmental protection plans developed for the project's construction, operation, and decommissioning.

9 Closure

This Terms of Reference has been prepared by SNC-Lavalin Inc. on behalf of Canada Golden Fortune Potash Corporation for submission to the Saskatchewan Ministry of Environment. Please contact us at +1.306.668.8080 or greg.potter@snclavalin.com if you have any questions.

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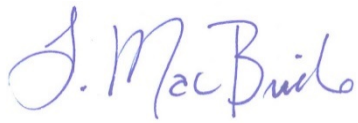

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Appendix A

Environmental Impact Statement – Table of Contents

EIS Table of Contents

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