

# FORAN

Mcllvenna Bay Project  
*Revised Technical Proposal and Terms of Reference*

Submitted to:

**Saskatchewan Ministry of Environment**

Environmental Assessment and Stewardship Branch  
3211 Albert Street, 4<sup>th</sup> Floor  
Regina, SK S4S 5W6

Submitted by:

**Mcllvenna Bay Operating Ltd.**

A Subsidiary of Foran Mining Corporation  
100-318 Wellman Lane  
Saskatoon, SK S7T 0J1



## Table of Contents

1	Executive Summary .....	6
2	Introduction .....	9
2.1	The Proponent .....	9
2.2	Development Justification .....	9
2.3	Land Controls .....	11
2.4	Regulatory Requirements .....	11
2.4.1	Environmental Assessment.....	12
2.4.2	Federal and Provincial Legislation.....	12
2.4.3	Guidelines, Policies, Standards .....	14
2.4.4	Licensing and Permitting.....	14
3	Description of Development .....	15
3.1	Siting.....	15
3.2	Infrastructure .....	22
3.2.1	Mining Infrastructure.....	25
3.2.2	Mineral Processing Infrastructure .....	37
3.2.3	Water Management Infrastructure .....	63
3.2.4	Waste Management Infrastructure .....	73
3.2.5	Surface Support Infrastructure .....	73
3.2.6	Site Access.....	75
3.3	Activities.....	76
3.3.1	General.....	76
3.3.2	Site Preparation and Construction.....	78
3.3.3	Operation .....	78
3.3.4	Decommissioning and Reclamation .....	79
3.4	Post-Decommissioning.....	83
3.5	Inputs and Outputs .....	84
3.5.1	Products .....	84
3.5.2	Resource Use.....	84
3.5.3	By-Products, Reagents and Emissions .....	84
3.5.4	Sensory Outputs.....	85
3.5.5	Employment Opportunities .....	85
3.5.6	Traffic .....	88

---

3.6	Alternative Means of Carrying out the Development .....	92
4	Stakeholder Engagement.....	93
4.1	Stakeholder Engagement Plan .....	93
4.1.1	Stakeholder Identification.....	94
4.1.2	Stakeholder Engagement Objectives .....	95
4.1.3	Stakeholder Engagement and Feedback Collection Tools and Methods.....	96
4.1.4	Stakeholder Records Management and Reporting.....	97
4.2	Stakeholder Engagement Activities Completed to Date.....	97
5	Rights-Holder Engagement .....	98
5.1	Rights-Holder Engagement Strategy.....	98
5.1.1	Rights-Holder Identification .....	98
5.1.2	Rights-holder Engagement Objectives.....	100
5.1.3	Rights-holder Engagement and Feedback Collection Tools and Methods .....	101
5.1.4	Rights-holder Records Management and Reporting .....	102
5.2	Rights-holder Engagement Activities Completed to Date .....	103
5.2.1	Engagement with Peter Ballantyne Cree Nation .....	103
5.2.2	Engagement with Métis Nation-Saskatchewan (MN-S) Eastern Region 1 (ER1) (Representing Cumberland House Métis Local #42) .....	105
5.2.3	Engagement with Métis Local #90 Sandy Bay.....	105
5.2.4	Engagement with Cumberland House Cree Nation .....	105
5.2.5	Engagement with Opaskwayak Cree Nation.....	106
6	EIA Boundaries .....	106
6.1	Spatial Boundaries .....	106
6.2	Temporal Boundaries.....	106
7	Existing Environment .....	107
7.1	General Requirements .....	107
7.2	Biophysical .....	108
7.2.1	Topography and Soils.....	108
7.2.2	Terrestrial Environment .....	108
7.2.3	Species of Conservation Concern.....	112
7.2.4	Aquatic Environment .....	115
7.2.5	Groundwater.....	126
7.2.6	Geology and Geochemistry.....	128

---

7.2.7	Atmospheric and Sensory Environment .....	130
7.3	Social, Economic and Health .....	131
7.3.1	Demographics .....	135
7.3.2	Employment .....	135
7.3.3	Community Services.....	138
7.3.4	Land and Resource Use .....	139
7.4	Archaeology and Heritage.....	141
7.5	Traditional Land Use .....	143
8	Valued Component Selection .....	145
9	Effects Assessment .....	153
9.1	Predicted Effects and Mitigation .....	153
9.2	Screening Effects Assessment.....	157
9.2.1	Baseline Information.....	157
9.2.2	Spatial and Temporal Boundaries .....	163
9.2.3	Environmental Change Analyses.....	174
9.3	Residual Effects .....	180
9.3.1	Significance Determination.....	181
9.3.2	Key Anticipated Residual Effects.....	183
9.4	Cumulative Effects .....	183
9.4.1	Projects Included in Cumulative Effects Assessment.....	183
9.4.2	Assessment Methods.....	185
10	Consultation Report – Effects on First Nation and Métis Communities.....	186
11	Potential Accidents and Malfunctions .....	186
12	Ancillary Projects.....	186
13	Effects of the Environment on the Development.....	187
14	Monitoring .....	187
15	Summary and Conclusions .....	188
16	Conditions Management .....	188
16.1	Commitments Register .....	188
16.2	Follow-Up Reporting .....	188
17	Qualified Persons Credentials.....	188
18	References .....	189

## List of Acronyms

ADEX – advanced exploration  
ASA – aquatic study area  
BACI – before-after-control-impact  
BEV – battery electric vehicle  
BP – Boreal Plain  
CDP – conceptual decommissioning plan  
CEA – cumulative effects assessment  
CEAA – *Canadian Environmental Assessment Act*  
CHCN – Cumberland House Cree Nation  
CIE – Commission Internationale de L’Eclairage (International Commission on Illumination)  
COPC – Constituents of Potential Concern  
COSEWIC – Committee on the Status of Endangered Wildlife in Canada  
CSFWZ – copper stockwork footwall zone  
CSM – Conceptual Site Model  
CSZ – copper stockwork zone  
DDP – detailed decommissioning plan  
EAB – Environmental Assessment & Stewardship Branch  
ECCC – Environment and Climate Change Canada  
EEM – environmental effects monitoring  
EIA – Environmental Impact Assessment  
EIS – Environmental Impact Statement  
EM – electro-magnetic  
ER1 – Eastern Region 1  
ERA – ecological risk assessment  
ETP – effluent treatment plant  
FFGB – Flin Flon Greenstone Belt  
GCL - geosynthetic clay liner  
GHG – greenhouse gas  
HABISask – Hunting, Angling, and Biodiversity Information of Saskatchewan  
HCB – Heritage Conservation Branch  
HDPE – high density polyethylene  
HHERA – human health and ecological risk assessment  
HHRA – human health risk assessment  
HRIA – Heritage Resource Impact Assessment  
IAA – *Impact Assessment Act*  
ICP – Institutional Control Program  
INAP – International Network for Acid Protection  
LLDPE – linear low-density polyethylene  
LNG – liquified natural gas  
LRC – Lands and Resource Committee

LSA – Local Study Area  
MBO – McIlvenna Bay Operating Subsidiary Ltd.  
MDMER – Metal and Diamond Mining Effluent Regulations  
MMIWG – National Inquiry into Missing and Murdered Indigenous Women and Girls  
MN-S – Métis Nation-Saskatchewan  
MSWG – Mapping System Working Group  
NAG – not acid generating  
NO<sub>2</sub> – nitrogen dioxide  
NSAD – Northern Saskatchewan Administration District  
NSEQC – Northern Saskatchewan Environmental Quality Committee  
OCN – Opaskwayak Cree Nation  
PAG – potentially acid generating  
PAMF – Prince Albert Model Forest  
PBCN – Peter Ballantyne Cree Nation  
PBGOC – Peter Ballantyne Group of Companies  
PDP – preliminary decommissioning plan  
PEA – Preliminary Economic Assessment  
PFS – Pre-feasibility Study  
PM – particulate matter  
PMP – probably maximum precipitation  
QA/QC – quality assurance/quality control  
ROC – Records of Contact  
RSA – Regional Study Area  
SAAQS – Saskatchewan Ambient Air Quality Standards  
SAG – Semi-Autogenous Grinding  
SAR – species at risk  
SARA – *Species At Risk Act*  
SIL – Survey Intensity Level  
SKCDC – Saskatchewan Conservation Data Centre  
SKMOE – Saskatchewan Ministry of Environment  
SO<sub>2</sub> – sulphur dioxide  
SOCC – Species of Conservation Concern  
SSA – Site Study Area  
TAWMP – tailings area water management pond  
TLU – traditional land use  
TOC – Total Organic Carbon  
TOR – Terms of Reference  
TP – Technical Proposal  
TSF – tailings storage facility  
TSM – Towards Sustainable Management  
UNDRIP – United Nations Declaration on the Rights of Indigenous Peoples  
UWZ – Upper West Massive Sulphide

VC – Valued Component

VHMS – Volcanogenic Hosted Massive Sulfide

Z2 – Zone 2 massive sulphide

## List of Figures

Figure 2-1	Mcllvenna Bay Project Location
Figure 3-1	Mcllvenna Bay Project Site Location
Figure 3-2	Illustration of Historical Development in the Immediate Vicinity of the Project Site
Figure 3-3	Hanson Lake Facility during Operations in 2012
Figure 3-4	Previously Disturbed Sand Quarry (Proposed TSF Site)
Figure 3-5	Mcllvenna Bay Exploration Camp
Figure 3-6	Illustration of Constructed ADEX Infrastructure as of May 2022
Figure 3-7	Overview of Proposed Expansion of Surface Development in Relation to Existing Site Development
Figure 3-8	Conceptual 3D Model Illustration of Proposed Surface Infrastructure, Mcllvenna Bay Project
Figure 3-9	Conceptual 3D Model Illustration of Proposed Underground Workings, Mcllvenna Bay Project
Figure 3-10	Mcllvenna Bay Mineral Complex Overview
Figure 3-11	General Arrangement of Headframe and Hoist House
Figure 3-12	Pre-Production Ventilation Schematic
Figure 3-13	Production Ventilation Schematic
Figure 3-14	Life of Mine Ventilation Schematic
Figure 3-15	Conceptual Schematic of Surface General Arrangement of Mine Air Heating, Heat Recovery and Mine Air Ventilation System
Figure 3-16	Proposed Ore and Waste Rock Handling System Schematic
Figure 3-17	Underground Mine Dewatering Schematic
Figure 3-18	Conceptual Processing Flowsheet
Figure 3-19	Image of ADEX Ore and Waste Rock Pad
Figure 3-20	Primary Crusher Building Plan and Section View
Figure 3-21	Schematic of Sorting, Crushing and Screening. Ore Stockpiles would be under Covered Buildings.
Figure 3-22	Processing Plant Plan View
Figure 3-23	Processing Plant Section View
Figure 3-24	Schematic of Proposed Pyrite Flotation Circuit
Figure 3-25	Paste Backfill Plant Plan View
Figure 3-26	Paste Backfill Plant Section View
Figure 3-27	Tailings Storage Facility Stage 1
Figure 3-28	Tailings Storage Facility Stage 2
Figure 3-29	Tailings Storage Facility Stage 3
Figure 3-30	Tailings Storage Facility Stage 4
Figure 3-31	Tailings Storage Facility Stage 5
Figure 3-32	Tailings Storage Facility Stage 6
Figure 3-33	Tailings Storage Facility Sections and Details 1
Figure 3-34	Tailings Storage Facility Sections and Details 2
Figure 3-35	Site Water Balance, Average Conditions, Typical Operating Year
Figure 3-36	Site Water Balance, Average Precipitation with RCP 8.5 Climate Change Factor and Increased Mine Inflow
Figure 3-37	Site Water Balance, 95 <sup>th</sup> Percentile Wet Conditions with RCP 8.5 Normal Mine Inflow
Figure 3-38	Image of Constructed Effluent Storage Pond
Figure 3-39	Proposed Routing for Treated Effluent Discharge Line
Figure 3-40	Proposed Diffuser Detail, Treated Effluent Discharge to Winn Bay of Hanson Lake
Figure 3-41	Proposed Crossing Details, Treated Effluent Discharge Pipeline
Figure 3-42	Site Access Road, 2022
Figure 3-43	High Level Project Schedule

Figure 3-44	Site Water Balance – Early Active Closure
Figure 3-45	Site Water Balance – Late Closure
Figure 3-46	Estimated Workforce During Construction
Figure 3-47	Estimated MBO Employed Positions During Full Production
Figure 3-48	Summary of Vehicles by Activity
Figure 3-49	Alternative Routings for Ore Concentrate Shipments through Creighton/Flin Flon
Figure 3-50	Possible Transportation Routes for Shipment of Goods and Freight to the Site
Figure 7-1	Terrestrial Local and Regional Study Areas from the 2012 and 2021 Baseline Studies
Figure 7-2	Aquatic Study Areas from the 2012 and 2021 Baseline Studies
Figure 7-3	Regional Watersheds and Flow Surrounding the Project
Figure 7-4	Stratigraphic Column for the Mcllvenna Bay Complex Area (Foran 2020)
Figure 7-5	Proposed Socio-economic Study Area for the Project
Figure 7-6	Land Use in the Socio-economic Study Area for the Project
Figure 7-7	Heritages Resources in the Terrestrial LSA and 2012 Baseline Study Search Locations
Figure 9-1	Locations of 2022 Early Season Vegetation Survey Transects
Figure 9-2	Locations of 2022 Water Sampling Stations
Figure 9-3	SSA, LSA, and RSA for Air Quality VC
Figure 9-4	SSA, LSA, and RSA for Noise and Vibration VC
Figure 9-5	SSA, LSA and RSA for Hydrogeological VC
Figure 9-6	SSA, LSA, and RSA for Aquatic VC
Figure 9-7	SSA, LSA, and RSA for Terrestrial VC
Figure 9-8	LSA for Human VC Scoping
Figure 9-9	RSA for Human VC

## List of Tables

Table 2-1	Potentially Applicable Federal and Provincial Legislation
Table 2-2	Potential List of Permits, Approvals, or Authorizations Required by the Project
Table 3-1	Life of Mine Waste Rock Mass Balance
Table 3-2	Summary of Acid Generating Potential of De-sulphurized Tailings Results Tested through Pilot Pyrite Flotation Circuit
Table 3-3	Summary of Total Metals Analysis from De-sulphurized Tailings Tested through Pilot Pyrite Flotation Circuit
Table 3-4	Estimated Employment Numbers by Labour Category and Rotation
Table 3-5	Traffic Estimate for the Project
Table 4-1	Stakeholder Engagement Objectives
Table 4-2	Stakeholder Engagement Activities and Feedback Collection Tools
Table 5-1	Rights-Holder Engagement Objectives
Table 5-2	Rights-Holder Engagement Activities and Feedback Collection Tools
Table 7-1	Species of Conservation Concern Identified during the 2012 and 2021 Baseline Studies
Table 7-2	Aquatic Studies Conducted in the Mcllvenna Bay Project Aquatic Study Area, 2012 and 2021
Table 7-3	Water Chemistry Parameters Measured from Baseline Studies Conducted in 2012, 2021, and 2022
Table 7-4	Sediment Chemistry Parameters Measured from Baseline Studies Conducted in 2012 and 2021
Table 7-5	Fish Species Captured in Hanson Lake
Table 7-6	Populations of Communities in the LSA and the Distance to the Project
Table-7-7	Population of Communities in the LSA by Age and Gender
Table 7-8	Labour Force Characteristics of Communities Located in the LSA
Table 7-9	Employment by Sector of Communities in the LSA
Table 8-1	Proposed Valued Component Overview
Table 9-1	Preliminary Identification of Environmental Risks and Mitigation Measures for the Mcllvenna Bay Project
Table 9-2	Residual Effects Assessment Criteria Ratings for Significance Determination
Table 9-3	Projects Included in the Cumulative Effects Assessment
Table 17-1	Credentials of Key Personnel

**Concordance Table for Technical Proposal and Terms of Reference according to Saskatchewan Ministry of Environment Technical Proposal Guidelines, November 2021 and Saskatchewan Ministry of Environment Guidelines for the Terms of Reference and Environmental Impact Statement, November 2021**

Section	Guideline	Guidance	Section and Page #
1 Executive Summary	TP	Provide a brief project summary, including the proponent's name and corporate structure. Identify key project personnel, along with their experience with similar projects and technical expertise used in the planning and design of the proposed project. Include the length, schedule and location of the project, main design features of the project itself, key environmental impacts and mitigation, residual impacts, the number and type of people to be employed and the need for and benefits of the project, including the demand for the project. This could include potential impact to local communities in terms of jobs and contracts.	1, 6
	TOR	a) Brief description of the development's purpose, product or service. b) Location of the development in the province c) Land ownership structure, for example private or Crown by type d) Brief indication of anticipated key environmental impacts	1, 6
2 Introduction			
2.1 The Proponent	TOR	a) legal ownership of the development and contact information b) primary individual with which the SKMOE will interact	2.1, 9
2.2 Development Justification	TOR	a) a brief statement of the societal positives and negatives of the proposed development	2.2, 9
2.3 Land Controls	TOR	a) a brief statement of current and anticipated land controls	2.3, 11
2.4 Regulatory Requirements			
2.4.1 Provincial and Federal Environmental Assessment Legislation	TOR	a) a summary of the development elements/ impacts that triggered the provincial EIA b) applicability of provincial and federal assessment legislation and the reasons	2.4.1, 12
2.4.2 Other Legislation, Guidance or Constitutional Requirements	TOR	TOR Guidelines: a) table of other applicable legislation, regulation, approvals, standards, codes of practice, guidelines, policies or constitutional requirements (e.g. duty to consult) b) applicable municipal bylaws and approvals	2.4.2, 12
3. Development Description	TP	Socioeconomics – Outline the possible impact on local communities in terms of potential jobs and contracts. Information should detail the types of jobs and contracts, the inputs that will be purchased locally, and the proponent's policy on the hiring of local employees for both labour and managerial positions. Also, outline any negative impacts on social or economic factors, including impacts on community infrastructure (e.g. schools, housing, medical facilities).	3.5.5, 85
3.1 Siting	TOR	a) the approach that was/will be taken to site selection and key considerations Location – Provide a detailed description of the location. Include maps to show the location of the proposed project relative to other land uses, developments and communities.	3.1, 15
3.2 Infrastructure	TP	3.2 Infrastructure	3.2, 22
	TOR	a) brief description of key infrastructure components required by the development and who the proponent(s) will be	3.2, 22
3.3 Activities			
3.3.1 General	TOR	a) proposed timeline for key development activities by phase including on-site environmental monitoring and installation of monitoring and domestic waste management equipment	3.3.1, 76
3.3.2 Site Preparation and Construction	TOR	a) listing of key activities associated with the phase	3.2, 22

Section	Guideline	Guidance	Section and Page #
3.3.3 Operation	TOR	a) listing of key activities associated with the phase	3.3.3, 78
3.3.4 Decommissioning and Reclamation	TOR	a) list of key activities associated with the phase	3.3, 79 3.4, 83
3.4 Inputs and Outputs	TP	Identify all inputs (e.g. water, other natural resources, electricity, process chemicals, hazardous substances) and describe their quantities and sources. Describe and quantify outputs (e.g. services and products). Identify and evaluate outputs that affect climate change conditions, including greenhouse gas (GHG) emissions. The removal of natural carbon sink features as part of project construction should also be identified and evaluated as outputs.	3.5, 84
3.4.1 Products	TOR	a) identification of key intended product(s) or service(s)	3.5.1, 84
3.4.2 Resource Use	TOR	a) identification of the key primary resources and secondary resources required to make the intended products or service generated by the development	3.5.2, 84
3.4.3 By-Products, Reagents and Emissions	TP	Describe the amount and type of all by-products and wastes, including: recyclable materials, hazardous and nonhazardous wastes, wastewater, air emissions and domestic waste. Describe how these materials will be treated, stored, contained, transported, used and/or disposed.	3.5.3, 84
	TOR	a) identification of the key components of the development's waste streams and air emissions	3.5.3, 84
3.4.4 Sensory Outputs	TOR	a) identification of key acoustic, visual, olfactory and vibrational outputs in the context of allowable standards	3.5.4, 85
3.5 Alternative Means of Carrying out the Development	TOR	a) key parameters/methodology for analysis of alternatives and selection of preferred approach b) list of parameters for which alternatives will be examined in the EIS Outline any alternatives considered feasible during project planning (e.g. location, process, route) and explain the rationale for rejecting. Identify any environmental considerations relevant to selection of the preferred alternative.	3.6, 92
4. Interest-Based Engagement	TOR	a) a plan outlining the interest-based engagement activities to be undertaken b) identification of groups to be engaged, including landowners, community associations, municipal governments, First Nations, Métis communities, regional planning agencies, businesses and special interest groups, c) methodology for acquiring feedback on potential issues, interests, VCs and concerns related to the development	4, 93
5. First Nation and Métis Consultation Plan	TOR	a) a plan for consulting with potentially impacted First Nation and Métis communities that captures the assigned procedural aspects of the consultation b) the plan should include: - a list of First Nation and Métis communities to be consulted - consultation objectives - a general process of the proposed consultation process, including a commitment to work with each community to develop a mutually acceptable approach for exchanging development-specific and traditional use information - potential tools and methods for acquiring feedback on adverse impacts to the exercise of Treaty and Aboriginal rights and traditional uses in the development area, along with other issues, interests and concerns related to the development - strategies for maintaining records and reporting back on consultation activities to communities and the SKMOE	5, 98
6. EIA Boundaries			
6.1 Spatial Boundaries	TOR	a) extent of development area boundary b) the proposed approach to defining the EIA's local and regional study areas, taking into account: - component specific study areas, if anticipated - known sensitive receptors - land use by wildlife and humans	6.1, 106

Section	Guideline	Guidance	Section and Page #
		<ul style="list-style-type: none"> <li>- potentially impacted local and regional services and infrastructure</li> <li>- necessary ancillary projects</li> <li>- existing development</li> <li>- potentially affected local First Nations and Métis communities and their areas of use for the exercise of rights and traditional uses</li> </ul>	
6.2 Temporal Boundaries	TOR	a) methodology for determining the temporal boundaries of the EIA, taking into account: <ul style="list-style-type: none"> <li>- how development effects could change over time for different environmental components</li> <li>- duration of residual effects</li> <li>- interactions with other environmental effects</li> <li>- landscape disturbances</li> <li>- anticipated future development, land use and demographics</li> <li>- ancillary projects</li> </ul>	6.2, 106
7. Existing Environment	TOR	a) outline of baseline information to be collected during the EIA and proposed timeline b) reference to specific government survey protocols or brief description of and rationale for proposed methodologies to be used for data collection and characterization	7.1, 107
7.2 Biophysical			
7.2.1 Topography and Soils	TP	Describe physical conditions, including unique landforms, slopes, runoff characteristics and soil types as well as proximity to streams or waterbodies.	7.2.1, 108
	TOR	a) brief overview of existing information for the topography and soils in the development area b) identification of known characteristics or soil pathogens that may require special mitigation or management plans	7.2.1, 108
7.2.2 Flora	TP	Identify and quantify vegetation types at and around the project footprint. Inventories of all detected plant species must be provided. References to vegetation in the technical proposal must be standardized according to the 'dominant habitat' terminology indicated in the Saskatchewan Ministry of Environment's (SKMOE's) most current Species Detection Loadform.	7.2.2.1, 110 7.2.2.2, 110
	TOR	a) current landcover and land use in the area b) identification of known sensitive habitats, noxious weed infestations or culturally sensitive plants	7.2.2.1, 110 7.2.2.2, 110
7.2.3 Fauna	TP	Identify and quantify aquatic habitats at and around the project footprint, the presence of wild species in the project area and the value of the project area as habitat features and habitat types. Inventories of all detected animal species must be provided. Describe fish and fish habitat if surface water bodies will be affected.	7.2.2.3, 110 7.2.2.4, 111 7.2.2.5, 112
	TOR	a) brief overview of known wildlife management challenges or sensitivities in the area b) known use of wildlife resources that may be impacted by the development, potentially requiring engagement and mitigation	7.2.3, 112 7.3.4, 139
7.2.4 Species of Conservation Concern	TP	Occurrences of SOCC and their habitats must be identified.	7.2.3, 112
	TOR	a) provide HABISask Project Screening Report for the proposed development study area buffered by one kilometer b) identify any known species that may require additional investigation and mitigation	7.2.3.1, 113
7.2.5 Surface Water	TOR	a) identification of major water bodies in the development area b) brief indication of any key interactions between the development and water bodies in the area that may require further investigation and possible mitigation	7.2.4.1, 118

Section	Guideline	Guidance	Section and Page #
7.2.6 Groundwater	TP	Determine subsurface stratigraphy and depth to groundwater and describe groundwater quality where appropriate.	7.2.5, 126
	TOR	a) identification of major groundwater aquifers in the development area b) brief indication of any key interactions between the development and groundwater that may require further investigation and possible mitigation	7.2.5, 126
7.2.7 Geology and Geochemistry	TOR	a) high level description of the major geological formations underlying the development site b) identification of known potential issues that may require further investigation and mitigation	7.2.6, 128
7.2.8 Atmospheric and Sensory Environment	TOR	a) proximity of development to communities or other known sensitive environmental features b) identification of likely atmospheric and sensory impacts that may require further investigation and mitigation	7.2.7, 130
7.3 Social, Economic and Health	TP	Describe social and economic conditions, including land use at and around the project area, special land use designations (e.g. parks, local zoning) and existing infrastructure (e.g. roads, utilities). Identify nearby residents and communities. Identify... any site that may have significant cultural value.	7.3, 131
	TOR	a) proximity of development to communities b) potential for development to put additional pressure on local infrastructure or lifestyle	7.3, 131
7.4 Archaeology and Heritage	TP	Identify... any site that may have significant heritage value	7.4, 141
	TOR	a) brief description of landscape features or heritage resources known to the proponent that may require further investigation	7.4, 141
7.5 First Nations and Métis Land Use	TOR	a) identification of First Nation and Métis communities using the site or located within 100 km of the development b) identification of development site land ownership and current access	7.5, 143
8 Valued Components	TOR	a) proposed criteria for selection of VCs other than those of importance to First Nation and Métis communities, which should be selected in consultation with the communities according to section 5	8, 145
	TOR	b) preliminary list of VCs (except for those to be determined with First Nation and Métis communities) to be considered in the EIA	8, 145
9. Effects Assessment	TP	Describe the effects (positive and negative) that the project may have on the environmental features previously identified. Describe measures to avoid, minimize or manage impacts. For each impact, identify the magnitude, geographic extent, duration, reversibility, frequency and probability of occurrence of the impact, and determine the methods or best management practices that will be used to mitigate for the effects. Identify any project changes or mitigation implemented in response to public concern. Finally, identify any residual impacts and provide rationale for why they cannot be mitigated.	9, 153
9.1 Predicted Changes to the Environment	TOR	a) for each environmental component, identify the approach that will be used to measure environmental changes resulting at each phase of the development	9.1, 153
9.2 Assessment of Effects on Valued Components			
9.2.1 Development Impact	TOR	a) for each VC or group of similar VCs, briefly describe the spatial and temporal boundaries, techniques, models, analyses and impact thresholds that will be used to assess the potential impacts of development related changes b) expected impacts (if known) to key VCs c) how historical information and traditional knowledge collected through engagement with local communities, First Nation and Métis communities will be used to identify potential impacts to VCs in the study area	9.2, 157
9.2.2 Proposed Mitigation	TOR	a) potential technically and economically feasible mitigation measures available for key VCs that may be impacted by the development b) indication of expected outcomes of potential mitigation measures	9.1, 153

Section	Guideline	Guidance	Section and Page #
		c) approach for engaging with HCB, local authorities and communities on culturally significant finds to determine appropriate mitigation	
9.2.3 Residual Effects	TOR	a) approach for determining what residual effects may remain after mitigation is implemented b) methodology for assessing the significance of residual effects c) identification of key anticipated residual effects (if known) d) statement addressing the proponent's intent to offset for VCs, as required where residual impacts are anticipated	9.3, 180
9.3 Cumulative Effects Assessment	TOR	a) commitment to discuss in the EIS how the development will contribute to any cumulative environmental impacts in the short or long-term b) description of the proposed approach for evaluating the cumulative impact of the development on VCs	9.4, 183
10. Consultation Report – Effect on First Nation and Métis Communities	TOR	a) acknowledgement that the Section 5. First Nation and Métis Consultation Plan will be used to assess and present any potential effects of the development on their rights and traditional uses b) identification of the need to work with impacted communities to develop appropriate mitigation or accommodations where necessary	10, 186
11. Potential Accidents and Malfunctions	TOR	a) list of potential major accidents and malfunctions associated with the development	11, 186
12 Ancillary Projects	TP	Ancillary projects include any associated or related projects whose planning, construction and/or operation are the responsibility of another proponent. Include a general description of anticipated ancillary projects and potential environmental impacts as part of the technical proposal.	12, 186
	TOR	a) list of ancillary projects and the expected responsible third-party proponent b) list of potential expansions or related projects the proponent is considering for the future, but that are not essential to the current development and for which approval is not currently being sought	12, 186
13 Effects of the Environment on the Development	TP	Describe climate and weather parameters that may impact the project.	13, 187
	TOR	a) list of the likely environmental events that could impact the development at each phase	13, 187
14. Monitoring	TOR	a) identification of the various monitoring programs that will be established as part of the follow-up to the EIA during each phase of the development	14, 187
15 Summary and Conclusions	TOR	a) the anticipated approach to presenting the information for this section of the EIS	15, 188
<b>16 Conditions Management</b>			
16.1 Commitments Register	TOR	a) format for the register if different from the suggested excel spreadsheet template in Appendix B of this document	16.1, 188
16.2 Follow-up Reporting	TOR	a) identification of potential needs for follow-up reporting, such as reporting back on monitoring or offset activities	16.2, 188
17. Qualified Persons Credentials	TOR	a) if known, a list of disciplinary leads responsible for undertaking the EIA b) academic and experiential qualifications, or credentials of a qualified person for members of a related discipline	17, 188

## 1 Executive Summary

Mcllvenna Bay Operating Subsidiary Ltd. (MBO), a wholly owned subsidiary of Foran Mining Corporation (Foran), is proposing the Mcllvenna Bay Project (the Project). The Project is a proposed base and precious metals underground mine and surface mineral processing facility to be constructed in east-central Saskatchewan, approximately 375 kilometres (km) northeast of Saskatoon and 65 km southwest of Creighton, Saskatchewan. The Project encompasses all activities, facilities, and phases to support a base and precious metals mining and mineral processing operation that will extract and process ore at a nominal 4,200 tonnes per day (tpd) and process upwards of 1.512 million tonnes per annum over its life. The copper and zinc generated from the Project are critical minerals that are essential to enabling the world's transition to a low carbon future.

The Project is accessible year-round via an existing 18 km all-weather gravel road that is connected to Saskatchewan Provincial Highway 106. The Project site has a long history of past exploration and silica sand mining activity and currently hosts an active regional exploration program as well as the Advanced Exploration Project (ADEX Project) for the Mcllvenna Bay complex. The ADEX Project involves infrastructure and activities to support bulk sampling of the Mcllvenna Bay complex.

The *Saskatchewan Environmental Assessment Act* (the Act) requires that a proponent receive the approval of the Minister of Environment before proceeding with a project that is defined as a development under the Act. MBO is self-declaring the Project to be a development and, therefore, a provincial Environmental Impact Assessment (EIA) is required. This document contains relevant information prescribed by the Act and is structured to align with both the Technical Proposal Guidelines and the Guidelines for the Terms of Reference and Environmental Impact Statement, November 2021.

MBO has been advised by the Saskatchewan Government that Peter Ballantyne Cree Nation (PBCN), the Cumberland House Cree Nation (CHCN), the Opaskwayak Cree Nation (OCN), the Sandy Bay Métis Local #90, the Creighton Métis Local #89, and the Cumberland House Métis Local #42 may have Aboriginal rights and/or interests that may be affected by the proposed Project. Accordingly, Foran has engaged with these Nations through the EIA process and will continue to implement a stakeholder and rights holder engagement strategy throughout the EIA process using a comprehensive plan that was developed for the Project. Foran has been actively engaging with nearby communities since 2011.

PBCN is a signatory to Treaty 6 and its territory spans a portion of Treaty 10 and a portion of Treaty 6. The Project is located on Crown land within PBCN territory and in proximity to the PBCN reserves located at Denare Beach, Deschambault Lake, Pelican Narrows, Birch Portage and Sturgeon Landing. Foran has been engaging with PBCN as a treaty and aboriginal rights holder with respect to Project impacts, including potential adverse environmental and socio-economic impacts to PBCN members, lands and uses, including hunting, fishing, and gathering, in all seasons, throughout its territory.

The Project area lies in the Boreal Plain Ecozone on the boundary of two ecoregions: the Namew Lake Upland landscape area of the Mid-Boreal Lowland Ecoregion and the Flin Flon Plain landscape area of the Churchill River Upland Ecoregion. A comprehensive understanding of the biophysical environment exists because of baseline investigations conducted at the site over the past decades that continue to be supplemented. A detailed socio-economic baseline and land use study was completed in 2022 using primary and secondary information sources to inform the EIA process.

The Project comprises the expansion of facilities and activities at the previously developed site to support mining and processing of the Mcllvenna Bay complex. The Mcllvenna Bay complex is currently understood to include the Mcllvenna Bay deposit having a reserve of 25,703,062 tonnes, grading 2.39% Zn and 1.23% Cu (Foran 2022), as well as the recently intersected Tesla zone among several other target areas. The Mcllvenna Bay deposit occurs from 30 metres (m) to greater than 1 km below ground surface and over a 2 km strike length. The Mcllvenna Bay deposit is a volcanogenic hosted massive sulphide (VHMS) deposit. The current mineral reserve for Mcllvenna Bay supports a projected mine operational period of 20 years. For the environmental assessment, an extended operational period of 34 years was assessed, followed by an active decommissioning period of 6 years that would include discharge of treated effluent. Reclamation and post-decommissioning monitoring would follow active decommissioning.

MBO proposes to mine the Mcllvenna Bay deposit using underground mining methods including transverse open stoping, Avoca, and longitudinal open stoping. The underground mine is proposed to be accessed via a ramp and vertical production shaft and ventilated over the life of mine using a combination of vertical fresh and exhaust air raises and the ramp system. Battery electric vehicles are proposed to reduce mine ventilation requirements and a heat recovery system is proposed to minimize fresh air heating requirements during winter months. MBO proposes to reduce the amount of water that may inflow to the mine using grouting and other techniques and to maintain safe underground working conditions by pumping water that cannot be reused underground to surface management facilities. Waste rock produced from the mine is proposed to be segregated underground, used underground as much as practical, and the remainder transported to a surface stockpile.

A surface mineral processing facility is proposed with the capacity to process ore at a rate of 4,200 tpd. Ore would enter the crushing circuit and be conveyed through additional sorting, screening, and crushing steps located in surface buildings before entering the processing plant. The processing plant would include grinding and floatation circuits that would produce a copper concentrate, a zinc concentrate, and two streams of tailings (a sulphur/pyrite concentrate stream, and a non-acid generating/de-sulphurized tailings stream). The pyrite tailings are proposed to be mixed with a binding agent (slag cement) and non-sulphur tailings and distributed underground to backfill mined stopes. The desulphurized tailings would be thickened, filtered, and trucked to an engineered, lined surface dry stack tailings storage facility (TSF) where they would be safely stacked.

Water management facilities are proposed to divert clean water away from the Project site and to collect and treat water that is influenced by site operations for reuse within site operations or for discharge to Winn Bay of Hanson Lake. Non-hazardous and hazardous wastes are proposed to be segregated and temporarily stored on site before transport off-site for final disposal. Additional surface supporting infrastructure includes facilities such as on-site accommodations, administration facilities, and maintenance facilities. The Project is proposed to be accessed via an existing road that connects to Saskatchewan Provincial Highway 106 with a helipad maintained on site for medical emergencies.

MBO proposes to conduct an effects assessment through an EIA process that will identify and assess the potential environmental effects of the proposed Project on valued components (VC), identify measures to mitigate and monitor potential environmental effects, and discuss the significance of residual effects that may occur after mitigation measures have been implemented. Mitigation strategies will be developed in consultation with stakeholders and rights-holders. MBO anticipates that the assessment of potential environmental impacts of the Project will focus on the potential impacts related to proposed releases to

air; proposed discharge of clean treated effluent; and proposed surface development. The environmental impact statement (EIS) will contain detailed information on the significance determination of each residual effect and where residual effects are unavoidable, planned follow-up through monitoring, offsets, reclamation, and other measures will be identified.

## 2 Introduction

Mcllvenna Bay Operating Ltd. (MBO), a fully owned subsidiary of Foran Mining Corporation (Foran), is proposing the Mcllvenna Bay Project. The Project is a proposed base and precious metals underground mine and surface mineral processing facility to be constructed in east-central Saskatchewan. The Project is located approximately 1 km south of Hanson Lake, Saskatchewan.

The Project includes the planned development of a base and precious metals mining operation that will process upwards of 1.512 million tonnes per annum of ore containing copper, zinc, gold, and silver over its life. These commodities are essential ingredients of the world's transition to a low carbon future.

The Project comprises activities and facilities to support mining and processing of the Mcllvenna Bay complex. The Mcllvenna Bay complex is currently understood to include the Mcllvenna Bay deposit, which extends from 30 metres (m) to greater than 1 km below ground surface and over at least a 2 km strike length, as well as additional zones and targets proximate to the current reserve. The Mcllvenna Bay deposit is a volcanogenic hosted massive sulphide (VHMS) deposit.

This document contains relevant information prescribed by the Saskatchewan *Environmental Assessment Act* (the Act) and is structured to align with both the Draft Technical Proposal Guidelines and the Guidelines for the Terms of Reference and Environmental Impact Statement, June 2021.

### 2.1 The Proponent

MBO is a fully owned subsidiary of Foran. Foran is a carbon neutral development company focused on the development of its wholly owned Mcllvenna Bay Project and exploration on its mineral claim package in east-central Saskatchewan. Foran is headquartered in Vancouver, Canada and publicly traded on the TSX-V under the trading symbol "FOM" and on the OTCQX under the trading symbol "FMCXF."

The primary individuals with which the SKMOE will interact are listed below.

Kirsten Ketilson	Director, ESG	Tel: 306-380-1425 Email: kketilson@foranmining.com
Jeff Pryznyk	Manager, Environment and Permitting	Tel: 306-291-1807 Email: jpryznyk@foranmining.com

### 2.2 Development Justification

The Government of Canada currently recognizes copper and zinc, which would be produced by the Project, as critical minerals. Critical minerals include those that are essential to Canada's economic security or are required for Canada's transition to a low carbon economy or are a sustainable source of critical minerals for Canada's partners. Critical minerals are priorities for Canada and a focus for domestic development.

Copper is a critical mineral that would be produced by the Project. The green energy transition is expected to significantly increase demand for copper because of its uses in expanding electricity networks and clean energy technologies such as electric vehicles. There are no producing copper mines in Saskatchewan, and the nearest copper-zinc mine to Saskatchewan (the HudBay 777 copper-zinc mine in Flin Flon, Manitoba) recently closed. There are several copper mines in Canada that are nearing the end of their life. This,

combined with the projected shortfall in copper supply globally over the next decade as the clean energy transition accelerates, means that new and additional copper supply is needed.

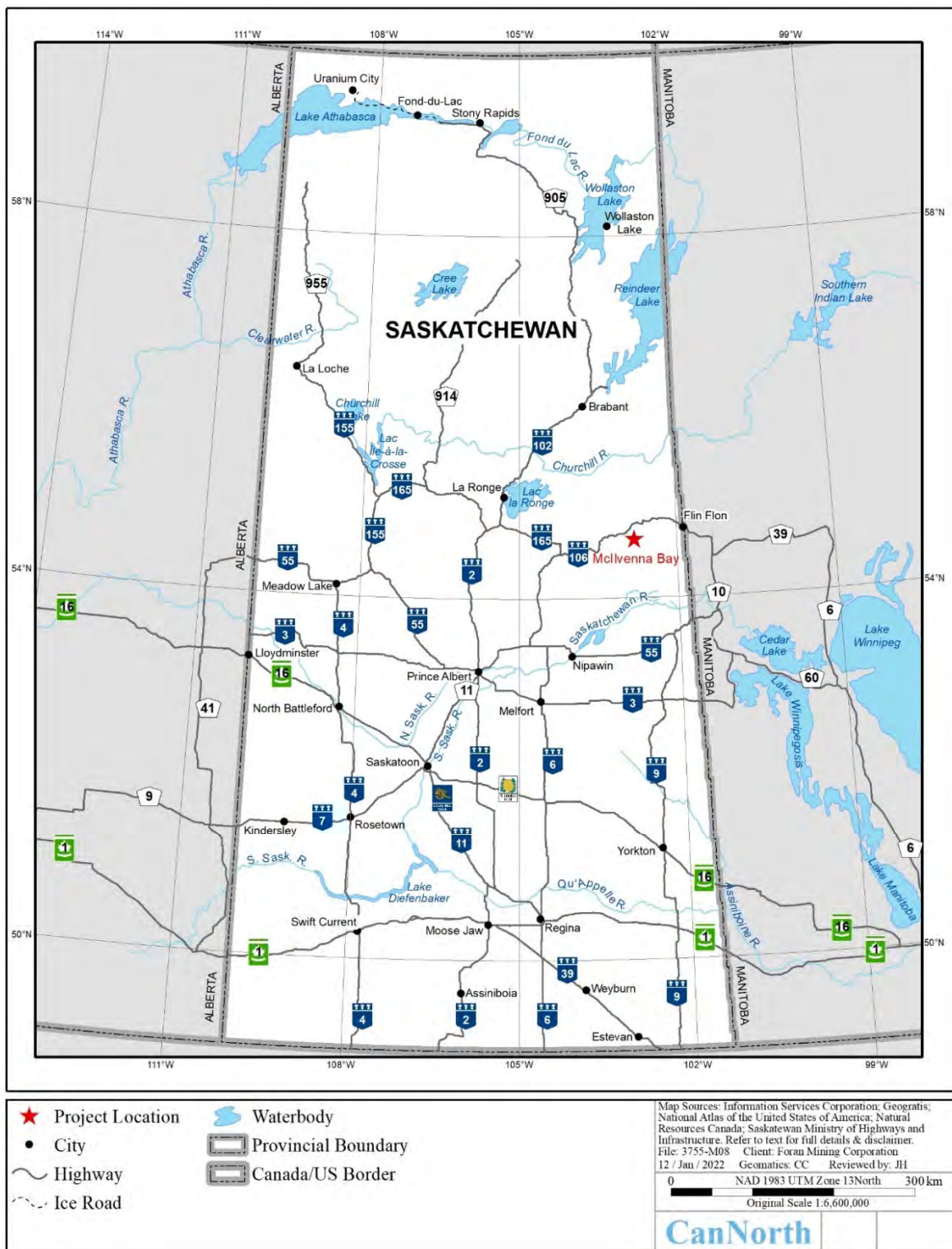


Figure 2-1 Mcllvenna Bay Project Location

Zinc is a second critical mineral that would be produced by the Project. Zinc is used in the galvanizing process, as an alloy with other metals, in various types of equipment, in fertilizers, in skin creams, and in tire manufacturing. Zinc production in Canada has been declining since 2012 and there is currently no producing zinc mine in Saskatchewan.

The Government of Canada has published a draft discussion paper and is proposing to publish a Critical Minerals Strategy in fall 2022. The draft discussion paper identifies copper and zinc as two of six critical minerals that represent a near term focus for Canada because of their potential to provide the greatest economic growth and employment opportunities across the country, including for Indigenous peoples, as well as their ability to support the manufacture of value-added products, including clean technologies, information/communication technology, and advanced manufacturing. Domestically mined and processed critical minerals including copper and zinc can be provided to Canadian manufacturing facilities. Canada's focus on the entire value chain and urgent attention to copper and zinc is intended to create maximum economic prosperity for Canadians.

The Critical Minerals Strategy is part of Canada's strengthened climate plan and the draft discussion paper sets out five core objectives: support economic growth and competitiveness, promote climate action and environmental protection, enhance global security and partnership with allies, advance Indigenous reconciliation, and foster diverse and inclusive workforces and communities. These objectives highlight the importance of environmental, social, and governance considerations to Canada's approach to critical minerals.

Foran seeks to implement a net positive approach to the Project that directly responds to the proposed core objectives of Canada's Critical Mineral Strategy. Foran's vision is to give more to the world than we take and Foran's intent is to provide critical minerals from the Mcllvenna Bay Project in a way that has a measurable positive impact on the environment and society. Foran is excited for the potential for the Mcllvenna Bay Project to showcase the implementation of Canada's Critical Minerals Strategy.

### 2.3 Land Controls

The Project is proposed on Crown Lands. Foran will need to secure a surface lease or leases from the Government of Saskatchewan for use of the surface lands required to construct, operate, and decommission the Project. Foran has existing surface leases that are relevant to the Project. These include:

- A pending industrial surface lease for the area of the ongoing Advanced Exploration Project (ADEX Project).
- An industrial surface lease (303228) for the area of the existing exploration camp.
- A proposed surface lease for the core storage area.

MBO has also recently executed a transfer agreement with the Government of Saskatchewan to transfer a portion of the previous Preferred Sands land from the Institutional Control Program (ICP) to MBO upon completion of any and all licensing, permitting, approval or other requirements required.

### 2.4 Regulatory Requirements

Based on the nature of the Project and the provincial and federal legislative criteria, MBO is self-declaring that the Project will be subject to a provincial EIA before the Project can proceed. The Project will also require provincial licenses, approvals, and permits for various aspects and phases, and will need to meet

federal legislation requirements. The regulatory framework and associated approvals process for the Project are outlined in the following sections.

#### 2.4.1 Environmental Assessment

##### 2.4.1.1 Federal Impact Assessment

On August 28, 2019, the federal *Impact Assessment Act* (IAA) came into force, which created the Impact Assessment Agency of Canada and repealed the *Canadian Environmental Assessment Act* (CEAA) 2012. Projects subject to the IAA include:

- projects described in the *Physical Activities Regulations* (the Project List) (GC 2019);
- projects designated by the Minister of Environment and Climate Change that are not described in the Project List; and
- projects on federal lands and outside Canada assessed by federal authorities before decisions are made.

It is not anticipated that the Project will require an approval pursuant to the federal IAA because the Project falls below the applicable criteria listed in the Project List. Section 18 of the *Physical Activities Regulations* clarifies that designated projects include the following:

- 18(c) a new metal mine, other than a rare earth element mine, placer mine, or uranium mine, with an ore production capacity of 5 000 t/day [tpd] or more; and
- 18(d) a new metal mill, other than a uranium mill, with an ore input capacity of 5 000 t/day [t/d] or more.

The Project encompasses all activities, facilities, and phases to support a base and precious metals mining and mineral processing operation that will extract and process ore at a nominal 4,200 tpd.

##### 2.4.1.2 Provincial Environmental Assessment

The Saskatchewan *Environmental Assessment Act* requires that a proponent receive the approval of the Minister of Environment before proceeding with a project that is defined as a development under the Act (SKMOE 2014a).

MBO is self-declaring the Project to be a development; therefore, a provincial EIA is required. The submission of this document is initiating the EIA process by providing a joint Technical Proposal (TP) and Terms of Reference (TOR) for review by the Environmental Assessment & Stewardship Branch (EAB).

MBO will conduct, prepare, and submit a draft EIS to the EAB for a technical review by experts, including those from other provincial ministries and, where required, to federal government reviewers. Once there are no concerns remaining, the Technical Review Comments from the EAB and the final EIS document will be placed in public review for a minimum of 30 days. Ultimately, the Project will require issuance of ministerial approval under Section 15 of the *Environmental Assessment Act* before licenses and permits can be issued.

#### 2.4.2 Federal and Provincial Legislation

Table 2-1 provides a list of potentially applicable federal and provincial Acts and Regulations. MBO recognizes that other legislation may apply and it will be the responsibility of MBO to comply with all applicable legislation throughout the life-cycle of the Project.

Table 2-1 Potentially Applicable Federal and Provincial Legislation

Act	Regulation
<b>Federal:</b>	
Fisheries Act	Metal and Diamond Mining Effluent Regulations
	Deposit Out of the Normal Course of Events Notification Regulations
	Wastewater Systems Effluent Regulations
Canadian Environmental Protection Act	Environmental Emergencies Regulations
	Federal Halocarbon Regulations
	Greenhouse Gas Reporting Regulations
Transportation of Dangerous Goods Act	Transportation of Dangerous Goods Regulations
Canadian Navigable Waters Act	No specific regulations related to this act
Species at Risk Act	No specific regulations related to this act
Migratory Birds Convention Act	Migratory Birds Regulations
Explosive Act	Explosive Regulations
Hazardous Products Act	Hazardous Products Regulations
<b>Provincial:</b>	
The Environmental Assessment Act	No specific regulations related to this act
The Environmental Management and Protection Act, 2010	The Environmental Management and Protection (Saskatchewan Environmental Code Adoption) Regulations
	The Mineral Industry Environmental Protection Regulations, 1996
	The Waterworks and Sewage Works Regulations
The Environmental Management and Protection Act, 2010 (Continued)	The Hazardous Substances and Waste Dangerous Goods Regulations
	The Municipal Refuse Management Regulations
The Wildlife Act, 1998	The Wildlife Regulations
	The Wild Species at Risk Regulations
The Fisheries (Saskatchewan) Act, 2020	The Fisheries Regulations
The Water Security Agency Act	The Water Security Agency Regulations
	Ground Water Regulations
The Wildfire Act	The Wildfire Regulations
The Provincial Lands Act, 2016	The Crown Resource Land Regulations
	Provincial Lands Regulations
The Heritage Property Act	The Heritage Property Regulations
The Crown Minerals Act	The Crown Mineral Royalty Regulations
	The Mineral Tenure Registry Regulations
The Planning and Development Act, 2007	The Subdivision Regulations
	The Statements of Provincial Interest Regulations
The Pest Control Act	The Pests Declaration Regulations
The Pest Control Products (Saskatchewan) Act	The Pest Control Products Regulations, 2015
The Weed Control Act	The Weed Control Regulations
The Management and Reduction of Greenhouse Gases Amendment Act	The Management and Reduction of Greenhouse Gases (General and Reporting) Regulations
	The Management and Reduction of Greenhouse Gases (Standards and Compliance) Regulations
The Northern Municipalities Act	The Northern Municipalities Regulations
The Saskatchewan Employment Act	Occupational Health and Safety Regulations, 2020
	The Minimum Wage Regulations
	The Employment Standards Regulations
	The Labour Relations (Supervisory Employees) Regulations
	Employer's COVID-19 Emergency Regulations

Act	Regulation
	The Mines Regulations, 2018
The Boiler and Pressure Vessel Act	The Boiler and Pressure Vessel Regulations
The Technical Safety Authority of Saskatchewan Act	No specific regulations related to this act
The Electrical Inspection Act	The Electrical Inspection Regulations
The Gas Inspection Act	The Gas Inspection Regulations
The Public Health Act	Disease Control Regulations
The Northern Saskatchewan Economic Development Act	No specific regulations related to this act
The Surface Rights Acquisition and Compensation Act	The Surface Rights Acquisition and Compensation Regulations
The Reclaimed Industrial Sites Act	The Reclaimed Industrial Sites Regulations

### 2.4.3 Guidelines, Policies, Standards

In addition to regulatory requirements, MBO will apply a number of other guidelines, policies, and standards to the Project. MBO will consider the following guides, policies, and standards when completing the EIA, although the list is not exhaustive:

- Guidelines for Northern Mine Decommissioning and Reclamation (SKMOE 2008).
- Environmental Monitoring Guidelines for Mining/Industrial Operations (SKMOE 2015).
- The Saskatchewan Environmental Code and attendant standards.
- Health Canada guidance for environmental assessments for air, water, noise and human health risk assessment (Health Canada 2016a, 2016b, 2017a, 2017b, 2019).
- Saskatchewan Air Quality Modelling Guideline (SKMOE 2012a).
- Consultation with First Nations and Métis in Saskatchewan Environmental Impact Assessment (SKMOE 2014b).

### 2.4.4 Licensing and Permitting

The Project will require a number of permits, approvals, and authorizations over its life cycle in accordance with the requirements outlined in legislation, regulations, and standards. MBO will also be required to comply with any other terms and conditions issued by regulatory agencies associated with approval under the EIA process. A preliminary list of permits, approvals, and authorizations that may be required throughout the life of the Project is presented in Table 2-2, subject to confirmation with the responsible agencies.

Table 2-2 Potential List of Permits, Approvals, or Authorizations Required by the Project

Permit, Approval, or Authorization	Issuing Agency
<b>Provincial:</b>	
Environmental Assessment Process	Saskatchewan Environmental Assessment Branch
Approval to Construct and Operate Waterworks (Surface Water Withdrawal and Groundwater Withdrawal)	Water Security Agency
Water Rights License	Water Security Agency
Approval to Construct and Operate Drainage Works	Water Security Agency
Approval to Construct and Operate Sewage Works	Water Security Agency
Aquatic Habitat Protection Permit	Water Security Agency
Subdivision Approval	SK Ministry of Government Relations, Community Planning Branch

Permit, Approval, or Authorization	Issuing Agency
Heritage Clearance	SK Heritage Conservation Board
Forest Product Permit	SKMOE
Miscellaneous Use Permit	SKMOE
Construction Permit	SKMOE
Environmental Protection Plan for Industrial Sources	SKMOE
Approval to Construct/Alter Highways Approach	SK Ministry of Highways and Infrastructure
Approval to Construct and Operate an Industrial Effluent Works	SKMOE
Approval to Construct and Operate a Storage Facility (Hazardous Materials and Waste Dangerous Goods)	SKMOE, Industrial Branch
Approval to Operate Pollutant Control Facilities	SKMOE
Sand and Gravel Surface Lease	SKMOE
Approval to Decommission Pollutant Control Facilities	SKMOE
Release from Decommissioning and Reclamation	SKMOE
Provincial Acceptance of Decommissioned and Reclaimed Site into Institutional Control Program	SKMOE
Mineral Lease	SK Ministry of Energy and Resources
<b>Federal</b>	
Fisheries Act Authorization	Department of Fisheries and Oceans Canada
Canadian Navigation Protect Act Authorization	Transport Canada
Aquatic Environmental Effects Monitoring Program	ECCC
License to Store, Manufacture, or Handle Explosives	Natural Resources Canada

### 3 Description of Development

#### 3.1 Siting

The Project is located on Crown lands (Figure 3-1). The Project site is accessible year-round via an existing 18 km all-weather gravel road that is connected to Saskatchewan Provincial Highway 106 approximately 85 km southwest of the neighboring communities of Flin Flon, Manitoba and Creighton, Saskatchewan.

Foran has been advised by the Saskatchewan Government that PBCN, CHCN, OCN, the Sandy Bay Métis Local #90, the Creighton Métis Local #89, and the Cumberland House Métis Local #42 may have Aboriginal rights and/or interests that may be affected by the proposed Project. Accordingly, Foran has engaged with these Nations through the EIA process and will continue to implement a stakeholder and rights holder engagement strategy throughout the EIA process using a comprehensive plan that was developed for the Project. Foran has been actively engaging with nearby communities since 2011.

PBCN is a signatory to Treaty 6 and its territory spans Treaty 10 and Treaty 6. The Project is located on Crown land within PBCN territory and in proximity to the PBCN reserves located at Denare Beach, Deschambault Lake, Pelican Narrows, Birch Portage and Sturgeon Landing. Foran has been engaging with PBCN as a treaty and aboriginal rights holder with respect to Project impacts, including potential adverse environmental and socio-economic impacts to PBCN members, lands and uses, including hunting, fishing, and gathering, in all seasons, throughout its territory.

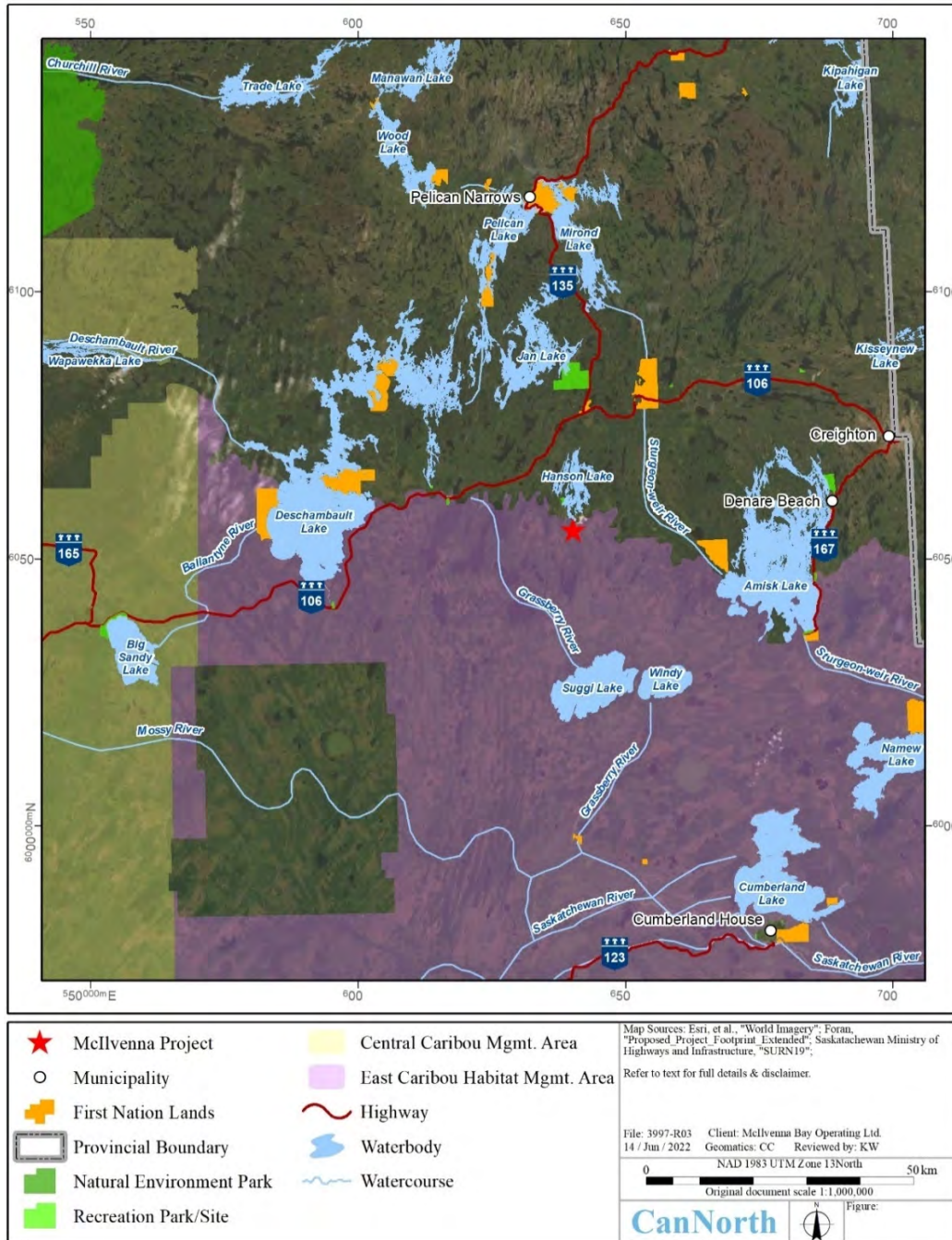


Figure 3-1 Mcllvenna Bay Project Site Location

The Project is situated at the site of the active Mcllvenna Bay advanced exploration (ADEX) project, MBO exploration camp, and a reclaimed industrial site associated with a former silica sand mine (Hanson Lake Facility). Exploration of the Mcllvenna Bay deposit and associated mineral complex in this area initiated in 1988 and is ongoing. The Project proposes to re-utilize the current and historical development associated with these activities as much as practical to minimize additional surface development. An illustration of historical surface development in the immediate vicinity of the proposed Project is provided in Figure 3-2.

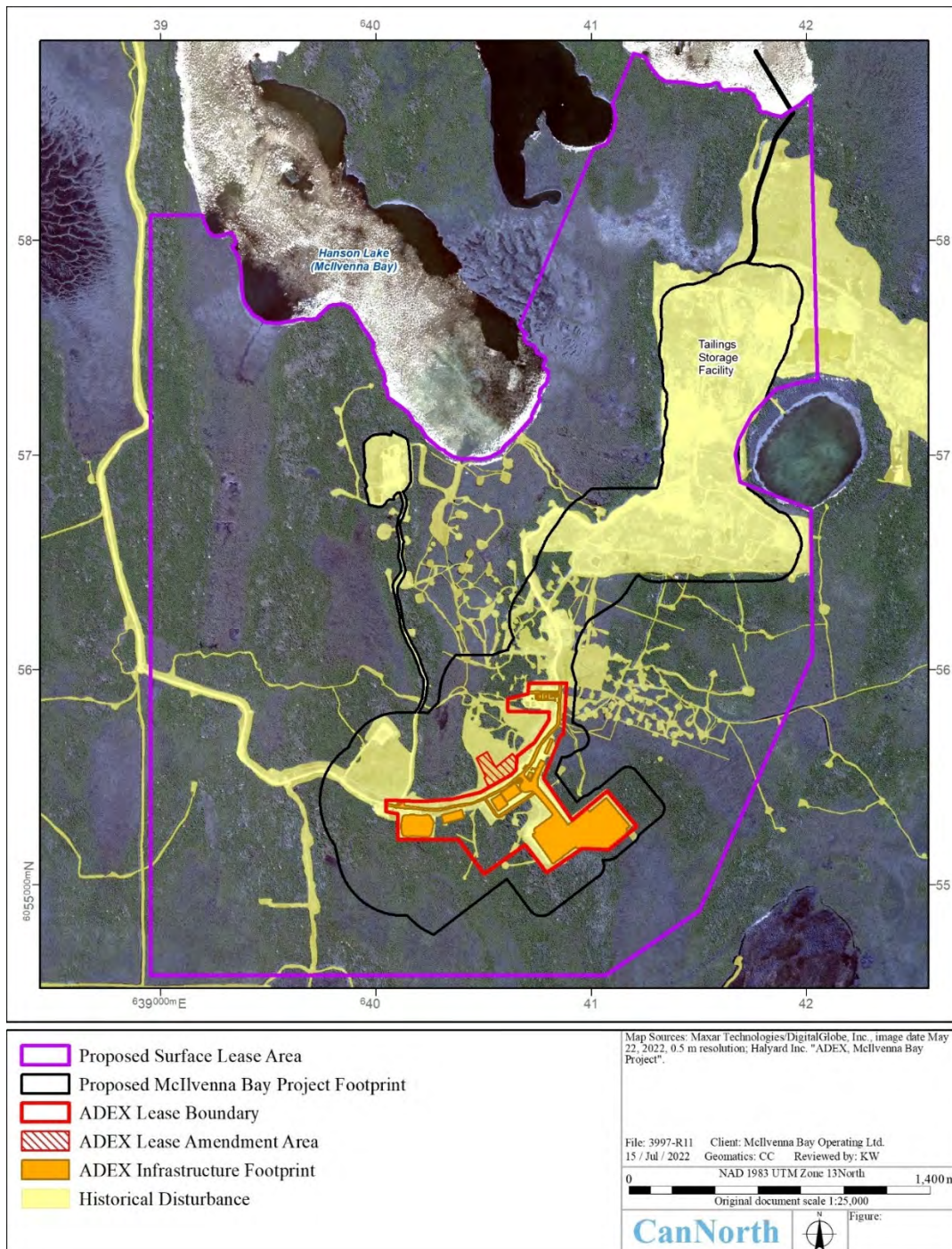


Figure 3-2 Illustration of Historical Development in the Immediate Vicinity of the Project Site

The past-producing Hanson Lake Mine, operated by Western Nuclear Mines Ltd., lies approximately 5 km north of the proposed Project on the western shore of Bertrum Bay of Hanson Lake. The abandoned Hanson Lake Mine is accessed by the all-weather gravel road connected to Provincial Highway 106 and remediation and decommissioning of the site has been transferred to the Saskatchewan Ministry of Environment (SKMOE). The site operated from 1966 to 1969 and produced lead, zinc, and copper. Access to the site became restricted in 2007, although the site is identified as continuing to be used by the public,

and current mining infrastructure includes various concrete pads, concrete covers for shaft and vent raise opening, and roadways. Areas at the site that require additional remediation include the mill area, the tailings impoundment area, and the west and south waste rock storage areas (SNC Lavalin 2021). The primary concern with respect to human health is the potential for direct contact exposure to arsenic, cadmium, and lead contaminated soil and surface water in the mill and tailings areas (SNC Lavalin 2021). The primary receiving water body for surface water and groundwater drainage from the Site is Hanson Lake through outlets located at Bertrum Bay, Mine Bay, and South Bay (SNC Lavalin 2021).

A former silica sand mine (Hanson Lake Facility) that was previously operated by Preferred Sands Ltd. is in the immediate vicinity of the Project and is shown in operation in 2012 in Figure 3-3. The EIS was approved in 2001 and the site operated under various ownership until 2014. Decommissioning and reclamation of this site began in 2015 and was completed in 2017 with activities including blasting vertical dolomite quarry faces, contouring remaining materials to achieve slopes no greater than 4H:1V, and spreading clayey topsoil and organics over the footprint to promote re-vegetation. After closure and reclamation, the quarry area was transitioned into Saskatchewan's ICP. As discussed in Section 2.3, MBO has entered into an agreement with the Saskatchewan Ministry of Energy and Resources that would transfer ownership of a portion of this site from the ICP to MBO upon completion of required regulatory approvals. This area would be used for construction aggregate, as the site of the proposed TSF, and as the site of a portion of the proposed effluent discharge line. A photograph of the ICP site as it after reclamation is shown in Figure 3-4.



Figure 3-3 Hanson Lake Facility during Operations in 2012



Figure 3-4 Previously Disturbed Sand Quarry (Proposed TSF Site)

In 2011, Foran commenced the installation of exploration and development camp facilities on the Property to support ongoing exploration activities. At that time, the camp included a 35-bed trailer camp with office, core shack, shop, and core storage facility (Figure 3-5). The camp facilities were expanded in 2021 to accommodate the regional exploration program as well as on-site accommodations for personnel associated with the ADEX Project.



Figure 3-5 Mcllvenna Bay Exploration Camp

An all-season gravel road has already been built. In addition to providing access to the Project site, it also acts as the route and service access for a 1.2 MVA distribution power line which runs to the Property from the Island Falls hydroelectric generating station located near the community of Pelican Narrows, SK. This power line has been brought back into service by SaskPower and is anticipated to support various exploration and construction activities. The gravel road was initially developed in 2000 and was used for many years as a haul road by the now re-claimed sand mine to transport products to market by tractor trailer.

An ADEX Project is ongoing at the site to extract a bulk sample of the deposit and provide further information to the Project. Existing infrastructure at the site associated with the ADEX includes a mine portal and preliminary ramp system, ore and waste rock storage pad, water management system including a containment pond, treated effluent cells and proposed water treatment plant, accommodation for over 100 people and associated water supply and sewage works, offices and core storage, storage of hazardous substances and waste dangerous goods, waste collection areas, laydown areas, parking, a helipad, and access control on the main road into the Project site. Constructed infrastructure as of May 2022, within the existing crown work authorization area and pending industrial lease boundary associated with the ADEX Project, is illustrated on Figure 3-6. An amendment to the ADEX lease boundary has been requested (Figure 3-2). Construction of an effluent discharge line and effluent treatment plant is anticipated to be completed as part of the ADEX. The ADEX Project is a temporary project that will temporarily discharge treated effluent to land at a nominal rate of 700 m<sup>3</sup>/day at the headwaters of the Hobbs Lake drainage. The facilities associated with the ADEX Project are proposed to be re-used for the Mcllvenna Bay Project, should it receive approval to proceed.



## 3.2 Infrastructure

The Project includes additional surface and underground infrastructure to support mining and mineral processing of the Mcllvenna Bay complex.

The surface infrastructure is designed to be relatively compact and centralized around the mine portal, and to re-utilize infrastructure developed during the ADEX program, with the objectives of minimizing the environmental footprint, and minimizing underground to surface haul distances.

Several images are presented to illustrate the current understanding of the proposed development that are based on the feasibility engineering conducted.

Figure 3-7 illustrates the current understanding of the proposed additional surface development associated with the Project in relation to the existing development associated with the ADEX Project, as well as pending or existing surface lease or transfer agreement areas. Figure 3-7 illustrates that surface development and clearing is likely to occur in a larger area than that associated with the Project infrastructure, primarily to accommodate laydown storage areas required during construction. Figure 3-7 also illustrates the proposed mine surface lease area for the Project.

Figure 3-8 provides a conceptual site layout from the 3D model. This illustration indicates the proposed locations and types of surface infrastructure that would be constructed based on feasibility engineering design. Locations of proposed laydown areas are not yet defined but would occur within the expanded footprint shown in Figure 3-7. The detailed design of the facilities illustrated has not been completed and thus, there may be some minor changes to locations or sizes of buildings as design progresses.

Figure 3-9 provides an overview illustration of the proposed surface infrastructure in relation to the proposed underground workings. In Figure 3-9, the Mcllvenna Bay deposit is represented by the orange highlight and proposed underground horizontal and vertical tunnels are shown in pink.

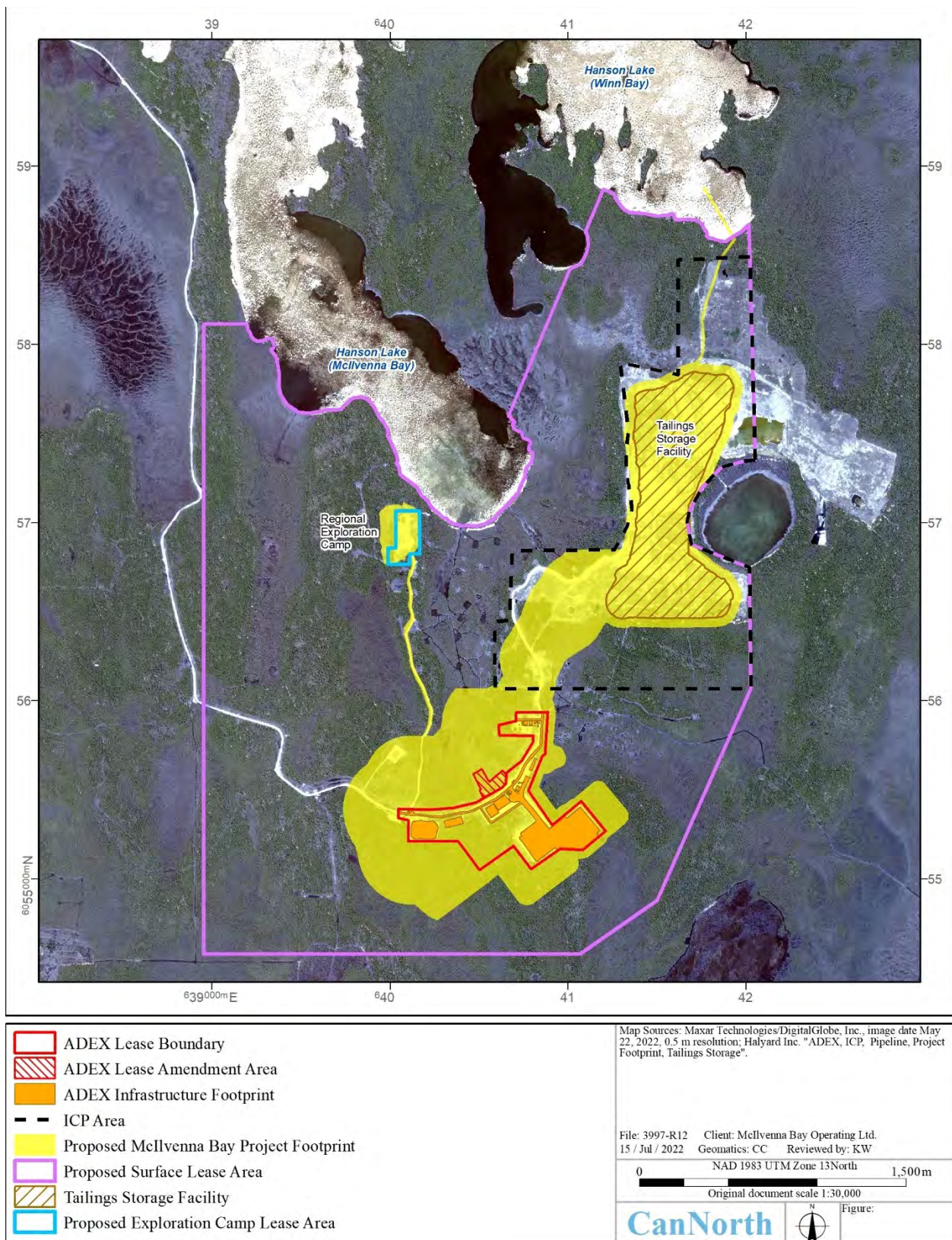


Figure 3-7 Overview of Proposed Expansion of Surface Development in Relation to Existing Site Development

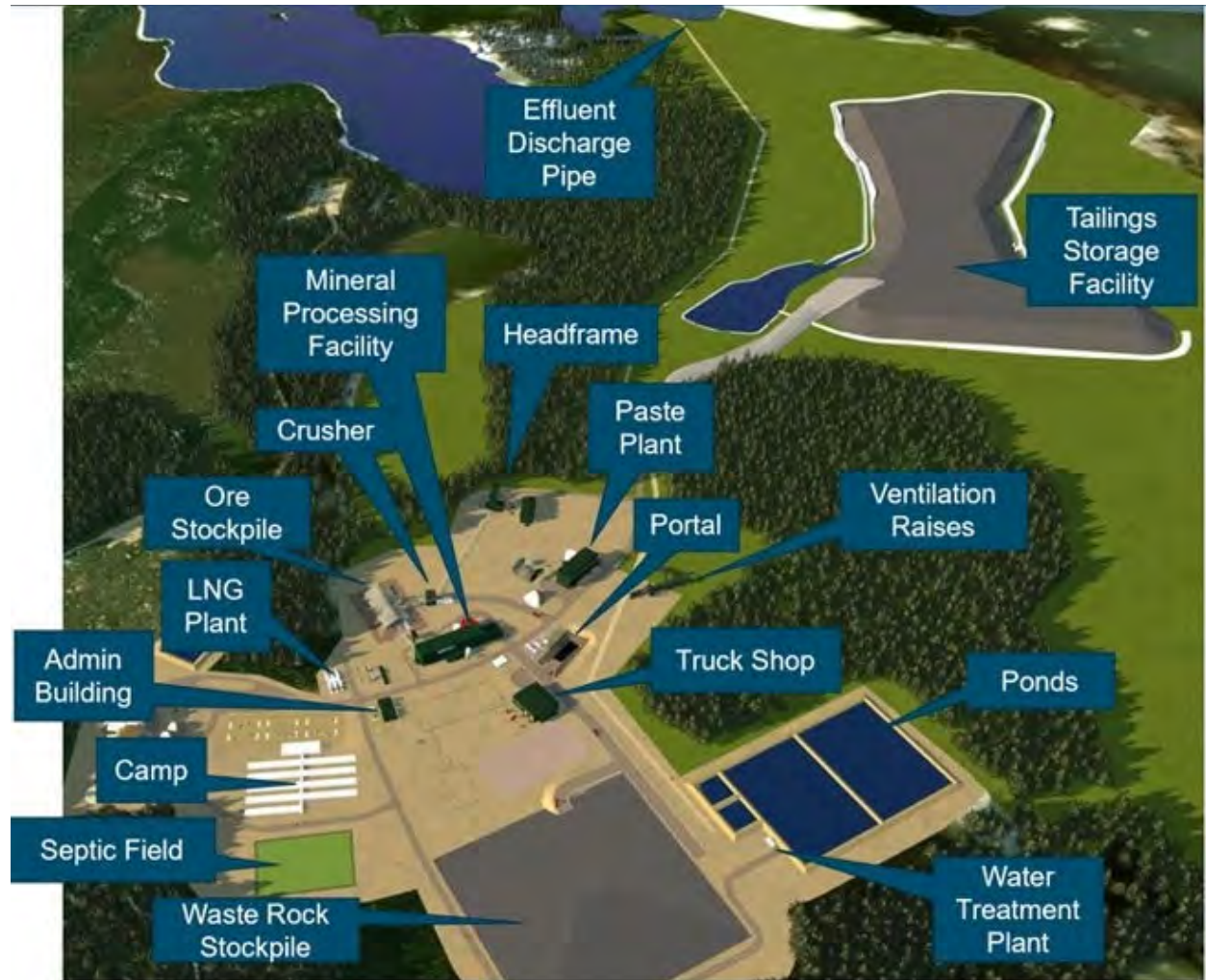


Figure 3-8 Conceptual 3D Model Illustration of Proposed Surface Infrastructure, Mcllvenna Bay Project

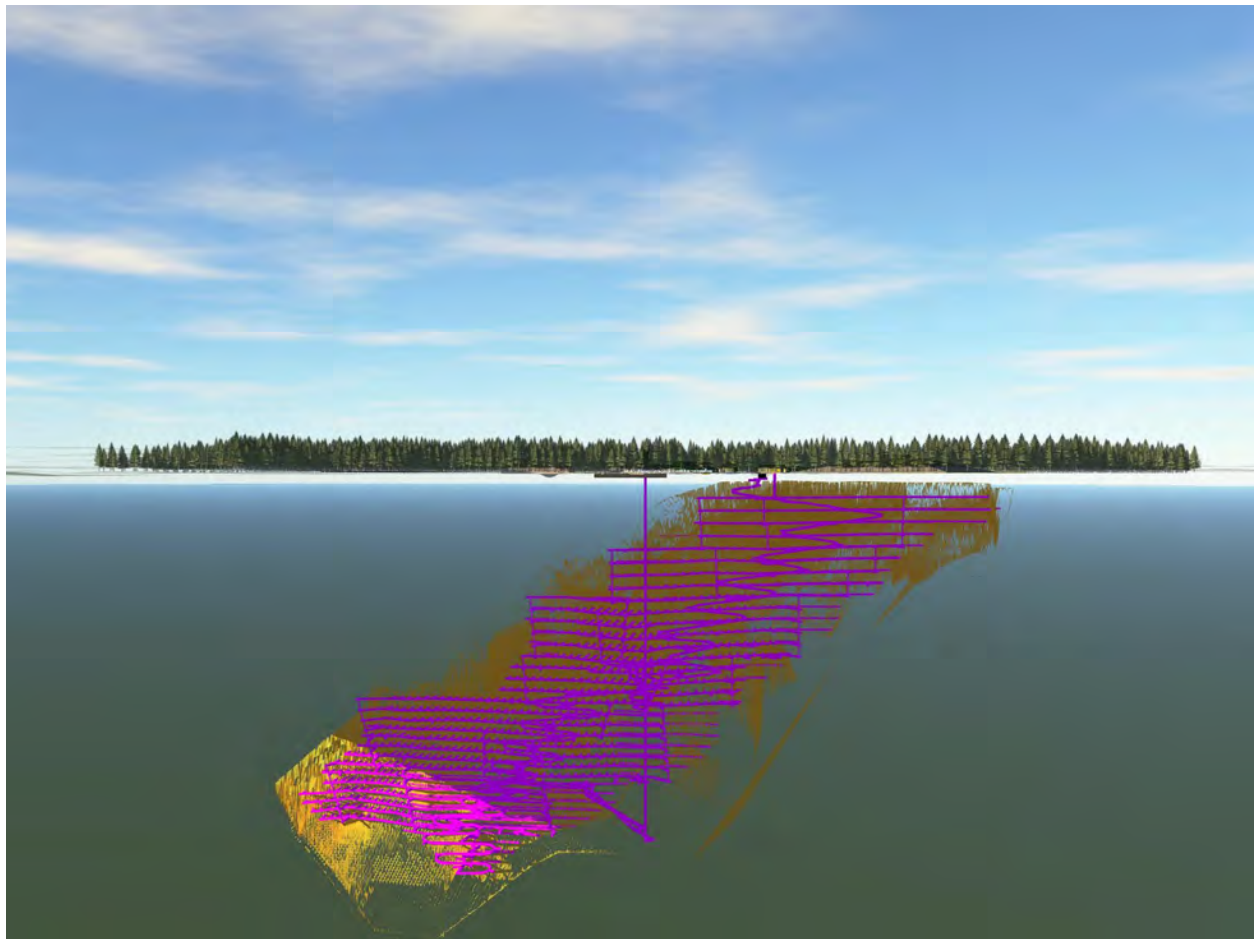


Figure 3-9 Conceptual 3D Model Illustration of Proposed Underground Workings, Mcllvenna Bay Project

The proponent for proposed infrastructure listed herein is MBO. Proposed infrastructure associated with mining, mineral processing, water management, waste management, surface support facilities and site access is described below.

### 3.2.1 Mining Infrastructure

The proposed underground mining method and associated infrastructure has been designed in consideration of the geological interpretation of the Mcllvenna Bay deposit and its surrounding geology. An overview of proposed underground infrastructure is provided below.

#### 3.2.1.1 Description of the Mcllvenna Bay Complex

The Mcllvenna Bay deposit is a VHMS deposit consisting of volcanic-hosted, polymetallic, disseminated to massive sulphide mineralization and associated stringer style mineralization. The sulphides contain copper and/or zinc, with lower concentrations of silver, gold, and lead, while the stringer style mineralization generally contains elevated copper and gold. The deposit has undergone moderate to strong deformation and upper greenschist to possibly lower amphibolite facies metamorphism. The sulphide lenses are now attenuated down the plunge to the northwest. The Mcllvenna Bay deposit

includes five separate zones and two styles of mineralization that are mineralogically and texturally distinct.

As a result of recent geophysical surveys and advancements in understanding the controls on mineralization at McIlvenna Bay, additional zones and targets have been determined that are proximate to the current reserve and are part of the McIlvenna Bay complex. These include the Tesla zone some 300m north of the last down plunge intersections on the main orebody itself and several new electro-magnetic (EM) targets. An illustration of the deposit and associated McIlvenna Bay targets is provided in Figure 3-10.

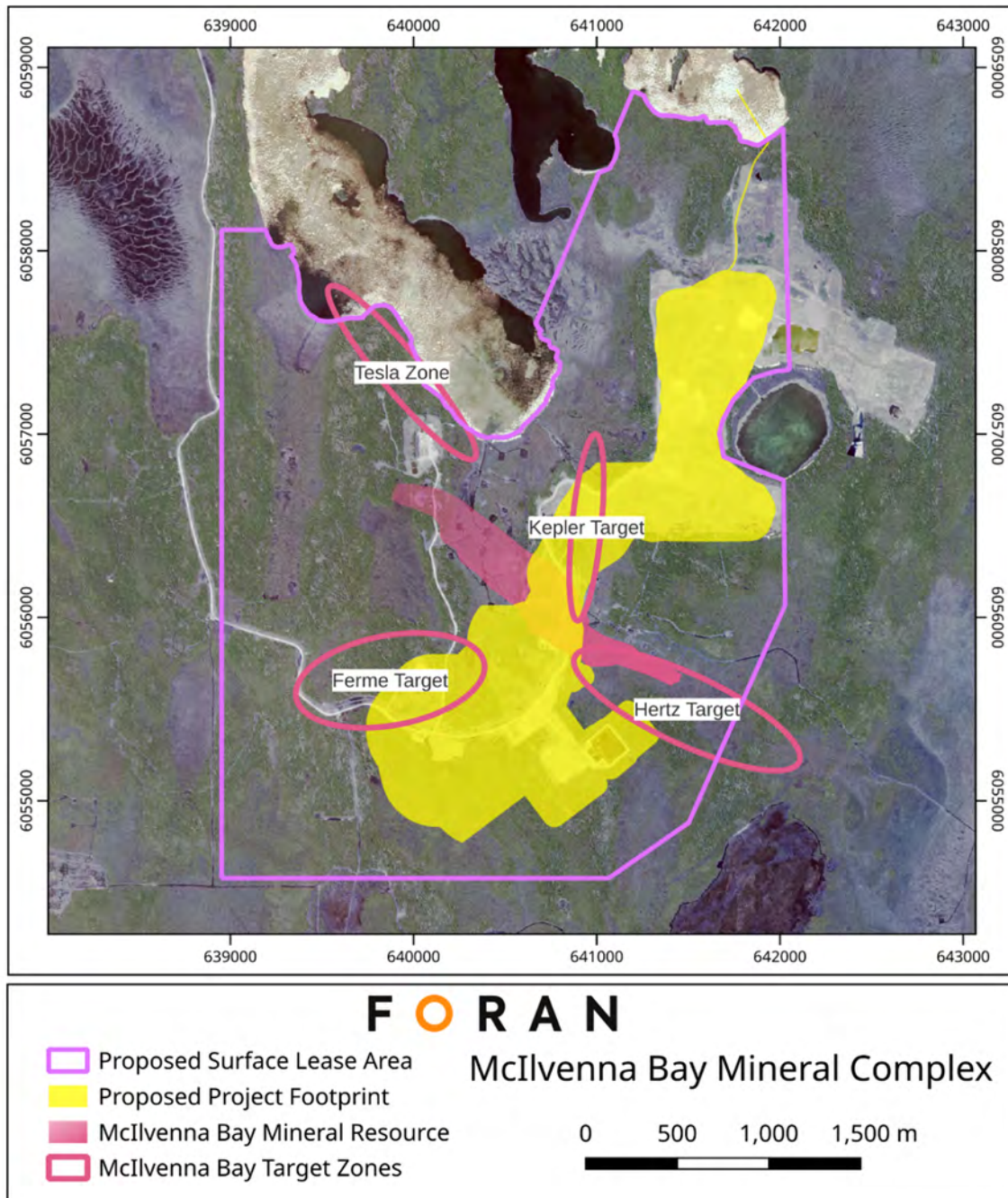


Figure 3-10 McIlvenna Bay Mineral Complex Overview

Initial drill testing of the Tesla zone has shown it to be a zone of disseminated and semi massive sulphide mineralization hosted in a zone of intense silica alteration possibly in a hangingwall position relative to the Mcllvenna Bay deposit itself. This mineralization is considered significant in its tenor and position relative to the planned mine infrastructure and will be the focus for ongoing exploration within the near mine environment. EM targets proximate to Mcllvenna Bay (hangingwall) will be tested in the near future for potential further mineralization.

Further information on the geology of the area and the mineralization is provided in Section 7.2.6.

#### *3.2.1.2 Mining Method*

The Project is designed to be a decline/shaft underground mining operation utilizing long hole mining methods for ore extraction at a nominal 4,200 tpd. Since the deposit is steeply dipping, it is highly amenable to longhole mining methods.

Ore is proposed to be produced from the underground mine using primarily transverse stoping methods, along with longitudinal, and Avoca stoping. These mining methods involve developing horizontal access drifts at 25 m sublevel intervals and drilling vertical production holes from the top level to the bottom level. Emulsion is loaded into the vertical production holes and blasted. This releases the ore which is then transferred/mucked from the stope to a stockpile on the lower level. Once the ore is extracted, the stopes are backfilled. MBO proposes to utilize cemented tailings paste and unmineralized development rock to backfill the stopes.

#### *3.2.1.3 Mine Access*

The Project plans to utilize the mine portal established through the ADEX Program and extend this system to establish a ramp system through the underground mine. The ramp system is proposed to connect underground mining levels spaced at 30 m intervals and allow bottom access to excavate the production shaft and fresh and return air raises. The ramp is planned to be retained through the operation of the Project and provide access for mobile equipment and materials between levels. The ramp system is also proposed to supply fresh air to the mine during pre-production and is expected to be a source of exhaust air from the mine.

A vertical production shaft is proposed to be constructed as the mine progresses to transport people, tools, light materials, ore, and waste from surface to underground and vice versa. The production shaft is proposed to be supported by a headframe/collar house, hoist house, bin, and all associated works required for the hoisting plant. Figure 3-11 provides a general arrangement of design of the proposed headframe and hoist house.

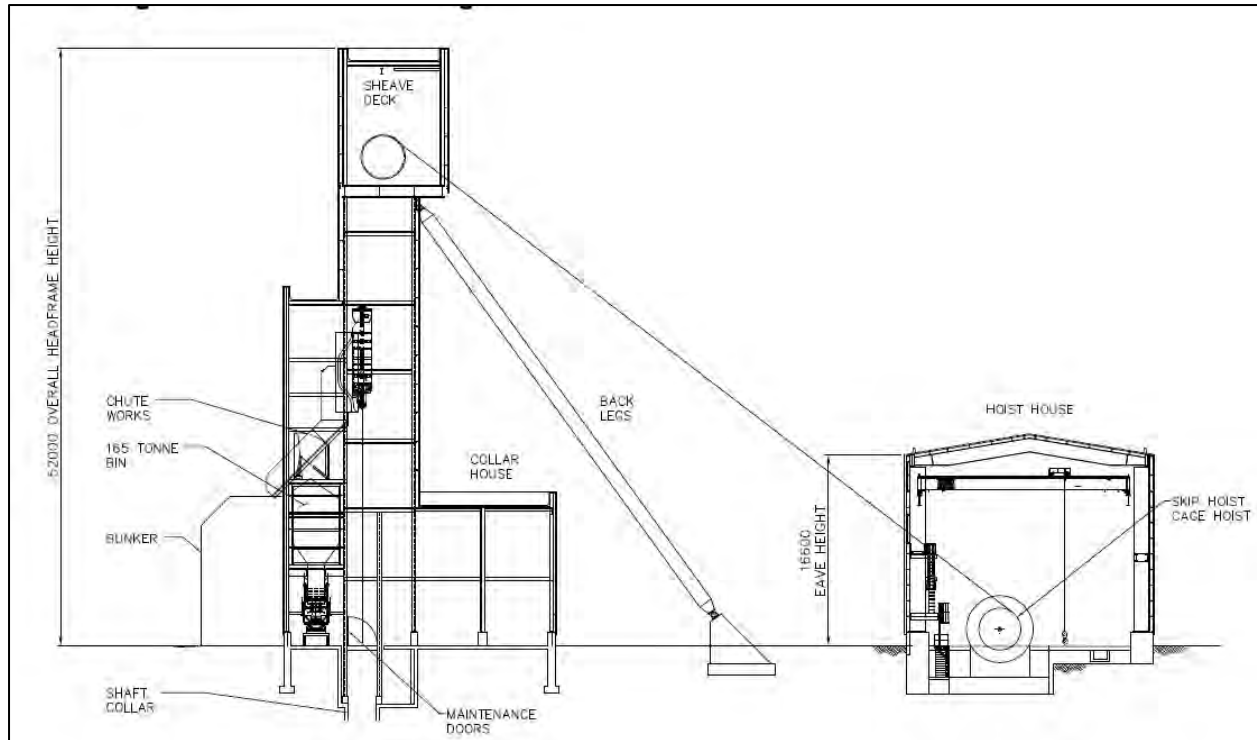


Figure 3-11 General Arrangement of Headframe and Hoist House

#### 3.2.1.4 Mine Development

Underground lateral development is proposed to provide access to the deposit and related infrastructure from the ramp and production shaft, and support underground infrastructure such as maintenance shops, fuel bays, storage areas, permanent refuge stations, and latrine facilities. Development is proposed to be undertaken using conventional drill and blast with mechanized equipment. Development will commence when a construction decision is made, consisting of excavation of underground workings to access the ore as well as the excavations required to support production. There are proposed to be several underground levels within the mine, ranging in depth from 30 m below the ground surface to 1,050 m below the ground surface. Permanent refuge stations are proposed to be constructed at locations allowing personnel access within 15 minutes of the worksite and these will be supplied with bottled breathing air as well as an air circulation/scrubbing system.

#### 3.2.1.5 Mine Ventilation System

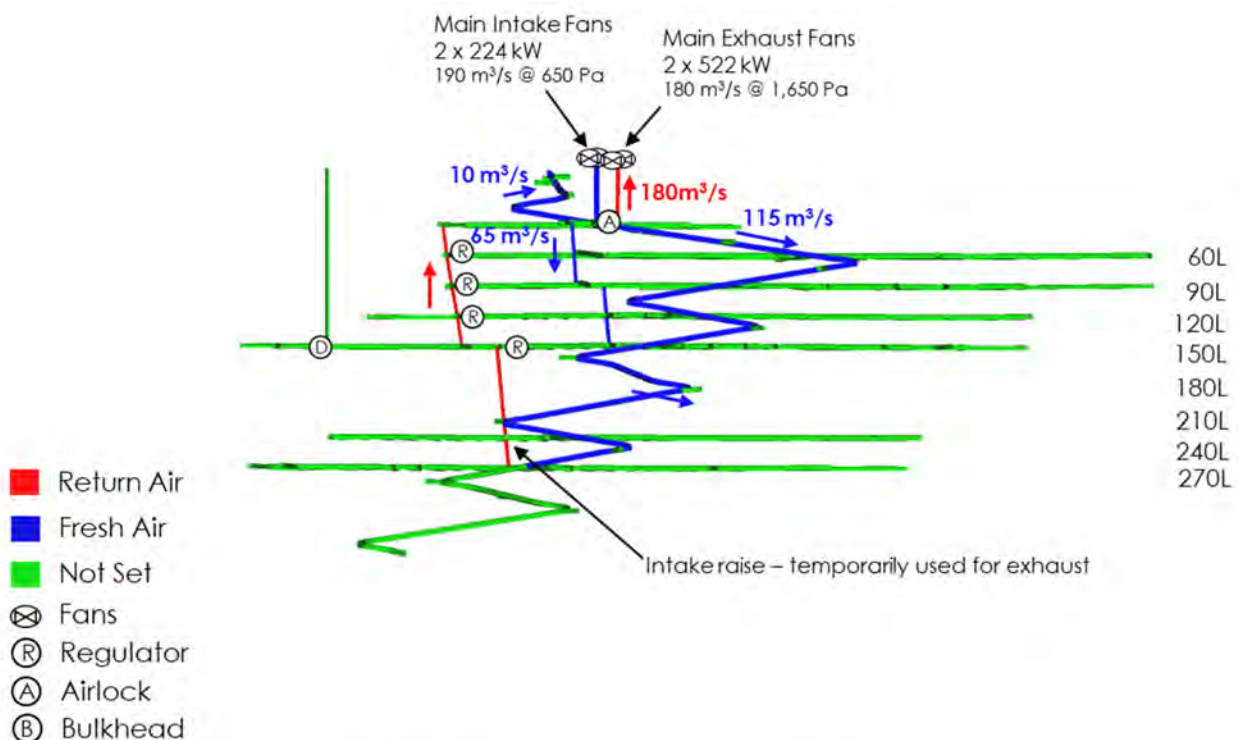
The mine ventilation system has been designed in a “push-pull” arrangement with the intake and exhaust raises to surface located close to one another to allow for heat recovery from the exhaust air and a reduction in the energy used to heat the mine air during the winter months. Intake and exhaust fans are proposed to be located on surface at each raise.

Construction of the overall ventilation system will be staged as underground lateral and vertical development proceeds from the construction phase through to operation.

During construction and before mine production, fresh air will be supplied to the underground area by rigid tubing established through the portal and extended down the ramp. Air will be exhausted through the ramp.

Once mine development is complete on the 60 m underground level, fresh and return air raises will be excavated to surface. Surface fans will be installed along with associated works to ensure adequate ventilation for the mine. Installation of regulators and doors underground is proposed, as required, to segregate fresh and exhaust streams.

It is anticipated that the major ventilation change from pre-production to production will initially be the addition of underground vertical exhaust air raises between underground levels at the furthest distance from the exhaust air ramp and later, as the mine expands, underground vertical fresh air raises between underground levels in the middle of the levels. Exhaust air from vertical exhaust air raises is planned to be controlled using regulators and directed for exhaust to surface via dedicated exhaust transfer drift that will connect to the ramp system. Conceptual underground mine ventilation schematics for pre-production, production and life of mine are shown in Figure 3-12, Figure 3-13, and Figure 3-14, with a surface general arrangement for the mine air heating, heat recovery and ventilation system provided in Figure 3-15.



Note: All development/production fans are excluded from schematic.

Figure 3-12 Pre-Production Ventilation Schematic

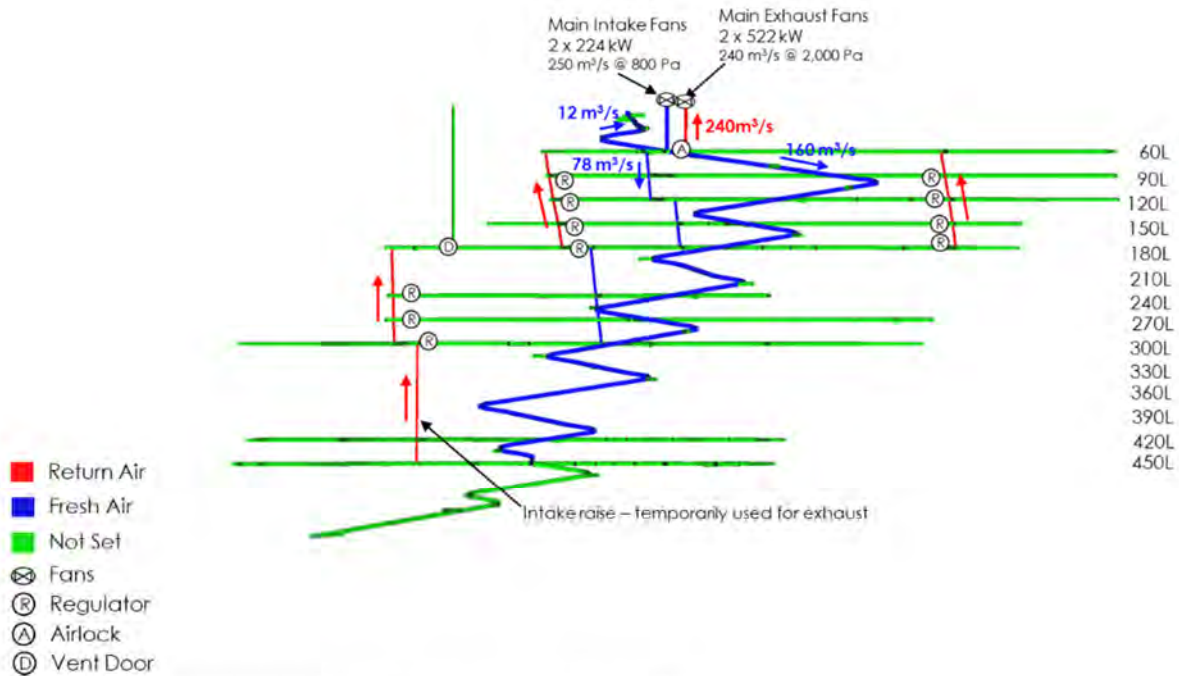


Figure 3-13 Production Ventilation Schematic

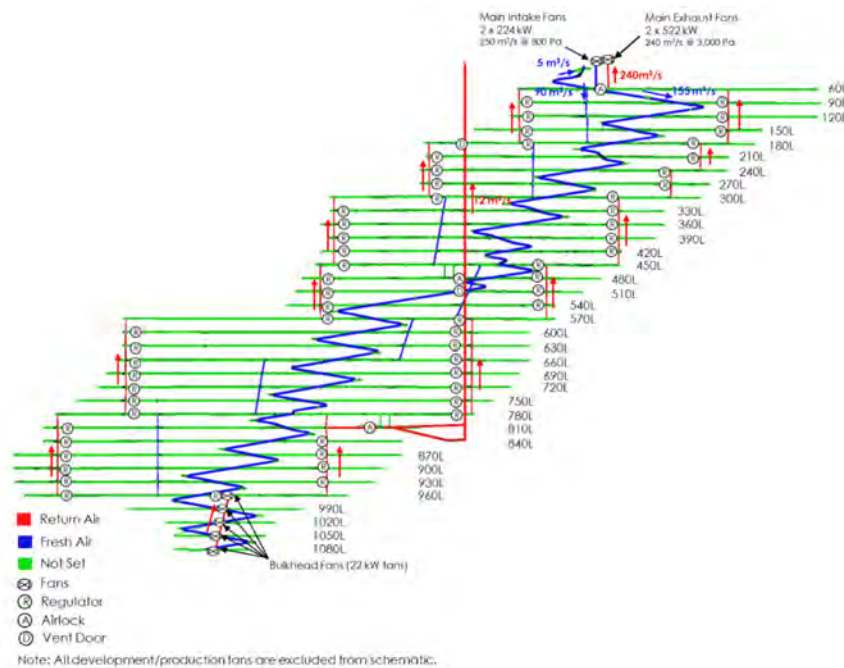
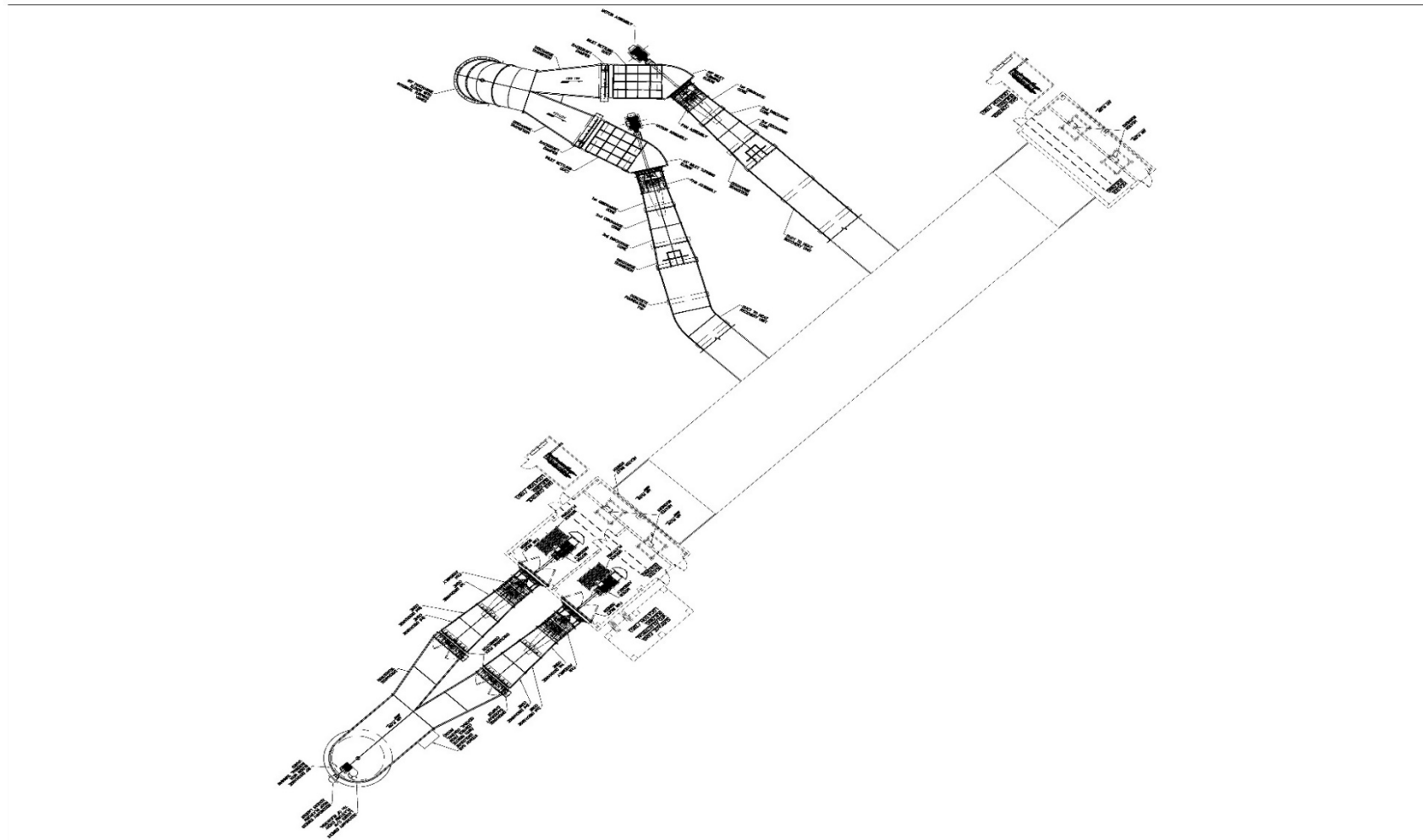


Figure 3-14 Life of Mine Ventilation Schematic



Oversize A0, 1:5

Figure 3-15 Conceptual Schematic of Surface General Arrangement of Mine Air Heating, Heat Recovery and Mine Air Ventilation System

Ventilation controls will be used throughout the mine to optimize ventilation system performance and ensure adequate air quality underground. These will include airlocks, automated regulators with louvers, and underground fans in bulkheads. Ventilation on demand is planned to be implemented that will involve a series of sensors distributed throughout the mine that would send real-time information to a centralized computer with specialized software regarding the air quality, vehicle use, and personnel locations underground. This technology combined with variable speed main fans and louver controls, will establish a highly adaptable ventilation system capable of substantial energy savings, while maintaining air quality standards. Underground air quality monitoring stations will monitor underground air quality to ensure the health and safety of workers.

#### *3.2.1.6 Underground Paste Backfill Distribution System*

A cemented tailings paste is proposed to be used as backfill for mined out stopes. The system design proposes to transport tailings paste from a paste plant on surface to the underground workings via vertical boreholes. These boreholes are proposed to be connected to an underground distribution system consisting of pipes and valves underground that would direct the flow of paste to the designated stopes as required. The paste backfill would become cemented in the stope. The permeability of the paste backfill once cemented in the stope is anticipated to be extremely low ( $10^{-9}$  m/s) with essentially no water percolation through the fill.

#### *3.2.1.7 Ore and Waste Rock Storage and Processing System*

Mined ore and waste rock will be produced by the Project and segregated underground based on their location. Ore and waste rock are proposed to be transported from their source for temporary storage within ore and waste rock storage bays on each underground level.

Ore is proposed to be transported from temporary ore storage locations at each level to surface for further processing. Ore may reach surface in battery electric vehicle (BEV) haul trucks that access surface via the ramp or may be transported to surface using a hoisting system within the production shaft. A production shaft hoisting system is also under consideration that could skip ore via a loading pocket to surface using a skip system. Waste rock is proposed to be hauled to designated levels for use as backfill or, if space is not available, hauled to the waste rock stockpile on surface using BEV haul trucks.

A schematic of the proposed ore and waste rock handling system is provided in Figure 3-16.

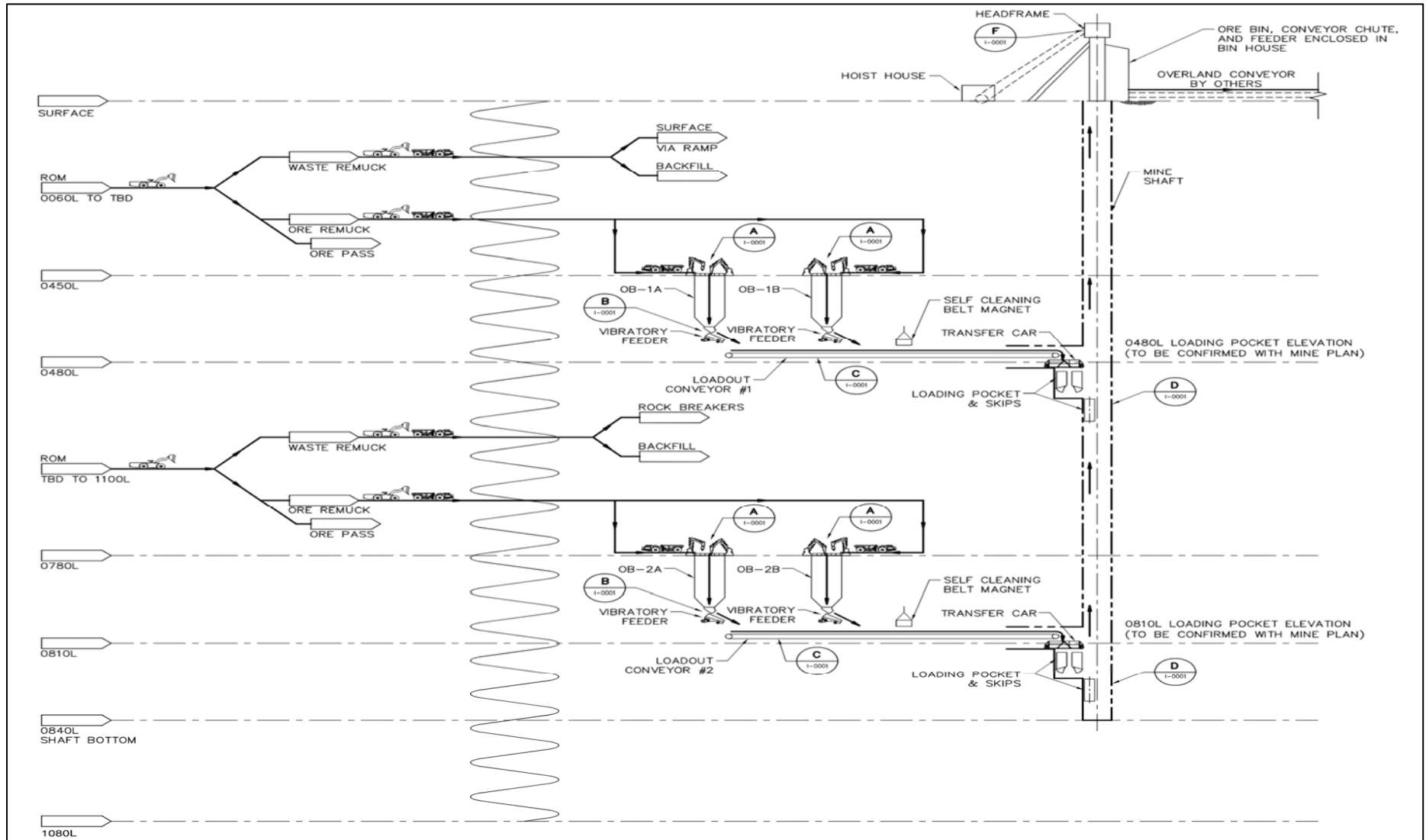


Figure 3-16 Proposed Ore and Waste Rock Handling System Schematic

Management of potentially acid generating (PAG) ore and waste rock is an important consideration of the Project. Static and kinetic testing of waste rock anticipated to be generated by the Project has been completed and additional testing is underway. Rock is anticipated to be categorized as PAG or not acid generating (NAG) based on several criteria including sulphide concentration, the ratio of neutralizing potential compared to acid potential, the non-acid generating pH of the material, and the net neutralizing potential. Waste rock management procedures developed for the ADEX program are anticipated to be utilized and modified over the project lifecycle to ensure appropriate segregation at the rock face.

A life-of-mine waste rock mass balance calculation was completed to determine the anticipated quantities of waste rock that would be produced and require storage on surface. These quantities are shown in Table 3-1 below.

Table 3-1 Life of Mine Waste Rock Mass Balance

Product	Estimated Volume (m3)
Waste rock produced (NAG)	787,393
Waste rock produced (PAG)	1,823,164
Waste rock as backfill (NAG)	302,253
Waste rock as backfill (PAG)	1,451,893
Waste rock to surface (NAG)	485,144
Waste rock to surface (PAG)	371,271
Avoca mining rockfill	228,678

### 3.2.1.8 Mine Dewatering System

The underground mine is expected to generate water, including clean seepage from the surrounding rock formations, and process water from mine operations and paste backfill line flushing. Water from these three sources will be directed to different areas of the underground mine workings.

Water that is generated underground is proposed to be managed via an underground dewatering system consisting of sumps (water storage locations or reservoirs) and pumps capable of storing and transporting water within the underground and to surface. Process water is expected to be supplied from these underground water reservoirs or as treated water from surface. Water is proposed to be recycled for process use underground to the maximum extent practical.

Borehole sumps will consist of two drainage boreholes located in the floor at the front (or shallow end) of the sump, and intake boreholes from the back at the backend of the sump. Depending on the operating level, the sump may or may not be fed from a higher-level borehole sump. Process water drops will be supplied at the entrance for every borehole sump for flushing and cleaning the sumps. A fan will be installed to ventilate the sump.

A typical level sump will consist of one or more submersible pumps located at the end of a walkway. The submersible pumps can be removed using a chain hoist on a monorail. Process water drops will be supplied at the entrance for every level sump for flushing and cleaning purposes. A fan and duct will be installed to ventilate the sump.

Temporary dirty water level sumps will be commissioned away from the ramp, generally using existing cutouts with a negative gradient. These sumps will collect and pump water to the borehole sump using a single submersible pump. The underground mine dewatering schematic is provided in Figure 3-17.

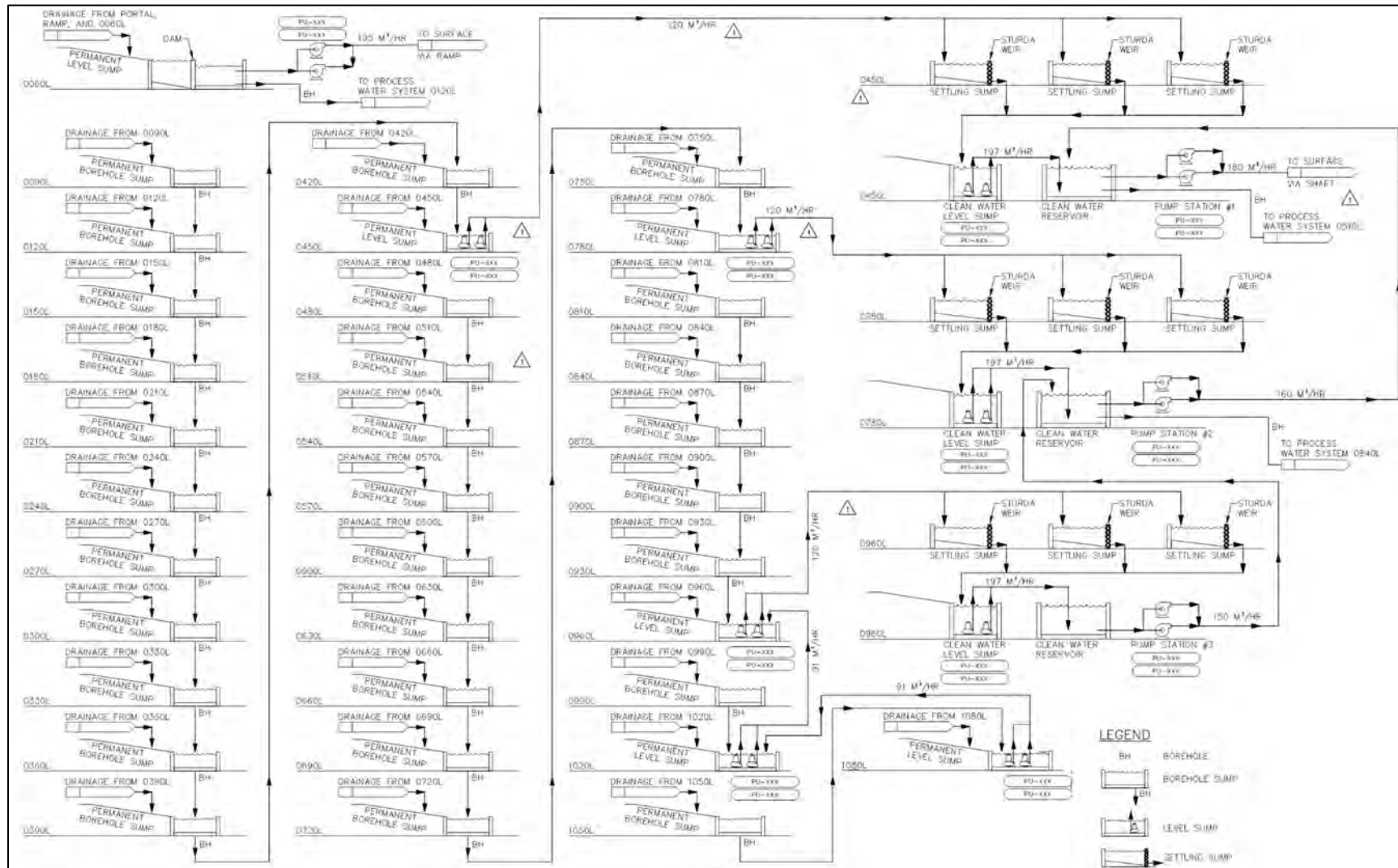


Figure 3-17 Underground Mine Dewatering Schematic

Borehole sumps will be located on every level, nominally 30m vertical spacing, except on levels with permanent level sumps (0060L, 0450L, 0780L, 0960L, 1020L, 1080L).

Water collected in the level sumps on main pumping station levels will be pumped into one of three dirty water settling sumps. The settling sumps will be constructed on a base graded at a +3% slope to allow water to drain via gravity through a porous filter membrane (Sturda weir or equivalent). Based on an estimate of 1% solids by weight for run-of-mine water, the sump will take approximately 10 days to fill completely with solids. Once full, the dirty water will be directed to the subsequent settling sump allowing for a 20 day cycle to decant the excess water, remove the residual solids, and setup the weir to receive water again.

Settled and filtered water from the settling sumps will be directed to the clean water level sump through a concrete ditch. This sump will be graded at -17% and have a shallow excavation with a short holding time, pumping clean water at a rate of 197 m<sup>3</sup>/hr to the clean water reservoir on the same level. The clean water reservoir will have a live capacity of 350 m<sup>3</sup>.

The clean water reservoir will be constructed in a cutout with a concrete dam to provide flooded suction for the pumps. There will be two horizontal multistage centrifugal pumps in the pump station, one operating and one standby, to pump the filtered water to the next pumping station or to surface for treatment. There will also be a pipe and valving to supply filtered water to the process water system two levels below, nominally 60 metres, from the clean water reservoirs on 0450L and 0780L, and the decanted water side of the 0060L permanent level sump.

Additional information on water management is provided in Section 3.2.3.

#### *3.2.1.9 Underground Services*

The underground mine is expected to require process water, power, compressed services, and mobile equipment.

Process water is proposed to be delivered underground as recycled treated water from surface or will be distributed from clean water reservoirs located underground. Water is proposed to be recycled to the maximum extent practical.

Power is proposed to be distributed to the underground by feeder cables run from surface to underground electrical rooms located throughout the mine.

Compressed air is expected to be provided locally via mobile machinery.

Mobile equipment is expected to include the use of BEVs for haul trucks and load, haul, dump equipment and diesel-powered mobile equipment for mine development and production. Development and production activities are expected to require a high degree of mechanization, including the use of remote and/or autonomous operation. The equipment fleet composition allows completion of every mining process such as lateral development, production, secondary ground support, underground construction, and utility installation. Specialized equipment used for vertical development (e.g., a raise bore or mechanized raise climbers) may also be utilized.

#### *3.2.1.10 Surface Mine Dry*

A modular surface mine dry is proposed to accommodate male and female mine personnel as they transition from the underground mine to surface. The design of the dry includes dirty and clean sides as well as showers, urinals, toilets, sinks, and benches. A mechanical room will be included to house the required hot water heaters. Laundry facilities may be required.

#### *3.2.1.11 Explosive Magazines*

A main detonator storage magazine and an explosive magazine currently exist on surface to the north of the mine site and are approved by the Government of Saskatchewan. These magazines are planned to be re-located to purpose-built underground storage magazines and this re-location may be completed as part of the ongoing ADEX Project. Once the underground magazines are established, the surface magazines are planned to be removed. The underground storage areas will be managed in accordance with The Mines Regulations, 2018 (GS 2018).

#### *3.2.1.12 Temporary Batch Plant*

It is anticipated that a temporary batch plant will be required on site to provide concrete for foundations for the process plant, as well as other installations on surface and underground. The batch plant will be required for the foundations for the processing facility, hoist building, headframe, and collars for the shaft and ventilation raises. The plant, sand, and aggregate storages will be constructed early in the Project and may be winterized depending on the schedule for main construction activities. The batch plant will be equipped with a dust suppression system.

As the batch plant will only be utilized during the construction phase, it is anticipated that a contractor will be utilized to supply the plant, source and provide suitable aggregates and cement, and operate the plant as required. Once the main construction activities are completed, the plant will be demobilized from the site.

### *3.2.2 Mineral Processing Infrastructure*

The proposed processing facility has been designed as a nominal 4,200 tpd concentrator plant. In the early years of production, ore will be hauled to surface in 42-tonne trucks and dumped into a surface crushing facility. As the mine development continues to depth and the number of trucks becomes difficult to manage, a mine hoist will be constructed to feed ore onto a new overland conveying system to feed the surface crushing facility.

Ore is expected to be processed using conventional single stage crushing circuit with a semi-autogenous grinding (SAG) mill and ball mill design. Crushing will be followed by grinding and flotation circuits to produce separate copper and zinc concentrates. The overall process flowsheet is provided in Figure 3-18.

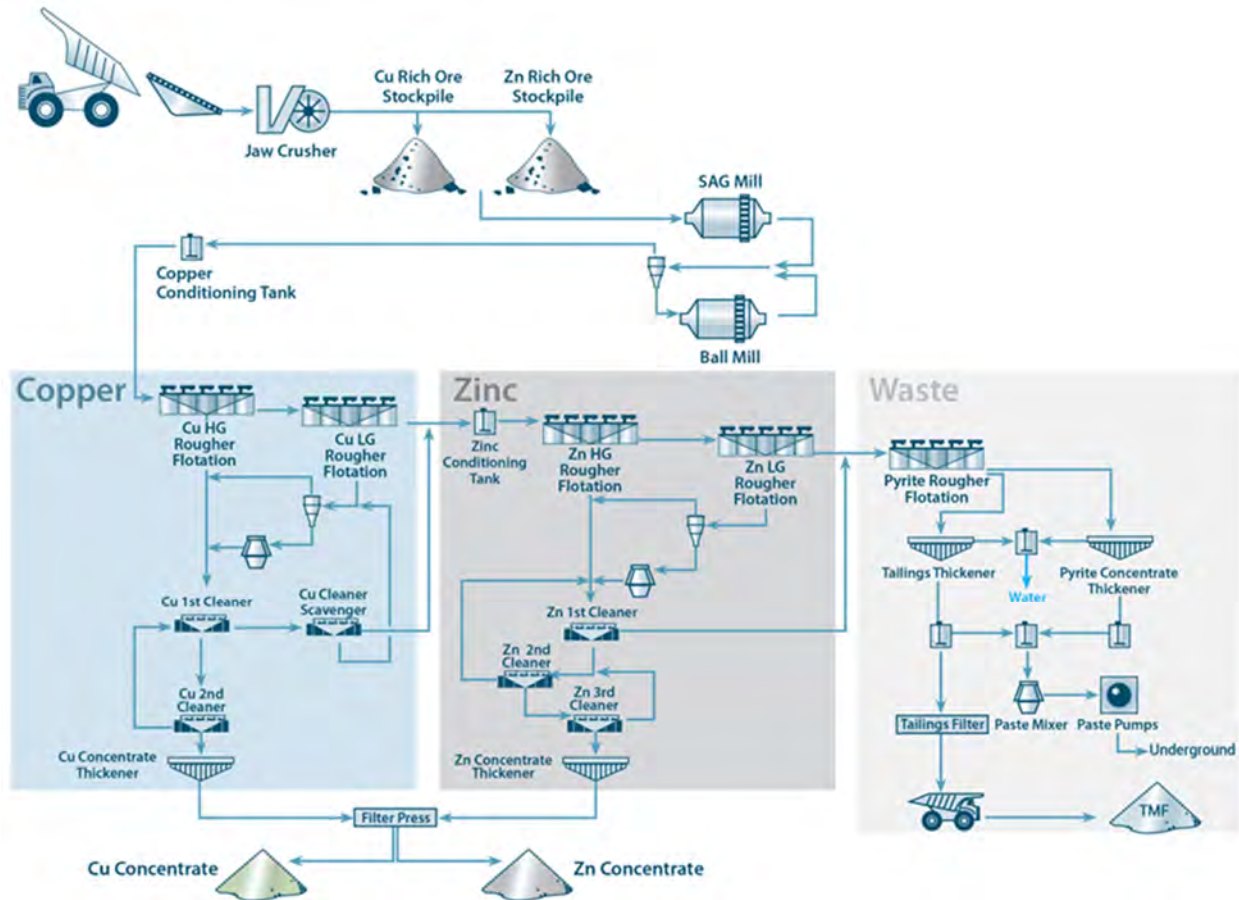


Figure 3-18 Conceptual Processing Flowsheet

### 3.2.2.1 Ore and Waste Rock Stockpile

The existing ADEX ore and waste rock storage pad is proposed to be re-utilized for the Mcllvenna Bay Project. The engineered ADEX waste rock and ore pad has dimensions of 150 m x 125 m and capacity to store 60,000 tonnes of waste and 4,500 tonnes of ore. Containment is provided by a reinforced Geosynthetic Clay Liner (GCL) topped with a 1.5 mm thick High Density Polyethylene (HDPE) Geomembrane liner, sand and a Granular A layer to accommodate vehicular traffic. The pad slopes towards the east and north and is surrounded by perimeter berms to direct water towards a collection sump located in the northeast corner. Water is pumped from the collection sump to the primary containment pond via submersible pumps and overland HDPE pipe. The pipe routing is within the containment area from the pump to the southeast corner where the pipe passes south of the road across to the primary containment pond. The pipe is insulated, and heat traced on support sleepers running on grade. A photograph of the ADEX ore and waste rock pad is provided in Figure 3-19.



Figure 3-19 Image of ADEX Ore and Waste Rock Pad

Staged expansion of the existing ADEX ore and waste rock storage pad is proposed to accommodate the waste rock that would need to be stored on surface. This would involve expansion of the existing lined ore and waste rock storage pad utilized for the ADEX to accommodate the ore and waste rock that is proposed to be stored on surface during the life of mine.

The waste rock pad is proposed to be constructed in three stages in the vicinity of the underground mine portal and the process plant. Stage 1 (226 kilotonne [kt] capacity) has been constructed as part of the ADEX project. Phase 2 (426 kt capacity) will be constructed during the construction period. Phase 3 (1,057 kt capacity) will follow in approximately year 2 of operations. Total storage capacity will be 1,700 kt, creating a 280 m W × 265 m L × 30 m H stockpile.

The ore and waste rock stockpile is proposed to be constructed in the following manner. The pad and perimeter earthen berm footprint will be cleared down to bedrock. The subbase would be constructed of crushed and compacted granular material, sloping toward the north-east corner for contact water collection. The pad and 1 m deep collection ditch would be lined with GCL and HDPE liners on a bedding of granular material. Above the liners, sand and granular material would be placed to form a drivable surface for mobile equipment.

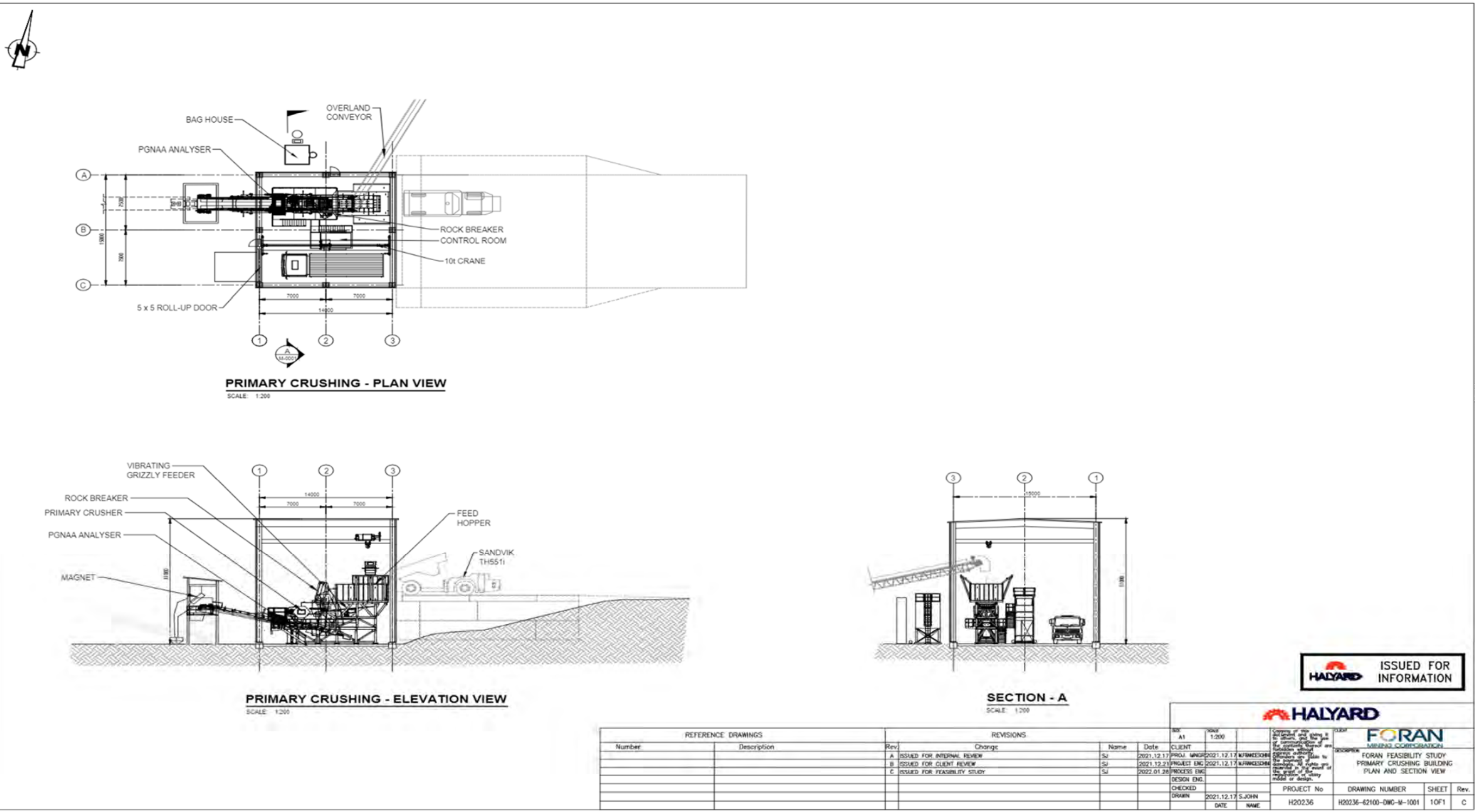
During operation of the facility, waste rock is proposed to be placed in lifts at an average slope of 4H:1V. The shallow slope has been selected for pile stability and so the stockpile can be capped in place at decommissioning with minimal regrading.

Run of mine ore that cannot be delivered directly to the primary crushing plant may be stored temporarily in the ore stockpile on the lined ore and waste rock pad.

### 3.2.2.2 *Primary Crushing Plant*

In the initial years of mine life, ore will be hauled to surface using 42-tonne capacity BEV haul trucks and delivered from the portal either to the ore and waste rock stockpile or to the dump bin of the surface crushing facility. In later years, as the ramp development passes the 0600 level, the truck haulage system will be used in combination with a mine hoist lifting system. At this point, the hoist system will be able to feed the existing surface crushing circuit via a new overland conveyor.

The primary crushing plant is proposed to be housed in a pre-engineered building with an adjacent concrete retaining wall (currently proposed at 6 m height) to allow for dumping of underground haul trucks into the surge bin. From the dump bin, ore would be crushed to a coarse size (100% passing 150 mm, 80% passing 100 mm) and transferred to a conveyor system. Ore would move on the conveyor through an analyzer that would determine the copper and zinc concentrations of the ore and segregate the ore to the appropriate transfer conveyor and coarse ore stockpile, in preparation for the grinding circuit. The building is proposed to have a dust collection system. A feasibility level drawing of the proposed crushing plant is provided in Figure 3-20.



**HALYARD** ISSUED FOR INFORMATION

**HALYARD**

**FORAN**  
 MINING CORPORATION

FORAN FEASIBILITY STUDY  
 PRIMARY CRUSHING BUILDING  
 PLAN AND SECTION VIEW

PROJECT No	H20236	DRAWING NUMBER	H20236-42100-DWC-M-1001	SHEET	10F1	Rev.	C
------------	--------	----------------	-------------------------	-------	------	------	---

REFERENCE DRAWINGS		REVISIONS				NO.	SCALE	Drawing of this Client and they is to be used for the construction of the facility unless otherwise stated. All costs are provided in the cost of the facility unless otherwise stated.		PROJECT No		DRAWING NUMBER	SHEET	Rev.
Number	Description	Rev.	Change	Name	Date	A1	1:200			H20236	H20236-42100-DWC-M-1001	10F1	C	
A	ISSUED FOR INTERNAL REVIEW			SJ	2021.12.17			CLIENT						
B	ISSUED FOR CLIENT REVIEW			SJ	2021.12.21			PROJECT ENG						
C	ISSUED FOR FEASIBILITY STUDY			SJ	2022.01.26			PROCESS ENG.						
								CHECKED						
								DRAWN	2021.12.17	SJOHN				
									DATE	NAME				

Figure 3-20 Primary Crusher Building Plan and Section View

### *3.2.2.3 Sorting, Screening and Secondary Crushing*

From the primary crushing facility, ore would be conveyed through a series of conveyors and covered buildings to be sorted, screened and go through secondary crushing into fine material prior to entering the processing plant (Figure 3-21). The ore stockpiles will be drawn down in a controlled manner to feed the grinding circuit.

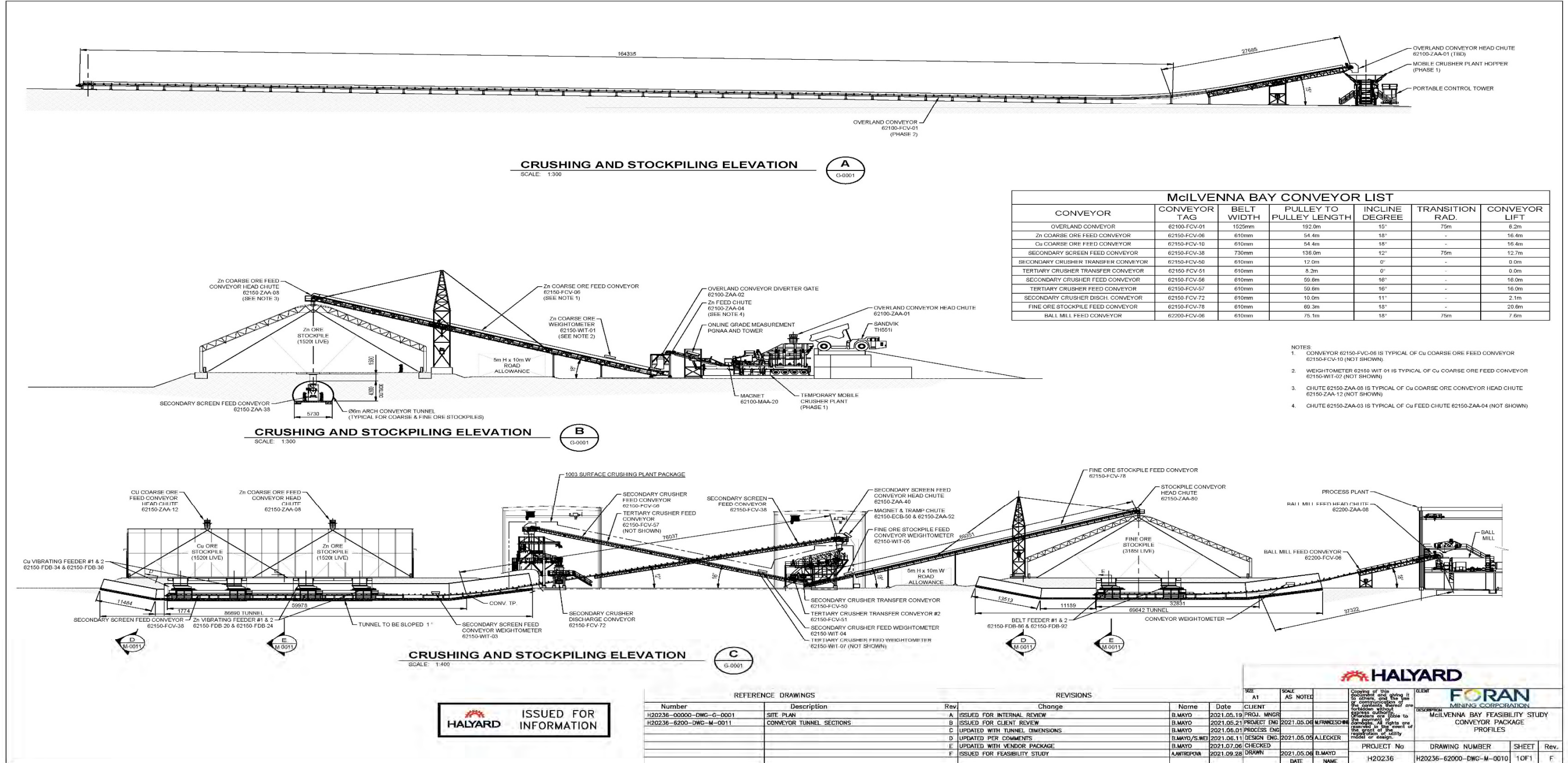


Figure 3-21 Schematic of Sorting, Crushing and Screening. Ore Stockpiles would be under Covered Buildings.

#### 3.2.2.4 *Surface Mineral Processing Plant*

The mineral processing plant is proposed to process the 1.512 Mt of ore produced from the mine annually. The facility consists of grinding mills, flotations circuits to separate zinc and copper, and thickeners/filters (Figure 3-22).

The processing plant is proposed to be housed in a pre-engineered building. Feasibility level plan and section view drawings of the processing plant are provided in Figure 3-22 and Figure 3-23, respectively. Equipment such as tanks, pumps, and piping for the following processes are included within the processing plant:

- Grinding (primary and secondary ball or SAG mills)
- Rougher flotation (copper and zinc)
- Cleaner flotation (copper and zinc)
- Pyrite flotation and dewatering
- Concentrate thickening (copper and zinc)
- Concentrate filtration (copper and zinc)

The grinding circuit produces a cyclone overflow slurry that is directed to the flotation section for sequential copper and zinc recovery. The copper and zinc circuits will be similar in nature, producing rougher concentrates (rougher flotation) prior to re-grinding and multi-stage cleaning (cleaner flotation). Final cleaner concentrate from copper and zinc circuits will be pumped to copper and zinc concentrate thickeners to recover water from the slurry and produce an underflow stream suitable for pressure filtration. A single vertical pressure filter is proposed to further dewater both copper and zinc thickened concentrates in batches to provide two stockpiles of product filter cake suitable for transportation to toll smelters. Concentrate produced at the processing plant is proposed to be loaded on highway haul trucks, weighed, and transported towards Flin Flon, Manitoba via road to a rail loading facility from where it would be distributed for smelting.

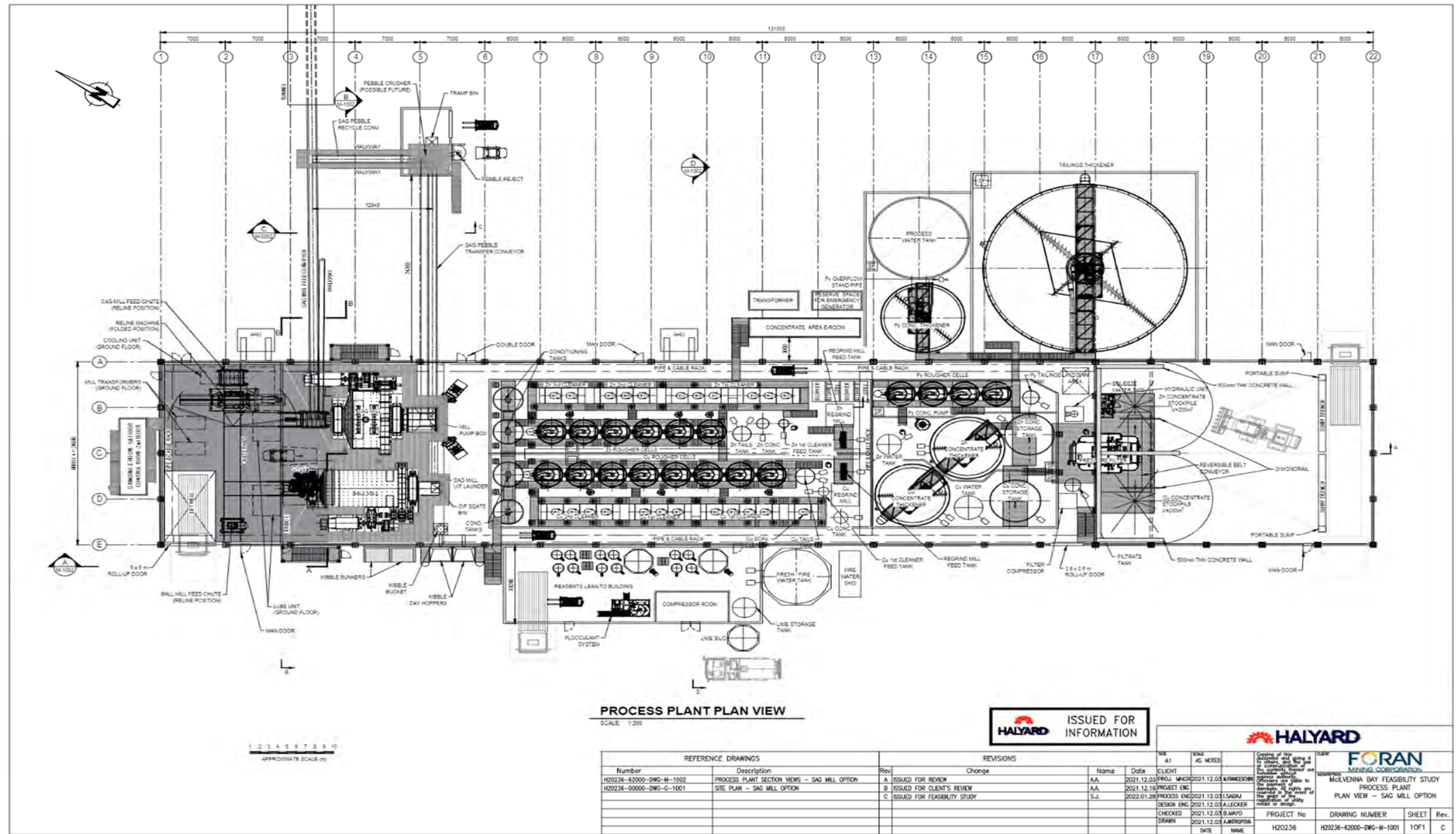


Figure 3-22 Processing Plant Plan View

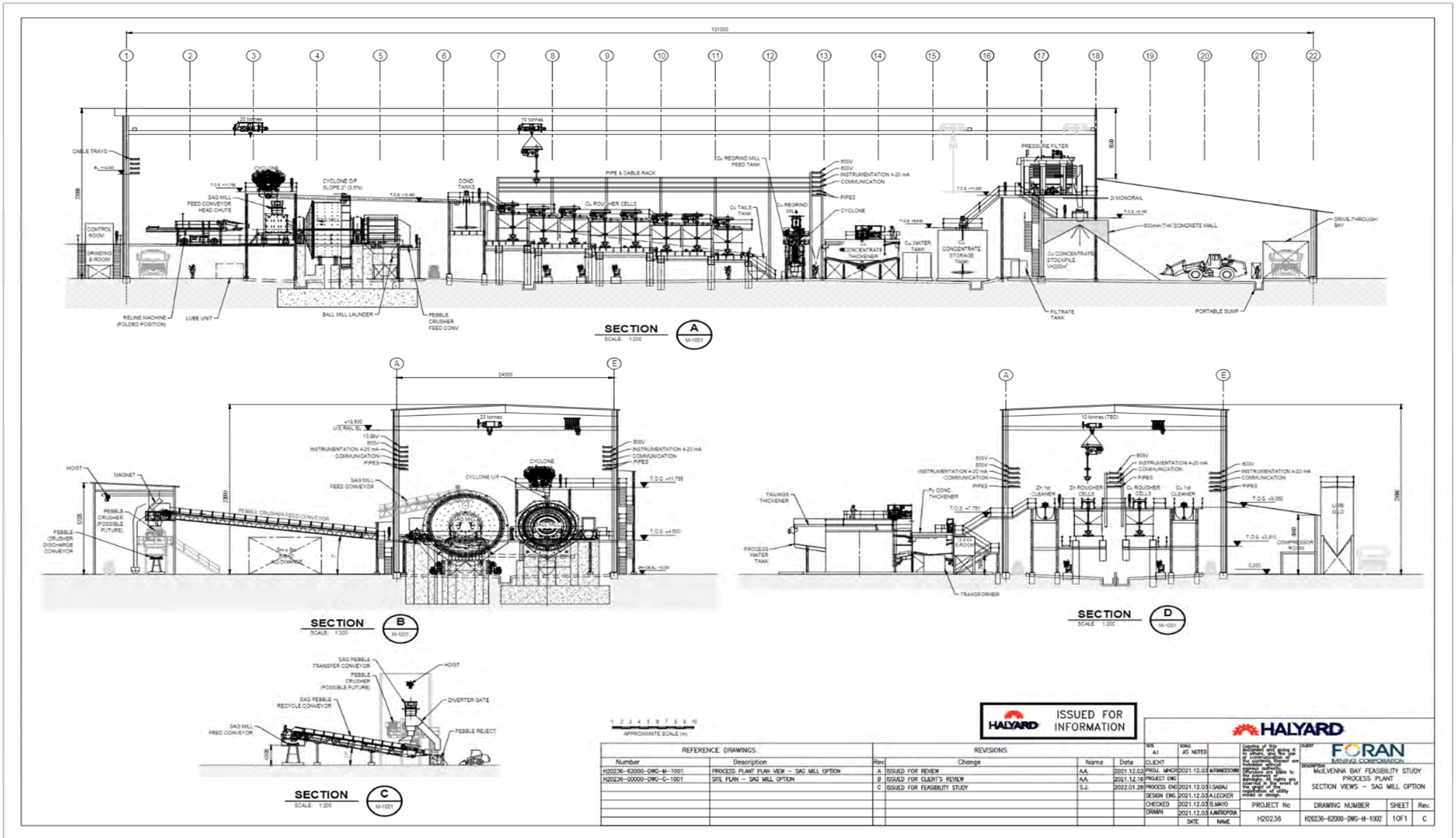


Figure 3-23 Processing Plant Section View

Water required for the processing plant is proposed to be primarily delivered through a closed loop recycle system, with supplemental make-up water provided as treated water. Process water would be reclaimed from the processing circuit as well as from the paste plant and would not enter the containment pond. This is illustrated in Section 3.2.3.

The pyrite flotation circuit is proposed to produce two products: a filtered sulphur tailings product (pyrite concentrate) to be sent to the paste backfill plant to be blended with desulphurized tailings cake and Portland cement prior to pumping underground for use as paste backfill in completed stopes; and a desulphurized, non-acid generating tailings product that would be either directed to the paste backfill plant to be mixed with the sulphur tailings product, or thickened and filtered to reduce moisture content and trucked to the engineered TSF. The current mine production plan indicates that approximately 23.8 Mt of tailings will be produced from the processing plant to mine the current mineral reserves associated with the Mcllvenna Bay deposit. Of this volume, it is anticipated that slightly more than 20% (5.4 Mt) would be produced as the higher-sulphur pyrite concentrate tailings stream for use in the paste backfill and of the remaining volume, approximately 30% (6.0 Mt) of the desulphurized tailings would also be used in the backfill. The remaining 12.4 Mt of tailings filter cake would be placed and compacted in the engineered TSF. A schematic of the pyrite flotation circuit is included in Figure 3-24.

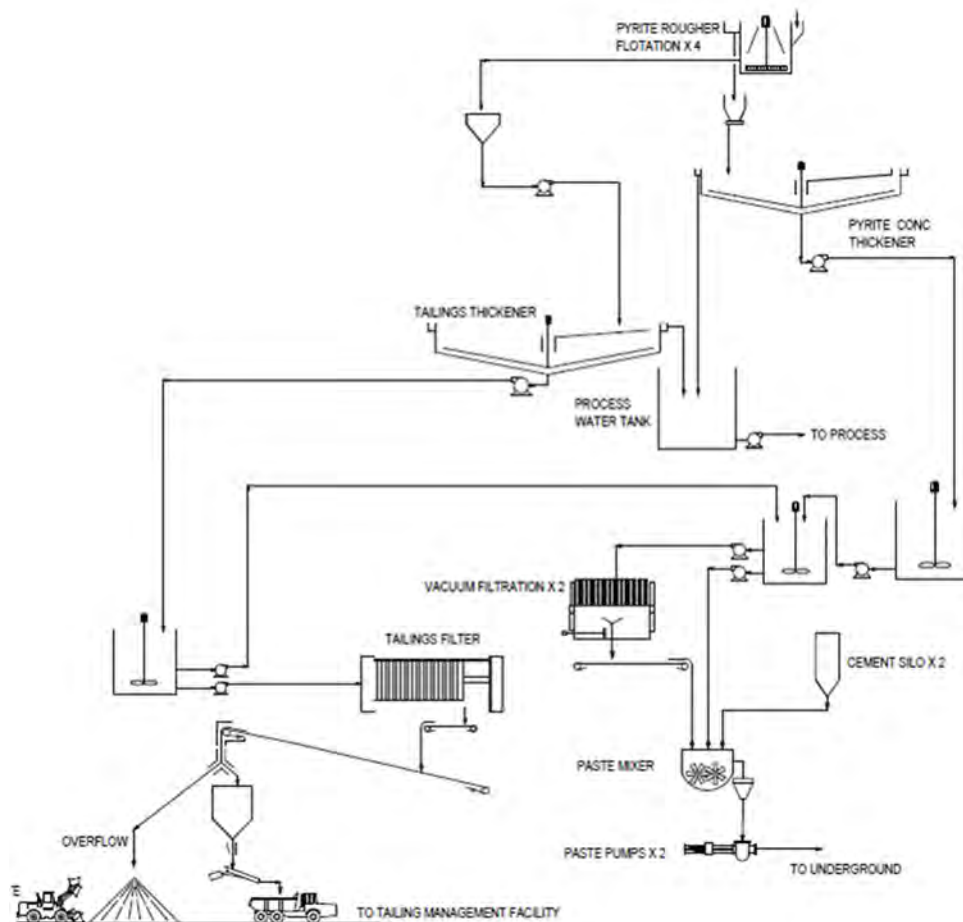


Figure 3-24 Schematic of Proposed Pyrite Flotation Circuit

Sulphur is expected to be contained in the ore that would be processed, and through processing this sulphur would be distributed to four product streams: the saleable copper concentrate, the saleable zinc concentrate, a pyrite tailings stream, and a non-acid generating tailings stream. It is estimated that the typical sulphur grade that could be encountered in the incoming mill feed is 13.75%. Through processing approximately 25% of the sulphur will be removed from the site in the copper and zinc concentrates, 72% of the sulphur would be concentrated into the pyrite/ sulphur tailings product, and approximately 3% would be contained in the non-acid generating tailings product. Because desulphurized tailings would be mixed into the paste backfill, the vast majority (~73%) of the sulphur originating in the ore would be directed back underground with low quantities (~2%) remaining in the non-acid generating tailings on surface.

To validate the performance of the proposed pyrite flotation circuit and the ability to generate desulphurized tailings, MBO tested the three main ore types (upper west massive sulphide (UWZ), copper stockwork zone (CSZ), Zone 2 massive sulphide (Z2)) associated with the Mcllvenna Bay deposit as well as a blend typical of the plant feed (Blend-1) for desulphurization performance (Table 3-2). The testing identified that the sulfides were readily floatable with moderate collector dosages and the pyrite recovery circuit was quite effective at creating NAG tailings to be disposed in the TSF. This is illustrated by Neutralization Potential Ratio > 3. Where desulphurization performance was poorer than expected, higher collector dosages, increased mass recovery, or longer flotation time could be implemented to reduce the sulfur grade of the tailings. MBO is confident that final collector and PH control recipes will consistently provide NAG tailings.

Table 3-2 Summary of Acid Generating Potential of De-sulphurized Tailings Results Tested through Pilot Pyrite Flotation Circuit

Test #	Comp	PAX Addition (g/t)	pH	Float Time (min)	Sulphur Guide			S Stage Recovery (%)	NPR (NP AP)
					Comp (%)	Py Feed (%)	Tails (%)		
R5	UWZ	65	10.8	10	24.5	21	1.21	96.7	-
R6	UWZ	65	10.8	10	23.9	22.4	1.35	96.7	-
R7	UWZ	65	10.8	10	24.3	21.6	1.47	96.3	-
R8	Z2	65	10.8	10	25.2	23.8	1.81	96.0	-
R9	Z2	90	10.3	15	24.8	22.7	0.91	98.0	-
C10	UWZ	65	10.6	10	23.8	21.5	1.24	96.8	-
C11	UWZ	100	10.7	10	23.0	20.1	0.75	97.9	5.93
C12	CSZ	65	7.7	10	4.55	1.72	0.22	87.9	1.15
C13	Blend-1	100	10.9	10	13.5	9.18	0.44	96.1	3.41
C14	UWZ	100	7.5	10	24.3	21.5	1.19	96.8	6.72
C15	Blend-1	35	10.5	10	14.2	9.02	0.60	94.6	4.85
C16	Blend-1	35	10.9	10	14.2	8.93	0.73	92.8	-
C18	Z2	35	10.8	10	24.9	22.8	1.58	96.3	4.97

Selected tailings samples that were processed through the pilot pyrite flotation circuit were tested for total metals, and the results of this analysis are shown in Table 3-3.

Table 3-3 Summary of Total Metals Analysis from De-sulphurized Tailings Tested through Pilot Pyrite Flotation Circuit

Parameter	Unit	BL770-12 RT	BL770-14 RT	BL770-15 RT	BL770-17 RT	BL770-18 PyRT
Ag	ppm	0.6	4.2	1.2	14	3
Al	ppm	32000	45000	34000	56000	41000
As	ppm	8.9	79	21	52	46
Ba	ppm	130	86	130	1500	210
Be	ppm	0.73	0.72	0.72	1.3	1
Bi	ppm	7.7	56	14	0.27	3.3
Ca	ppm	2700	45000	16000	16000	52000
Cd	ppm	1.3	3.3	1.3	4.9	3.6
Ce	ppm	58	89	52	29	55
Co	ppm	2.8	3.4	3	13	4
Cr	ppm	9.8	11	11	210	20
Cs	ppm	0.24	0.24	0.27	2.6	0.39
Cu	ppm	290	740	290	84	250
Fe	ppm	32000	68000	39000	31000	59000
Ga	ppm	15	29	18	17	33
Hf	ppm	1.9	3.4	2.4	2.3	2.9
In	ppm	0.57	2.1	0.67	0.05	6.2
K	ppm	6700	2600	6000	45000	7600
La	ppm	26	42	25	14	26
Li	ppm	14	18	15	90	19
Mg	ppm	20000	70000	30000	12000	53000
Mn	ppm	310	1300	600	1800	1500
Mo	ppm	1	1.2	1	6	1.5
Na	ppm	1300	1800	1600	5300	2900
Nb	ppm	3.1	9	4.9	2.6	5.8
Ni	ppm	6.2	4.3	4.4	86	6.4
P	ppm	88	120	100	790	140
Pb	ppm	42	480	210	690	720
Rb	ppm	14.1	5.6	13.3	180	15.7
Rh	ppm	< 0.01	0.01	< 0.01	0.02	0.02
Sb	ppm	1.4	18	5.2	8.2	13
Se	ppm	3.3	19	4.7	< 0.7	6.1
Sn	ppm	13	40	15	< 6	15
Sr	ppm	39	64	47	100	78
Ta	ppm	0.23	0.73	0.4	0.21	0.46
Te	ppm	< 0.1	0.2	< 0.1	0.2	0.1
Th	ppm	2.7	4.3	2.9	4.1	3.2
Ti	ppm	430	660	490	3300	610
Tl	ppm	1.2	4.5	2.4	2	7.8
U	ppm	1.4	3	1.8	1.8	2.9
V	ppm	6.7	9	8.1	120	16
Y	ppm	7.6	23	10	15	15
Zn	ppm	450	1500	570	1100	1500

Reagents for the processing plant will be delivered to site by road and stored in the warehouse. Reagents will be moved to the plant reagents area on an as-needed basis. The speed of the reagents dosing pumps can be adjusted remotely from the control room. The operator can adjust reagents based upon viewing the cameras and automated flow measurement. Reagents required for the process plant are generally categorized as frothers (MIBC and Polyfroth H57), promoters (Cytec Aero 5100, Cytec Aero 3894),

collectors (Cytec Aero 3894, Cytec Aero 3501, Potassium Amyl Xanthate), activators (copper sulphate), depressors (sodium metabisulfite, PE26), and flocculant (Magnafloc 10).

The processing plant will also include an adjacent assay lab that will contain lab equipment and workstations suitable for sample preparation, fire assay, and wet chemical analysis.

#### *3.2.2.5 Paste Backfill Plant*

A paste backfill plant is proposed to be constructed at the north end of the mine site. Tailings lines are proposed to be installed from the process plant to the paste backfill plant to deliver both pyrite concentrate (sulphur tailings) and NAG filtered tailings for use in paste production. The plant is proposed to be in a heated, fully enclosed building and be equipped with a truck loadout for transfer of tailings to the TSF. Plan and section view illustrations of the paste backfill plant are provided in Figure 3-25 and Figure 3-26.

Binder (a slag-based cement with sulphate resistance) is proposed to be added to the pyrite concentrate and de-sulphurized tailings in the paste backfill plant. The resultant paste is proposed to be transferred underground via two borehole that will connect the paste plant to the underground development. The optimum blending ratio for tailings and binder to meet the mine's process and geotechnical requirements was determined through laboratory testwork.

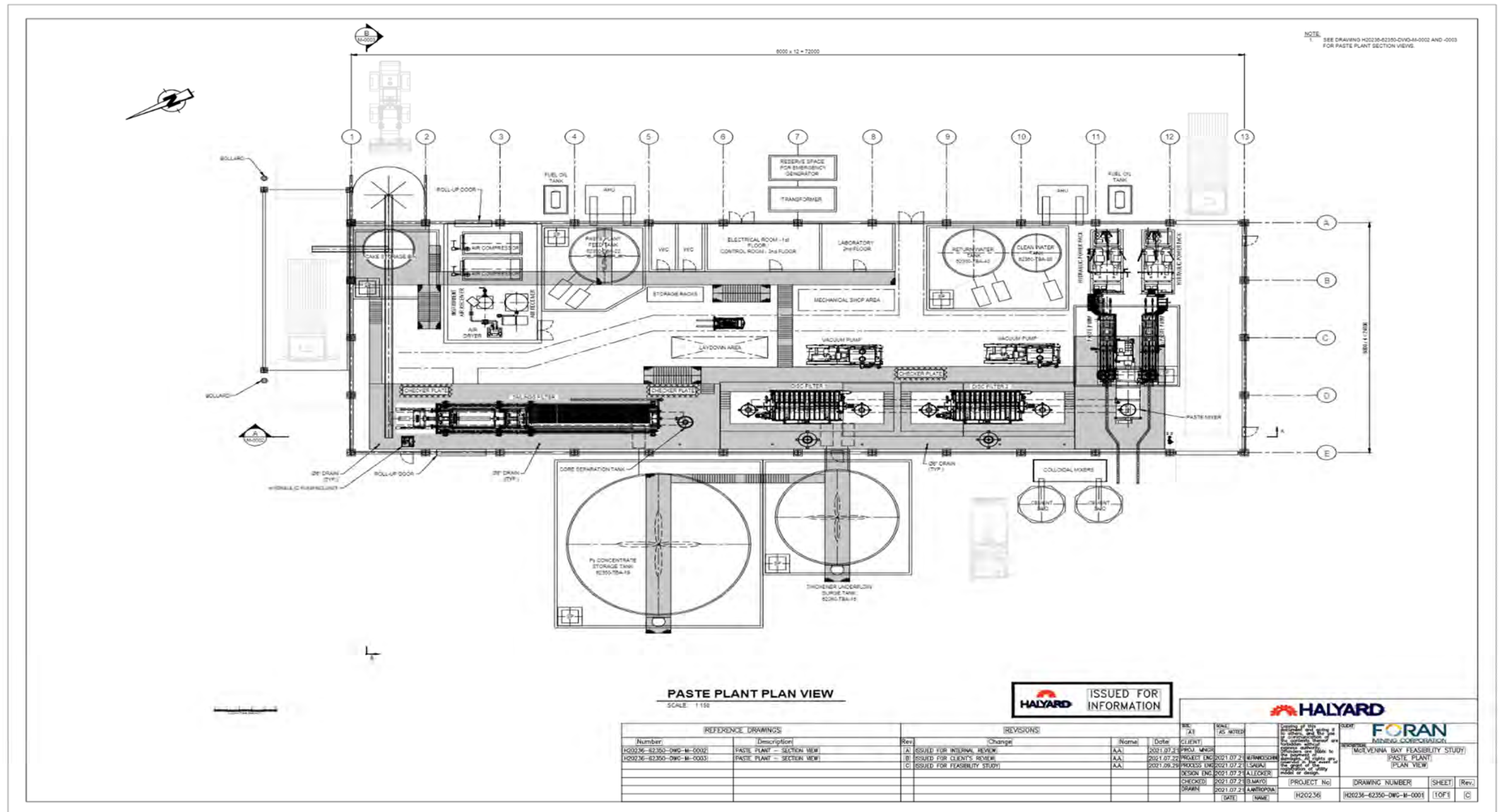
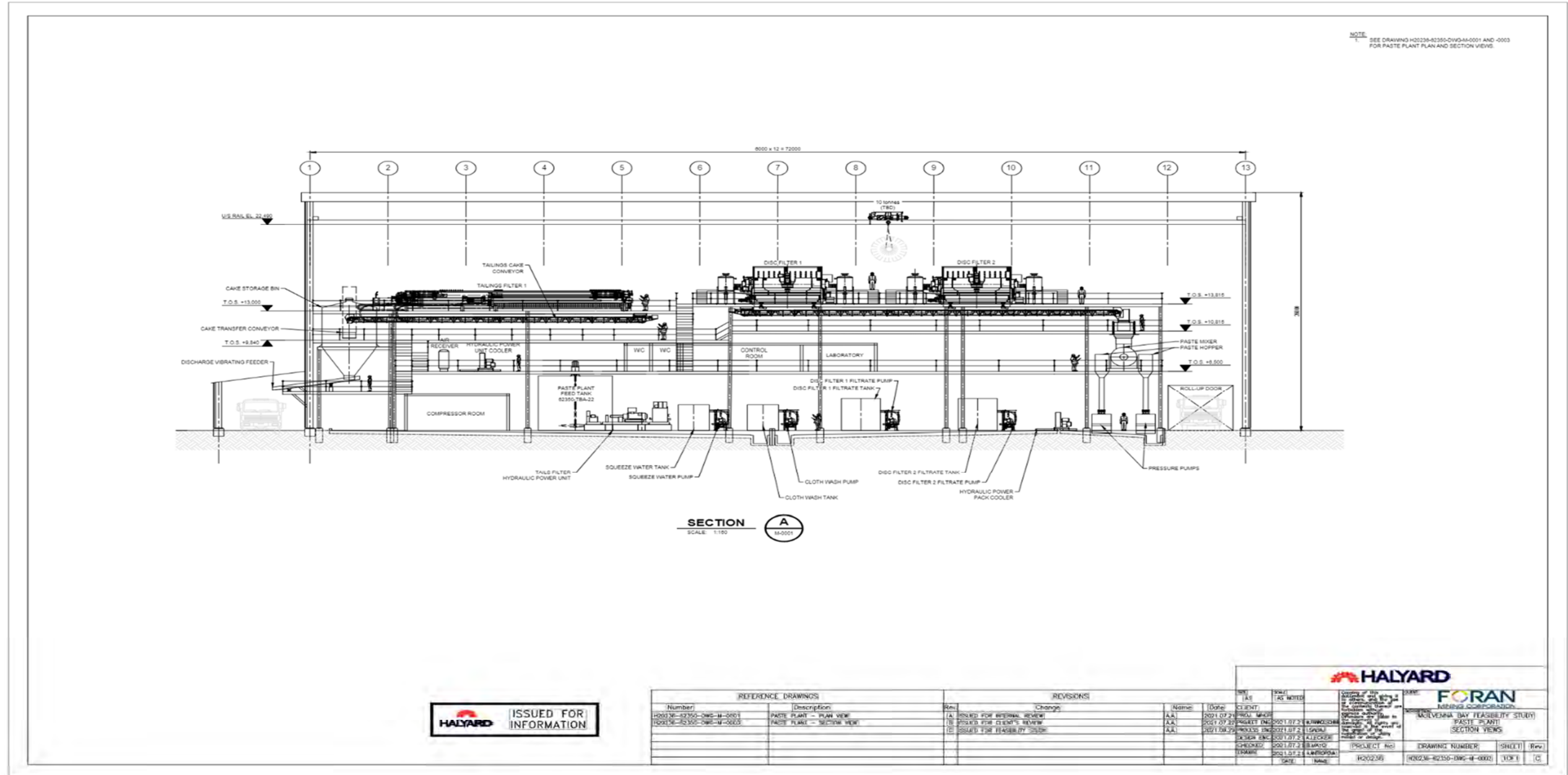


Figure 3-25 Paste Backfill Plant Plan View



**HALYARD** ISSUED FOR INFORMATION

REFERENCE DRAWINGS		REVISIONS	
Number	Description	Rev	Change
H02236-02350-0V04-M-0001	PASTE PLANT - PLAN VIEW	AA	ISSUED FOR INTERNAL REVIEW
H02236-02350-0V04-M-0002	PASTE PLANT - SECTION VIEW	AA	ISSUED FOR CLIENT'S REVIEW
		AA	ISSUED FOR FABRIC BY SHOP

Rev	Date	Name	Change
AA	2021.07.29	PROJ MGR	ISSUED FOR INTERNAL REVIEW
AA	2021.07.29	PROJECT ENG	ISSUED FOR CLIENT'S REVIEW
AA	2021.08.25	DESIGN ENG	ISSUED FOR FABRIC BY SHOP

**HALYARD**

**FORAN**  
 ENGINEERING CORPORATION

MCLLVANNA BAY FEASIBILITY STUDY  
 PASTE PLANT  
 SECTION VIEWS

PROJECT No:	H02236
DRAWING NUMBER:	H02236-02350-0V04-M-0002
SHEET:	10
REV:	AA

Figure 3-26 Paste Backfill Plant Section View

### 3.2.2.6 Dry-Stack Tailings Storage Facility

A dry stack TSF is proposed to be constructed 1 km to the north of the site at a previous silica sand mine. Proposed dry stack TSF infrastructure includes:

- **Dry Stack Tailings Storage Facility** – perimeter ditch is proposed to direct surface water from the TSF into the Tailings Area Water Management Pond (TAWMP).
- **Tailings Haul Road** – existing 1 km road from process plant site to the dry stack TSF to allow truck haulage of filtered tailings.
- **Tailings Area Water Management Pond** – proposed to be lined and provided with a pump and return pipeline to the process plant.
- **Tailings Storage Shed** – a fabric building proposed to be located adjacent to the tailings filter presses for temporary storage of tailings until trucking to the dry stack TSF can occur. This will provide overnight or inclement weather storage for dewatered tailings. The shed is proposed to be positioned on a lined pad.

The TSF will be comprised of a linear low-density polyethylene (LLDPE) lined tailings storage pad. The tailings storage pad will be constructed in six stages over the mine life (as illustrated in Figure 3-27 to Figure 3-32) to minimize upfront capital expenditures as well as allow an adaptive approach to tailings management over the life-of-mine. Foundation drains will be installed over the liner to direct percolated water to a lined perimeter ditch where the water will be conveyed to the TAWMP discussed above. The perimeter ditch will also serve to collect runoff water from the tailings area.

The tailings stack is proposed to be compacted during placement. This will increase stability and minimize infiltration of precipitation. The outer slopes of the facility will be constructed at a shallow angle of 4H:1V up to an approximate height of 16 m above original ground to minimize effort required at closure.

The side slopes of the TSF will be lined with a GCL then covered with clean rockfill and a soil cover progressively during operations. As stages of the TSF are completed, the top of the TSF will be covered with an HDPE liner and surface soil. These covers will serve as the final closure cover for the TSF and will minimize potential environmental impacts such as dusting, and tailings contact runoff water from the pile.

A plan and sections of the TSF are available in Figure 3-33 and Figure 3-34.

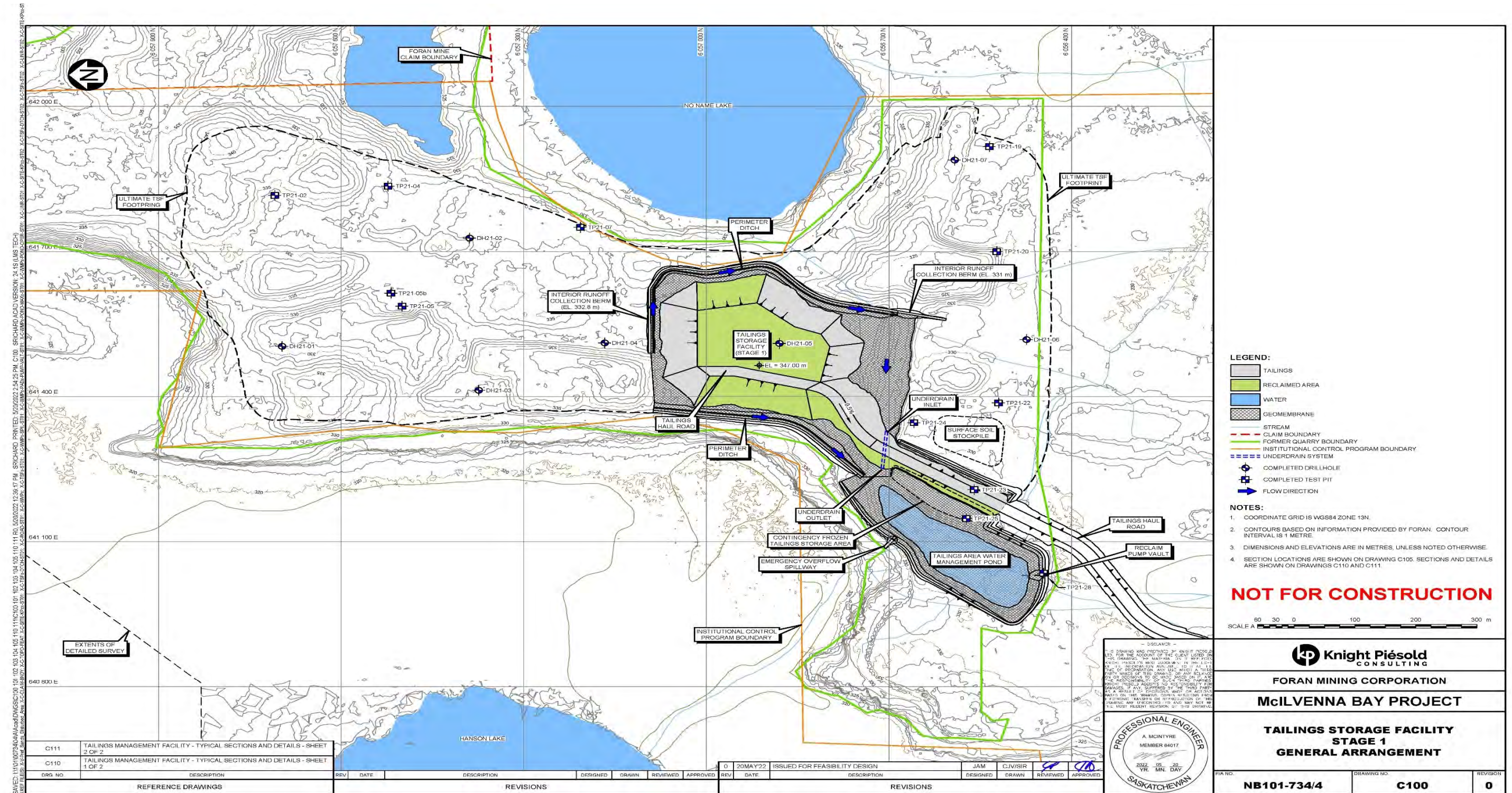


Figure 3-27 Tailings Storage Facility Stage 1

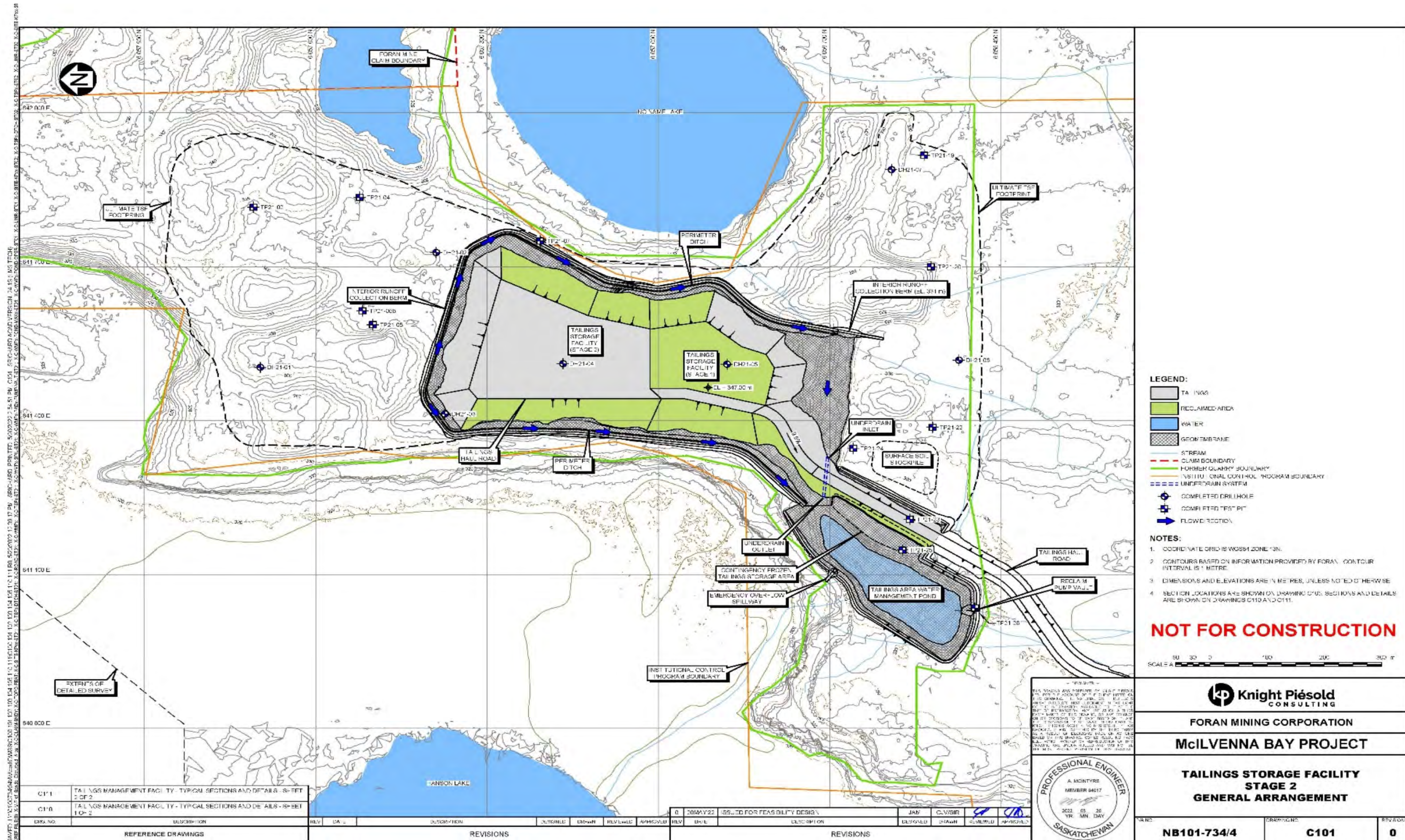


Figure 3-28 Tailings Storage Facility Stage 2

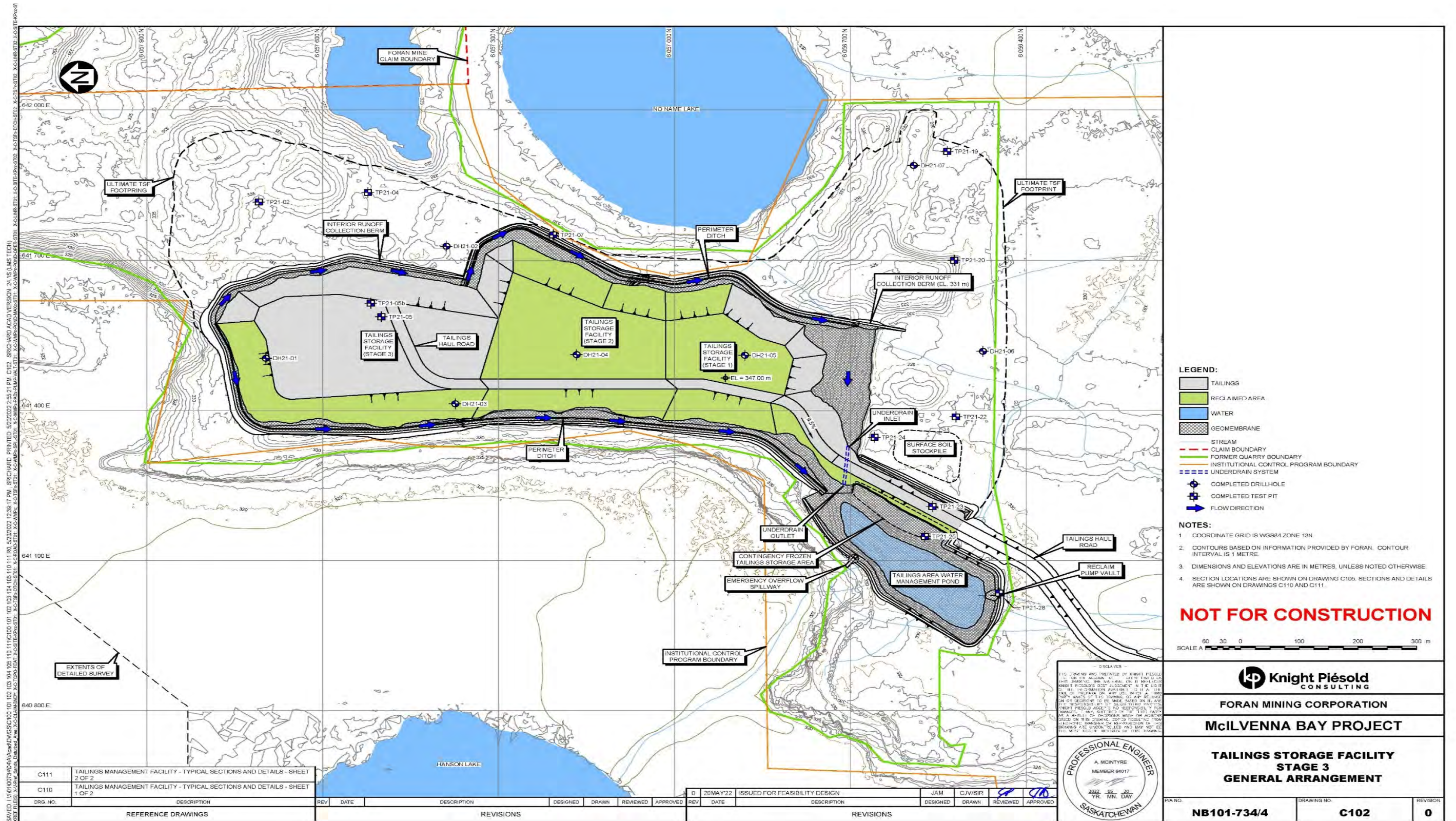


Figure 3-29 Tailings Storage Facility Stage 3

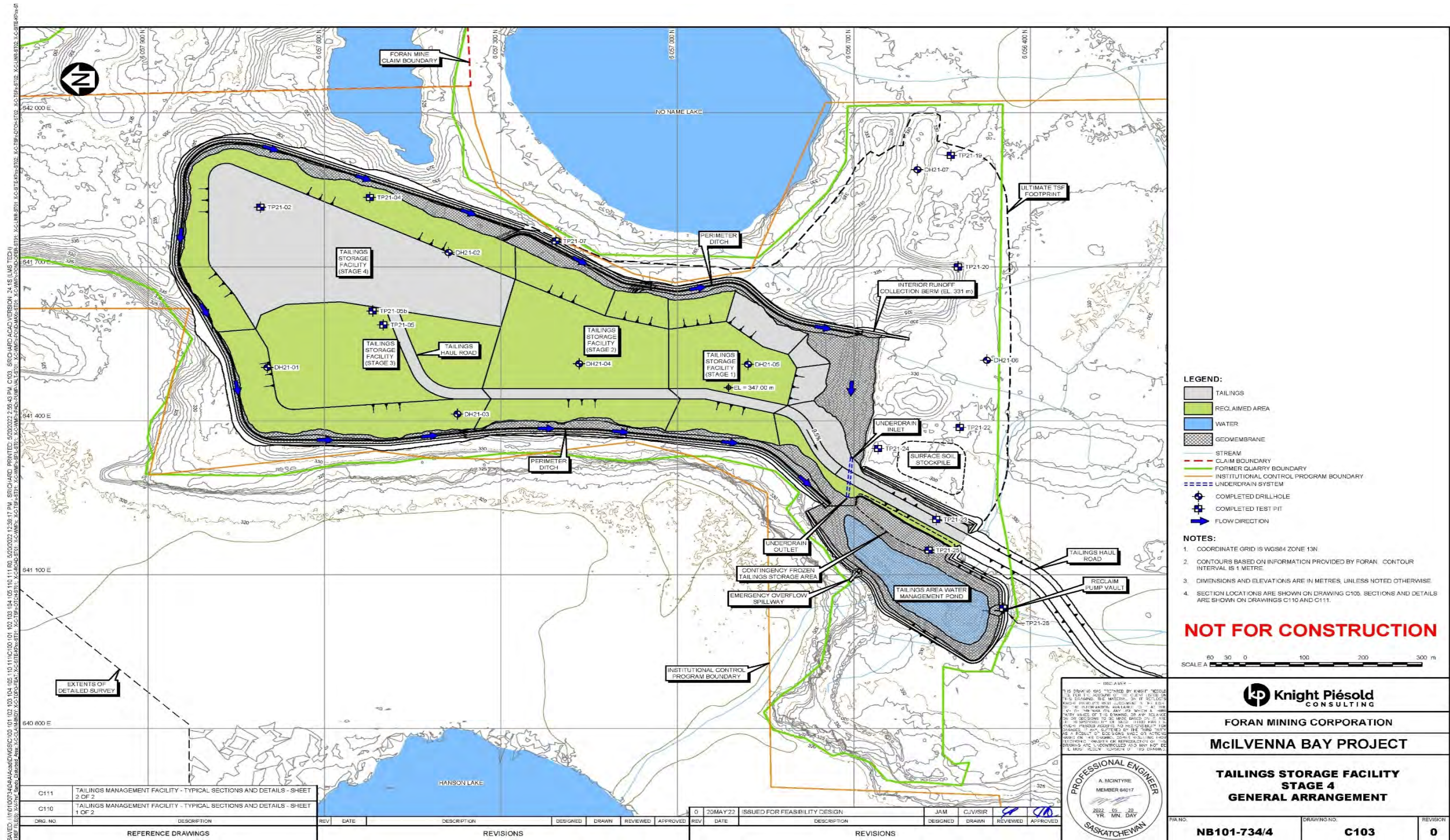


Figure 3-30 Tailings Storage Facility Stage 4

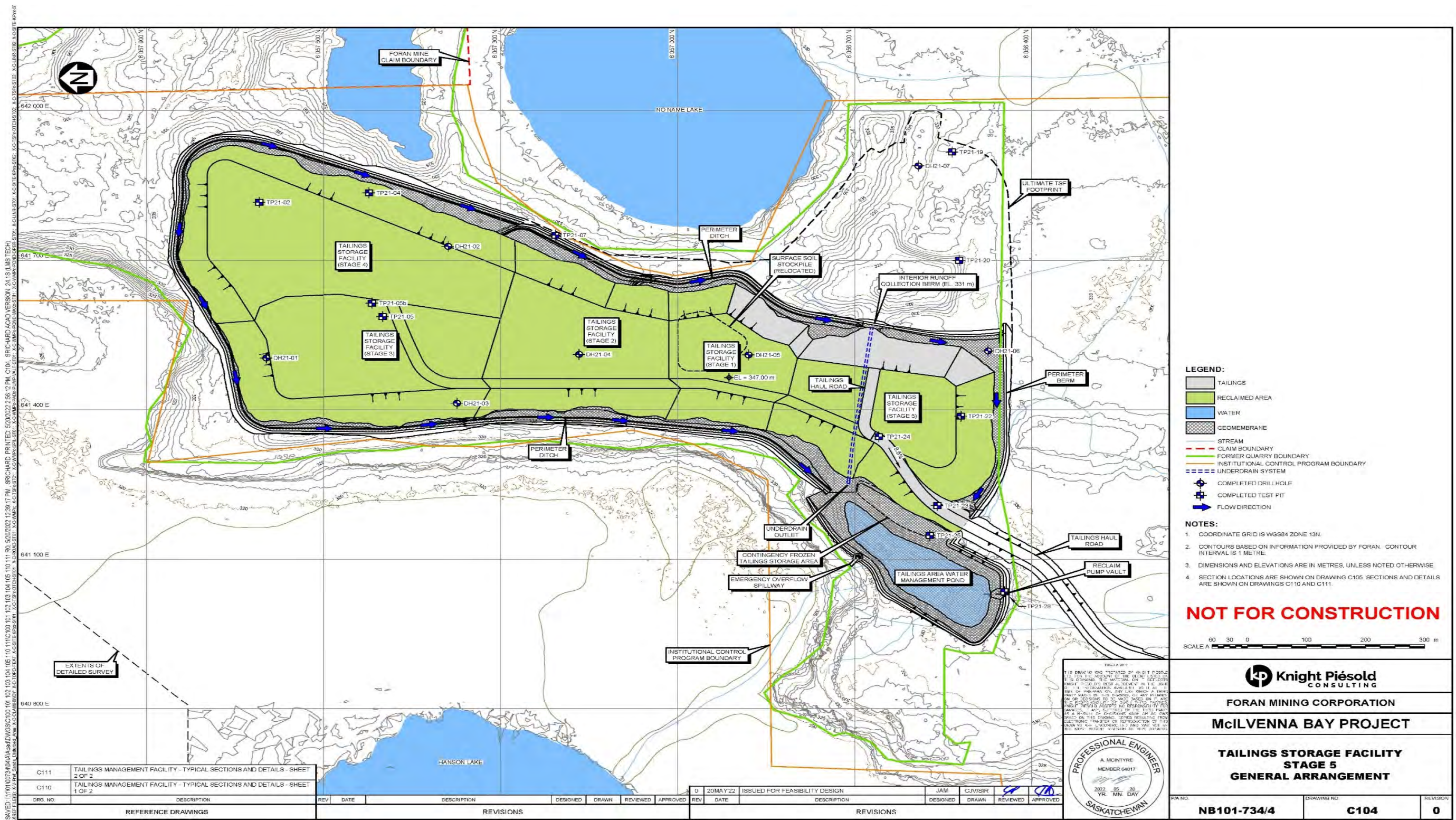


Figure 3-31 Tailings Storage Facility Stage 5

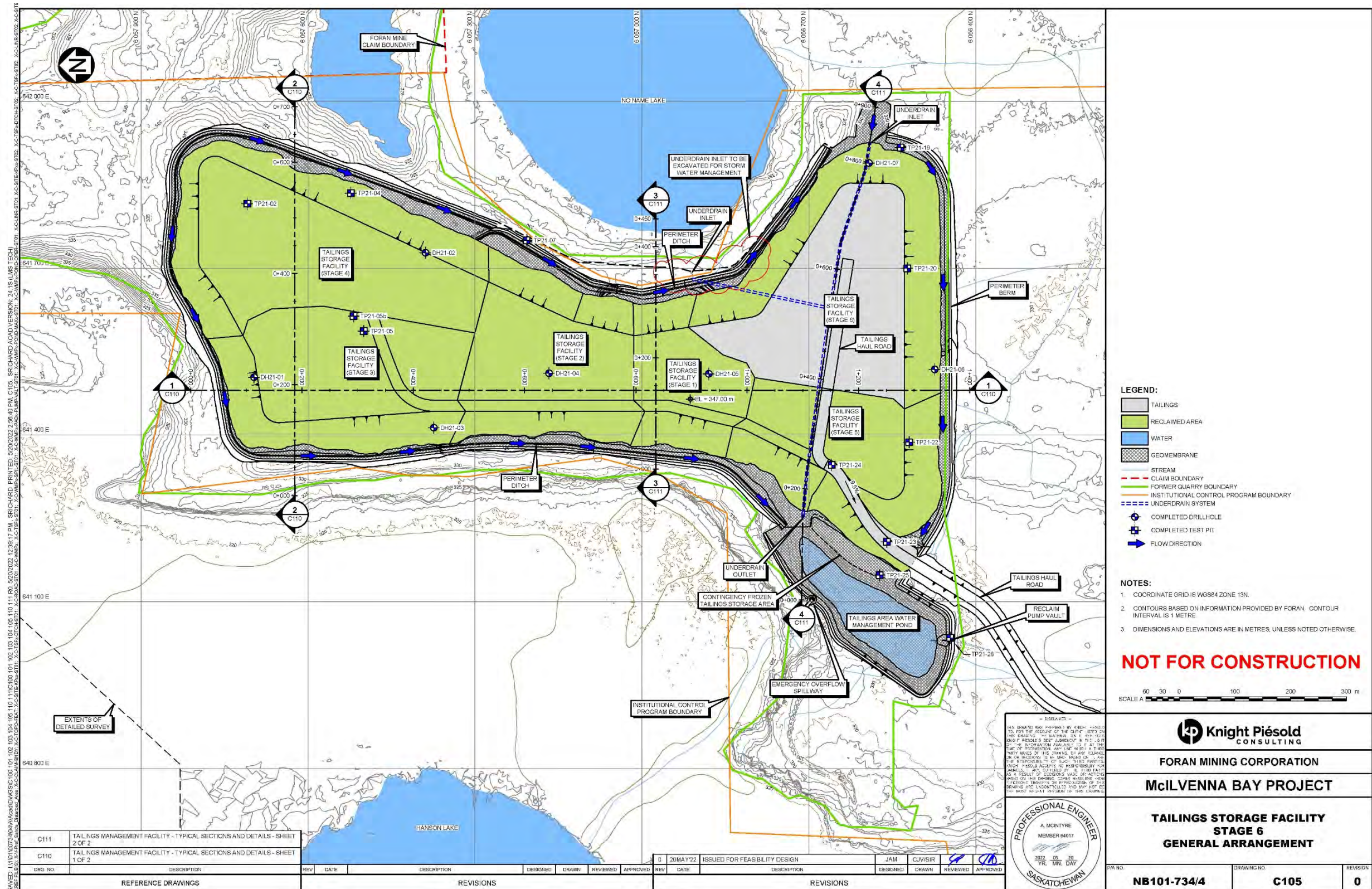


Figure 3-32 Tailings Storage Facility Stage 6

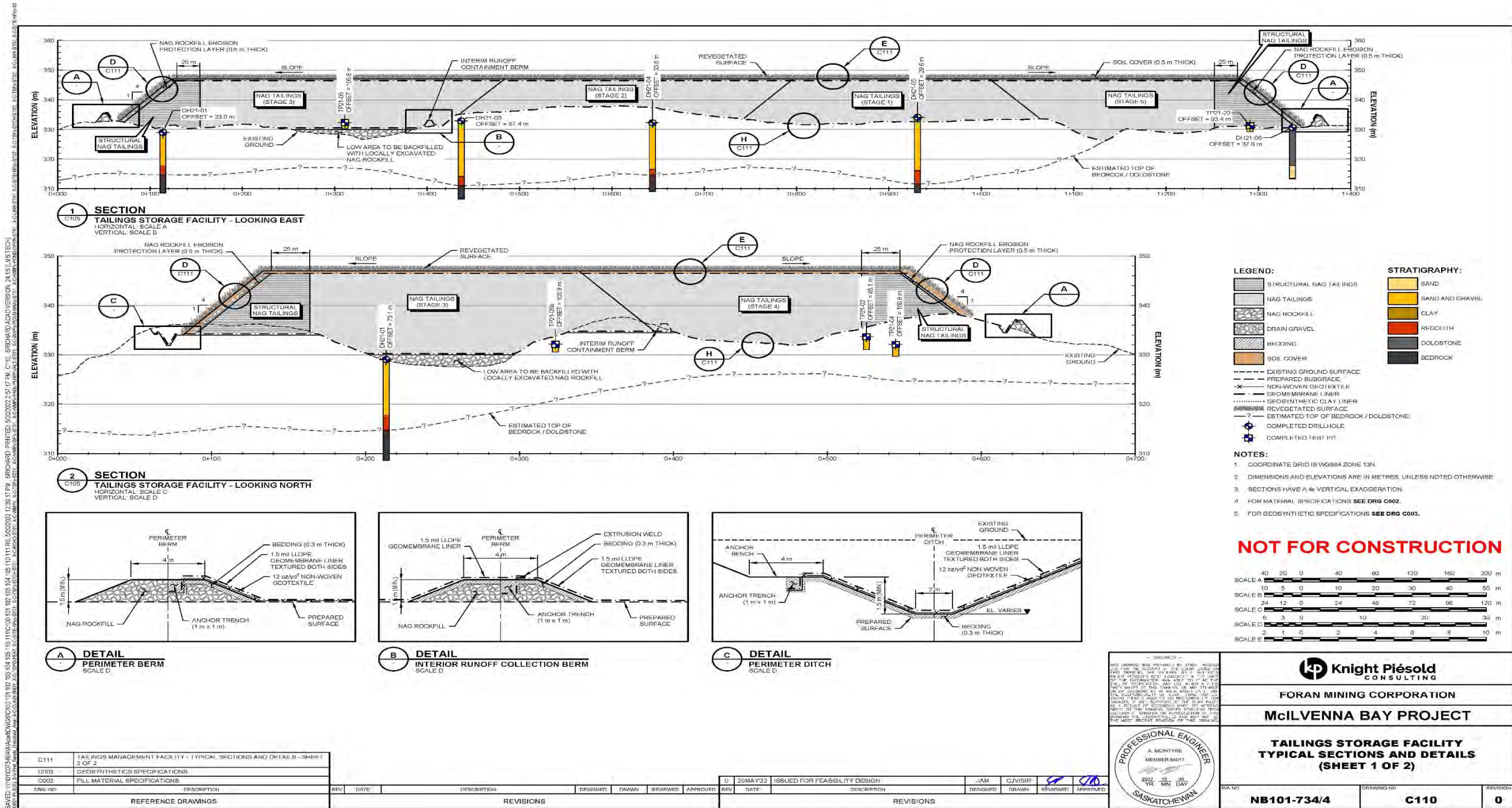


Figure 3-33 Tailings Storage Facility Sections and Details 1

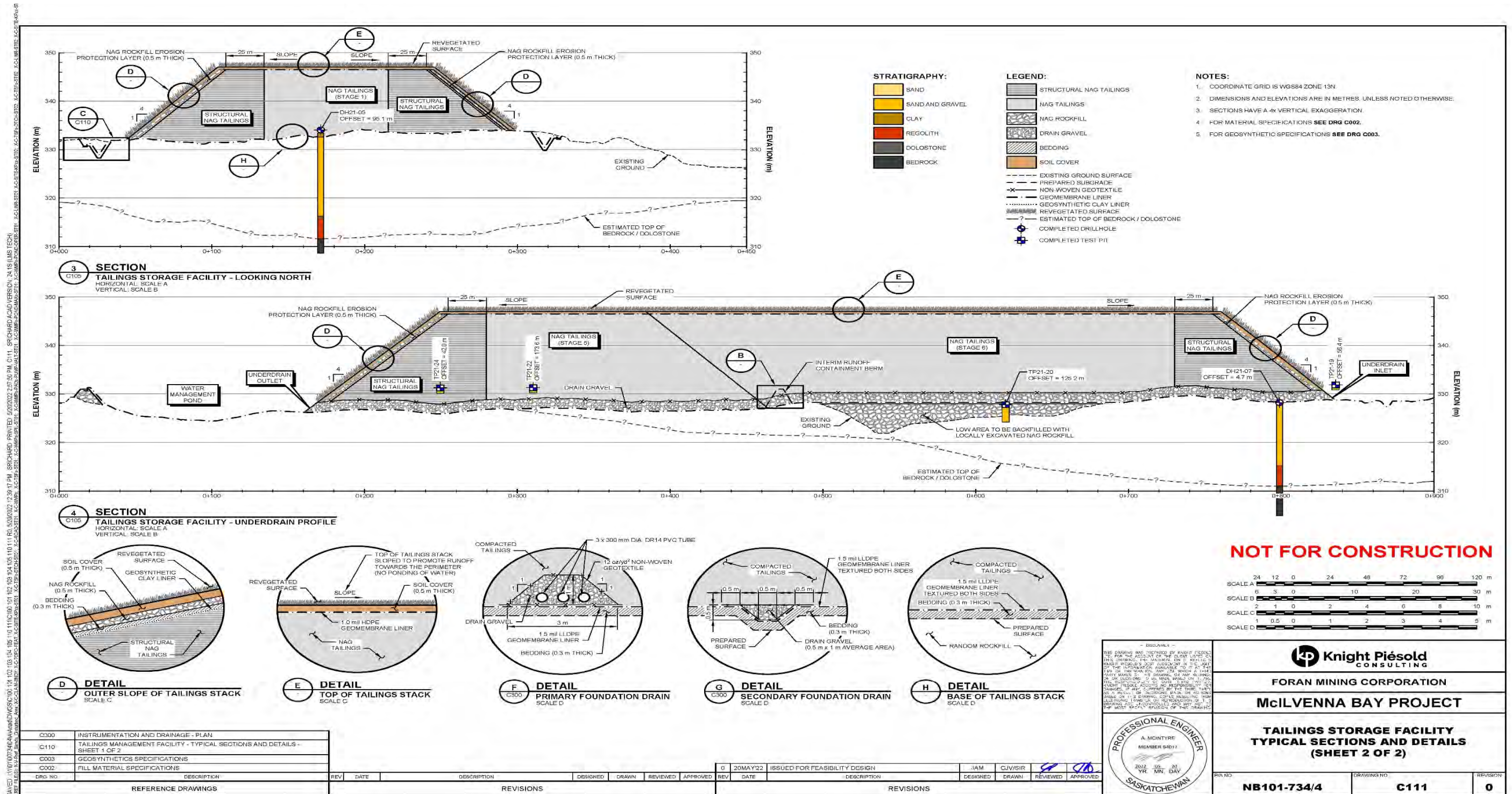


Figure 3-34 Tailings Storage Facility Sections and Details 2

Dust is proposed to be controlled from the TSF using the following measures:

- The slopes of the TSF will be progressively covered with a GCL and NAG waste rock as the elevation is raised to reduce exposure to the wind.
- The crests of each stage of the TSF will be closed (lined and covered) as each area is completed.
- Moisture conditioning with a water truck will be used to minimize dust generation along haul routes and active work areas.
- During winter, snow clearing will be carried out only in active work areas to minimize exposure of dry tailings.

The TAWMP is sized to provide temporary containment of runoff water from the full footprint of the tailings area resulting rainfall events up to and including a probable maximum precipitation (PMP) event. This facility is described further in Section 3.2.3.

### 3.2.3 Water Management Infrastructure

Water management is proposed to focus on diverting non-contact surface runoff away from the Project site and collecting and treating contact, or site influenced, water. It is anticipated that site influenced water will include water transported to surface from the underground mine and water collected from surface activities (e.g., the dry-stack tailings storage facility, truck wash), the ore and waste rock stockpile, as well as surface runoff. Given the relatively flat nature of the site, perimeter deflection berms and diversion ditches are proposed to divert water away from the site and minimize the catchment required.

An overview of the proposed water management system and anticipated flow rates under several scenarios are provided in Figure 3-35, Figure 3-36, and Figure 3-37. Figure 3-35 illustrates the typical, or routine, operating year water balance; rates illustrated are nominal rates. Figure 3-36 illustrates a scenario that could be experienced in the short-term on a non-routine basis if both increased precipitation and increased mine inflow were to occur at the same time. Figure 3-37 illustrates a scenario that also could be experienced in the short term on a non-routine, short term basis. The intent of these scenarios is to capture the range of potential precipitation, climate, and inflow conditions that could occur during the mine life prior to decommissioning for the EIA process.

I:\1101100734105\A\Data\WFD2 - Predictive Water Quality Model\2. Water Quality Model\Water Balance WQ MODEL - 22-06-29.xlsm\FIG 1\_AVG

Print 2022-06-29 1:48 PM

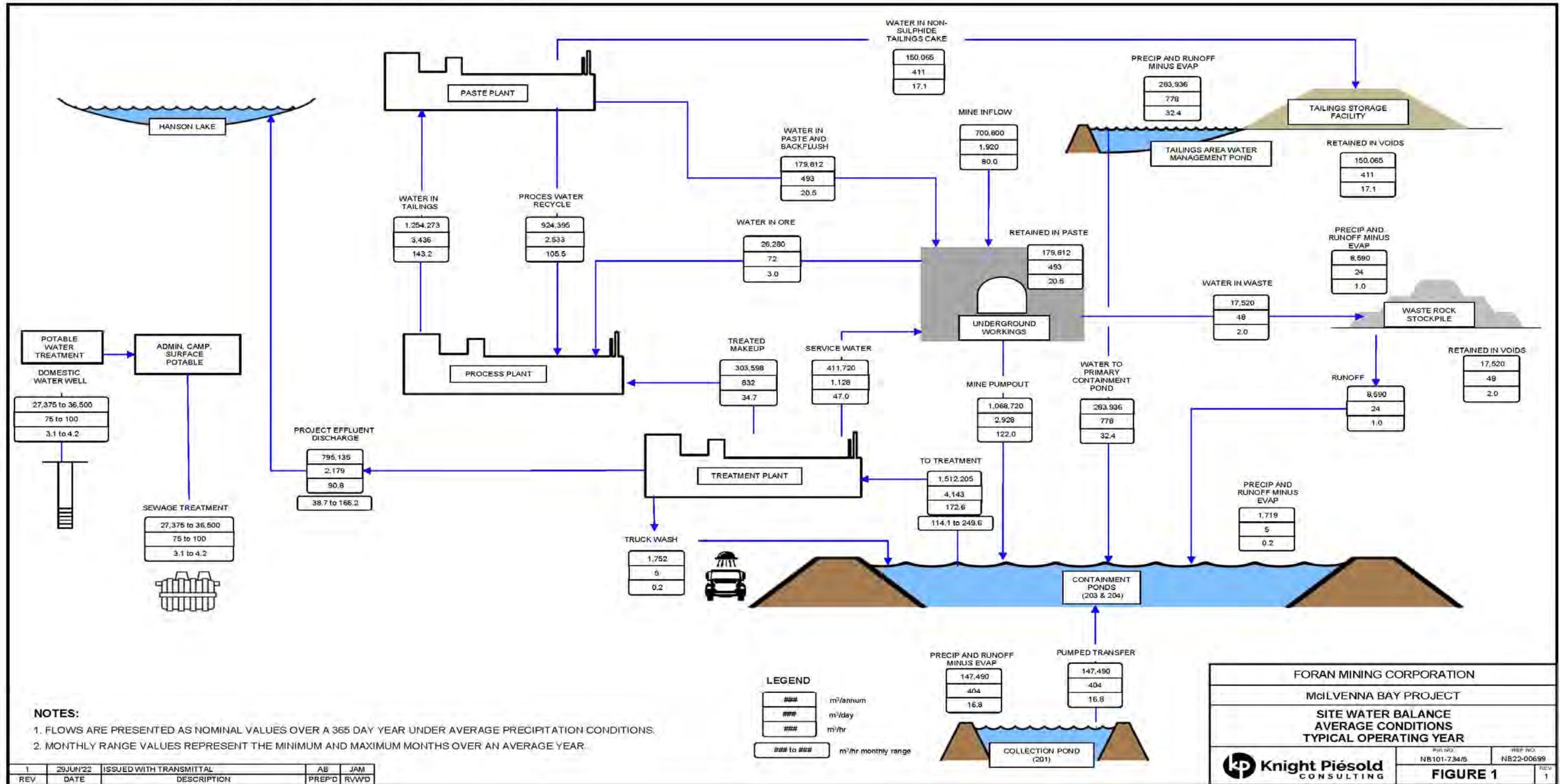


Figure 3-35 Site Water Balance, Average Conditions, Typical Operating Year

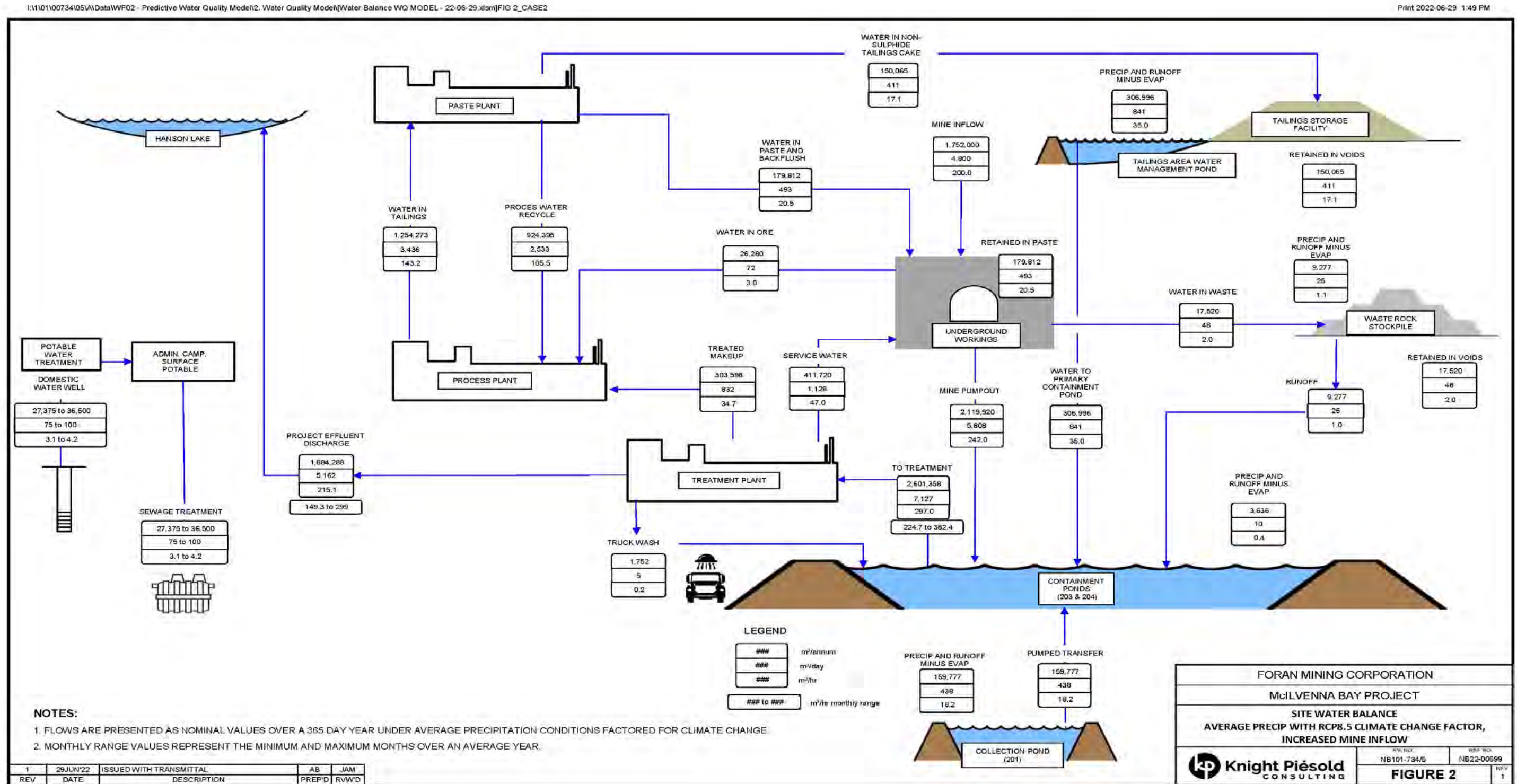


Figure 3-36 Site Water Balance, Average Precipitation with RCP 8.5 Climate Change Factor and Increased Mine Inflow

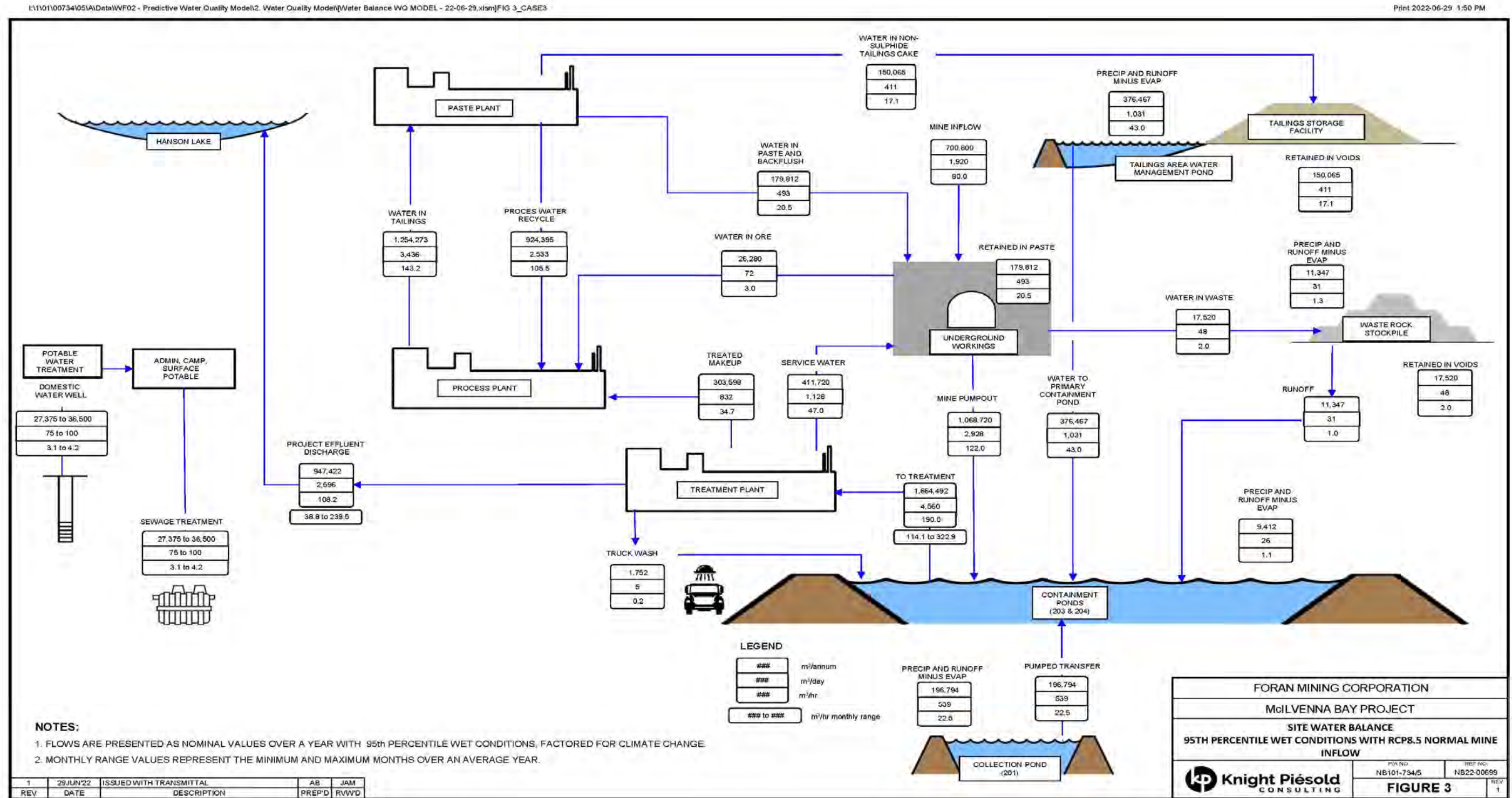


Figure 3-37 Site Water Balance, 95<sup>th</sup> Percentile Wet Conditions with RCP 8.5 Normal Mine Inflow

The proposed water management system is proposed to be expanded from the water management system for the ADEX Project. Water management infrastructure that would be constructed includes several ponds as well as water collection and transfer systems. Additional information is provided below.

**Containment Ponds.** The containment ponds are designed to allow the settling of suspended solids. Water would be introduced from the containment ponds into the effluent treatment plant (ETP). The Project proposes to expand containment pond capacity to provide up to 72,000 m<sup>3</sup> of storage. The ADEX containment pond is currently sized to accommodate 41,700 m<sup>3</sup> of water when 1 m of containment freeboard is retained. Normal seasonal pumping from the containment ponds is expected to range from 114 m<sup>3</sup>/hr in February to 249 m<sup>3</sup>/hr in May, with a nominal annual pumping rate of 175.2 m<sup>3</sup>/hr.

The existing ADEX containment pond is proposed to be re-used for the Project. The ADEX containment pond is an engineered pond with the dimensions of 115 mL x 155 mW measured from the inside toe of the dam walls. This containment pond is used to collect and contain water, and has three cells: an untreated water cell, and two treated water cells. The containment pond is designed to provide a total of 1,105 mm of freeboard above the normal operating water level of the pond with a constructed design capacity of 49,200 m<sup>3</sup>. The SKMOE has currently enforced a condition on operation of the pond that requires to the maintenance of 1.0 m of wet / containment freeboard, and this limits the available capacity in the pond to 40,700 m<sup>3</sup>. The pond berm is 3.35 m tall with a 15.4 m wide base around all four sides, with a 2H:1V slope and a 2 m flat embankment crest for liner anchoring. There is a 0.5 mD x 5.0 mW lined overflow emergency spillway covered with river rock designed to ensure dam stability. An image of the constructed containment pond is provided in Figure 3-38.



Figure 3-38 Image of Constructed Effluent Storage Pond

The containment ponds will be constructed as gravity earth berms, 2H:1V slope, composed of compacted granular material and lined with GCL and HDPE liner system to minimize infiltration of pond water and erosion of the inboard berm wall. The proposed expansion of the containment pond is to establish a

secondary containment pond that would share a common central berm wall to the primary (ADEX) containment pond. This containment pond expansion may be adjusted through the detailed design effort and would be equipped with an emergency spillway sized for the Probable Maximum Flood theoretical storm event (10,000-year Type II 24-hour storm event consisting of 349 mm precipitation).

**Tailings Area Water Management Pond:** As discussed in Section 3.2.2.6, a lined containment pond will be constructed as part of the tailings management area to contain runoff from the TSF. An existing topographical depression (approximately 100 m L x 300 m W x 4 m D) remaining from closure of a former quarry will be utilized as a surface water runoff management pond for the TSF. A 2 m tall berm will be constructed around the perimeter of the pond to provide additional containment for extreme storm events. The pond has a capacity of approximately 215,000 m<sup>3</sup> and is designed to accommodate a PMP event. The pond and berm will be lined with an HDPE liner to minimize infiltration and seepage. Water from the pond will be pumped to the primary containment pond using a submersible pump and pipelines. Normal seasonal pumping from the pond is expected to range from <1 m<sup>3</sup>/hr in February to 83 m<sup>3</sup>/hr in May, with a nominal annual pumping rate of 32.9 m<sup>3</sup>/hr.

**Surface Runoff Collection Pond:** A surface runoff collection pond will be located in the northwest corner of the site and is currently sized to accommodate runoff capacity of 5,000 m<sup>3</sup>. During storm events, water received in the collection pond would be pumped to the containment ponds via transfer works (pumps and pipelines). Runoff to this pond will primarily be comprised of contact water associated with plant infrastructure. Sizing of this surface pond will be re-evaluated as part of the detailed design effort. Normal seasonal pumping from the pond is expected to range from <1 m<sup>3</sup>/hr in February to 43.5 m<sup>3</sup>/hr in May, with a nominal annual pumping rate of 17.5 m<sup>3</sup>/hr.

**Effluent Treatment Plant:** The ETP is proposed to be housed in a heated enclosure adjacent to the containment ponds. Contact water will be processed through this facility.

MBO is currently evaluating and updating the design of the ETP based on an updated understanding of the predicted influent quality. MBO has completed bench scale testing of mine water collected through the ADEX program for a proposed chemical treatment process and is considering piloting a mobile ETP through the ADEX program to validate predicted performance.

**Re-use of Treated Water:** Treated water is proposed to be used as make-up water in the processing plant, for underground process water, and for truck washing. MBO intends to re-use water as much as practical to minimize freshwater withdrawal requirements.

**Effluent Discharge:** Clean treated water would be confirmed to meet applicable criteria through a regular monitoring program and any water that could not be reused for on-site operations would be discharged to Winn Bay in Hanson Lake via a heat traced line capped with a diffuser installed at a minimum 2.5 m water depth to allow for mixing during winter months when ice is present.

MBO anticipates that the constituents of potential concern in the treated effluent could include ammonia, cadmium, calcium, chloride, copper, fluoride, manganese, nitrate, nitrite, selenium, sulphate, total dissolved solids, and zinc.

The treated effluent discharge line is proposed as a single walled HDPE line with heat trace, and the proposed surface routing has been selected to minimize new surface disturbance (Figure 3-39). The line is proposed to be on grade and appropriate berms for wildlife crossing are proposed to be installed. The

diffuser is designed to direct treated effluent up at an angle away from the lake bottom to minimize lake sediment disturbance (see Figure 3-40 and Figure 3-41).

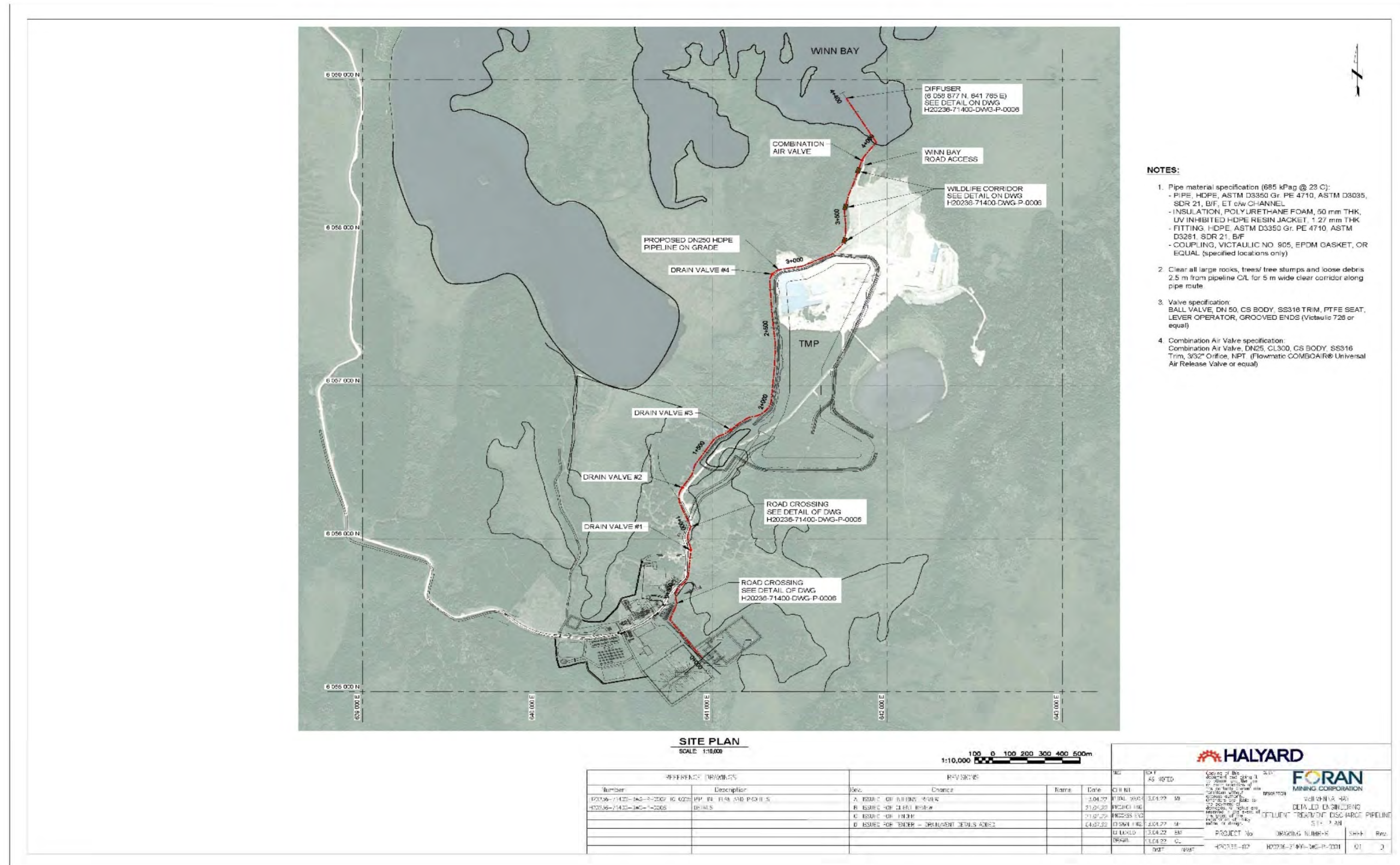


Figure 3-39 Proposed Routing for Treated Effluent Discharge Line

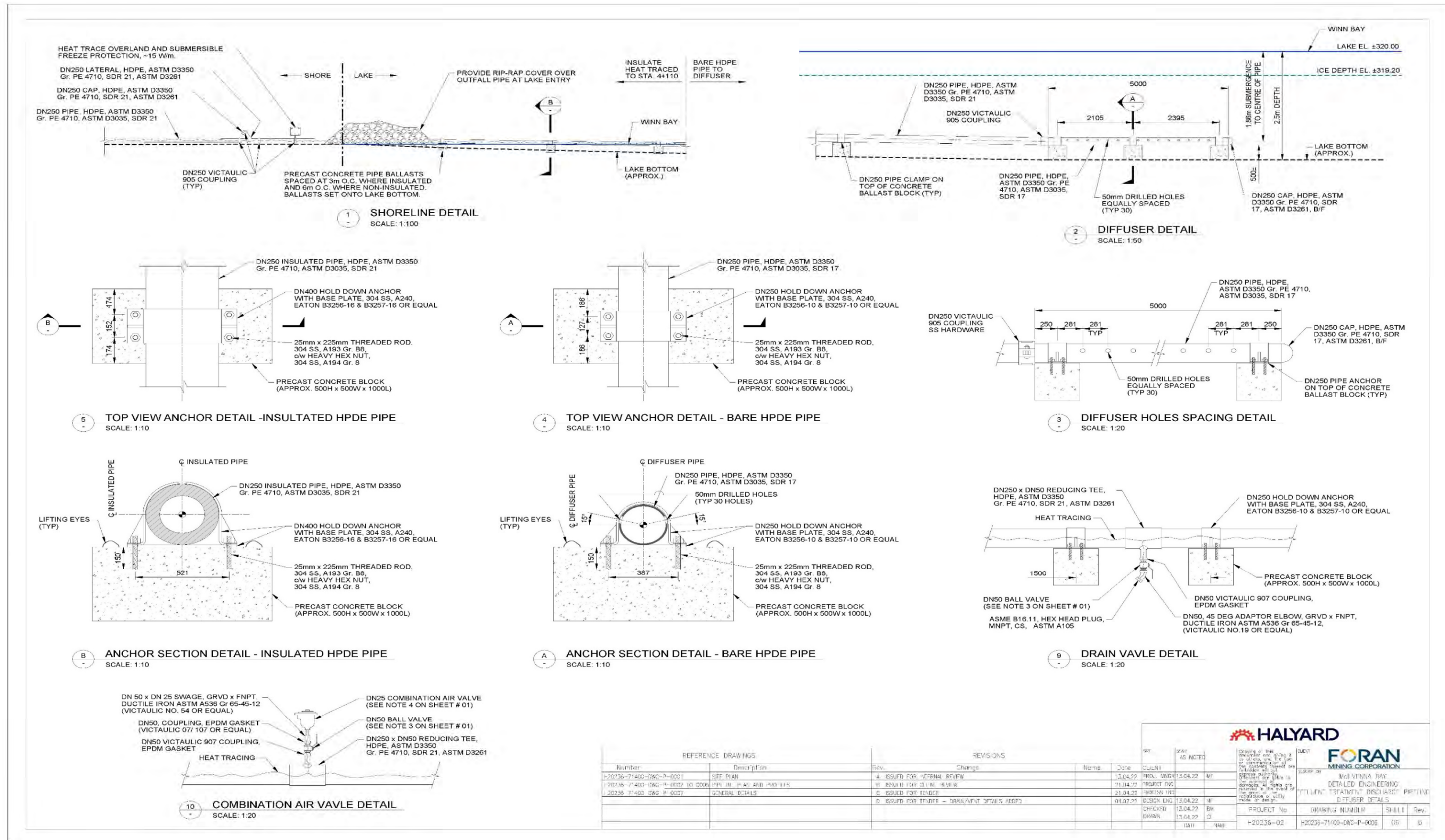
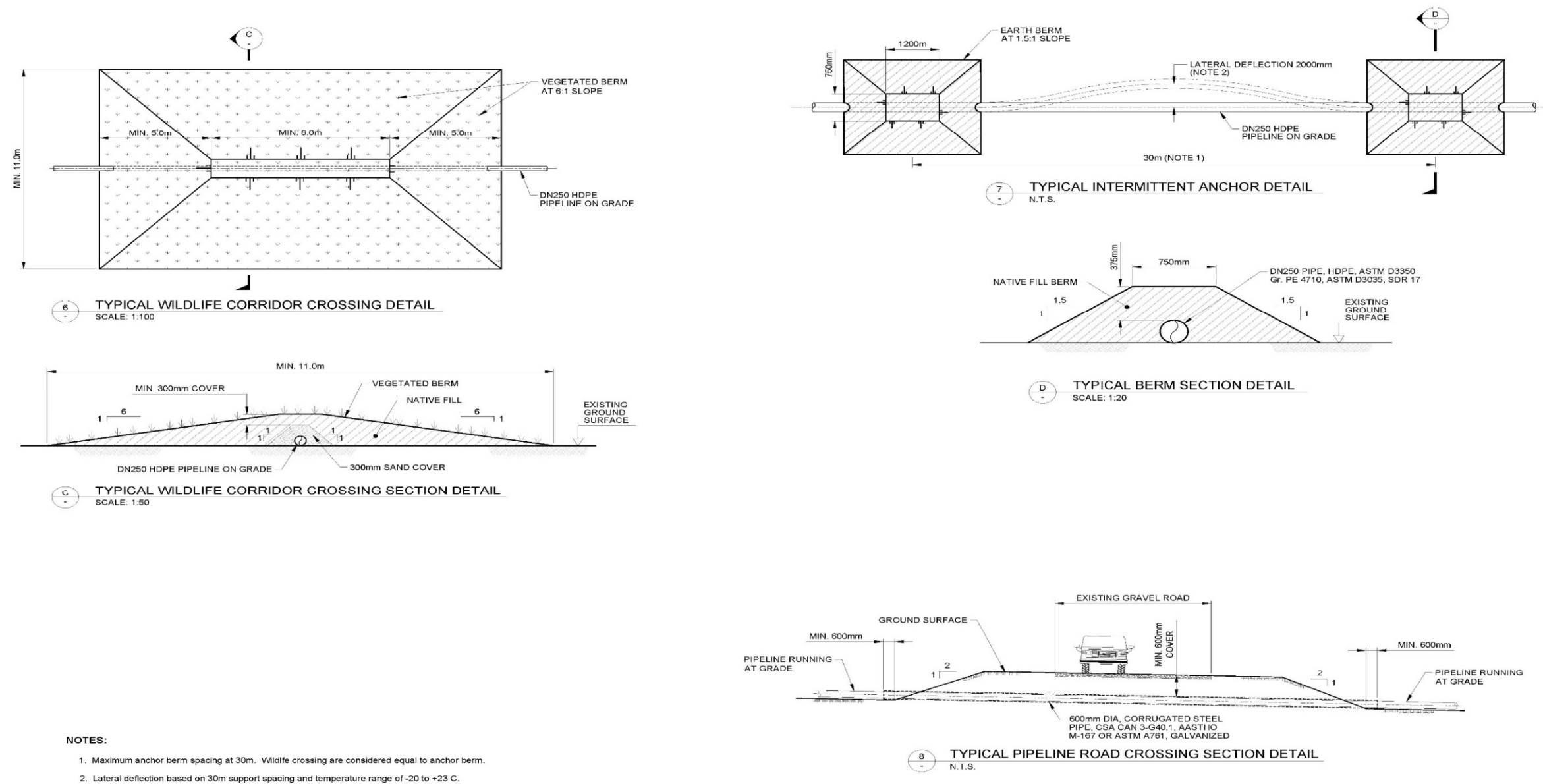


Figure 3-40 Proposed Diffuser Detail, Treated Effluent Discharge to Winn Bay of Hanson Lake



REFERENCE DRAWINGS		REVISIONS		SCALE	AS NOTED	DATE	BY	CHKD	APP'D
Number	Description	Rev	Change						
H20236-71430-DWG-P-0001	SITE PLAN	A	ISSUED FOR INTERNAL REVIEW	13.04.22	PROJ. ENG.	13.04.22	MI		
H20236-71430-DWG-P-0002 TO 0008	PIPELINE PLAN AND PROFILES	B	ISSUED FOR CLIENT REVIEW	21.07.22	PROJ. ENG.				
H20236-71430-DWG-P-0006	SUPPLIER DETAILS	C	ISSUED FOR TENDER	21.07.22	PROJ. ENG.				
		D	ISSUED FOR TENDER - DRAWING DETAILS ADDED	04.07.22	DESIGN ENG.	13.04.22	MI		
				13.04.22	CI CHECKED				
				13.04.22	CI DRAWN				

HAILYARD		FORAN MINING CORPORATION	
PROJECT No	H20236-02	DRAWING NUMBER	H20236-71430-DWG-P-0007
SHEET	07	DATE	

Figure 3-41 Proposed Crossing Details, Treated Effluent Discharge Pipeline

### 3.2.4 Waste Management Infrastructure

In addition to mine wastes including waste rock and tailings described in earlier sections, the Project proposes to generate, manage, and temporarily store non-hazardous and hazardous wastes on site.

Waste from site such as plastic, paper, cardboard, scraps, rubber, etc. is proposed to be collected and stored in the garbage disposal area. The waste is proposed to be picked up on a set schedule and sent away for disposal at a licensed disposal facility.

Hazardous materials are proposed to be segregated and temporarily stored within secondary containment onsite. Contractors are proposed to be responsible for managing any waste generated or hazardous materials utilized in the work. This is proposed to include requirements for vehicle driver training in the transportation and handling of hazardous goods, as well as in spill response training.

### 3.2.5 Surface Support Infrastructure

Support facilities are proposed on surface for the mine and mineral processing facility.

#### 3.2.5.1 Accommodations

A permanent camp is proposed to be constructed at the site to accommodate the operations workforce. Temporary camp facilities are also anticipated during the construction phase to accommodate the peak workforce. The permanent camp designed in the feasibility study would accommodate 350 people with associated canteen and recreation facilities. The size of the permanent camp will be reviewed through the detailed design effort. This facility would be operated year-round. The camp would require freshwater supply that is proposed to be supplied by an on-site groundwater well, treated to meet applicable requirements. Wastes that would be produced by the camp would include sewage as well as domestic non-hazardous wastes. Non-hazardous wastes would be stored in a locked and secured area for regular pick-up for disposal at a regional landfill. Sewage is proposed to be disposed on-site through an approved sewage works system, currently proposed as a septic system.

#### 3.2.5.2 Warehouse and Maintenance Shop and Wash Facility

A surface warehouse and maintenance shop is proposed in combination with a truck wash facility to provide warehouse storage, a shop area to work on heavy and light equipment, and a facility to manually wash trucks and other vehicles as required. The warehouse and maintenance shop is proposed to contain light and heavy-duty overhead cranes and allow building access through overhead doors as well as a BEV charging station. The warehouse is proposed to contain areas for lockable storage, a tool crib, electrical storage, and a separate lubrication storage facility.

The truck wash facility is proposed to be constructed to the south of the truck shop and be equipped with water hoses to manually wash trucks and other vehicles as required. The facility is designed with platforms to allow operators to reach the top of the trucks and is equipped with an oil/water separator to allow cleaning of the water prior to being pumped to the containment pond. Water for the truck wash is proposed to be provided as recycled treated water.

#### 3.2.5.3 Administration Complex and First Aid Station

A modular office complex is proposed to accommodate general management, administration staff, and technical staff. The administration complex is proposed to include office space, an underground operations control room, a conference room, washrooms, mechanical and information technology rooms,

and a mine rescue and safety office. Adjacent to the administration complex will be a modular first aid room.

The mine rescue area will be of suitable size to store mine rescue equipment and to provide a base for mine rescue operations. A Mutual Aid agreement is in place with SSR Mining and Hudbay Mining to support underground emergency response.

#### *3.2.5.4 Surface Laydown Areas*

Laydown areas are proposed throughout the site to allow for storage of equipment and materials. These laydown areas are anticipated to be used for temporary storage of equipment and materials corresponding to construction requirements. Examples of where laydown areas may exist include proximate to the ramp, proximate to the process plant, proximate to the production shaft, and proximate to the north end of the mine site.

#### *3.2.5.5 Soil Storage*

Topsoil removed during the site preparation process will be placed on a lined pad near the entrance to site, graded, and suitably covered to prevent contamination and erosion. The topsoil will be reclaimed during future progressive and final closure activities.

#### *3.2.5.6 Potable Water*

A potable water treatment system is proposed to be installed to treat water from a nearby groundwater well to be suitable for human consumption at a rate greater than 18 m<sup>3</sup>/day and as high as 75 m<sup>3</sup>/day to 100 m<sup>3</sup>/day. This system will provide drinking water to the on-site permanent camp and will be used to fill large plastic re-usable bottles that will be distributed to other locations within the site. Water will be supplied for non-consumptive use as hygienic water for washrooms and showers at other surface facilities.

#### *3.2.5.7 Sewage*

Domestic wastewater from the mine dry, the mill, and the office complex is proposed to be collected and directed to the sewage treatment plant. The proposed treatment system is a climate-controlled, fully enclosed building that would include oil separation, UV disinfection chamber, pump out chamber, and effluent pumps. The effluent is proposed to be discharged through an on-site septic bed located south of the proposed location of the permanent camp. Solid waste is proposed to be periodically trucked off site for disposal at municipal waste facility. Sewage treatment facilities may be modified over the mine life and will meet applicable permit requirements.

#### *3.2.5.8 Fire Protection*

Fire water storage is provided in the clean/ fire water tank located adjacent to the process plant. The tank has live capacity of 276 m<sup>3</sup> of which 60 m<sup>3</sup> is allocated as fresh makeup water. The remaining 216 m<sup>3</sup> is fire water reserve. A fire truck will be stationed at the main office complex should the need for mobile firefighting be necessary. Water connections will be installed in strategic locations within the facility.

#### *3.2.5.9 Fuel Storage and Distribution*

A fuel storage and distribution facility is proposed on the northeast section of the mine site. This facility will store the diesel and low sulphur diesel in tanks within containment and dispensing equipment. The secondary containment systems will hold 110% of the designed capacity of the storage facility.

#### 3.2.5.10 Power Supply

Power is proposed to be supplied to the Project site via two parallel overhead distribution lines: an existing 25 kV overhead line with approximately 1.2 MVA available capacity; and a new dedicated 34.5 kV dual overhead line running parallel to the 25 kV line that which will eventually replace the 25 kV line that will subsequently be decommissioned.

While construction occurs on the new transmission line, supplemental power will be supplied by an on-site liquified natural gas (LNG) power plant. The LNG power plant will be comprised of LNG power gensets and LNG will be stored at the site to supply the gensets. Diesel generators may also be installed to provide back-up power supply. Renewable and low carbon power options that could provide power to the site are also under consideration for the life of mine.

The new incoming overhead power line will supply a new substation located centrally onsite. Two power transformers will supply the underground and surface operations.

#### 3.2.6 Site Access

The Project is proposed to primarily be accessed by ground, with a security to the facility controlled by a gatehouse and a helipad maintained adjacent to the mine site entrance for emergencies that would benefit from medivac. This includes transport of staff and contractors, and various supplies and equipment to site, as well as transport of staff and contractors, wastes, and saleable copper and zinc concentrates off site.

The mine access road from Highway 106 to the mine site is 18 km in length and includes one single lane bridge (Figure 3-42). The initial 10 km of the road is administered and maintained by the Saskatchewan Department of Highways; the bridge is within this 10 km section.

The bridge was previously used for haul traffic during the sand quarry operation and has been in use during the ADEX Project. Saskatchewan Ministry of Highways and Infrastructure has confirmed the bridge was constructed in 2004 and received SEAL-750 (load rating exceeds provincial capacity requirements). Provincial safety inspections are schedule every 2 years per provincial regulation. The bridge is suitable for MBO use without restriction.

The remaining 8 km of this road is currently permitted to be accessed by MBO through a miscellaneous use permit. This section of the road will continue to be utilized through the Project and maintenance of the 8 km section of road is proposed to be completed by MBO throughout the Project.

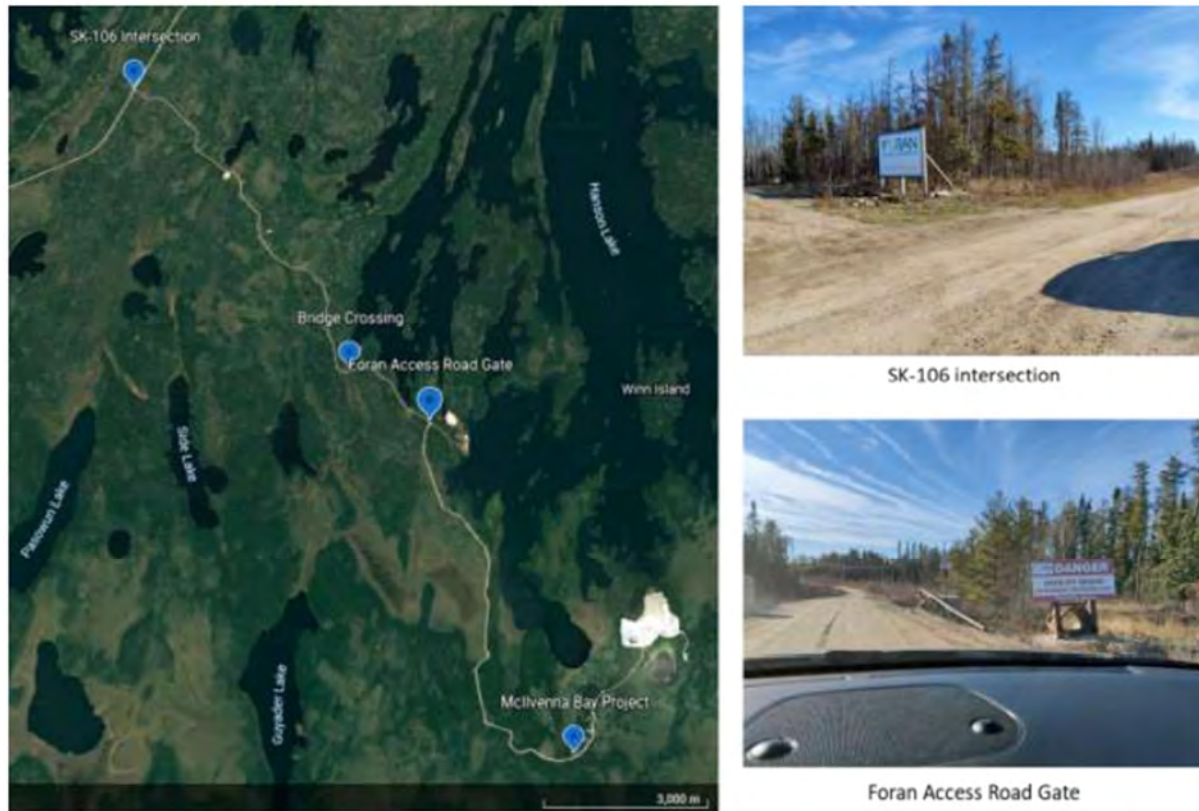


Figure 3-42 Site Access Road, 2022

A security gatehouse is proposed at the main entrance of the site. The security gatehouse is intended to be occupied 24 hours per day, seven days per week. The gatehouse is proposed to be modular in design and connected to the site power distribution network.

A truck weigh scale is also proposed outside the gatehouse. The truck weigh scale is intended to be used to provide accurate measurement of concentrate shipment weights. The weigh scale indicator and ticket printer are designed to be located in the gatehouse.

Beyond the gatehouse, onsite roads and parking areas will be upgraded or constructed to provide access to the shaft area, administration building, mill, laydowns, rock dump, and other ancillary infrastructure as required.

### 3.3 Activities

#### 3.3.1 General

The Project will involve pre-development including the ongoing ADEX Project as well as regulatory approvals and detailed engineering, construction, operation, and decommissioning phases. A high-level schedule is shown in Figure 3-43. The assessment includes a projected operational period that is slightly extended from that associated with the known mineral reserves. This additional operational period acknowledges that additional mineral resources could be identified that could be mined and processed utilizing the existing infrastructure, or that changes in mine commodity prices could extend the operational period.

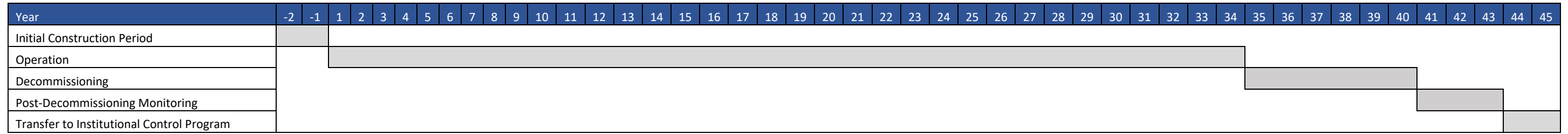


Figure 3-43 High Level Project Schedule

### 3.3.2 Site Preparation and Construction

Key site preparation activities are proposed to include:

- Civil upgrades to the existing access road and the tailing facility haul road;
- Clearing and grubbing of proposed disturbance areas including laydown areas;
- Site grading and terracing;
- Establishment of site water management facilities such as water collection ponds, pumping systems, diversion ditches, and drainage channels;
- Establishment of temporary contractor facilities, such as offices, laydown areas, and workshops;
- Establishment of waste and fuel and oil (hazardous substance and waste dangerous goods) storage facilities; and
- Fencing of critical areas in preparation for the construction phase.

During construction, the number of workers on site will peak, and traffic to/from site will temporarily be of greater volume than in normal operations. The volume of site activity will increase during construction and key construction activities are proposed to include:

- Establishment of a concrete batch plant;
- Movement of materials and equipment into laydown areas;
- Construction of multiple structures, such as offices, workshops, the camp, processing facilities, and substations;
- Construction of various civil works;
- Construction of Phase 1 of the TSF (earthworks, liner installation, and pumping systems);
- Installation and erection of process plant equipment;
- Delivery and storage of process plant first fills, including grinding media and reagents;
- Delivery of initial mobile mining equipment fleet and other auxiliary vehicles;
- Ventilation of the underground workings;
- Initial development of the underground workings;
- Expansion of surface ore and waste storage stockpiles;
- Transfer of ore and waste rock to surface;
- Storage of ore and waste rock on surface;
- Management of water including on-site collection, transfer, treatment and final discharge of treated effluent to Winn Bay of Hanson Lake;
- Transportation and housing of employees and contractors; and
- Management of non-hazardous waste and hazardous substances and waste dangerous goods.

### 3.3.3 Operation

Key activities that are proposed during site operations include:

- Ventilation of the underground mine;
- Ongoing development of the underground mine and transfer of waste rock to surface;
- Mining of ore and transfer of ore to surface;
- Storage of ore and waste rock on surface;
- Processing of mined ore in an on-site processing facility to produce ore concentrates;
- Shipment of ore concentrates along Highway 106 towards Flin Flon, Manitoba to a third party rail loading facility;

- Generation of de-sulphurized, thickened and filtered tailings and transfer of filtered tailings for paste backfill or to the on-site TSF;
- Management and progressive reclamation of the on-site TSF;
- Operation of a paste backfill plant and transfer of paste backfill for cementing in underground stopes within the underground mine;
- Management of water including on-site collection, transfer, treatment and final discharge of treated effluent to Winn Bay of Hanson Lake;
- Transportation and housing of employees and contractors;
- Management of non-hazardous waste and hazardous substances and waste dangerous goods; and
- Transportation of non-hazardous and hazardous waste for off-site disposal.

### 3.3.4 Decommissioning and Reclamation

MBO understands the importance of restoring the environment once the Project has been completed and has prepared this conceptual decommissioning plan (CDP) to support the EIA. Additional details will be provided in the preliminary decommissioning plan (PDP) which will incorporate input from stakeholders and rights-holders and be submitted to SKMOE as part of Project permitting. Ultimately the detailed decommissioning plan (DDP) will be developed and approved by SKMOE prior to initiating any decommissioning activities. MBO is required to provide a financial guarantee, as either a letter of credit or surety bond, to the Government of Saskatchewan that covers the present value of the estimated cost of decommissioning activities.

MBO will develop the CDP, PDP, and DDP to align with various guidelines, standards and regulations, including for example Mine Regulations 2018 (GS 2018) and SKMOE's Guidelines for Northern Mine Decommissioning and Reclamation (SKMOE 2008) throughout all decommissioning and reclamation activities.

MBO's overarching decommissioning objective for the Project is to establish a safe and stable landscape with unrestricted land use activities. In general, areas disturbed by operations will be reclaimed to an ecological (i.e., physical and biological) condition that will be similar to that which was observed in the area prior to disturbance. Each of the physical works on the project site will be decommissioned and reclaimed to a standard that will ensure their long-term stability (i.e., resistance to erosion, reestablishment of drainage, etc.).

Progressive decommissioning and reclamation will be conducted throughout operations as reasonably practical.

#### **Decommissioning**

The key decommissioning activities include:

- Removal of all salvageable material and infrastructure. This may include recyclables and other assets such as buildings, equipment, tanks, furniture, etc. Salvageable material will be taken off site for recycling or repurposed use.
- All shafts, raises, portals, and other openings will be capped and sealed. Larger openings such as shafts and raises will be sealed with an engineered reinforced concrete cap. Smaller openings such as wells will be sealed with bentonite or grout as appropriate.

- Any remaining material on the waste rock stockpile will be capped. Given that the pile will be constructed at a 4H:1V slope during operations, no significant re-grading or sloping of the pile would be expected for closure. The waste rock pile cap is planned to be a composite cover comprising GCL, low density polyethylene liner, sand and gravel protection layers, with riprap erosion channels, and organic surface soil. The cap will be designed and constructed to minimize water infiltration.
- The TSF will be progressively decommissioned during operations as the side slopes of the TSF will be lined with a GCL, covered with clean rockfill, and completed with a soil cover. As stages of the TSF are completed, the top of the TSF will be covered with an HDPE liner and surface soil. These covers will serve as the final closure cover for the TSF and will minimize potential environmental impacts such as dusting, and tailings contact runoff water from the pile.
- Ponds and other water management structures will be breached and graded into the surrounding landscapes. Synthetic materials such as liners will be removed and disposed of off site or underground.
- Pumps and pipelines will be removed and disposed of.
- All buildings will be demolished, with steel and other rubble being removed and disposed of off site. Concrete footings will be broken down to surface and buried. Concrete pads will be broken up and buried.
- Stationary surface equipment along with mobile equipment will be dismantled as required and removed off site for reuse or a licensed scrap yard.
- Fixed underground equipment will be drained of hazardous materials (oil and fuel) and will remain underground post closure.
- Potentially contaminated soils from around the site will be tested and hauled off site to appropriate disposal sites as required.
- General grading of the entire site will be carried out to restore natural drainage patterns.

During all decommissioning activities, MBO will maximize opportunities to recycle and reuse materials wherever possible. Furthermore, MBO intends to implement passive decommissioning and reclamation strategies at the site whenever possible. The intent of these strategies is to minimize, the use of engineered containment structures during closure as such structures will likely require long term care and maintenance after the post-closure custodial transfer of the property to the province.

During decommissioning the water management plan will evolve as decommissioning progresses. Figure 3-44 shows the water management plan during early, active decommissioning while Figure 3-45 outlines the water management plan towards the end of decommissioning.

Decommissioning is expected to take 5 to 8 years.

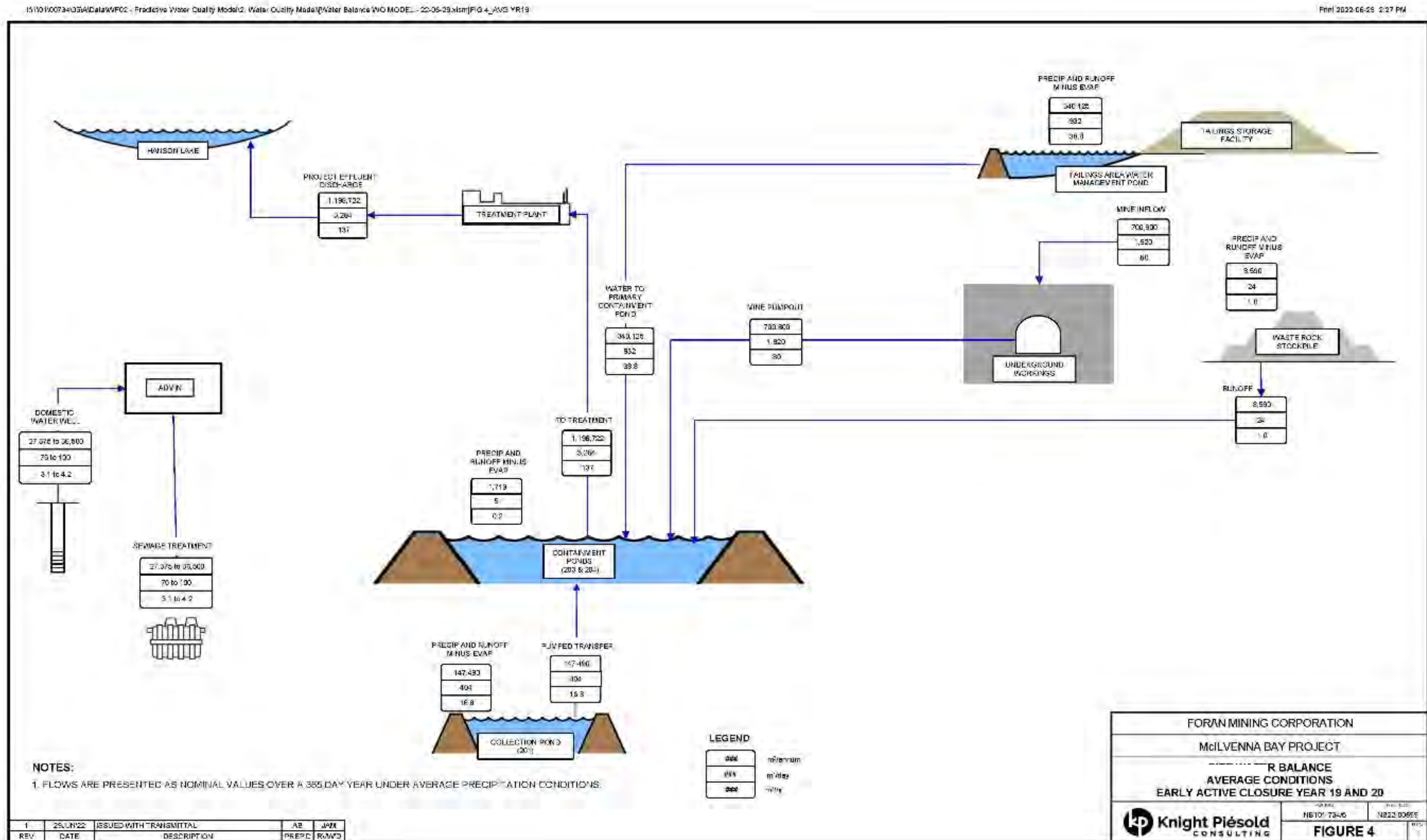


Figure 3-44 Site Water Balance – Early Active Closure

I:\110100734\05A\Data\WF02 - Predictive Water Quality Model\2 Water Quality Model\Water Balance WQ MODEL - 22-06-29.xlsm\FIG 5\_AVG YR24

Print 2022-06-29 1:43 PM

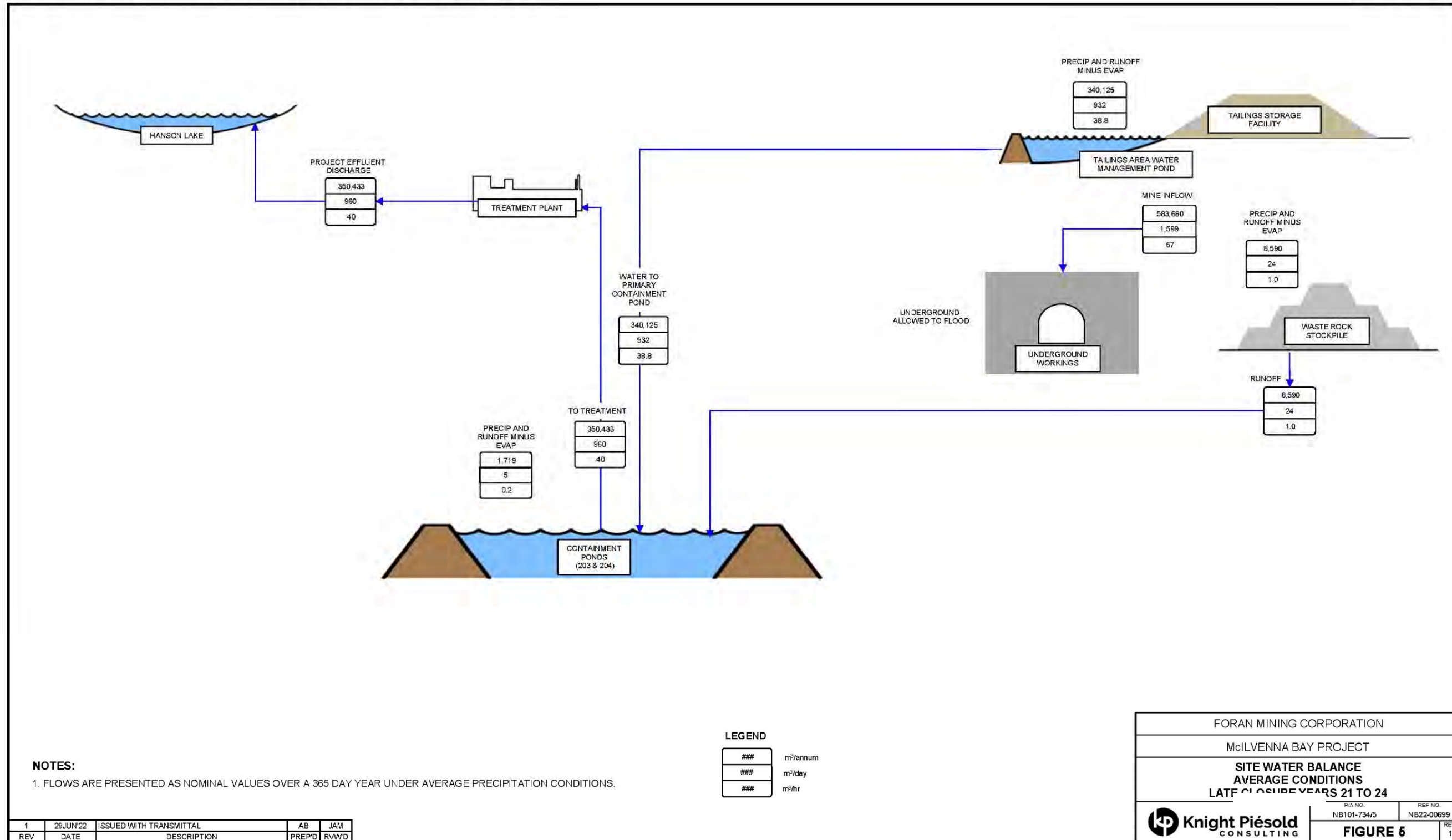


Figure 3-45 Site Water Balance – Late Closure

### **Tailings Storage Facility Closure**

The Project TSF has been designed using best industry practices, including the selection of desulphurization and filtration processes prior to storage, and plans for safe and reliable closure. Together, these are proposed to help to minimize the potential for the facility to serve as a source of contaminants at any point in its lifecycle.

The general closure strategy for the TSF includes:

- Compaction of tailings during placement with full time quality control included as part of operational monitoring. The compaction process is anticipated to result in over consolidation of the tailings and in so doing will minimize permeability of the pile.
- The tailings surface is proposed to be graded for efficient drainage during operations, and again prior to final closure to promote runoff.
- Rockfill is proposed to be placed on the outer slopes during operations in order to minimize slope erosion. Riprap lined channels are proposed to be incorporated into the final grading to control erosion in the cover layer.
- A geosynthetic liner is proposed to be placed over the final tailings surface to control infiltration into the tailings over the long-term. The TSF closure cover liner has been selected based on the INAP Global Cover System Design – Technical Guidance Document. The liner has been selected to control net percolation through the tailings stack and can generally be expected to reduce percolation below 5% of the unlined value.
- A cover layer of clayey organic soils is proposed to be placed over the geosynthetic liner and seeded for re-vegetation. The liner is proposed to minimize the potential for contaminant intake into the cover species.
- Shallow side slopes (4H:1V max) and relatively low height (20 m max) will assist in reducing the potential for stability concerns over the long-term.
- Exposed geomembrane liners, pumps, pipeline, sheds, etc. are proposed to be removed, recycled, and or disposed in a permitted landfill once post closure monitoring period has been completed and water collection is no-longer required.

### **Reclamation**

Surface soils stripped during construction activities will be utilized to cap disturbed areas following decommissioning activities. Revegetation will take place including tree planting in all areas with exception of the waste rock pile and tailings areas, which will be vegetated with grasses on account of their geomembrane caps.

Decommissioning and reclamation activities are expected to be completed after approximately 5 to 8 years.

#### **3.4 Post-Decommissioning**

Monitoring and inspections will be completed during the post-decommissioning period to ensure the decommissioning and reclamation has been successfully completed. Once the site is safe and stable, as determined through monitoring and inspections, the property will transfer to the Province of Saskatchewan's Institutional Control Program (ICP). The post-decommissioning period is expected to be 5 years. It is anticipated that after decommissioning, reclamation, and post-decommissioning monitoring

are completed, the Project will be in a state that will allow for unrestricted access and for a land use similar to that which existed before the development of the site.

### 3.5 Inputs and Outputs

#### 3.5.1 Products

The Project proposes to produce base metal concentrates including:

- A copper concentrate, with nominal copper content of 20-30% and precious metal content of 160 ppm silver and 8 ppm gold.
- A zinc concentrate, with nominal zinc content of 45-50% and precious metal content of 40 ppm silver and 1.5 ppm gold.

#### 3.5.2 Resource Use

The Project will use energy in the form of propane, diesel, gasoline, LNG, and electricity. Renewable diesel and LNG are under consideration as supply options to replace diesel and LNG that could be implemented over the life of mine as these alternative fuels become more readily accessible. The Project will also require water for operations and for washrooms and shower facilities in on-site buildings and an on-site camp. Drinking water is needed for on-site employees and contractors.

Water for operations is intended to be supplied primarily by recycled water generated within the operation. Fresh water is proposed to be supplied by a groundwater supply well. Water suitable for human consumption (drinking, cooking and food preparation; definition as set out in the *Waterworks and Sewage Works Regulations*) is proposed to be provided in the on-site permanent camp and throughout the facility in large plastic re-usable containers. Hygienic water (suitable for bathing and personal hygiene) is proposed to be provided in other surface facilities..

#### 3.5.3 By-Products, Reagents and Emissions

The Project will generate silver and gold as by-products in the copper and zinc concentrates (Section 3.5.1). The Project will utilize reagents in the mineral processing facility, the effluent treatment plant, and the water and sewage treatment plants. Reagents associated with the chemical processing facilities on site could include: frothers (MIBC and Polyfroth H57), promoters (Cytec Aero 5100, Cytec Aero 3894), collectors (Cytec Aero 3894, Cytec Aero 3501, Potassium Amyl Xanthate), activators (copper sulphate), depressors (sodium metabisulfite, PE26), flocculant (Magnafloc 10), ferric sulphate, carbamate, sodium hydroxide, and potassium hydroxide. A binding agent (slag cement) will be added to the paste backfill. The Project will generate domestic and hazardous wastes that will be shipped off site to approved facilities.

The Project will generate emissions to air from on-site vehicles, mine exhaust points, surface development and on-site ore, waste rock and tailings surface storage facilities.

The Project is intending to achieve net zero direct (Scope 1) and acquired energy (Scope 2) greenhouse gas emissions. This goal is intended to be achieved through a multi-faceted approach that includes: design features to reduce the energy use of the operation and electrify energy use where practical; securing a stable supply of clean electricity and investigating on-site renewable electricity supply; investigating and utilizing alternative fuels including renewable LNG and renewable diesel, as appropriate; implementing or

purchasing carbon offsets; and investigating, implementing or purchasing carbon sequestration and storage options.

Direct GHG emissions are estimated to be generated by the Project through the use of fuel and explosives for stationary combustion (heating and power generation) and on-site transportation as well as leakage from a temporary LNG power supply facility. The temporary LNG facility is the largest potential direct GHG emission source for the facility during the life of mine with annual emissions estimated between 38 kt and 64 kt carbon dioxide equivalent (CO<sub>2</sub>e) while this facility is operational with standard LNG fuel supply. Other material direct GHG emission sources are anticipated to include stationary fuel combustion of propane for mine air heating (3 to 4 kt CO<sub>2</sub>e/year) and diesel use associated with on-site transportation (1 to 4 kt CO<sub>2</sub>e/year). A mine air heat recovery system as well as ventilation on demand are planned to reduce propane consumption for mine air heating and battery electric vehicles (BEVs) are planned to reduce diesel consumption. Other on-site energy reduction initiatives are under investigation.

#### 3.5.4 Sensory Outputs

The Project expects to generate localized vibration and noise outputs within the underground mine and on surface. The enclosure of equipment underground and in buildings on surface are proposed to mitigate these outputs. The project does not expect to generate olfactory outputs.

#### 3.5.5 Employment Opportunities

The Mcllvenna Bay Project would provide employment, including contracting, opportunities through the construction, operation, and decommissioning phases. Employment opportunities estimated during the operating period are summarized in Table 3-4. During the construction phase, up to 800 employees and contractors could work at the site during the peak period. During the operations phase, approximately 300 to 480 employees are anticipated while the site is at full production. As shown in Table 3-4, most of the jobs during operation will be employee status jobs, with only about 5% of the workforce expected to be comprised of contract positions.

Table 3-4 Estimated Employment Numbers by Labour Category and Rotation

Description	Rotation	# of Workers	Approximate % of Workforce
Employee Labour Count	4 on / 3 off - 10hr Shift	38 -63	15%
Employee Labour Count	14 on / 14 off - 12hr Shift	234 – 392	80%
Contractor Labour Count	14 on / 14 off - 12hr Shift	14- 34	5%

Note: Estimate does not include indirect employment from mine.

Figure 3-46 illustrates the estimated increase in employment that would occur through the construction phase. The figure shows that contracting opportunities will dominate in the early phase of construction, with a transition to mine operation jobs as operations ramp up to full production. During construction, off-site accommodation may be utilized during peak employment periods.

Figure 3-47 provides a breakdown of the workforce anticipated during full production. Most of the jobs will be associated with the active mine operation shifts (mine operators, mine maintenance workers, and surface maintenance and operating workers), with additional support provided by administration and technical services. The expected minimum education requirements vary according to position but would range from completion of trade school/high school to college/university degree. Appropriate experience could also satisfy the requirements for certain roles.

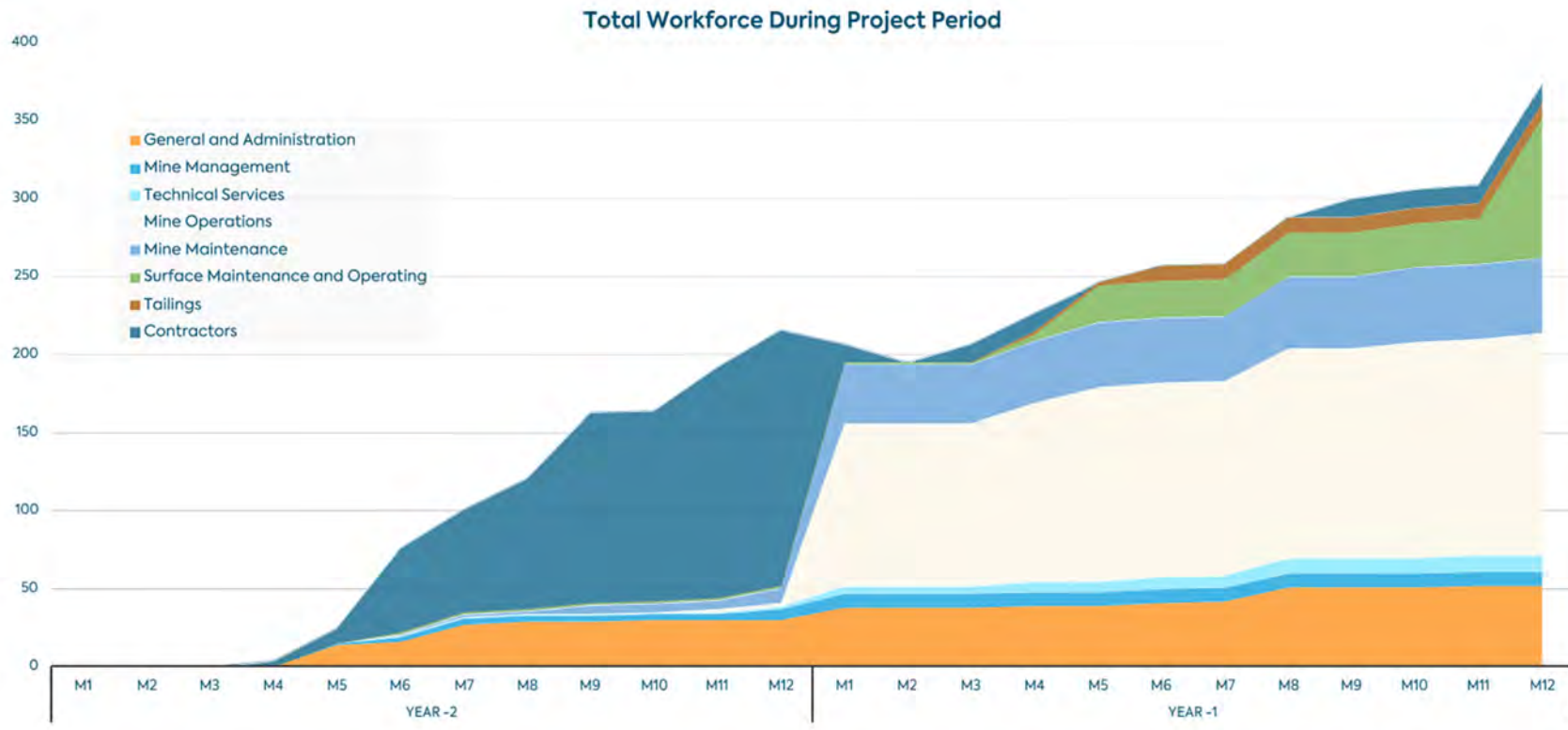


Figure 3-46 Estimated Workforce During Construction

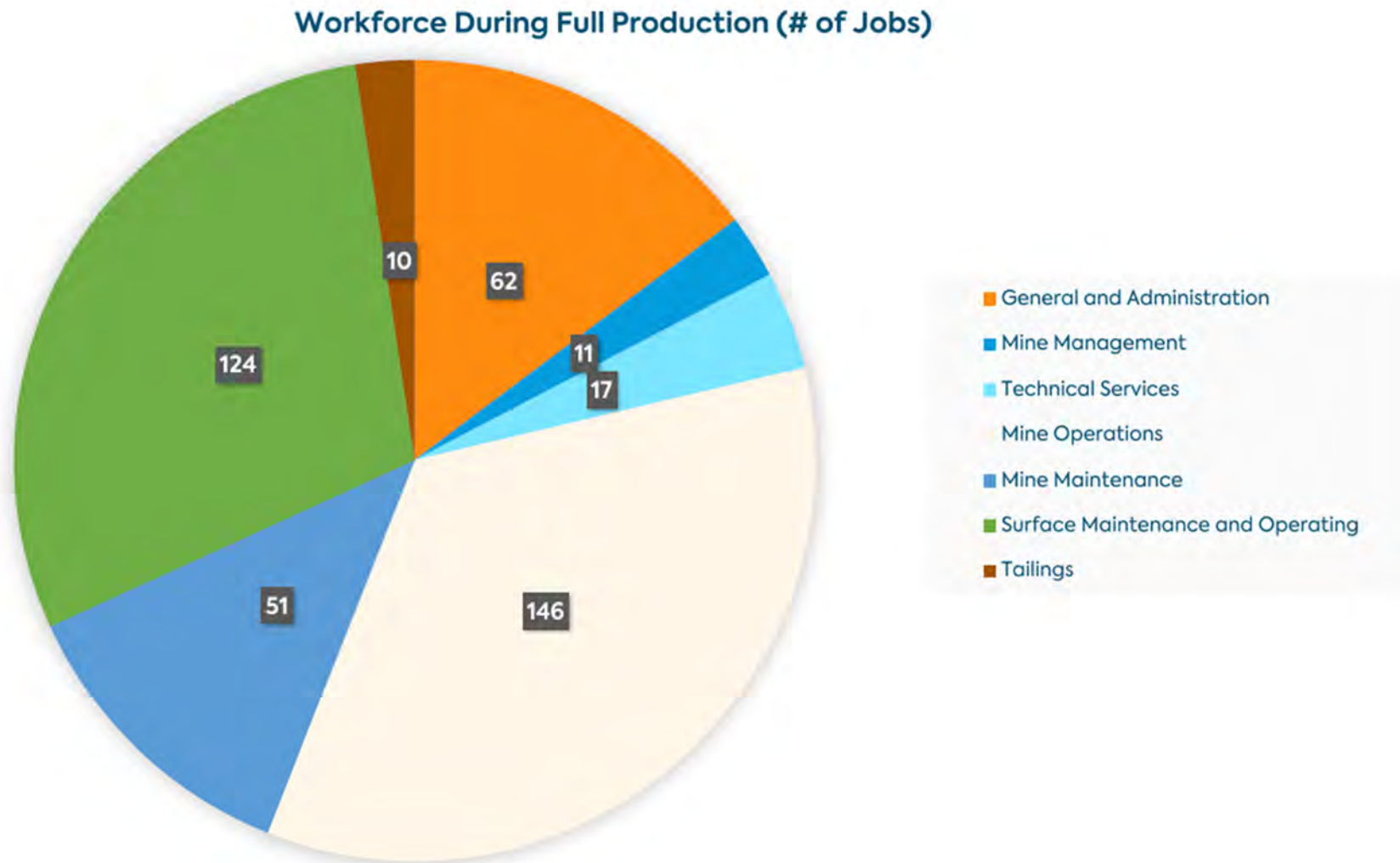


Figure 3-47 Estimated MBO Employed Positions During Full Production

### 3.5.6 Traffic

A traffic estimate was completed for the Project, considering traffic generated by the following activities: mining, processing, construction, LNG transportation, couriers, waste, and personnel. The estimate assumed that most personnel will be bused to site, according to the shift changeover schedule. The estimated number of vehicles per year on Highway 106 related to the Project construction and operation is provided in Table 3-5 and includes both travel to and from the site.

For context, the annual traffic count for Highway 106 is provided, which indicates that there would be a projected increase between 2-7% in annual traffic on Highway 106 associated with the Project. Figure 3-48 summarizes the traffic breakdown by activity associated with the Project. The transport of copper and zinc concentrate is expected to comprise most of the traffic generated for the Project.

MBO intends to complete a transportation impact assessment in accordance with the Saskatchewan Ministry of Highways’ Transportation Impact Assessment Guidelines. This assessment will validate the traffic estimate provided in Table 3-5 and will be presented in the EIS.

Table 3-5 Traffic Estimate for the Project

Vehicle Type	Estimated # per year	Highway 106 Annual Traffic Count	Approximate % Annual Increase
Heavy Haul Truck	2,000 – 9,320	164,250	1-5%
Truck	225 – 1,830		1%
Car/Personal Vehicle	150 – 1,000		<1%
Total	3,745 – 11,500		2-7%

Note: Highway 106 Traffic Count based on 2019 average annual daily traffic for Highway 106 from Highway 911 to Creighton, converted to annual basis.

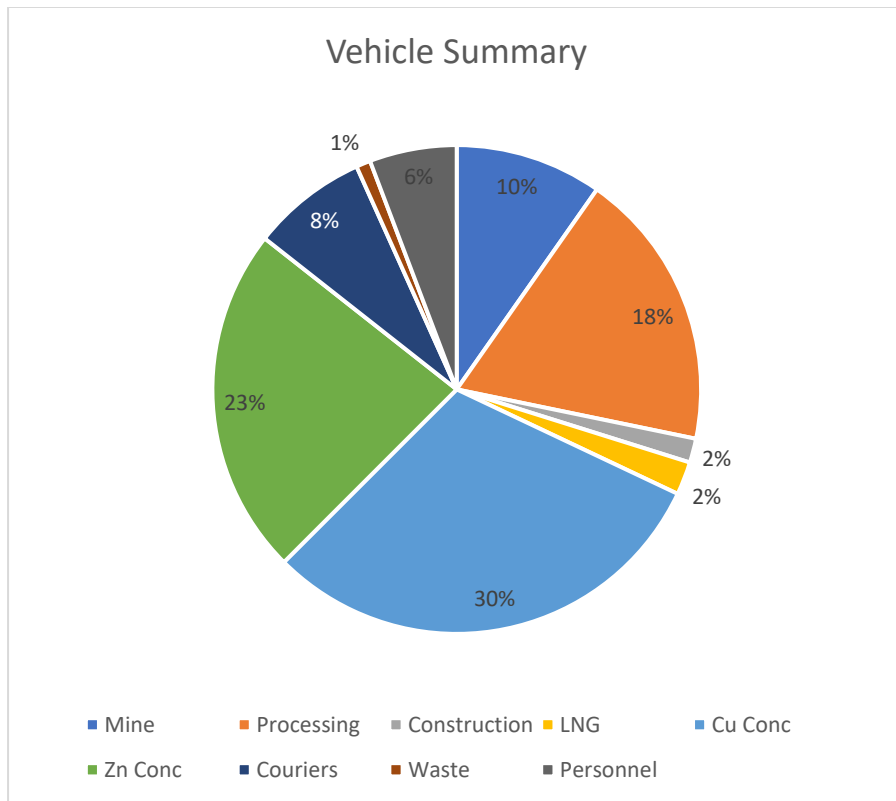


Figure 3-48 Summary of Vehicles by Activity

An overview of potential ore concentrate shipment routing options through Creighton/Flin Flon is provided in Figure 3-49. A final ore concentrate routing through Creighton/ Flin Flon has not been selected for the Project and several alternatives remain under consideration. MBO will make a commitment in the EIS to completing and submitting to ENV a detailed assessment of the final ore concentrate routing once it is selected. Alternatives under consideration will be discussed and compared at a screening level.

Figure 3-50 provides the possible transportation routes for the shipment of bulk goods and freight to the site.

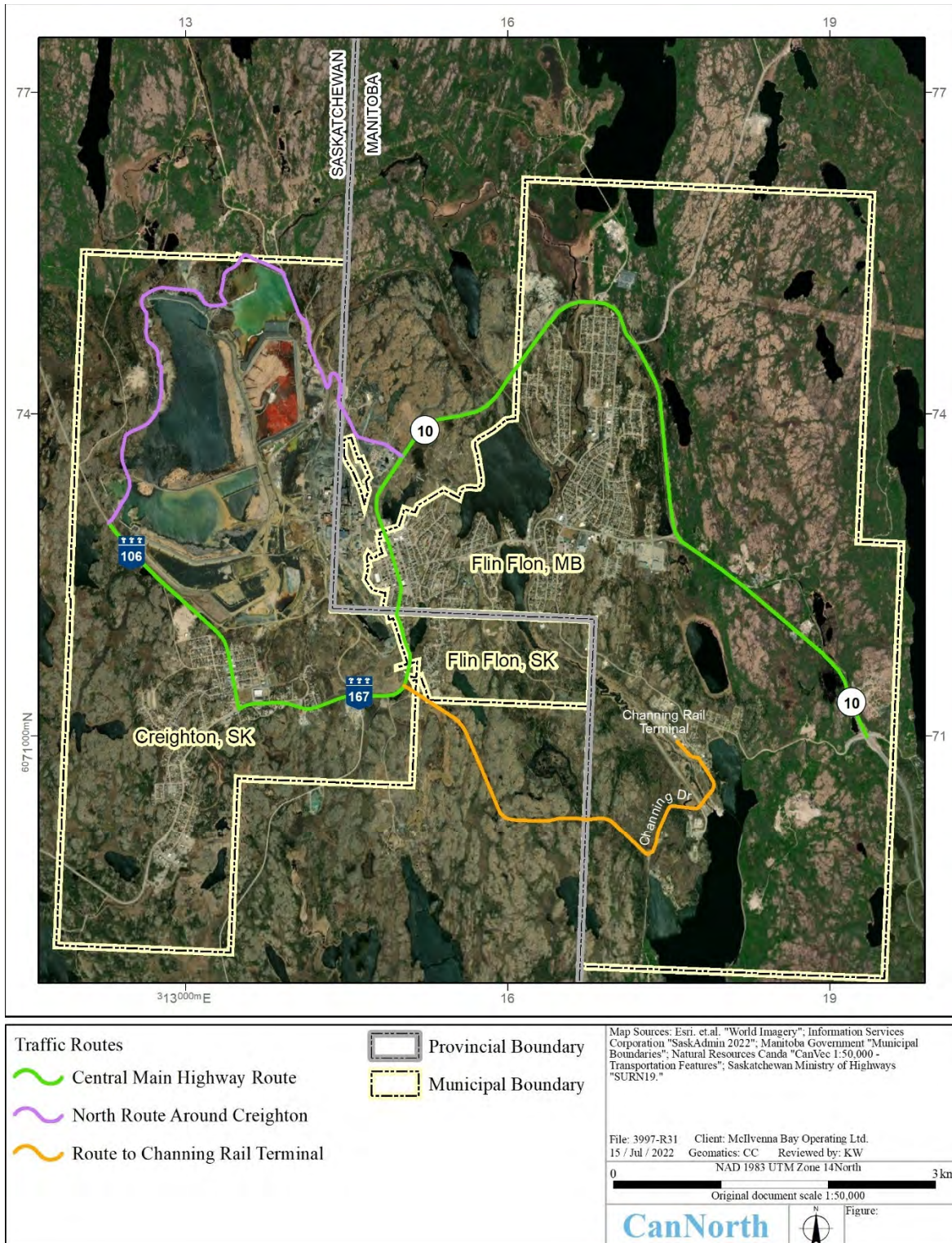


Figure 3-49 Alternative Routings for Ore Concentrate Shipments through Creighton/Flin Flon

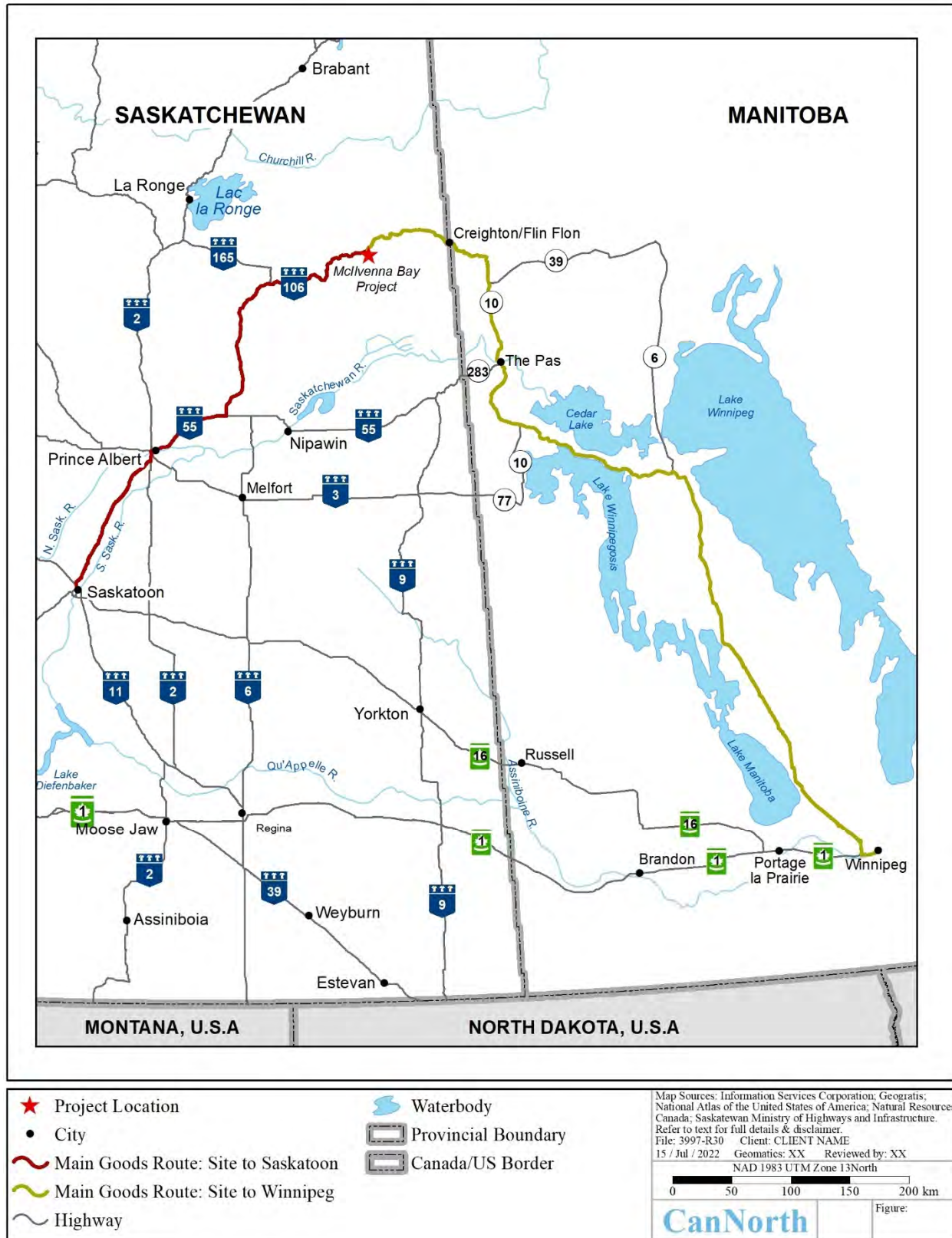


Figure 3-50 Possible Transportation Routes for Shipment of Goods and Freight to the Site

### 3.6 Alternative Means of Carrying out the Development

The development aspects of the Project have been studied since 2012, which culminated in the 2014-15 Preliminary Economic Assessment (PEA) Study (JDS 2015), a Pre-feasibility study (PFS) Study for the Project in 2020 (AGP 2020), and a Feasibility Study in 2022 (Stantec 2022). During this work, several trade-off studies have been completed, including the alternatives described below.

#### **Processing Location**

An alternatives analysis was conducted on option for onsite processing versus offsite processing.

The trucking of mineralized ore to existing processing facilities in Flin Flon was studied in detail, but ultimately was dismissed due to the risks associated with handling and storage of the resultant tailings stream on an older storage facility located within view of the town of Creighton. Although the capital cost of the on-site processing option is significantly higher, the ability to safely store tailings at the Project was a critical determinant. For the selected option, roughly 50% of the tailings can be stored in the mined-out stopes underground as paste backfill and the remaining 50% can be stored safely on surface as dry stack tailings.

#### **Mining Method**

The Mcllvenna Bay mineral deposit does extend to relatively shallow depth and consideration was given to open pit mining methods, which provides an overall lower cost than underground mining methods.

However, the greater surface disturbance footprint from an open pit compared to an underground mine was considered a significant negative environmental aspect. Additionally, the very large volumes of rock to be pre-stripped and stockpiled prior to open access to economic material was considered a significant negative financial aspect.

Ultimately, the less invasive (but more capital intensive) underground mining option was selected based on Foran's Net Positive strategy. The assessment of the Project using underground mining methods versus open pit, has resulted in avoidance of a fairly large area of potential new land disturbance.

#### **Treated Effluent Discharge Location**

In addition to Hanson Lake, aquatic baseline studies were conducted on Guyader Lake and an adjacent wetland within the Hobbs Lake drainages to provide options for treated effluent discharge sites for the Project. Ultimately, the treated effluent discharge location was selected as Winn Bay of Hanson Lake. This decision was made based on proximity to the proposed Project, predicted volume of effluent discharge associated with the Project, and characteristics of Winn Bay.

Briefly, Guyader Lake was eliminated as a potential option for treated effluent discharge based on distance from the proposed infrastructure. The wetland system associated with the Hobbs Lake drainage was eliminated as a potential option based on the predicted volume of effluent discharge and the assimilative capacity of the system. Mcllvenna Bay was considered as a potential option for treated effluent discharge but ultimately Winn Bay of Hanson Lake was chosen as the preferred location because of the depth of the bay.

## **Tailings Management**

A tailings management study was completed by Golder Associates Ltd. (Golder) in 2013 that identified and evaluated 12 potential sites within a 10 km radius of Mcllvenna Bay that would be suitable to store the estimated volume of tailings from Mcllvenna Bay. This study (Golder 2013) resulted in the identification of Guyader Lake as the preferred option for tailings disposal, and JDS (2015) included this option.

However, use of Guyader Lake for tailings disposal would have resulted in the loss of aquatic habitat provided by Guyader Lake and did not align with Foran's Net Positive strategy. Another alternative was to construct an aboveground tailings management facility that would have contained tailings slurry with a water content of 40-50% by mass. In recent years, some structural failures to these structures have led to catastrophic events with loss of life and significant environmental damage. Thus, for the Project, Foran's Net Positive strategy directed the company to pursue a more expensive, but significantly lower risk option which involves production of two tailings product within the processing circuit: a low sulphur, non-acid generating tailings slurry that would be thickened and filtered and stacked on surface on a TSF and a higher sulphur tailings paste that would be mixed with cement and used for backfill underground.

## **Transportation of Ore Concentrate**

The Mcllvenna Bay Project will produce copper and zinc concentrates that will be saleable and will be transported from the site by truck to a third party rail loading facility for distribution to next stage smelting. Several third party rail loading facilities could be utilized and remain under consideration including a private rail loading facility located in Flin Flon, a third party rail loading facility that would be constructed at Channing, Manitoba, and a third party rail loading facility at The Pas, Manitoba.

The transportation route for ore concentrate through the community of Creighton/ Flin Flon has not been finalized and two options remain under consideration, one of which bypasses downtown Creighton, will be discussed and compared at a screening level in the EIS.

For the Saskatchewan EIA process, an assessment of the potential impacts associated with truck transport of ore concentrate on the Hanson Lake Haul Road and Highway 106 will be completed as this is common to all alternatives that remain under consideration. MBO will make a commitment in the EIS to completing and submitting to ENV a detailed assessment of the final ore concentrate routing through the community of Creighton, SK if the final routing is confirmed to go through downtown Creighton.

The rail loading facility is ancillary to the Project.

## **4 Stakeholder Engagement**

### **4.1 Stakeholder Engagement Plan**

MBO's stakeholder engagement strategy will focus on communities, groups, and individuals with the potential to have an interest in the Project, but who are not considered rights-holders. The stakeholder engagement strategy is summarized below in terms of stakeholder groups identified for engagement, engagement objectives, potential feedback collection tools and methods, and records management and reporting strategies.

#### 4.1.1 Stakeholder Identification

Stakeholders are communities, groups, or individuals with potential to have an interest or experience impacts in relation to proposed Project activities. Potential stakeholders have been identified based on proximity to the Project area using satellite imagery and other publicly available maps, and are categorized below by stakeholder type including municipality, land users, and special interest groups.

- Municipalities
  - Town of Creighton, Saskatchewan
  - City of Flin Flon, Manitoba
  - Northern Saskatchewan Administration District (NSAD)
  - Northern Municipal Services - Northern Engagement Inquiry
  - Sturgeon-Weir Resort Subdivision
  - Jan Lake Resort Subdivision
  - Tyrrell Lake Resort Subdivision
  - Northern Village of Cumberland House
  - Northern Village of Denare Beach
  - Northern Village of Pelican Narrows
  - Northern Village of Sandy Bay
- Land Users
  - Ministry of Tourism, Parks, Culture and Sport – Hanson Lake Recreation Site
  - Ministry of Environment - Sturgeon-Weir River Representative Area Ecological Reserve
  - Camp owner on Hobbs Lake
  - Ministry of Environment Conservation Officer
  - N-31 Fur Block (potential to be considered rights-holders as well)
  - Wild Rice Harvesters (potential to be considered rights-holders as well)
  - Outfitters and resort owners on Highway 106 and on Amisk Lake
- Special Interest Groups (service providers, businesses, environmental non-government organizations, education and training providers, etc.)
  - Kitsaki Management
  - Northlands College
  - Saskatchewan Indigenous Institute of Technology
  - University College of the North
  - Northern Manitoba Sector Council
  - NORMAN Health Region
  - Saskatchewan Health Authority Office
  - Prince Albert Model Forest (PAMF)
  - Northern Saskatchewan Environmental Quality Committee (NSEQC)
  - Peter Ballantyne Group of Companies (PBGOC)
  - T&D Amisk Camp
  - Bayside Resort
  - Bloomfield's Resort
  - Camp Grizzly
  - Deschambault Lake Resort
  - Northern Lights Lodge

- Hanson Lake Cabins
- Bayview Lodge
- F.A.T.S. Camp
- Great North Lodge
- Jan Lake Campground
- Jan Lake Lodge
- Miniquay Lodge
- Newmart Resort
- Silence of the North
- Slim’s Cabins
- Three Lake Camp
- Twin Bay Resort

As engagement progresses and detailed project information is shared, some stakeholder groups may determine that they do not require further engagement or may recommend reaching out to additional groups or individuals who may have an interest in the Project. As such, the stakeholder list is likely to change over the course of the engagement program.

#### 4.1.2 Stakeholder Engagement Objectives

The information shared, feedback collected, and activities selected to facilitate engagement with stakeholders must run concurrently with those identified for rights-holder engagement (described in Section 5) and must link back to an overarching objective. The objectives recommended for this program were selected to align with the phases of an EIA. Each objective is described in Table 4-1 below in terms of the information that will be shared, the goals, and intended outputs of engagement.

Table 4-1 Stakeholder Engagement Objectives

Objective	Information Shared, Goals, and Outputs
Introduce Project	<p><b>Information shared:</b> Preliminary project design information (e.g. location, mine and mineral processing facility design, employment opportunities, Project timelines) baseline data collected, anticipated regulatory process, assessment approach and preliminary list of valued components (VCs) .</p> <p><b>Goals:</b> share information with each community, hear concerns, address questions, discuss communication preferences identify stakeholder level of interest in the Project, obtain feedback on preliminary VCs.</p> <p><b>Output:</b> Update engagement strategy with details of level of engagement expected and communication protocol. Documented concerns and shared responses and commitments back to stakeholders.</p>
Review Potential Effects and Refine Mitigation Measures	<p><b>Information shared:</b> Potential effects identified, assessment results, and proposed mitigation measures.</p> <p><b>Goals:</b> Collect community-specific information related to potential environmental and socio-economic impacts. Engagement activities will aim to identify, confirm, and/or refine potential effects, and linkages between effects; and identify possible mitigation measures for consideration.</p> <p><b>Outcome:</b> Potential effects, assessment results, and proposed mitigation measures are validated by key stakeholders. Additional mitigation measures may be identified.</p>
Share Environmental Impact Assessment Results and Next Steps	<p><b>Information shared:</b> Summary of environmental impact assessment results after all comments have been received and addressed [at or prior to public review stage] and next steps.</p> <p><b>Goals:</b> Provide information to facilitate public review process.</p> <p><b>Outcomes:</b> Summary of feedback received during community engagement sessions.</p>

#### 4.1.3 Stakeholder Engagement and Feedback Collection Tools and Methods

Stakeholder engagement activities and feedback collection tools have been selected for each stakeholder group to guide collection of feedback required to meet each of the engagement objectives. The engagement activities and feedback collection tools identified for each stakeholder group to provide input on each objective or group of objectives are summarized in Table 4-2.

Table 4-2 Stakeholder Engagement Activities and Feedback Collection Tools

Engagement Activity	Target Stakeholder Groups	Objectives	Feedback Collection Tools
Information Packages with invitation to meet	Municipal Leaders, Land Users, and Special Interest Groups	Introduce Project	Email, phone, or letter
Small Group Meetings	Municipal Leaders, Land Users, Key Special Interest Groups	Introduce Project, identify and evaluate effects, refine mitigations, close the loop on effects assessment	Meeting minutes, maps, or email
Community Meetings (open house style) and Information Packages	Municipal Leaders and Residents, Land Users, and Special Interest Groups	Introduce Project, identify and evaluate effects, refine mitigations, close the loop on effects assessment	Feedback forms, sticky notes, mapping, and facilitator notes

#### 4.1.4 Stakeholder Records Management and Reporting

Meeting minutes, feedback forms, comments, and other feedback mechanism will be prepared, validated by participants where possible, and saved as Records of Contact (ROCs).

Each ROC will be entered into the stakeholder tracking program for timely response, where possible, and coded by topic area so that reports can be populated by discipline, topic, and community for review and consideration in development of the EIS.

The Stakeholder Engagement EIS section will include:

- A complete communication log including dates, places, participants, nature of communication, key topics addressed, and outcomes.
- Concerns raised at each event, MBO’s response (if applicable), and the measures proposed to address the concerns.
- Indication of how information about the development was effectively communicated to stakeholders.
- Indication of how local knowledge was collected and used to identify effects and develop mitigation measures throughout the EIA.
- List of groups and individuals who would like to be notified directly for the formal 30-day EIS public review period.
- Plans for future engagement activities for the life of the Project.

#### 4.2 Stakeholder Engagement Activities Completed to Date

Foran has been actively engaging with nearby communities since 2011; however, engagement efforts to date have focused primarily on rights-holder interests and concerns. Engagement with stakeholders was initiated in 2022.

To date, MBO has introduced the Project to all stakeholders listed in Section 4.1.1 and have hosted tours of the advanced exploration project for multiple stakeholders.

Stakeholders have expressed interest in employment and business opportunities and understanding how workers would commute to the work site and in understanding MBO's connection to the former silica sand mine proximate to the proposed Project and the former Western Nuclear lead mine proximate to the proposed Project.

Stakeholders have shared concerns related to conservation of woodland caribou, water quality and the preservation of clean water, air quality impacts associated with dust from the proposed tailings storage facility, management of sewage and domestic waste from the proposed Project, traffic on Highway 106 at the intersection from the access road to Highway 106, and at the intersection of Highway 106 and Highway 167. MBO will continue to engage with stakeholders.

## 5 Rights-Holder Engagement

The Duty to Consult is triggered when Crown decisions have the potential to adversely impact the ability to exercise Aboriginal or Treaty rights and traditional land uses.

The Mcllvenna Bay Project area and proposed surface lease area includes lands available for the exercise of Treaty and Aboriginal rights and traditional uses, and community leaders have asserted that their members are known to, or are likely to, use the Mcllvenna Bay Project and proposed surface lease area for traditional purposes. The Duty to Consult has been triggered by the Government of Saskatchewan for the Project.

### 5.1 Rights-Holder Engagement Strategy

Responsible development is important to Foran and engagement with potentially affected rights-holders has been underway since 2011.

Foran's rights-holder engagement strategy, described in this section, was designed to build on engagement completed and information shared to date in a way that is adaptable and responsive to rights-holder needs and preferences for engagement processes, studies, and activities. The rights-holder engagement strategy has also been designed to inform the Crown's Duty to Consult, and to incorporate any procedural aspects of Consultation requested by the Crown.

Foran acknowledges and respects the best practices and expectations described in the Mining Association of Canada's Towards Sustainable Management (TSM) protocols, United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), the Truth and Reconciliation Commission Call to Action #92, and the National Inquiry into Missing and Murdered Indigenous Women and Girls' (MMIWG) Calls for Justice. The rights-holder engagement strategy described in this section has been informed by these considerations and best practices.

Foran's rights-holder engagement strategy is summarized below in terms of rights-holder groups identified for engagement, engagement objectives and approach, potential feedback collection tools and methods, and records management and reporting strategies.

#### 5.1.1 Rights-Holder Identification

Rights-holders are Indigenous communities with traditional territories, homeland, reserve land, land claims, and/or treaty territory overlapping or located in close proximity to the project development and associated proposed surface lease area, or impact area.

PBCN is a signatory to Treaty 6 and its territory spans Treaty 10 and Treaty 6. The Project is located on Crown land within PBCN territory and in proximity to the PBCN reserves located at Denare Beach, Deschambault Lake, Pelican Narrows, Birch Portage and Sturgeon Landing. Foran has been engaging with PBCN as a treaty and aboriginal rights holder with respect to Project impacts, including potential adverse environmental and socio-economic impacts to PBCN members, lands and uses, including hunting, fishing, and gathering, in all seasons, throughout its territory.

Rights-holders with traditional lands and communities located downstream of the Project area were also identified given the potential for real or perceived impacts to their rights and traditional uses.

SKMOE identified and advised Foran of the Indigenous communities to be engaged as part of anticipated Duty to Consult process for the Mcllvenna Bay Project in 2021. The SKMOE identified that the Peter Ballantyne Cree Nation (PBCN), the Cumberland House Cree Nation (CHCN), the Opaskwayak Cree Nation (OCN), the Sandy Bay Métis Local 90, the Creighton Métis Local 89, and the Cumberland House Métis Local 42 may have Aboriginal rights and/or interests that may be affected by the proposed Project.

In April 2022, the Saskatchewan Government assigned procedural aspects of the duty to consult to Foran to assist with the Ministry's consultation process. This assignment was communicated by SKMOE by letter to the PBCN, the CHCN, the OCN, the Sandy Bay Métis Local 90, and the Eastern Region I of the Métis Nation of Saskatchewan as delegated by the Cumberland House Métis Local 42. SKMOE informed Foran that the Creighton Métis Local 89 was vacant. Each letter set out expectations for Foran to meet with each community, provide project-specific information that would help in understanding how the proposed Project may affect their Treaty rights and traditional uses, and to obtain information from each community about their Treaty rights in the area of the proposed Project related to hunting, fishing, trapping and specifically how the Project may affect the communities ability to exercise those rights and carry out traditional uses. The following procedural aspects of consultation were assigned to Foran:

- Provide information to the Indigenous community to ensure they are reasonably informed as to the nature of the proposed activities and are aware of any potential environmental impacts including short, medium and long-term plans:
- Arrange meetings by mutual agreement with elected officials of the Indigenous community or their formally authorized designate to discuss appropriate means of engagement, recognizing community specific requirements.
- Engage with the Indigenous community to identify and discuss specific potential adverse impacts of the project on their ability to exercise their right to hunt, fish and trap for food and carry out traditional uses.
- Consider the views of the Indigenous community and, where necessary, work with the community to avoid or minimize adverse impacts on the Indigenous community's ability to hunt, fish and trap for food and carry out traditional uses.
- Document the consultation efforts and include in the EIS a consultation report outlining:
  - Attempts to contact and steps taken to engage the Indigenous community;

- Specific community concerns related to potential adverse impacts on their ability to exercise Treaty rights and carry out traditional uses;
- How the concerns identified were considered and addressed;
- Any outstanding issues that were unable to be addressed and the reasons why;
- Any agreements developed with the community; and
- Other relevant information related to community discussions.

Where required by the SKMOE, participate in follow-up consultations between the SKMOE and the Indigenous community. The list of Indigenous communities that was a focus for engagement therefore includes:

- Peter Ballantyne Cree Nation)
- Cumberland House Cree Nation )
- Opaskwayak Cree Nation)
- Creighton Métis Local 89)
- Cumberland House Métis Local 42 (represented by MN-S ERI,)
- Sandy Bay - Métis Local 90 (located within MN-S ER1)

As engagement on the Project progresses, and detailed Project information is shared, additional rights-holder groups may approach MBO, or be identified. MBO is committed to engaging with right-holder groups who express a potential to experience real or perceived impacts to Indigenous rights or traditional uses as a result of the Project.

#### 5.1.2 Rights-holder Engagement Objectives

Engagement objectives serve as the foundation of an engagement strategy. The information shared, feedback collected, and activities selected to facilitate engagement with rights-holders must link back to an overarching objective. The objectives recommended for this program were selected to align with the phases of an EIA. Each objective is described in Table 5-1 below in terms of the information that will be shared, the goals, and intended outputs of engagement.

Table 5-1 Rights-Holder Engagement Objectives

Objective	Information Shared, Goals, and Outputs
Introduce Project	<p><b>Information shared:</b> Preliminary project design information (e.g. location, mine and mineral processing facility design, employment opportunities, Project timelines) baseline data collected, anticipated regulatory process, assessment approach and preliminary list of valued components (VCs) .</p> <p><b>Goals:</b> share information with each community, hear concerns, address questions, discuss communication preferences and identify stakeholder level of interest in the Project, obtain feedback on preliminary VCs.</p> <p><b>Output:</b> Update engagement strategy with details of level of engagement expected and communication protocol. Documented concerns and shared responses and commitments back to rights holder leaders.</p>
Determine Agreed Upon Approach for Information Sharing and Participation in EIA Process	<p><b>Information shared:</b> list of information required including the assigned procedural aspects of the duty to consult from SKMOE and participation anticipated from rights-holders for the EIA process.</p> <p><b>Goals:</b> feedback from rights-holder leadership regarding how information should be collected, shared, and used in the EIA process and agreement on how communication will occur through the EIA process.</p> <p><b>Output:</b> Agreements detailing how rights-holders and MBO will share information and communicate through the EIA process.</p>
Refine Assessment Approach	<p><b>Information shared:</b> VCs and assessment approach including information on Project design, baseline studies, preliminary project effects and preliminary mitigation measures for review by rights-holder leadership or delegates. This includes the terms of reference document.</p> <p><b>Goals:</b> rights-holder leadership to review assessment approach and provide feedback to refine assessment approach.</p> <p><b>Output:</b> Refinement to assessment approach (i.e. Revised Technical Proposal and Terms of Reference]</p>
Review Potential Effects and Refine Mitigation Measures	<p><b>Information shared:</b> Potential effects identified, assessment results, and proposed mitigation measures.</p> <p><b>Goals:</b> Collect community-specific information related to potential effects, assessment results and proposed mitigation measures. Refine proposed mitigation measures including proposed monitoring. Ensure assigned procedural aspects of duty to consult are completed.</p> <p><b>Outcome:</b> List of refined mitigation measures and commitments, summary of feedback received during engagement sessions.</p>
Share Environmental Impact Assessment Results and Next Steps	<p><b>Information shared:</b> Summary of environmental impact assessment results after all comments have been received and addressed [at or prior to public review stage] and next steps.</p> <p><b>Goals:</b> Provide information to facilitate public review process.</p> <p><b>Outcomes:</b> Summary of feedback received during community engagement sessions.</p>

### 5.1.3 Rights-holder Engagement and Feedback Collection Tools and Methods

Engagement and feedback collection tools and methods will consist of meetings, emails, and phone calls until an agreed upon approach to information sharing is in place (Table 5-2). The engagement strategy will then be updated to reflect the preferred tools and methods for engagement and feedback collection identified by each rights-holder group.

If preferred tools and methods are not identified by rights-holder leadership, and MBO has approval from leadership to engage members of rights-holder communities, a proposed suite of activities and feedback collection tools is suggested below to collect information and feedback from members on the each of the objectives. To provide opportunities for rights-holders to share input on all objectives within that time frame, some engagement activities will be used to seek feedback on multiple objectives.

Table 5-2 Rights-Holder Engagement Activities and Feedback Collection Tools

Engagement Activity	Target Rights-holder Groups	Objectives	Feedback Collection Tools
Information Package with Invitation to Meet	Leadership	Introduce Project	Email, phone, or letter
Small Group Meetings	Leadership and Delegates	Introduce Project, determine agreed upon approach for information sharing, refine assessment approach, review potential effects and refine mitigation measures, share results of environmental impact assessment and next steps	Meeting minutes, maps, or follow up email/letter responses
Community Meetings (open house / workshop style) and Information Packages	Leadership and Members	Introduce Project, review potential effects and refine mitigation measures share results of environmental impact assessment and next steps,	Feedback forms, sticky notes, mapping, and facilitator notes

#### 5.1.4 Rights-holder Records Management and Reporting

Meeting minutes, feedback forms, comments, and other feedback mechanism will be prepared, validated by participants where possible, and saved as ROCs. Each ROC will be entered as soon as possible for timely response (where required) and coded by topic area so that reports can be populated on request by discipline, topic, and community for review and consideration in development of the EIS.

At the conclusion of the EIA process, reports will be generated to form the Communications Log and Concerns Tracking Log deliverables, which are required as part of the EIS. A Comprehensive Engagement Report will be summarized in the EIS and appended to the submission.

As per the EIA guidelines, the EIS section will include a summary of the following:

- How information about the development was effectively communicated to communities.
- How Indigenous knowledge was collected during the EIA.
- List of Indigenous knowledge and traditional use information sources referenced.
- A complete communication log including dates, places, participants, nature of communication, key topics addressed, and outcomes.
- Concerns raised at each event, MBO’s response (if applicable), and the measures proposed to address the concerns.
- Indication throughout the EIS of how Indigenous knowledge was used to assess impacts and develop mitigation measures.
- Plans for future engagement activities for the life of the Project.

Feedback and input collected during engagement activities with rights-holders will be used to inform development of all applicable sections of the EIS where relevant information is shared, but rights-holder input will be sought specifically to inform the following topics where rights-holder have expressed concerns, including but not limited to:

- Heritage resources and development of chance finds procedure;

- Treated effluent discharge and its potential effect on surface water quality, biota and people and associated monitoring program;
- Air emissions and noise and their potential effects on the environment and people;
- Potential effects on groundwater and associated monitoring program;
- Woodland caribou and proposed management plan;
- Socio-economic assessment approach and results including potential impacts to Indigenous women and girls;
- Proposed decommissioning and reclamation approach;
- Tailings storage facility design.

## 5.2 Rights-holder Engagement Activities Completed to Date

Foran initiated engagement activities with the Peter Ballantyne Cree Nation in 2011 and initiated engagement activities with other rights holders beginning in 2021. Engagement activities completed to date are summarized below.

### 5.2.1 Engagement with Peter Ballantyne Cree Nation

Engagement with PBCN has been ongoing since 2011. Engagement has taken the form of meetings (both in person and virtual), site tours, notification letters, email correspondence, and phone calls.

In 2012, Foran offered support to PBCN to conduct a Traditional Land Use/Knowledge Inventory Study, which was completed by ASKI Resource Management and Environmental Services (ASKI) in 2012 (ASKI 2012). During the study, members of PBCN surveyed clearly articulated their continuing reliance on large game, fish, and waterfowl as well as innumerable plant species, to provide for their physical, social, and spiritual needs. Most of the PBCN members interviewed for the ASKI Traditional Land Use/ Knowledge Study acknowledged that the mining sector does provide the potential for employment, including creating spin-off opportunities in service-related businesses; however, it was stated the benefits of mining developments must be tempered against the continued reliance of PBCN members on the waters, lands, and forests for sustenance, livelihood, and spiritual support (ASKI 2012). Additionally, the importance of economic opportunities for PBCN were mentioned during discussions between Foran/MBO and PBCN throughout 2021 and 2022. PBCN has shared with MBO that the ASKI (2012) report should not be relied upon to inform the EIS with respect to PBCN rights, interests and concerns.

Since 2011, PBCN shared information about their interests and concerns related to the Project. A summary of the interests and concerns are detailed below.

- Concerns regarding potential to experience impacts related to:
  - environment, due to risk of diesel and oil spills and the need for contingency plans to deal with any spills;
  - environment due to cumulative and regional effects;
  - trap lines due to winter Project activities;
  - heritage resources;
  - country foods for consumption, medicinal and sacred uses;
  - wildlife;
  - aquatic resources;
  - water quality;

- wild rice harvesting;
- hunting and trapping activities; and
- potential for violence against women in the community due to workforce demographic changes.
- Engagement concerns related to:
  - perceived lack of engagement with PBCN by MBO and SKMOE;
  - limitations of Traditional Use/Knowledge Inventory from 2012, which is not sufficient to fully identify potential impacts to rights and interests;
  - communication lead by SKMOE instead of MBO;
  - unclear communication protocols;
  - lack of information shared regarding activities completed to date; and
  - insufficient time for meaningful engagement or consideration of potential accommodations or mitigations.
- Interests related to:
  - conservation of woodland caribou populations;
  - conservation of Alvar, a unique ecological type in the region;
  - potential deterioration of Highway 106 associated with Project-related traffic;
  - urging Foran to adopt the principles outlined in the United Nation's Declaration on the Rights of Indigenous Peoples;
  - long term, sustainable benefits for the community;
  - local hiring; and
  - inclusion in environmental monitoring and economic development opportunities.

In 2022, MBO entered into an agreement with PBCN to provide capacity to PBCN to participate in the environmental review and permitting process and to undertake an update to the 2012 Traditional Land Use / Knowledge Inventory Study. PBCN established a Lands and Resource Committee (LRC) to represent PBCN in ongoing dialogue with MBO and participate in the environment review process, and enlisted the expertise of consultants to inform their participation. MBO and the PBCN LRC established regular and ongoing meetings to discuss the proposed Project, and regular meetings with PBCN's consultants and LRC representatives were also established to inform the environmental review process.

PBCN provided preliminary information on the project to communities and requested and was provided an opportunity to review the draft TP/TOR and provided comments. These comments resulted in the revision of the TP/TOR.

PBCN has communicated to MBO an intent to lead community information sessions and to invite MBO to attend, and MBO has committed to working with the LRC to develop accessible content for these information sessions.

MBO anticipates that PBCN and PBCN's consultants will undertake a review of the material presented in the EIS. MBO will continue to reach out to and engage with PBCN. Where consensus is not reached on a topic of the environmental assessment, the details will be included as part of the consultation record for review by PBCN.

### 5.2.2 Engagement with Métis Nation-Saskatchewan (MN-S) Eastern Region 1 (ER1) (Representing Cumberland House Métis Local #42)

Engagement with MN-S ER1 was initiated in 2021. Engagement efforts have focused on engaging with representatives for MN-S Eastern Region 1 (ER1) and has taken the form of emails, letters, phone calls, and virtual meetings. At this time, MBO has shared information on the Mcllvenna Bay Project and the anticipated provincial EIA process with MN-S ER1 and offered capacity to MN-S ER1 to participate in the environmental review process and to provide traditional knowledge and land use information. MBO will continue to reach out to and engage with MN-S.

### 5.2.3 Engagement with Métis Local #90 Sandy Bay

Engagement with the Métis Local #90 (Sandy Bay) was initiated in 2022. Engagement efforts have taken the form of emails, letters, phone calls, and multiple offers of meetings. At this time, MBO has shared introductory information on the Mcllvenna Bay Project with the leadership of the Métis Local #90 and leadership of Métis Local #90 has confirmed receipt of this information. MBO will continue to reach out to and engage with Métis Local #90 Sandy Bay.

### 5.2.4 Engagement with Cumberland House Cree Nation

Engagement with Cumberland House Cree Nation (CHCN) was initiated in 2021. Engagement has included meetings with leadership, letters, emails, phone calls, and a community information session. MBO has participated in a number of community events. CHCN has shared initial information about their interests and concerns related to the Project. A summary of the interests and concerns are detailed below.

- Concerns regarding potential to experience impacts related to:
  - environment at and surrounding Suggi Lake and Windy Lake and their importance in supporting hunting, trapping, fishing, and use by residents;
  - Amisk Lake;
  - Saskatchewan river watershed and Saskatchewan river delta; and
  - environment due to cumulative and regional effects,
- Engagement concerns related to:
  - desire to have the ability to express the community's free, prior and informed consent prior to a development decision being made.
- Interests related to:
  - conservation of woodland caribou populations;
  - conservation of Alvar habitat, a unique ecological type in the region;
  - conservation of the Saskatchewan River delta;
  - conservation of carbon sequestration potential provided by the Saskatchewan River delta;
  - long term, sustainable benefits for the community;
  - local hiring; and
  - inclusion in environmental monitoring and economic development opportunities.

In 2022, MBO entered into an agreement to provide capacity to CHCN to participate in the environmental review and permitting process and to provide traditional knowledge and land use information for the EIA process. MBO anticipates that CHCN and CHCN's consultants will undertake a review of the information presented in the EIS and that additional meetings with leadership and community members will be used

to engage on potential impacts and associated mitigation measures. MBO will continue to reach out to and engage with CHCN.

### 5.2.5 Engagement with Opaskwayak Cree Nation

Engagement with Opaskwayak Cree Nation (OCN) was initiated in 2021. Engagement effort has taken the form of an introductory letter, emails, phone calls, in-person visits, and a virtual meeting. At this time, MBO has provided high-level information on the McIlvenna Bay Project and the anticipated provincial EIA process to OCN's leadership. OCN's leadership provided direction to the OCN Land Manager to request additional information on the Project. MBO responded to OCN's specific questions on the Project and OCN confirmed receipt of information. OCN has not requested further meetings. MBO will continue to reach out to and engage with OCN.

## 6 EIA Boundaries

### 6.1 Spatial Boundaries

The spatial boundaries for the EIA are of a geographical scale that enables an evaluation of potential Project-related effects on local and regional natural and human environments and considers the potential for cumulative effects.

The following spatial scales were applied to each component:

- Site Study Area (SSA): The SSA for the majority of VCs includes the current proposed Project footprint and the proposed surface lease area where MBO may situate infrastructure in the future. For some components the SSA differed; details are provided in Section 9.2.2.
- Local Study Area (LSA): The LSA is defined as the area adjacent to the SSA where there is the potential for direct Project-related impacts on VCs.
- Regional Study Area (RSA): The RSA is defined as the area adjacent to the LSA where there is the potential for indirect and/or cumulative Project-related effects on VCs.

Traffic routing options for ore concentrate are not limited to a single route at this time. Since the access road to the Project connects with Highway 106, it is a certainty that vehicles travelling to site will drive on a portion of this highway. Therefore, for select VCs (air quality, noise, wildlife, woodland caribou, human health, and community well-being), the EIS study area includes a representative portion of Highway 106; however, the exact location is not defined.

The spatial boundaries differ between components and sometimes VCs within a component since the potential for Project interactions varies depending on the source and type of effect, receiving environment, and VC. Detailed information on the SSA, LSA, and RSA used in the effects assessment for each component and/or VC are provided in Section 9.2.2.

### 6.2 Temporal Boundaries

The temporal boundaries used in the effects assessment will cover the life of the Project and be inclusive of all Project stages including construction, operation, decommissioning, and post-decommissioning. Unlike the spatial boundaries, the same temporal boundaries will be applied to all VCs; however, the potential for effects during each stage will depend on Project activities and their interaction with each VC or group of VCs. Other factors such as interactions of environmental components, landscape disturbances,

cumulative effects, and ancillary projects will be taken into account when incorporating temporal boundaries in the EIA.

## 7 Existing Environment

### 7.1 General Requirements

The local existing environment for the Project does not represent undisturbed baseline conditions as it has a long history of past exploration and mining activities, which are detailed in Section 3.1. Historical environmental studies conducted specific to MBO's Project have included aquatic investigations and water sampling programs completed between 1989 and 1992, and rare plant, raptor, and boreal woodland caribou (*Rangifer tarandus caribou*) habitat studies completed along access road route options for Foran in 1999 (CPET 1999a, 1999b; TAEM 1990a, 1990b).

In 2012, a comprehensive environmental baseline program was completed by Canada North Environmental Services (CanNorth) for Foran that was designed to prepare the Project for future licensing and regulatory requirements. The program collected a full suite of environmental data including climate and meteorology; noise; surface water hydrology; water and sediment quality; plankton, benthic invertebrate, and fish communities; fish habitat, chemistry, and spawning; ecosite classification; vegetation communities; wildlife communities; species at risk; and heritage resources (CanNorth 2013). Additionally, in 2018 and 2019, the hydrological and meteorological stations were re-visited to extend these datasets.

Foran commissioned CanNorth to complete an environmental baseline program commencing in 2021 and extending into 2022. Existing environment data collected until the end of 2021 is summarized below; details are provided in CanNorth (2022). Information on the studies being completed in 2022 and how these data will be integrated into the EIS is provided in Section 9.2.1. This includes extensive data collections in the terrestrial environment, as well as follow-up studies in future exposure and reference areas in the aquatic environment.

A detailed baseline socio-economic and land use study will be completed in 2022 to inform the EIA process. The study will build on the information provided in Section 7.3 below, and will include identification of the following metrics:

- demographic information to support identification of particularly sensitive or vulnerable population subsets;
- historical and current land uses with potential to impact health through air or water contaminants;
- current status of community services with potential to be impacted by Project activities;
- 2021 census data indicating current levels of employment, income, and education where available;
- current level of access to the SSA with potential to be altered;
- current and reasonably foreseeable land uses in the SSA; and
- information related to regional food security.

A Traditional Land Use (TLU) study is being community-led by the PBCN and is being completed under a separate cover. The results from the TLU study will be used in the EIS.

## 7.2 Biophysical

### 7.2.1 Topography and Soils

The Project area lies in the Boreal Plain (BP) Ecozone on the boundary of two ecoregions: the Namew Lake Upland landscape area of the Mid-Boreal Lowland Ecoregion and the Flin Flon Plain landscape area of the Churchill River Upland Ecoregion. The boundary between these two ecoregions passes through McIlvenna Bay on Hanson Lake, such that the northern part of the study area lies in the Churchill River upland, and the southern part lies in the Mid-Boreal Lowland.

The topography of the Namew Lake Upland landscape area of the Mid-Boreal Lowland Ecoregion is predominantly an association of glacial deposits, bedrock outcrops, peatlands, and lakes (Acton et al. 1998; SKCDC 2014). Surficial deposits are dominated by shallow sandy loam and calcareous glacial till containing Eutric Brunisols, and clayey glaciolacustrine deposits of moderate to weak calcareousness also overlay a significant proportion of the terrain. Approximately 20% of the land area is marked by dolomitic limestone bedrock or Paleozoic dolomite outcrops (Acton et al. 1998).

The Flin Flon Plain landscape area of the Churchill River Upland Ecoregion lies in eastern Saskatchewan's southernmost stretch of Precambrian Shield. Bedrock predominates in this area, with thin deposits of sandy glacial till or glaciolacustrine silt and clay. Brunisolic and Gray Luvisolic soils are present in deposits lining well-drained slopes. Areas of poor drainage, such as swales and flats are dominated by Gleysols and organics. The land surface is hummocky and irregular due to the underlying bedrock (Acton et al. 1998; SKCDC 2014).

A baseline site-specific soil survey is planned for 2022 to characterize the terrain and soils in the SSA and LSA, and will include identification and distribution of soil types, evaluating soil suitability for reclamation, and identification of sensitive (e.g., erosion-prone, highly compactible) soils.

### 7.2.2 Terrestrial Environment

The terrestrial baseline program utilized database searches for rare, at-risk, or sensitive plant and wildlife species, along with an intensive field program to assess the vegetation, wildlife, and wildlife habitat present within the Project area. A comprehensive program was conducted in 2012 that included vegetation and landcover classification, mapping, and accuracy assessment; ecosite classification; rare plant surveys; a winter tracking survey; an ungulate aerial survey; a breeding waterbird and raptor nest aerial survey; a breeding bird survey; an amphibian acoustic survey; an ungulate pellet group/browse survey; a small mammal survey; a semi-aquatic furbearer shoreline survey; and fall bird migration surveys. Additionally, in 2021, updated database searches for rare, at-risk, or sensitive plant and wildlife species, a small mammal survey, a semi-aquatic mammal survey, and two winter tracking surveys were completed. To supplement the two winter tracking surveys, twenty trail cameras were also deployed between February and December of 2021. Detailed methods and results from the 2012 and 2021 studies are presented in CanNorth (2013) and in CanNorth (2022); a brief summary of findings is provided below.

The 2012 and 2021 baseline studies were conducted in the SSA, LSA (3.7 km radius of the deposit), and RSA (15 km radius of the deposit) established for the terrestrial baseline program (Figure 7-1), with studies primarily focused in the SSA/LSA.

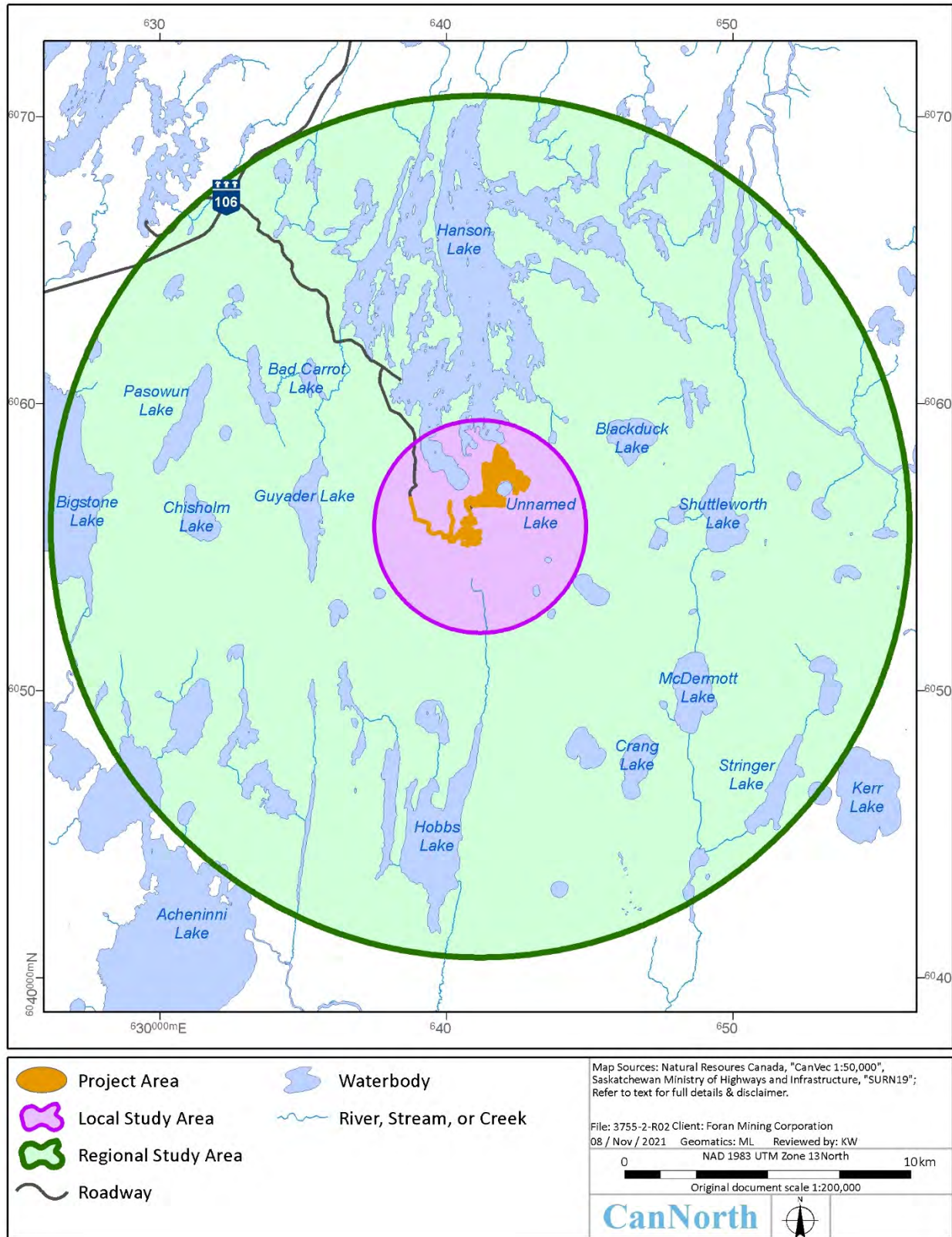


Figure 7-1 Terrestrial Local and Regional Study Areas from the 2012 and 2021 Baseline Studies

#### 7.2.2.1 Ecosite and Wetland Classifications

The 2012 ecosite classifications of the dominant landforms in the LSA and RSA, using McLaughlan et al. (2010), identified 15 distinct classes from 51 survey locations. The jack pine – spruce/feathermoss (BP12) ecosite was the most dominant habitat surveyed followed by the black spruce treed bog (BP19). White spruce – trembling aspen/feathermoss (BP9) and white birch – white spruce – balsam fir (BP11) were also abundant.

A total of 24 wetland classifications were completed, resulting in 7 wetland classes. Shallow/open wetlands, swamps, and marshes were the most common ecosite types encountered in wetlands.

#### 7.2.2.2 Vegetation Inventory

The vegetation inventory surveys sampled 51 plots in 2012, with 31 of the plots occurring within the LSA. A total of 127 vascular plant species were identified during the 2012 spring rare plant surveys, and 42 were identified in the fall surveys. Twelve of these species were ranked as rare provincially during the time of the study (refer to Section 7.2.3.2, Table 7-1). The only exotic and/or prohibited, noxious, or nuisance weed species listed by the *Saskatchewan Weed Control Act* (GS 2010) observed during the 2012 vegetation inventory surveys was dandelion (*Taraxacum officinale*). Sixty-three of the observed plant species have documented traditional uses by the Cree and/or Dene people of northern Saskatchewan. Many of these plants are common and widely distributed in the Mid-boreal Lowland or Churchill River Upland ecoregions.

#### 7.2.2.3 Mammals

A systematic ungulate aerial survey was conducted in 2012 to determine presence and density of moose (*Alces alces*) and boreal woodland caribou in the LSA and RSA. Thirty transects were flown by helicopter covering approximately 40% of the RSA. A total of seven adult moose were observed resulting in a density of 0.02 individuals/km<sup>2</sup>. Five groups of woodland caribou were observed, ranging in number from 1 to 11 individuals, for a total of 27 caribou. The density of woodland caribou was 0.07 individuals/km<sup>2</sup>. Woodland caribou signs (tracks and craters) were recorded in 34 additional locations.

During the 2012 winter tracking survey, 15 triangular transects were surveyed to determine the presence and abundance of wintering mammals within 6 major habitat types. A total of 3,465 instances of mammal sign were observed that included 14 species or species groups over the 72.9 km of transect sampled. The sampled species/groups were snowshoe hare (*Lepus americanus*), red squirrel (*Tamiasciurus hudsonicus*), river otter (*Lontra canadensis*), fisher (*Pekania pennanti*), American marten (*Martes americana*), mink (*Neovision vision*), weasel (*Mustela spp.*), grey wolf (*Canis lupus occidentalis*), red fox (*Vulpes vulpes*), Canada lynx (*Lynx canadensis*), moose, boreal woodland caribou, microtines and shrews, and grouse/ptarmigan. Boreal woodland caribou was the only species at risk (SAR) for which sign was observed.

During the 2021 winter tracking surveys, 15 triangle transects were also surveyed for a total sampling distance of 45 km. A total of 1,618 observations of mammal or phasianid bird sign were recorded over the two survey rounds including 16 species or species groups. The species/groups detected in 2021 were moose, boreal woodland caribou, red fox, Canada lynx, cougar (*Puma concolor*), river otter, wolverine (*Gulo gulo*), fisher, American marten, weasel species, snowshoe hare, North American beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), red squirrel, microtine species (voles or mice), and American

black bear (*Ursus americanus*). The tracks of spruce grouse (*Falcapennis canadensis*), willow ptarmigan (*Lagopus lagopus*), and phasianid birds were also observed. Four mammalian Species of Conservation Concern (SOCC) were recorded in 2021, including river otter, cougar, wolverine, and woodland caribou of which, wolverine and woodland caribou are listed under the *Species At Risk Act* (SARA). In 2021, twenty trail cameras were also deployed to provide supplemental data to the winter tracking surveys. These cameras were deployed between February and December of 2021 and remain in place. In total, 863 detections were made with identifiable animals during the 3379 detection days in 2021. Sixteen identifiable mammal species were captured on the trail cameras which included five additional species when compared to the winter tracking survey (American ermine *{Mustela richardsonii}*, American mink *{Neovison vison}*, grey wolf, least chipmunk *{Neotamias minimus}*, and woodchuck *{Marmota monax}*).

Pellet and browse surveys were conducted to determine presence and abundance of wildlife species, along with an estimate of their habitat use. Signs of six species/groups were identified: black bear, boreal woodland caribou, moose, snowshoe hare, and grouse/ptarmigan spp. Black bear scat was observed in mixedwood forest and spruce dominated forest. Moose pellets were observed in all habitat types except for spruce dominated forest and disturbed areas. Caribou pellets were only observed twice in spruce-dominated forest. Snowshoe hare pellets were observed in all habitat types except open/shrubby wetlands. Grouse/ptarmigan pellets were observed in four of six habitat types sampled. Browse data indicate that deciduous forest, pine dominated forest, and mixedwood forest are important moose foraging habitats.

In 2012, a total of 766 snap traps and 36 pitfall arrays were set for small mammals in five broad habitat types to determine species composition and relative abundance. One hundred and sixty-four small mammals were caught, consisting of six species: red-backed vole (*Myodes gapperi*), meadow vole (*Microtus pennsylvanicus*), deer mouse (*Peromyscus maniculatus*), Arctic shrew (*Sorex arcticus*), masked shrew (*Sorex cinereus*), and eastern pygmy shrew (*Sorex hoyi*). During the fall 2021 small mammal trapping survey, a total of 147 small mammals were captured on 12 transects over 1000 trap nights. Eight small mammal species were captured, including meadow vole, Gapper's red-backed vole (*Myodes gapperi*), deer mouse, meadow jumping mouse (*Zapus hudsonius*), water shrew (*Sorex palustris*), Arctic shrew, masked shrew, and least chipmunk.

In 2012, semi-aquatic furbearer surveys resulted in 74 observations of semi-aquatic mammals or their sign, including muskrat, North American beaver, and river otter at a density of 2.2 observations/km of shoreline surveyed over 17 transects. Muskrat activity was observed on 7 of the 17 transects, beaver activity on 11, and otter activity on 6. Semi-aquatic mammals were also recorded incidentally in the LSA and RSA. During the semi-aquatic mammal survey in the fall of 2021, five visual observations of animals were recorded, including two beaver, one muskrat, one mink, and one unidentified semi-aquatic mammal. Signs were observed for four species, including beaver, river otter, mink, and muskrat. Beaver activity was the most common type of sign observed, with 38 observations of sign at all 6 transects.

#### 7.2.2.4 Birds

A spring waterbird and raptor nest aerial survey was conducted in May 2012 and a total of 232 individual birds were observed, representing 13 species. The most abundant species observed were scaup (*Aythya spp.*), mallard (*Anas platyrhynchos*), and ring-necked duck (*Aythya collaris*). American white pelican (*Pelecanus erythrorhynchos*) and common tern (*Sterna hirundo*) were observed incidentally during the survey, and both species are considered sensitive in Saskatchewan. Setback distances and timing

restrictions for common terns and American white pelicans apply to breeding colonies. No breeding colonies were observed within the RSA. A sharp-shinned hawk (*Accipiter striatus*) and its nest and one bald eagle (*Haliaeetus leucocephalus*) were also observed during the aerial survey; bald eagles are considered sensitive in Saskatchewan and their nests are protected by activity restriction guidelines (SKMOE 2017).

A total of 73 avian species were detected on 68 point counts and incidentally during the breeding bird surveys conducted in May and June 2012, and incidentally during all wildlife surveys. Three species detected in the LSA and RSA are listed federally as Special Concern: barn swallow (*Hirundo rustica*), olive-sided flycatcher (*Contopus cooperi*), and common nighthawk (*Chordeiles minor*). Two additional species with provincial activity setback distances and timing restrictions were observed during point count surveys or incidentally: bald eagle and common tern.

A total of 18 observation periods over three surveys conducted in September and October 2012 were completed within the LSA and RSA for staging and migrating waterfowl. Forty-seven migratory bird species were detected from a total of 854 observations during the three fall migration surveys. Sandhill cranes (*Antigone canadensis*), snow geese (*Anser caerulescens*), and ring-billed gulls (*Larus delawarensis*) represented the highest abundance of migrating birds. Waterbirds, including geese, ducks, cranes, loons, pelicans, and gulls accounted for 630 (72.9%) of the observations. Two federally listed species were observed: rusty blackbird (*Euphagus carolinus*) and horned grebe (*Podiceps auritus*). Two osprey (*Pandion haliaetus*) and eight bald eagles were also observed. More than 50% of the birds observed during this survey were detected while flying over.

#### 7.2.2.5 Amphibians

Four amphibian species were observed during auditory surveys conducted in May and June 2012, including boreal chorus frog (*Pseudacris maculata*), wood frog (*Lithobates sylvaticus*), northern leopard frog (*Lithobates pipiens*), and Canadian toad (*Anaxyrus hemiophrys*). Boreal chorus frogs were detected at 9 of the 22 (40.9%) acoustic survey sites, and wood frogs at 11 (50%). Northern leopard frogs and Canadian toads were each detected at 1 acoustic survey site (4.5%). Northern leopard frog was the only amphibian SAR observed in the RSA; both northern leopard frog and Canadian toad have activity setback distances.

#### 7.2.3 Species of Conservation Concern

Species of Conservation Concern are defined as federally and provincially legislated species that are identified on federal and provincial tracking lists and activity restriction guidelines. In Saskatchewan, this includes:

- species listed under Schedule 1, Schedule 2, or Schedule 3 of the federal SARA as endangered, threatened, or special concern (SARPR 2022);
- species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as endangered, threatened, or special concern that are not listed under SARA (COSEWIC 2021);
- species listed as endangered, threatened, or vulnerable in *The Wildlife Act* (GS 1998);
- species listed as ranking of S1, S2, or S3 or a combination of rankings (including an applicable rank modifier such as “M” for migrant) by the Saskatchewan Conservation Data Centre (SKCDC)(SKCDC 2020a, 2020b); and,

- species included in the Saskatchewan Activity Restriction Guidelines for Sensitive Species (SKMOE 2017).

#### *7.2.3.1 Database Searches*

In order to ensure up to date information is provided on records for rare and endangered flora, fauna, and aquatic SAR and SOCC that may occur in the Project area, database searches were completed in 2022 using the Hunting, Angling, and Biodiversity Information of Saskatchewan (HABISask) mapping application (SKMOE 2022), the W.P. Fraser Herbarium (SASK 2022), the Saskatchewan Breeding Bird Atlas (SKBBA; Birds Canada 2022), and the Species at Risk Public Registry (SARPR; GC 2022). A list of plant and wildlife SOCC was compiled from searches that encompassed a 30-km radius from the centre of the LSA. The results identified a total of 84 SOCC that may potentially occur within the search area. From the HABISask search, 68 species were found, including 12 lichens, 9 non-vascular plants, 34 vascular plants, 2 amphibians, 2 mammals, and 9 birds. The W.P. Fraser Herbarium search yielded one additional vascular plant occurrence, and the Saskatchewan Breeding Bird Atlas search identified 10 additional avian SOCC. Four additional wildlife species were also added to the search results based on species biogeographical range and habitat characteristics within the LSA and RSA. Six mammalian SOCC were identified including cougar, river otter, wolverine, the boreal population of woodland caribou, and two bat species that have breeding ranges that overlap the search area. Additionally, the LSA and RSA are considered a Tier 1 caribou habitat management area (i.e., areas that constitute higher current habitat value and use by woodland caribou).

#### *7.2.3.2 Field Observations*

The 2012 baseline studies identified 12 vegetation SOCC in the LSA and RSA with conservation rankings ranging from S1 to S3S4 (rare to uncommon); however, four of these species are currently ranked S4 and are no longer a SOCC (Table 7-1). The provincial activity restriction guidelines for sensitive species apply to vegetation species with conservation rankings between S1 and S3; thus, mitigation for these species may be required (SKCDC 2021).

A total of 15 wildlife SOCC were observed during the 2012 wildlife field surveys and incidentally in the LSA and RSA. Seven of these species are listed federally as SAR, including boreal woodland caribou (threatened) (COSEWIC 2014). Other observed species that are not federally listed but are considered sensitive in Saskatchewan were also found during the 2012 baseline studies. During the investigations completed in 2021, four mammalian wildlife SOCC were observed.

Table 7-1 outlines the vegetation and wildlife SOCC identified during the 2012 and 2021 baseline studies; however, the conservation rankings were updated using current information. While some of these species are no longer of special concern, other species may need to be added to this table based on changes to conservation rankings. The list of SOCC will be updated as part of the EIA.

Table 7-1 Species of Conservation Concern Identified during the 2012 and 2021 Baseline Studies

Species	Scientific Name	Conservation Ranking <sup>a</sup>
<b>Vegetation:</b>		
Red alpine bearberry <sup>b</sup>	<i>Arctous rubra</i>	S3
Dragon's mouth orchid	<i>Arethusa bulbosa</i>	S2
Leathery grape fern	<i>Sceptridium multifidum</i> <sup>b</sup>	S4 <sup>c</sup>
Fairy slipper	<i>Calypso bulbosa</i> var. <i>americana</i> <sup>b</sup>	S3
Few-flowered sedge	<i>Carex pauciflora</i>	S4 <sup>c</sup>
English sundew	<i>Drosera anglica</i>	S3
Slenderleaf sundew	<i>Drosera linearis</i>	S3
Western red lily	<i>Lilium philadelphicum</i> var. <i>andinum</i> <sup>b</sup>	S4 <sup>c</sup>
Western smooth cliff-brake	<i>Pellaea glabella</i> ssp. <i>occidentalis</i> <sup>b</sup>	S1
Pink fringed milkwort	<i>Polygala pauciflora</i>	S3
American scheuchzeria	<i>Scheuchzeria palustris</i> ssp. <i>americana</i>	S4 <sup>c</sup>
Smooth woodsia	<i>Woodsia glabella</i>	S3
<b>Wildlife:</b>		
Common nighthawk	<i>Chordeiles minor</i>	Special Concern
Olive-sided flycatcher	<i>Contopus cooperi</i>	Special Concern
Rusty blackbird	<i>Euphagus carolinus</i>	Special Concern
Wolverine	<i>Gulo gulo</i>	Special Concern
Barn swallow	<i>Hirundo rustica</i>	Special Concern
Horned grebe	<i>Podiceps auritus</i>	Special Concern
Northern leopard frog	<i>Lithobates pipiens</i>	Special Concern
River otter	<i>Lontra canadensis</i>	S3
Boreal woodland caribou	<i>Rangifer tarandus caribou</i>	Threatened
Bald eagle	<i>Haliaeetus leucocephalus</i>	S5B, S5N, S4M <sup>d</sup>
Franklin's gull	<i>Leucophaeus pipixcan</i>	S4B, S4M <sup>e</sup>
Osprey	<i>Pandion haliaetus</i>	S2B, S2M <sup>d</sup>
American white pelican	<i>Pelecanus erythrorhynchos</i>	S5B, S4M <sup>d</sup>
Double-crested cormorant	<i>Phalacrocorax auritus</i>	S5B, S5M <sup>d</sup>
Cougar	<i>Puma concolor</i>	S2
Common tern	<i>Sterna hirundo</i>	S5B, S5M <sup>e</sup>
Canadian toad	<i>Anaxyrus hemiophrys</i>	S4 <sup>f</sup>

<sup>a</sup> Species' status have been updated, where applicable, from the 2012 rankings.

<sup>b</sup> Species' names have been updated since the 2012 database search.

<sup>c</sup> Species no longer of conservation concern since the 2012 baseline study.

<sup>d</sup> Species considered sensitive in Saskatchewan and has an activity setback distance of 1 km.

<sup>e</sup> Species considered sensitive in Saskatchewan and has an activity setback distance of 400 m.

<sup>f</sup> Species considered sensitive in Saskatchewan and has an activity setback distance of 90 m.

Woodland caribou (boreal population; Suggi-Amisk-Kississing management unit) were found to occur in the LSA and RSA. The boreal population of woodland caribou in Saskatchewan is listed on SARA Schedule 1 as Threatened (SARPR 2022), and is ranked as rare to uncommon (S3) by the SKCDC (2020a); however,

there are currently no activity restriction guidelines pertinent to woodland caribou in Saskatchewan. A federal recovery strategy for the boreal population of woodland caribou has been published by Environment Canada (EC 2012a). The Project is located near the northern boundary of the SK2-East range plan area. It is anticipated that a caribou management and offset plan will be needed prior to Project development and this will be developed during the EIA (refer to Section 14).

#### 7.2.4 Aquatic Environment

The Aquatic Study Areas (ASA) for the 2012 and 2021 studies were chosen to include numerous lakes and bays located in the vicinity of the Project, as well as various options for the treated effluent discharge location. The 2012 studies were conducted in five bays on Hanson Lake (Agnew Bay, Bad Carrot Bay, Mcllvenna Bay, Unnamed Bay, and Winn Bay), as well as Bad Carrot River, Bad Carrot Lake, Blackduck Lake, Guyader Lake, and Unnamed Lake (Figure 7-2). Agnew and Unnamed bays were included in the program as they have the potential to function as future reference areas once the mine is operational.

The 2021 ASA included Mcllvenna and Winn bays on Hanson Lake to provide updated information; however, the focus of the studies was on the Hobbs Lake drainage and waterbodies located in the region that could act as future reference areas for the Hobbs Lake drainage because the Hobbs Lake drainage was the primary option for treated effluent discharge at the time (Figure 7-2). An attempt was made to re-sample Unnamed Lake in 2021; however, the unconsolidated sediment adjacent to the lake made access unsafe. A comprehensive suite of information was obtained from the Hobbs Lake drainage; however, it was subsequently determined to be an unsuitable location for treated effluent discharge from the Project. After a review of options, it was decided that the most suitable location for treated effluent discharge is into Winn Bay of Hanson Lake. Thus, further studies were conducted in Winn Bay in October 2021 and further studies in Winn Bay, Hanson Lake, and downstream of the treated effluent flow path are occurring in 2022 (refer to Section 9.2.1).

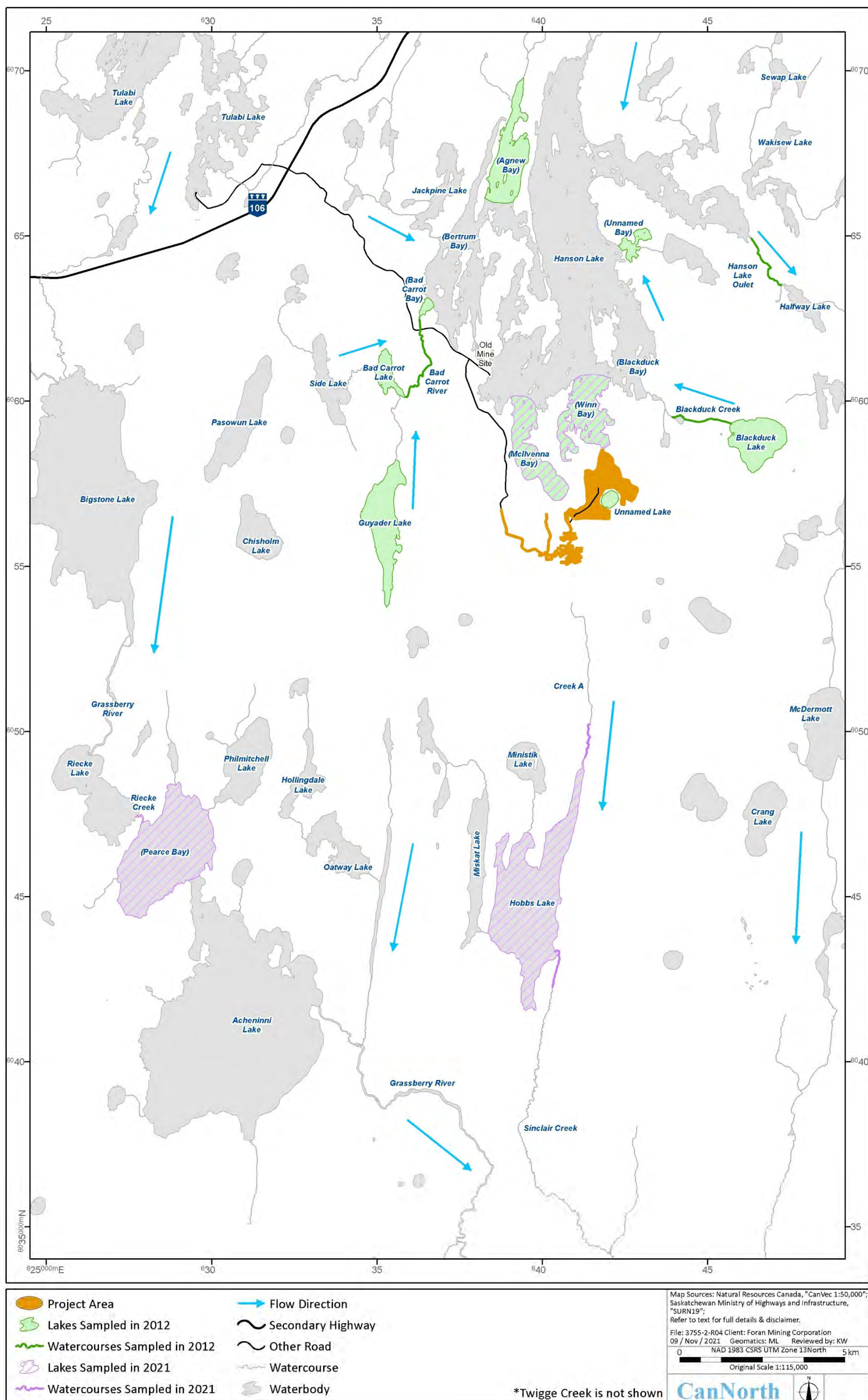


Figure 7-2 Aquatic Study Areas from the 2012 and 2021 Baseline Studies

Table 7-2 illustrates the data types that have been collected in each study area since 2012. In consideration of the current Project plans, the results provided in the sections below are mainly focused on Mcllvenna and Winn bays of Hanson Lake, as well as Unnamed Lake, due to their proximity to the Project and potential for Project-environment interactions.

Table 7-2 Aquatic Studies Conducted in the Mcllvenna Bay Project Aquatic Study Area, 2012 and 2021

Sample Type/Survey	Agnew Bay, Hanson Lake	Bad Carrot Bay, Hanson Lake	Mcllvenna Bay, Hanson Lake	Unnamed Bay, Hanson Lake	Winn Bay, Hanson Lake	Blackduck Bay, Hanson Lake	Hanson Lake Outlet	Bad Carrot Lake	Bad Carrot Creek	Guyader Lake	Blackduck Lake	Blackduck Creek	Unnamed Lake	Pearce Bay, Acheninni Lake	Riecke Creek	Hobbs Lake	Creek A	Sinclair Creek
2012 (except where noted)																		
Water Level/Stream Velocity <sup>a</sup>			✓		✓		✓	✓	✓	✓	✓	✓						
Bathymetry <sup>b</sup>	✓	✓	✓	✓	✓	✓		✓		✓	✓		✓					
Water Quality	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓					
Sediment Quality	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓					
Benthic Invertebrate Community	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓					
Plankton Community	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓					
Fish Community and Health	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓					
Fish Spawning		✓	✓		✓			✓	✓	✓								
Fish Chemistry	✓	✓	✓	✓	✓			✓		✓								
Qualitative Aquatic Habitat	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓					
2021																		
Water Level/Stream Velocity			✓		✓				✓					✓		✓		✓
Bathymetry														✓		✓		
Water Quality			✓		✓									✓	✓	✓	✓	✓
Sediment Quality			✓		✓									✓		✓	✓	
Benthic Invertebrate Community			✓		✓									✓		✓	✓	
Plankton Community			✓											✓		✓		
Fish Community and Health			✓		✓									✓		✓	✓	✓
Fish Spawning <sup>c</sup>			✓		✓									✓	✓	✓	✓	✓
Fish Chemistry					✓									✓		✓		
Qualitative Aquatic Habitat			✓		✓									✓	✓	✓	✓	✓

<sup>a</sup> Measurements were taken between 2012 to 2014 and 2018 to 2019.

<sup>b</sup> Bathymetry data were collected in 1990 for Mcllvenna Bay, Blackduck Bay, Blackduck Lake, Guyader Lake, and Unnamed Lake (TAEM 1990b) and in 2012 for the remainder of the study areas.

<sup>c</sup> Spawning surveys done in only in fall in Mcllvenna and Winn bays and only in spring in other study areas.

#### 7.2.4.1 Surface Water Hydrology

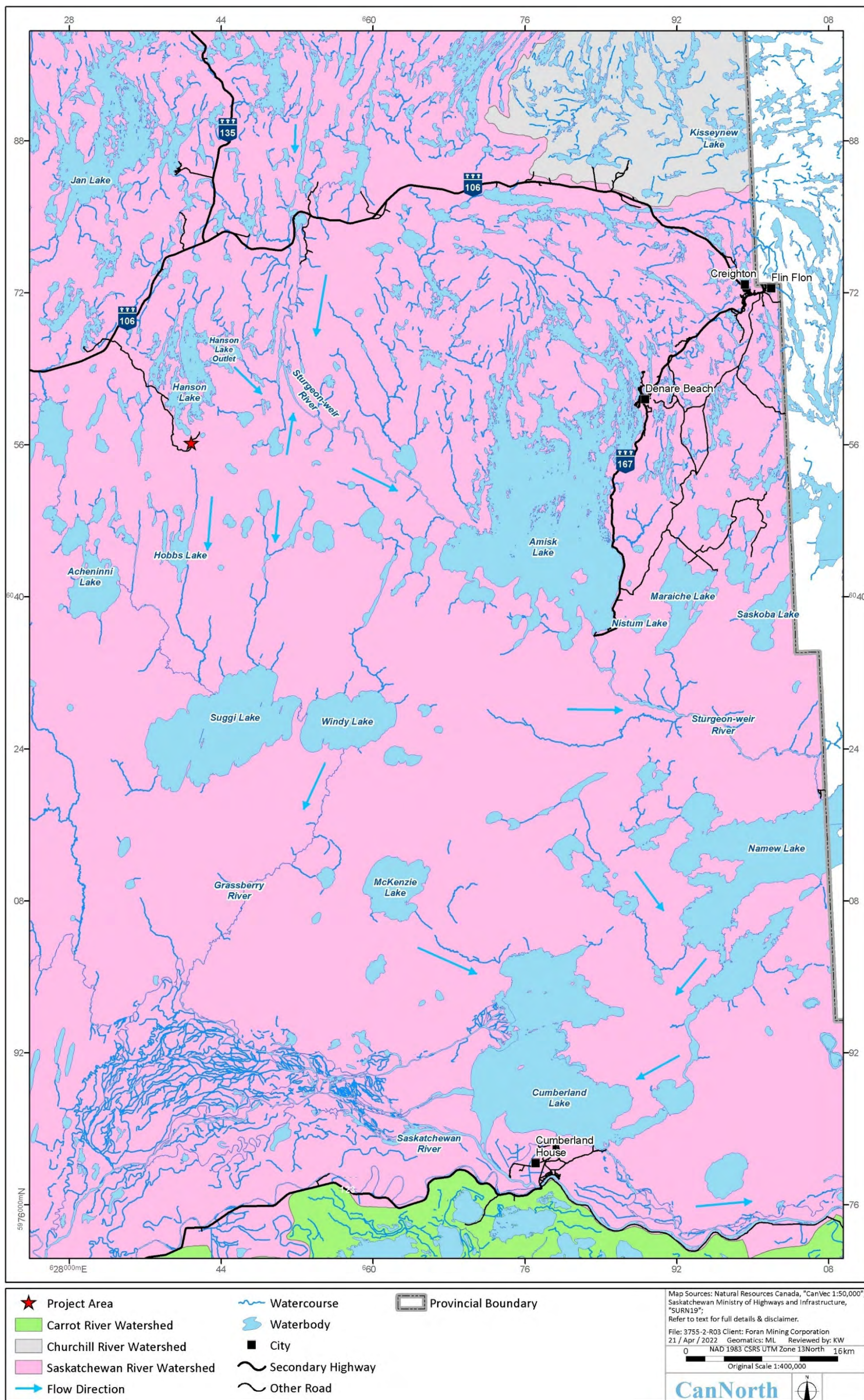
Hanson Lake is the primary study lake in the ASA as it is located adjacent to the Project, it is the proposed site of treated effluent discharge, and it is of regional importance. Hanson Lake drains into the Sturgeon-Weir River, which then flows through several large lakes (Amisk Lake, Namew Lake, and Cumberland Lake) to join the Saskatchewan River near Cumberland House. The Saskatchewan River forms part of the Nelson River system, which ultimately discharges into Hudson Bay (Figure 7-3).

Baseline surface water hydrologic information was obtained from both desktop studies and field surveys to characterize the spatial and temporal variability in the hydrologic regime of the area. A hydrology field program designed to monitor water levels and stream discharge was first established in May 2012, and monitoring occurred between 2012 and 2014 and in 2018 to 2019 in the study areas shown in Table 7-2 and Figure 7-2. In 2021, hydrology stations were established in the Hobbs Lake drainage and associated reference areas and monitoring continued in Mcllvenna Bay, Winn Bay, and Bad Carrot River.

The Hanson Lake watershed is approximately 295 km<sup>2</sup> and includes many smaller lakes and streams. The largest tributary stream into Hanson Lake is Bad Carrot River, which drains an area of roughly 103.1 km<sup>2</sup> and includes the outflows from Guyader Lake and Bad Carrot Lake. Blackduck Creek flows into the southeastern end of Hanson Lake and drains an area of approximately 10.3 km<sup>2</sup>.

Bathymetric mapping of the majority of waterbodies in the ASA was completed in 1990 (TAEM 1990b) or 2012 (CanNorth 2013), with additional areas completed in July 2021. Bathymetric information from Hanson Lake is historic (Sawchyn 1967), and the lake was reported to be large and complex with a surface area of 41.88 km<sup>2</sup>, a volume of  $332.8 \times 10^6$  m<sup>3</sup>, a maximum depth of 32.8 m, and a mean depth of 7.94 m. Mcllvenna Bay is a long and narrow bay with a shore length of 10.98 km and 8 islands. The entire bay is shallow; bathymetric mapping conducted in 1990 showed the maximum depth, located near the mouth, was 3.40 m and the mean depth was 1.04 m (CanNorth 2013). Winn Bay is slightly bigger and deeper than Mcllvenna Bay with a shore length of 15.33 km, a maximum depth of 9.28 m, and a mean depth of 2.82 m (CanNorth 2013). Winn Bay was selected as the location for treated effluent discharge because it is in close proximity to site infrastructure and is deeper than Mcllvenna Bay.

Unnamed Lake is located south of Hanson Lake directly adjacent to Hanson Lake Facility silica sand quarry that was decommissioned in 2015 (refer to Section 3.1 for further information). It is a small and shallow lake with a surface area of 0.83 km<sup>2</sup>, a volume of  $0.19 \times 10^6$  m<sup>3</sup>, a maximum depth of 1.40 m, and a mean depth of 0.92 m (CanNorth 2013).



OK

Figure 7-3 Regional Watersheds and Flow Surrounding the Project

7.2.4.2 Surface Water Quality

Field-measured and laboratory-analyzed water quality data were collected seasonally in 2012 and 2021 in the Project ASA (Table 7-2) and 2022 data collections are underway. The parameters measured each year are presented in Table 7-3. Water quality monitoring stations were sampled in Winn Bay and Mcllvenna Bay during both years. The water quality program included collecting limnological measurements (temperature, dissolved oxygen, pH, and conductivity) and water chemistry data for a large suite of parameters, including inorganic ions, metals, nutrients, and physical properties.

The limnological profiles in Mcllvenna and Winn bays were similar between the 2012 and 2021 studies and between seasons. The water columns in both bays were well oxygenated with moderate specific conductance levels (average of approximately 150 µS/cm), and pH levels that were slightly basic (average of approximately 8.3). Water chemistry data illustrated that parameter concentrations were low, with the majority of values being near or below laboratory detection limits. There were no instances where parameter concentrations exceeded Saskatchewan Surface Water Quality Objectives and Canadian Water Quality Guidelines for the protection of freshwater aquatic life in Mcllvenna Bay or Winn Bay during the 2012 or 2021 sampling programs.

One water sample collected in Unnamed Lake in October 2012 contained concentrations of aluminum, selenium, and uranium that were higher than in the other seasons and exceeded guidelines; however, the high turbidity and specific conductance concentrations indicated that possibly sediment was disturbed during sampling collection (CanNorth 2013). Otherwise, water quality in Unnamed Lake was found to be similar to other small lakes in the ASA.

Table 7-3 Water Chemistry Parameters Measured from Baseline Studies Conducted in 2012, 2021, and 2022

Parameter	Units	2012	2021	2022
<b>Inorganic Ions</b>				
Bicarbonate	mg/L	✓	✓	✓
Calcium	mg/L	✓	✓	✓
Carbonate	mg/L	✓	✓	✓
Chloride	mg/L	✓	✓	✓
Hydroxide	mg/L	✓	✓	✓
Inorganic carbon	mg/L	✓	-	-
Magnesium	mg/L	✓	✓	✓
Potassium	mg/L	✓	✓	✓
Sodium	mg/L	✓	✓	✓
Sulfate	mg/L	✓	✓	✓
<b>Metals and Trace Elements</b>				
Aluminum	mg/L	✓	✓	✓
Aluminum, dissolved	mg/L	-	-	✓
Antimony	mg/L	✓	✓	✓
Arsenic	µg/L	✓	✓	✓
Barium	mg/L	✓	✓	✓

Parameter	Units	2012	2021	2022
Beryllium	mg/L	✓	✓	✓
Boron	mg/L	✓	✓	✓
Cadmium	mg/L	✓	✓	✓
Chromium	mg/L	✓	✓	✓
Chromium hexavalent	mg/L	-	-	✓
Chromium trivalent	mg/L	-	-	✓
Cobalt	mg/L	✓	✓	✓
Copper	mg/L	✓	✓	✓
Cyanide, total (S.A.D.)	µg/L	✓	-	-
Fluoride	mg/L	✓	✓	✓
Iron	mg/L	✓	✓	✓
Lead	mg/L	✓	✓	✓
Lithium	µg/L	-	-	✓
Manganese	mg/L	✓	✓	✓
Mercury	µg/L	✓	✓	✓
Molybdenum	mg/L	✓	✓	✓
Nickel	mg/L	✓	✓	✓
Selenium	mg/L	✓	✓	✓
Silver	mg/L	✓	✓	✓
Strontium	mg/L	✓	✓	✓
Thallium	mg/L	✓	✓	✓
Tin	mg/L	✓	✓	✓
Titanium	mg/L	✓	✓	✓
Uranium	µg/L	✓	✓	✓
Vanadium	mg/L	✓	✓	✓
Zinc	mg/L	✓	✓	✓
<b>Nutrients</b>				
Ammonia as nitrogen	mg/L	✓	✓	✓
Nitrate	mg/L	✓	-	-
Nitrate (as N)	mg/L	-	✓	✓
Nitrate (NO3)	mg/L	-	✓	✓
Nitrate+Nitrite (as N)	mg/L	-	✓	✓
Organic carbon	mg/L	✓	-	-
Organic dissolved carbon	mg/L	-	✓	✓
Phosphorus	mg/L	✓	✓	✓
Total Kjeldahl nitrogen	mg/L	✓	✓	✓
Total nitrogen	mg/L	✓	-	-
Total organic carbon	mg/L	-	✓	✓
<b>Physical Properties</b>				
Alkalinity, Phenolphthalein	mg/L	✓	✓	✓

Parameter	Units	2012	2021	2022
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	✓	✓	✓
pH	pH units	✓	✓	✓
Specific conductivity	µS/cm	✓	✓	✓
Sum of ions	mg/L	✓	✓	✓
Total dissolved solids	mg/L	✓	✓	✓
Total hardness	mg/L	✓	✓	✓
Total suspended solids	mg/L	✓	✓	✓
Turbidity	NTU	✓	✓	✓

#### 7.2.4.3 Sediment Quality

Sediment samples were collected from the ASA in October 2012 and September 2021 (Table 7-2), with Mcllvenna Bay and Winn Bay sampled in both years. The parameters measured each year are presented in Table 7-4. In these bays, five replicate stations were sampled in depositional areas using a Tech-ops extruder corer, and the surficial horizons were submitted for analyses of Total Organic Carbon (TOC), particle size, inorganic ions, metals, and nutrients.

Mcllvenna and Winn bays were sampled at depths of approximately 2 m and particle size was almost entirely comprised of silt/clay composition in both years. Sediment parameter concentrations were comparable between Mcllvenna and Winn bays and between sampling years (2012 and 2021). There were several instances where sediment metal concentrations (i.e., arsenic, cadmium, chromium, copper, nickel) exceeded the lowest guidelines (Interim Sediment Quality Guidelines (CCME 2021) or Lowest Effect Levels (Thompson et al. 2005)) in one or both bays and/or years. These results illustrate that the sediment in these bays contains naturally elevated concentrations of select metals and trace elements. In 2012, sediment chemistry data from Unnamed Lake were comparable to Hanson Lake, and mean concentrations of cadmium, copper, and arsenic also exceeded these benchmarks (CanNorth 2013).

Table 7-4 Sediment Chemistry Parameters Measured from Baseline Studies Conducted in 2012 and 2021

Parameter	Units	2012	2021
<b>Inorganic Ions</b>			
Calcium	µg/g	✓	✓
Magnesium	µg/g	✓	✓
Potassium	µg/g	✓	✓
Sodium	µg/g	✓	✓
<b>Metals and Trace Elements</b>			
Aluminum	µg/g	✓	✓
Antimony	µg/g	✓	✓
Arsenic	µg/g	✓	✓
Barium	µg/g	✓	✓
Beryllium	µg/g	✓	✓
Boron	µg/g	-	✓

Parameter	Units	2012	2021
Cadmium	µg/g	✓	✓
Chromium	µg/g	✓	✓
Cobalt	µg/g	✓	✓
Copper	µg/g	✓	✓
Cyanide, total (S.A.D.)	µg/g	✓	-
Iron	µg/g	✓	✓
Lead	µg/g	✓	✓
Manganese	µg/g	✓	✓
Mercury	µg/g	-	✓
Molybdenum	µg/g	✓	✓
Nickel	µg/g	✓	✓
Selenium	µg/g	✓	✓
Silver	µg/g	✓	✓
Strontium	µg/g	✓	✓
Thallium	µg/g	✓	✓
Tin	µg/g	✓	✓
Titanium	µg/g	✓	✓
Uranium	µg/g	✓	✓
Vanadium	µg/g	✓	✓
Zinc	µg/g	✓	✓
<b>Nutrients</b>			
Organic carbon	%	✓	✓
Phosphorus	µg/g	✓	✓
<b>Physical Properties</b>			
Clay	wt %	✓	✓
Coarse Sand	wt %	✓	✓
Fine Sand	wt %	✓	✓
Gravel	wt %	✓	✓
Loss on ignition	%	✓	✓
Moisture	%	✓	✓
Silt	wt %	✓	✓

#### 7.2.4.4 Plankton Community

Phytoplankton and zooplankton were sampled concurrently in the ASA in summer 2012, and in Mcllvenna Bay in the spring, summer, and fall 2021 to capture seasonal variation (Table 7-2). In Mcllvenna and Winn bays in 2012, phytoplankton assemblages were diverse and numerically dominated by blue-green algae, with green algae and diatoms also making notable contributions. In 2021, phytoplankton communities in Mcllvenna Bay were dominated by golden algae in spring and blue-green algae in the summer and fall. The Unnamed Lake phytoplankton assemblage was almost entirely composed of green algae accounting for 94% of the total phytoplankton density. In 2012, rotifers were the numerically dominant zooplankton in Mcllvenna Bay and Unnamed Lake, whereas Calanoida crustaceans comprised the bulk of zooplankton

composition in Winn Bay. In 2021, zooplankton communities in Mcllvenna Bay consisted of mainly of Cyclopoida crustaceans in spring and rotifers in summer and fall. Unnamed Lake had the lowest zooplankton richness and diversity in the ASA in 2012 (CanNorth 2013).

#### 7.2.4.5 Benthic Invertebrate Community

Benthic invertebrate sampling was conducted in the ASA concurrent with the sediment sampling program in October 2012 and September 2021 (Table 7-2). Composite benthic invertebrate samples were collected using an Ekman dredge at five replicate stations per study area and were submitted to a qualified taxonomist for taxonomic identification, enumeration, and biomass estimations.

In Mcllvenna Bay in 2012, Amphipoda (also called scuds and freshwater shrimp) was the predominant group (43% community composition), while in Winn Bay and Unnamed Lake, approximately half of the community composition contained non-biting midges from the Family Chironomidae. In 2021, the most abundant taxa within the communities in both Mcllvenna and Winn bays was Amphipoda (45.7% and 35.6% of the community composition, respectively), followed by Cyclopoida (small shrimp) and Ephemeroptera (*Caenis* sp., also called mayflies) in Mcllvenna Bay, and Chironomidae (non-biting midge larvae) and Mollusca in Winn Bay. Mcllvenna and Winn bays both illustrated abundant, diverse, and rich benthic invertebrate communities with relatively similar community metrics between study areas and years. Replicate stations in Unnamed Lake were extremely variable in benthic invertebrate density and richness.

#### 7.2.4.6 Fish Community, Spawning, Chemistry, and Habitat

Extensive fish and fish habitat studies have been completed in the ASA to meeting the following objectives:

- determine fish community composition, abundance, and health;
- locate key areas that are utilized for fish spawning;
- map aquatic habitat types and document areas of critical habitat; and
- collect baseline fish chemistry data.

Fish and fish habitat studies were conducted in 10 waterbodies in the ASA in 2012, and in 7 waterbodies in 2021 (Table 7-5). Although notable data changes were not anticipated, fish surveys were conducted in Mcllvenna and Winn bays during the 2021 program to provide updated information for the EIA.

A total of 15 species of fish are known to be present in Hanson Lake (Table 7-5), and none of these species are considered to be SOCC. Six large-bodied fish species, which are of commercial, recreational, and Indigenous importance, were captured in Mcllvenna Bay and Winn Bay during the 2012 and 2021 baseline studies [cisco (*Coregonus artedii*) lake whitefish (*Coregonus clupeaformis*), northern pike (*Esox lucius*), walleye (*Sander vitreus*), white sucker (*Catostomus commersonii*), and yellow perch (*Perca flavescens*)]. A fish study conducted in 1966 captured one lake trout in 20 gill net sets; and during 1929 and 1967, commercial fisherman produced 20,815 pounds of lake trout from Hanson Lake (Sawchyn 1967). Lake trout have not been captured in Hanson Lake during studies conducted in 1990 (TAEM 1990a, 1990b), 1999 (unpublished data), 2012 (CanNorth 2013), and 2021 (unpublished data). Fish community studies were conducted in Unnamed Lake during the 2012 program and no fish were captured (CanNorth 2013).

Table 7-5 Fish Species Captured in Hanson Lake

Fish Species	Hanson Lake <sup>a</sup>	Agnew Bay	Bad Carrot Bay	Mcllvenna Bay	Unnamed Bay	Winn Bay
Brook Stickleback	*, x, ✓	x		*, x		*, x
Cisco	*, ✓			*, ✓		*, ✓
Fathead Minnow	✓					
Lake Chub	*, x	x		*, x	x	*, x
Lake Trout	✓					
Lake Whitefish	*, x, ✓		x	*, x, ✓		*, x
Logperch	*, x, ✓			x		*
Ninespine Stickleback	*, ✓			*		*
Northern Pike	*, x, ✓	x	x	*, x, ✓	x	*, x
Slimy Sculpin	*, x, ✓					*, x
Spottail Shiner	*, x, ✓			*, x, ✓		*, x
Trout Perch	x, ✓					x
Walleye	*, x, ✓	x	x	x, ✓	x	*, x
White Sucker	*, x, ✓	x	x	*, x, ✓	x	*, x
Yellow Perch	*, x, ✓	x	x	*, x, ✓	x	*, x

x denotes captured during 2012 surveys, \* denotes capture during 2021 surveys in Winn Bay and Mcllvenna Bay, ✓ denotes historical fish capture.

<sup>a</sup> Includes all areas on Hanson Lake including Agnew Bay, Bad Carrot Bay, Mcllvenna Bay, Unnamed Bay, and Winn Bay. Sources: Sawchyn 1967; TAEM 1990a, 1990b; 1999 unpublished data; CanNorth (2013, 2022).

In Winn Bay a total of 213 fish were captured during the 2021 fall fish community and spawning surveys. Twelve different species were captured (n = 6 for both large-bodied fish and small-bodied fish) in Winn Bay, with white sucker (n = 44; 20.7%), lake whitefish (n = 31; 14.6%), and yellow perch (n = 31; 14.6%) comprising the majority of the large-bodied fish captured. Spottail shiner was the dominant small-bodied fish captured (n = 39; 18.3%).

Evidence of spawning (i.e., eggs) by northern pike and yellow perch was abundant throughout most of the ASA, and Bad Carrot River was found to be an important spawning migration route/area for white sucker, walleye, northern pike, and yellow perch during the 2012 study (CanNorth 2013). Results from Mcllvenna and Winn bays from the spawning surveys (2012 spring, and 2012 and 2021 fall) and most recent habitat assessments (2021) illustrated that numerous areas contain moderately to highly suitable spawning habitat for yellow perch and northern pike, and eggs for both species were located during the 2012 spring spawning survey. Most of the littoral zone in Mcllvenna and Winn bays contained rocky substrates such as gravel, cobble, boulder, and bedrock. The abundance of rock substrate and the presence of rocky islands and shoals in the upper portion of Winn Bay provided several locations of moderately to highly suitable spawning habitat for walleye, lake whitefish, and white sucker, and lake whitefish eggs were found in some of these areas during the 2021 fall spawning survey. However, the lower portions of both bays located near to the Project contained a higher amount of dirty rocks, organic, sand, or silt/clay substrates, and emergent vegetation that limited suitable spawning habitat for these species.

Northern pike flesh samples were submitted for chemical analyses as a predatory species and white sucker flesh samples were submitted as a bottom feeding species from numerous lakes in the ASA during the 2012 study (Table 7-5). In 2021, northern pike and white sucker fish flesh samples from McIlvenna and Winn bays were submitted. Mean metal concentrations in northern pike and white sucker flesh samples from McIlvenna Bay (2012) and Winn Bay (2012 and 2021) were comparable and low, with most concentrations near or below the laboratory detection limits. All samples collected had selenium concentrations below the 11.3 µg/g (dry weight) guideline (U.S. EPA 2016). Mercury concentrations in fish flesh samples were below the 0.5 µg/g Health Canada recommended safe consumption level (GS 2015) except for one northern pike from Winn Bay in 2012 where a concentration of 0.52 µg/g was measured.

### 7.2.5 Groundwater

A summary of the relevant hydrogeological investigations completed within the SSA and surrounding area since 2012 are provided below:

Golder (2012):

- 2000 m of geotechnical core logging of 14 NQ-diameter double tube borehole. Core logging included lithological description, fracture counts, and rock quality designation.
- Hydraulic response testing of three geotechnical boreholes to measure hydraulic conductivity and transmissivity of bedrock intervals within the hanging wall, mineralized zone, and footwall of the deposit.

North Rock Mining Solutions Inc. and Hydro-Resources Inc (2019):

- Measurement of groundwater discharge (via seepage meters) at 71 locations along the shores of Hanson Lake and Unnamed Lake to understand surface water/groundwater interactions.
- Hydraulic response testing (via Profile Tracer Tests and slug tests) of 15 boreholes to measure the average hydraulic conductivity of bedrock along the borehole.
- Groundwater sampling of 10 bedrock boreholes for analysis of metals and metalloids, major ions, selected organic and inorganic compounds, and properties such as conductivity and pH.

Stantec (2021a):

- Shallow groundwater investigation in the ADEX Camp Area consisting of installation of one test supply well and seven monitoring wells.
- 24-hour pumping test of the test supply well to estimate aquifer yield, hydraulic conductivity, and water quality of the supply aquifer.
- Hydraulic response testing (slug testing) of a monitoring well installed in sandstone.
- Groundwater sampling of five monitoring wells for analysis of benzene toluene, ethylbenzene, xylenes, petroleum hydrocarbons, metals, mercury, phosphate, ammonia, radium 226, and properties such as conductivity and pH.
- Hydraulic response testing (packer testing) of four bedrock boreholes at multiple depths for a total of 15 test intervals to estimate bedrock hydraulic conductivity of the tested interval.

The hydrogeology in the Project area can be categorized by shallow consolidated and unconsolidated sedimentary formations overlaying deeper igneous and metamorphic basement geological formations (Figure 7-4).

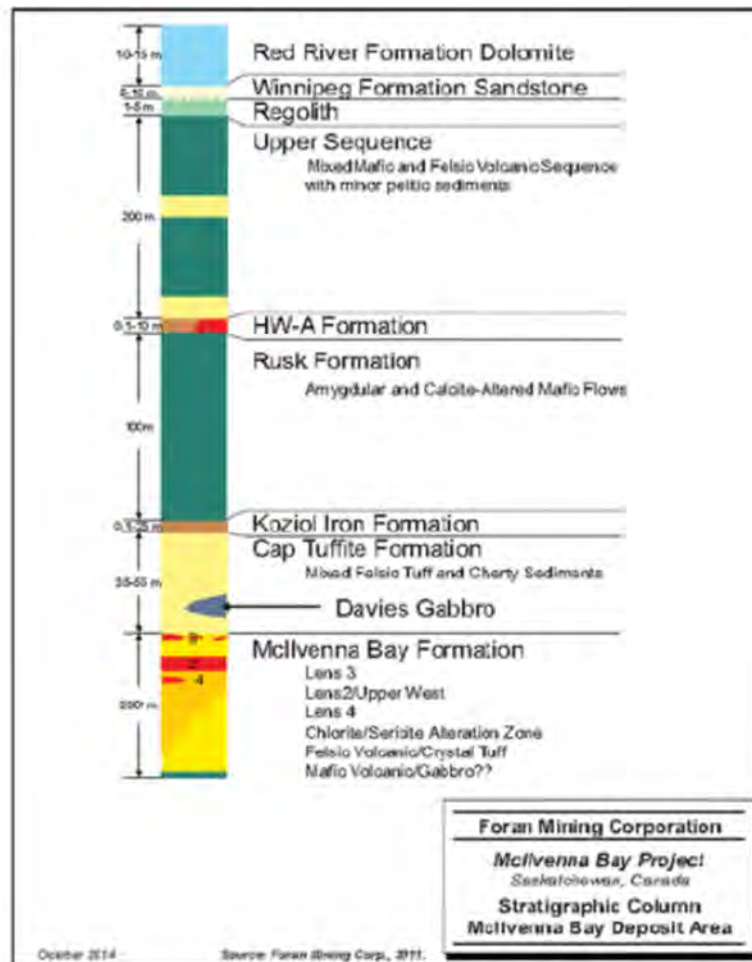


Figure 7-4 Stratigraphic Column for the Mcllvenna Bay Complex Area (Foran 2020)

Apart from saturated marshlands, the shallow aquifer of note resides within the Winnipeg Formation. This formation consists of a 5 m to 10 m thick (MDEng 2019), heterogeneous, weak to moderately cemented sandstone. Hydrogeological testing within the Winnipeg Formation indicates that hydraulic conductivity varies from orders of magnitude from  $10^{-3}$  to  $10^{-7}$  m/s (Stantec 2021a, 2021b). This aquifer is assumed to be confined by the overlying 10 m to 20 m thick Red River Formation dolostone and underlain by the igneous and metamorphic basement geological formations (MDEng 2019; Stantec 2021a). The Red River Formation dolostone has been described by Golder (2012) as being competent; however, saturated fractured zones within the Red River dolostone are likely to be recharged by the underlying Winnipeg Formation.

The deeper igneous and metamorphic bedrock formations were observed to have lower hydraulic conductivities than the upper sedimentary formations. The hydraulic conductivity of the deep igneous and metamorphic bedrock formations varies over three orders of magnitude from  $10^{-8}$  m/s to  $10^{-11}$  m/s. Of note, MDEng (2019) describes the presence of the Koziol Fault above the Cap Tuffite Formation. The fault is located roughly 50 m of the ore body and consists of a 1 m thick zone of rubble and gouge.

The seepage testing completed along the shores of Hanson Lake and Unnamed Lake indicate that both are shallow groundwater discharge zones. Shallow groundwater is expected to laterally flow towards these surface water features. Groundwater elevations measured in boreholes open from just below

ground surface through the Mcllvenna Bay complex, suggest the average groundwater flow is to the northwest and may also be influenced by surface water features.

Groundwater quality in the Winnipeg formation was assessed through sampling of the test supply well installed at the ADEX Camp Area. The water quality meets the Water Security Agency potable water requirements for safe consumption. The results indicate that groundwater exceeds the aesthetic objectives for iron and manganese included in the Canadian Drinking Water Quality Guidelines. Both iron and manganese are naturally occurring in groundwater in the area due to the erosion and weathering of rock (Stantec 2021a).

## 7.2.6 Geology and Geochemistry

### 7.2.6.1 Regional Geology

The Project is located on the western edge of the Paleoproterozoic Flin Flon Greenstone Belt (FFGB) which extends from north central Manitoba into north-eastern Saskatchewan. The FFGB forms part of the Reindeer Zone, a subdivision of the Trans-Hudson Orogen, a continental-scale tectonic event which occurred approximately between 1.84 Ga and 1.80 Ga (Syme et al. 1999) as a result of the collision between the Superior and Hearne Archean Cratons.

As currently viewed, the FFGB contains eight geographically separate juvenile island arc volcanic assemblages (blocks), each being 20 km to 50 km across (Maxeiner et al. 1999; Zwanzig and Schledewitz 1997). These assemblages are separated by major structural features and/or areas of differing tectonostratigraphic origin. It is unclear whether the juvenile arc sequences represent different island arcs, or segments of a larger continuous arc. Within the belt, each tectonostratigraphic block has been broken into several subblocks, usually bounded by local to regional fault systems. Correlation of stratigraphy between subblocks is difficult to impossible to determine.

The exposed portion of the FFGB is approximately 250 km in an east-west direction by 75km north-south. Although it has an apparent easterly trend, this is an artefact of the belt's tectonic contact with gneissic metasedimentary, metavolcanic, and plutonic rocks to the north (Kissynew Domain) and the east-trending trace of Phanerozoic platformal cover rocks to the south. In reality, the FFGB extends hundreds of kilometres to the south-southwest beneath a thin cover of essentially flat-lying, Phanerozoic sedimentary rocks.

By Early Ordovician time, the area of northern Saskatchewan and Manitoba had been effectively peneplaned and a regolith was developed on exposed rocks. Inundation by the Ordovician ocean initiated the deposition of the Phanerozoic cover sequence which, in the Mcllvenna Bay area, is now represented by the basal Winnipeg Formation sandstone overlain by the Red River Formation Dolomite.

In the general Flin Flon area, the predominant direction for the Late Wisconsinan ice-flow indicators is south-southwest indicating that the ice was flowing from a Keewatin dispersal centre. The resulting tills are thin and generally reflect local bedrock lithologies (McMartin et al. 1999).

### 7.2.6.2 Local and Property Geology

The Hanson Lake Block, the host terrain of Mcllvenna Bay, is bound to the east by the Sturgeon-Weir Shear Zone and to the west by the Tabbernor Fault Zone. The block extends an unknown distance to the south beneath a nearly flat lying cover of Ordovician sandstones of the Winnipeg Formation, and dolomites of the Red River Formation. To the north, the block is bound by the Kissynew Domain, a gneissic

metasedimentary belt and the Attitti Complex. The east end of the block hosts the Hanson Lake Pluton, a large compositionally variable granodiorite to pyroxenite intrusion.

At least two distinct folding events, both having northerly trending fold axes, have influenced the stratigraphy in the Hanson Lake Area. The Hanson Block structural fabric is dominated by a north to northwest-southeast trending, upright regional transposition foliation. A protracted D2 structural event resulted in tight to isoclinal, southwest plunging F2 folds and local southwest verging mylonite zones. D3 deformation resulted in tight north trending folds followed by a brittle D4 event characterized by north-south trending faults.

Peak regional metamorphism in the areas west and north of Hanson Lake reached upper amphibolite facies as observed by the partial melting of the granodiorite-tonalite assemblage in the Jackpine and Tulabi Lake areas. At Mcllvenna Bay, the Proterozoic sequence exhibits a greenschist metamorphic facies as the deposit alteration assemblages are dominated by sericite and chlorite. Lacking any outcrop in the area of the deposit, the property geology has been interpreted from the drill core record with help from geophysical surveys.

The stratigraphy of the deposit area, has been divided into six formations, has been defined over a 2 km strike length by a total of 285 drill holes. The identification of zones of mylonite and phyllonite within this “stratigraphy” casts doubt on its layer cake nature. It is more likely to represent a structurally disrupted tectonostratigraphy. The lowest unit intersected by drilling is the Mcllvenna Bay Formation, the host of much of the mineralization. The Mcllvenna Bay Formation is overlain to the north by the Cap Tuffite Formation. The Mcllvenna Bay Formation and the Cap Tuffite Formation may be genetically related but have been separated as they are temporally distinct, as demonstrated by the positioning of the Mcllvenna Bay complex between these two units.

Overlying the Cap Tuffite Formation is the Koziol Iron Formation, a long and distinctive unit traceable for several kilometres along strike by mapping and geophysics. Structurally above the Koziol Iron Formation is the Rusk Formation, a thick package of mafic volcanics. The Rusk Formation in turn is overlain by the HW-A Formation, a thin unit of iron rich lithologies. Capping the HW-A Formation is a thick unsorted bimodal package of mafic and felsic volcanics, and mafic intrusions and minor iron formations tentatively called the Upper Sequence which may be thickened due to folding and faulting.

The tectonostratigraphy has been cut by several different intrusions, the largest of which is the Davies Gabbro, represented by a number of sill-like bodies found within the Cap Tuffite Formation. The Proterozoic basement geology is unconformably overlain by the relatively flat lying to shallowly south-dipping Ordovician dolomites and sandstones of the Red River and Winnipeg Formations which have an average total thickness between 20 m and 30 m.

The Mcllvenna Bay Formation, the host formation of the sulphide deposit, is known only to the extent it has been drilled below the footwall of the deposit. The formation is at least 200 m thick (true thickness) and comprises the massive and disseminated sulphides and copper-rich stringer zones that make up the Mcllvenna Bay Complex, and a succession of variably altered felsic volcanics, volcanoclastics, and/or volcanic-derived sediments of rhyolitic composition.

#### 7.2.6.3 Mineralization

Mcllvenna Bay is a VHMS which consists of structurally controlled, polymetallic massive sulphide mineralization and associated stringer style mineralization. The disseminated and massive ~~to~~ sulphides

contain copper and/or zinc, with lower concentrations of silver, gold and lead while the stringer style mineralization generally contains elevated copper and gold. The deposit has undergone moderate to strong deformation and upper greenschist to possibly lower amphibolite facies metamorphism. The sulphide lenses are now attenuated down the plunge to the northwest.

The Mcllvenna Bay complex includes five separate zones and two styles of mineralization that are mineralogically and texturally distinct and typical of VMS deposits, including:

- massive to semi-massive sulphide mineralization in the Main Lens and Lens 3;
- stockwork-style sulphide mineralization in the CSZ that directly underlies the Main Lens; and
- two other small lenses of stockwork-style mineralization:
  - the Stringer Zone, which is located between the Main Lens and Lens 3;
  - the Copper Stockwork Footwall Zone (CSFWZ), which occurs as a separate lens underneath the CSZ for approximately 140m of strike length which could represent a fault offset and repetition of the Main Lens and CSZ.

As a result of recent geophysical surveys and advancements in understanding the controls on mineralization at Mcllvenna Bay several new drill targets have been determined within the confines of the Mcllvenna Bay Mine Lease. These include the Tesla Target some 300m north of the last down plunge intersections on the main orebody itself and several new EM targets immediately to the north of the mine. Initial drill testing of the Tesla Target has shown it to be a zone of disseminated and semi massive sulphide mineralization hosted in a zone of intense silica alteration possibly in a hangingwall position relative to the Mcllvenna Bay deposit itself. This mineralization is considered significant in its tenor and position relative to the planned mine infrastructure and will be the focus for ongoing exploration within the near mine environment. EM targets to the immediate north and east of Mcllvenna Bay (hangingwall) will be tested in the near future for potential further mineralization.

#### 7.2.7 Atmospheric and Sensory Environment

Historical climate data (1981-2010) for the Environment and Climate Change Canada (ECCC) meteorological station at the Flin Flon Airport was used to describe the climate normals for the region surrounding the Project. Annual average temperature was 0.2°C with monthly average temperatures ranging from -19.8°C (January) to 18.2°C (July). Total mean annual precipitation over the 30-year period was 487.6 mm, while mean annual snowfall was 150.2 cm, approximately 31% of the total annual precipitation.

In the summer of 2012, a permanent meteorological station was installed on the Project site to record site-specific data over the long-term. This station continuously monitors temperature, precipitation, relative humidity, wind speed and wind direction, solar radiation, and barometric pressure. In 2020, mean monthly temperatures in the Mcllvenna Bay Project area ranged from -15.4°C in January to 19.1°C in July, while total precipitation was 618.8 mm.

Baseline air quality and light monitoring studies were completed throughout the summer and fall of 2021 and included monitoring of:

- sulphur dioxide (SO<sub>2</sub>);
- nitrogen dioxide (NO<sub>2</sub>);
- dustfall;
- particulate matter less than 2.5 micron (PM<sub>2.5</sub>);

- particulate matter less than 10 micron (PM<sub>10</sub>);
- metals; and
- illuminance and sky glow.

Air quality monitoring was completed in accordance with the Saskatchewan air monitoring guideline (SKMOE 2012b) and US Environmental Protection Agency equivalent reference methods, where available. Air quality data were collected at three stations using semi-continuous monitoring approaches (particulate) and passive monitoring approaches (SO<sub>2</sub>, NO<sub>2</sub>).

A baseline noise monitoring program was completed in 2012. As no sensitive receptors were found within the SSA, two monitoring stations were established within the Project LSA. Noise monitoring occurred three times throughout the year, for a 24-hour period at each site. The average sound level recorded throughout the monitoring period ranged from 49.2 dBA in the spring to 61.4 dBA in the summer (CanNorth 2013).

Light trespass and sky glow were measured during the 2021 summer field campaign, during a period with no significant light contribution from the moon, and no significant cloud cover in accordance with methods established under the International Commission on Illumination (CIE). Light trespass was measured using a standard hand-held light meter and baseline sky glow was measured using a Unihedron Sky Quality Meter.

### 7.3 Social, Economic and Health

A high level socio-economic and land use screening was completed in the fall of 2021 using the 2016 Census data to assess the demographic, employment, and economic setting of the LSA (StatsCan 2017). The socio-economic LSA used for this screening includes communities and reserve lands located within a 100 km radius of the SSA (Figure 7-5). A total of 44 communities and reserves were identified in the LSA, 12 of which had 2016 Census population data available. Approximately 13,941 people resided in these 12 communities in 2016 (StatsCan 2017). Municipalities within the study area include:

- Cities of Flin Flon, Saskatchewan (population 203) and Flin Flon, Manitoba (4,982)
- Town of Creighton (1,402)
- Northern Villages of Denare Beach (813), Pelican Narrows (630), Cumberland House (791), and Sandy Bay (697)
- Northern Resort Subdivisions of Sturgeon-Weir, Jan Lake, and Tyrrell Lake
- Cluster Subdivisions of Deschambault Lake and Sturgeon Landing, the unorganized communities of Bakers Narrows, Big Island Lake, and Payuk Lake
- Local Urban District of Cranberry Portage.

Population data for the Northern Resort Subdivisions and Cluster Subdivisions are included in the NSAD population counts, and population data for the unorganized communities of Bakers Narrows, Big Island Land, and Payuk Lake are included in the Division No. 21 Unorganized Census Subdivision. These population data could not be broken out for the communities in the LSA and is therefore not included in this assessment. In the 2016 census, the adjacent communities of Amiskosakahikan I.R. No. 210 and the Northern Village of Denare Beach were enumerated together. The adjacent communities of Wapaskokimaw I.R. No. 202 and the Northern Village of Sandy Bay were also enumerated together.

PBCN also had 2021 population data available for four communities including:

- Kimosom Pwatinahk I.R. No. 203 (Deschambault Lake) (1632) (PBCN 2021a)
- Amiskosakahikan I.R. No. 210 (444) (Denare Beach) (PBCN Health Services 2022a)
- Pelican Narrows I.R. No. 184B (3759) (PBCN 2022)
- Sturgeon Weir I.R. No. 184F (111) (PBCN Health Services 2022b).

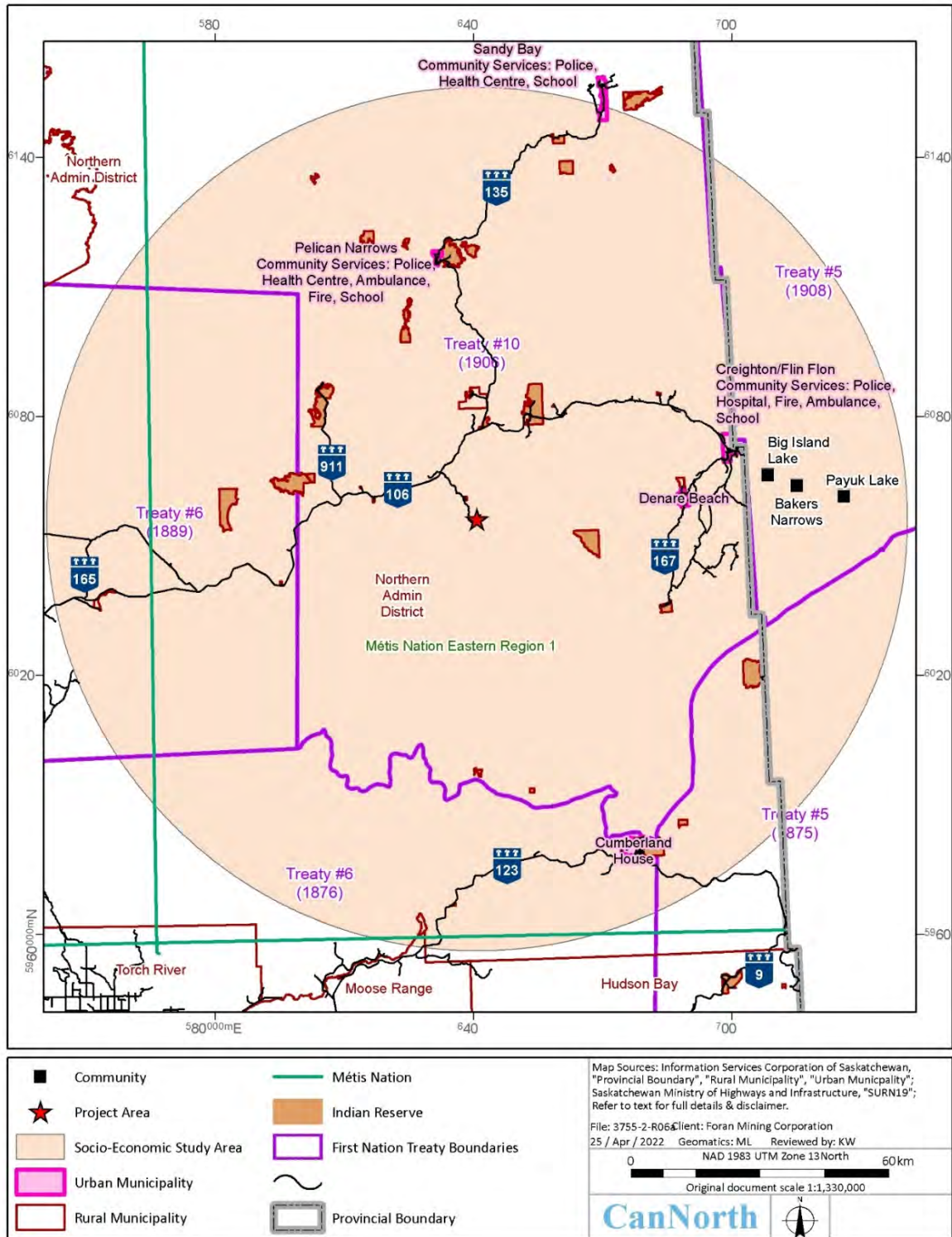


Figure 7-5 Proposed Socio-economic Study Area for the Project

A list of communities and reserves, their approximate distance from the SSA, and population data if available are provided in Table 7-6.

Table 7-6 Populations of Communities in the LSA and the Distance to the Project

Community	Government	Approximate Distance to Project (km)	2016 population <sup>1,2</sup>	2021 population <sup>1,2</sup>
Nakiskatowaneek I.R. No. 2273	PBCN	22	-	-
Amisk Lake I.R. No. 184	PBCN	23	-	-
Amisk Lake I.R. No. 184	PBCN	24	-	-
Waskwaynikapik I.R. No. 228	PBCN	26	-	-
Northern Resort Subdivision of Sturgeon-Weir, Saskatchewan	NSAD	27	-	-
Northern Resort Subdivision of Jan Lake, Saskatchewan	NSAD	29	-	-
Birch Portage I.R. No. 184A	PBCN	30	-	-
Pisiwiniwatim I.R. No. 207	PBCN	40	-	-
Mistik I.R.	PBCN	41	-	-
Kimosom Pwatinahk I.R. No. 203 (Deschambault Lake)	PBCN	43	1061	1632
Sandy Narrows I.R. No. 184C	PBCN	44	-	-
Cluster Subdivision of Deschambault, Saskatchewan	NSAD	47	-	-
Amiskosakahikan I.R. No. 210	PBCN	48	-	444
Northern Village of Denare Beach, Saskatchewan	Northern Village of Denare Beach	49	779	-
Northern Resort Subdivision of Tyrrell, Saskatchewan	NSAD	53	-	-
Muskwaminiwatim I.R. No. 225	PBCN	54	-	-
Maskikopawiscikosik I.R. No. 229	PBCN	55	-	-
Pine Bluff I.R. No. 20A	Cumberland House Cree Nation	57	-	-
Pine Bluff I.R. No. 20B	Cumberland House Cree Nation	57	-	-
Pelican Narrows I.R. No. 184B	PBCN	59	1869	3759
Pelican Narrows I.R. No. 206	PBCN	59	-	-
Northern Village of Pelican Narrows, Saskatchewan	NSAD	60	630	-

Community	Government	Approximate Distance to Project (km)	2016 population <sup>1,2</sup>	2021 population <sup>1,2</sup>
Town of Creighton, Saskatchewan	Town of Creighton	60	1402	-
Thomas Morin I.R.	PBCN	60	-	-
Mirond Lake I.R. No. 184E	PBCN	61	-	-
Muskeg River I.R. No. 20C	Cumberland House Cree Nation	63	-	-
City of Flin Flon, Saskatchewan	City of Flin Flon	64	203	-
City of Flin Flon, Manitoba	City of Flin Flon	64	4982	-
Woody Lake I.R. No. 184D	PBCN	68	-	-
Unorganized Community of Big Island Lake, Manitoba	N/A - Division No. 21, Unorganized	70	-	-
Sturgeon Weir I.R. No. 184F	PBCN	71	81	111
Unorganized Community of Bakers Narrows, Manitoba	N/A - Division No. 21, Unorganized	75	-	-
Cluster Subdivision of Sturgeon Landing, Saskatchewan	NSAD	76	-	-
Sturgeon Weir I.R. No. 205	PBCN	76	-	-
Waskiatik Sakahikan I.R. No. 223	PBCN	83	-	-
Northern Village of Cumberland House, Saskatchewan	Northern Village of Cumberland House	84	671	-
Cumberland House Cree Nation I.R. 20	Cumberland House Cree Nation	84	795	-
Budd's Point I.R. No. 20D	Cumberland House Cree Nation	84	-	-
Manawanstawayak I.R. No. 230 <sup>3</sup>	PBCN	87	-	-
Unorganized Community of Payuk Lake, Manitoba	N/A - Division No. 21, Unorganized	88	-	-
Nemekus Sakahikan I.R. No. 221	PBCN	88	-	-
Sokatisewin Sakahikan I.R. No. 224	PBCN	90	-	-
Local Urban District of Cranberry Portage	Municipality of Kelsey	94	771	-
Wapaskokimaw I.R. No. 202	PBCN	98	-	-
Northern Village of Sandy Bay, Saskatchewan	NSAD	99	697	-

<sup>1</sup>Data has been subjected to a confidentiality procedure known as random rounding whereby values are rounded either up or down to a multiple of 5, and in some cases 10. Rows may not add due to rounding.

<sup>2</sup>The adjustment to counts of the population for any dissemination block is controlled to ensure that the population counts for dissemination areas will always be within 5 of the actual values. The adjustment has no impact on the population counts of census divisions and large census subdivisions.

### 7.3.1 Demographics

Of the total population of the LSA, approximately 26% were under 15 years of age in 2016, 63% were aged 15 to 64, and the remaining 11% were 65 or older. Approximately 51% of the LSA population identified as male and 49% identified as female. Detailed information on the population breakdown by age and gender per community is provided in Table-7-7.

Table-7-7 Population of Communities in the LSA by Age and Gender

Community	Total Population (2016) <sup>1</sup>	Age			Gender	
		0-14	15-64	65+	Male	Female
Kimosom Pwatinahk I.R. No. 203 (Deschambault Lake)	1061	415	605	40	515	545
Northern Village of Denare Beach, Saskatchewan	779	155	510	115	410	365
Pelican Narrows I.R. No. 184B	1869	705	1100	60	995	875
Northern Village of Pelican Narrows, Saskatchewan	630	230	365	30	315	315
Town of Creighton, Saskatchewan	1402	275	910	220	705	695
City of Flin Flon, Saskatchewan	203	25	135	40	115	90
City of Flin Flon, Manitoba	4982	860	3360	765	2510	2470
Sturgeon Weir I.R. No. 184F	81	25	50	0	45	35
Northern Village of Cumberland House, Saskatchewan	671	220	410	40	360	315
Cumberland House Cree Nation I.R. 20	795	300	470	20	405	390
Local Urban District of Cranberry Portage	771	115	550	100	415	355
Northern Village of Sandy Bay, Saskatchewan	697	280	380	35	345	350
<b>LSA total<sup>2</sup></b>	<b>13941</b>	<b>3605</b>	<b>8845</b>	<b>1465</b>	<b>7135</b>	<b>6800</b>

<sup>1</sup>Please see footnotes 1-2 from Table 7-6.

<sup>2</sup>The study area total does not include unorganized areas, subdivisions, or Indian Reserves that are not separately enumerated by Statistics Canada or cases where data is not released due to data quality or confidentiality reasons.

### 7.3.2 Employment

In the 2016 Census, the potential labour force in the LSA was estimated at 10,120 people, and of the potential labour force, the estimated participation rate was 54.4% (or 5,510 individuals). Approximately 47.5% (4,810 individuals) of the potential labour force in the LSA was employed and approximately 12.8% (705 individuals) were considered unemployed. Detailed information on employment statistics is provided in Table 7-8 and Table 7-9.

Table 7-8 Labour Force Characteristics of Communities Located in the LSA

Community	Total Population Aged 15+ by Labour Force Status <sup>1</sup>	In the Labour Force <sup>2,3</sup>	Participation Rate <sup>2,3</sup>	Employed <sup>2</sup>	Employment Rate <sup>2,3</sup>	Unemployed <sup>2,3</sup>	Unemployment Rate <sup>2,3</sup>	Not in the Labour Force <sup>2,3</sup>
Kimosom Pwatinahk I.R. No. 203 (Deschambault Lake)	640	180	28.1%	120	18.8%	60	33.3%	465
Northern Village of Denare Beach, Saskatchewan	600	380	63.3%	355	59.2%	30	7.9%	215
Pelican Narrows I.R. No. 184B	1160	395	34.1%	225	19.4%	170	43.0%	770
Northern Village of Pelican Narrows, Saskatchewan	400	120	30.0%	70	17.5%	50	41.7%	275
Town of Creighton, Saskatchewan	1105	785	71.0%	725	65.6%	55	7.0%	320
City of Flin Flon, Saskatchewan	130	95	73.1%	95	73.1%	0	0.0%	35
City of Flin Flon, Manitoba	4075	2725	66.9%	2540	62.3%	185	6.8%	1350
Sturgeon Weir I.R. No. 184F	55	35	63.6%	25	45.5%	10	28.6%	20
Northern Village of Cumberland House, Saskatchewan	525	220	41.9%	170	32.4%	55	25.0%	300
Cumberland House Cree Nation I.R. 20	495	125	25.3%	110	22.2%	15	12.0%	370
Local Urban District of Cranberry Portage	520	300	57.7%	275	52.9%	25	8.3%	225
Northern Village of Sandy Bay, Saskatchewan	415	150	36.1%	100	24.1%	50	33.3%	265
<b>LSA Total<sup>4</sup></b>	<b>10120</b>	<b>5510</b>	<b>54.4%</b>	<b>4810</b>	<b>47.5%</b>	<b>705</b>	<b>12.8%</b>	<b>4610</b>

<sup>1</sup>Total population aged 15 years and over by labour force status is 25% sample data. However, on Indian reserves and in remote communities, Statistics Canada attempts to obtain data from 100% of the population.

<sup>2</sup>See the 2016 Census Dictionary for definitions.

<sup>3</sup>Please see footnotes 1-2 from Table 7-6.

<sup>4</sup>The study area total does not include unorganized areas, subdivisions, or Indian Reserves that are not separately enumerated by Statistics Canada or cases where data is not released due to data quality or confidentiality reasons.

A total of 5,500 people over 15 years of age provided industry-specific employment information. Approximately 16.8% of those aged 15+ are employed in the Mining, Quarrying, and Oil and Gas Extraction sector, followed by 13.3% in the Health Care and Social Assistance sector, 12.9% in the Educational Services sector, and 10.7% in the Retail Sector. Of the 16.8% (925 individuals) employed in the Mining, Quarrying, and Oil and Gas Extraction sector, the highest percentages of people in this sector are located in Denare Beach, Creighton, and Flin Flon.

Table 7-9 Employment by Sector of Communities in the LSA

Community	Total Population Aged 15+ by Industry <sup>1</sup>	Mining, Quarrying, and Oil and Gas Extraction		Health Care and Social Assistance		Educational Services		Retail Trade	
		Population Employed in Sector	% of Total Population 15+ by Industry	Population Employed in Sector	% of Total Population 15+ by Industry	Population Employed in Sector	% of Total Population 15+ by Industry	Population Employed in Sector	% of Total Population 15+ by Industry
Kimosom Pwatinahk I.R. No. 203 (Deschambault Lake) <sup>2</sup>	180	0	0.0%	45	25.0%	30	16.7%	10	5.6%
Northern Village of Denare Beach, Saskatchewan <sup>2</sup>	385	105	27.3%	40	10.4%	40	10.4%	40	10.4%
Pelican Narrows I.R. No. 184B <sup>2</sup>	390	0	0.0%	50	12.8%	75	19.2%	15	3.8%
Northern Village of Pelican Narrows, Saskatchewan <sup>2</sup>	120	0	0.0%	25	20.8%	20	16.7%	0	0.0%
Town of Creighton, Saskatchewan <sup>2</sup>	780	175	22.4%	80	10.3%	70	9.0%	80	10.3%
City of Flin Flon, Saskatchewan <sup>2</sup>	95	30	31.6%	10	10.5%	10	10.5%	10	10.5%
City of Flin Flon, Manitoba <sup>2</sup>	2725	585	21.5%	370	13.6%	200	7.3%	395	14.5%
Sturgeon Weir I.R. No. 184F <sup>3,4</sup>	30	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Northern Village of Cumberland House, Saskatchewan <sup>2</sup>	220	10	4.5%	40	18.2%	75	34.1%	10	4.5%
Cumberland House Cree Nation I.R. 20 <sup>2</sup>	125	10	8.0%	20	16.0%	25	20.0%	10	8.0%
Local Urban District of Cranberry Portage <sup>2</sup>	300	10	3.3%	25	8.3%	125	41.7%	10	3.3%

Community	Total Population Aged 15+ by Industry <sup>1</sup>	Mining, Quarrying, and Oil and Gas Extraction		Health Care and Social Assistance		Educational Services		Retail Trade	
		Population Employed in Sector	% of Total Population 15+ by Industry	Population Employed in Sector	% of Total Population 15+ by Industry	Population Employed in Sector	% of Total Population 15+ by Industry	Population Employed in Sector	% of Total Population 15+ by Industry
Northern Village of Sandy Bay, Saskatchewan <sup>2</sup>	150	0	0.0%	25	16.7%	40	26.7%	10	6.7%
<b>LSA Total<sup>3</sup></b>	<b>5500</b>	<b>925</b>	<b>16.8%</b>	<b>730</b>	<b>13.3%</b>	<b>710</b>	<b>12.9%</b>	<b>590</b>	<b>10.7%</b>

<sup>1</sup>Refers to the general nature of the business carried out in the establishment where the person worked. The data are produced according to NAICS 2012.

<sup>2</sup>Please see footnotes 1-2 from Table 7-4.

<sup>3</sup>The study area total does not include unorganized areas, subdivisions, or Indian Reserves that are not separately enumerated by Statistics Canada or cases where data is not released due to data quality or confidentiality reasons.

Hudbay Minerals Inc. (HudBay) operates several mines in the Flin Flon/Snow Lake area as well as a mill and zinc processing plant in Flin Flon. The 777 Mine located in Flin Flon is expected to transition to care and maintenance in mid-2022 (HudBay 2021). The transition of the mine may impact employment rates in the LSA. The mine currently employs approximately 785 individuals and plans to reduce to 50 positions in 2023. As the 777 mine transitions, activity at the Snow Lake Mine located 198 km by road from Flin Flon will increase and approximately 225 jobs will be created (The Reminder 2021). The transition will result in a reduction of approximately 510 positions in the LSA in the mining sector.

Strong Pine Energy Services received approval in 2020 to construct a silica sand project in the LSA, directly adjacent to the Project SSA, which is anticipated to create 286 positions once operational (Clifton 2019). Strong Pine Energy Services intends on providing shuttles to transport employees from Denare Beach, Flin Flon, Creighton, Pelican Narrows, and Deschambault Lake to the work site (Clifton 2019). Construction was anticipated to begin in February 2020 with a project duration of 20 to 25 years.

The largest employer in PCBN communities is the Band itself through programs such as Band education, health center, Band office, and child and family services (PBCN 2021b). The local economy in PCBN communities includes primarily hunting and trapping, commercial fishing, guiding, mining, forestry, and recreational and cultural opportunities (PBCN 2021b). Key industries in Pelican Narrows include local governance, silica sand production, hunting and trapping, commercial fishing, and guiding, with future development potential in mining (Northern Municipal Services 2012). In Sandy Bay, key industries in 2012 were local governance and hydro-electric power generation through SaskPower's Island Falls facility (Northern Municipal Services 2012). Key industries around Cumberland House include tourism and local governance, with future development opportunities related to agriculture, forestry, and tourism (Northern Municipal Services 2012).

### 7.3.3 Community Services

The nearest health centre to the SSA is located at Deschambault Lake, approximately 66 km by road, and the nearest hospital is located in Flin Flon, Manitoba, approximately 100 km by road.

Fire Services in the LSA are located in Flin Flon. Other fire services located in the RSA include a volunteer fire department in Creighton and seasonal forest fire staff in Deschambault Lake and Pelican Narrows.

Ambulance Services in the LSA are provided by the PBCN Health Services Inc. through a funding agreement with the Mamawetan Churchill River Health Region (Saskatchewan Health Authority) and through Flin Flon (Manitoba Northern Health Region). PBCN Health Services Inc. has an ambulance stationed in Pelican Narrows, which provides service to the Pelican Narrows area, including Sandy Bay and Deschambault Lake. Ambulance services for the City of Flin Flon are provided by the Manitoba Northern Health Region. RCMP detachments in the LSA are located in Deschambault Lake (4 officers), Pelican Narrows (15 officers), Sandy Bay (4 officers), Flin Flon, and Creighton.

The nearest educational facility to the SSA is Kimosom Pwatinahk Collegiate and Kistapiskaw School located at Deschambault Lake, approximately 43 km from the SSA. Opawikoscikan School and Wapanacac School are located in Pelican Narrows approximately 59 km from the SSA. Creighton Community School is located approximately 60 km from the SSA. Flin Flon has four schools within the Flin Flon School Division located approximately 60 km from the SSA.

#### 7.3.4 Land and Resource Use

Land and resource use in the SSA and LSA includes hunting, trapping, fishing, gathering, snowmobiling, and other recreational, commercial, and industrial uses (Figure 7-6).

The SSA is located within Wildlife Management Zone 70. Hunting, both recreational and subsistence, is a popular activity in the area and is administered by the SKMOE. Hunting restrictions are in place throughout the province. At least three hunting outfitters specializing in bear and moose hunting operate in the RSA.

The SSA is located in Fur Block N-31 and adjacent to Fur Block N-35, which were used by approximately 12 trappers in 2012 (ASKI 2012).

Several of the lakes and rivers adjacent to the SSA, including Hanson Lake, contain fish species desirable for anglers (refer to Table 7-5). The closest recreational facility to the SSA is the Hanson Lake Recreation Site located on the western shore of Hanson Lake, approximately 6 km northeast of the SSA. The recreation site has a small campground, picnic area, and boat launch. The recreation site was closed in 2007 due to heavy metal contamination from an abandoned mine shaft (CBC News 2007). It is unclear if the recreation site is still closed. A sign at the recreation site indicates that you should not fish in Hanson Lake. There are no commercial lodges (i.e., outfitters) or larger cabin developments on Hanson Lake, however there may be private cabins on Hanson Lake that are not visible on satellite imagery. The closest commercial outfitter is Miskat Lake Outfitters on Hobbs Lake. It is not known if commercial outfitters or wild rice harvesters utilize the lake. If additional uses on, or in the vicinity of Hanson Lake are identified during engagement they will be considered during the EIS process.

Sturgeon-Weir River Representative Area Ecological Reserve, managed by the SKMOE is located approximately 9 km from the SSA, and the Jan Lake Representative Area is located approximately 25 km from the SSA.

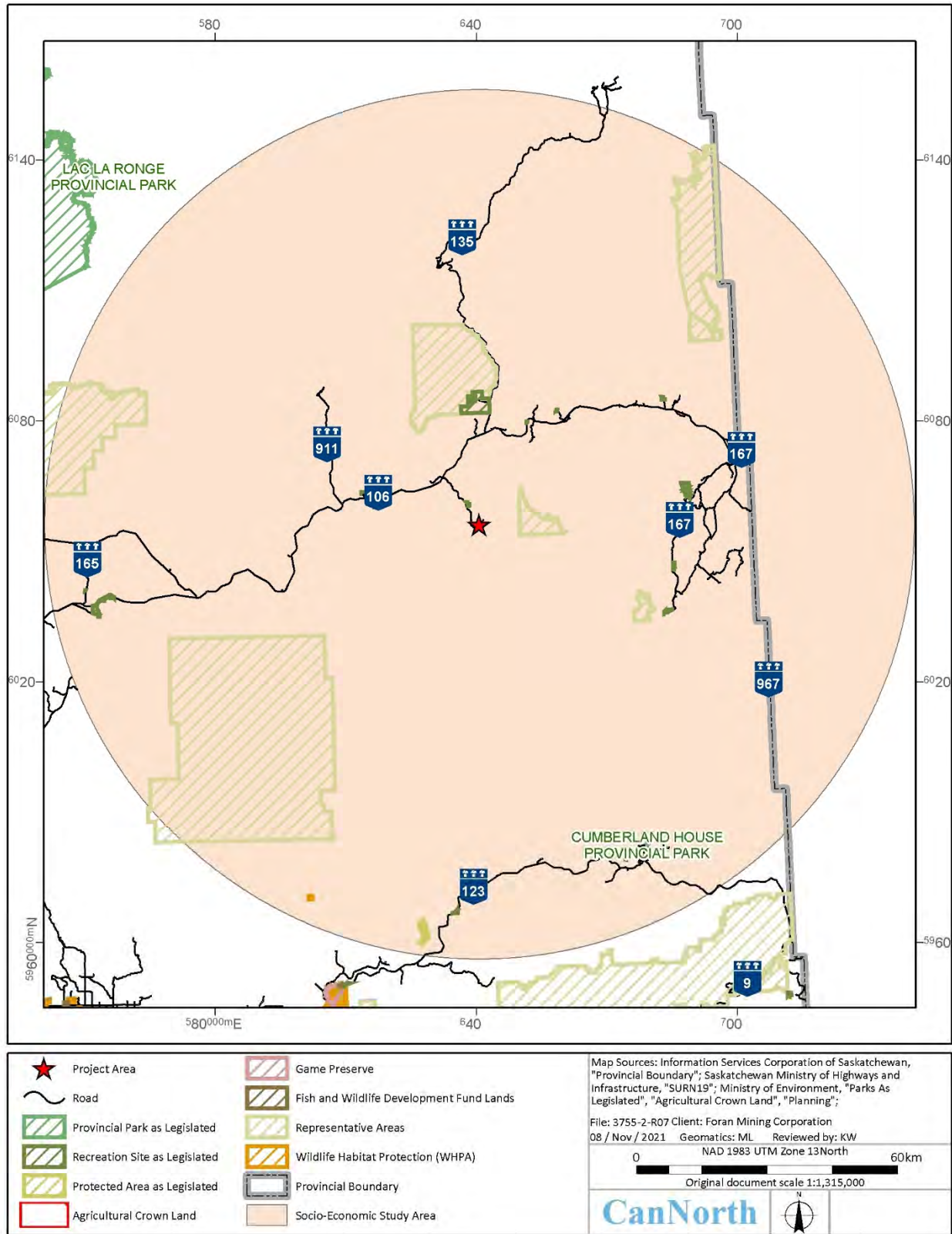


Figure 7-6 Land Use in the Socio-economic Study Area for the Project

Several Provincial Recreation Sites are located within the LSA. Hanson Lake Recreation Site is the closest and is located approximately 5 km northeast of the SSA. Limestone Lake Recreation Site is the next closest located 24 km west of the SSA.

Other recreational activities in the RSA include snowmobiling. The Saskatchewan snowmobile association maintains a large network of trails on the western side of Amisk Lake (SSA 2021). Several snowmobile trails are also used around Hanson Lake (SKMOE 2004).

Eleven commercial outfitters operate within the LSA. Commercial outfitters are located at Amisk, Jan, Bronwell, Kvamsing, and Deschaumbault lakes. Some outfitters offer day trips to several unnamed lakes that are accessible by float planes.

Commercial wild rice farming was identified during 2017 engagement activities as a current land use in the LSA near Limestone Lake. Wild rice farming may also occur on leased Crown Lands in other areas of the LSA.

The SSA is located within the Provincial Forest and the North East Timber Supply Area, and within the Amisk-Atik Management Zone for land use planning. The Amisk-Atik Integrated Forest Land Use Plan was released in 2004 to guide decisions about land and resource use in the LSA. The SSA is located in the Deschambault community area of influence (SKMOE 2004).

Industrial land use in the Project area primarily consists of mining operations. This includes historic and current silica sand projects on Hanson Lake and the 777 Mine in Flin Flon. SaskPower's Island Falls hydro-electric facility is located approximately 99 km north of the SSA at the edge of the LSA.

The Project footprint is accessed from Highway 106 (Hanson Lake Road) by a municipal access road. The access road is operated by the NSAD, and Highway 106 (Hanson Lake Road) is operated by the Ministry of Highways and Infrastructure.

#### 7.4 Archaeology and Heritage

The Heritage Resource Impact Assessment (HRIA) conducted in 2012 was focused in the SSA, which included Project footprint at the time (CanNorth 2013). CanNorth archaeologists initially reviewed the development area for heritage sensitivities and submitted the Project to the Saskatchewan Heritage Conservation Branch (HCB) to determine HRIA requirements. The HCB determined that a HRIA was required for areas that are within 250 m of Hanson Lake (HCB File No. 12-1072). Therefore, in order to adequately assess the shorelines of Hanson Lake's McIlvenna Bay and Winn Bay and to identify areas considered to have the greatest heritage potential, a canoe was paddled along the shorelines. All areas considered to have moderate to high heritage potential were assessed using a combination of pedestrian reconnaissance, the excavation of shovel probes, and examining surface exposures including tree throws and cut lines. Dolomite outcroppings (e.g., cliff faces) were also closely inspected for rock art.

In total, approximately 18.5 ha were assessed on foot including the excavation/inspection of 68 shovel probes/surface exposures and one new heritage resource, GdMq-1, was discovered (Figure 7-7). GdMq-1 was found to be of significance due to the discovery of a quartz biface, which is a stone cutting tool or knife that has been flaked on both sides and may have been hafted to a handle (Kooyman 2000). Additionally, upon further investigation of GdMq-1, three deeply incised dolomite rock crevices were observed in a shelter bay that were large enough to conceal a person, suggesting that this area may have been used as a hunting blind or temporary shelter during the winter.

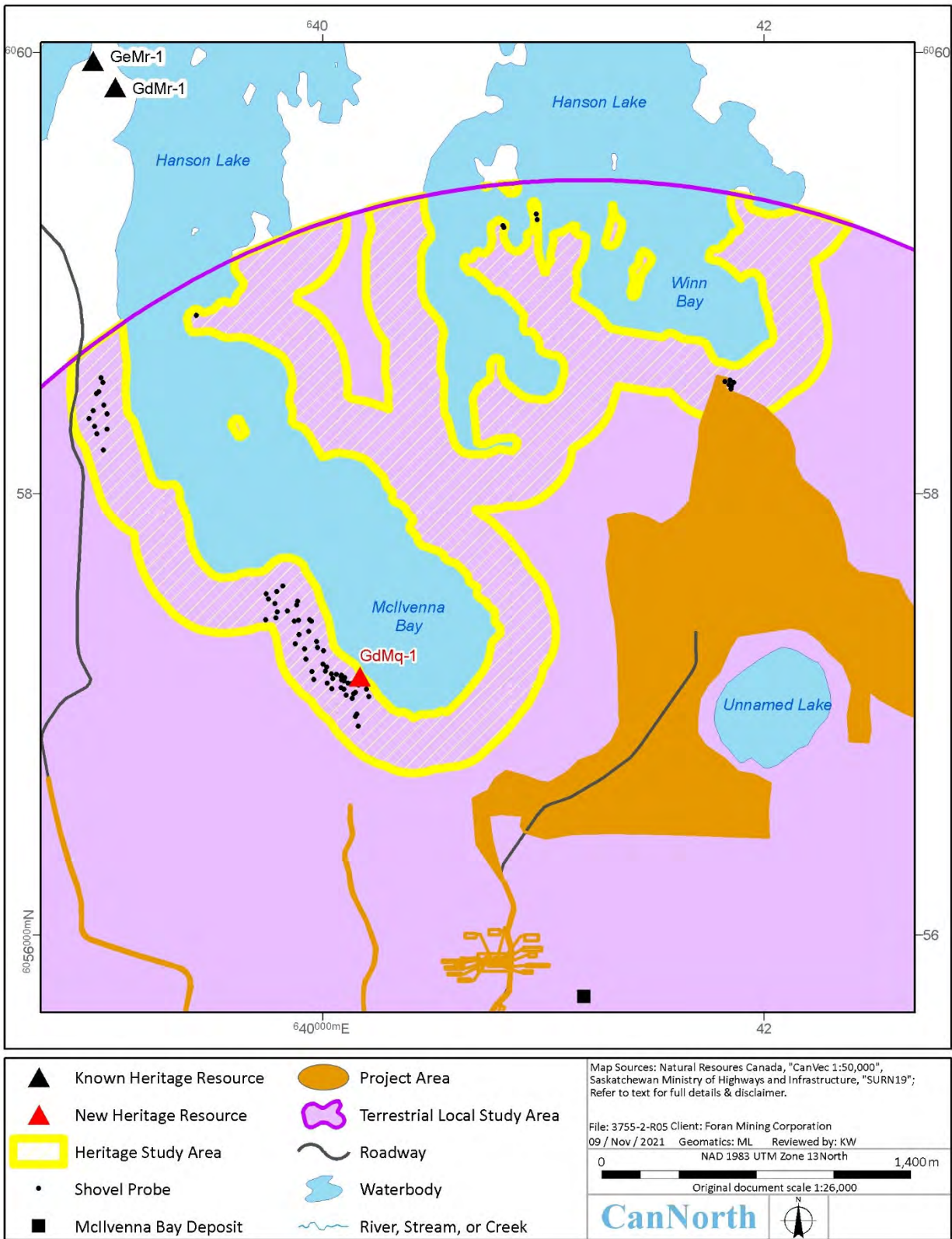


Figure 7-7 Heritages Resources in the Terrestrial LSA and 2012 Baseline Study Search Locations

The revised Project footprint and ancillary projects were submitted for HCB review in May 2022, and the results of the review were received in June 2022 (HRR File No. 22-467, 21-June-2022). The review concluded that no known archaeological sites are located in direct conflict with the proposed development. There were no further concerns with the project proceeding as planned. However, an archaeological site (GdMq-1) was identified in the Project area, and, therefore, the potential for the identification of new heritage resources during construction activities is possible. A chance finds procedure will be developed to ensure that should new heritage resources be identified during construction they will be assessed, and potential effects will be mitigated appropriately.

## 7.5 Traditional Land Use

Foran has been advised by the Saskatchewan Government that Peter Ballantyne Cree Nation (PBCN), the Cumberland House Cree Nation (CHCN), the Opaskwayak Cree Nation (OCN), the Sandy Bay Métis Local #90, and the Cumberland House Métis Local #42 may have Aboriginal and/or Treaty rights and/or interests that may be affected by the proposed Project. Accordingly, Foran has engaged with these Nations through the EIA process and will continue to implement a stakeholder and rights holder engagement strategy throughout the EIA process using a comprehensive plan that was developed for the Project. Foran has been actively engaging with nearby communities since 2011.

PBCN is a signatory to Treaty 6 and its territory spans Treaty 10 and Treaty 6. The Project and SSA are located on Crown land within PBCN territory and in proximity to the PBCN reserves located at Denare Beach, Deschambault Lake, Pelican Narrows, Birch Portage and Sturgeon Landing. Foran has been engaging with PBCN as a treaty and aboriginal rights holder with respect to Project impacts, including potential adverse environmental and socio-economic impacts to PBCN members, lands and uses, including hunting, fishing, trapping and gathering, in all seasons, throughout its territory.

The SSA includes lands available and accessible for the exercise of Treaty and Aboriginal rights and traditional uses.

In 2022, MBO entered into an agreement with PBCN to provide capacity to PBCN to undertake an update to a previous 2012 Traditional Land Use / Knowledge Inventory Study. The results of this study, including any traditional land use areas or cabins near Hanson Lake, will be considered when assessing potential effects on PBCN's rights and interests to participate in traditional activities. During engagement activities for the Project at least one traditional land user with cabins on Hanson Lake and Bad Carrot Lake has been identified. To fully understand potential effects to rights and interests, PBCN requires detailed project information. Engagement efforts will be made to share detailed Project information and further identify and understand potential effects on PBCN rights and interests, including traditional land uses, as part of the EIA process.

Cumberland House Cree Nation traditional territory is also located within the LSA but is not known to overlap the SSA. In 2022, MBO entered into an agreement with CHCN to provide capacity to CHCN to undertake a Traditional Land Use / Knowledge Inventory Study. The results of this study will also be considered during the EIA process.

The SSA is located within Métis Nation Saskatchewan Eastern Region 1 with Locals in the communities of Creighton, Cumberland House, and Sandy Bay.

The nearest Treaty 10 First Nation is English River First Nation with the closest reserve lands located more than 250 km from the SSA.

A Traditional Land Use/Knowledge Inventory study was completed for PBCN by ASKI in 2012 (ASKI 2012). PBCN has shared with MBO that the ASKI (2012) report should not be relied upon to inform the EIS with respect to PBCN rights, interests and concerns.

The purpose of the study was to identify how the Project area is currently being used by PBCN members. The study area included a portion of the LSA and was defined as a corridor approximately 40 km wide centering on the proposed Project and extending northwest from the community of Deschambault Lake, southeast to the Denare Beach.

The study was conducted by two Cree speaking members of PBCN and included interviews with 45 traditional land users during the fall of 2012. Interviewees included both men and women ranging in age from approximately 20 to 70 years of age and included Elders, hunters, trappers, fishermen, and traditional plant harvesters. A summary of the findings of the Traditional Land Use Study is provided below.

The lakes and rivers within the study area provide PBCN members with dependable drinking water supplies, important transportation links, and are a valuable resource for food. They are also vital components of an ecosystem that provides habitat to support the fishing, hunting, and trapping upon which many PBCN residents have traditionally and continue to depend upon for their diet and economic livelihoods. The water resources of the area remain sensitive to contamination from industrial activities (including existing mining and smelting operations), the impacts of water control structure operations, improper sewage disposal, and inappropriate forest harvesting practices. Contamination of the water in any form has the potential to impact a number of medicinal remedies that originate from the water. As a result, a number of interviewees stated continuous testing of the water should happen and that the results be shared with the community (ASKI 2012).

Approximately 75% of PBCN members interviewed indicated that they augment their diet with fish harvested from various lakes in the study area. Species harvested for consumption include (by order of preference) walleye, northern pike, sucker, lake trout, and lake whitefish (if present). The fish are generally eaten fresh or smoked (ASKI 2012).

More than 60% of those interviewed shared that they augment their diet by hunting. Species often harvested for consumption include moose, rabbits, ptarmigan, migratory birds, beaver, muskrat, and occasionally caribou (ASKI 2012).

The study area overlaps Fur Block N-35 and N-31 which are used by approximately 12 people for trapping. Major species trapped include beaver, wolf, rabbit, muskrat, weasels, mink, squirrel, and fox. Trapping is conducted on a commercial basis by some, but also used as a food source and source of material for clothing (ASKI 2012).

Protection of wildlife was a major concern for the residents of the community. Concerns were raised about declining populations and presence of summer birds (migratory waterfowl), weasels, mink, lynx, moose, deer, and woodland caribou. These declines were blamed on the destruction of habitat due to mineral exploration and use of explosives. It is the belief of local people that the industrial activity has caused the animals to disappear or migrate away from the area making it harder and more expensive to hunt and put food on the table (ASKI 2012).

A number of interviewees identified the harvest of understory forest products for food and medicinal purposes as an important issue. There are many roots, leaves, branches, and berries used for food and flavoring as well as medicinal roots, leaves, branches in the forest that have been used in the past and continue to be used today by members of PBCN (ASKI 2012).

An area east of the proposed Project was identified as an important mushroom harvesting area. It is important that contaminants not be allowed to impact the plants in order to ensure that sacred remedies are protected for future generations (ASKI 2012).

While no areas of special significance were identified in the Project area, a number of historical “gathering places” and previous cabins were identified in the surrounding area. These sites are particularly sensitive as they often include historical graves from an era in which people lived in relative seclusion during long periods of the year (i.e., at fish camps or trapping cabins). In the event that anyone comes across evidence of previous habitation (i.e., cabin foundations), it is always treated with respect and not disturbed unless absolutely necessary and even then, only after being fully investigated and discussed with Elders and other leadership within the communities (ASKI 2012).

As the Project proceeds and greater certainty is arrived at for aspects of the mine development, it is recommended that Foran continue to engage the traditional users in order to receive input on potential ways and means to minimize, to the extent possible, negative impacts on the traditional use of the lands in the vicinity of the Project site (ASKI 2012).

## 8 Valued Component Selection

Valued Components (VCs) refer to a selected list of biophysical and human environment components that may be affected (positively or negatively) by the Project, and are the focus of the effects assessment, mitigation planning, and monitoring/offsetting planning in the EIA.

The environmental components assessed in this EIS are broad and encompass potentially affected physical, biological, human environments. They include the following:

1. Atmospheric and acoustic environment
2. Hydrogeological environment
3. Aquatic environment
4. Terrestrial environment
5. Human environment

To concentrate on environmental and social aspects of most relevance to the Project area and activities, VCs were selected within each of the environmental components listed above. The selection of VCs was carried out in consideration of:

- input from stakeholders and rights-holders;
- components that are known to be of ecological, human health, cultural, and/or socio-economic importance;
- input from regulatory agencies, including the TP/TOR document and reviewer comments;
- species of conservation concern with the potential to utilize the Project area (e.g., boreal woodland caribou);
- existing environment conditions and an understanding of potential Project-environment interactions and potential effects; and

- best practices as well as precedent for effects assessments from other mining developments located in similar environments in northern Saskatchewan.

Table 8-1 provides a list of the VCs, rationale for their inclusion, and their focus of assessment and measurement endpoints. The focus of assessment refers to study areas and/or indicators where the effects assessment was focused; these were determined using the same criteria listed above for the VCs. Measurement endpoints represent expressions of change that were used during the effects assessment to determine if an impact (positive or negative) is predicted to occur. These may be quantitative, such as changes in water chemistry, or qualitative such as evaluating potential effects on community well-being. The expected level of change in a measurement endpoint is a key factor in identifying the magnitude of impact that a Project activity may cause on the VC, and whether the effect is deemed not significant or significant.

Table 8-1 Proposed Valued Component Overview

Valued Component	Rationale	Priority Areas	Measurement Endpoints
Air quality	<ul style="list-style-type: none"> <li>• Potential changes in air quality can affect the health of people and the environment</li> <li>• Meeting air quality standards is a regulatory requirement</li> <li>• Project-related increase in dust is of concern to communities</li> </ul>	<ul style="list-style-type: none"> <li>• Selected locations for people and species within the site study area (SSA), local study area (LSA), and regional study area (RSA)</li> <li>• Access road and representative section of Highway 106</li> </ul>	<ul style="list-style-type: none"> <li>• Predicted changes in constituents of potential concern (COPC) and dust concentrations compared to existing environment conditions and Saskatchewan Ambient Air Quality Standards</li> </ul>
Noise and vibration	<ul style="list-style-type: none"> <li>• Potential changes to noise and vibration can affect human health and wildlife</li> </ul>	<ul style="list-style-type: none"> <li>• Selected locations for people and species within the SSA, LSA, and RSA</li> <li>• Access road and representative section of Highway 106</li> </ul>	<ul style="list-style-type: none"> <li>• Predicted changes in noise and vibration compared to existing environment conditions and guidelines</li> </ul>
Greenhouse gas emissions	<ul style="list-style-type: none"> <li>• Meeting greenhouse gas emission standards is a regulatory requirement</li> <li>• The Mcllvenna Bay Project has an ambition of achieving carbon neutrality</li> </ul>	<ul style="list-style-type: none"> <li>• Direct GHG Emissions from the Project</li> </ul>	<ul style="list-style-type: none"> <li>• Predicted direct (Scope 1) GHG emissions by regulated source category and greenhouse gas</li> </ul>
Groundwater quantity	<ul style="list-style-type: none"> <li>• Potential changes to groundwater levels and flow could affect the availability of water for people and biota</li> <li>• Availability of clean water to support current and future generations is an area of concern for communities</li> </ul>	<ul style="list-style-type: none"> <li>• Mcllvenna Bay</li> <li>• Winn Bay</li> <li>• Unnamed Lake</li> <li>• Shallow groundwater aquifers that could support groundwater supply wells</li> </ul>	<ul style="list-style-type: none"> <li>• Predicted changes to flux of groundwater discharging to surface water</li> <li>• Predicted changes in shallow groundwater levels compared to existing environment conditions</li> </ul>
Groundwater quality	<ul style="list-style-type: none"> <li>• Potential changes in COPC concentrations in groundwater could affect its use by groundwater supply well users</li> <li>• Meeting groundwater quality standards is a regulatory requirement</li> <li>• Availability of clean water to support current and future generations is an area of concern for communities</li> </ul>	<ul style="list-style-type: none"> <li>• Shallow groundwater aquifers that could support groundwater supply wells</li> </ul>	<ul style="list-style-type: none"> <li>• Predicted changes in shallow and deep groundwater COPC concentrations compared to existing environment conditions and Saskatchewan Environmental Quality Guidelines (SEQG) for groundwater</li> </ul>
Surface water quantity	<ul style="list-style-type: none"> <li>• Potential changes to surface water levels could affect the availability of water for people and biota</li> <li>• Availability of clean water to support current and future generations is an area of concern for communities</li> </ul>	<ul style="list-style-type: none"> <li>• Winn Bay</li> <li>• Mcllvenna Bay</li> <li>• Unnamed Lake</li> <li>• Wetlands</li> </ul>	<ul style="list-style-type: none"> <li>• Predicted changes in surface water levels compared to existing environment conditions</li> </ul>

Valued Component	Rationale	Priority Areas	Measurement Endpoints
Surface water quality	<ul style="list-style-type: none"> <li>• Potential change in COPC concentrations in surface water and sediment could affect its use by people and biota</li> <li>• Meeting surface water quality standards is a regulatory requirement</li> <li>• Availability of clean water to support current and future generations is an area of concern for communities</li> </ul>	<ul style="list-style-type: none"> <li>• Winn Bay</li> <li>• Mcllvenna Bay</li> <li>• Hanson Lake</li> <li>• Wetlands</li> <li>• Downstream waterbodies (Sturgeon-Weir River, Amisk Lake, and Saskatchewan River below Cumberland House)</li> <li>• Waterbodies of community interest (Suggi Lake, Hobbs Lake)</li> </ul>	<ul style="list-style-type: none"> <li>• Predicted changes in COPC concentrations in surface water and sediment compared to existing environment conditions and guidelines</li> </ul>
Fish and habitat	<ul style="list-style-type: none"> <li>• Potential changes in COPC concentrations in the environment may affect fish health as well as the health of people and wildlife species who consume them</li> <li>• Potential changes to the abundance or types of fish or fish habitat could affect the ability of fish populations to be self-sustaining</li> <li>• Avoiding, mitigating, or offsetting loss of fish habitat is a regulatory requirement</li> <li>• Maintenance of self-sustaining fish populations for current and future generations is an area of concern to communities</li> </ul>	<ul style="list-style-type: none"> <li>• Winn Bay</li> <li>• Mcllvenna Bay</li> <li>• Hanson Lake</li> <li>• Representative fish and aquatic species assessed in the Human Health and Ecological Risk Assessment (HHERA) including plankton, benthic invertebrates, and fish that are consumed by humans and other species</li> </ul>	<ul style="list-style-type: none"> <li>• Predicted effects to aquatic biota due to changes in receiving environments identified through the HHERA</li> <li>• Predicted changes in quantity and quality of fish habitat compared to existing environment conditions</li> <li>•</li> </ul>
Soil health	<ul style="list-style-type: none"> <li>• Potential changes to soil quality and quantity could affect the capacity of soils to support plant growth</li> </ul>	<ul style="list-style-type: none"> <li>• Soil quality in the SSA</li> <li>• Soil quantity in the SSA</li> </ul>	<ul style="list-style-type: none"> <li>• Predicted changes in COPC concentrations in soil compared to existing environment conditions and SEQG for soil</li> <li>• Predicted changes in soil quantity available for reclamation</li> </ul>
Vegetation and unique ecological habitat	<ul style="list-style-type: none"> <li>• Potential changes in COPC concentrations in the environment may affect vegetation health as well as the health of people and wildlife species who consume them</li> <li>• Potential changes to vegetation could affect the ability of these populations to be self-sustaining</li> <li>• Avoidance or mitigation of species of conservation concern (SOCC) is a regulatory requirement</li> </ul>	<ul style="list-style-type: none"> <li>• Vegetation SOCC and communities in the SSA, LSA, and RSA</li> <li>• Representative vegetation species assessed in the HHERA including aquatic and terrestrial plants, lichen, and berries that are consumed by humans and other species</li> <li>• Alvar habitat, a unique ecological type</li> <li>• Wild rice</li> <li>• Plants that are listed as prohibited, noxious or nuisance weeds according to provincial legislation</li> </ul>	<ul style="list-style-type: none"> <li>• Predicted effects to vegetation due to changes in receiving environments identified through the HHERA</li> <li>• Predicted change in abundance and composition of vegetation communities, particularly SOCC, compared to existing environment conditions</li> <li>• Predicted interactions with regional alvar habitat</li> </ul>

Valued Component	Rationale	Priority Areas	Measurement Endpoints
	<ul style="list-style-type: none"> <li>Control of prohibited and noxious weeds is a regulatory requirement</li> <li>Maintenance of land that supports plants and wildlife for current and future generations is an area of concern for communities</li> <li>Preservation of alvar habitat in Saskatchewan is a conservation focus for the Government of Saskatchewan</li> </ul>		
Wildlife and habitat	<ul style="list-style-type: none"> <li>Potential changes in COPC concentrations in the environment may affect wildlife health as well as the health of people and wildlife species who consume them</li> <li>Potential changes to wildlife and their habitat could affect the ability of these populations to be self-sustaining</li> <li>Avoidance or mitigation of SOCC is a regulatory requirement</li> <li>Migratory birds are protected under the Migratory Birds Convention Act</li> <li>Maintenance of land that supports plants and wildlife for current and future generations is an area of concern for communities</li> </ul>	<ul style="list-style-type: none"> <li>Amphibian, bird, and mammal SOCC in the SSA, LSA, and RSA</li> <li>Representative amphibian, bird, and mammal species assessed in the HHERA including wildlife consumed by humans and other species</li> <li>High quality wildlife habitat and habitat connectivity</li> <li>Access road and representative section of Highway 106 for potential wildlife collisions</li> </ul>	<ul style="list-style-type: none"> <li>Predicted effects on wildlife species due to changes in receiving environments identified through the HHERA</li> <li>Predicted change in abundance and composition of wildlife populations, particularly SOCC, compared to existing environment conditions</li> <li>Predicted change in abundance, quality, and fragmentation of wildlife habitat compared to existing environment conditions</li> <li>Predicted traffic collisions with wildlife</li> </ul>
Woodland caribou and habitat	<ul style="list-style-type: none"> <li>Woodland caribou are listed as threatened pursuant to the Species at Risk Act</li> <li>Avoiding, mitigating, or offsetting loss of woodland caribou habitat is a regulatory requirement</li> <li>Protection of woodland caribou was identified by communities as an area of concern</li> </ul>	<ul style="list-style-type: none"> <li>Woodland caribou in the SSA, LSA, and RSA</li> <li>High quality woodland caribou habitat and woodland caribou habitat connectivity</li> <li>Access road and representative section of Highway 106 for potential wildlife collisions</li> </ul>	<ul style="list-style-type: none"> <li>Predicted effects on woodland caribou due to changes in receiving environments identified through the HHERA</li> <li>Predicted changes in quantity and quality of woodland caribou and habitat compared to existing environment conditions</li> <li>Predicted traffic collisions with wildlife</li> </ul>
Traditional land and resource use	<ul style="list-style-type: none"> <li>Potential changes to quality, quantity, and accessibility of land, important areas (including cultural and spiritual sites), traditional foods, and resources required for the exercise of Indigenous rights were identified as areas of concern by rights-holders and in the terms of reference (TOR) comments by the Saskatchewan Health Authority (SHA)</li> </ul>	<ul style="list-style-type: none"> <li>Environmental attributes and species identified by rights-holder communities as important for the exercise of rights and traditional uses in the SSA and LSA</li> <li>Accessibility of, and access routes to, identified environmental attributes and species used by Indigenous peoples that occur in the SSA and LSA</li> </ul>	<ul style="list-style-type: none"> <li>Predicted changes to land and resource quantity and quality compared to existing conditions</li> <li>Predicted changes to accessibility of land and resources compared to existing conditions</li> </ul>

Valued Component	Rationale	Priority Areas	Measurement Endpoints
	<ul style="list-style-type: none"> <li>Changes have the potential to impact the exercise of Aboriginal and Treaty Rights</li> </ul>		<ul style="list-style-type: none"> <li>Predicted changes to frequency or pattern of use compared to existing conditions</li> </ul>
Non-traditional land and resource use	<ul style="list-style-type: none"> <li>Potential changes to quality, quantity, and access to Crown land, important areas (including spiritual and cultural sites), and resources required for, and which may affect continuance of, public uses were identified as areas of concern by community members</li> </ul>	<ul style="list-style-type: none"> <li>Environmental attributes and species identified by land users as important for the continuance of non-traditional land uses on Crown land within the LSA</li> </ul>	<ul style="list-style-type: none"> <li>Predicted changes to land and resource quantity and quality compared to existing conditions</li> <li>Predicted changes to accessibility of land and resources compared to existing conditions</li> <li>Predicted changes to frequency or pattern of use compared to existing conditions</li> </ul>
Human health	<ul style="list-style-type: none"> <li>Potential for impacts to human health due to changes in COPC concentrations in the environment</li> <li>Assessing potential impacts to human health is a regulatory requirement</li> </ul>	<ul style="list-style-type: none"> <li>Deschambault Lake Resort</li> <li>Limestone Lake</li> <li>Resort of Jan Lake</li> <li>Bad Carrot Lake</li> <li>Old Mine Site/Hanson Lake Recreation Area</li> <li>Hanson Lake Cabins</li> <li>Leaf Rapids at Sturgeon-Weir River</li> <li>Sturgeon-Weir River</li> <li>Amisk Lake</li> <li>Denare Beach</li> <li>Fenceline</li> <li>Representative section of Highway 106</li> </ul>	<ul style="list-style-type: none"> <li>Potential risks to human health caused by predicted changes in COPC concentrations in the environment assessed through HHERA</li> </ul>
Worker safety	<ul style="list-style-type: none"> <li>Potential for injury or illness of personnel.</li> <li>The health and safety of workers is a Foran corporate value.</li> </ul>	<ul style="list-style-type: none"> <li>Personnel working on the Project both on and off-site including employees, contractors and visitors.</li> </ul>	<ul style="list-style-type: none"> <li>Predicted exposure of health and safety risks to personnel based on Project design and occupational health and safety plans.</li> </ul>

Valued Component	Rationale	Priority Areas	Measurement Endpoints
Heritage resources	<ul style="list-style-type: none"> <li>Avoiding or mitigating disturbance of heritage resources is a regulatory requirement</li> </ul>	<ul style="list-style-type: none"> <li>SSA where Project activities will disturb land and have the potential to impact heritage resources</li> </ul>	<ul style="list-style-type: none"> <li>Predicted disturbances to known heritage resources that require avoidance or mitigation because of Project activities</li> </ul>
Economic wellbeing	<ul style="list-style-type: none"> <li>Access to employment, income, and contracts for the provision of goods and services is an area of interest noted by community members</li> <li>Deployment of best efforts to extend employment and business opportunities to residents and businesses in the NSAD is a requirement of the mine surface lease agreement</li> <li>Access to education and training to take advantage of employment and business opportunities was identified as an area of interest by community members</li> </ul>	<ul style="list-style-type: none"> <li>Priority employment and business service providers within the NSAD</li> <li>Historically underemployed subsets of the population within priority employment and business service providers</li> </ul>	<ul style="list-style-type: none"> <li>Predicted changes in levels and distribution of employment and income, and access to employment and opportunities among historically underemployed subsets of the population compared to existing conditions</li> <li>Predicted changes to training and education needs and access for historically underemployed subsets compared to existing conditions</li> </ul>
Community wellbeing	<ul style="list-style-type: none"> <li>The presence of safe roads that are in good condition and accident-free, including Highway 106 and intersections, was identified as an area of concern by communities and the SHA</li> <li>Change in pressure on housing and accommodation, especially on PBCN communities, was identified as an area of concern by community members and in the TOR comments by the SHA</li> <li>Changes to community dynamics as a result of shift work was identified as an area of concern by communities</li> <li>The presence of safe and healthy communities and wellbeing of vulnerable persons including Indigenous women and girls was identified as an area of concern by community members</li> <li>Increased pressure on demand and access to health, police, emergency, and other community services was identified as an area of concern by communities and in the TOR comments by the SHA</li> </ul>	<ul style="list-style-type: none"> <li>Representative section of Highway 106 and intersection from access road to Highway 106</li> <li>Populations that may be a focus for employment or experience population and demographic changes</li> <li>Wellbeing of vulnerable persons that are within 200 km driving distance of the camp site</li> <li>Capacity of emergency service providers in the LSA within 200 km driving distance of the camp site</li> </ul>	<ul style="list-style-type: none"> <li>Predicted changes to condition and accident levels on Highway 106 compared to existing conditions</li> <li>Predicted changes in housing and accommodation capacity as compared to existing conditions</li> <li>Predicted change in the number of workers completing shift work compared to existing conditions</li> <li>Predicted changes to the safety and health of communities compared to existing conditions</li> <li>Predicted changes to the wellbeing of vulnerable persons including Indigenous women and girls compared to existing conditions</li> <li>Predicted changes in access, the type, and the frequency of use of community services compared to existing conditions</li> </ul>



## 9 Effects Assessment

This section presents an overview of the methodology that will be used to conduct the effects assessment in the EIA. The intent is to complete the effects assessment and mitigation planning on all potential Project-environment interactions to be comprehensive, and then to focus the residual effects assessment and follow-up monitoring plans on Project activities with the highest risk to the VCs in the biophysical and human environments. The effects assessment approach includes the following stages.

1. Scoping: identification of 1) environmental components, VCs, and the focus of assessment and associated measurement endpoints for each VC, 2) interactions between VCs and Project activities and stages (i.e., Project-environment interactions), and 3) assessment boundaries for each environmental component (spatial and temporal).
2. Screening Effects Assessment: examination of potential Project-environment interactions to identify negative or positive effects on VCs and a description of mitigation measures that will reduce or eliminate the negative effects. This process will result in the identification of residual effects, which are effects remaining after the implementation of environmental design features and mitigation measures. Residual effects will be moved forward into the detailed effects assessment.
3. Detailed Effects Assessment: evaluation of the significance of each residual effect using criteria described in Section 9.3.

The following subsections provide a preliminary description of anticipated Project-environment interactions and potential mitigation strategies, and proposed methods for assessing effects on VCs and determining the significance of residual effects during the EIA. Section 9.1 identifies anticipated impacts to key VCs and proposed mitigation measures that will be utilized to minimize or eliminate these impacts. Section 9.2 outlines the proposed methodology for assessing effects on VCs, including spatial and temporal boundaries and proposed methods for estimating environmental changes and identifying residual effects. Section 9.3 discusses the approach for determining residual effect significance, potential residual effects anticipated for key components, and the intent for offset, as required. Information on engagement with local communities, First Nations, and Métis about VCs and potential impacts to VCs is discussed in sections 4 and 5. Section 9.4 discusses projects that will be included in the Cumulative Effects Assessment (CEA) and the assessment approach.

### 9.1 Predicted Effects and Mitigation

Provided below is a high-level summary of the potential effects (positive and negative) anticipated to occur during all phases (construction, operation, decommissioning, and post-decommissioning) of the Project, including accidents and malfunctions. As part of the EIA, a Conceptual Site Model (CSM) that details the predicted Project inputs, potential receptors, and linkages between them will be developed. This information will then be fed back to the design team to allow for optimization of the mitigation strategies.

A preliminary risk assessment has been completed using the Project plans detailed in Section 3. The objective was to identify potential effects pathways and mitigation measures on potential VCs from various activities that could result from the Project. The results of the preliminary risk assessment are provided in Table 9-1.

Table 9-1 Preliminary Identification of Environmental Risks and Mitigation Measures for the Mcllvenna Bay Project

Activity/Disturbance	Potential Impact/Effects Pathway	Component	Preliminary Mitigation
Dust Generation	Increased release of dust due to excavation, earth-moving, vehicle travel (including travel to/from the site), waste rock pile, and ore stockpile.	Atmospheric Environment	Potential effects of dust will be evaluated during the EIA and mitigation and monitoring measures developed.
	Deposit of dust on soil and plant leaves can affect plant health, consumption of plant material can affect wildlife, and consumption of plant material and wildlife can affect human health.	Terrestrial Environment Human Environment	Potential effects of dust on the terrestrial and aquatic environment will be considered in the EIA including the use of air dispersion models developed in accordance with the Saskatchewan Air Quality Modeling Guideline (SKMOE 2012).  Potential risks to health of plants, wildlife, and humans will be assessed through a human health and environmental risk assessment.
	Changes in ambient air quality and associated deposition may have direct and/or indirect effects on surface water quality.	Aquatic Environment	
	Inhalation of dust.	Human Environment	Development and implement a comprehensive health and safety program for all phases of the Project.
Emissions	Increased emissions during construction, operation and decommissioning could affect air quality and contribute greenhouse gases to the atmosphere.	Atmospheric and Human Environment	Use of best available technology in design of mine, mill, and supporting infrastructure to reduce emissions to air. MBO is aiming to have the Mcllvenna Bay Project be carbon neutral.
			Tying into provincial power grid from the Island Falls hydroelectric station will reduce greenhouse gas emissions associated with the Project over the life of mine.
			Other measures proposed to reduce GHG emissions include the use of battery electric vehicles and a mine air heat recovery system.
Noise	Noise related to vehicles (including travel to/from the site), heavy equipment, blasting, and mining/milling activities can increase ambient noise levels disrupting wildlife.	Human Environment	The Project expects to generate localized vibration and noise outputs within the underground mine and on surface. The enclosure of equipment underground and in buildings on surface are proposed to mitigate these outputs.
		Terrestrial and Atmospheric Environment	Noise effects will be further quantified in the EIA with further potential mitigation options provided
Dewatering	Underground mine dewatering could lower groundwater levels and alter groundwater flow patterns and groundwater discharge to surface water features. Drawdown resulting from dewatering the underground workings may affect local groundwater users if located within the predicted zone of influence.	Hydrogeological Environment Human Environment	Hydrogeological groundwater flow models to predict effects will be utilized in the EIA and further mitigation options will be provided if required.  A water well survey will be conducted to confirm local groundwater users within the predicted zone of influence of mine dewatering on groundwater levels.
	Changes in groundwater discharge to surface water features as a result of underground mine dewatering may result in changes in natural streamflow and surface water levels		
	Mine water release could impact water quality and quantity in the receiving waterbody (Hanson Lake).		Mine water will be collected and treated in the effluent treatment plant. The potential impacts to the receiving waterbody will be characterized in the environmental assessment process.
Ore and waste rock storage pad and TSF	Seepage of contaminants from the ore or waste rock storage pads or TSF could affect groundwater quality.	Hydrogeological Environment	Engineered barriers are proposed to limit seepage.
	The presence of the ore stockpile, waste rock pile, or TSF may alter recharge rates which may affect groundwater flow patterns and groundwater discharge to surface water features.	Human Environment	Tailings not required for paste backfill are proposed to be de-sulphurized to a level that ensures they are not acid generating, dewatered in a thickener, filtered and trucked to the dry stack TSF for deposition.  TSF management program and design standards will be applied (e.g., Mining Association of Canada Tailings Guidance).  Existing groundwater monitoring program will be expanded and implemented.
Site run-off and treated effluent release	Site run-off and treated effluent release may result in changes in volume, flow, and water and sediment quality of receiving waterbody from addition of treated effluent. This in turn could impact aquatic biota and people that consume fish.	Aquatic and Human Environments	All potentially contaminated water will be collected and treated prior to release.  Treated effluent release will be designed to reduce erosion.  Treated effluent volume will be minimized by recycling process water as much as possible.  Estimates of treated effluent quality and quantity will be used in the EIA to predict impacts to the aquatic environment and mitigation measures will be developed where necessary along with follow-up monitoring program.

Activity/Disturbance	Potential Impact/Effects Pathway	Component	Preliminary Mitigation
			A monitoring program for the aquatic environment will be developed and implemented.
Unintentional releases	Unintentional releases of hazardous substances and waste dangerous goods can affect waterbodies, soils, vegetation, and wildlife.	Aquatic and Terrestrial Environments	Hazardous substances and waste dangerous goods storage facilities will be permitted and operated in accordance with the requirements of <i>The Hazardous Substances and Waste Dangerous Goods Regulation</i> .  An Emergency Response Plan will be developed to provide quick detection, control, and management of any unintentional release.  Unintentional releases will be reported according to internal reporting procedures and to regulators as set out in the Discharge and Discovery Reporting Standard.
Surface development	Direct loss and fragmentation of wildlife habitat and movement caused by surface development in previously undeveloped areas.  Sensory disturbance of wildlife.  Direct loss or alteration of native vegetation from surface development in previously undeveloped areas.  Direct loss of soil via erosion, reduction in soil quality/productivity, changes to terrain stability, and alteration of local slope profiles.  Introduction of new or additional prohibited, noxious, nuisance, and/or invasive plants to the area.	Terrestrial and Aquatic Environments	The majority of the proposed surface development is within a previously developed area, thus the disturbance of additional area has been minimized as much as practical.  Potential impacts to the terrestrial environment will be assessed in the EIA and mitigation measures will be developed where necessary along with follow-up monitoring programs and management measures.
Increased traffic	Increase in traffic may impact the terrestrial environment through an increase in collisions with wildlife, sensory disturbance to wildlife, in particular SOCC.  Increase in traffic may influence the atmospheric and acoustic environment through increased dust and noise as a result of vehicle travel.  Deposit of dust on soil and plant leaves can affect plant health, consumption of plant material can affect wildlife, and consumption of plant material and wildlife can affect human health.  Increased traffic can result in increased risk of accidents and impacts to road conditions.	Terrestrial Environment  Atmospheric and Acoustic Environment  Terrestrial Environment Human Environment  Human Environment	Potential effects of traffic on the terrestrial environment will be considered in the EIA. Prevention and mitigation will be addressed through management systems.  Potential effects of dust on the terrestrial and aquatic environment will be considered in the EIA including the use of air dispersion models developed in accordance with the Saskatchewan Air Quality Modeling Guideline (SKMOE 2012).  Noise effects will be further quantified in the EIA with further potential mitigation options provided  Potential effects of dust on the terrestrial and aquatic environment will be considered in the EIA including the use of air dispersion models developed in accordance with the Saskatchewan Air Quality Modeling Guideline (SKMOE 2012).  Potential risks to health of plants, wildlife, and humans will be assessed through a human health and environmental risk assessment.  A transportation impact assessment will be completed and traffic-related impacts will be discussed in the EIA.  A journey management standard will be put in place.
Waste generation	Wildlife may be attracted to the waste generated by the Project which may increase the human-wildlife interactions and mortality and risk to wildlife.	Terrestrial and Human Environments	Waste will be regularly trucked off site.
Health and safety of workers	Potential for increased exposure to workers at the Project to contaminants.	Human Environment	Assessment of potential health effects in the EIA and development and implementation of a comprehensive health and safety program.
Disturbance of heritage resources in Project footprint	Potential disturbance of heritage resources during land clearing and construction activities.	Human Environment	Proposed Project surface development area is not currently overlapping with known heritage resources.
Changes in traditional and other land use	Potential loss or loss of access to traditional hunting, fishing, gathering grounds.	Human Environment  Human Environment	Potential impacts will be assessed in the EIA and management plans and monitoring will be developed and implemented.  Continued engagement with local stakeholders and rights-holders to ensure concerns are heard and adequately addressed.  A socio-economic assessment will be completed in the EIA and Project interactions will be evaluated with mitigation strategies developed.

Activity/Disturbance	Potential Impact/Effects Pathway	Component	Preliminary Mitigation
Socio-economic benefits to local communities	Potential for increased employment, training, economic development, and community services.		Continued engagement with local stakeholders and rights-holders to ensure community involvement in the Project is maximized.
Stress on local health system	Potential for project activities to create stress on the local health care system.	Human Environment	The local SHA and NORMAN health regions will be engaged to assist in the identification and evaluation of these potential stressors.

## 9.2 Screening Effects Assessment

Potential Project-related effects pathways are identified through technical expertise, review of literature and other publicly available EISs, consultation with regulators, and input obtained through stakeholder/rights-holder engagement. Detailed information provided by MBO on Project plans will be used as inputs to models to predict environmental changes for some VCs (e.g., ground water quantity). Predicted changes in measurement endpoints will be compared to existing environment conditions documented during the baseline studies, available guidelines/benchmarks, or to other relevant information. A Human Health and Ecological Risk Assessment (HHERA) will be conducted to predict the potential for effects from specific pathways on selected aquatic and terrestrial VCs (refer to Section 9.2.3).

Mitigation measures will be developed using a hierarchy of strategies that include avoid, minimize, restore, and offset. The primary mitigation strategy used will be avoidance, which has been achieved by measures such as placing facilities on areas previously disturbed by historic mining activities and using existing roads and infrastructure from exploration. Several mitigation strategies will aim to reduce the likelihood, magnitude, extent, and duration of potential effects during the Project stages and minimize overall impacts. Wherever possible, reclamation strategies will be employed throughout the Project phases; for example, progressive reclamation of the TSF is planned throughout the operational period. Additionally, numerous management and monitoring plans will be developed to ensure mitigation measure implementation and to monitor their effectiveness. Emergency response procedures will be prepared to mitigate effects that could result from accidents and malfunctions.

The following sections outline proposed EIA methodologies for the effects assessment including how baseline data will be utilized, spatial and temporal boundaries for each component, and models/techniques for predicting environmental changes and residual effects.

### 9.2.1 Baseline Information

Existing environment data for the Project have been collected since 1989, with baseline programs completed in 2012 and 2021 (summaries are provided in Section 7; details are provided in numerous baseline reports that will be appended to the EIS). The 2021 studies included the following components:

- hydrological, surface water, groundwater, and aquatic environment studies;
- database searches for SOCC;
- small mammal and semi-aquatic mammal studies;
- winter tracking surveys and trail camera studies;
- air quality monitoring and ongoing collection of meteorological data; and,
- light studies.

The following sections provide information on the 2022 baseline studies; several of which have been completed and data are undergoing QA/QC and analyses; therefore, the results were not presented in Section 7, Existing Environment.

#### 9.2.1.1 Terrestrial Environment

The following is a list of terrestrial surveys that will be completed or have been completed in 2022, along with reference to the SKMOE protocols or standard survey methodologies that each survey will follow (when available):

- Land Cover and Habitat Classification Modelling and Mapping (completed in August 2022)
- Vegetation Inventory Surveys (SKMOE 2021a; completed in June and August 2022)
- Aquatic Vegetation Surveys in close proximity to proposed mine infrastructure in Winn Bay (SKMOE 2021a; completed in August 2022)
- Soil Characterization Survey (completed in July 2022)
- Amphibian Survey (SKMOE 2020a; completed in June 2022)
- Breeding Bird Surveys (SKMOE 2020b; completed twice in June 2022)
- Nocturnal Bird Surveys (completed in June 2022)
  - Common Nighthawk Survey (SKMOE 2020c)
  - Yellow Rail Survey (SKMOE 2014c)
- Aerial Survey for Waterbird and Raptor Nests (GA 2013; completed in June 2022)
- Ungulate Pellet Group/Browse Survey (Månsson et al. 2011; Stickney 1966; completed in July 2022)
- Bat Acoustic Surveys (Alberta Sustainable Resource Development 2006; Lausen, C.L. et al. 2008; Vonhof 2017; completed from May to October 2022)

These data will be available for inclusion in the draft EIS with the exception of the bat acoustic information that will not be available until November 2022. To supplement field survey data, 20 ARUs and 5 bat detectors were installed in May 2022 and will be retrieved in late July 2022. The study areas for the 2022 baseline wildlife surveys are described in Section 9.2.2.4.

The 2022 vegetation and soil classification survey methods and locations are discussed in further detail below to address comments provided by the PBCN. Baseline vegetation inventory surveys were conducted in near vicinity to the Project footprint (SSA) and along the approximately 17-km access road from Highway 106 to the Project site (Figure 9-1). Surveys were planned in accordance with SKMOE protocols, using McLaughlin ecosite strata, and were focused on those ecosites likely to contain sensitive species in targeted areas of potential direct disturbance. An early-season terrestrial vegetation inventory survey consisting of 93 transects was conducted in June 2022 by qualified botanists. The survey was conducted in accordance with SKMOE guidelines for vascular plant surveys (SKMOE 2021a), which focuses on community composition by identifying and documenting vascular plant species present, including distribution and abundance of rare/sensitive species and weed species listed under *The Weed Control Act* (GS 2010). The late season survey is scheduled to occur in early August 2022.

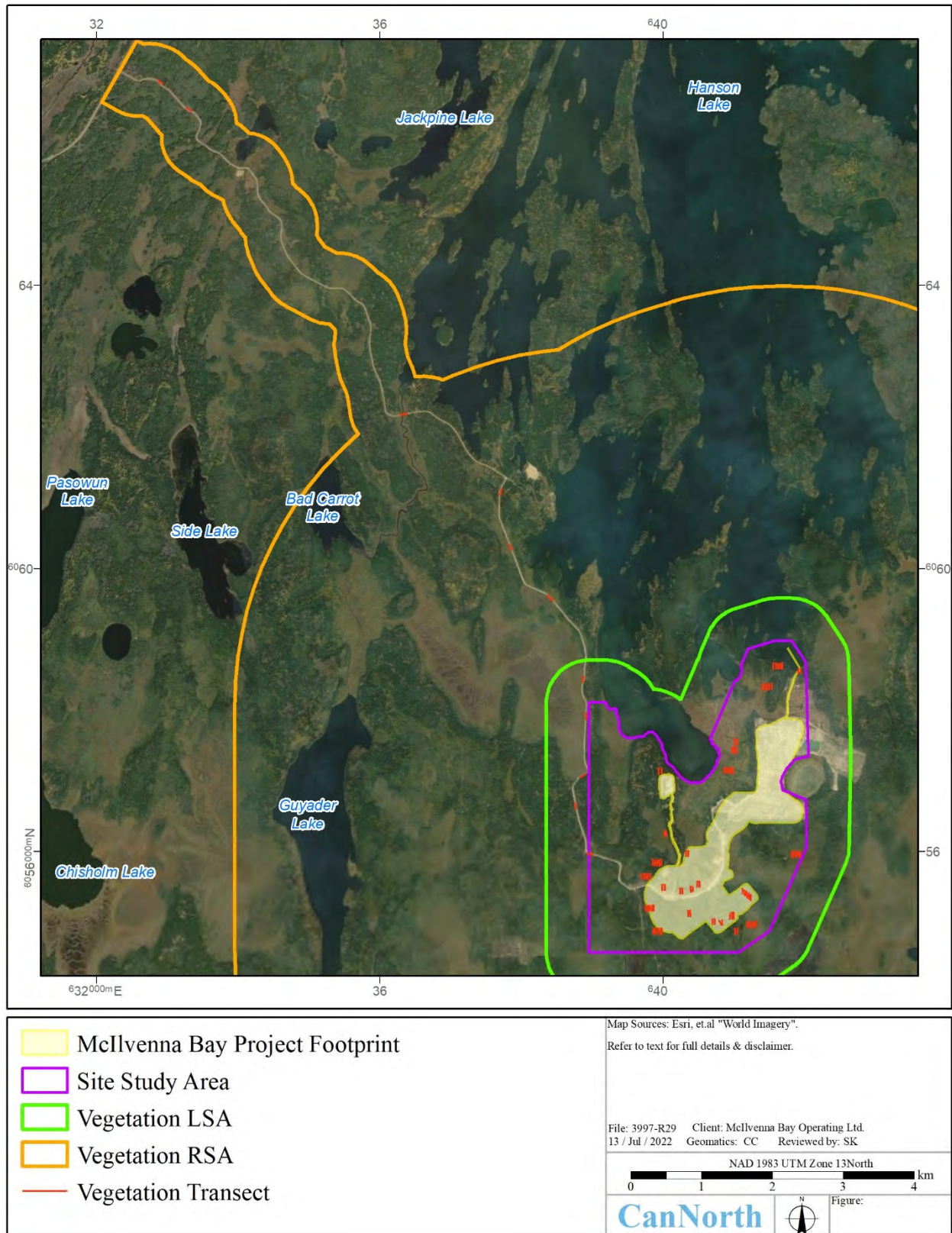


Figure 9-1 Locations of 2022 Early Season Vegetation Survey Transects

Soil classification surveys were conducted throughout the SSA in July 2022 to identify potential environmental and land use concerns related to topsoil conservation, maintenance of soil productivity, and soil erosion following accepted guidelines and classification systems (MSWG 1981; Pennock et al. 2016; SCWG 1998). Survey Intensity Level (SIL) for this survey was based on Mapping System Working Group (MSWG) 1981 for a SIL 2 Survey in which one inspection must be conducted for every 2 to 30 hectares and at least one inspection must be included within 90% of the delineations made. Given these protocols, roughly 70 soil pits were conducted within the SSA. A stratified random sampling design was used, with soil inspection densities varying throughout the SSA according to terrain, access, and the complexity of soil distributions. Where contoured terrain was present, inspection locations were modified to include various slope positions to capture variability in soil characteristics influenced by topography. Additionally, all soil inspection sites were located farther than 100 m from any existing development.

#### 9.2.1.2 Aquatic Environment

The following is a list of surveys that will be completed or have been completed in the aquatic environment in 2022.

- Surface Water Hydrology (spring, summer, and fall)
  - Staff Gauges (water level elevations) in Mcllvenna Bay, Winn Bay, and the Outlet of Hanson Lake
  - Continuous Stream Discharge at the outlet of Hanson Lake
- Surface Water Quality and Limnology – Mcllvenna Bay, 3 locations in Winn Bay, near outlet of Hanson Lake, Sturgeon-weir River<sup>1</sup>, and Amisk Lake (winter, spring, summer, and fall; sampling locations are illustrated in Figure 9-2)
- Spring Spawning Survey in Winn Bay and Mcllvenna Bay (completed in May 2022)
- Additional Fish Chemistry Survey in Winn Bay (flesh and ovary of northern pike; completed in May 2022)
- Detailed Substrate Mapping of the lower portion of Winn Bay near the proposed location of the treated effluent diffuser (completed in May 2022)
- Phytoplankton and Zooplankton sample collections at Winn Bay and near the Hanson Lake outlet (completed in July 2022)
- Sediment chemistry and Benthic Invertebrate Community sample collections in Winn Bay<sup>2</sup>, near the Hanson Lake outlet, and in two potential reference areas<sup>3</sup> (completed in September 2022)
- Fish community information from Hanson Lake outlet and two potential reference areas (completed in September 2022)

Data from the winter, spring, and summer surveys will be available for inclusion in the draft EIS. Data being collected in the fall will provide baseline information from both exposure and reference areas; this information is important for the design of long-term monitoring programs as part of provincial permitting

---

<sup>1</sup> An additional water station is hopefully being added on the Sturgeon-weir River downstream of the confluence with Attree Lake starting in July 2022, but this will be dependent on access.

<sup>2</sup> Sediment and benthic invertebrate samples were collected in Winn Bay in October 2021; however, attempts will be made to move the sampling locations to be within the proposed treated effluent flow path.

<sup>3</sup> Potential reference areas will be located on Hanson Lake that are outside of the proposed treated effluent flow path. Potential options include Agnew and Unnamed bays that were sampled in 2012. Information on surface water quality, limnology, and habitat will also be collected from the reference areas.

and will provide site characterization information for future Environmental Effects Monitoring (EEM) biological studies. This will enable Before-After-Control-Impact (BACI) studies to be completed during the operational period. The locations of reference areas will be bays in Hanson Lake and will be determined following site characterization studies.

Data are unable to be obtained from Unnamed Lake due to access and safety concerns. A plethora of data were collected in 2012 that illustrated Unnamed Lake is small, shallow (<1 m deep mean depth) and not fish bearing. These data will be used to evaluate potential effects to Unnamed Lake in the EIS for identified Project-environment interactions.

Aquatic survey protocols are based on methods and procedures described in Environment Canada (2012b), procedures developed by standard-setting organizations such as the United States Environmental Protection Agency (U.S. EPA 2016) and Canadian Standards Association (CSA 2010), procedures outlined in Environmental Monitoring Guidelines for Mining/Industrial Operations in Saskatchewan (SKMOE 2015), and procedures referenced in primary literature.

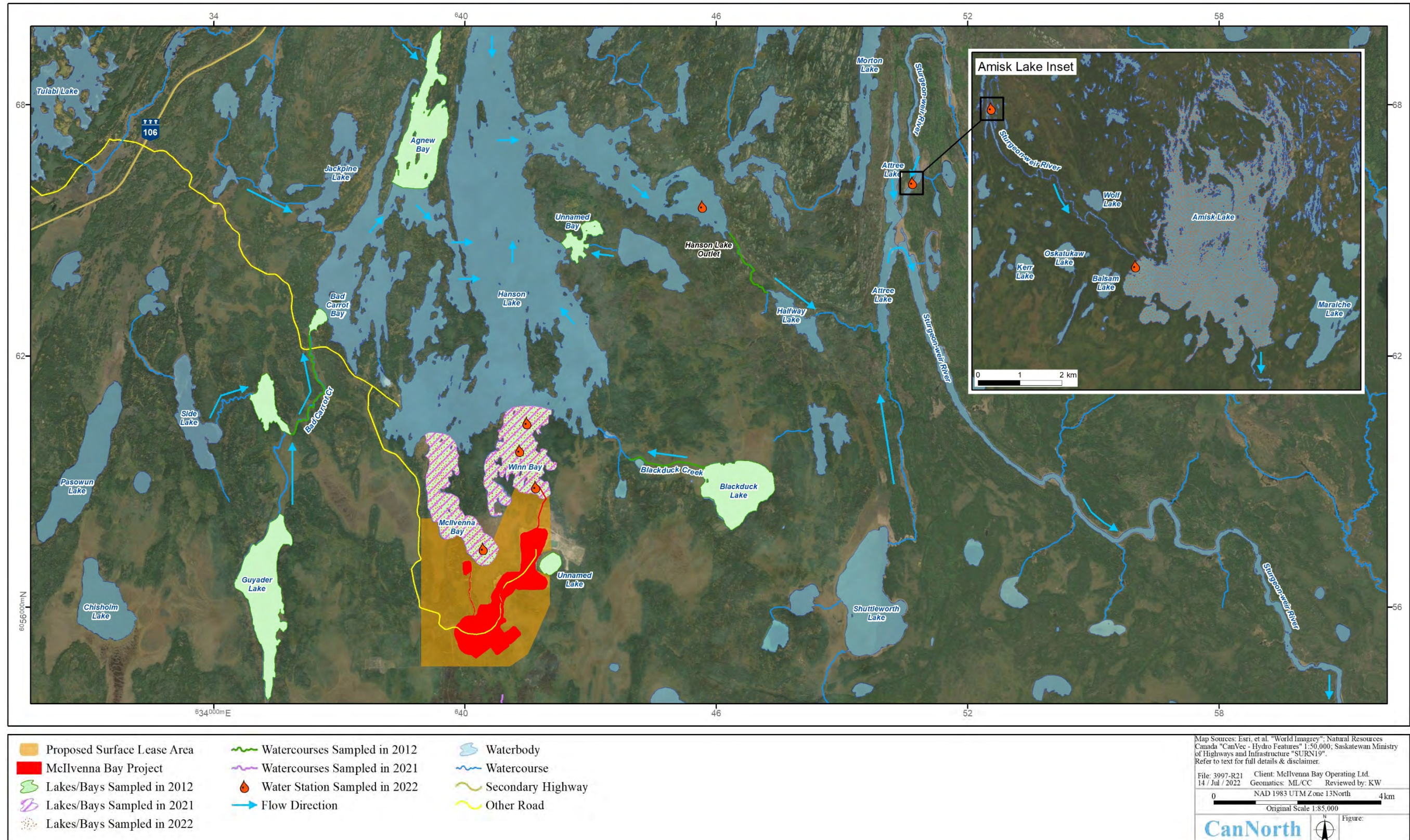


Figure 9-2 Locations of 2022 Water Sampling Stations

### 9.2.1.3 *Baseline Data Use in EIS*

Baseline data are essential for describing the existing environment, identifying VCs, establishing the CSM and Project-environment interactions, and focusing the effects assessment on components relevant to the Project area. The baseline program study components, sampling locations and timeframes, and sample sizes were designed for each VC in consideration of EIA needs for modelling, risk assessment, and overall effects assessments.

The baseline data collected in 2021 and 2022 will be used to complete the effects assessment, mitigation planning, and monitoring plan development in the EIA. These data will be supplemented with the 2012 baseline data where applicable. Field and desktop data provide extensive information that characterize the environment in the SSA, LSA, and RSA, identify plant and wildlife SOCC that could occur and have been located near to the Project, and baseline chemistry data from multiple media types. It is a benefit conducting baseline studies as close as possible to construction activities to mitigate potential effects using the most up to date information and for ensuring environmental protections are properly planned and implemented.

## 9.2.2 *Spatial and Temporal Boundaries*

The temporal boundaries used in the effects assessment of the EIA will cover the life of the Project and be inclusive of all Project stages including construction, operation, decommissioning, and post-decommissioning. The spatial boundaries will vary between VC groups, and provided below is information on the SSA, LSA, and RSA boundaries for each component.

### 9.2.2.1 *Atmospheric and Acoustic Environment*

The SSA, LSA, and RSA for the air quality VC are illustrated in Figure 9-3 and for the noise and vibration VC are illustrated in Figure 9-4. The SSA for both VCs is the current proposed Project footprint and the proposed surface lease area.

The atmospheric LSA covers an area that is centered on the Project footprint and extends outwards to approximately 10 km by 10 km (100 km<sup>2</sup>). The size of the LSA meets the requirements of the Saskatchewan air quality modelling guideline (SKMOE 2012a), which specify a minimum modelling domain size of 10 km by 10 km. The LSA also includes a 500 m buffer on either side of the access road between Highway 106 and the Project that is truncated at the junction. The atmospheric RSA extends approximately 30 km x 30 km from the centre of the Project footprint to encompass adjacent developments. In addition, specific receptor locations required for the HHRA will be assessed.

The noise LSA was set to bound the area where measurable changes resulting from the Project activities would be anticipated (i.e., the distance beyond which the Project would no longer be audible). Based on the results of noise modelling conducted for the Project, the LSA was set as a 5 km buffer around the SSA and the access road between Highway 106 and the Project. The LSA is truncated at the intersection of the access road with Highway 106, representing the source terminus. Noise is typically a local concern; however, for the purposes of identifying any cumulative impacts from other adjacent developments on sensitive receptors in the assessment, the same size of RSA applied to air quality was used for noise (30 km x 30 km from the centre of the Project footprint) with the addition of a 5 km radius outcropping to the north-west to account for traffic noise predictions north of Highway 106 at the access road junction.

#### *9.2.2.2 Hydrogeological Environment*

The hydrogeological LSA and RSA were defined as the same geographical area due to the localized nature of potential Project effects to the groundwater boundary (Figure 9-5). The LSA/RSA were delineated based on local watershed boundaries but were extended into neighboring watersheds based on potential groundwater table drawdown from the presence of the underground workings. The LSA/RSA were extended to natural hydrologic/hydrogeologic boundaries, including watershed boundaries or surface water features, which were both assumed to be coincident with groundwater flow divides.

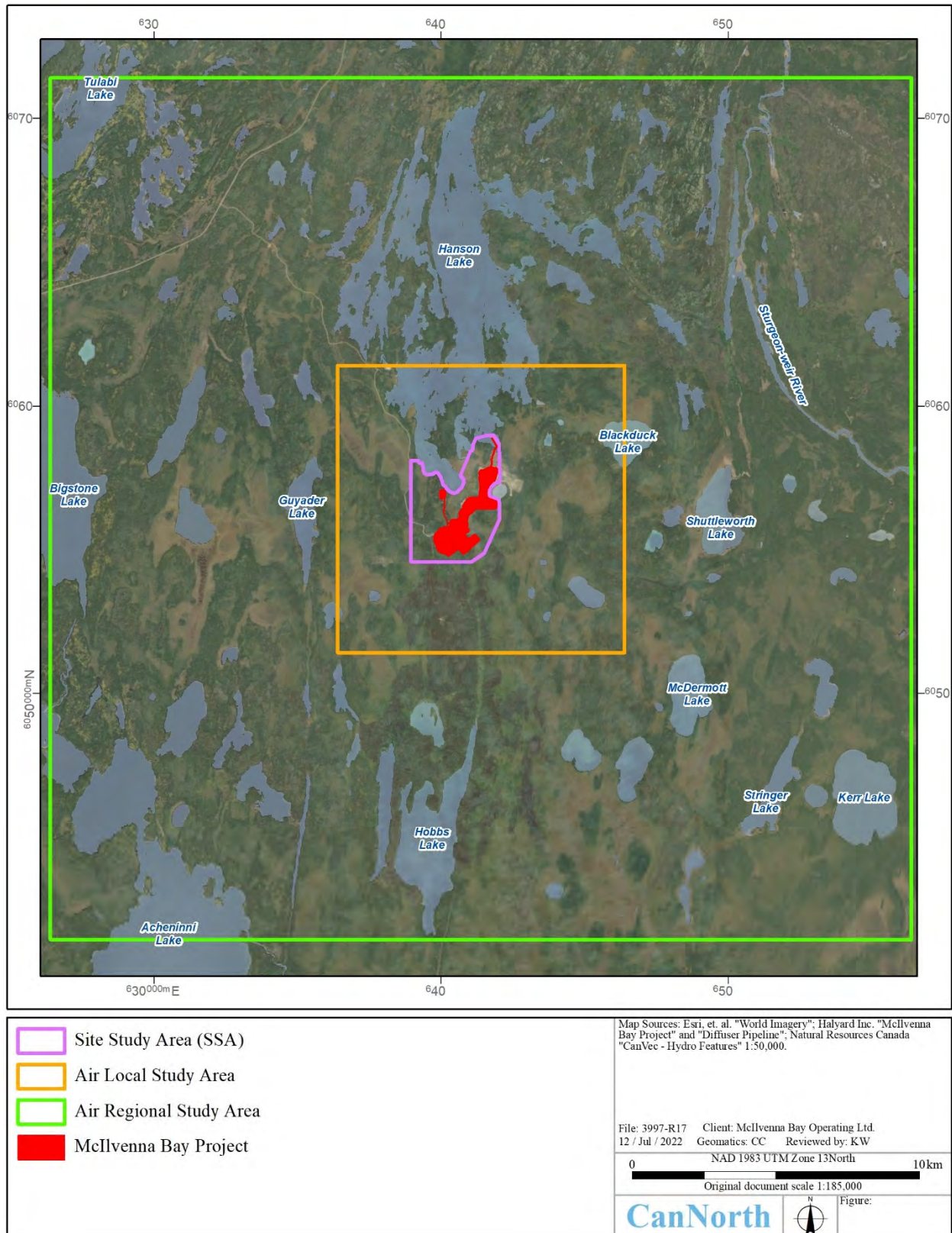


Figure 9-3 SSA, LSA, and RSA for Air Quality VC

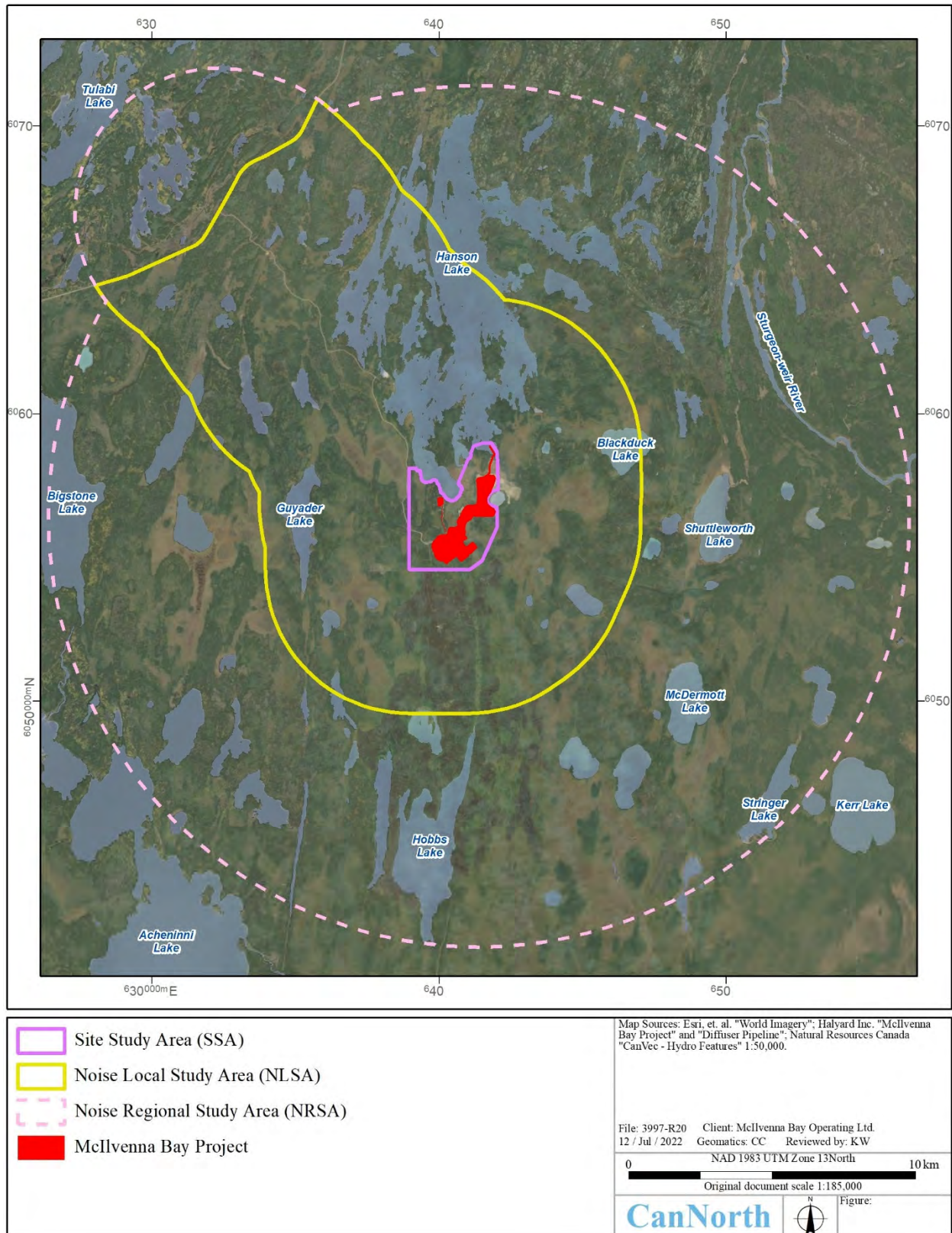


Figure 9-4 SSA, LSA, and RSA for Noise and Vibration VC

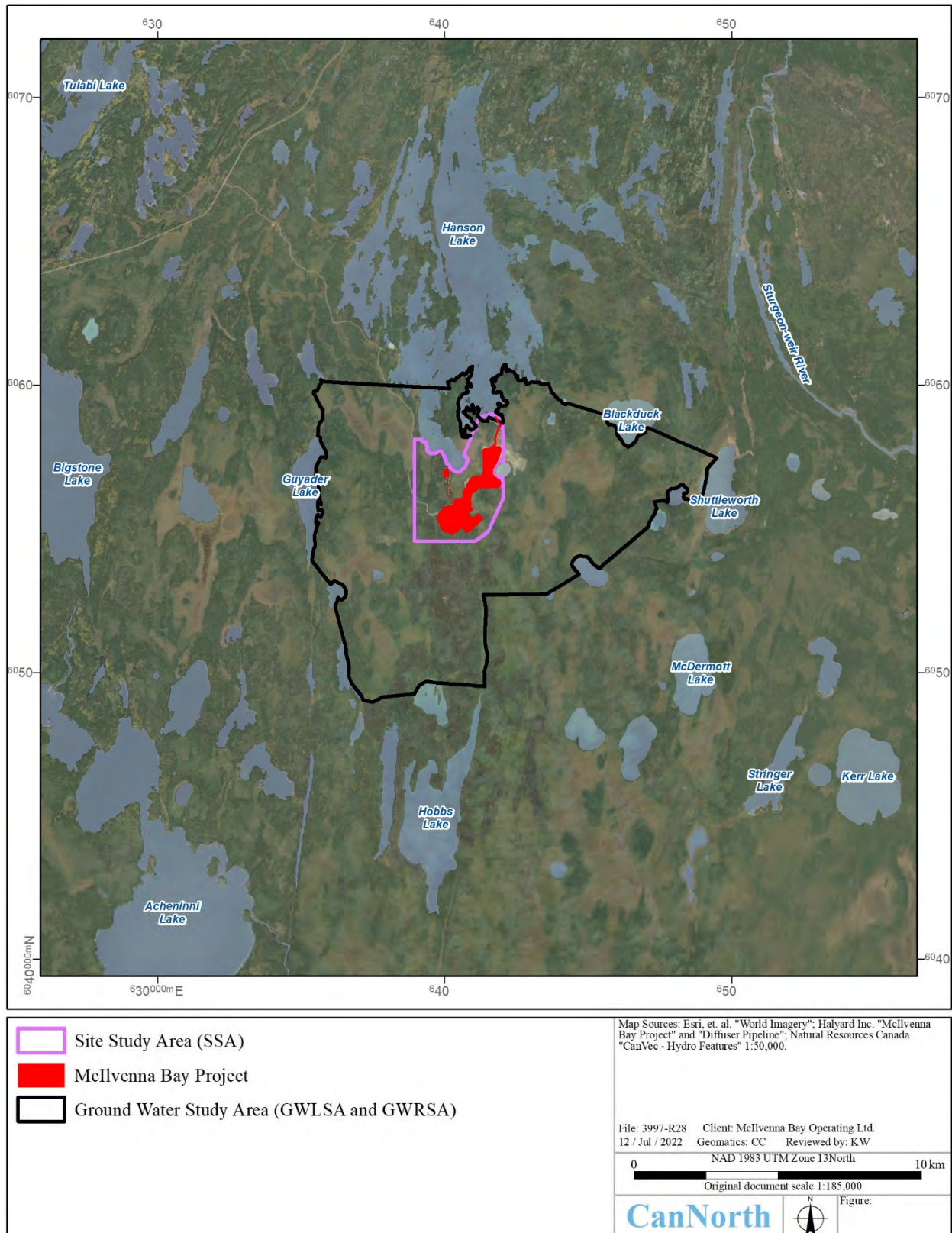


Figure 9-5 SSA, LSA and RSA for Hydrogeological VC

### 9.2.2.3 Aquatic Environment

Potential Project-environment interactions on the aquatic environment were identified to delineate the SSA, LSA, and RSA (Figure 9-6). The aquatic environment SSA was defined as Winn Bay of Hanson Lake since this is the proposed location of the diffuser and near-field treated effluent release. The aquatic environment LSA includes the remainder of Hanson Lake and Unnamed Lake. Hanson Lake is downstream of the treated effluent discharge location and Unnamed Lake is immediately adjacent to the Project development assessment area and the TSF.

The aquatic environment RSA includes numerous study areas that were selected for the following reasons.

- Potential for changes to water quality in waterbodies downstream of the treated effluent discharge location (waterbodies between Hanson Lake and Amisk Lake as well as Amisk Lake).
- Potential for Project-related effects on waterbodies of high community interest (Hobbs Lake, Suggi Lake, and the Saskatchewan River downstream of Cumberland House).

### 9.2.2.4 Terrestrial Environment

Study areas were determined based on the 2012/2021/2022 baseline studies, potential for Project-environment interactions, regulatory requirements (provincial [GS 2021]), and recent study area sizes used for other baseline investigations completed to advance northern Saskatchewan mining developments (e.g., CanNorth 2020, 2021).

The SSA for the terrestrial environment is the current proposed Project footprint and the proposed surface lease area. The LSA and RSA applied to vegetation and wildlife VCs differ due to wildlife movement and home ranges affecting the potential for Project-environment interactions (Figure 9-7). The vegetation LSA is a 600 m buffer around the SSA, and the vegetation RSA is a 5 km buffer around the SSA. The vegetation RSA includes a 500 m buffer on either side of the access road between the Project and Highway 106 that is truncated at the intersection. The wildlife LSA matches the vegetation RSA. The wildlife RSA is a circle centered on the deposit with a 15 km radius (706.5 km<sup>2</sup>). The larger RSA is relevant to studying indirect effects and cumulative effects of the Project in a broader context, particularly impacts on large mammal VC such as boreal woodland caribou.

### 9.2.2.5 Human Environment

Socio-economic study areas were selected based on location of services and workforce available to support the Project, or with the potential to be impacted by the Project. Human health locations were selected to be representative of local residences and other locations where people are known to spend time. Land and resource use study areas were selected based on the potential for impacts to the lands and resources that land users rely on. The study area for heritage resources is restricted to areas that will be directly disturbed by Project activities (i.e., proposed Project footprint).

The SSA includes all lands that will be physically disturbed or become inaccessible during Project construction, operation, and decommissioning activities. The SSA is comprised of Crown lands under the jurisdiction of the Government of Saskatchewan that are proposed to contain the Project surface lease area (Figure 9-8).

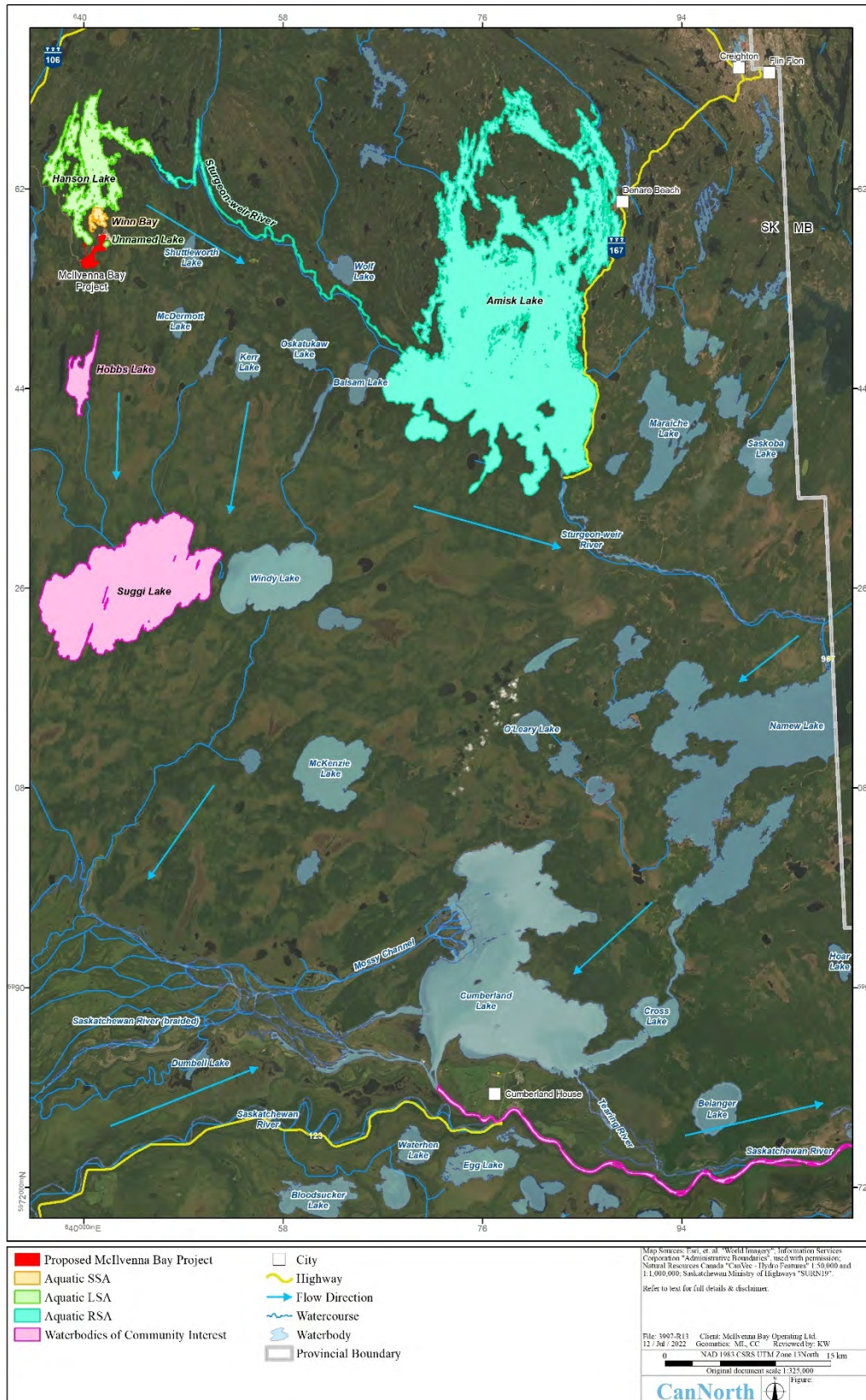


Figure 9-6 SSA, LSA, and RSA for Aquatic VC

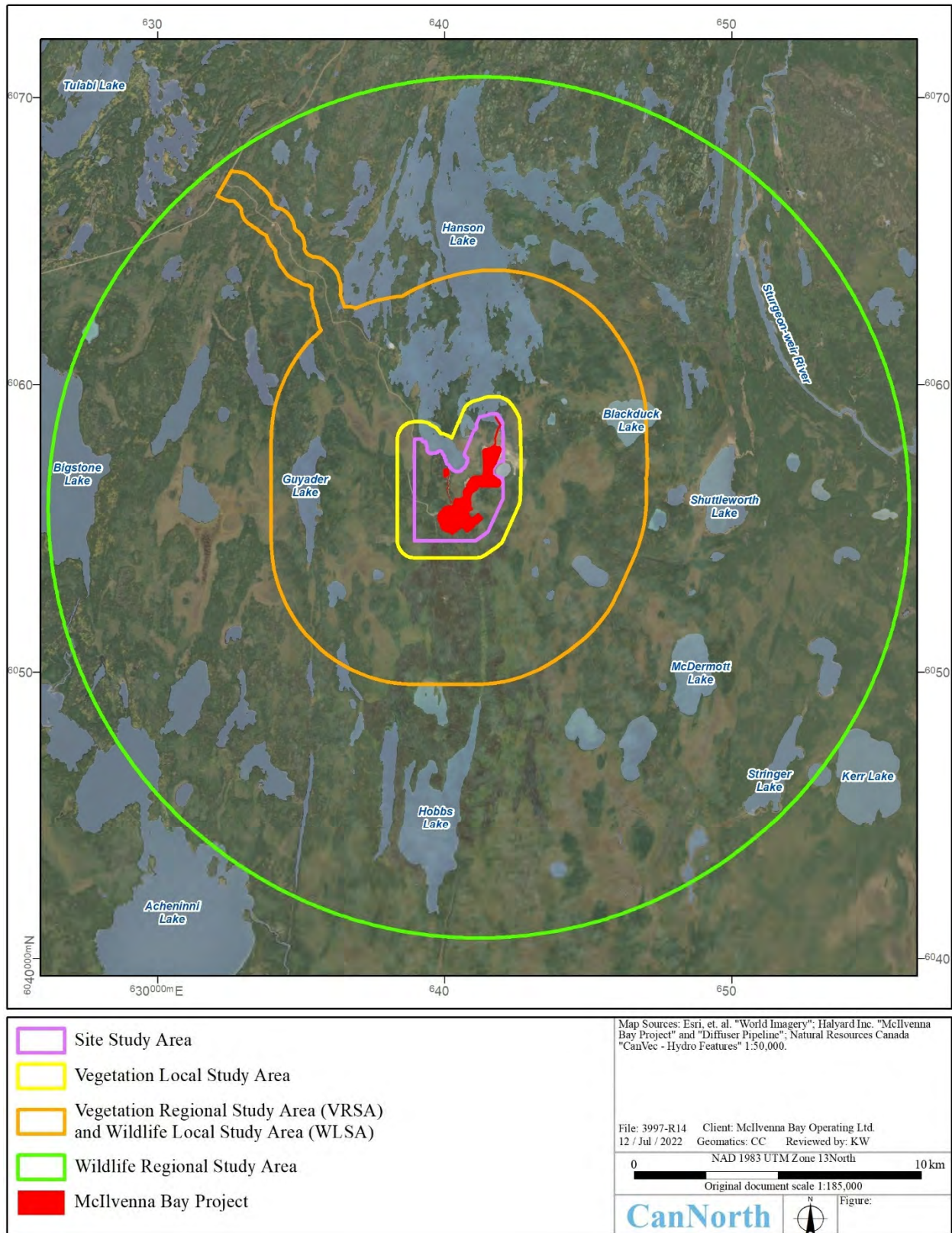


Figure 9-7 SSA, LSA, and RSA for Terrestrial VC

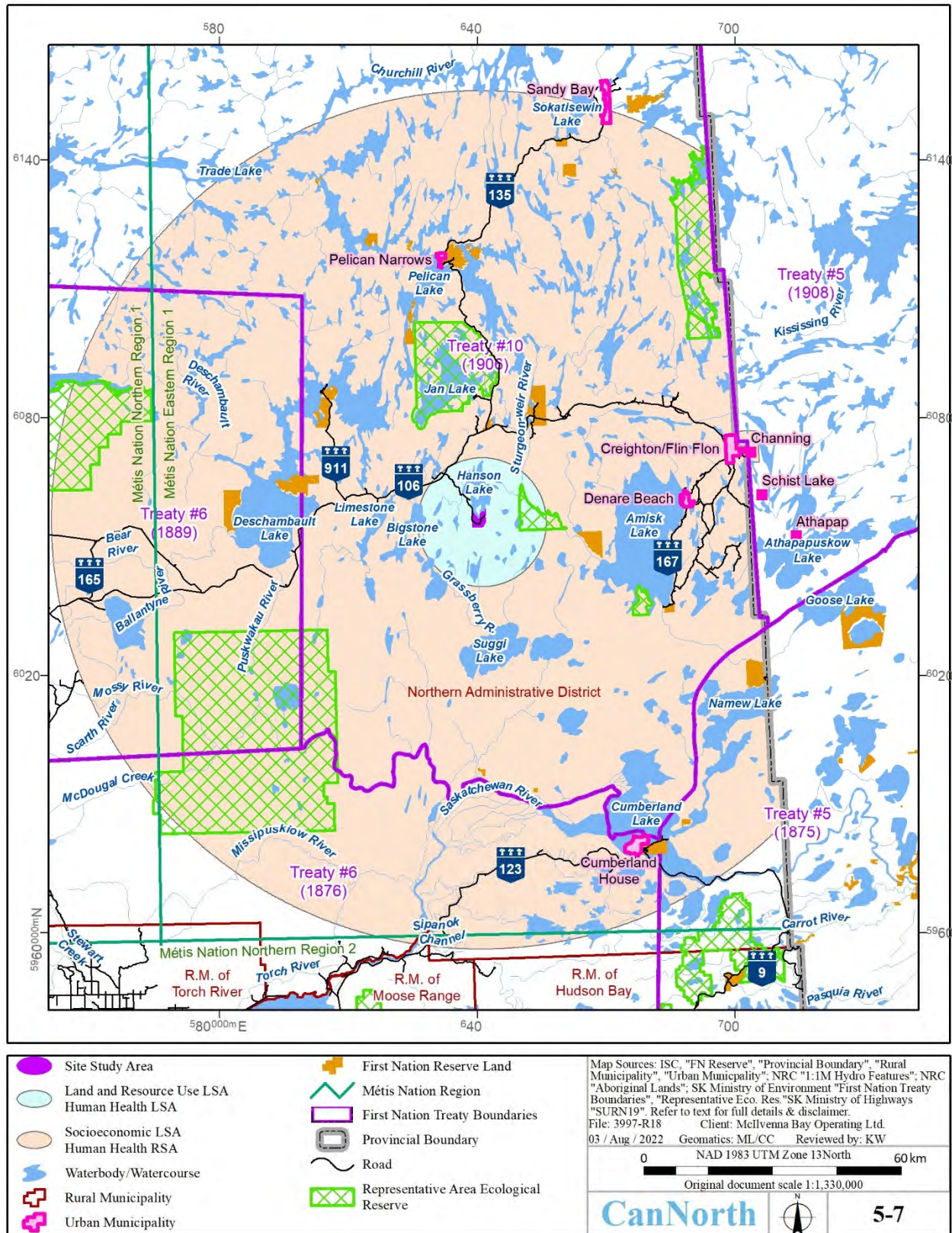


Figure 9-8 LSA for Human VC Scoping

The socio-economic LSA selected to scope the effects assessment and collect baseline data includes the municipal and reserve lands in Saskatchewan communities (with the exception of Flin Flon which has a portion of the population located in Manitoba) located within a 100 km buffer of the SSA (Figure 9-8), including:

- Pelican Narrows
- Sandy Bay
- Deschambault Lake
- Denare Beach
- Cumberland House
- Sturgeon Landing
- Creighton
- Flin Flon

Project-environment interactions have the potential to affect different subsets of human populations in different ways at different geographic scales. For example, residents of a community 50 km from the SSA may experience changes related to employment or income levels as a result of Project activities but may not necessarily experience changes to the safety of their daily commute if residents do not use Highway 106 regularly. For the purpose of the effects assessment, the following refined spatial scales will serve as priority areas for identification of potential changes to measurement endpoints:

- Priority employment and business service providers within the NSAD will be used to assess changes to economic wellbeing and elements of community wellbeing.
- Communities within 200 km driving distance from the camp site will be used to assess several elements of community wellbeing.
- Representative section of Highway 106 and the intersection from the access road to Highway 106 will be used to assess impacts to community wellbeing related to traffic.

The land and resource use LSA is a circle centered on the deposit with a 15 km radius (706.5 km<sup>2</sup>), which matches the wildlife RSA. This radius was selected to capture any potential impacts to large mammals and downstream fish-bearing water bodies which may, in turn, impact the experience of land users.

Land users such as businesses and residences which are directly accessible from Highway 106 between the Highway 167 intersection and the access road were also identified as part of this study as these roadways are the primary access route between the SSA and the nearest full-service centres.

The socio-economic RSA selected for this study is all communities located within Northern Saskatchewan Administration District (NSAD) and the City of Flin Flon (Figure 9-9). This RSA was selected to examine the potential work force capacity and potential for cumulative effects to occur to communities in northern Saskatchewan.

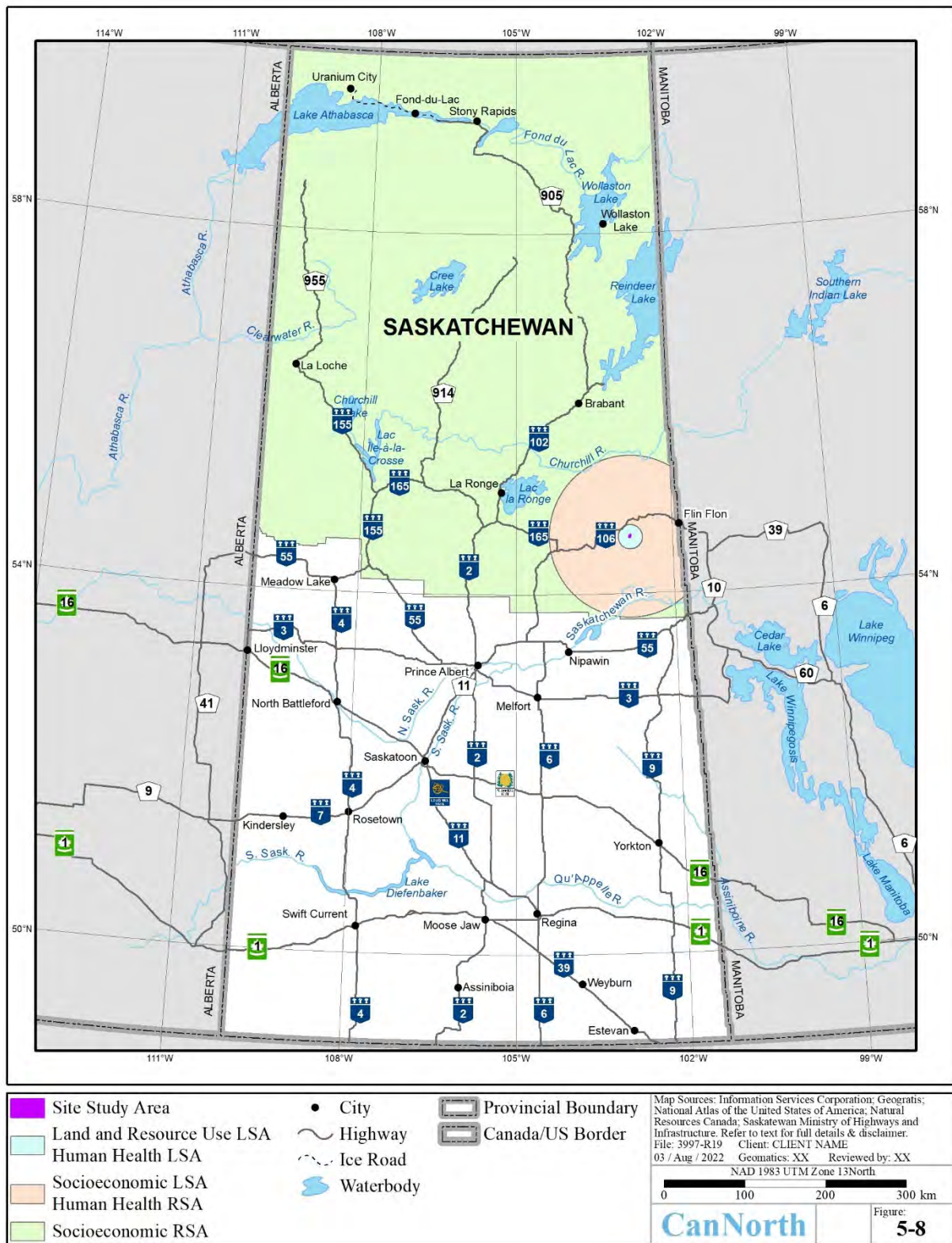


Figure 9-9 RSA for Human VC

### 9.2.3 Environmental Change Analyses

Changes to the environment through Project-related activities such as releases to the water and air and land clearing, and changes to surrounding communities through activities such as increased traffic and job creation have the potential to result in changes, both positive and negative, to VCs (refer to Table 9-1). Provided below is summary of proposed methodology of techniques/models that will be used to predict environmental change and ultimately residual effects of key Project-environment interaction pathways.

#### 9.2.3.1 Treated Effluent Release

As discussed in Section 9.2.2.3, treated effluent from the Project is proposed to be released to Winn Bay of Hanson Lake. Parameter concentrations in the treated effluent will meet regulatory requirements set out in the Metal and Diamond Mining Effluent Regulations (MDMER) and provincial approvals prior to release to the receiving environment. Changes in Constituents of Potential Concern (COPC) concentrations in the receiving environment are the result of two general processes: watershed mixing and removal/exchange with sediments (through partitioning on settling solids and diffusive exchange). During the EIA, dispersion of COPCs in the treated effluent through downstream waterbodies will be evaluated in the near-field, in the mid-, and far-field using a mass balance approach. The receiving environment may be sub-divided to obtain greater resolution on the estimated concentrations within various areas of Hanson Lake. Simplifying assumptions will be used to estimate the potential influence on sediment COPC concentrations.

A proprietary contaminant dispersion and transport model (ADEPT – Assessment of the Dispersion and Effects of Parameter Transport) developed by CanNorth will be used to predict the concentrations of COPC in the receiving environment resulting from the treated effluent release from the Project. The model can assess a variety of COPC, such as metals and general water quality parameters, and considers numerous lakes/rivers/wetlands/bays and multiple branches of a watershed. It is a dynamic model, with conditions changing over time, and it can be run probabilistically to capture variability and uncertainty in the various input parameters. This makes it particularly useful for assessing effluent discharge scenarios and decommissioning periods for mines.

The results of the surface water quality predictions for the LSA and/or RSA will be compared to baseline concentrations and Saskatchewan Environmental Quality Guidelines or other effects thresholds (e.g., CCME water quality guidelines) as appropriate. If the predicted future condition is greater than the selected benchmark, and mitigation measures are unable to eliminate predicted effects, then residual effects will be identified and evaluated to determine their significance (refer to Section 9.3).

#### 9.2.3.2 Hydrogeological Environment

Groundwater quantity during the Project will primarily be potentially affected by the lowering of water levels through the dewatering of the underground workings. Drawdown resulting from dewatering the underground workings may affect local groundwater users if located within the predicted zone of influence.

Groundwater flow patterns will potentially be altered by dewatering of the underground workings and construction of the ore and waste rock storage areas and TSF. The resulting change in groundwater flow patterns may affect groundwater discharge to surface water features and wetlands. Potential effects to

surface water features and wetlands from the lowering of groundwater levels and changes to baseflow will be assessed as part of the surface water VC and vegetation communities VC, respectively.

The environmental effects analysis for groundwater quantity will be carried out using a three-dimensional numerical groundwater flow model. A groundwater flow model of the Project was developed to support the prefeasibility study and will be updated for use in the assessment of effects of the Project on groundwater. The model will provide quantitative predictions about changes in groundwater levels and flow during operation and closure phases of the Project and the resulting changes in groundwater discharge to surface water. The effects analysis will describe the mitigation measures that are specific to avoiding or lessening adverse effects of the Project on groundwater. A summary of the residual environmental effects of the Project on groundwater will be presented with a detailed analysis of the significance of the residual environmental effects, as described below

The ore and waste rock storage areas, the containment pond, and the TSF will be lined facilities; therefore, an effect to groundwater from recharge through these engineering controls is not anticipated. Regardless, the potential for effects on groundwater and surface water quality from minor liner leakage will be assessed using the three-dimensional numerical groundwater flow model and, if appropriate, solute transport model(s). The potential for effects to groundwater and surface water quality related to interaction between groundwater and the cemented paste backfill will be assessed using the three-dimensional numerical groundwater flow model and solute transport model(s).

#### 9.2.3.3 *Atmospheric Environment*

The atmospheric assessment framework will, in part, be developed to meet the Saskatchewan air quality regulatory requirements that are mandated through *The Saskatchewan Environmental Code* (The Code) under *The Environment Management and Protection Act*. The Code includes the Saskatchewan Ambient Air Quality Standards (SAAQS), which consider a limited subset of parameters including particulate matter, sulphur containing compounds, nitrogen oxides, ozone, and carbon monoxide. In accordance with the Saskatchewan air quality modelling guideline (SKMOE 2012a) all relevant parameters are expected to be modelled and compared against regulatory criteria.

With respect to the acoustic environment, the SKMOE has not issued noise assessment guidelines for proposed Projects. The SKMOE has accepted analysis completed in accordance with guidelines developed for applications in Alberta under the Alberta Energy Regulator Directive 038. Further, Health Canada has developed *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise for projects under CEAA* (Health Canada 2017a). As such, the assessment framework will incorporate the requirements of these guidance documents and directives and input from other disciplines that require an assessment of noise impacts.

In keeping with standard practice, a series of assessment scenarios will be developed to characterize the worst case (maximum or bounding) emissions for the site preparation and construction, operations, and decommissioning stages of the Project. Based on the assessment of Project-environment interactions and key production and engineering data, emission inventories will be developed for air pollutants and greenhouse gases (GHGs), noise, and light, and mitigation measures will be planned.

To assess the changes as a result of the Project, a series of quantitative computer models will be employed to predict the dispersion or propagation of parameter concentrations for sensitive human, ecological, and traditional use receptors during each stage of the Project. Air dispersion modelling will be completed in accordance with the Saskatchewan air quality modelling guideline (SKMOE 2012a) using the AERMOD/AERMET modelling platform. Acoustic modelling will be completed in Cadna-A from DataKustik GmbH, which is an industry standard method for completing sound level propagation modelling for industrial facilities. The light impact modelling will be completed using the AGI32 photometric model, which conforms to the International Commission on Illumination (CIE) benchmark, CIE 171:2006.

Based on the modelling outputs, an assessment of potential residual effects within the LSA and/or RSA will be completed. The residual effects assessment will be based on a comparison of the predicted future conditions to baseline conditions and the threshold criteria established under the assessment framework. If the predicted future condition is greater than the threshold criteria within the LSA/RSA, then a residual effect assessment will be completed to determine significance (refer to Section 9.3).

#### *9.2.3.4 Human Health and Ecological Risk Assessment*

Risk assessment is a tool used to estimate the potential for, and extent of, an effect as a result of a Project-related activity. A human health and ecological risk assessment (HHERA), that considers both people and wildlife receptors, will be conducted to identify incremental changes that may occur relating to the Project. All stages of the Project (construction, operation, and decommissioning) will be considered. The risk assessment will follow standard regulatory guidance, such as that from Health Canada and ECCC. There are four main components in HHERAs including,

- Problem formulation – defines the scope of the risk assessment, including spatial extent, identification of COPCs and other Project-environment interactions, receptors (e.g. fish, benthic invertebrates, wildlife, hunters or campers), and exposure pathways.
- Exposure assessment – summarizes the expected concentrations/effect on the environment and determines the level of exposure for each receptor taking into account receptor behavior and exposure duration.
- Toxicity assessment – determines the level of exposure for each receptor where adverse effects may be expected.
- Risk characterization – integrates the exposure assessment and toxicity assessment to characterize the overall risk to each receptor.

The Problem Formulation is the foundation of the risk assessment. The COPC that will be included in the risk assessment will be identified. Based on preliminary information the COPC are expected to include ions (chloride, fluoride, sulphate, total dissolved solids), nitrogen compounds (ammonia, nitrite, nitrate), calcium (to assess changes in water hardness), and metals (cadmium, copper, manganese, selenium, zinc), but this will be refined as the project design proceeds. A full discussion of the selection of COPC will be included in the assessment.

The selection of receptors is an important component and will be directly related to VC selection (refer to Section 8). For the human health risk assessment, receptors will be selected to represent the range of people that may access the area within the potential influence of water releases and air emissions. It is important to include an appropriate representation of how the land is used (e.g., traditional land use activities) and stakeholders/rights-holders with the potential to be impacted by Project interactions.

Receptors are expected to include recreational users in the area with regular, but short-term, exposure, people with cabins in the area, as well as long-term residents. An important consideration will be people who access the area to harvest traditional foods such as fish, medicinal plants, berries, and game. Attention will be given to identifying subsets of the population that are expected to be particularly sensitive. Ongoing conversations with Indigenous groups, such as the PBCN, will help inform the selection of receptors.

For Indigenous receptors, the consumption of country foods will be taken from the First Nations Food Nutrition and Environment Study First Nation Food for Saskatchewan (FNFNES; Chan et al. 2018). Consumption information for both the Boreal Plains and Boreal Shield ecozones will be considered in the assessment. The ingestion rates will include a range of exposure from an average to a high consumer.

The potential pathways of exposure will be identified. This is expected to include: inhalation of dust, ingestion of surface water, harvest of plants (berries, medicinal plants), fish, game, and direct contact with soil and surface water. Potential exposure with sediment via direct contact or ingestion will also be considered. Other pathways of exposure not associated with the site, such as ingestion of supermarket foods, will also be considered.

For the ecological risk assessment, a range of receptors will be included from lower trophic species such as vegetation and aquatic biota, as well as fish, ducks, muskrat, bats, blackbirds, small mammals, moose, caribou and carnivores (e.g., wolf). Species that have been identified by the government that need to be protected (SOCC) will require a higher level of protection.

Receptor locations for the people included in the human health risk assessment (HHRA) and ecological receptors included in the ecological risk assessment (ERA) will be discussed in the EIS. It is expected that these locations will be informed by discussions with Indigenous groups and other land users in the area.

The Exposure Assessment will consider the total exposure to the identified COPC through all pathways. The results from air and water dispersion models will provide information on the movement of COPCs through the environment. The results of these models can be used to determine whether there will be any influence of the Project on concentrations of COPC in the environment. For select media and COPC (those that bioaccumulate, i.e. the metals) the results of the air and water dispersion models can be used to estimate the predicted concentrations in the environment. Baseline information is available for some environmental media, such as fish. For other media, environmental modelling will be conducted to estimate baseline concentrations and then examine the potential change due to the project. Information from other areas and the FNFNES study will be used to ensure that baseline concentrations are reasonable. The potential transfer of COPC to key VCs including aquatic receptors (e.g., aquatic vegetation, fish), vegetation (e.g., lichen, berries), wildlife (e.g., mammals and birds), and humans will be examined through environmental modelling.

The total exposure will be estimated from all pathways of exposure. This includes inhalation, ingestion, and dermal exposure (water during recreational activities and soil from land use).

The potential effects/risks of the Project will be assessed based on the results of the quantitative assessment and then ranked through a qualitative evaluation that considers the intensity of an effect and the sensitivity of the receptor in order to provide a severity ranking. The intensity is based on many factors including the temporal scale of the effect (e.g., short-term, medium-term, long-term, permanent), the

magnitude of the effect, the geographical extent of the effect (SSA, LSA, RSA), as well as other factors such as frequency. The sensitivity of the environmental receptors is characterized based on information obtained from the baseline studies and input from stakeholders, rights-holders, technical reviewers, and regulators.

From this information, a ranking matrix will be developed. This effects matrix will aid in the development of mitigation measures and enable identification of residual effects.

#### *9.2.3.5 Socio-Economic Environment*

Assessment of socio-economic VCs will be completed using both qualitative and quantitative approaches. Where data is available to characterize both the Project-environment interaction and the existing receiving environment, then quantitative methods will be used to predict change. Where quantitative data is not available for the Project-interaction and/or existing environment, then qualitative methods will be applied and supported with information from several inputs which may include engagement results, case studies from similar situations, and professional judgement and experience.

The socio-economic assessment will identify and evaluate Project-environment interactions, predicted changes, receptor pathways, and residual effects for measurement endpoints within the following socio-economic VCs:

- Traditional land and resource use;
- Non-traditional land and resource use;
- Economic wellbeing; and
- Community wellbeing.

Assessment of each VC will include consideration (using concepts of GBA+) of the potential for different subsets of the population with the potential to be affected by Project-environment interactions to experience different types of impacts, significance if impacts, and effectiveness of mitigation measures designed to avoid or eliminate those impacts.

Subsets of the population with potential to experience disproportionate adverse impacts are considered vulnerable groups for the purpose of the effects assessment.

Effects scoping was conducted using input from early engagement with communities, and review of the TOR comments and project-environment interactions. Through this process, several potentially vulnerable groups were identified for consideration in the assessment including, but not limited to:

- Indigenous women and girls;
- Traditional land users;
- Indigenous communities (both on and off reserve members);
- Employees and their families;
- Service providers, specifically related to emergency services, safety, and mental health;
- People who are unemployed or with barriers to seeking or sustaining employment;
- Commercial land users, specifically outfitters, trappers, and wild rice harvesters;
- Land users along transportation routes and directly adjacent to the SSA; and
- People with existing barriers to food security.

These vulnerable groups will be confirmed and discussed with rightsholders.

Potential to experience disproportionate effects, differences in significance of effects, and effectiveness of proposed mitigation measures will be assessed with consideration for specific pathways and sensitivities of the vulnerable groups identified.

To assess changes in traditional and non-traditional land and resource use, predicting changes to land and resource quantity, quality, accessibility, and frequency of pattern of use compared to existing conditions will be evaluated and described (Table 8-1). This assessment will measure the changes to the quantity of land and resources available for land use by identifying: the existing land base accessible for land uses in comparison to the predicted expanded land base that will be disturbed by project activities; changes to the abundance and distribution of resources based on assessment results of VCs related to fish, wildlife, and vegetation; and how effects to land and resources could affect land and resource uses such as fishing, hunting, trapping, gathering plants, and wild rice harvesting. Changes to the quality of land and resources will be identified based on results of engagement, traditional land use studies, and air, noise, water, vegetation, wildlife, aquatics, and human health risk assessments which will be reviewed to identify pathways for changes to land and resource health and safety, and experience of the land user. Changes to accessibility and access routes to land and resources for traditional, recreational, and commercial purposes will be identified by comparing: the existing unrestricted land base area to the land base area that will be restricted, permanently or temporarily because of project activities; and the reported and expected access routes currently being used to access the area to the routes that will be disturbed or restricted permanently or temporarily because of project activities. Changes to the quality, quantity and accessibility of land and resources will be assessed qualitatively to predict pathways and likelihood for changes to reported or expected frequency and patterns of use. Where changes to frequency and patterns of use have potential to result in changes to economic and community wellbeing, these pathways and predicted changes will be discussed specific to those VCs.

To assess changes in economic wellbeing, predicted changes in levels and distribution of employment and income, access to employment and opportunities, and training and education needs compared to existing conditions will be evaluated and described. The assessment will focus on historically underemployed subsets of the population. To determine changes to levels and distribution of employment and income, project details related to employment will be compared to the existing labor capacity, employment rates, and income levels for the RSA, LSA, PBCN, CHCN, and each community in the LSA. Additionally, a qualitative assessment will be used to identify pathways for certain traditionally un- or under-employed demographic groups to experience barriers to accessing economic opportunities provided by the Project. To identify changes to training and education needs, project details related to education and training requirements for each anticipated position will be compared to existing levels of education, areas of study, and employment sectors in the LSA and RSA to assess potential labour capacity. Education and training providers and program offerings will be reviewed to assess potential to develop the workforce in the LSA and RSA, and barriers to meeting the training and educational requirements for participation in the Project workforce will be assessed qualitatively.

To assess changes in community wellbeing, predicted changes to existing conditions with regards to the condition and accident levels on Highway 106, housing and accommodation capacity, number of workers completing shift work, safety and health of communities, wellbeing of vulnerable persons including Indigenous women and girls, and access, the type, and the frequency of use of community services will be evaluated and described. To complete this assessment, the results of the accidents and malfunctions

assessment and available traffic studies detailing conditions and capacity for Highway 106 will be assessed qualitatively to identify pathways for changes to community wellbeing around safety and ease of transportation. Project employment forecasts and recruitment plans, and assumptions will be used to predict changes to demand for temporary and long-term accommodations. Changes to demand will be assessed in comparison to existing accommodation capacity levels. Employment forecasts will be used to determine the number of workers completing shift work in the peak employment window. This number will be compared to the existing number of workers in the LSA engaged in similar shift work schedules to evaluate the level of change to community dynamics anticipated. Changes to land use, populations and demographics, employment, income, traffic, food safety and accidents and malfunctions will be reviewed and assessed qualitatively to identify pathways for changes to safety and health of communities and wellbeing of vulnerable groups. The results of assessments on all human environment VCs will be reviewed to identify pathways for changes to the wellbeing of vulnerable persons to occur. Where pathways are identified, these changes will be characterized with qualitative methods. Project details will be reviewed to identify changes to pressures on community services. Changes to pressures on community services will be assessed in comparison to existing capacity of those service providers to identify the level of change.

### 9.3 Residual Effects

Despite taking a comprehensive and best practices approach to mitigating effects, it is anticipated that some residual effects will remain, and these will be subjected to a detailed assessment. The following criteria will be used to evaluate which effects are moved forward into the detailed effects assessment:

1. If a Project-environment interaction is expected to result in no measurable change, then no residual effect is predicted, and the VC will not be included in the detailed effects assessment and determination of significance.
2. If a Project-environment interaction is expected to result in minor changes to the VC, but no residual effect is predicted, then the VC will not be included in the detailed effects assessment and determination of significance.
3. If a Project-environment interaction is expected to result in changes to the VC and residual effects are predicted, then the VC will be moved forward into the detailed effects assessment and determination of significance.

The methodology for conducting the detailed effects assessment will include a weight of evidence approach where the overall significance of each residual effect was rated by collectively considering multiple criteria commonly used in EIAs. Definitions of the criteria used are as follows.

- Direction indicates whether the residual effect will result in a negative (i.e., adverse) or positive (i.e., beneficial) change.
- Magnitude is the expected scale and/or severity of the residual effect and indicates the degree to which the effect is different from baseline, reference criteria, or guideline values.
- Geographic extent is the spatial area over which the residual effect is expected to occur; ratings correlate to the site, local, or regional study areas applied to each VC.
- Duration is the length of time from when the residual effect begins to the time it is reversed or an effect can no longer be measured.
- Reversibility is the likelihood and time required after removal of the stressor to the VC to return to a state that is similar to baseline or to other similar areas in the region at that time.

- Timing identifies the Project phase during which the residual effect expected to occur (i.e., construction, operations, decommissioning, or post-decommissioning).
- Frequency is associated with duration and defines how often the residual effect is expected to occur.
- Likelihood is the probability of the residual effect occurring and is a measure of uncertainty.
- Ecological Context is the importance of the impact or benefit the residual effect is predicted to cause on ecosystem function and/or SOCC; this context is applied to biophysical environment VCs.
- Social Context is the importance of the impact or benefit the residual effect is predicted to cause on components such as community health, well-being, economy, employment, and other factors; this context is applied to human environment VCs.

The definitions of the ratings for each criterion listed above (e.g., negligible, low, medium, or high magnitude) are provided in Table 9-2. The exceptions are direction since this is simply categorized as a negative or positive change, and timing since this category identifies the Project phase during which the effect is expected to occur, but this does not correlate to a negligible, low, medium, or high effect.

### 9.3.1 Significance Determination

The criteria discussed above will be collectively used to rate the significance of each residual effect as not significant or significant. This is a qualitative rating system that considers predicted changes in the measurable endpoints of the VC and assesses the overall level of impact and risk in consideration of the criteria ratings. The not significant designation was split into negligible, minor, or moderate, as illustrated on Table 9-2; however, it is unlikely a residual effect will meet all the criteria designated under each of those categories; thus, a weight of evidence approach will be used.

The most weight will be placed on magnitude, geographic extent, and duration with timing, frequency, and reversibility included as secondary factors. This approach places more importance on effects with the highest impact that could affect the biophysical or human environments on a larger and/or longer scale. As much as possible, the magnitude will be evaluated using measurement endpoints that are quantifiable. Assessing ecological or social context will be included to ensure the objective of focusing the effects assessment on areas of highest importance to the environment, people, and culture is met. Since the focus of the EIA is on adverse effects, a significance determination will not be provided for positive effects, but these are important to consider for development justification and overall benefits provided to local communities, the economy, and the supply chain.

The EIS acts to predict future conditions of biophysical and human environments, but there is a complexity of factors, interactions, and unknowns that introduce a level of uncertainty. Determination of the level of confidence or uncertainty in predicted effects, the ratings provided for each criterion, and the overall significance determination will be identified throughout the EIA and will also be broadly captured in the rating criterion of likelihood. Monitoring programs will be used to follow-up on identified uncertainties and to provide an on-going evaluation of the accuracy of the effects assessment, mitigation measure effectiveness, and significance determinations. Throughout the life of the Project, adaptive management will be used to update information, processes, mitigations, management plans, and monitoring programs as needed with the goal of continually improving protection of the environmental components.

Table 9-2 Residual Effects Assessment Criteria Ratings for Significance Determination

Magnitude	Geographic Extent	Duration	Reversibility	Frequency	Likelihood	Ecological or Social Context	Significance
<b>Negligible:</b> no detectable or measurable change from existing conditions	<b>Negligible:</b> effect is highly localized	<b>Short-term:</b> effect occurs over a period of days to weeks	<b>Negligible:</b> effect ceases after a short-term duration	<b>Negligible:</b> effect occurs once for a short-term duration	<b>Negligible:</b> effect is unlikely to occur	<b>Negligible:</b> effect has no detectable or measurable change on ecosystem function, SOCC, or social components	<b>Not Significant (Negligible)</b>
<b>Low:</b> effect is within the range of natural variability of existing conditions and/or is lower than reference or guideline levels	<b>Site:</b> effect is limited to the SSA	<b>Medium-term:</b> effect may occur during all project phases	<b>Reversible – short-term:</b> effect ceases once stressor is removed	<b>Isolated:</b> effect is confined to a discrete period	<b>Low:</b> effect has the potential to occur	<b>Low:</b> effect is anticipated to have a low impact on ecosystem function, SOCC, or social components	<b>Not Significant (Minor)</b>
<b>Moderate:</b> effect is at or slightly above the range of natural variability of existing conditions and/or is at or slightly above reference or guideline levels	<b>Local:</b> effect is limited to the LSA	<b>Long-term:</b> effect extends beyond post-decommissioning	<b>Reversible – long-term:</b> effect persists after stressor is removed	<b>Periodic:</b> effect occurs intermittently, but repeatedly	<b>Moderate:</b> effect is expected to occur	<b>Moderate:</b> effect is anticipated to have a moderate impact on ecosystem function, SOCC, or social components	<b>Not Significant (Moderate)</b>
<b>High:</b> effect is above or below the range of natural variability of existing conditions and/or is above reference or guideline levels	<b>Regional:</b> effect extends into the RSA	<b>Permanent:</b> effect will remain permanently	<b>Irreversible:</b> effect does not reverse after stressor is removed	<b>Continuous:</b> effect occurs continuously	<b>High:</b> effect is highly likely to occur	<b>High:</b> effect is anticipated to have a high impact on ecosystem function or social components	<b>Significant</b>

### 9.3.2 Key Anticipated Residual Effects

Key anticipated residual effects are difficult to predict at this time as the Project design and mitigation plans are still being developed, and mitigation strategies will continue to evolve as information from baseline data collections and engagement with stakeholders and rights-holders is incorporated. The following pathways could contribute to negative residual effects if not properly mitigated:

- direct loss or alteration of native vegetation (including rare plants) from construction of Project infrastructure;
- introduction of invasive plant species and/or noxious weeds;
- direct loss and fragmentation of wildlife habitat from construction of Project infrastructure;
- sensory disturbance to wildlife, in particular SOCC, from construction activities;
- direct mortality to wildlife from Project activities such as increased traffic; and
- effects on aquatic and terrestrial environments from increases in COPC concentrations in the environment due to Project releases to the air and water, surface run-off, and dust dispersion.

MBO commits to reducing the potential for residual effects through these pathways to the maximum extent possible and to offset residual effects to the VCs as necessary (e.g., development and implementation of a boreal woodland caribou mitigation and offsetting plan). The EIS will contain detailed information on the significance determination of each residual effect and where residual effects are unavoidable, follow-up through monitoring, offsets, reclamation, and other measures will be identified.

## 9.4 Cumulative Effects

The EIA will include a cumulative effects assessment (CEA) on how past, present, and future developments may affect the Project's VCs. The CEA within the EIA will describe the net cumulative impacts of the Project, mitigation strategies, and monitoring implementation.

### 9.4.1 Projects Included in Cumulative Effects Assessment

The focus of the CEA will be on projects occurring or that have occurred in near vicinity to the Project (within 10 km) or that are occurring on the proposed surface lease area. These are described in Table 9-3. There are a number of exploration sites in the vicinity of the Project, including the Balsam Zone Project, Miskat Lake Project, Mcllvenna Bay Deposit, which are owned and operated by Foran. The activities that have occurred or are planned to occur at these sites will be considered in the cumulative effects assessment to the extent possible.

Regionally, the Mcllvenna Bay Deposit is situated in one of the oldest and most active resource extraction regions in Saskatchewan. There are many historic mines, deposits, and exploration projects for gold, copper, and zinc clustered largely in the Flin Flon and Amisk Lake area. In addition to mineral mining, various other industries have occurred historically in the region (within 50 km of the Project) such as a dolomite quarry on the southeastern shores of Deschambault Lake (1988-1991) and forestry. Existing operations (mining, paper/lumber/oriented strand board mills, and peatland harvest) are all located >50 km from the Project and are unlikely to have Project interactions, with the exception of select VCs in the human environment. For example, the 777 copper/zinc mine operated by Hudbay Minerals Inc. located in Flin Flon approximately 60 km from the Project is scheduled to close mid-2022 and this will be included in the socio-economic cumulative effects assessment.

Table 9-3 Projects Included in the Cumulative Effects Assessment

Project Name	Owner	Location	Approximate Distance from Project	Overview	Status	Project Interaction
Hanson Lake Mine (copper-lead-zinc)	Western Nuclear Mines Ltd.	Bertrum Bay of Hanson Lake	5 km north of the Project	Hanson Lake mine was a copper, lead, and predominantly zinc mine that operated between 1966 to 1969. Tailings were dammed into a small pond and runoff was diverted to Bertrum Bay of Hanson Lake, although traces have also entered Mine Bay. Some remediation efforts were completed including the demolition of surface buildings around the mid-1980s, but tailings are still present at the site. There was a recreation site located on the property that was closed in 2007 due to safety concerns. The SKMOE is currently evaluating remediation options presented in an action plan for the site and intends to finalize plans in 2022.	Future for remediation efforts	It is expected that rehabilitation activities will occur during the Project lifespan; however, the timing and extent of activities are not known
Hanson Lake Facility (silica sand)	Preferred Sands Ltd.	190 m south of Winn Bay of Hanson Lake and 3.6 km east of the Mcllvenna Bay deposit	Part of the proposed Project lease area and is the proposed site of the Tailings Storage Facility (TSF) for the Project	The silica sand mine was in operation from 2001 until 2015. The site underwent progressive decommissioning during operation which contributed to prompt reclamation of the area. Treated effluent/water was recycled in the wet water plant instead of being released to the environment. Decommissioning and reclamation of this site was completed in 2017 with activities including blasting vertical dolomite quarry faces, contouring remaining materials to achieve slopes no greater than 4H:1V, and spreading clayey topsoil and organics over the footprint to promote re-vegetation. After closure and reclamation, the quarry area was transitioned into Saskatchewan's Institutional Control Program (ICP).	Historic	MBO is applying for release of part of the property from the ICP so the already disturbed land can be used as the Project TSF
Hanson Lake Silica Sand Project	Strong Pine Energy Services	Between Mcllvenna Bay of Hanson Lake and Guyader Lake	3.5 km west of the Project; however, the Strong Pine proposed site layout illustrates infrastructure adjacent to the proposed Project lease area	This project was granted ministerial approval in February 2020, but development of the project has not yet proceeded. The mine is projected to have an operating life of 20 to 25 years. Sand extraction will occur on a gradual basis where 55 to 60 ha of habitat will be disturbed annually after which, the area will be re-contoured and the organic material returned as part of a progressive reclamation process. Groundwater will be diverted from the boxcuts to decant ponds and will be utilized by the site facilities as well as for processing of the silica sand. Excess water in the decant ponds will be treated, if required, and discharged into the north end of Mcllvenna Bay on Hanson Lake.	Future; it is assumed this project will occur during the Project lifespan.	The Hanson Lake Silica Sand Project is located in close proximity to the Project and potential effects need to be evaluated cumulatively
Advanced Exploration (ADEX) Project	Mcllvenna Bay Operating Ltd.	Mcllvenna Bay Project lease area	Mcllvenna Bay Project lease area	The ADEX project is a small-scale, short-term (<420 days) project with the objective of providing additional detail on the Mcllvenna Bay orebody and surrounding rock material. The intent is to extract enough material to determine the metallurgical properties of the ore, further define the properties of the waste rock material, validate the flow sheet, and assess the geotechnical conditions. Primary facilities at the ADEX site include a mine portal and ramp, ore and waste rock pad, and water collection and containment system. Treated effluent collected during the ADEX project will be discharged south of the Effluent Treatment Plant (ETP) within MBO's industrial lease boundary into a peat bog situated at the headwaters of the Hobbs Lake drainage.	Present	The Project will be an extension of the ADEX project using the same infrastructure; the treated effluent discharge location will differ
Forestry	Mee-Toos Forest Products Ltd.	North East TSL	In the vicinity and region (awaiting information from SKMOE)	Mee-Toos Forestry Products Ltd. has held Timber Supply Licenses for several years and SKMOE has provided information on current/ historical cutblocks in the area. Detailed information regarding future harvesting in the North East TSA is not currently available. Consideration will be given to information available in public documents including the draft SK2 East Range Plan for Woodland Caribou related to forest harvest utilization rates for the North East TSA.	Historical; potential current and future activity	Potential interactions will be evaluated based on available information.
<b>Ancillary Projects</b>						
Transmission/Distribution Line	SaskPower	Assumed to be along the right of way of the access road between Highway 106 and the Project	Extending along the access road and connecting with the Project, possibly from the Island Falls Station	New 34.5 kV dual overhead line that will run parallel to the 25 kV line; intention to replace and decommission the 25 kV line.	Future	This is an ancillary project with assessment and permitting completed by SaskPower
Fibre Optics	SaskTel	Assumed to be along the right of way of the access road between Highway 106 and the Project	Extending along the access road and connecting with the Project	Ancillary project	Future	This is an ancillary project with assessment and permitting completed by SaskTel
Solar Power Project	To be determined	Mcllvenna Bay Project lease area	On site	Ancillary project	Future	This is an ancillary project located within the mine surface lease area. as

#### 9.4.2 Assessment Methods

The VCs assessed for the Project (refer to Section 8) will be included in the CEA; however, assessments will only be completed if there is a Project-environment interaction. For example, the interactions with the Western Nuclear abandoned mine site are strictly with the aquatic environment; thus, the assessment will be limited to this component. Many of the projects are located in the Project footprint and/or proposed surface lease area (Hanson Lake Facility (silica sand), ADEX, ancillary projects, some exploration activities); thus, the CEA will build on the effects assessment being completed for the Project.

A large focus of the cumulative effects assessment will be on the Strong Pine Energy Services Hanson Lake Silica Sand Project that received provincial approval in February 2020 to operate a silica sand extraction project approximately 3 km west of the Project. Since the timing of the Strong Pine project is not known, it will be conservatively assumed that the two projects occur concurrently. Provided below is information on planned approaches for CEAs specifically related to this development.

To assess the cumulative effects from effluent release, the information provided in the Strong Pine EIS (Clifton 2019) will be used to define an additional source load to Hanson Lake. This cumulative effects scenario will include the proposed Project EIA base case effluent load and the additional Strong Pine effluent load to Hanson Lake for the Project COPC. ADEPT, the dispersion and pathways model, will be used to characterize the potential effects from the two projects, should effluent be released concurrently. This information will be used to evaluate if there are potential cumulative effects to aquatic VCs.

The Strong Pine project will be simulated in the Project numerical groundwater flow model and a cumulative effects scenario will be run with both the Project underground workings and the Strong Pine project boxcut fully dewatered. The estimated drawdown if both projects were at their full extents and fully dewatered at the same time will be presented along with predicted impacts to discharge of groundwater to surface water. In addition, changes to the predicted groundwater inflow to the Project mine workings that result from including the Strong Pine project in the groundwater flow model will be provided.

Two cumulative effects scenarios will be assessed for air quality with consideration to both the Strong Pine and Mcllvenna Bay projects. The construction and operations phase of the Project will be modelled with Strong Pine operations for six common COPCs including total suspended particulate, particulate matter (PM10, PM2.5), nitrogen oxides, sulphur dioxide, and carbon monoxide. The outcomes of the modelling assessment will be used to identify potential cumulative effects to ambient air quality at the locations of interest to the human health and terrestrial assessments. Predicted contaminant concentrations will be compared to Saskatchewan Air Quality Standards.

Wildlife habitat disturbance related to the Strong Pine project will be assessed in combination with disturbance metrics for the Project for caribou in relation to the draft SK2 East range plan landscape management goals (SKMOE 2021b). Potential impacts will be assessed against proposed mitigations to determine if there is any residual risk.

The socio-economic assessment will evaluate the cumulative effect of the operation of the Strong Pine project in terms of economic and community well-being for endpoints such as additional job availability, training, education, and changes to community demographics and services.

Overall, the CEA approach will be similar to the screening effects assessment approach for the Project. This will include an examination of potential Project-environment interactions to identify negative or positive effects on VCs, a description of mitigation measures that will reduce or eliminate the negative effects, and identification of residual effects and monitoring plans.

## 10 Consultation Report – Effects on First Nation and Métis Communities

The activities described in Rightsholder Engagement Strategy (Section 5) will be refined and facilitated in collaboration with rights-holders. Feedback or information collected through these activities will be used to assess any potential effects of the development on Indigenous rights, culture, and traditional land uses. MBO will work with potentially impacted communities to develop appropriate mitigation or accommodations where necessary. Leadership from rights-holder communities will be provided an opportunity to review and provide comment on the draft Consultation Report prior to EIS submission.

## 11 Potential Accidents and Malfunctions

The EIA will identify potential significant accidents or malfunctions as well as associated mitigation strategies. It is expected that the major scenarios considered for the assessment of accidents and malfunctions will include:

- Containment failure and release of untreated wastewater
- Containment failure and release of tailings (tailings thickener)
- Containment failure and release of contaminants (zinc and copper, and pyrite conc thickener)
- Mine flooding, potential for groundwater contamination
- Surface flooding and potential for groundwater / surface water contamination
- Mine fire and contaminants emission
- Uncontrolled explosion of explosives
- Fuel spill during transportation and refueling
- Fuel fire
- Transportation accident resulting in:
  - Release of contaminants to surface water and soil
  - Wildlife interaction
  - Human interaction
  - Storage failure and release of reagents and incompatible chemical interaction
- Electrical fire
- LNG storage failure and release of LNG, fire and explosion
- LNG truck fire and explosion
- Wildfire

The requirements under the Occupational Health and Safety Regulations will not be part of the EIA, since these will be addressed in an occupational health and safety plan that will be developed as part of the permitting process.

## 12 Ancillary Projects

Ancillary projects that could potentially be constructed in connection with the Project are:

- Transmission/distribution line (proponent: SaskPower).
- Fibre optic communications line (proponent: SaskTel)
- Solar power project (proponent: other).
- Rail loading facility, if required

Foran does not have any plans for future expansion in place currently; however, the company continues to explore for additional resources in the area. If exploration is successful, it is possible that Foran will construct additional mines nearby that will provide additional feed to the processing facility in the years after the McIlvenna Bay resource is depleted.

### 13 Effects of the Environment on the Development

Effects of the environment on the Project refer to the forces of nature, such as earthquakes, forest fires, tornadoes, precipitation (flooding or drought), etc., that could affect the Project physically or interfere with the normal activities of the Project. These forces of nature may result in damage beyond repair to one or more Project components, disruption to Project construction and/or operation, and/or damage to one or more of the Project's components that then results in harm to the labour force or the public. Climate change may impact the severity of these forces, leading to more frequent flooding, heightened wind, etc. The same environmental factors have the potential to affect all Project phases (construction, operation, decommissioning, and post-decommissioning) and are not specific to certain phases.

This section of the EIA will assess how potential effect(s) of the environment interact with each Project phase, discuss the likelihood of these forces occurring in the Project area and implications on VCs, and present mitigation measures and contingency plans if necessary.

### 14 Monitoring

MBO will commission monitoring during construction, operation, and decommissioning stages of the Project to ensure VC targets, EIA commitments, and regulatory requirements are met. Preliminary monitoring and follow-up plans outlining components, processes, parameters, and schedules will be provided in this section of the EIS. The type and extent of monitoring will vary depending on the Project stage, as monitoring conducted during construction will be focused on ensuring the environment is sufficiently protected during activities such as land clearing, while monitoring during the decommissioning stage will be focused on examining components such as revegetation success. Monitoring results will be used to quantify impacts and successes, determine if mitigation measures are sufficient, ensure public interest and safety is addressed, and aid in adaptive management if adjustments are required.

During the operational period, monitoring and reporting requirements of numerous components such as treated effluent, surface water and sediment quality; groundwater quality and levels; aquatic biota health; soil and terrestrial vegetation chemistry; and environmental inspections of infrastructure will be detailed in provincially issued permits (e.g., *Approval to Operate Pollutant Control Facilities* and *Permit to Operate Sewage Works*). If the Project meets trigger requirements, monitoring and reporting will also be required by the federally regulated programs like the National Pollutant Release Inventory and MDMER.

The Project commits to preparing and fulfilling management and offset plans as required. It is anticipated that a caribou management and offset plan will be needed and this will be developed during the EIA. The

caribou mitigation and offsetting plan developed during the Strong Pine EIS (Clifton 2019) will be taken into consideration during preparation of MBO's plan to ensure high level objectives for caribou protection are met.

## 15 Summary and Conclusions

This section of the EIS will summarize the key technical findings of the EIA using a table format. This will include synthesizing potential environmental, social, and economic effects (positive and negative) of the Project, and describing the significance of residual effects that could not be eliminated through Project design, monitoring, and other mitigation strategies. It will also summarize:

- any potential effects on Indigenous rights, culture, and traditional land uses and how these will be mitigated or accommodated for;
- the cumulative effects of the Project in consideration of past, present, and future developments in the region and how these will be mitigated and monitored; and
- proposed monitoring and offsetting during all phases of the Project to ensure VC targets, EIA commitments, and regulatory requirements are met.

## 16 Conditions Management

### 16.1 Commitments Register

The Commitments Register Template provided in Appendix B of the Draft Guidelines for the Terms of Reference and Environmental Impact Statement, June 2021 will be used.

### 16.2 Follow-Up Reporting

The EIS will include preliminary identification of reporting needs and timelines for monitoring and follow-up activities; however, it is expected that details will be outlined in licenses, permits, and regulations. For example, a provincially issued *Approval to Operate Pollutant Control Facilities* will contain information on required timelines for each monitoring component (i.e., quarterly, annually, etc.) and the submission of study designs and interpretive reports for Environmental Effects Monitoring biological monitoring programs required under the MDMER have specified regulatory timelines. Any offset plans prepared for the Project will contain information on reporting requirements and timelines for implementation and follow-up monitoring. It is anticipated that there will be additional follow-up monitoring needs identified as a result of the EIS review, which will be addressed as the Project moves forward.

## 17 Qualified Persons Credentials

The credentials of key personnel involved in the EIA are listed below in Table 17-1.

Table 17-1 Credentials of Key Personnel

Personnel and Credentials	EIS Contribution/Expertise
Kirsten Ketilson, M.Sc., P.Ag	Regulatory Approval Requirements and Guidance
Jeff Pryznyk, Engineering Licensee, A.Sc.T	Regulatory Approval Requirements and Guidance
Jason Linklater	Stakeholder and Rights Holder Engagement
Katie Suek, M.SEM	Stakeholder and Rights Holder Engagement Socio-economic Assessment
Kelly Wells, M.Sc., P.Biol.	Project Manager Aquatic Environment
Jocelyn Howery, M.Sc., P.Ag	Hydrology
Sheri Korpess, P.Ag	Soils and Vegetation
Joshua Traylor, Ph.D	Wildlife Woodland Caribou Management Plan
Katherine Woolhouse, M.Sc.	Project Coordinator Human Health and Ecological Risk Assessment
Stacey Fernandes, M.Sc., P.Eng, QP-RA	Human Health and Ecological Risk Assessment
Michelle Fraser, M.Sc., P. Geo.	Hydrogeology
Amy Domaratzki, M.A.Sc., P.Eng	Hydrogeology
Paul Kirby, M.Sc.	Atmospheric and Acoustic Environment
Nick Shinbin, P.Eng	Noise Modelling
Kim Theobald, B.Sc.	Air Quality Modelling and Emissions Estimations
Svetlana Music, M.Sc.	Air Quality Modelling/Meteorology
Jennifer Hodowsky, P.Eng	Air Quality Emissions Estimation
Mehran Monabatti, Ph.D	Accidents and Malfunctions

## 18 References

- Acton, D.F., G.A. Padbury, and C.T. Stushnoff. 1998. The ecoregions of Saskatchewan. Canadian Plains Research Centre, Regina, Saskatchewan.
- AGP (AGP Mining Consultants Inc.). 2020. NI 43-101 Technical report, pre-feasibility study for the Mcllvenna Bay Project, Saskatchewan, Canada. Prepared for Foran Mining Corporation, Vancouver, British Columbia.
- Alberta Sustainable Resource Development. 2006. Handbook of inventory methods and standard protocols for surveying bats in Alberta. Edmonton, AB.
- ASKI (ASKI Resource Management and Environmental Services LP). 2012. Mcllvenna Bay Project Tradition Land Use/Knowledge Inventory. Prepared for Foran Mining Corporation, Vancouver, British Columbia.
- Birds Canada. 2022. Saskatchewan breeding bird atlas 2017-2021. Data Accessed from NatureCounts, a Node of the Avian Knowledge Network, Birds Canada. Available: <http://www.naturecounts.ca/>.
- CanNorth (Canada North Environmental Services Limited). 2013. Mcllvenna Bay Project Environmental Baseline Assessment. Prepared for Foran Mining Corporation, Vancouver, British Columbia.
- CanNorth (Canada North Environmental Services Limited). 2020. Patterson Lake South Project Environmental Baseline Report. Prepared for Fission Uranium Corp., Kelowna, British Columbia.
- CanNorth (Canada North Environmental Services Limited). 2021. Wildlife Baseline Report 2 (amphibians, birds, and bats) for the Rook I Project. Prepared for NexGen Energy Ltd., Saskatoon, Saskatchewan.

- CanNorth (Canada North Environmental Services Limited). 2022. Mcllvenna Bay Project 2021 Environmental Baseline Report. Draft report, April.
- CBC News. 2007. Metal contamination prompts province to close camping area. CBC News Saskatchewan. <https://www.cbc.ca/news/canada/saskatchewan/metal-contamination-prompts-province-to-close-camping-area-1.646416> (accessed May 10, 2022).
- CCME (Canadian Council of Ministers of the Environment). 2021. Canadian Environmental Quality Guidelines summary table. <https://ccme.ca/en/summary-table>.
- Chan, L., O. Receveur, M. Batal, T. Sadik, H. Schwartz, A. Ing, K. Fediuk, and C. Tikhonov. 2018. First Nations Food, Nutrition and Environment Study (FNFNES): Results from Saskatchewan (2015). University of Ottawa.
- Clifton. 2019. Strong Pine Energy Services Environmental Impact Statement; Silica Sand Project, Hanson Lake, Saskatchewan. Prepared for Strong Pine Energy Services, Saskatoon, SK.
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2014. COSEWIC assessment and status report on the Caribou Rangifer tarandus, Newfoundland population, Atlantic-Gaspésie population and Boreal population, in Canada. Committee on the Status of Endangered Wildlife in Canada.
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2021. Wildlife Species Search: Database of wildlife species assessed by COSEWIC. Website: <https://www.cosewic.ca/index.php/en-ca/>.
- CPET (Connor Pacific Environmental Technologies Inc.). 1999a. Mcllvenna Bay test mine access road environmental assessment, eagle and osprey nest and woodland caribou habitat reconnaissance. Prepared for Foran Mining Corporation, Vancouver, British Columbia.
- CPET (Connor Pacific Environmental Technologies Inc.). 1999b. Mcllvenna Bay test mine access road environmental assessment, rare plant survey. Prepared for Foran Mining Corporation, Vancouver, British Columbia.
- CSA (Canadian Standards Association). 2010. N288.4-10: Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills. May 2010. Reaffirmed January 2015.
- EC (Environment Canada). 2012a. Recovery strategy for the woodland caribou (Rangifer tarandus caribou), Boreal population, in Canada. [https://wildlife-species.canada.ca/species-risk-registry/virtual\\_sara/files/plans/rs\\_caribou\\_boreal\\_caribou\\_0912\\_e1.pdf](https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/plans/rs_caribou_boreal_caribou_0912_e1.pdf).
- EC (Environment Canada). 2012b. Metal mining technical guidance for environmental effects monitoring. Environment Canada, National Environmental Effects Monitoring Office, Science Policy and Environmental Quality Branch, Ottawa, Ontario.
- Foran (Foran Mining Corporation). 2022. Technical Report on the Feasibility Study for the Mcllvenna Bay Project, Saskatchewan Canada. Prepared for Foran Mining Corporation, April 14.

- GA (Government of Alberta). 2013. Sensitive species inventory guidelines. Edmonton, Alberta: Prepared by the Government of Alberta Environment and Sustainable Resource Development. <https://open.alberta.ca/publications/sensitive-species-inventory-guidelines#detailed>.
- GC (Government of Canada). 2019. Impact Assessment Act. <https://laws.justice.gc.ca/eng/acts/I-2.75/FullText.html>.
- GC (Government of Canada). 2022. Species at risk public registry. <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>.
- Golder (Golder Associates Inc.). 2012. 2011-2012 Geotechnical field investigations – Mcllvenna Bar deposit geotechnical and hydrogeological field investigations. Prepared for Foran Mining Corporation, Vancouver, British Columbia.
- GS (Government of Saskatchewan). 1998. The Wildlife Act. <http://www.publications.gov.sk.ca/details.cfm?p=938>.
- GS (Government of Saskatchewan). 2010. The Weed Control Act. S.S. c. W-11.1, 2010 (effective December 1, 2010) as amended by the Statutes of Saskatchewan, 2014, c. 19. <http://www.publications.gov.sk.ca/details.cfm?p=31364>.
- GS (Government of Saskatchewan). 2015. Mercury in Saskatchewan fish: Guidelines for consumption updated to 2015.
- GS (Government of Saskatchewan). 2018. The Mines Regulations, 2018; Chapter S-15.1 Reg 8.
- GS (Government of Saskatchewan). 2021. Saskatchewan environmental quality guidelines. <https://envrbrportal.crm.saskatchewan.ca/seqg-search/> (accessed May 27, 2021).
- Health Canada. 2016a. Guidance for evaluating human health impacts in Environmental Assessment: air quality. Ottawa.
- Health Canada. 2016b. Guidance for evaluating human health impacts in Environmental Assessment: drinking and recreational water quality. Ottawa.
- Health Canada. 2017a. Guidance for evaluating human health impacts in Environmental Assessment: Noise. Ottawa.
- Health Canada. 2017b. Guidance for evaluating human health impacts in Environmental Assessment: country foods. Ottawa.
- Health Canada. 2019. Guidance for evaluating human health impacts in Environmental Assessment: human health risk assessment. Ottawa.
- HR and NRMS (Hydro-Resources and North Rock Mining Solutions Inc.). 2019. Mcllvenna Bay Project Hydrogeological Feasibility Analysis. Technical Report – File P18-107. Prepared for Foran Mining Corporation, Vancouver, British Columbia.

- HudBay. 2021. Hudbay releases first quarter 2021 results. TMX, NYSE - HBM 2021 No. 8. [https://s23.q4cdn.com/405985100/files/doc\\_news/2021/HBMNR8\\_AnnualReserveResourceUpdate\\_FINAL.pdf](https://s23.q4cdn.com/405985100/files/doc_news/2021/HBMNR8_AnnualReserveResourceUpdate_FINAL.pdf).
- Impact Assessment Agency of Canada. Unknown. Assessment of Potential Impacts on the Rights of Indigenous Peoples. Guidance. Available online at: <https://www.canada.ca/content/dam/iaac-acei/documents/policy-guidance/practitioners-guide/guidance-assessment-potential-impacts-rights-indigenous-peoples.pdf>
- JDS (JDS Energy and Mining Inc.). 2015. Preliminary Economic Assessment Technical Report Mcllvenna Bay Project, Saskatchewan, Canada. (Reissued).
- Kooyman, B.P. 2000. Understanding stone tools and archaeological sites. University of Calgary Press, Calgary, Alberta.
- Lausen, C.L., E. Baerwald, J. Gruver, and R.M.R. Barclay. 2008. Appendix 5: Bats and wind turbines. Pre-siting and pre-construction survey protocols, 2nd ed. Alberta Bat Action Team, University of Calgary, Alberta Fish and Wildlife. Updated May 2010.
- Månsson, J., H. Andrén, and H. Sand. 2011. Can pellet counts be used to accurately describe winter habitat selection by moose *Alces alces*? *European Journal of Wildlife Research* 57(5):1017–1023. <https://link.springer.com/article/10.1007/s10344-011-0512-3>.
- MSWG (Mapping System Working Group). 1981. A soil mapping system for Canada: revised. Ottawa, ON.
- Maxeiner, R.O., T.I. Sibbald, L.S. William, L.M. Heaman, and B.R. Watters. 1999. Lithogeochemistry of volcano-plutonic assemblages of the southern Hanson Lake Block and southeastern Glennie Domain, Trans-Hudsonian Orogen: evidence for a single island arc complex. *Canadian Journal of Earth Sciences* 36:209–225.
- McLaughlan, M.S., R.A. Wright, and R.D. Jiricka. 2010. Field guide to the ecosites of Saskatchewan's provincial forests. <http://publications.gov.sk.ca/documents/66/38836-English.pdf>.
- McMartin, I., P.J. Henderson, and E. Neilson. 1999. Impact of base metal smelter on the geochemistry of soils in the Flin Flon region, Manitoba and Saskatchewan. *Canadian Journal of Earth Sciences* 35:141–160.
- MDEng (MD Engineering). 2019. MDEng report #18040-109 Mcllvenna Bay Project geomechanical feasibility analysis. Prepared for Foran Mining Corporation, Vancouver, British Columbia.
- Northern Municipal Services. 2012. Deschambault Lake Subdivision. <https://www.planningforgrowthnorthsk.com/deschambault-lake-subdivision.html> (accessed April 13, 2022).
- PBCN (Peter Ballantyne Cree Nation). 2021a. Deschambault Lake. <http://www.pbcnhealthservices.org/index.php/communities/deschambault-lake> (accessed November 22, 2021).

- PBCN (Peter Ballantyne Cree Nation). 2021b. Communities. <https://www.planningforgrowthnorthsk.com/deschambault-lake-subdivision.html> (accessed November 3, 2021).
- PBCN (Peter Ballantyne Cree Nation). 2022. Pelican Narrows. <http://www.pbcnhealthservices.org/index.php/communities/pelican-narrows> (accessed April 22, 2022).
- PBCN Health Services (Peter Ballantyne Cree Nation Health Services). 2022a. Denare Beach. <http://www.pbcnhealthservices.org/index.php/communities/denare-beach> (accessed April 21, 2022).
- PBCN Health Services (Peter Ballantyne Cree Nation Health Services). 2022b. Sturgeon Landing. <http://www.pbcnhealthservices.org/index.php/communities/sturgeon-landing> (accessed April 22, 2022).
- Pennock, D., K. Watson, and P. Sanborn. 2016. Field handbook for the soils of Western Canada. Pedology Subcommittee, Canadian Society of Soil Science. <http://www.soilsofcanada.ca/links.php>.
- SARPR (Species at Risk Public Registry). 2022. Species list. Environment and Climate Change Canada. [https://www.sararegistry.gc.ca/species/schedules\\_e.cfm?id=1](https://www.sararegistry.gc.ca/species/schedules_e.cfm?id=1).
- SASK. 2022. Rare plants database search results. W.P. Fraser Herbarium, University of Saskatchewan, Saskatoon, Saskatchewan.
- Sawchyn, W.W. 1967. Hanson and Wildnest Lakes, 1966 and preliminary investigations into the productivity of Granite Lake, 1966.
- SCWG (Soil Classification Working Group). 1998. The Canadian system of soil classification. Third. Ottawa, ON: Agriculture and Agri-Food Canada Publication 1646 (Revised).
- SKCDC (Saskatchewan Conservation Data Centre). 2014. Saskatchewan ecoregions. <http://biodiversity.sk.ca/eco.htm>.
- SKCDC (Saskatchewan Conservation Data Centre). 2020a. Taxa list for vertebrates. <http://www.biodiversity.sk.ca/SpplList/verts.pdf> (accessed June 6, 2018).
- SKCDC (Saskatchewan Conservation Data Centre). 2020b. Saskatchewan vascular plant taxa list. Regina, Saskatchewan. <http://www.biodiversity.sk.ca/SpplList.htm> (accessed March 20, 2018).
- SKCDC (Saskatchewan Conservation Data Centre). 2021. Taxa list: vascular plants. <http://biodiversity.sk.ca/TaxaList/sk-taxa-vascularplant-all.pdf>.
- SKMOE (Saskatchewan Ministry of Environment). 2004. Amisk-Atik integrated forest land use plan. <http://www.environment.gov.sk.ca/adx/asp/adxGetMedia.aspx?DocID=a2d6c2ee-51ae-4645-8398-2f98432de4c2&MediaID=1744&Filename=Amisk-Atik+Land+Use+Plan.pdf&l=English#:~:text=The Amisk-Atik Integrated Forest Land Use Plan covers approximately,use in the plann.>

- SKMOE (Saskatchewan Ministry of Environment). 2008. Northern mine decommissioning and reclamation guidelines. EPB 381. [https://pubsaskdev.blob.core.windows.net/pubsask-prod/96788/96788-Northern\\_Mine\\_Decommissioning\\_and\\_Reclamation\\_Guidelines.pdf](https://pubsaskdev.blob.core.windows.net/pubsask-prod/96788/96788-Northern_Mine_Decommissioning_and_Reclamation_Guidelines.pdf).
- SKMOE (Saskatchewan Ministry of Environment). 2012a. Saskatchewan Air Quality Modelling Guideline Version : March 2012. March 2012. Technical Resources Branch. Air Science and Monitoring Unit.
- SKMOE (Saskatchewan Ministry of Environment). 2012b. Air Monitoring Guideline for Saskatchewan. <http://publications.saskatchewan.ca/#/products/71865>.
- SKMOE (Saskatchewan Ministry of Environment). 2014a. Environmental assessment in Saskatchewan. A high level overview of the Environmental Assessment process for developments within Saskatchewan under the Environmental Assessment Act. Environmental Assessment Branch, Regina, SK.
- SKMOE (Saskatchewan Ministry of Environment). 2014b. Consultation with First Nations and Métis in Saskatchewan Environmental Impact Assessment.
- SKMOE (Saskatchewan Ministry of Environment). 2014c. Yellow rail survey protocol. [http://publications.gov.sk.ca/documents/66/89838-Yellow\\_Rail\\_Survey\\_Protocol.pdf](http://publications.gov.sk.ca/documents/66/89838-Yellow_Rail_Survey_Protocol.pdf).
- SKMOE (Saskatchewan Ministry of Environment). 2015. Environmental monitoring guidelines for mining/industrial operations (Draft). Version 4.3, November 5, 2015.
- SKMOE (Saskatchewan Ministry of Environment). 2017. Saskatchewan activity restriction guidelines for sensitive species. <https://publications.saskatchewan.ca/#/products/79241>.
- SKMOE (Saskatchewan Ministry of Environment). 2020a. Species Detection Survey Protocol: 1.0 Amphibian Auditory Surveys. Prepared by Saskatchewan Ministry of Environment, Fish, Wildlife and Lands Branch, Regina, Saskatchewan, Canada.
- SKMOE (Saskatchewan Ministry of Environment). 2020b. Species detection survey protocol 10.0 Forest bird surveys April 2020 update. Fish, Wildlife and Lands Branch. Regina, Saskatchewan. <https://publications.saskatchewan.ca/#/products/79503>.
- SKMOE (Saskatchewan Ministry of Environment). 2020c. Species Detection Survey Protocol: 15.0 Common Nighthawk Surveys. [https://pubsaskdev.blob.core.windows.net/pubsask-prod/117104/SDSP\\_15.0%252BCommonNighthawk\\_Apr%252B2020.pdf](https://pubsaskdev.blob.core.windows.net/pubsask-prod/117104/SDSP_15.0%252BCommonNighthawk_Apr%252B2020.pdf).
- SKMOE (Saskatchewan Ministry of Environment). 2021a. Species detection survey protocol: 20.0 vascular plant - June 2021 Update. Saskatchewan Ministry of Environment, Fish, Wildlife and Lands Branch, Regina, Saskatchewan. [https://pubsaskdev.blob.core.windows.net/pubsask-prod/127305/20.0\\_Vascular\\_Plant\\_SDSP.pdf](https://pubsaskdev.blob.core.windows.net/pubsask-prod/127305/20.0_Vascular_Plant_SDSP.pdf).
- SKMOE (Saskatchewan Ministry of Environment). 2021b. Range Plan for Woodland Caribou in Saskatchewan - Draft. Boreal Plain Ecozone - SK2 East Caribou Administration Unit, October.
- SKMOE (Saskatchewan Ministry of Environment). 2022. Hunting, angling and biodiversity of Saskatchewan (HABISask). Fish, Wildlife and Lands Branch, Regina, Saskatchewan. <https://gisappl.saskatchewan.ca/Html5Ext/?viewer=habisask>.

- SNC Lavalin. 2021. Western Nuclear Mine Remediation - Corrective Action Plan to 60% Engineering Design. Prepared for Saskatchewan Ministry of Environment, Final Report, August.
- SSA (Saskatchewan Snowmobile Association). 2021. Trail Map 2021 to 2022. <https://ssa.evtrails.com/#> (accessed November 5, 2021).
- Stantec. 2021a. Foran Mining Corporation - ADEX camp water supply drilling program Mcllvenna Bay, Saskatchewan. Prepared for Foran Mining Corporation, Vancouver, British Columbia.
- Stantec. 2021b. Document No. 400.100.000-REP-U-0001 groundwater model update. Prepared for Foran Mining Corporation, Vancouver, British Columbia.
- StatsCan (Statistics Canada). 2017. Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. <https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E>.
- Stickney, P.F. 1966. Browse utilization based on percentage of twig numbers browsed. *Journal of Wildlife Management* 30(1):204–206. [https://www.jstor.org/stable/3797908?seq=1#page\\_scan\\_tab\\_contents](https://www.jstor.org/stable/3797908?seq=1#page_scan_tab_contents).
- Syme, E.C., S. Lucas, A.H. Bailes, and R. Stern. 1999. Contrasting arc and MORB-like assemblages in the Paleoproterozoic Flin Flon Belt, Manitoba and the role of intra-arc extension in localizing volcanic-hosted massive sulphide deposits. *Canadian Journal of Earth Sciences* 36(11):1767–1788.
- TAEM (Terrestrial & Aquatic Environmental Managers Limited). 1990a. Aquatic biological resources of the Hanson Lake Project Area, Spring Spawning Investigations. Prepared for Cameco Corporation, Saskatoon, Saskatchewan.
- TAEM (Terrestrial & Aquatic Environmental Managers Limited). 1990b. Aquatic biological resources of the Hanson Lake project area, Saskatchewan. Prepared for Cameco Corporation, Saskatoon, Saskatchewan.
- The Reminder. 2021. Hudbay starts plan to shift jobs to Snow Lake, announces update for Snow Lake area. <https://www.thereminder.ca/local-news/hudbay-starts-plan-to-shift-jobs-to-snow-lake-announces-updates-for-snow-lake-area-4210827>.
- Thompson, P.A., J. Kurias, and S. Mihok. 2005. Derivation and use of Sediment Quality Guidelines for Ecological Risk Assessment of metals and radionuclides released to the environment from uranium mining and milling activities in Canada. *Environmental Monitoring and Assessment*. 110:71–85.
- U.S. EPA (United States Environmental Protection Agency). 2016. Aquatic Life Ambient Water Quality Criterion for Selenium - Freshwater. U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology. EPA 822-R-16-006, June. <https://www.epa.gov/wqc/aquatic-life-ambient-water-quality-criteria>.
- Vonhof, M.J. 2017. Handbook of inventory methods and standard protocols for surveying bats in Alberta. Alberta Fish and Wildlife Division. Updated by Alberta Sustainable Resource Development and Alberta Bat Action Team in 2017, Edmonton, Alberta.

Zwanzig, H.V., and D.C. Schledewitz. 1997. Geological Compilation of Parts of the Flin Flon terrane and Kiseynew gneisses, Trans-Hudson Orogen, Manitoba. GaC-MAC Annual Meeting Abstract Volume 22: A163.

