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Anderson Tailings Impoundment Area Subaerial Tailings Deposition Trial Study

Notice of Alteration

Hudbay Minerals Inc.

Project number: 60686634

February 2024

Delivering a better world

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AECOM: 2015-04-13

Quality information

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Revision History

Revision	Revision date	Name	Details
0	February 21, 2024	Cliff Samoiloff	Final

Distribution List

# Hard Copies	PDF Required	Association / Company Name
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Table of Contents

Figures

Tables

Appendices

1. Introduction

1.1 Project Overview

Hudbay Minerals Inc's (Hudbay) Anderson Tailings Impoundment Area (Anderson TIA or ATIA) is in the Snow Lake mining district in northern Manitoba. **Figure 1** displays the general location of the Anderson TIA in Manitoba.

Anderson Lake was designated as a TIA in 1979, and has been in operation, along with the Stall Concentrator since that time. A concentrator (sometimes called a mill) processes the ore produced in a mine, extracting the metals from the ore, and leaving behind slurry called "tailings". Tailings from the Stall Concentrator (Stall), and the New Britannia Mill (NBM) (which was recommissioned in 2021) are deposited via a pipeline into the Anderson TIA. Storage of tailings under water has long been understood to provide effective environmental management of tailings.

Anderson TIA operates in accordance with Environment Act License (EAL) No. 3263 and the criteria set out in the Metal and Diamond Mining Effluent Regulations (MDMER) made under the (federal) *Fisheries Act*. As described in Item 1 of Schedule 2 to the MDMER, the Anderson TIA is in "the area bounded by (a) the contour of elevation around Anderson Lake at the 285 m level, and (b) the control dam built at the east end of Anderson Lake."

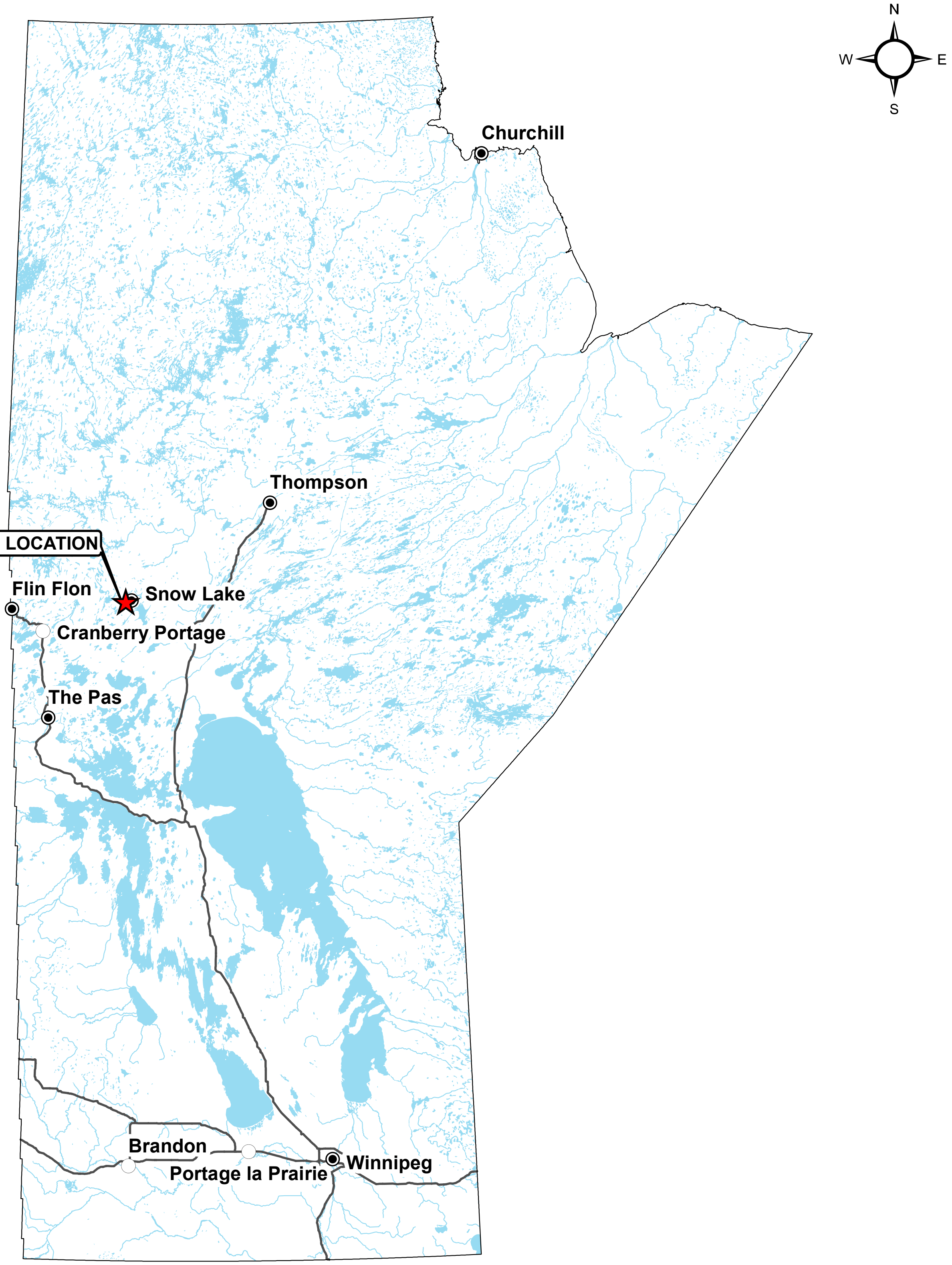
Hudbay is continuously seeking innovative approaches for the operation and management of the Anderson TIA, and one of the approaches that Hudbay is exploring is the feasibility of transitioning the Anderson TIA from a subaqueous to a subaerial tailings deposition method. This approach involves depositing tailings above the water table, potentially offering a more efficient use of impoundment space and addressing seasonal operational constraints.

To allow for further evaluation of this tailings management approach, Hudbay is seeking approval from Manitoba Environment and Climate Change (MECC) Environmental Approvals Branch (EAB) to allow for a limited trial study to evaluate the feasibility of controlled subaerial placement of tailings within designated areas of the Anderson TIA. This will be a 3-year trial study aimed at exploring subaerial tailings storage in a controlled manner within the current areas used for tailings deposition, starting in westernmost Area 1 (the area that is furthest from the discharge location) and moving eastward.

This trial study will also be referred to as the "Project" in the context of this document.

In support of this trial study request, Hudbay has requested advice from AECOM with respect to the anticipated environmental impact and mitigation requirements to obtain approval from MECC to proceed with this study. AECOM has conducted a cursory review of the proposed trial study and the results of our environmental assessment are provided in this report.

This report contains the information described in Manitoba Environment and Climate "Information Bulletin, - Environment Act Proposal Report Guidelines." (MEBC, 2022). It has been prepared and is submitted for consideration as a minor Notice of Alteration to EAL No. 3263 for the proposed trial study on subaerial tailings deposition. Our environmental assessment is based on our understanding of the proposed trial study and the existing environmental conditions at the Anderson TIA and associated infrastructure, which have been subject to previous environmental baseline studies and site assessments conducted between 2007 and 2023.



Source: Geogratis - North American Atlas (NR Canada); Manitoba Lands Initiative (MLI)

NOTICE OF ALTERATION
ANDERSON TIA SUBAERIAL TAILINGS DEPOSITION TRIAL STUDY
HUDBAY MINERALS INC.
Project No.: 60686634 Date: 2023-10-31

GENERAL SITE LOCATION

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Figure: 1

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1.2 Proponent Contact Information

Table 1-1: Proponent Contact Information

Name of Project:	Anderson TIA Subaerial Tailings Deposition Trial Study
Name of Proponent	Hudbay Minerals Inc.
Address of Proponent	PO Box 1500, #1 Company Road, Flin Flon, Manitoba, R8A 1N9
Principal Contact Person for the NOA	Landice Yestrau Manager of Environmental Control PO Box 1500, #1 Company Road, Flin Flon, Manitoba, R8A 1N9 Ph: (204) 687-2169 Email: landice.yestrau@hudbayminerals.com

1.3 Company Profile

Hudbay operates the Lalor Mine, located near Snow Lake, Manitoba. The Lalor Mine is an underground zinc-copper-gold mine and when including other satellite deposits, Hudbay expects to continue mining operations until approximately 2038 in Snow Lake. Zinc and copper ore obtained at the Lalor Mine is processed at the Stall Concentrator, and gold ore obtained from the Lalor Mine is processed at the New Britannia Mill. Tailings from the Stall Concentrator and New Britannia Mill are deposited via a pipeline into the Anderson TIA. Tailings from Stall Concentrator are also used in the production of paste backfill at the Lalor Paste Plant that was commissioned in 2018.

Hudbay operations in Flin Flon, including the 777 Mine and Flin Flon Metallurgical Complex, ceased in 2022 and the facilities are currently in care and maintenance. Zinc and copper concentrate from the Stall Concentrator is shipped out of Manitoba for further processing.

Hudbay's operating portfolio also includes the Constancia Mine in Cusco, Peru, and the Copper Mountain Mine in British Columbia.

As of December 2022, Hudbay directly employed 1,920 people, with an annual payroll of $238.1 million (USD) in wages and benefits. In 2022, Hudbay paid approximately $33.4 million in municipal taxes and grants as well as making community investments and charitable donations of approximately $10.1 million.

1.4 History of the Snow Lake Region

The Snow Lake region of northern Manitoba has had an active mining history for more than 50 years. Hudbay has played an integral part in this history since the late 1950's by operating mines in the area, including the Photo Lake, Rod, Chisel Lake, Chisel Open Pit, Stall Lake, Osborne Lake, Spruce Point, Ghost Lake, Anderson Lake, and Chisel North Mines.

Currently, Hudbay operates the Lalor Mine in the Snow Lake region. The locations of the Hudbay facilities within the Snow Lake area that have components connected to the Anderson TIA are provided in **Figure 2**.

Project Components

Hudbay Mines

- Closed Hudbay Mine
- Operating Hudbay Mine

Hudbay Infrastructure

- New Britannia Mill
- Stall Concentrator
- Existing Tailings Pipeline

Roads

- Provincial Road

N
W E
S

1:50,000
NAD 1983 UTM Zone 14N

500 250 0 500 1,000 1,500 m

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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Figure: 2

NOTICE OF ALTERATION
ANDERSON TIA SUBAERIAL TAILINGS DEPOSITION TRIAL STUDY
HUDBAY MINERALS INC.
Project No.: 60686634 Date: 2023-10-31

LOCATION OF PROJECT COMPONENTS AND EXISTING HUDBAY FACILITIES

1.4.1 Lalor Mine

The Lalor Mine commenced ore production in 2012 for copper, zinc, and gold. It is operated in accordance with *Environment Act* Licence No. 3096. In 2016, Hudbay filed a Notice of Alteration to add the Lalor Paste Plant, and this alteration was approved on January 30, 2017. The Lalor Mine is an underground mine and is accessed via a production shaft located on surface at the mine site and via an underground ramp that extends from the former Chisel North Mine.

The Lalor Mine, like many underground mining operations, utilizes “backfill”, often comprised of waste rock, to fill voids that are created by extraction of rock during underground mining. Future backfill requirements for the Lalor Mine are 6.4 million tonnes of rock fill assuming 100% of the voids are filled.

The purpose of a paste backfill plant is to produce an alternative source of backfill which can both stabilize underground workings and produce environmental advantages. Because of these advantages, the use of a paste backfill plant is regarded as a best practice in the mining industry.

Paste backfill is created by mixing tailings generated by a mining operation with water and cement or a similar binding agent. Paste backfill is distributed into the voids in the mine and then gains compressive strength over time. Using paste backfill is a sustainable way to manage tailings as the production of paste requires the addition of tailings that are diverted from the Anderson TIA while increasing operational safety within Lalor Mine. Using paste backfill as opposed to waste rock increases recovery of the mineral resource and thereby extends the life of the Lalor Mine and will extend the life of the Anderson TIA by diverting tailings from the facility for use as paste. It also recycles tailings in a way that prevents the formation of acid rock drainage.

1.4.2 New Britannia Mill

The original Britannia Mine and mill, referred to as the Nor-Acme Mine, operated between 1949 and 1958, producing approximately 512,000 ounces of gold and 41,400 ounces of silver. The milling by-products were discharged primarily as tailings to the Birch Lake Tailings Disposal Facility (TDF) approximately 1.5 km northeast of the mine, with smaller quantities discharged to a swampy area directly east of the original mill, which is now the Province of Manitoba’s remediated former mine tailings area. Also, during that time, the Nor-Acme Mine piped 227,000 tonnes of cyanide-treated refractory sulphide concentrate into an open impoundment (the Arsenopyrite Residue Stockpile) with the hope of eventually developing a safe and economical means of extracting precious metal from the mine waste.

From 1959 to 1987 various companies conducted further exploration activities in the Snow Lake area, but the mill and mine remained closed during this period. In 1980, Hudbay purchased the former mill building (referred to as the Britannia Concentrator) for use as storage and warehouse space.

In 1988, Nor-Acme Mines Limited amalgamated with High River Gold Mines Limited (HGR) and became the owner of the original Nor-Acme deposit. The site was re-opened as Snow Lake Mine and New Britannia Mill in 1995 under the control of TVX Gold Inc. (TVX) and HGR, and operations at the mine resumed with a focus on dewatering portions of the previous underground workings and advancing workings in the mineralized zone. At that time, TVX installed several monitoring wells into the confined sand-gravel aquifer underlying the mine site and an impermeable cap was placed on the Arsenopyrite Residue Stockpile to prevent oxidation and acidic, metal-contaminated runoff. Once the cap was placed, the Arsenopyrite Residue Stockpile became the property and responsibility of the Province of Manitoba.

Ownership of the mine and mill operations changed to Kinross Gold and High River Resources in 1995 and it operated from 1995 until closure in late 2004. Garson Resources and Piper Capital acquired a 100% interest in the Snow Lake Mine in December 2006. The two companies merged in June 2007 to form Garson Gold Corp. (Garson), with the intention of recommencing gold mine operations. In April 2010, Garson became a wholly owned subsidiary of Alexis Minerals. Alexis Minerals did not in fact recommence operation of the Snow Lake Mine.

In 2008, Hudbay demolished the Britannia Concentrator and in 2010 this site became the original location of the Snow Lake Camp.

In 2015, Hudbay acquired the balance of the property with the intention of considering resumption of operations of the New Britannia Mill.

In 2021, Hudbay completed a refurbishment of the New Britannia Mill and re-commenced gold ore processing in August 2021. The facility is operated in accordance with *Environment Act* Licence No. 3320. Unlike ore processed at the Stall Concentrator, the gold is recovered separately from other metals at the New Britannia Mill using a cyanide leach circuit. The release of residual cyanide from the gold recovery process is mitigated at the New Britannia Mill by passing the tailings through a cyanide destruction (CND) tank. In this process, cyanide and cyanide complexes are oxidized to cyanate by the addition of sulphur dioxide and oxygen. The source of sulphur dioxide is sodium metabisulphite, which is added to the CND tank as a solution. Oxygen is provided by sparging compressed air into the slurry. Copper sulphate is added as needed to catalyze the reaction. The CND tank provides an hour of retention time to complete the reaction, after which the tailings pH is adjusted with lime and pumped to the tailings pipeline that leads from the New Britannia Mill to the Stall Concentrator.

1.4.3 Stall Concentrator

The Stall Concentrator (also referred to as the Stall Mill) is located approximately 6 km southeast of Snow Lake on Highway 393. It was commissioned in 1979 and at the time served to process copper and zinc ore from the former Stall Lake Mine, which was situated immediately east of the Stall Concentrator. The facility has been in continuous operation since 1979 (except for brief periods during 1993-1994, 1999 and 2009) and has provided ore processing for the various legacy and existing Hudbay mines located in the Snow Lake region including the former Stall Lake Mine, Rod Mine, Osborne Mine, Photo Lake Mine, Ghost Lake Mine, Anderson Lake Mine, Spruce Point Mine, Chisel North Mine, and existing Lalor Mine.

The Stall Concentrator, which operates in accordance with Clean Environment Commission (CEC) Order 765, currently processes copper and zinc-bearing ore obtained from the Lalor Mine and produces copper and zinc concentrate which is then shipped by truck off-site for further processing. Except for brief intervals, the Stall Concentrator has been in continuous use since its construction, though at varying volumes of production. Over the years, however, various aspects of the operation have been removed from service or upgraded over the years. In 2013-14, the Stall Concentrator was refurbished, and it is now anticipated that it will continue to operate for the life of Lalor Mine.

Tailings generated during the milling process at the Stall Concentrator are combined with tailings from the New Britannia Mill and discharged via a surface pipeline to the Anderson TIA where they are stored under subaqueous conditions. A portion of the combined tailings are also diverted via a surface pipeline to a paste backfill plant, situated at the site of the Lalor Mine, to create paste backfill for placement underground at the Lalor Mine. The paste backfill plant is described in further detail above in Section 1.4.1.

1.4.4 Anderson TIA

The Anderson TIA has been used for subaqueous disposal of tailings since commissioning of the Stall Concentrator in 1979 when a control dam (Anderson Dam) was built across Anderson Creek. It operated under CEC order No. 766 until 2018 when EAL No. 3263 replaced the previous approval. The Anderson TIA continues to operate in accordance with EAL No. 3263.

Anderson Dam was originally equipped with a controlled decant pipe that passed discharge from the Anderson TIA into Anderson Creek, which is shallow channel connecting Anderson TIA to Anderson Bay in Wekusko Lake. All water that enters Anderson Creek is almost entirely comprised of effluent discharged from Anderson TIA, and there are no other surface water inputs into Anderson Creek other than localized runoff. The decant pipe has been recently replaced with siphons at the regulated discharge location. Effluent from the Anderson TIA is discharged intermittently via these siphons to Anderson Creek in accordance with EAL No. 3263 and the requirements of the MDMER. During winter (typically between October to March), discharge is typically shut off at Anderson Dam and remains shut off until the freshet flows commence, and ice breakup occurs in spring.

Since operation in 1979, tailings from the processing of ore obtained from various mine sites were deposited in Anderson TIA, and all tailings have been deposited below the water surface within the Anderson TIA as per the specifications and operating conditions in the former CEC order No. 766 and now in EAL No. 3263. After the closure of the Chisel North Mine in 2012, Hudbay shifted production to the processing of primarily base metal ore from the Lalor Mine at the Stall Concentrator, with associated tailings directed to Anderson TIA.

In 2015, Hudbay acquired the New Britannia Mill with the intent of processing the gold ore from Lalor Mine, with generated tailings to be disposed of at the Anderson TIA. The New Britannia Mill officially began processing gold ore in August 2021, and tailings from the New Britannia Mill began depositing within the Anderson TIA shortly after.

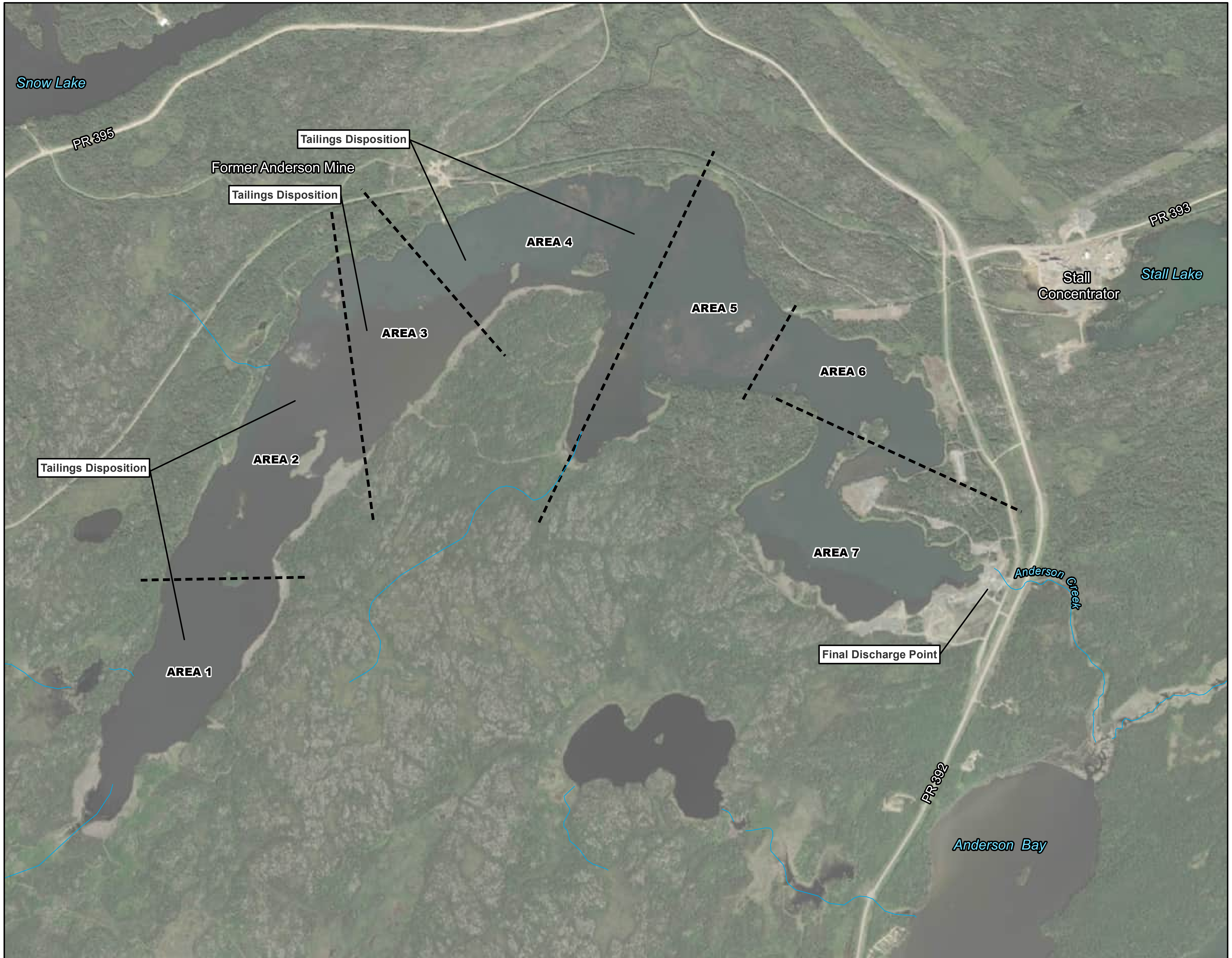
2. Project Description

2.1 Overview of Current Operation of the Anderson TIA

Effluent from the Anderson TIA is discharged intermittently via siphons to Anderson Creek in accordance with EAL No. 3263 and the requirements of the MDMER. During winter (between October to March), discharge is typically shut off at Anderson Dam and remains shut off until the freshet flows commence, and ice breakup occurs in spring.

After the construction of Anderson Dam in 1979, the Anderson TIA was operated at a typical water elevation of between 277.6 m to 277.7 m, to maintain the minimum required freeboard of 1.0 m with respect to the original Anderson Dam crest (BGC 2013). New dam construction has been ongoing since 2019 to increase tailings storage capacity in Anderson TIA and allow tailings from Lalor Mine to be safely managed. New dam construction is being carried out over three phases. Phase 1 consists of three stages (1A, 1B and 1C) to progressively increase the storage capacity. Once completed, Phase 1 is expected to be sufficient to accommodate tailings deposition from Lalor Mine for its expected Life of Mine (2038) and would bring the water level in Anderson TIA to an elevation of 283.9 m. The current Maximum Operating Water Level (MOWL) in Anderson TIA is 279.5 m.

Figure 3 provides the general arrangement and operation of the Anderson TIA while **Figure 4** and Table 2-1 provide additional information on the dam construction status, which is isolated to Area 7 in the Anderson TIA.



Legend

- - - Deposition Area Boundary
→ Overall Flow Direction

N / E / S / W

1:20,000
NAD 1983 UTM Zone 14N
200 0 200 400 600 m

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

NOTICE OF ALTERATION
ANDERSON TIA SUBAERIAL TAILINGS DEPOSITION TRIAL STUDY
HUDBAY MINERALS INC.
Project No.: 60686634 Date: October 2023

GENERAL ARRANGEMENT AND OPERATION OF THE ANDERSON TIA

AECOM

Figure: 3

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N
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1:5,000
NAD 1983 UTM Zone 14N

50 0 50 100 150 m

Imagery: Google Earth 08/2023

NOTICE OF ALTERATION
ANDERSON TIA SUBAERIAL TAILINGS DEPOSITION TRIAL STUDY
HUDBAY MINERALS INC.
Project No.: 60686634 Date: October 2023

ANDERSON TIA DAM
CONSTRUCTION STATUS (AREA 7)

AECOM
Figure: 4

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Table 2-1: Dam Construction Status

Completed and Anticipated Dam Raises and Water Level Increases under EAL No. 3263	Date of Completion
Southwest Dams 1 and 2 and South Dam constructed to elevation (el.) 283.75m (Stage C)	2021
Permanent spillway rock cut channel constructed to invert el. 279.2m	2021
East Dam 1 and 2 raised to el. 282.4 m	2022
East Dam 3 raised to el. 281 m	2022
Northeast Dam 2 raised to el. 281.2 m	2022
Water level in Anderson TIA increased to el. 278.98 m	November 2022
Water level in Anderson TIA increased to el. 279.5 m (MOWL[1])[2]	Q2 (spring) 2024
Raise East Dam 3 to el. 282.4 m (Stage B)	October 2025[3]
Raise Northeast Dam 2 to el. 282.6 m (Stage B)	October 2025[3]
Water level in Anderson TIA increased to el. 281.1 m (MOWL)	October 2026[3]
Raise East Dam 1, 2, 3 to el. 283.75 m (Stage C)	October 2030[3]
Raise of Northeast Dam 1, 2 to el. 283.9 m (Stage C)	October 2030[3]
Water level in Anderson TIA increased to el. 282.4 m	October 2031[3]

[1] Maximum Operating Water Level (MOWL)
[2] Note: current operating range is 278.5 m Lowest Operating Water Level (LOWL)
[3] Forecasted date of completion.

2.1.1 Conditions within the Environment Act License

Article 21(a) of EAL No. 3263, which addresses subaerial tailings deposition, states as follows:

The Licensee shall:

a) *Distribute and deposit tailings underwater such that there is no contact between the tailings and the atmosphere at any time including during wave action or seasonal low-water conditions.*

Hudbay has been successful in maintaining the tailings in the Anderson TIA underwater during most times of the year. During the shoulder seasons and extreme weather events, it is unsafe for employees to go onto the water or ice to reposition the floating pipes that deposit tailings into the impoundment area. As such, this results in a very small area of exposed tailings, approximately 2% to 8% of the total surface area of the ATIA based on operating water level.

2.1.2 Current Mitigation and Optimization Measures

The previous practice for maintaining tailings submerged underwater was successful under historical conditions which included greater water depth, fewer areas subject to tailings deposition, and lower volume of tailings deposited. Under these historical conditions, the management of the Anderson TIA included once per day pipe moves, fewer crews and crew members, annual deposition planning, and bathymetric survey once every three years.

Under the current and future conditions, additional management and mitigation measures have been or will be put in place as required. To mitigate the isolated occurrences of exposed tailings and to optimize tailings deposition within the Anderson TIA, Hudbay has implemented the following strategies and improvements:

- Additional employees on the Tailings Crew.
- Addition of a Technical Lead to provide guidance and defined deposition planning to Tailings Crew.
- Addition of dedicated supervisor for the ATIA to provide direct supervision and additional support to Tailings Crew.

- Improved procedures that include multiple pipe movements per day instead of one.
- Improved deposition planning and methodology using 3D modelling software.
- Regular drone surveys to evaluate progress.
- Increased frequency of bathymetry surveys.
- Weekly Key Performance Indicators (KPIs) reporting to track progress.
- Additional piping to support deposition in Areas 1 and 2 (farthest from discharge point).
- Additional equipment to support pipe movements.
- Improved response to maintenance of equipment.

2.1.3 Observed Impact of Exposed Tailings

In 2022 and early 2023, Hudbay noted the following while operating the Anderson TIA:

- During rare occasions when tailings are above the water level and exposed to oxygen, they remain saturated due to wind and wave action, precipitation, and capillary action.
- Ongoing water quality monitoring that is occurring within the Anderson TIA and downstream (Anderson Creek, Anderson Bay, and Wekusko Lake) confirm no significant deterioration of water quality during these periods of exposed tailings.
- Tailings above the water appear to consolidate more quickly than tailings underwater; therefore, there is the potential to deposit more tailings in a smaller space which then reduces the pore water space.
- The coarse tailings appear to remain above water with finer material settling underwater, therefore, minimizing the risk of dusting.
- The finer material is encapsulated into the tailings, therefore, reducing the potential for metal leaching.

Some of these observations, and their potential implications, will be discussed further in applicable sections of this report.

3. Project Objective, Need, and Alternatives Analysis

3.1 Project Objective

The objective of the study is to determine if the subaerial deposition of tailings from the Stall Concentrator and New Britannia Mill is a feasible long-term tailings management approach at the Anderson TIA. This will be accomplished by depositing Stall Concentrator and New Britannia tailings within designated areas of the Anderson TIA sequentially over a period of 3-years (from the date of project approval) and monitoring the water quality and aquatic habitat in the downstream environment (Anderson Creek and Anderson Bay in Wekusko Lake).

The Project will be confined within designated areas (western and central portions of the Anderson TIA) for the following reasons:

- Confining the Project to the western and central portions of the Anderson TIA will allow for maximum retention time for surface water and suspended solids that flow from the area of subaerial tailings to the Anderson TIA discharge location on the easternmost shore of the Anderson TIA. Maximum retention will allow for maximum natural attenuation of contaminants and settling of solids to occur.
- Confining the Project to the western and central portions of the Anderson TIA will maintain exposed tails at the maximum possible distance from PTH 392 and any cottages and residences located on Anderson Bay and in Snow Lake (English Drive). Maintaining maximum distance will help to mitigate any potential impact from wind-blown dust events that may occur during subaerial deposition activities.
- Confining the Project to the western and central portion of the Anderson TIA will allow for continued access to water sampling locations established within the Anderson TIA as part of the historical and ongoing seasonal water sampling program, which has been taking place since March 2012. Maintaining these sampling points will allow for continuity of field data and support ongoing water quality trend analysis and modelling.

The Project is proposed to have a 3-year duration for the following reasons:

- Geochemical processes that result in the formation of acid mine drainage and metal leaching can have slow chemical reaction times, especially within partially oxidized environments such as those encountered in partially exposed tailings. Having an extended project timeline will allow for adequate time for chemical reaction to occur, thus ensuring that potential impacts resulting from acid mine drainage and metal leaching are accounted for in the monitoring programs.
- A 3-year project timeframe will allow for seasonal analysis to be accounted for in the sampling program and associated data analysis and modelling. Seasonal variations in water quality (spring vs. fall vs. winter) can be evaluated for possible trends, and multi-year variability within seasons can be accounted for in the event of any abnormal climactic conditions (e.g., drought, extreme storm events) that may occur within the 3-year project period.
- Three years of on-going monitoring will allow for the collection of many data points, which will provide increased confidence in the quality of the data (outliers can be easily detected) and allow for effective trend analysis.

The Project will be considered a success if the monitoring results demonstrate that tailings can be stored subaerially in the ATIA with minimal to no degradation to downstream water quality and aquatic habitat. Other important environmental aspects, including air quality (specifically the impact of dust from exposed tailings), will also be assessed to confirm the viability of subaerial tailings deposition in the Anderson TIA.

3.2 Project Need

The controlled subaerial placement of tailings in the Anderson TIA is being considered in Hudbay's long-term tailings management strategy as a means of optimizing tailings deposition and extending the operating life of the Anderson TIA.

There are also several advantages to Hudbay and to the mining operations in Snow Lake associated with controlled subaerial tailings deposition including:

- Increased safety for the Tailings Crew allowing for the safe placement of tailings during periods of unsafe ice conditions or extreme weather events
- Increase to the overall current storage capacity within the Anderson TIA
- Optimized engineering design of current approved and ongoing expansion activities
- Reduction in size of future expansions of the Anderson TIA
- Reduced likelihood for the need for a new tailings management facility in the future

Conducting a controlled trial study will provide “real-life” data to support current environmental studies and will allow Hudbay to make better operational decisions to optimize the use of the Anderson TIA. Hudbay also anticipates that the proposed trial study will yield additional data, inform operational considerations, determine the long-term feasibility of controlled subaerial tailings deposition, and support future Notices of Alteration for the Anderson TIA.

Hudbay anticipates that the data and information collected and reported through the trial study will support the EAB in making fully informed licensing decisions with respect to tailings management. In addition, the knowledge and experience obtained during this trial study could also be applied to other mining facilities in Manitoba, both existing and future, to evaluate and/or develop tailings management strategies.

The data collected during this trial study would allow for the ongoing calibration and refinement of the existing water quality models and will verify the results of historical and ongoing geochemical studies.

The trial study will also assist with the design, execution, and testing of mitigation plans and procedures which include engineered and operational controls. For example, should water treatment technologies be required during the future operation or post-closure of the Anderson TIA, this trial study will inform the design and selection of treatment options.

3.3 Alternatives Analysis

Prior to the decision to seek approval for this trial study, Hudbay reviewed other tailings management alternatives associated with tailings generated at the New Britannia Mill and Stall Concentrator, most notably the use of the Birch Lake TDF, which is situated near the New Britannia Mill. This option was rejected for several reasons:

- Expansion of the existing Birch Lake TDF (raising existing dams) to accommodate the volume of tailings produced at the New Britannia Mill would be required.
- A permanent water cover over the tailings would need to be maintained in perpetuity to minimize oxidation, which imposes an additional risk of potential dam failure.
- The water level in the Birch Lake TDF would have to be monitored to ensure tailings are not left exposed beyond the estimated acid generation lag time.
- The Birch Lake TDF has not been in operation for many years, and data from recent water quality tests is limited. This would make it difficult to predict future potential water and effluent quality.
- Additional treatment, over and above attenuation, would be required to maintain the quality of effluent discharged to the environment in accordance with regulatory parameters.
- Seepage from the Birch Lake TDF would likely increase as a function of higher water levels which may result in the need for continual capture and seepage pump-back to the facility.

Other possible alternatives for tailings management, including discharging tailings to the Chisel Open Pit and identification and conversion of a local water body into a new tailings storage facility were also explored but rejected due to environmental, scheduling, and logistical constraints.

4. Project Methodology and Tasks

The study will require the deposition of tailings, via a slurry line, from the Stall Concentrator and New Britannia Mill in the westernmost reaches of Anderson TIA. This deposition will form several tailings cones across the surface within the designated deposition area, with the peaks of these cones exposed to air. See **Section 4.2** for details on the deposition process, locations, and sequencing of deposition over the 3-year study period.

Utilizing these areas of exposed cones, and other areas of subaerially exposed tailings, Hudbay and AECOM will conduct field investigations, laboratory testing, water balance/water quality modelling and monitoring to characterize the surface water, tailings solids, and porewater within the Anderson TIA and areas downstream. The data obtained will also enhance our ability to predict the evolution of water quality in the Anderson TIA as tailings are exposed above the water table. We also propose to monitor system behaviour to allow for refinement of geochemical source terms and judge the need for implementation of additional mitigation measures.

AECOM has developed a detailed study method that will be used to guide the various activities that will be required to complete a successful study. This methodology is described in the following sections.

4.1 Project Methodology

The Project activities included within the trial study are as follows:

- **Task 1:** Develop, implement, and evaluate a suitable tailings deposition methodology that will allow for the controlled subaerial deposition of tailings within the designated areas of the Anderson TIA.
- **Tasks 2-4:** Investigate the feasibility and environmental impacts of a subaerial deposition strategy for controlled placement of exposed tailings, where tailings are exposed to atmosphere for a designated period at Anderson TIA.
- **Task 5:** Establish a comprehensive plan to sample, characterize, and manage the tailings to minimize the risk of unacceptable impacts to the environment. This will help understand the nature and magnitude of changes in tailings geochemistry and the resultant impact of the tailings management strategy on water quality in the Anderson TIA and effluent discharged to Anderson Creek.
- **Task 6:** Develop a Trigger Action Response Plan (TARP) to ensure regulatory compliance and minimal environmental impact during the implementation of this subaerial tailings deposition strategy.
- **Task 7:** Update the water balance and water quality model to evaluate the impact of tailings deposition and changes in tailings geochemistry on effluent quality in Anderson TIA.
- **Task 8:** Refine the subaerial tailings deposition strategy to guide future management of tailings in a manner that mitigates environmental risk while considering the unique geochemical and physical properties of both tailings streams (Stall Concentrator and New Britannia Mill) deposited in the Anderson TIA.
- **Task 9:** Reporting of trial study activities and monitoring results to the EAB and/or regulatory agencies or interested stakeholders (as required), to allow for continual and on-going evaluation of the Project.

4.2 Project Tasks

4.2.1 Task 1 – Tailings Deposition Methodology

The following is a summary of the deposition methodology to be used for the subaerial deposition trial:

Deposition with Floating Pipeline

Current subaqueous deposition is facilitated by floating pipelines within the Anderson TIA. Tailings are discharged from the end of the floating pipeline into open water until the deposited tailings reach the target elevation. The target top of tailings elevation is below the operating water level of the tailings facility. Once the tailings reach the target elevation, the pipeline is moved to a new location approximately 15 m from the current position. This deposition methodology results in subaqueous cones of deposited tailings. The relatively steep slope of the subaqueous tailings cones results in a significant volume of unused space between the peaks of the cones (**Figure 5**).

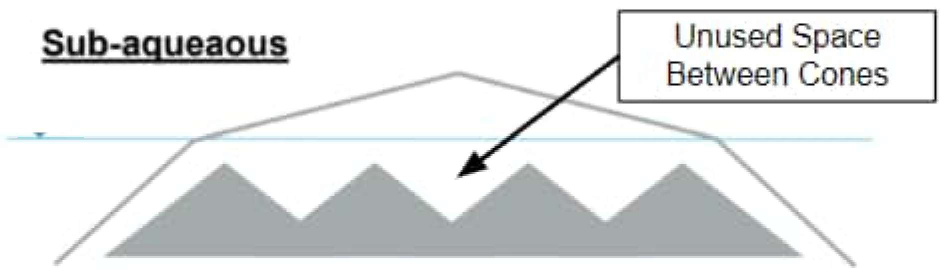


Figure 5 – Illustration of Subaqueous Deposition

The proposed subaerial variant of floating pipeline deposition would consist of the following methodology:

- Lower the operating water level to the target top of tailings elevation, and deposit tailings from the end of the pipeline until the tailings reach the surface of the water.
- Once the tailings deposition breaches the water surface the tailings will start to form a radial subaerial beach outwards from the end of the pipeline. The slope of the subaerial beach will be very shallow and will continue to deposit tailings radially outward from the deposition point forming a shape resembling the top of a mushroom rather than the peak of a cone. This process will optimally fill the space between the deposition points (**Figure 6**).

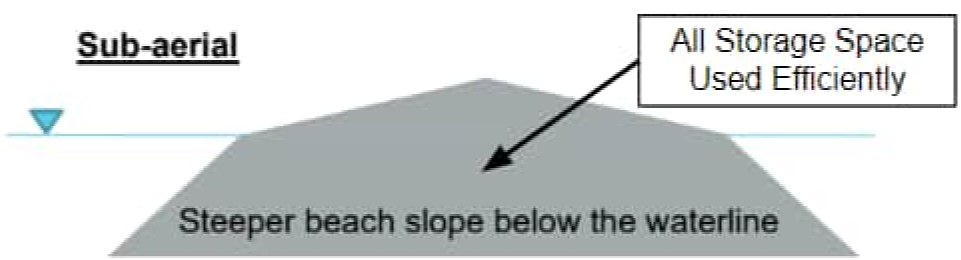


Figure 6 – Illustration of Subaerial Deposition

Deposition will continue until the tailings stops forming a beach and starts building up around the end of the pipeline at which point the pipeline will be moved to a new deposition point approximately 15 m from the current deposition point and the process repeated. **Figure 7** shows an example of the anticipated tailings deposition resulting from this methodology.

Figure 7 – Example of Tailings Deposition Resulting from the Proposed Methodology

Deposition from Shoreline with Spigots

In addition to subaerial deposition using floating pipelines, the trial study would include deposition from shore using stationary pipelines and spigots. The methodology will be similar to deposition from the floating pipeline. The main tailings discharge pipeline will be placed along the shoreline in the trial location. Small diameter spigots will be installed approximately 15 m apart along the main pipeline extending just past the shoreline. Tailings will discharge from the spigots forming a “beach” outward in a radial direction from the end of the discharge spigot. Once the tailings have accumulated to an elevation slightly above the operating water level (which will be set at the target tailings elevation) the spigot will be extended out onto the beach to the current shoreline and the cycle repeated. Deposition will continue outward from shore toward the center of the tailings facility.

Winter Deposition

During the winter months, once the surface of the Anderson TIA has frozen sufficiently to allow safe UTV and snowmobile access onto the ice, the deposition methodology will change. The operating water level will remain as close as possible to the target top of tailings deposition elevation. Deposition pipelines are placed on the surface of the ice and a hole is augered through the ice at the target deposition location. Deposition continues through the opening in the ice until the tailings reach the water surface, at which time the end of the deposition pipe is moved approximately 15 m to the next deposition location.

Tailings Deposition Sequencing and Timing

The proposed sequencing and timing of deposition during the trial period is outlined below. There are two (2) tailings distribution pipelines from the Stall Concentrator to the Anderson TIA: a 12” HDPE pipeline (referred to as the Stall Line) and an 8” HDPE pipeline (referred to as the New Brit Line). Each of these two pipelines discharge at different locations in the Anderson TIA. The timing summarized below is based on the current tailings production forecast.

Note that any tailings deposition that occurs prior to the approval of this NOA will be managed as outlined in the following sections and will adhere to the current subaqueous practices as outlined in EAL No. 3263.

For the purposes of the following proposed tailings deposition sequencing and timing, it has been assumed that the EAB will approve the NOA for the trial study in early Q1 2024. However, depending on the timing of the NOA approval, the deposition schedule outlined in the following sections may need to be revised and/or pushed out to later seasons.

Spring 2024

- Stall Line to commence discharge at the southernmost extent of Area 1, with tailings deposition advancing northward towards Area 2.
- New Brit Line to discharge in the western portion of Area 2.

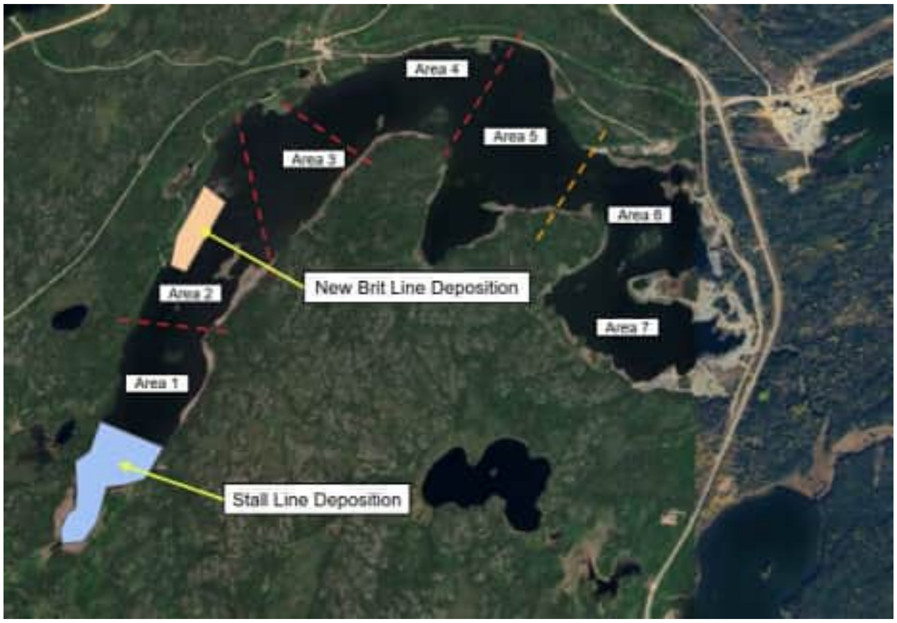


Figure 8 – Spring 2024 Deposition Locations

Spring/Summer 2024

- Stall Line to continue deposition in Area 1.
- New Brit Line to discharge in the eastern portion of Area 2 and Area 3.

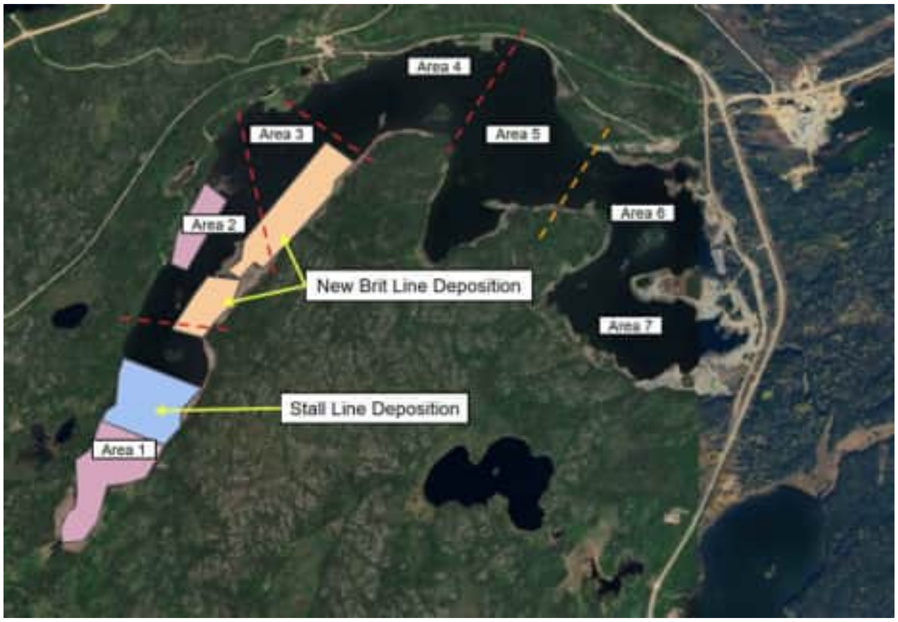


Figure 9 – Spring/Summer 2024 Deposition Locations

Summer/Fall 2024

- Stall Line to continue deposition in Area 1 and Area 2.
- New Brit Line to discharge in Area 5 using shoreline and spigot deposition methodology.

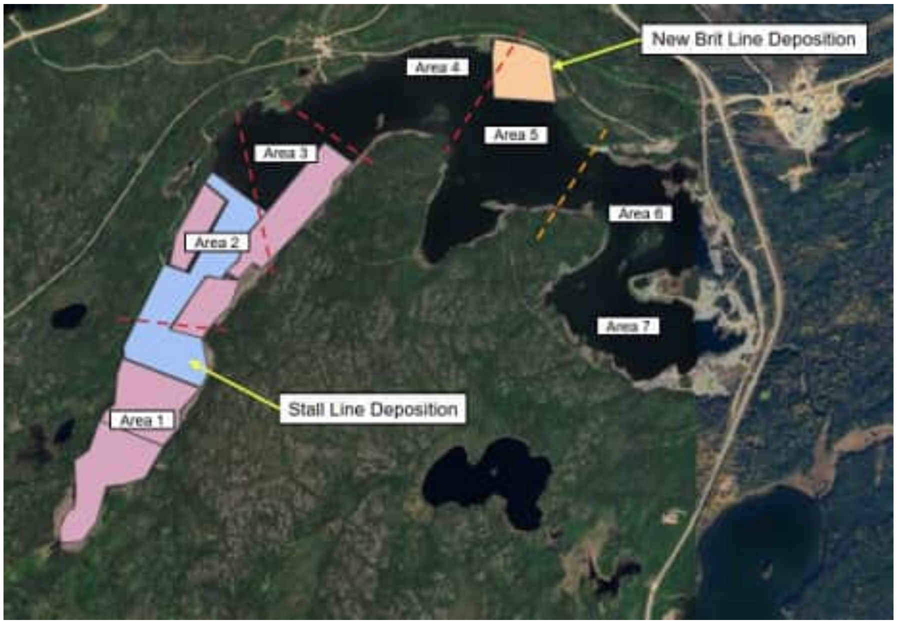


Figure 10 – Summer/Fall 2024 Deposition Locations

Winter 2024 / 2025

- Stall Line to continue deposition in Area 3 and into Area 4.
- New Brit Line to discharge in southern portion of Area 5.

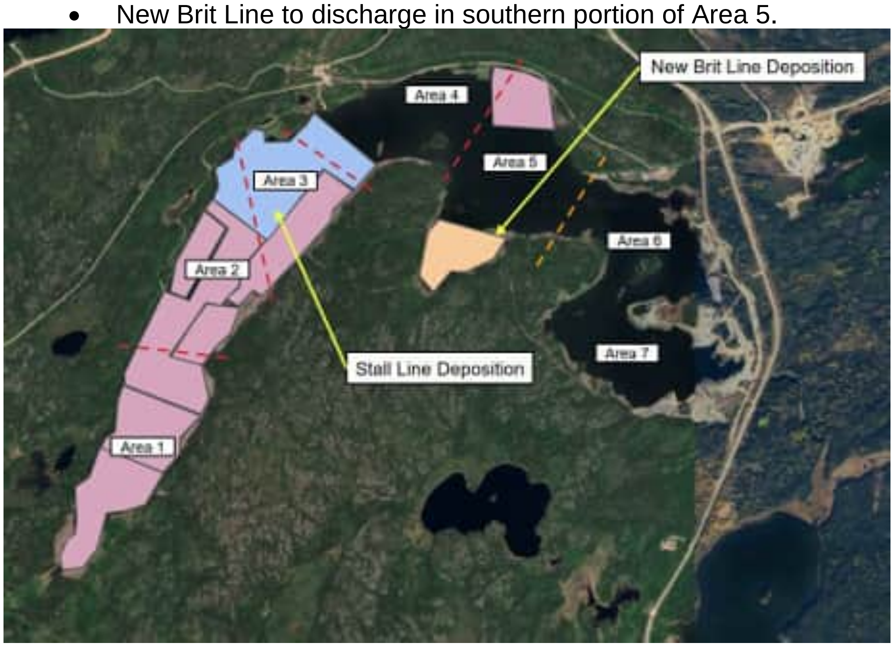


Figure 11 – Winter 2024/2025 Deposition Locations

Summer 2025

- Stall Line to continue deposition in Area 4.
- New Brit Line to discharge in northern portion of Area 4.

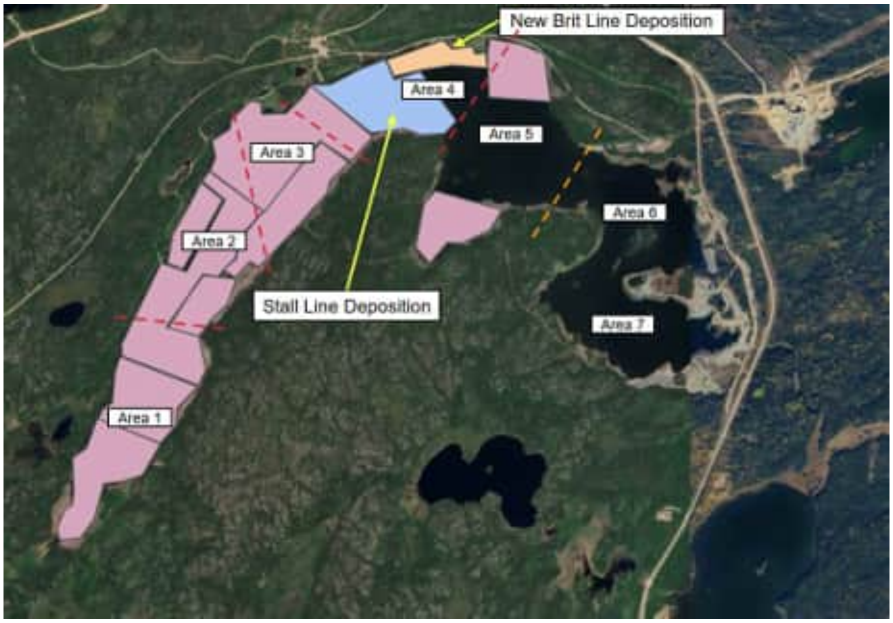


Figure 12 – Summer 2025 Deposition Locations

Winter 2025 / 2026

- Stall Line to continue deposition in Area 4.
- New Brit Line to discharge in northern portion of Area 4.

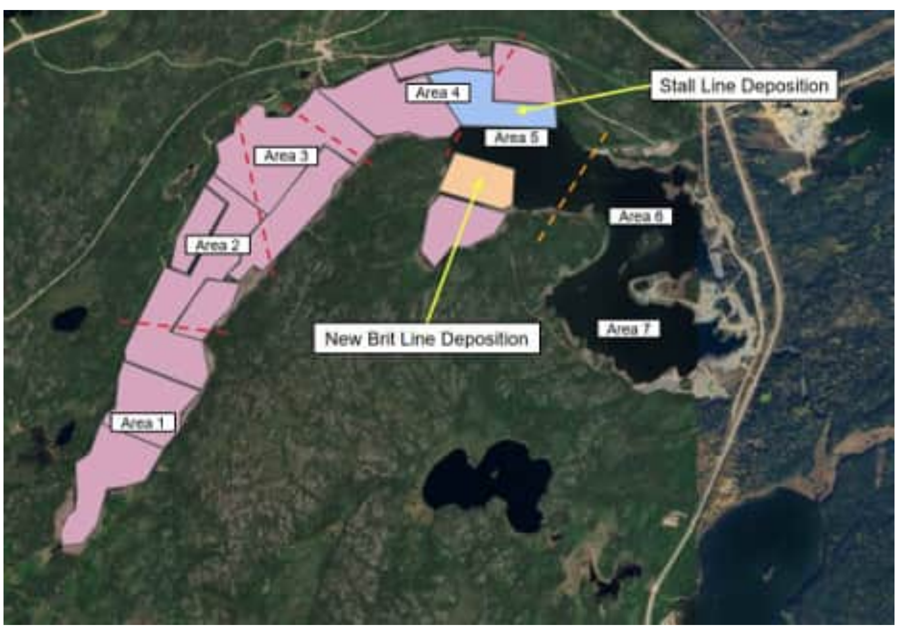


Figure 13 – Winter 2025/2026 Deposition Locations

Hudbay's current projection is that the next dam raise, for which Hudbay already has approval, will be constructed in 2025 and the water level in the Anderson TIA will then be raised throughout 2026. Summer 2026 deposition will continue in Area 5 and the water level will be raised by winter 2026 such that, should the trial study prove to be successful, the next cycle of subaerial deposition can start again in Area 1 with a new target top of tailings elevation.

4.2.2 Task 2 – Characterization of Tailings Physical and Hydraulic Properties

Water covers are frequently used to mitigate environmental risks associated with acid rock drainage and metal leaching for tailings containing elevated concentrations of sulphide minerals. The primary purpose of the water cover is to minimize oxygen diffusion into the tailings, and thereby inhibit oxidation of sulphide minerals.

However, fine tailings may also remain tension-saturated within the capillary fringe above the elevation of the tailings pond which also limits oxygen diffusion into the tailings. The capillary fringe or tension-saturated zone occurs immediately above the water table and results from a combination of the surface tension of water and the ability of water to wet the surface of the medium. The capillary fringe acts as a transition between the unsaturated zone (or vadose zone) above, where pore spaces contain both air and water, and the saturated zone below, where all the pore spaces are filled with water. In the capillary fringe zone, soil or sediment pores are saturated with water due to capillary action, and therefore would effectively inhibit diffusion of oxygen. The vertical height of this zone above the water table depends on the interstitial pore size which is directly related to the particle grain-size distribution. Specifically, the smaller the pore size the greater the surface tension and consequently the higher the capillary rise above the water table (MEND 1996).

A schematic of the conceptual model is provided in **Figure 14**.

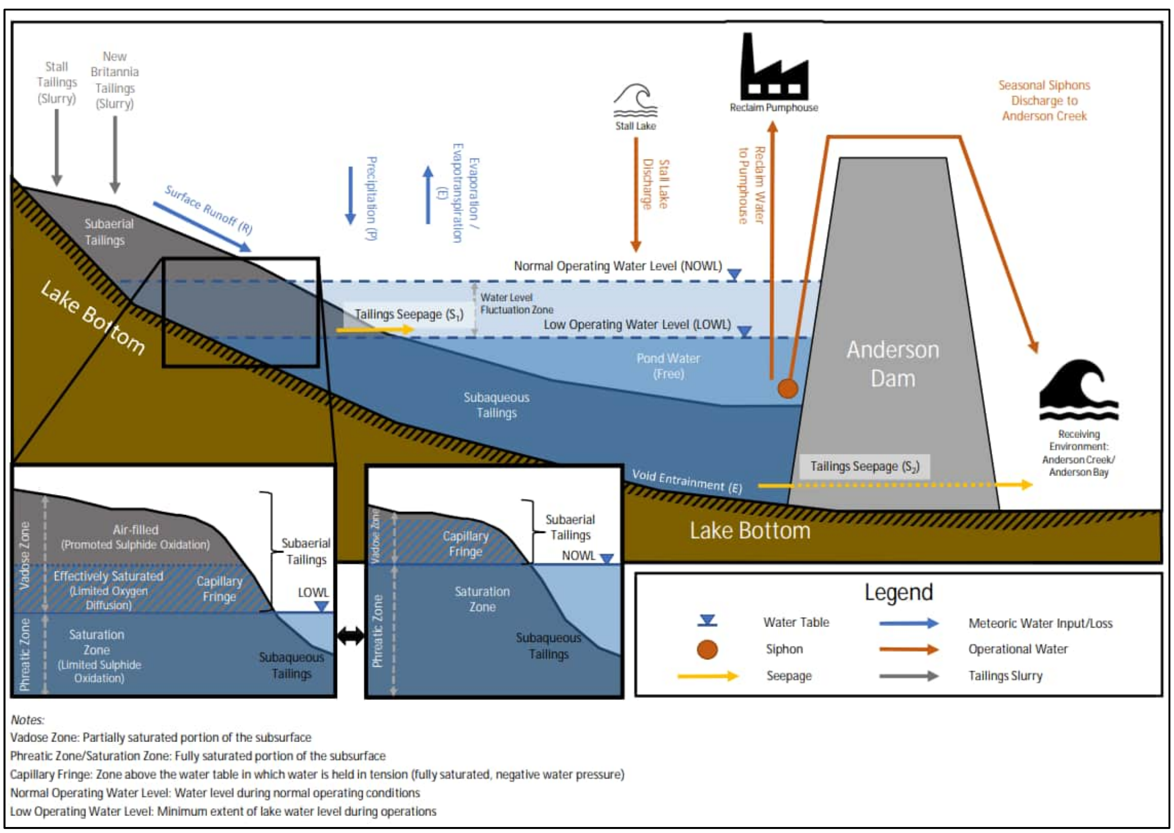


Figure 14 – Schematic of Conceptual Model

The objective of this task is to characterize the texture of the tailings, with the goal of estimating the height of the capillary fringe for each type of tailings. This will help understand the height to which reactive tailings can be mounded above the pond level, while also maintaining a sufficiently high degree of saturation to prevent sulphide oxidation.

To achieve this, a minimum of four (4) samples of Stall Tailings and four (4) samples of New Britannia Tailings slurry (approximately 8 kg each) will be collected from their respective tailings streams over a one-month period and tested. This approach is designed to ensure that the samples are representative of a longer operational period and help minimize variations caused by different ore types and mill processing methods.

Furthermore, four (4) mixed tailings samples will be synthesized in the lab, reflecting forecasted tailings production rates. This approach will allow for the assessment of a scenario where mixed tailings are deposited into ATIA.

Laboratory testing of physical properties will be conducted. This includes:

- Grain Size Analysis.
- Soil Moisture Content.
- Tailings Dry Density.
- Solid Content.
- Porosity.

Using the parent samples, three (3) composite tailings samples will be produced and tested as follows:

- Composite of four (4) weekly samples of Stall Tailings:
  - Grain Size Analysis
  - Soil Water Characteristic Curve (SWCC)
  - Hydraulic Conductivity
- Composite of four (4) weekly samples of NBM Tailings:
  - Grain Size Analysis
  - Soil Water Characteristic Curve (SWCC)
  - Hydraulic Conductivity
- Composite of Stall and NBM Tailings in forecasted ratios:
  - Grain Size Analysis
  - Soil Water Characteristic Curve (SWCC)
  - Hydraulic Conductivity

Soil-Water Characterization Curves will be developed for each of the composite samples to provide in-depth information about the water retention capacity of the individual tailings streams and the theoretical composite mixture. This will facilitate the prediction of capillary rise, permeability, and other key hydraulic properties of the tailings. This information will determine the height to which tailings can be placed above the water level in the pond with minimal incremental tailings oxidation. It will also determine whether there are any benefits to managing each tailings stream differently to take advantage of their individual or composite physical properties. This information can provide valuable insights into tailings placement strategies, as the tailings' physical characteristics, which influence water retention, can be optimized to improve overall tailings management in Anderson TIA.

4.2.3 Task 3 – Characterization of Tailings Geochemical Properties

Although there are studies ongoing to assess the potential effects on water quality of exposed tailings that occasionally appear in the Anderson TIA during the shoulder seasons and during low water events, the availability of geochemical data (which is critical for the characterization of tailings geochemistry under various deposition conditions and the development of tailings source terms for water quality predictions) for the Anderson TIA is limited. The existing knowledge is primarily based on studies conducted by SGS Canada Inc. (SGS), including:

- SGS, 2017. An Investigation into Environmental Characterization of Cyanide Destruct Tailings Samples from the Lalor Lake Deposit.
- SGS, 2018. Geochemical Characterization of Stall Tailings (2018-Aug9 Stall Tails).

Review of the geochemical static data indicated that both Lalor copper-zinc tailings and Lalor gold tailings are potentially acid generating (PAG), with negative net neutralization potential and a neutralization potential ratio (NPR) of <1. Results of the modified acid-base accounting (ABA) tests showed elevated sulphur (up to 16.6%) and negative net neutralization potential. These findings indicate that there's a potential risk associated with storing these tailings above the water table and exposing them to weathering and oxidation. The elevated sulphur content and the PAG status of the tailings suggest the possibility of acid generation when exposed to atmospheric conditions. Because comprehensive geochemical testing has not yet been completed on both tailings streams, geochemical source terms have not yet been developed for both tailings streams for use in water quality predictions.

However, it's important to note that these laboratory testing results may not be representative of current tailings geochemistry. Recent data from tailings slurry collected from both the Stall Concentrator and New Britannia Mill have generally shown higher concentrations of constituents, suggesting potentially different geochemical properties. This discrepancy could be due to several factors, including variability in ore grade and accessory minerals, variability in ore processing approaches, unrepresentative sample selection, and spatial or temporal variability in the geochemical composition of tailings.

Consequently, a more robust trial study program is necessary to establish geochemical source terms under various tailings storage conditions. These are key inputs for future water quality modelling efforts aimed at evaluating the influence of subaerial tailings storage.

To better understand current tailings geochemistry, analysis of contemporary tailings samples will be completed as they are more reliable than use of geochemical data from historical geochemical programs, some of which are over a decade old. Tailings samples collected for analysis of physical properties will also be analyzed for the following:

- Static Geochemical Testing:
- Acid-Base Accounting (ABA): Samples will be analyzed for paste pH, fizz test, modified neutralization potential (NP), total sulfur, sulfate-sulfur sulfide-sulphur (insoluble sulfur by difference), total carbon, total inorganic carbon, and organic carbon (by difference).
- Shake Flask Extraction: Samples will be analyzed for nitrate, nitrite, ammonia, total cyanide, wade cyanide, and free cyanide in addition to pH, acidity, alkalinity, sulphate, chloride, fluoride, and dissolved metals.
- Mineralogy by Rietveld X-ray Diffraction and Quantitative Evaluation of Materials by Scanning Electron Microscopy/TESCAN Integrated Mineral Analyzer.
- Near-Total Metals by aqua regia digestion and ICP-MS.
- Whole Rock Analysis including Loss on Ignition.
- Single Addition Net Acid Generation test (NAG).
- Sequential NAG Test on a subset of samples (3-4 cycles).
- Water quality analysis of the mixed tailings supernatant after tailings solid have settled for 48 hours.

Although the results of static testing may indicate a potential for acid rock drainage or metal leaching, kinetic testing is required to assess the relative rates of the various acid rock drainage and metal leaching reactions that may occur, and to provide information on the evolution of acid rock drainage and metal leaching over time.

Kinetic Testing:

- Trickle leach columns mimicking depositional conditions.

A representative split from the samples will be stored under frozen and nitrogen purged conditions if further characterization is required. Upon receipt of static testing results, kinetic testing will be initiated to inform long-term acid generation, metal loadings and geochemical behaviour of tailings. This will allow for focused investigation of parameters identified at levels that may be of concern for the receiving environment. It is assumed that 40 weeks trickle leach columns will be conducted for the following tailings materials:

- One (1) Stall Tailings.
- One (1) New Britannia Tailings.
- One (1) mixed Stall and New Britannia tailings.
- One (1) duplicate sample for QA/QC purposes.

Static geochemical testing will take 6-12 weeks to complete and kinetic testing could take up to one year. Results of the static and kinetic tests will be reviewed, compiled into a database, analyzed, interpreted, and used to calculate mass loading per unit time using standard analytical calculations. This task will calculate mass loadings from the kinetic tests (to test scale) and use these data to provide an indication of potential drainage chemistry.

Following the completion of the kinetic testing, post-experiment residue samples will also be submitted for closedown geochemical analysis to inform the minerology and geochemical properties of the residue and determine the geochemical changes that occurred during the kinetic simulation. The tests will include:

- Acid-Base Accounting (ABA): Samples will be analyzed for paste pH, fizz test, modified neutralization potential (NP), total sulfur, sulfate-sulfur sulfide-sulphur (insoluble sulfur by difference), total carbon, total inorganic carbon, and organic carbon (by difference).
- Shake Flask Extraction: Samples will be analyzed for nitrate, nitrite, ammonia, total cyanide, SAD cyanide, WAD cyanide and free cyanide in addition to pH, acidity, alkalinity, sulphate, chloride, fluoride, and dissolved metals.
- Mineralogy by Rietveld X-ray Diffraction and Quantitative Evaluation of Materials by Scanning Electron Microscopy/TESCAN Integrated Mineral Analyzer.
- Near-Total Metals by aqua regia digestion and ICP-MS.
- Single Addition Net Acid Generation test (NAG).

4.2.4 Task 4 – Characterization of Tailings Seepage and Porewater

Tailings porewater chemistry has not been directly measured in the Anderson TIA. A primary objective of this task is to characterize tailings porewater quality in the western areas (Area 1 and Area 2) of the Anderson TIA. Up to four (4) areas where tailings have been placed above the water level in Anderson TIA (i.e., subaerially exposed) will be targeted for porewater and seepage characterization.

Samples will be collected from the unsaturated zone and saturated zone of the tailings using a combination of methods, with the goal of revisiting the same monitoring locations multiple times to track the evolution of porewater quality (and surface water quality). The porewater results will help refine geochemical source terms for seepage infiltrating through the exposed tailings area and provide a better understanding of geochemical variability within the tailings. Sampling locations will be established in consultation with Hudbay in consideration of site accessibility, safety, tailings physical properties, and the depth to the water table in the exposed tailings area.

The following sampling methods will be utilized to extract tailings porewater, depending on tailings grain size, site accessibility, etc.:

Drive-point piezometers: Drive-point piezometers can be installed in the beach zone of subaerially deposited tailings in the western area of the Anderson TIA. This would facilitate the investigation of the porewater profile in the tailings beach area at various depths (ranging from 3 m to 5 m). It is anticipated that the drive point piezometer(s) will be installed at 3-5 depths to characterize porewater quality. Samples will be collected using peristaltic pumps and filtered/preserved for laboratory analysis. Consideration will be given to hand augering pilot holes to facilitate logging of shallow materials in advance of piezometer installation.

Suction Lysimeters: Suction lysimeters allow for the collection of porewater samples from unsaturated zones. They consist of a porous cup attached to a tube, which is in turn connected to a vacuum source. The vacuum draws the porewater into the cup, where it can be collected for analysis. Lysimeters can be installed at various depths within the tailings, enabling the collection of porewater samples across a range of depths. They provide an efficient and effective method for sampling porewater without significantly disturbing the surrounding tailings material.

Piston Squeezing Apparatus: This laboratory method will be utilized if field collection of tailings porewater using drive-point piezometers or suction lysimeters proves challenging. Piston Squeezing Apparatus is another common method used to extract porewater from tailings, sediments, and sludges, especially those with fine-grained textures. The piston squeezing apparatus uses mechanical pressure to extract porewater from a sample. The sample is typically placed in a permeable membrane or cloth and then enclosed in a rigid chamber. A piston applies pressure to the sample, forcing the porewater out. If this method is selected, tailings grab samples will be sent to the University of Saskatchewan for extraction of tailings porewater. The extracted porewater will be sent to a commercial testing laboratory for analysis of standard water quality parameters.

Should seepage from the subaerial tailings be observed, water quality will be sampled. Tailings seepage is representative of the real-time tailings source term and provides valuable data on the impact of the exposed tailings on water quality. The extent to which near surface oxidation of reactive tailings has occurred is also of importance. Following Year 1 of the trial study (12 months following Project start), and assuming there is safe access, boreholes or tests pits will be advanced in two locations near the beach areas of Stall and NBM deposition zones in Area 1 and Area 2. The goal is to observe and develop a depth profile of the tailings characteristics, determine the zone of tailings that has been oxidized, and collect tailings samples at different depths and porewater for testing.

The proposed sampling frequency and sampling parameters for surface water, seepage, and tailings porewater are summarized in Task 5.

4.2.5 Task 5 – Development of a Water Quality Monitoring Plan

A water quality monitoring program will be developed in consultation with Hudbay and will include, at minimum, ongoing monitoring of metals and other contaminants that have been identified as Contaminants of Primary Concern (COPCs) within the MDMER. The overall goal of the program will be to establish the baseline water quality in porewater and surface water, and then monitor changes in water quality over time and in response to transitioning from a subaqueous to subaerial tailings management strategy.

The overall goal of this robust monitoring plan is to collect detailed water quality information in proximity to the subaerial deposition area and characterize water quality at the boundaries between each area as the water moves downstream through the impoundment toward the spillway and siphon that seasonally drains to Anderson Creek. This will help understand whether subaerial tailings deposition is affecting water quality in the Anderson TIA.

It is AECOM's experience that water quality under ice-covered tailings facilities can change significantly over winter months due to lack of interaction with the atmosphere and may affect the ability to discharge water from the Anderson TIA during the open water season. The monitoring locations and the sampling frequency will be refined in consultation with Hudbay, but it is expected that new surface water sampling locations will be established along the boundaries of Area 1 and Area 2 within the Anderson TIA, allowing for more detailed monitoring of water quality in areas draining the subaerial deposition zones.

Hudbay recognizes that there are logistical and safety considerations associated with sampling of a basin that has an ice cover during winter months, and that monthly sampling may not be possible during fall ice formation or spring ice break-up. Existing sampling locations in the remaining areas of the Anderson TIA will be utilized to monitor changes in water quality downstream of the subaerial tailings deposition areas to build upon the existing water quality monitoring dataset. Interpretation will also be informed by routine monitoring of tailings slurry inputs and effluent from the siphon when it is operating.

During the first year of the trial study, tailings porewater, seepage (if observed), and surface water samples within and along the boundary of Area 1, Area 2 will be collected on bi-monthly basis during the open water season (i.e., March, May, July, and September) and/or discharge period. For new and existing sampling locations in Areas 3 to Area 7, water samples will be collected following their routine sampling plan, with collections scheduled for March and September. It may be possible to reduce the sampling frequency in future years based on the water quality monitoring results and geochemical testing results.

Tailings porewater, seepage and surface water samples will be monitored for the following field parameters during sampling: pH, temperature, electric conductivity, dissolved oxygen, oxidation-reduction potential, and total dissolved solids.

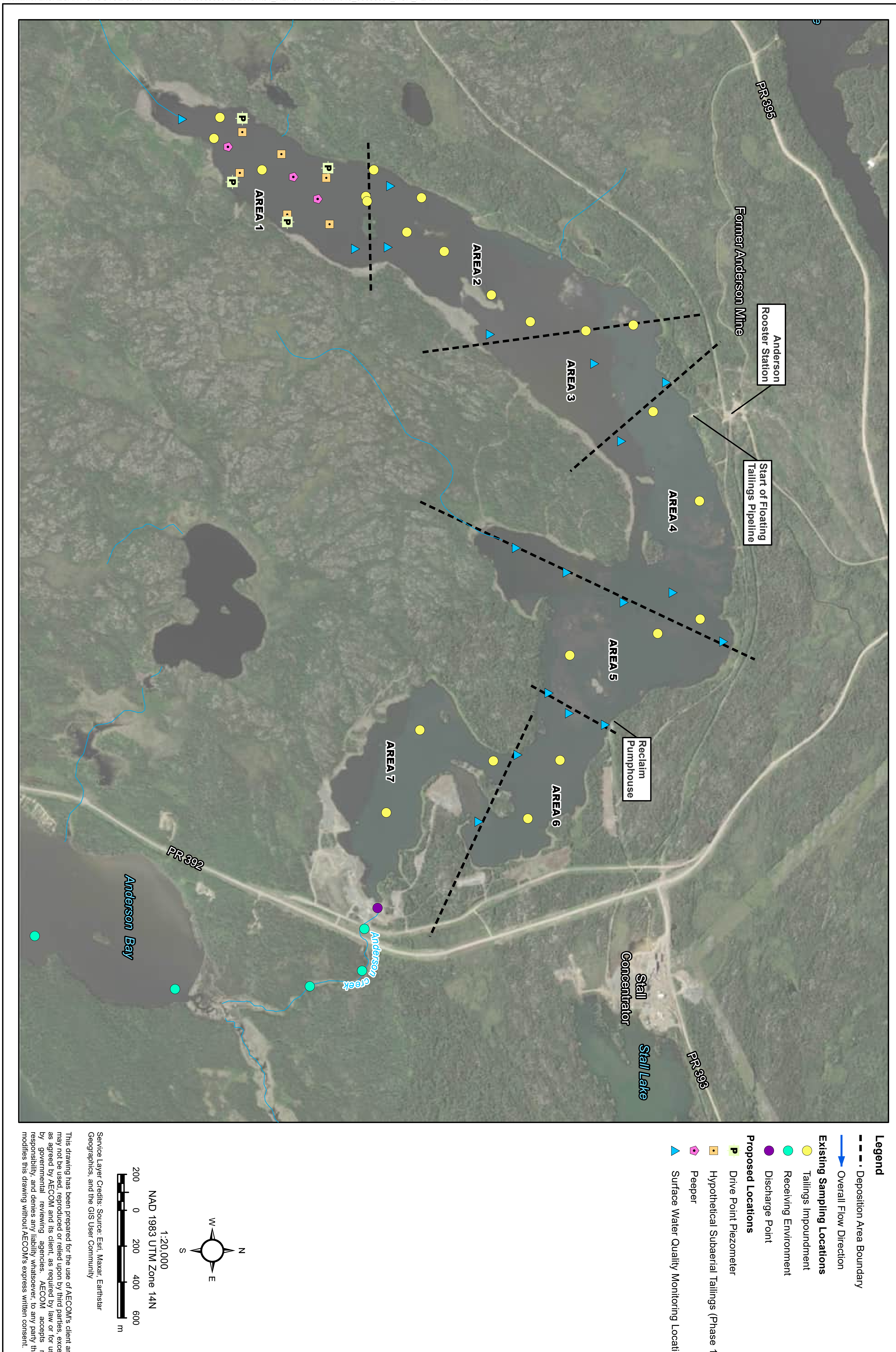
Tailings porewater and surface water samples will be analyzed for the following parameters:

- General parameters: pH, temperature, electric conductivity, and total suspended solids.
- Anions: alkalinity, chloride, fluoride, sulfate, sulfide, phosphorus.
- Nitrogen Species: nitrate, nitrite, total ammonium.
- Total and dissolved organic carbon.
- Total and dissolved Metals.

Cyanide species including weak-acid dissociable (WAD), strong-acid dissociable (SAD), cyanate (OCN), thiocyanate (SCN) and free cyanide will be analyzed at selected locations**.** These locations are primarily along the area boundaries to track variations in cyanide levels throughout the deposition zones. Furthermore, due to the deposition of New Britannia Mill tailings in Area 2, water quality samples from this area are also recommended for cyanide species analysis.

A summary of the physical and chemical testing parameters is summarized in **Appendix A**.

Figure 15 illustrates the proposed tailings porewater and surface water monitoring locations at the conceptual level.



NOTICE OF ALTERATION
ANDERSON TIA SUBAERIAL TAILINGS DEPOSITION TRIAL STUDY
HUDBAY MINERALS INC.
Project No.: 60686634 Date: October 2023

PROPOSED POREWATER AND SURFACE WATER MONITORING LOCATIONS

AECOM

Figure: 15

It should be noted that the plan is primarily designed to focus on the first-year trial study, acknowledging that tailings deposition areas and sizes will change over time. As the deposition plan evolves, both the monitoring locations and sampling frequency will be periodically reviewed and adjusted to ensure continued relevance and effectiveness.

Frequent monitoring and toxicity testing at the discharge location (AND) and in the receiving environment (ANB) will be ongoing to evaluate water quality and ensure that the effluent is not having an adverse impact on the downstream environment. The sampling frequency and chosen parameters associated with this study will align and supplement other monitoring programs currently in place at the Anderson TIA and the downstream environment. Throughout the trial study period, Hudbay will continue to conduct normal compliance sampling (effluent characterization and acute lethality) as required by EAL No. 3263 and the MDMER.

4.2.6 Task 6 – Development of a Trigger Action Response Plan

Geochemical testing and water quality monitoring results will provide valuable data to inform Hudbay's tailings management strategy. The goal of the Trigger Action Response Plan (TARP) is to identify and mitigate potential environmental impacts using a trigger-action-response framework in a timely manner based on information provided by the Water Quality Monitoring Plan (Task 5). This will guide responses to uncertain or anomalous data, ensure the Anderson TIA is operated to meet regulatory requirements, and guide the operation of the Anderson TIA during the trial study.

The TARP will be used in collaboration with Hudbay’s existing emergency plans (ENP-008 and ENP-110) that relate to the Anderson TIA. The Effluent Quality Emergency Response Plan (ENP-008, **Appendix B**) was developed by Hudbay to reduce the risk of impact to the environment during an unusual event or emergency that may result in an unauthorized deposit under any applicable regulatory or EAL requirements.
The Emergency Action Plan under the Anderson TIA Operations, Monitoring, and Surveillance (OMS) Manual (ENP-110, **Appendix C**) was developed by Hudbay to reduce risk to employee and public safety as well as environmental impact during an unusual event or emergency relating to tailings structures and stability for the Anderson TIA.

The TARP will identify the normal range of fluctuation for various parameters (indicators) and establish alert levels (triggers) that would initiate additional monitoring, investigation, or implementation of mitigation measures (actions). Monitoring results will be evaluated on an ongoing basis to inform the need for any changes to the operation of the Anderson TIA to avoid unacceptable impacts to downstream receiving environment. Anomalous water quality monitoring results may require modifications to tailings management procedures to avoid impacts to the downstream receiving environment. Indicators and triggers along with their corresponding response events (action levels) will be established using monitoring results and observed temporal trends.

A variety of scenarios will be identified including:

- Anomalous monitoring results including an increase in the concentration of one or more regulated parameters.
- An increase in parameters relevant to tailings source terms.
- Changes relative to the baseline water quality attributable to the placement of exposed tailings.
- Exceedances of water quality standards or guidelines in the receiving environment.
- Failed toxicity tests.

Each of these scenarios will be described and appropriate responses will be developed to characterize and mitigate the issue. In extreme cases, this could include stopping the discharge of effluent from Anderson TIA and/or treatment of effluent prior to discharge. The first draft of the TARP, to be revised and updated as the Project progresses, is attached at **Appendix D**.

4.2.7 Task 7 – Update Water Balance and Water Quality Model

Task 7.1 – Model Update

In 2021, BGC Engineering Inc. (BGC) developed a predictive water balance model (WBM) to support operational decisions as well as inform design of the Stage B and Stage C Spillway Structure. It is assumed that BGC will update and calibrate the WBM to reflect existing conditions and engineering infrastructure that has been constructed and operated since the last model update in 2021. Water levels and tailings storage in Anderson TIA will be calibrated to current conditions.

Upon receiving the WBM from BGC, AECOM will develop a water balance and water quality model (WBWQM) to address recent changes in the operation of the Anderson TIA operational management and better support the trial study. The updated WBWQM will take advantage of best available information to date, including information relating to geochemistry, water quality, and water management. Notably, it will utilize updated geochemical source terms for subaqueous and subaerial tailings based on the results of the field and laboratory investigations of tailings, geochemistry, and water quality monitoring programs described under Tasks 1 to 4, above.

The updated WBWQM will include the following information:

- Updated site operational information (e.g., tailings capacity, water management, water inventory, dam raises, etc.).
- Updated water quality data.
- Updated exposed tailings geochemical source terms derived from static and kinetic geochemical programs.
- Updated cyanide-nitrogen geochemical conceptual model (shown in **Figure 16**).
- Updated trial study depositional plan provided by Hudbay.

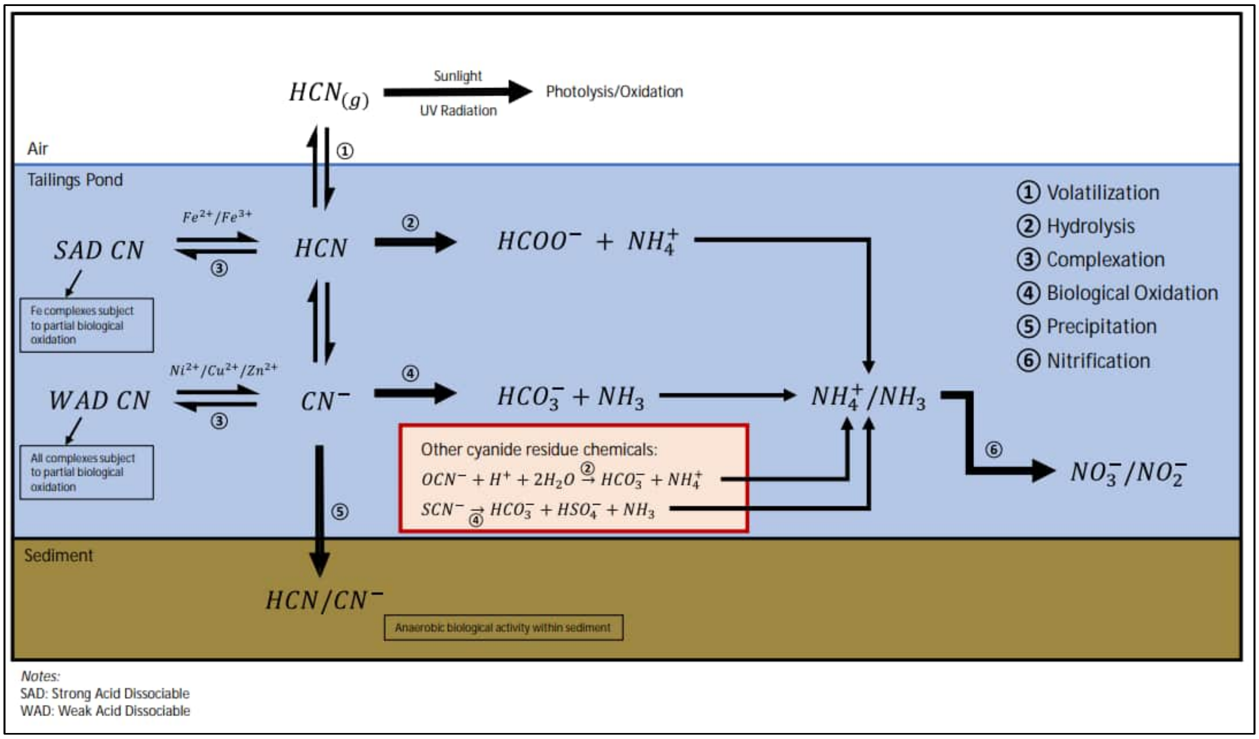


Figure 16 – Geochemical Conceptual Model

Based on the water quality assessment of Anderson TIA (AECOM 2021), it is currently reasonable to consider the Anderson TIA as well-mixed, without significant variations in water quality across deposition areas. Therefore, the simulated effluent water quality is representative of “mixed” water quality in Anderson TIA. However, this consideration might change once tailings are subaerially deposited in designated areas. This deposition method could lead to diminished free water, potentially resulting in reduced dilution and elevated concentrations in these specific regions. Moreover, subaerial tailings, being exposed to air, can experience distinct geochemical processes such as oxidation compared to submerged tailings. This may produce varied leachate qualities, further introducing water quality disparities across different areas. Therefore, as water quality data from the trial study are available, it will be important to re-evaluate and, if necessary, adjust the existing “well-mixed” conceptual model.

Task 7.2 – Model Validation

The WBWQM will be validated by comparing the simulated water quality data to measured results from current conditions (i.e., September 2023) prior to the trial study. This comparison will demonstrate the ability of the model to reasonably simulate the water balance and water quality. Historical water quality datasets will need to be prepared for input to the model. This will include extraction of data from lab reports, data review, and formatting.

The model will be constructed in a manner that will permit stochastic evaluation of the sensitivity of predicted water quality to variable geochemical inputs in the future should sufficient trial study data be available.

Task 7.3 – Model Scenarios

Once model validation is complete, the WBWQM will be used to generate the predicted effluent quality accounting for the exposure of tailings in Area 1 and Area 2. It is anticipated that model results for the following scenarios will be generated:

- Base Case geochemical source term.
- Upper Case geochemical source terms (i.e., 95 percentile).
- Existing tailings production rates.
- Future tailings production rates.
- Any other sensitivity scenarios identified during regular meetings with Hudbay.

Changes in geochemical source terms for subaerial tailings due to seasonal fluctuations in operational water levels will not be considered in the model but will be discussed in the Tailings Deposition Strategy as outlined in Task 8.

Task 7.4 – Contaminant Transport

Contaminant transport will be simulated in a conservative manner that relies only on dilution initially and does not simulate geochemical reactions including adsorption, complexation, or biological oxidation. However, it is worth noting that chemical precipitation and dissolution can significantly modify the concentrations observed in the water column, particularly for species sensitive to oxidation-reduction conditions or those near their solubility limits. The evaluation will consider mineral phases that are likely to be present within the Anderson TIA. PHREEQC (a computer program designed to perform a wide variety of aqueous geochemical calculations) will be coupled to GoldSim (a computer program that allows for visualizing and simulating complex systems in engineering and science) to evaluate the influence of geochemical equilibration on metals concentrations in Anderson TIA.

The nitrogen and cyanide cycles are complex and may produce compounds that have variable persistence and mobility within the Anderson TIA and downstream receiving environment. **Figure 16** above presents the conceptual model for cyanide-nitrogen geochemistry in the Anderson TIA. The cyanide that has not been removed by the detoxification process may undergo natural decomposition processes such as volatilization, hydrolysis, complexation, biological oxidation, and precipitation in tailings ponds where the process water has been deposited. Moreover, the detoxification process can lead to the formation of ammonia as a by-product, as the cyanate undergoes hydrolysis to form ammonium and bicarbonate ions. The full complexity of the behavior of cyanide-nitrogen will not be simulated explicitly within the GoldSim model but can be incorporated if primary reactions that could drive elevated concentrations of cyanide species and nitrogen compounds are identified.

Given the current pH conditions (7-8), free cyanide in the surface ponds is likely to naturally attenuate through volatilization. This is supported by low cyanide concentrations in Anderson TIA. Cyanide attenuation typically occurs faster in the shallow ponds and is dependent on the water depth, solar radiation, time of year, and temperature. Furthermore, cyanide exhibits relatively short persistence in surface water during the open water season due to its rapid degradation. However, the situation changes during winter months when ice cover inhibits cyanide's volatilization, resulting in a longer persistence. Considering the importance of free cyanide to both human health and downstream habitat species, monthly cyanide volatilization rates will be incorporated into the updated WBWQM. Monthly cyanide volatilization rates are dependent on the surface area of the pond, ice cover, water depth, and water temperature.

If other metals such as zinc, copper, nickel, and mercury are present in solution, they may form weak-acid dissociable (WAD) complexes with cyanide that can dissolve under weak acid conditions (pH= 4-6). The presence of iron and cobalt has the potential to form much stronger compounds such as strong-acid dissociable (SAD) complexes of iron or cobalt and cyanide that are very stable and do not dissociate unless under extremely acidic conditions (pH=1-2) and high temperatures (100 ˚C).

Other cyanide species including cyanate (OCN-) and thiocyanate (SCN-) are also present in tailings process water and exhibit increasing trends in Anderson TIA. These compounds can undergo hydrolysis/biological oxidation reactions, resulting in the formation of ammonium (NH_4^+). These reactions can alter the chemical composition of the tailings water, especially ammonium/nitrate concentrations in the Anderson TIA. A thorough understanding of the factors controlling the fate and migration of cyanate/ thiocyanate may be required if the assessment identifies elevated concentrations of ammonium in tailings supernatant and/or effluent.

The model will be utilized to simulate effluent quality for a variety of species for water balance scenarios based on direction from Hudbay. Simulated parameters will include all the parameters that are regulated by the MDMER and identified as COPCs for the Project. Total and dissolved metals will be included in the model. However, due to the limitations of these types of models, pH, alkalinity and TSS will not be carried forward in the WBWQM.

4.2.8 Task 8 – Development of a Subaerial Tailings Deposition Strategy

The results of field and laboratory programs will be utilized to inform the need for revisions to the tailings deposition strategy. This optimized strategy will be specifically tailored to address the unique challenges present at Anderson TIA and will aim to address site-specific conditions while ensuring compliance with all regulatory requirements and minimizing environmental impact. The optimized strategy will require input from tailings operations staff to ensure it is reasonable in the context of operational considerations. The tailings deposition strategy will describe the following:

Planned Water and Material Balance: Based on input from Hudbay, the water balance and material balance will be described. It will include a description of mineral processing and tailings production rates from Stall Concentrator and the New Britannia Mill, operating water levels, dam elevations, timing, and rate of siphon discharge. The quantity of tailings produced by each mill will be defined independently to inform deposition strategies.

Physical and Hydraulic Properties of Tailings: Based on the physical properties of the tailings and measured SWCC data, there may be an opportunity to maintain a portion of the tailings mounded above the operating level of the Anderson TIA in a tension-saturated state that will limit the diffusion of oxygen into the tailings. The thickness of this tension-saturated zone (capillary fringe) is highly dependent on the physical properties of the tailings but may allow for storage of tailings above the phreatic surface of the Anderson TIA with minimal incremental risk of sulphide oxidation or impacts to water quality. This will provide valuable input into the decision-making process for establishing the deposition height needed to maintain the tailings in a saturated condition, thereby limiting oxygen ingress and sulphide oxidation. It will also present the residual moisture content for each tailings stream above the phreatic surface to inform risk evaluations. Seasonal fluctuations in operating water levels will also affect the moisture content of the tailings and will be considered in the evaluation of deposition height.

Geochemical Source Terms for Tailings: Based on the results of the field and laboratory investigations, tailings source terms will be developed for Stall tailings, New Britannia Mill tailings, and composite Stall/New Britannia Mill tailings. Source terms will be developed to represent both subaqueous (saturated) tailings and subaerial (unsaturated) tailings. Source terms will be presented in the temporal context, if possible, to allow for potential strategic future placement of tailings in a manner that takes advantage of the geochemistry of each tailings stream and their anticipated geochemical behaviour under subaqueous and subaerial conditions. This will enable an evaluation of the risk of placement of each tailings stream above the water table, and aid in future interpretation of water quality in the Anderson TIA.

Recommended Approach to Tailings Deposition: Stall tailings, New Britannia Mill tailings, and combined tailings may exhibit different physical and geochemical properties. The height to which tailings can be safely stored above the water table with minimal environmental risk will be defined for composite Stall/New Britannia Mill based on the combined physical and geochemical characteristics of the tailings. This will help understand whether there are any opportunities for strategic mixing of tailings to take advantage of the physical and geochemical properties of the tailings. This will include recommendations on the need for segregation of tailings streams, targeted placement of tailings in zones above or below the water level (or capillary fringe) in the Anderson TIA, acceptable timelines for subaerial exposure, and any requirements for regrading of the tailings surface after deposition is complete. The strategy will be developed together with Hudbay, taking advantage of feedback from tailings facility operations staff to optimize placement. Strategic placement of tailings will help minimize potential environmental risks by effectively managing the reactivity and mobility of contaminants.

Recommended Monitoring Plan: Following completion of the trial study, a monitoring plan will be developed to track the evolution of tailings porewater chemistry and water quality at various locations within the Anderson TIA. This will align with the existing monitoring locations to the extent possible to take advantage of existing long-term monitoring data but will be more focused on confirming the findings of the trial study and generating monitoring data to inform the TARP.

Once finalized, the Tailings Deposition Strategy will be utilized to guide tailings deposition within the Anderson TIA. The TARP will also be updated and used to guide response to anomalous monitoring results.

4.2.9 Task 9 – Trial Study Project Reporting

Hudbay will provide the EAB with a Trial Study Annual Report in November of each year during the trial study. This report will provide the EAB with a detailed update on project status and allow for formal input and guidance from the EAB and other regulatory agencies, as appropriate. The Annual Report will provide information on project activities that have occurred during the year and a detailed account of monitoring and testing data that has been collected, along with a discussion of data analysis and conclusions.

At minimum, the Annual Report will contain the following information:

- Executive Summary.
- Summary of deposition activities, including a map showing deposition areas and location of any exposed (subaerial) tailings.
- Water balance, including flow rates and total volumes of all operations discharging directly or indirectly into the Anderson TIA.
- Details on the water quality sampling programs, including sampling locations, list of analysis, results of analysis, and a discussion on the results of analysis (with an emphasis on any unacceptable impacts that may be observed).
- Details on other environmental studies that may be completed within the current year (e.g., air quality monitoring, geochemical analysis, bathymetric surveys, aquatic studies, etc.).
- Any updates to the water quality model, including any notable changes in tailings geochemistry on effluent quality.
- Any updates to the TARP, including any notable changes to triggers, trigger levels, responses, and the RACI matrix.
- In the event of any adverse impacts occurring, a discussion on root cause analysis, corrective actions, and follow up.
- A summary of public engagement activities, including complaints from the public (and corrective actions), community updates or information sessions, and other relevant public input.
- A summary of activities planned for the next year of the study.

A draft table of contents for the proposed Annual Report is provided in **Appendix E**. Prior to the submission of the Annual Report, Hudbay and AECOM will present (in person or virtually) the highlights of the study activities discussed in the Annual Report to allow for questions and comments prior to finalizing the report. The report will be shared with other regulatory agencies and interested stakeholders as required by the EAB and in accordance with any terms in the NOA approval.

In addition, Hudbay will provide the EAB informal project updates (email, technical memorandums) on a regular basis to keep the EAB informed and up to date on Project activities. Frequency of reporting will be discussed with the EAB or provided within the terms and conditions of the NOA approval. Any Project issues that result in an unacceptable impact to the environment will be immediately communicated to the EAB to allow for the identification and implementation of corrective actions in consultation with the EAB and their subject matter experts.

4.3 Project Components

The Project will comprise a change in the operation of tailings deposition within the Anderson TIA and will utilize existing infrastructure and components already associated with the operation of the Anderson TIA. The Project will involve minimal construction activity with no new containment structures (dams) or upgrades to existing containment structures being proposed.

The Project components referenced in the following sections are described using conceptual-level design. Detailed design drawings, if required, will be available prior to construction.

4.3.1 New Facilities

Site Trailer

A new 352 ft^2 foot portable site trailer will be located next to the existing Stall Reclaim Pumphouse located on the northwest shore of the Anderson TIA (within the region identified as Area 6). The approximate location of the new job trailer is presented in **Figure 17**. This trailer will be located on a 750 ft^2 gravel pad and will be used as a lunchroom and office for the Tailings Crew.

The trailer will receive electrical power by tying into the existing overhead Hydro line which is connected to the pumphouse. There will be no freshwater water supplied to the trailer, and drinking water will be provided in the form of a water cooler supplied by a local contractor. A 25 ft^2 modular wash car (washroom facilities) will be located near the job trailer, on the same gravel pad. This wash car will be serviced, as required, by a licensed contractor and any generated waste (sewage, grey water) will be disposed of at a licensed facility.

Figure 17 – Proposed Location of New Job Trailer

4.3.2 Continued Use of Existing Approved Facilities

Many existing facilities will be used in connection with the performance of the proposed Project:

- The existing tailings pipeline and pipeline route will be utilized to deposit tailings into Anderson TIA for the duration of the trial study.
- Existing access roads located along the northern shore of the Anderson TIA will be used to access various areas of the Anderson TIA to support tailings deposition and monitoring activities.
- The Stall Concentrator and New Britannia Mill will continue to discharge tailings into and recycle process water from the Anderson TIA throughout the Project.
- The Anderson TIA Reclaim Pumphouse will be used to recycle water from the Anderson TIA to the Stall Concentrator. It pumps only reclaimed water drawn from the Anderson TIA and does not relate to any freshwater source.

4.3.3 Clearing Requirements

There are no requirements for clearing. All work will be completed in areas that have been subject to previous clearing in support of ongoing mining activity.

4.3.4 Water Requirements

There are no requirements for water beyond those provided for by existing facilities.

4.3.5 Energy and Materials

There are no anticipated power requirements associated with the Project.

No new equipment or materials will be required during the normal course of operation. However, some equipment may be required on an “as required” temporary basis during the installation of monitoring equipment or during the implementation of a mitigation measure (portable generators, pumps, etc.).

4.3.6 Equipment. Personnel, and Traffic

No additional equipment, vehicles, or personnel will be required for the Project. Hudbay will be utilizing existing crews for the duration of the Project. Although a very minor increase in traffic is expected on the private access road leading into Area 1 and Area 2, there will be no increase in traffic on the public roads in the Snow Lake region resulting from this Project.

5. Project Schedule

Table 5-1: Proposed Project Schedule

Project Schedule Components	Date
Ongoing deposition in accordance with terms and conditions in EAL No. 3263.	Current
Submit Notice of Alteration for the Subaerial Tailings Deposition Trial Study	November 2023
EAB approval of the Notice of Alteration.	Q1 2024
Transition to summer deposition and implementation of subaerial tailings deposition practices as outline in the Deposition Plan (and EAL No. 3263).	May 2024
Submission of trial study Annual Report to EAB (Year 1)	November 2024
Submission of trial study Annual Report to EAB (Year 2)	November 2025
Submission of trial study Annual Report to EAB (Year 3)	November 2026
Submission of Notice of Alteration for long-term subaerial tailings deposition for the Anderson TIA	Q4 2026 or Q1 2027

6. Provincial and Federal Approvals

6.1 Manitoba Environment Act Licenses

The Anderson TIA is operated in accordance with EAL No. 3263. As described above, the operation of the Anderson TIA is ancillary to the operation of the Stall Concentrator (CEC Order 765) and New Britannia Mill (EAL No. 3320). Both milling facilities will continue to process ore from the Lalor Mine (EAL No. 3096). Should the Project prove to be successful, Hudbay will submit an NOA to permanently alter the terms of EAL No. 3263 to allow for the long-term subaerial deposition of tailings in the Anderson TIA.

6.2 Federal Approval

6.2.1 *Fisheries Act* and MDMER

The Anderson TIA is Item 1 of Schedule 2 to the Metal and Diamond Mining Effluent Regulations (MDMER, and formerly the Metal Mining Effluent Regulations (MMER)), in which its location is described as follows: "the area bounded by (a) the contour of elevation around Anderson Lake at the 285 m level, and (b) the control dam built at the east end of Anderson Lake." The operation of the Project will not require changes to or an expansion of this existing location.

The Anderson TIA has been and will continue to be operated in accordance with the MDMER, with studies conducted in accordance with Environmental Effects Monitoring (EEM) in 2004, 2007, 2009, 2011, and 2014, 2019, and 2022 and always meeting all applicable criteria. The discharge location will remain unchanged, and any effluent from the Anderson TIA will continue to be regulated under the MDMER.

6.2.2 Navigation Protection Act

In 2014, in conjunction with the review of the Project Description submitted for Lalor Concentrator (which was contemplated at that time), Transport Canada reviewed the current and historic navigability of the Anderson TIA and concluded that the Anderson TIA is not navigable for the purposes of the *Navigation Protection Act*.

6.2.3 Impact Assessment Act and Physical Activities Regulation

The Physical Activities Regulation (Regulation) made under the federal *Impact Assessment Act* (2019) were reviewed to determine if there is a requirement for a federal review and approval of the proposed Project.

Per sections 18 and 19 (Mines and Metal Mills) of the Regulation, a federal approval is not required for the trial study for the following reason:

- The Anderson TIA is an existing facility, and the Project is not associated with the construction, operation, decommissioning, and abandonment of a new mine or mill or the expansion of a new mine or mill.

Per sections 58 to 61 (Water Projects) of the Regulation, a federal approval is not required for the trial study for the following reasons:

- The Project does not require the construction, operation, decommissioning, and abandonment of a new dam or dike on a natural water body.
- The Project does not require the expansion of an existing dam or dike on a natural water body.
- The Project does not require the construction, operation, decommissioning, and abandonment of a new structure for the diversion of water from a natural water body into another water body.
- The Project does not require the expansion of an existing structure for the diversion of water from a natural water body into another natural water body.

7. Scope of the Assessment

7.1 Temporal Boundaries

The temporal boundaries of the assessment are divided as follows:

Preparation Phase (Q1 2024): Includes the activities that occur at the beginning of the Project mainly site preparation (clearing trails, excavation of material for construction, etc.).

Construction Phase (Q1 2024): Includes construction of permanent features and structures.

Operation and Monitoring Phase (Q1 2024 to Q4 2026): Period of active subaerial placement of tailings and proposed monitoring activities.

Closure Phase (Q2 2026 to Q1 2027): Completion of subaerial placement of tailings, evaluation of data, and determination of the feasibility of future subaerial tailings management.

Note that the temporal boundaries assume that the EAB will approve the Project in Q4 2023 or early in Q1 2024.

7.2 Spatial Boundaries

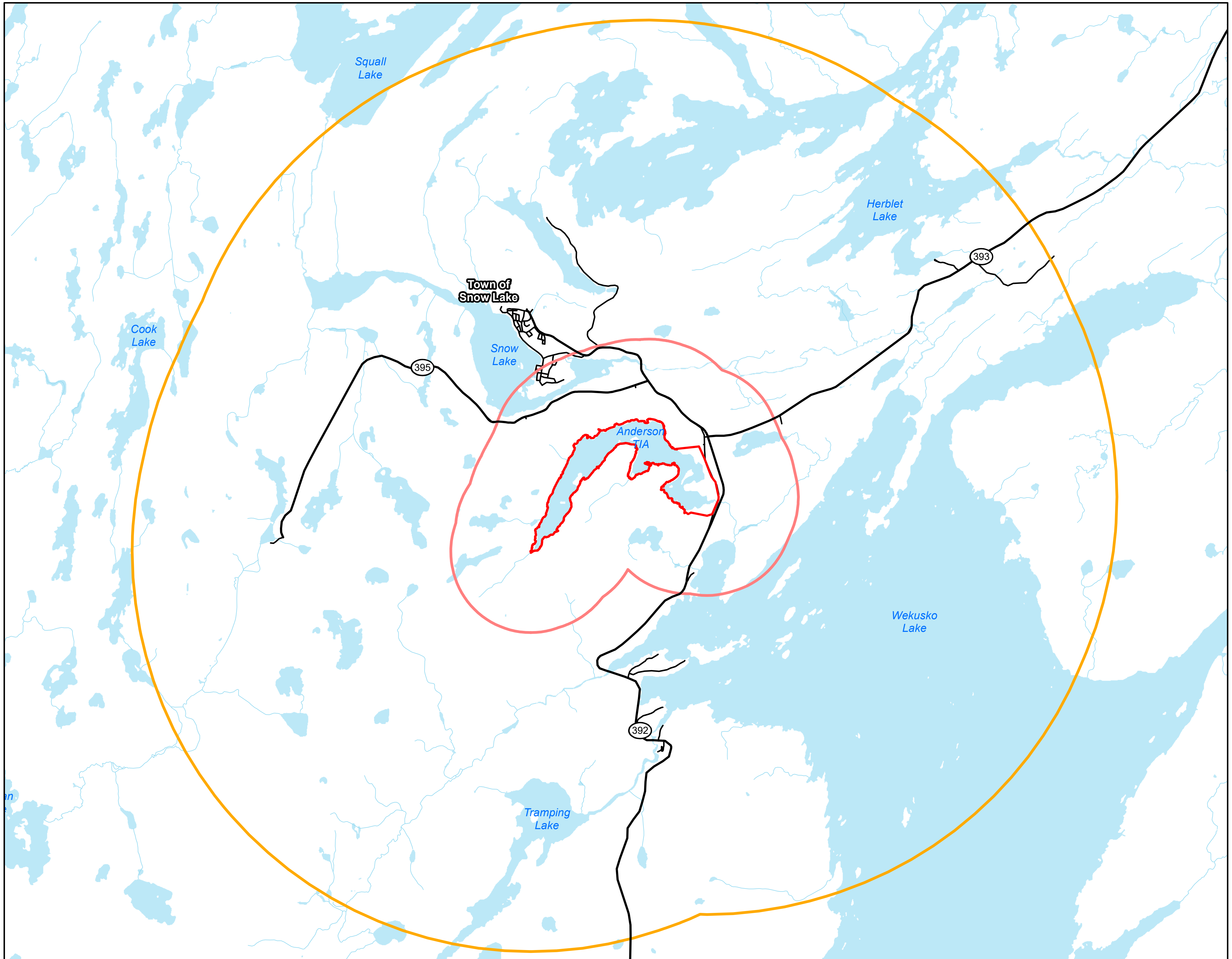
Spatial boundaries used for the assessment are described below. However, where specifically noted, the boundaries may be adjusted to suit the Environmental Component (EC) or Social Component (SC) affected.

Project Site – is comprised of the Anderson TIA, including dams, spillway, access roads, seepage collection system, the Anderson TIA Reclaim Pumphouse, and Anderson Creek from the ATIA to Anderson Bay of Wekusko Lake.

Project Area – is comprised of an area 2 km beyond the Project Site, which is intended to consider the indirect effects of the Project (such as noise, fauna, air emissions and traffic).

Project Region – is comprised of an area up to 10 km beyond the Project Site, which is intended to consider the maximum spatial extent of any potential impacts of the Project.

The Project Site, Project Area and Project Region are shown in **Figure 18**.



Legend

- Anderson TIA
- Project Area: 2 km From Project Site
- Project Region: 10 km From Project Site

Roads

- Provincial Road

N / E / S / W

1:100,000
NAD 1983 UTM Zone 14N

1 0.5 0 1 2 3 km

Basemap: GeoGratis

AECOM

Figure: 18

NOTICE OF ALTERATION
ANDERSON TIA SUBAERIAL TAILINGS DEPOSITION TRIAL STUDY
SPATIAL BOUNDARIES OF THE ASSESSMENT (PROJECT SITE, AREA AND REGION)

HUDBAY MINERALS INC.
Project No.: 60686634 Date: 2023-11-15

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8. Environmental Setting

This section provides an overview of the physical, terrestrial, and aquatic environment in the Snow Lake region.

8.1 Physical Environment

The physiographic setting for the Anderson TIA is defined using the ecological land classification system. This hierarchical system of ecozones, ecoregions, and ecodistricts represents subdivisions of increasing ecological detail. The Anderson TIA is located within the:

- Boreal Shield Ecozone, which contains the
- Churchill River Upland Ecoregion, which contains the
- Reed Lake Ecodistrict

The Boreal Shield Ecozone, the largest Ecozone in Canada, extends from northern Saskatchewan east to Newfoundland, north and east of Lake Winnipeg and finally north of the Great Lakes and St. Lawrence River. The Churchill River Upland Ecoregion extends from the sparsely forested regions to the north, the southern edge of the Precambrian Shield to the south and extends westward from the Grass River to the Saskatchewan border. The Reed Lake Ecodistrict extends west from Wekusko Lake to just over the Saskatchewan border as shown in **Figure 19** (Smith *et al.*, 1998).

8.1.1 Topography

The elevations in the Reed Lake Ecodistrict range from approximately 255 metres above sea level (masl) to 355 masl. Slope lengths in the ecodistrict range from approximately less than 50 m to more than 150 m in length. Rocky cliffs can rise from 35 m to 40 m above the lakes and peat-filled depressions (Smith *et al.,* 1998). The area surrounding Anderson TIA is characterized by broken, hilly to rolling bedrock, which controls relief of the area. The bedrock is partially covered by unconsolidated mineral and organic materials.

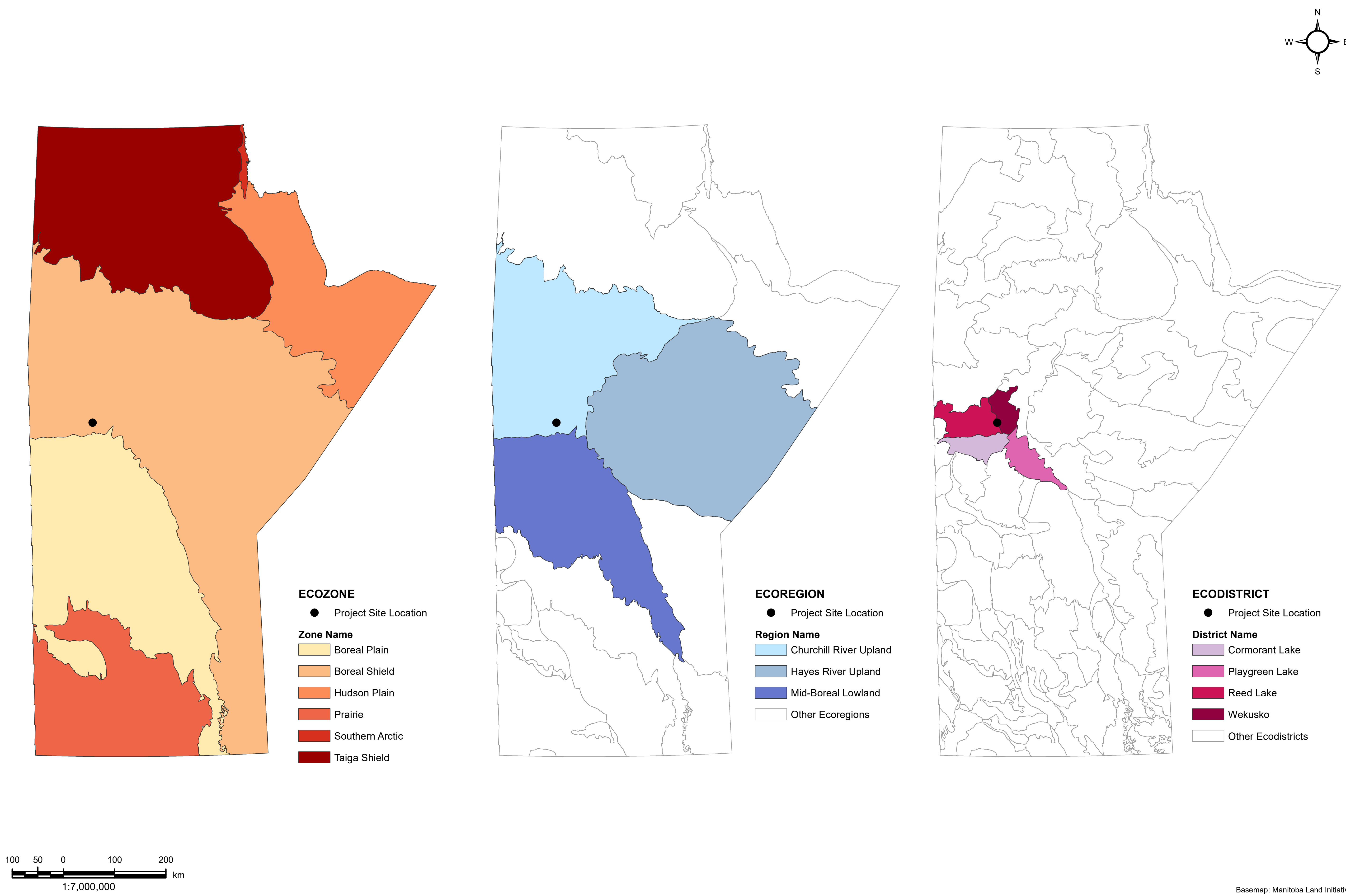
8.1.2 Geology

Anderson TIA is within the Flin Flon Belt (FFB), which according to the Manitoba Geological Survey, is in the juvenile internal zone of the Trans-Hudson Orogen and consists of Paleoproterozoic volcanic, plutonic and minor sedimentary rocks. According to Manitoba's Mineral Resources Geological Survey, "the Flin Flon greenstone belt extends hundreds of kilometres to the south-southwest beneath a thin, geophysically transparent Phanerozoic cover. To the north the FFB is tectonically overthrust by younger metasedimentary rocks of the Kisseynew domain and by nappes of metavolcanic rocks that are the same age as those in the FFB." (Bailes and Galley, 1999). The tectonostratigraphic architecture of the FFB is of vital economic significance. The FFB is one of the largest Proterozoic volcanic-hosted massive sulphide (VMS) districts in the world (Bailes and Galley, 1999).

8.1.3 Soil

As noted, the Reed Lake Ecodistrict extends west from Wekusko Lake to just over the Saskatchewan border. Acidic granitoid bedrock in the form of sloping uplands and lowlands can be found in this ecodistrict. Bedrock areas are subdominant and widely distributed areas of permafrost can occur in peatlands.

Dystric Brunisols are the dominant soils in the Ecodistrict. These soils have developed over glacial till overlying bedrock and consist of shallow, sandy and stoney veneers. Peat-filled depressions with very poorly drained Typic and Terric Fibrisolic and Mesisolic Organic soils can be found throughout the ecodistrict. These soils are overly loamy to clayey glaciolacustrine sediments. Eutric Brunisols and Gray Luvisols can be found on sandy bars, beaches, and exposed clayey deposits (Smith *et al.*, 1998).



NOTICE OF ALTERATION
ANDERSON TIA SUBAERIAL TAILINGS DEPOSITION TRIAL STUDY
HUDBAY MINERALS INC.
Project No.: 60686634 Date: 2023-10-31

PHYSIOGRAPHIC SETTING

AECOM

Figure: 19

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8.1.4 Air

There are no air quality monitoring stations in the Snow Lake area. However, air quality in this area is considered very good compared with larger cities and commercial and industrial areas in Manitoba. There are no industrial operations that release significant air emissions in Snow Lake. The closest significant industrial activity is in the City of Flin Flon, the Town of The Pas, and The City of Thompson, located approximately 124 km, 144 km, and 167 km from the Anderson TIA, respectively.

Occasionally, regional impediments to air quality, although uncommon, may occur in the area. This could include smoke from forest fires and wood-burning stoves, emissions from fuel storage tanks, and vehicle emissions.

8.1.5 Noise and Vibration

Baseline noise assessments were conducted by AECOM in July 2011 in support of other Hudbay projects occurring in the Snow Lake region (AECOM, 2012e). During these studies, baseline noise data was collected at two Points of Reception (POR) within the Town of Snow Lake. The equivalent day/night sound levels were calculated to be 53 dBA at POR 1 and 49 dBA at POR 2. Average root mean square velocities ranged from 0.045 mm/s to 0.426 mm/s at POR 1 and POR 2 over a 24 hour period. These measured background levels were determined to be typical of a suburban area where the dominant source of ambient noise and vibration is vehicular traffic (AECOM, 2012e).

The background noise levels at the Anderson TIA are expected to be similar to the levels measured in the 2011 study, since the primary source of noise and vibration is vehicular traffic on PR 392 (which is adjacent to the east end of the Anderson TIA).

Detailed noise methodology, results and discussion can be found in the Lalor Mine Noise Baseline and Impact Assessment prepared by AECOM in 2012 (AECOM, 2012e).

As part of the New Britannia Mill Notice of Alteration, AECOM conducted a Noise Impact Assessment (NIA) related to the refurbishment and operation of the New Britannia Mill in 2021 (AECOM 2021[b]). The planned operational changes included an increase in vehicle traffic from two (2) trucks per hour up to four (4), or a total of up to 90 trucks over a 20-hour period.

Based on the assessment methods conducted in the NIA, the acoustic modelling results indicated that noise emissions from the New Britannia Mill were not predicted to exceed sound level limits set by the Manitoba Guideline (MEMD, 2000) during the daytime or nighttime at multiple identified points of reception (AECOM 2021[b]). Detailed noise methodology, results and discussion can be found in the New Britannia Notice of Alteration prepared by AECOM in 2021 (AECOM, 2021[b]).

8.1.6 Climate

The closest weather station to the site is located at the Flin Flon airport near Baker's Narrows, approximately 121 km west of Anderson TIA. The Flin Flon airport is located at an elevation of 304 masl and is climatically representative of the Project Site. The mean annual temperature at the Flin Flon airport is 0.2°C. The daily mean temperature ranges between 18°C in July and -20°C in January. Total annual precipitation at the Flin Flon airport is composed of 354.9 mm of rain and 150.2 cm of snow. July has the highest average rainfall (83 mm), whereas November has the highest average snowfall (28 cm). (Environment Canada, 2016).

The average temperature, precipitation, and wind conditions at the Flin Flon airport for each month are provided in **Table 8-1**

Table 8-1: Climate Data for the Flin Flon Airport, Manitoba

Parameter		Month													
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Temperature (°C)	Daily Average	-19.8	-16.2	-8.9	0.8	8.4	14.9	18.2	17.0	10.4	2.6	-8.4	-17.1	0.2	A
	Daily Maximum	-15.1	-10.8	-2.7	6.9	14.4	20.4	23.4	22.0	14.7	6.0	-5.1	-12.9	5.1	A
	Daily Minimum	-24.5	-21.5	-15.0	-5.3	2.3	9.5	13.0	12.0	6.1	-0.9	-11.6	-21.3	-4.8	A
Precipitation	Rainfall (mm)	0.2	0.3	1.4	10.3	37.3	67.2	83.1	67.2	62.5	23.6	1.4	0.5	354.9	A
	Snowfall (cm)	21.7	18.2	19.7	18.7	3.6	0.0	0.0	0.0	1.7	14.6	27.5	24.6	150.2	A
Wind Conditions (km/h)	Speed	9.1	9.9	9.9	10.8	10.8	11.2	10.6	10.6	12.0	12.0	10.9	9.3	10.6	D
	Most Frequent Direction	NW	N	S	S	S	S	S	S	S	N	N	N	S	D

Notes: Data obtained from Flin Flon A meteorological station, latitude 54 ⁰ 41' N longitude 101 ⁰ 41' W Elevation 303.90 m (Environment Canada, 2016).
"A": World Meteorological Organization "3 and 5 rule" (i.e., no more than 3 consecutive and no more than 5 total missing for either temperature or precipitation) between 1971 and 2000,
"D": At least 15 years.

8.2 Surface Water

8.2.1 Hydrology

The Project lies within the Reed Lake Ecodistrict, which is in the glacial Lake Agassiz basin and is part of the Nelson River drainage system. The region drains generally eastward through medium sized lakes and an irregular bedrock-controlled network of streams to Wekusko Lake that are all part of the Grass River watershed (Smith *et al.*, 1998).

The downstream receptor for the Anderson TIA is Anderson Bay of Wekusko Lake (see **Figure 2** and **Figure 3**). The Anderson TIA drains to Anderson Creek, which is almost entirely fed from the Anderson TIA discharge pipe, with a smaller amount of water coming from the TIA spillway and surface drainage. The creek crosses Manitoba Provincial Road (PR) 392 and meanders for approximately 1.25 km before merging with Stall Creek and entering Anderson Bay of Wekusko Lake. Stall Creek and Anderson Creek merge approximately 0.2 km from the confluence with Anderson Bay, meandering through a wide wetland area dominated by emergent macrophytes.

Due to varying topography created by hummocky bedrock surfaces, the drainage conditions vary considerably over short distances. Regionally the terrain falls at about 0.6 m to 1.0 m per km. Locally, runoff from bedrock and upland areas collects in peat-filled lows (bogs), which slowly release excess water to surrounding lakes and creeks. Groundwater tables are high in most bogs and in low areas bordering the bogs (Smith *et al.*, 1998). Similar to much of the Boreal Shield Ecozone, contiguous and isolated bogs cover approximately 20% of the Anderson TIA region. Bogs are widespread and stagnant in the region.

8.2.2 Surface Water Quality

The existing Anderson TIA has been in use since 1979, when a control dam structure was built at the east end of Anderson Lake, controlling discharge into the downstream Anderson Creek. Anderson Creek is a shallow creek that flows into Anderson Bay, located north of Wekusko Lake. Presently, Anderson Bay receives water almost entirely from the Anderson TIA, as well as minimal amounts of overland runoff during periods of precipitation and snow melt.

Discharge of water out of the Anderson TIA occurs during the open water season (typically May to October). This water is not treated and is instead stored for a retention period within the Anderson TIA in order to achieve the required effluent quality prior to discharge to environment.

In 2016, AECOM conducted an Environmental Assessment of the Proposed Expansion of the Anderson Tailings Impoundment Area (AECOM 2016). The comprehensive report outlined the water quality data collected through several sources, including Environmental Effects Monitoring (EEM) studies conducted by Stantec from 2005 to 2016.

Since 2012, AECOM has conducted a seasonal water quality sampling program comprised of on-going water quality monitoring and sampling at approximately twenty (20) locations throughout Anderson TIA, three (3) locations in Anderson Creek, and two (2) locations in Anderson Bay. It should be noted that several locations that were historically sampled between 2012 and 2023 have been removed and changed due to changes in accessibility, including the changes in water depth due to tailings discharge, in Anderson TIA.

As of June 2023, parameters that are monitored in Anderson TIA, Anderson Creek, and Anderson Bay include the following in situ parameters and laboratory analysis.

In Situ Parameters:

- pH
- Total dissolved solids (TDS, g/L)
- Dissolved Oxygen (mg/L)
- Temperature (ºC)
- Electrical conductivity (mS/cm)
- Oxygen Reduction Potential (ORP, mV)

Laboratory Analysis:

- Total metals
- Dissolved metals
- Acidity
- Anions (by IC)
- True colour
- Ammonia (by colour)
- Nitrate and nitrite
- Total phosphorous
- Ph, conductivity, and total alkalinity
- Total dissolved solids (TDS)
- Total suspended solids
- Turbidity
- Sulphate
- Chloride
- Chlorophyll
- Cyanate
- Thiocyanate
- Total fluoride
- Cyanide (Total, WAD, and Free)
- Dissolved organic carbon

A summary of the results from the seasonal water quality sampling program conducted at the Anderson TIA, including Anderson Creek, and Anderson Bay, is provided in the following sections. The summary includes information collected from 2016 (following the processing of ore from Lalor Mine and well before the operation of the New Britannia Mill) along with a summary of the most recent monitoring in June 2023 (following start-up of the New Britannia Mill). Results of the seasonal water quality sampling conducted during the most recent three-year period (2021-2023) has also been summarized in a technical memorandum, with is provided in **Appendix F**.

In addition to the seasonal water quality studies completed by AECOM, the water quality in Anderson TIA and areas downstream are routinely monitored by Hudbay and external consultants in support of other internal and designated monitoring programs, including EEM as per the MDMER. Where appropriate, information obtained from these other studies is presented in the report.

8.2.2.1 Anderson TIA

In June 2016, the in-situ data indicated the following:

- The water depths at sampling locations in the Anderson TIA ranged from 0.30 m to 7.60 m.
- The specific conductivity showed little variation between sample locations in Anderson TIA. The average specific conductivity in the Anderson TIA was 0.498 mS/cm in 2012, 0.474 mS/cm in 2013, 0.567 mS/cm in 2014, and 0.749 mS/cm in 2015. There was little in-seasonal variation, but it was generally lower in the spring and summer compared to the winter and fall sampling events.
- Turbidity was generally low (<10 NTU) at most locations, although spikes in turbidity were identified at sample locations near the tailings discharge location. Near the tailings discharge locations in June 2015, samples reached 43.7 NTU. Anecdotally, it appears that sampling on windy days resulted in higher turbidity readings due to wind and wave action stirring up sediment.
- Total dissolved solids showed little variation within the Anderson TIA ranging from 0.228 mg/L to 0.690 mg/L, with the highest measurements recorded near the tailings discharge pipe.
- Dissolved oxygen levels in the Anderson TIA averaged 7.95 mg/L in spring, 8.87 mg/L in fall and 3.32 mg/L in winter.

Based on the data obtained in June 2023, in-situ parameters within Anderson TIA tend to fluctuate. Specific conductivity (mS/cm) showed moderate variation between sample locations in the Anderson TIA. TDS values observed within Anderson TIA occur within a narrow band of values, with all readings within 1,196 mg/L and 1,391 mg/L and have been generally increasing since the March 2012. Overall, June dissolved oxygen levels in the Anderson TIA fluctuate, and have been slowly rising over the last seven years.

In addition to a review of the in-situ parameters, AECOM has also completed a review of the concentrations of metals within the Anderson TIA as determined through the seasonal sampling program. When reviewing this data, it is important to note that although metal concentrations at many sampling locations exceeded the CCME PAL guidelines, there were no exceedances of MDMER guidelines for any metals at any of the sampling locations within Anderson TIA.

When comparing the results of metals analysis from June 2023 to prior years, there is a generally decreasing concentrations of aluminum, copper, iron, lead, and zinc in Anderson TIA (AECOM, 2023). Concentrations of arsenic, nickel, and silver were observed to be generally increasing in the Anderson TIA. Trends for cadmium and silver indicated decreasing concentrations in the western and central portion of Anderson TIA and increasing concentrations in the eastern end.

CCME PAL exceedances were notable for arsenic, cadmium, copper, selenium, silver, and zinc during the June 2023 sampling program. Occurrences of arsenic exceedances in 2023 increased compared to historical data while occurrences and the magnitude of copper and selenium exceedances are consistent with historical sampling events. During the June 2023 sampling event, exceedances of 5X the CCME PAL for selenium and copper were observed at all sampling sites in Anderson TIA. This trend in selenium concentrations is consistent with other recent sampling events.

Silver concentrations which have fluctuated above and below the CCME PAL guideline since June 2021 were observed to exceed the CCME PAL throughout Anderson TIA in June 2023.

Zinc concentrations in Anderson TIA have been decreasing in both occurrence and magnitude since March 2021.

Based on the results of the EEM studies completed in 2020 (EcoReg Solutions, 2022), the effluent discharged at the Anderson TIA was found to be of good quality as evidenced by no exceedances of MDMER parameter limits for deleterious substances during weekly monitoring, with the exception of one instance of un-ionized ammonia exceeding the limit in August 2022. This exceedance was reported to MECC in October 2022, and the root cause of the exceedance was investigated and attributed to elevated ammonia in the test sample and not the result of metal toxicity.

Additionally, lethal toxicity passed all tests (*Daphnia* and trout), with the exception of one rainbow trout test that displayed acute lethality in April 2023. This exceedance was reported to MECC in October 2023, and the root cause of the exceedance was investigated and attributed to elevated ammonia in the test sample and not the result of metal toxicity.

All sub-lethal tests met the applicable criteria, with the LC50 values reporting as 100%, and IC25 values that ranged from 13.4% to 100%.

8.2.2.2 Anderson Creek

The 2016 water temperatures in Anderson Creek followed seasonal variability, with temperatures highest in the summer, followed by spring, then the fall. Turbidity was generally higher in the fall months, likely linked to high primary productivity in the fall. Water in Anderson Creek was generally well-oxygenated with most dissolved oxygen concentrations ranging from 6.7 mg/L to 16.0 mg/L. Anderson Creek was observed as having a neutral pH ranging from 6.8 to 8.9. Specific conductivity showed little variation among sampling stations in each sampling event.

According to the CCME classification scheme for lake trophic status based on total phosphorus concentrations, Anderson Creek was considered mesotrophic in 2011, meso-eutrophic in 2012 and 2013 and eutrophic in 2014 and 2015.

In general, the historical concentrations of most metals and metalloids were low and below the CCME PAL guidelines, with some minor exceptions:

- Aluminum concentrations exceeded CCME PAL guideline (0.1 mg/L) in Anderson Creek in 2011, 2013, 2014 and 2015.
- Cadmium concentrations exceeded CCME PAL guideline (0.000075 mg/L) in 2011, 2014 and 2015.
- Copper exceeded CCME PAL guideline (0.004 mg/L) in 2011, 2013, 2014 and 2015.
- Iron concentrations exceeded CCME PAL guideline (0.3 mg/L) in 2011, 2013, 2014 and 2015.
- All lead samples collected in June 2014 exceeded the CCME PAL guideline (0.007 mg/L).
- Selenium concentrations exceeded CCME PAL guideline (0.001 mg/L) from 2011 to 2015.
- Zinc levels in water samples exceeded CCME PAL guideline (0.03 mg/L) in all water samples collected in all sampling events, except October 2013.

The results of the water quality analysis completed in Anderson Creek in June 2023 indicate the following:

- Although aluminum concentrations in Anderson Creek were above CCME PAL guideline, all three sites were well below historic concentrations.
- Arsenic concentrations in Anderson Creek exceeded CCME PAL guideline (0.005 mg/L) at all three sites and demonstrate a gradual increase since the beginning of sampling in 2013.
- No cadmium exceedances were observed and have not been observed in Anderson Creek since 2015.
- Zinc concentrations exceeded CCME PAL guideline at all three sites in June 2023, but have trended down since 2015, with a large decrease in concentration between June 2020 and June 2021.

Based on a review of historical sampling data from Anderson Bay, the following observations were noted:

- Copper exceeded CCME PAL guideline at all sites in every sampling event from 2019 to June 2023.
- Although iron concentrations exceed CCME PAL guideline in most sampling events between 2018 and 2022, no exceedances were observed in June 2023.
- No lead concentrations exceedances were recorded in Anderson Creek since 2014, with concentrations varying largely between programs.
- Selenium concentrations exceeded CCME PAL guideline in all sampling events at all three sites from 2018 to June 2023.

Like water quality results observed in Anderson TIA, it is important to note that although metal concentrations at some of the sampling locations exceeded the CCME PAL guidelines, there were no exceedances of MDMER guidelines for any metals at any of the sampling locations within Anderson Creek.

8.2.2.3 Anderson Bay of Wekusko Lake

In 2016, some variability in water quality was noted within Anderson Bay, with inshore sampling stations showing higher levels of some parameters, including dissolved solids, chloride, and sulfate. Overall, there were no consistent differences in limnological parameters between spring and fall.

Water quality studies completed by AECOM from 2011-2015 indicated that concentrations of most metals and metalloids remained low and below the CCME PAL guidelines, with only exceedances of aluminum, arsenic, and iron having been reported in Anderson Bay. However, during this period, concentrations within Anderson Creek were within normal range, indicating that higher concentrations in Anderson Bay did not appear to be a result of discharge from the Anderson TIA.

The results of the water quality analysis completed in Anderson Bay in June 2023 indicates the following:

- As with Anderson Creek, although aluminum concentrations were regularly above CCME PAL guideline, both sampling locations were lower than historic concentrations.
- Selenium concentrations exceeded CCME PAL guideline at one site in June 2023. This has also been observed in two other instances (June 2018 and September 2019).
- The two sites located in Anderson Bay were the only samples collected in June 2023 that registered an iron concentration below CCME PAL guideline.

Based on a review of historical sampling data from Anderson Bay, the following observations were noted:

- Arsenic concentrations exceeded CCME PAL guideline only once between 2015 and June 2023, in June 2019 at one site.
- Iron concentrations exceeded CCME PAL guideline in June 2018, and September 2019, with samples collected in June 2023 having some of the lowest concentrations observed.

Like water quality results observed in Anderson TIA and Anderson Creek, it is important to note that although metal concentrations at some of the sampling locations exceeded the CCME PAL guidelines, there were no exceedances of MDMER guidelines for any metals at any of the sampling locations within Anderson Bay.

8.2.3 Sediment Quality

As part of AECOM's 2016 Environmental Assessment of the Proposed Expansion of the Anderson Tailings Impoundment Area (AECOM 2016), an assessment of sediment quality was conducted in Anderson Creek and Anderson Bay, drawing conclusions based on AECOM's sediment sampling programs in 2011 and 2012, and Stantec's EEM studies.

Sediment quality data were compared to the CCME Canadian Soil Quality for the Protection of Environmental and Human Health for Residential/Parkland Land Use (CSQG-RPL, CCME 2011) and the Manitoba Interim Sediment Quality Guidelines (ISQG) and Probable Effect Level (PEL) (Williamson, 2011). Sediments with measured chemical concentrations equal to or lower than ISQG are considered by the province to be acceptable quality. Sediments with measured chemical concentrations between the ISQG and the PEL are considered by the province to represent potential hazards to exposed organisms. Sediments with a measured chemical concentration equal to or greater than the PEL are considered to represent significant and immediate hazards to exposed organisms by the province.

8.2.3.1 Anderson Creek

All sediment samples collected in 2011 and 2012 were classified as clay dominant, with low ranges of silt and sand. The following is a summary of the key sediment quality chemical parameters observed in Anderson Creek sediment samples in the 2011 and 2012 studies:

- One arsenic sample exceeded arsenic PEL.
- The cadmium PEL was exceeded at one sampling location and ISQG were exceeded at two locations.
- The chromium ISQG was exceeded in all samples and the chromium PEL was exceeded in two samples. Chromium concentrations were highest near the Anderson TIA discharge location.
- The copper ISQG was exceeded in two or more replicates, however the PEL guideline was not exceeded.
- Average lead and zinc concentrations in samples also increased as sample locations approached PR 392 and the Anderson TIA discharge. One sample was recorded as exceeding the lead ISQG. One or more triplicate sample locations were recorded as exceeded zinc ISQG. As well, one or more replicates also exceeded both lead and zinc PEL in two locations.

8.2.3.2 Anderson Bay

As reported in the EEM study in 2011, zinc was the only parameter that exceeded PEL guidelines in Anderson Bay, with zinc and aluminum detected above the CCME criteria. This is not uncommon in waterbodies located throughout Canada, and particularly in areas with metal rich substrates such as the Project Area.

Sediment samples collected from Anderson Bay were primarily composed of silt and clay and described as clay, silty clay, silty clay loam and silt loam. The following is a summary of exceedances observed in Anderson Bay sediment samples in 2011-2012:

- The majority (70%) of arsenic concentrations were between the ISQG and PEL guidelines.
- Chromium concentrations in 90% of samples exceeded ISQG, but none exceeded PEL sediment guidelines.
- Copper concentrations in 57% of samples exceeded the ISQG, but none exceeded PEL guidelines. In general, increased copper concentrations were observed in sample locations closer to the north end of Anderson Bay and concentrations decreased as sample locations extended further into Wekusko Lake.
- Zinc concentrations also followed a similar special trend, with the samples collected closest to the outflow of Anderson Creek having zinc concentrations above ISQG and PEL guidelines. Stations further into Wekusko Lake had zinc Concentrations above ISQG, but below PEL guidelines.

Based on a review of the information provided in the 2020 EEM report (EcoReg Solutions, 2022), except for molybdenum, sediment quality in Anderson Bay remained the same compared to previous studies with concentrations of arsenic, cadmium, chromium, copper, and zinc above the CCME guidelines. However, it was also noted that arsenic and chromium also exceeded the CCME guidelines in the approved

Reference Area in both 2018 and 2020, indicating high background levels of these parameters in the local region.

8.2.4 Lower Trophic Level Biota

As part of AECOM's 2016 Environmental Assessment of the Proposed Expansion of the Anderson Tailings Impoundment Area (AECOM 2016), a study of the aquatic invertebrate diversity and community composition was conducted to evaluate the potential downstream impacts from the discharge from the TIA. The study focused on lower trophic level biota, which included phytoplankton, zooplankton, and benthic invertebrates. Conclusions were based on AECOM's various lower trophic level biota sampling programs in 2011 and 2012, and the 2020 EEM study (EcoReg Solutions, 2022) which are summarized in the following sections.

8.2.4.1 Anderson Creek

One phytoplankton sample was collected in Anderson Creek for analysis for the spring season. Nine classes of phytoplankton were identified, with Fragilariophyceae (pennate diatoms) as the most abundant and Chrysophyceae (yellow-green algae) as the second most abundant.

One zooplankton sample was collected in Anderson Creek for analysis for the spring season. 17 species of zooplankton, across three classes, were identified. Monogononta (rotiferans) was the most abundant zooplankton class identified from Anderson Creek. The total number of zooplankton species identified was 73.7 n/L.

One benthic invertebrate sample was collected from Anderson Creek in the fall season. Six orders of benthic invertebrates were identified. The dominant order identified was Veneroida (bivalves), which accounted for 23% of the total density of benthic invertebrates identified in Anderson Creek.

8.2.4.2 Anderson Bay

Phytoplankton samples were collected in the spring and fall 2011 and 2012 within Anderson Bay. Nine classes of phytoplankton were identified from Anderson Bay. Chrysophyceae (yellow-green algae) was the most abundant class in both spring and fall. Phytoplankton abundance was highest in the fall season compared spring. This corresponds to higher primary productivity levels in the fall in Anderson Bay.

One zooplankton sample was collected from each of two sampling locations in the spring and fall seasons within Anderson Bay, 18 species of zooplankton, across four classes were identified, with a fifth class (within Rotifera) identified, but not to species level. Monogononta (rotiferans) was the most abundant class in both spring and fall in Anderson Bay, which corresponds with the previous findings in Anderson Bay. The total number of zooplankton species identified in the spring was 8.3 n/L and in the fall was 202.1 n/L. One benthic invertebrate sample was collected from Anderson Bay in the fall season. 17 orders of benthic invertebrates were identified in samples collected in Anderson Bay. The dominant order identified was Diptera (true flies), specifically the Chironomidae family (non-biting midges), which accounted for 38% of the total density of benthic invertebrates identified in Anderson Bay, Overall, Anderson Bay had more species diversity and density of benthic invertebrates than that observed in Anderson Creek.

Based on the result of the 2012 EEM study (Stantec, 2013), it was determined that Anderson Bay supported a diversity of benthic organisms similar to their reference areas. It was concluded that the Anderson TIA outfall resulted in no noticeable impacts on the downstream receiving benthic communities, when comparing Anderson Bay to the reference areas, despite the slightly elevated iron and aluminum concentrations in the surface water and increased metals concentrations in sediment samples.

The 2020 EEM (EcoReg Solutions, 2022) report indicates that two EEM Effect Endpoints (Family Richness and Bray-Curtis Index) were significantly different between the Anderson Bay Exposure Area and the Crowduck Bay Reference Area. However, the inference of effluent effects on the benthic invertebrate community within the Exposure Area was confounded due to the concordant differences in sediment composition between areas.

8.2.5 Fish and Fish Habitat

An environmental baseline aquatic assessment was conducted by AECOM in 2011 and 2012, which assessed the fish community composition in 13 waterbodies in a broad region downstream of the Anderson TIA. These waterbodies were assessed as they were relevant to continued operation of the Anderson TIA. The waterbodies included Anderson Creek, Anderson Bay of Wekusko Lake, and Goose Bay of Wekusko Lake (located outside of the Project Region) which was used as a reference location for the study. Fishing efforts were conducted using backpack electrofishing units, standard gang gill nets, a small gang gill net, and minnow traps. The following sections provide a summary of the findings in Anderson Creek and Anderson Bay.

8.2.5.1 Fishing Efforts and Fish Habitat Assessment in Anderson Creek

A total of 215 individuals, across four fish species, were caught in Anderson Creek during the baseline study. Fish species captured were Brook Stickleback, Fathead Minnow, Iowa Darter, and Pearl Dace. Brook Stickleback represented 60% of the fish caught and Pearl Dace represented 38% of the fish caught.

An assessment of potential fish habitat within Anderson Creek was conducted concurrently with fish sampling efforts. Anderson Creek originates at the Anderson TIA and flows east into Anderson Bay of Wekusko Lake. For the assessment, habitat was assessed beginning from the downstream outflow of the culvert running below PR 392, as there are barriers to fish passage within and upstream of the culvert. The channel was uniform in width (1.5m) and depth (~1.0 m) for approximately 757 m before spreading across a wide floodplain. Organic substrate was observed and common throughout the downstream environment. Boulders, overhanging vegetation, and woody debris were common along the banks and provided cover habitat for spawning and foraging fish species. Anderson Creek was assessed as having marginal fish habitat, due to the lack of upstream connectivity.

8.2.5.2 Fishing Efforts and Fish Habitat Assessment in Anderson Bay

Between 2011 and 2012, a total of 941 individuals, across 15 species, were caught in Anderson Bay. In 2011, the most caught species was Brook Stickleback, followed by Yellow Perch and Fathead Minnows. In 2012, the most caught species was Brook Stickleback, followed by Emerald Shiner and Yellow Perch.

An assessment of potential fish habitat within Anderson Bay was conducted concurrently with fish sampling efforts. Anderson Bay had a diversity of fish habitat within the sampling area. A complex benthic topography was present at site, including the presence of islands and small shoals which provided habitat for a variety of species. The shoreline was composed of a variety of riparian vegetation including coniferous forest, mixed forest, grasses, shrubs, and wetlands. Ample cover existed in the form of boulders, overhanging vegetation, emergent and submerged vegetation, and some woody debris. Anderson Creek was assessed as important fish habitat.

The 2020 EEM study (EcoReg Solutions, 2022) indicates that fish productivity in Anderson Bay may be higher than that of the Reference Area (Crowduck Bay) as Brook Stickleback caught in the Exposure Area were heavier at both age and length, for males, females, and YOY. The results indicate that effluent from the Anderson TIA is not adversely affecting the fish population of the receiving environment.

8.2.5.3 Shoreline Assessment of the Anderson TIA September 2023

In support of the proposed trial study, AECOM completed an aquatic and terrestrial shoreline survey of the Anderson TIA during the Fall 2023 (September) Anderson TIA Seasonal Sampling Program by a qualified AECOM biologist. The shoreline survey was conducted along the perimeter of Anderson TIA, broadly defining, and classifying habitat types based on their composition.

The most unique aquatic environment within Anderson TIA is the upstream environment, and inflow into Anderson TIA, which occurs within the south-west portion of the TIA. At the time of the survey, a series of beaver dams was preventing the passage of water from the upstream wetlands into Anderson TIA. The upstream aquatic environment is highly vegetated, with submerged and emergent aquatic vegetation, and high levels of algal communities. The aquatic environment immediately downstream of the inflow was more typical of that found throughout the Anderson TIA, characterized by little aquatic shoreline vegetation. The area contained many dead standing and submerged trees, likely due to fluctuating water levels, expanding shoreline, and flooding in the shallow area.

A majority of the aquatic shoreline environment throughout the Anderson TIA is very similar, with little-to-no aquatic vegetation present. Only small areas near the inflow into the Anderson TIA, and near the outflow into Anderson Creek has some form of submerged or emergent aquatic vegetation.

Additional details are provided in **Section 8.4.3.**

8.3 Groundwater

Comprehensive reports describing the regional groundwater flow system are not available for the Project Area. However, based on conditions in similar environments, the regional shallow groundwater flow, in particular in the overburden, is likely controlled by the bedrock surface and topography in the Project Region. Recharge of shallow groundwater can be expected to occur in elevated areas. From there, shallow groundwater flow will generally follow the topography and drain to the low-lying areas where it will discharge to surface waterbodies and wetlands.

Shallow groundwater tables are high in most peat lands and in low areas bordering the peat lands. Shallow groundwater levels in the area are generally at or near surface in the spring and early summer and drop as the year progresses. Locally, the topography of the buried bedrock surface can have a significant effect on groundwater flow direction. Bedrock groundwater wells, when present, are likely connected to fractures or discontinuities that are connected to the local water table and are not likely regionally interconnected.

Seven groundwater wells were identified through the Groundwater Information Network database map (GIN, 2021). Most wells are located within the property development around the Wekusko Lake (Barrs Bay and Berry Bay), the Town of Snow Lake, and Wekusko Falls Provincial Park (Wekusko Falls Campground). According to the Groundwater Information Network database, the closest well to Anderson TIA is located approximately 1.8 km west of the Anderson TIA. Its water use is domestic, well purpose is production, water status is active, and the well extends to 92.72 m below ground surface.

8.4 Terrestrial Environment

AECOM completed a terrestrial survey of the Anderson TIA shoreline, dike alignments, and Anderson Creek in summer of 2011 and 2012. This survey included a review of local geology, soil, vegetation, and wildlife. The survey consisted of a random meander survey by qualified AECOM biologists along the proposed dike alignments, former Anderson Mine Site and around Anderson Creek and a shoreline assessment around Anderson TIA via boat.

Detailed methodology, results and discussion of terrestrial field studies can also be found in:

- Lalor Concentrator Environment Act Proposal (AECOM, 2013c)
- Lalor Mine Environment Act Proposal Report (AECOM, 2012d)
- Proposed Lalor Concentrator Environment Baseline Assessment (AECOM, 2013e)
- Proposed Lalor Mine Environmental Baseline Assessment (AECOM, 2012c)
- Lalor Vegetation Regional Analysis (AECOM, 2012f)

To supplement the information obtained most recently in 2012, AECOM completed a terrestrial and shoreline survey of the Anderson TIA in September 2023. The shoreline survey was conducted along the perimeter of Anderson TIA, broadly defining and classifying habitat types based on their composition.

8.4.1 Vegetation

Vegetation in the Reed Lake Ecodistrict is typical of the northern Boreal Forest region with Black Spruce (*Picea mariana*), Jack Pine (*Pinus banksiana*), Trembling Leaf Aspen (*Populus tremuloides*), and White Spruce (*Picea glauca*). The bog peatlands have stunted Black Spruce, moss, and ericaceous shrub vegetation, while fens have sedge (*Carex sp*.), shrub, and Tamarack (*Larix laricina*) in varying mixtures. Forest composition is reflective of a forest fire history (Smith *et al*., 1998).

The general area of the Anderson TIA and region is a boreal forest biome typical of the rock outcrop and bog landscape. Rock outcrops are primarily igneous and common, forming open lichen woodlands of White Spruce and Jack Pine. Black Spruce bog has developed in the areas between rocky outcrops and created deep deposits of sphagnum moss that restrict drainage. The bog is mature with large areas of even-aged Black Spruce stands. One indication of tree stand density is the relative lack of understory shrubs. Speckled Alder (*Alder rugosa*) dominates the shrub layer in openings created by watercourses. Ground cover is moss with typical boreal ground plants such as Bunchberry (*Cornus canadensis*) and Solomon's Seal (*Polygonatum biflorum*). Soil development has occurred in pockets between rock outcrops with good drainage. Jack Pine grows in sporadic open sandy areas.

The general historical disturbance in this area has opened the forest canopy. However, most of this activity has been limited to narrow cut lines and drag roads that grow in rapidly. Re-growth in such areas is largely hardwoods, but these areas also offer some growth opportunity for shrubs that were largely lacking in other parts of the forest stand. The historical re-growth in this area is a minor part of the forest canopy, however, it is extensive and likely important in terms of offering linear features that present more diversity than the surrounding forest and providing openings in an otherwise dense canopy.

8.4.2 Wildlife

The Churchill River Upland Ecoregion provides habitat for Moose (*Alces alces*), Boreal Woodland Caribou (*Rangifer tarandus caribou*), Black Bear (*Ursus americanus*), Lynx (*Lynx lynx*), Timber Wolf (*Canis lupus*), Beaver (*Castor canadensis*), Muskrat (*Ondatra zibethicus*), and Snowshoe Hare (*Lepus americanus*). Various bird species including Sandhill Crane (*Grus canadensis*), grouse, waterfowl (*i.e*., ducks, geese, and pelicans) along with many other birds are found in this ecoregion (Smith *et al.*, 1998).

During the field studies conducted in 2007 - 2012 in the Project Region, signs of Black Bear and Moose in the Project Region were apparent. Wildlife directly observed included waterfowl, Common Raven (*Corvus corax*), Coyote (*Canis latranus*), Red Fox (*Vulpes fulva*), Whitetail Deer (*Odocoileus virginianus*), Timber Wolf, River Otter (*Lutra canadensis*), Beaver, eagles, American White Pelican (*Pelicanus erthrorhyncos*), cranes (*Grus* sp.), loons (*Gavia* sp.), and frogs.

The area surrounding Anderson TIA showed a high degree of use by wildlife, particularly birds. In June 2012, during the shoreline survey, ten species of waterfowl were observed in abundance around the area, as well as one Bald Eagle. Young of the year birds were also observed in the area.

Although not specifically surveyed, evidence of habitat use by wildlife species were documented during the 2023 terrestrial and shoreline assessment. Signs of black bear and moose were observed in cleared areas along the shoreline. Various migratory bird species (Canada Geese, Common Loon (*Gavia immer*), and several duck species), Common Ravens, gull species (*Laridae* family), and Bald Eagles (*Haliaeetus leucocephalus*) were observed in and around the Anderson TIA.

8.4.3 Terrestrial Shoreline Field Survey

In support of the trial study, AECOM completed a terrestrial and shoreline survey of the Anderson TIA in September 2023. The shoreline survey was conducted along the perimeter of Anderson TIA, broadly defining, and classifying habitat types based on their composition. Six distinct types of shoreline habitat were defined during the survey. The upstream Anderson TIA inflow was also described to better understand the natural upstream environment, prior to entry into the Anderson TIA. Additional details are provided in the Anderson TIA Terrestrial Shoreline Survey Memo (**Appendix G**).

The aquatic and terrestrial shoreline environment upstream of the natural inflow into the Anderson TIA are typical of boreal shoreline environments found in the area. The upstream environment is connected to the Anderson TIA via a series of beaver dams, which at the time of survey contained low water levels with no apparent flow into the Anderson TIA. The terrestrial shoreline was also typical of the TIA with a mature forest stand of black spruce, balsam poplar, and trembling aspen, and an understory of brush, sedges, and grasses.

The Anderson TIA contained six distinct types of shoreline habitat, varying from typical natural boreal habitat found in the Project Region, to cleared forest stands, to heavily altered environments. Please refer to Figure 1 in **Appendix G**.

Varying levels of clearing were observed along the shoreline. Portions of the west, south-west, and north terrestrial shoreline were maintained in their natural boreal composition, characterized by a mature forest stand dominated by black spruce, trembling aspen, and balsam poplar, with some birch and jack pine present. Along cleared shoreline, open areas ranging from 50 m to 200 m were observed, some of which showed evidence of regrowth after clearing.

Closer to the outflow into Anderson Creek, the shoreline of the Anderson TIA had been heavily cleared over the past several years to accommodate roads, laydown areas, and the existing dam along the east portion of Anderson TIA. Sparsely vegetated areas with mature trees and brush were still present along the shoreline, however a large majority of the terrestrial shoreline environment has been altered. Large portions of the ground near the Anderson TIA dam were covered in gravel or other forms of fill to accommodate the construction efforts.

8.4.4 Migratory Birds

During the September 2023 terrestrial and shoreline assessment as noted above, various migratory bird species including Canada Geese, Common Loon, and several duck species were observed in and around Anderson TIA. However, no evidence of nesting was observed.

8.4.5 Species of Conservation Concern

The Manitoba Conservation Data Centre (CDC) provides an online ‘Species List’ tool which identifies species of conservation concern, including Species at Risk, that may potentially occur in Manitoba’s ecoregions. Species at Risk that are protected under legislation, which may occur in the Churchill River Upland Ecoregion, within which the Project Site occurs, includes those listed in Table 8-2. Species at Risk, for the purpose of this document, are those species that are listed as Endangered or Threatened under Schedule 1 of the federal *Species at Risk Act* and those species listed under *The Endangered Species and Ecosystems Act* of Manitoba.

Table 8-2: Wildlife Species at Risk in the Churchill River Upland Ecoregion

Common Name	Scientific Name	MBESEA Status	SARA Status	Probability of Occurrence within the Project Site
Boreal Woodland Caribou	*Rangifer tarandus caribou*	Threatened	Threatened	Low to Medium - The Project Site occurs within favourable caribou habitat, i.e. lichen rich open areas, mature coniferous forest, and peatlands [a,b]. - However, there is a lower probability of caribou using the areas near the Project Site, as caribou tend to avoid industrial and linear disturbances such as roads and trails [c].
Little Brown Bat and Northern Long-eared Bat	*Myotis Lucifugus* and *Myotis septentrionalis*	Endangered	Endangered	Low to Medium - The Regional Project Area has wetland habitat and waterways conducive to insect production favourable for foraging bats [d] - Summer maternity colonies are established in buildings, large diameter trees, and crevices of which there are in the Regional Project Area. - Overwintering hibernation occurs in caves and abandoned mines.
Common Nighthawk	*Chordeiles minor*	Threatened	Threatened	Medium - There is a potential for common nighthawks to occur within the Regional Project Area, as it contains habitat favoured by ground nesting birds, i.e., cleared areas, burned areas, rock outcrops, peat bogs, and seldom used open linear features [e, f] - The probability of this species occurring in the Regional Project Area has been determined by the Atlas of the Breeding Birds of Manitoba to be approximately 40-60%. Areas of Possible breeding evidence have been identified surrounding the Regional Project Area [e, f].
Eastern Whip-poor-will	*Antrostomus vociferus*	Threatened	Threatened	Low to Medium - There is potential for eastern whip-poor-wills to occur in the Regional Project Area, as it contains habitat favoured by ground nesting birds, i.e., cleared areas, burned areas, rock outcrops, peat bogs, and seldom used open linear features [g, h]. - The probability of this species occurring in the Regional Project Area has been determined by the Atlas of the Breeding Birds of Manitoba to be approximately 20-30%. Areas of Possible breeding evidence have been identified surrounding the Regional Project Area [g, h].
Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Threatened	Medium - There is potential for olive sided flycatchers to occur in the Regional Project Area, as it contains habitat favoured by the species, i.e., swampy coniferous forest, wooded shorelines and streams, lakes, ponds, bogs, and muskegs where snags are present [i, j]. The probability of this species occurring in the Regional Project Area has been

Common Name	Scientific Name	MBESEA Status	SARA Status	Probability of Occurrence within the Project Site
				determined by the Atlas of the Breeding Birds of Manitoba to be approximately 40-60%. Areas of Possible breeding evidence has been identified surrounding the Regional Project Area [i, j].
Canada Warbler	*Cardellina canadensis*	Endangered	Threatened	Low - This species uses a wide range of forest types (deciduous, coniferous, and mixed) with well developed shrub and forest floor, as well as in post disturbance and old-growth riparian shrub forests [k, l]. The probability of this species occurring in the Regional Project Area has been determined by the Atlas of the Breeding Birds of Manitoba to be approximately 10%. No areas of breeding evidence have been identified surrounding the Regional Project Area [k, l].
Barn Swallow	*Hirundo rustica*	Not Listed	Threatened	Low to Medium - There is potential for the barn swallow to occur within the Regional Project Area, as there are man-made structures near the Project Site. There may also be natural (e.g., cliff overhang) nesting habitat for this species, which builds a mud cup nest adhered to vertical surfaces under overhangs [m, n]. - The probability of this species occurring in the Regional Project Area has been determined by the Atlas of the Breeding Birds of Manitoba to be approximately 20-40%. Areas of Possible breeding evidence has been identified surrounding the Regional Project Area. Areas of Confirmed breeding evidence have also been identified outside of the Regional Project Area, closer to the intersection of PR 392, and MB-39[m, n].
Bank Swallow	*Riparia*	Not Listed	Threatened	Low – There is limited suitable riparian bank habitat that occurs within the Regional Project Area that would be suitable nesting habitat for this species which burrows into banks for nesting [o,p].. – The probability of this species occurring in the Regional Project Area has been determined by the Atlas of the Breeding Birds of Manitoba to be approximately 10% - 20%. No areas of breeding evidence has been identified surrounding the Regional Project Area [o,p]

a Manitoba Boreal Woodland Caribou Management Committee 2015
b COSEWIC 2014
c Schindler et al. 2007
d COSEWIC 2013a
e COSEWIC 2007
f Sigurdson et al. 2018
g COSEWIC 2009
h Mills 2018
i COSEWIC 2018
j Berger 2018
k COSEWIC 2020
l Roberto-Charron 2018
m COSEWIC 2011
n Poole 2018
o COSEWIC 2013b
p Taylor 2018

The Boreal Woodland Caribou was designated as threatened under *MESA* in June 2006 (Manitoba Boreal Woodland Caribou Management Committee, 2015). Such factors as habitat destruction, hunting, disturbance by humans (including construction of roads and pipelines), and predation (by wolves, coyotes, and bears) have all contributed to the decline of caribou. In many parts of their range, anthropogenic activities have resulted in the loss and alteration of important caribou habitat. Other factors, such as weather and climate change, are also influential, but are also more difficult to control. One of the current challenges in caribou management is to learn more about how these factors interact and how to decrease their threat to caribou populations (Environment Canada, 2012).

The Provincial recovery strategy plan for Woodland Boreal Caribou identifies 15 known ranges of the species (Manitoba Boreal Woodland Caribou Management Committee, 2015). One of the Management Units, the Naosap, overlaps with the Project Region. The Project Region contains potentially suitable habitat for Boreal Woodland Caribou.

Historic field observations confirmed that wildlife habitats within the Project Area are typical for the region, with no unique or rare habitats encountered. No species listed as species of special concern by the Manitoba CDC were observed in the areas examined during the biophysical surveys.

8.5 Socio-Economic Environment

8.5.1 Parks and Natural Areas

There are no national or provincial parks in the Project Site or Project Area. The closest park is Wekusko Falls Provincial Park (0.88 km^2), which is located approximately 6 km south of the Anderson TIA. The Park flanks the Grass River as it drops 12 m over a series of rapids and falls, known as Wekusko Falls. The Park is classified as a Recreation Park (Natural Resources and Northern Development, 2023).

8.5.2 Heritage Resources

A search of the Manitoba Historic Society, Historic Sites of Manitoba interactive map indicated that the closest historically significant site is the Brookside Cemetery located approximately 1.5 km north of the Project Site. Other structures with significant heritage were noted within the community of Snow Lake located approximately 2.5 km northwest of the Project Site. Also, the 2016 Environmental Assessment of the Proposed Expansion of the Anderson TIA concluded that the Heritage Resources Branch had no concerns with the proposed development.

8.5.3 Economy

In the 2021 census conducted by Statistics Canada, the population of Snow Lake and surrounding area was 1,088 residents (Statistics Canada, 2021) with most of these residents employed at, or supported by, Hudbay. Many other Snow Lake residents are employed in the industries and services that support the region’s mining operations.

The Snow Lake area has had an active mining history for over 50 years. Hudbay has played an integral part in this history since the late 1950s, by operating ten mines in the area including: Photo Lake, Chisel Lake, Stall Lake, Osborne Lake, Spruce Point, Ghost Lake, Anderson Lake, Chisel North, and Lalor.

In addition to mining activities, extensive forestry operations have occurred within the region and surrounding area, with wood sent to the pulp and paper mill operation in The Pas, Manitoba. Trapping, fishing and hunting are also popular activities in the region.

8.5.4 Community Services

The Town of Snow Lake has various community services including: a health facility that is staffed by a doctor, a grocery store, two hotels/motels, two service stations, a hockey arena, a curling rink and a nine-hole golf course. There is an un-serviced gravel municipal airstrip located approximately 10 km northeast of the Anderson TIA that is designed to accommodate air ambulances for medical evacuations.

Other services include a Royal Canadian Mounted Police (RCMP) station and a volunteer fire department. There are also numerous recreational opportunities including camping, hiking trails, fishing, hunting, snowmobiling and all-terrain vehicle trails (Town of Snow Lake, 2023).

8.5.5 Regional Resource Use

8.5.5.1 Trappers

The Project Region falls within Trapping Area 6 – Northern Registered Trapline (RTL) District, in the smaller Herb Lake boundary (Natural Resources and Northern Development, 2022). Manitoba Conservation (Natural Resources and Northern Development) in Snow Lake confirmed that RTL 13, within which the Project Region falls, is registered, and actively trapped.

8.5.5.2 Cottages and Remote Residences

There are no cottages or residences on the Anderson TIA. The closest cottages and remote residences are the Wekusko Lake cabin subdivisions on Berry Bay, Taylor Bay, and Bartlett's Landing. There are approximately ten residences on Anderson Bay, with additional residences further south along the west shore of Wekusko Lake. Five seasonal cottages exist on Cook Lake, just west of the Lalor Mine site.

8.5.5.3 Lodges

There are five lodges located in the Snow Lake region. The Diamond Willow Inn & Willow House is in the Town of Snow Lake at 200 Lakeshore Drive and is approximately 3 km northwest of the Anderson TIA. Wekusko Falls Lodge and Tawow Lodge Ltd. (Herb Lake Landing) are located approximately 10 km and 25 km southeast of the Anderson TIA, respectively. Burntwood Lodge is a fly in fishing lodge located on Burntwood Lake and is estimated to be approximately 60 km northwest of the TIA. Grass River Lodge is located on Reed Lake and is approximately 28 km southwest of the Anderson TIA, with outpost cabins on Dolomite Lake (55 km southwest of the Anderson TIA) and Moody Lake (55 km northwest of the Anderson TIA).

8.5.5.4 Snowmobilers

The Snow Lake area is home to the Snow Lake Sno-Drifters snowmobiling club. The club maintains snowmobile trails in and around the Town of Snow Lake. Trails exist leading to Squall, Cook, Snow, Chisel, and Wekusko Lakes. Three warm-up shelters exist along the trail network. Snowmobile trails are mapped and posted by Snoman within the Manitoba North – Snowmobile Trail Guide (Snoman, 2023). Maintained trails exist leading from Snow Lake to Thompson, Manitoba, and onto Gillam, Manitoba.

8.5.5.5 Forestry

The Cormorant Provincial Forest is located approximately 95 km southwest of the Anderson TIA and covers an area of 1,479 km^2. Provincial forests are Crown lands managed by Natural Resources and Northern Development on a sustainable yield basis.

Through personal communications with the Manitoba Conservation Officer (Natural Resources and Northern Development) in The Pas, AECOM confirmed that Canadian Kraft Paper, located in The Pas, Manitoba, recently acquired the rights to conduct wood harvesting in forest sections surrounding Snow Lake.

8.5.5.6 Fisheries – Recreational and/or Commercial

Given the proximity to the Town of Snow Lake, there are recreational opportunities such as fishing, swimming, canoeing, and snowmobiling in and around the Project Region. Recreational fishing in Wekusko Lake increased after 1960 with the completion of PR 392.

Previous communications with the Regional Fisheries Manager in The Pas, Manitoba, indicated a commercial gill net fishery operated in Snow Lake from 1989 to 1990 targeting Lake Whitefish, but was suspended due to the high bycatch (~41% of round weight) of Walleye and Northern Pike.

Currently there is no commercial fishery in Snow Lake. Manitoba Conservation (Natural Resources and Northern Development) in Snow Lake confirmed that Wekusko Lake has an active commercial fishery for Walleye, Sauger, Whitefish, and Northern Pike.

8.5.6 First Nations

Based on Government of Manitoba and Federal sources, there is no Indian Reserve, RTL zone associated with First Nation/Aboriginal community use or other Aboriginal interest located within the Project Region. The First Nations in closest proximity to the Project Region are the Mathias Colomb Cree Nation, Nisichawayasihk Cree Nation, Mosakahiken Cree Nation, Opaskwayak Cree Nation, Cross Lake First Nation, and Norway House Cree Nation.

9. Public and Stakeholder Engagement

Two public information sessions were held by Hudbay and AECOM on September 27, 2023, to present details of the Anderson TIA trial study to the public. These public information sessions were held at the Laurie Marsh Community Hall: one session at 2:00 p.m. and the second session at 7:00 p.m. to accommodate shift workers. The purpose of the session was to provide the public with an opportunity to learn about the proposed trial study and provide feedback on the current operations at the Anderson TIA and other Hudbay facilities currently operating in Snow Lake. The information session included a presentation of the Project with an open question and answer period throughout its duration.

AECOM reached out to the Town of Snow Lake Mayor and Council to arrange a meeting prior to the public information session. After discussions with the Town, it was decided by the Town that they would have staff attend one of the public information sessions, and that a separate meeting with the Town was not required.

9.1 Public Information Sessions

Representatives from Hudbay and AECOM provided a visual (PowerPoint) and verbal presentation describing the Project, with an on-going question and answer period throughout the duration of each of the events. A copy of the PowerPoint presentation is provided in **Appendix H**.

There were 11 members of the public in attendance at the 2:00 p.m. session, and another 10 participants attended the 7:00 p.m. event. The information session provided the public the opportunity to:

- Listen and review Project information and provide feedback on current operations and the proposed Project.
- Comment on completed environmental studies.
- Express concerns and request information.
- Discuss the Project with project representatives from Hudbay and AECOM.

Material developed for the event included:

- PowerPoint presentation.
- A questionnaire and feedback form for attendees (**Appendix H**).

Hudbay has also made available an electronic version of the questionnaire and feedback form on their company website to allow people that could not attend the sessions in person to submit their questions and comments.

9.1.1 Notification Methods

AECOM provided Hudbay with an electronic poster for printing and distribution at select locations within Snow Lake to inform the public of the information session including the Cornerview Grocery, Diamond Willow, Outland Camp, Home Hardware, Motor Inn, Snow Lake Pharmacy, and the Town Office. A copy of the poster is attached in **Appendix H**. Hudbay also provided the electronic poster to the Town of Snow Lake for advertisement on their social media page along with emailing the poster to employees.

9.1.2 Summary of Feedback Received

General discussions during and after the presentation included monitoring requirements, current volumes of the Anderson TIA, method of tailings application, dam raising, use of Birch Lake TDF, odour, and dust. Table 9-1 below provides a summary of the questions received and responses provided by representatives of Hudbay and AECOM.

Table 9-1: Discussions at the September 2023 Public Information Session

Questions	Answers (from Hudbay/AECOM)
Asked where the treatment plant is and if an aerator is needed	For Anderson TIA, there is no physical treatment plant; it's a natural treatment process. Seven areas within the facility, Areas 1-5 are active deposition areas and Areas 6-7 are for natural clarification. No need for aeration as Hudbay has been able to meet water quality limits.
Asked with the increase in production, if Anderson TIA can't handle the current volumes, how is it going to be able to take on more tailings	Hudbay is trying to spread out the tailings within the Anderson TIA and then spread out the dam raises over time rather than all at once. Planning to maximize the potential storage at the Anderson TIA.
Asked how many locations are monitored	There are 23 seasonal locations between Anderson TIA and Anderson Creek which are sampled. There are 15 locations from Anderson Bay to further out
Asked about rumors of recovering minerals from the tailings at Anderson TIA and Flin Flon Metallurgical Complex; millions of dollars of gold possibly	A possibility, the biggest thing is an economically viable way to do it which involves lab work, methodologies, what by-products. It's been done at other facilities, but every ore body and milling process is different.
Asked when Anderson TIA is maxed out, are you going to put another couple of feet on the dam and submerge again or keep it subaerial	The current Environment Act License requires Hudbay to have it (tailings) fully subaqueous at time of closure. Doing subaerial deposition is all about efficiency. Not having the tailings crew out every 2-hours but instead every one to two days. But yes, we will fill up Anderson TIA from Area 1 to Area 5. End of 2026 is when we will be filling Area 5, so we need a new dam constructed by then (2 m dam raise); we will then come back to Area 1 and start the process all over again. Its about 7-years for the entire blueprint.
Asked is Hudbay will be pulling water from Snow Lake or Wekusko Lake	No, the 6 million cubic meter of water a year comes from mother nature, no water is pulled to fill ATIA.
Asked why tailings can't be put back underground	60% of the tailings do go back underground as paste. Parallel initiatives are to increase capabilities of the paste plant and put more tailings back underground as paste.
Asked how Hudbay is controlling odours; concerns about the current "cones" above water	The odour is not coming from the tailing cones (solids), but from the actual water. Not a function of how we're managing the tailings, its more to do with the processing. The smell is from the milling process. Changing to subaerial deposition shouldn't change the smell from Anderson TIA.
Ask if monitoring is funded by Hudbay or the Government	Just Hudbay. Providing study results to the government to foster an open relationship and to provide feedback from the government.
Asked if Anderson TIA have any issues with freezing pipelines in winter	The pipelines float and employees work on ice (when safe). They drill holes in the ice and move the end of the pipeline over the ice. Anderson TIA doesn't freeze completely over (slushy). Hudbay switches to smaller pipes in the winter to manage moving the pipelines easier with the use of snowmobiles.
Asked if chemicals are used or not used at the Anderson TIA; if arsenic and cyanide are there, if using UV light	Anderson TIA has sunlight and a big area (surface area), so no UV light is needed currently. The natural sunlight helps with further cyanide breakdown however New Britannia Mill has an effective cyanide destruction process which by the time the tailings reach the Anderson TIA are already below limit levels.
Asked what the life of Anderson TIA is	Phase 1 and 2 is doubled (double of current volume) and Phase 3 is double of Phase 2 volume

Source: Questions and answers are from both Public Information Session events.

Participants at the information sessions expressed their appreciation for the public information session and indicated that they would like to have more of these events held in the future.

A total of nine questionnaires were submitted at the end of the public information session. Only two questionnaires noted a concern (dust resulting from exposed tailings and concern that there was not enough sampling being completed in Anderson TIA prior to discharge).

As of October 30, 2023, Hudbay has not received any additional feedback in the form of electronic submissions (questionnaires or emails).

10. Evaluation of Potential Environmental Effects

Prior to the execution of the Project, Hudbay requested advice from AECOM with respect to the anticipated environmental impact (if any) and mitigation requirements to proceed with the proposed trial study. AECOM has conducted a review of the trial study plan and environmental assessments and regulatory submissions previously completed at the Anderson TIA and other Hudbay mining development projects in the region, including previous work completed in and around the location of the Anderson TIA.

AECOM provides the following opinion with respect to the environmental aspects that will need to be considered in the evaluation of mitigation options for this proposed trial study. This opinion is based on our understanding of the Project, existing environmental conditions, and the results of ongoing seasonal water quality monitoring and other environmental studies completed on behalf of Hudbay in the region of the Anderson TIA.

AECOM's assessment has also considered mitigation measures that have been incorporated into the proposed trial study (i.e., TARP), as well as environmental protection practices and procedures included in Hudbay's standards of operations (such as compliance with International Organization for Standardization (ISO) certified safety and environmental management systems) and complying with the MDMER regulatory limits for discharge.

10.1 Environmental Aspects - No Potential for Impact

Based on our review of the proposed trial study, the following environmental aspects have been assessed as experiencing **no potential negative impact** from the proposed subaerial tailings trial study:

- Topography
- Soil
- Air quality (emissions and noise)
- Groundwater
- Vegetation
- Wildlife
- Protected Species
- Land and Resource Use
- Heritage Resources
- Indigenous People
- Aesthetics
- Traffic

The rationale for our determination that the Project will have no potential negative impact on these aspects is provided in the following sections.

Topography

The proposed trial study will not have an impact on the local topography since the Project will utilize existing infrastructure with no proposed alterations or upgrades to the existing structures at the Anderson TIA.

Soil

The proposed Project will not have an impact on the local soil as no substantial ground disturbances will be required. Although a small gravel pad will be developed at the site of the job trailer, this will be located on a site that was previously developed with crushed rock and has minimal soil.

The construction and operation of the Project will not include activities that are likely to result in soil erosion.

Groundwater

Groundwater will not be impacted as part of the proposed trial study and no groundwater use will be required for the Project. No new groundwater wells will be developed and no impact on any existing wells located in the region will occur.

Air Quality (emissions and noise)

As there will only be a negligible increase in traffic during the operation phase of the Project, no significant increase in vehicle emissions is expected. No other sources of emissions (excluding dust) and noise have been identified or expected.

Vegetation (including Protected Species)

No vegetation clearing will be required for the trial study. Therefore, there is no risk of environmental impact associated with the clearing of vegetation, and no additional mitigation measures need to be considered.

The potential impact of dust on local vegetation is discussed in **Section 10.2.1**.

Wildlife (including Protected Species)

There will be no vegetation clearing associated with the trial study, and therefore no loss of wildlife habitat. It is anticipated that local wildlife is likely already accustomed to some level of noise associated with the current operations at the Anderson TIA, and associated traffic along PR 392. Additionally, there is very limited ideal habitat for protected wildlife species in the overall area of the Project.

Although there might be a very slight increase in local traffic (Hudbay vehicles utilizing access roads leading to and from the various areas of the Anderson TIA), no significant increase in the risk of vehicle collisions with wildlife is expected as vehicle strikes are rare on local roads.

Heritage Resources

Heritage assessments have previously been completed on the Project site, which has been previously subject to development, and no additional clearing or ground disturbance is planned for the trial study. There is no environmental risk associated with heritage resources, and no additional mitigation measures need to be considered.

Indigenous Peoples

There are no First Nations communities or heritage locations within proximity of the Anderson TIA, and the site is on private land which is already not available for traditional uses by Indigenous peoples.

Aesthetics

The Project is not anticipated to significantly alter the aesthetics of the site, and no additional mitigation measures need to be considered. The Anderson TIA is an active tailings management facility, and the adjacent Stall Mill is an active milling facility.

Traffic

Although a very minor increase in traffic is expected on the private access road leading into Area 1 and Area 2 of the Anderson TIA, there will be no increase in traffic on the public roads in the Snow Lake region resulting from this Project. The minor increase in traffic will not have an impact on local roads, topography, and soil since the Project will utilize existing roads.

10.2 Environmental Aspects - Potential for Impact

Based on our review of the proposed trial study, some environmental impacts have the potential to occur in the absence of engineered or operational controls. Hudbay and AECOM have identified four predominant conditions that may develop within the Anderson TIA that have potential to cause environmental effects by way of deterioration of effluent quality, air quality, or fish habitat.

1. Oxidation of Exposed Tailings: Oxidation of sulfide tailings may occur if unsaturated tailings are exposed to atmosphere and neutralizing potential is exhausted. This condition may lead to acid rock drainage where acid is generated from precipitation, pH will decrease, and metal concentration in the effluent will increase.
2. Dusting of Exposed Tailings: Unsaturated tailings may become airborne under high wind or freeze-dry conditions. Airborne tailings may decrease air quality and deposit high metal tailings outside of the footprint of the Anderson TIA.
3. Reduction of Retention Volume: Subaerial tailings deposition may decrease the overall volume of water retention in the Anderson TIA. This may lead to inadequate dilution via precipitation or inadequate retention time required to polish effluent for compliant release to environment. This condition may result in deteriorating water quality.
4. Geochemical Properties and Pore Water Quality: Geochemical properties of the tailings that may be exposed may be such that there is more likelihood to oxidize and create acid generating conditions. Monitoring of pore water quality will indicate if acid generating conditions may be advancing. Acid generating conditions will result in deteriorating water quality (i.e., depression of pH and increased metal concentrations).

Based on the environmental aspects that have been assessed, and considering the conditions and location identified above, the following aspects have **the *potential* to increase** the environmental impact from the subaerial trial study at the Anderson TIA:

- Air quality (dust)
- Surface water
- Fish and Fish Habitat

The rationale for our determination of potential impact on these aspects is provided in the following sections.

10.2.1 Air Quality (Dust)

Dust and particulate matter have the potential to adversely affect air quality with consequent effects on human health (e.g., respiratory concerns and safety concerns related to impaired visibility on roads) and soil quality (deposition of contaminants). High amounts of dust also have the potential to affect vegetation in the surrounding environment through the accumulation of dust on the surrounding vegetation or by interfering with the photosynthetic ability.

The potential for dust generation associated with the proposed trial study will be limited to exposed tailings that may become airborne under high wind or freeze-dry conditions. Airborne tailings may decrease air quality and deposit high metal tailings outside of the Anderson TIA.

To a lesser extent, small amounts of dust may also be generated during the construction/installation of the new site trailer and from vehicular traffic that occurs on the unpaved access roads.

It is important to note that tailings deposited above the water will consolidate more quickly than tailings underwater, which has already been observed in the Anderson TIA. The coarse tailings appear to remain above the water with the finer material settling underwater, therefore minimizing the risk of dusting. In addition, there are no homes, residences, cottages, or businesses located in the general vicinity of the Anderson TIA, and the risk of any individual being exposed to elevated levels of tailings dust at any given time in very unlikely. In most cases, exposure to tailings dust would be limited to Hudbay staff working in and around the Anderson TIA.

The effect of dust that may be generated from dry tailings has been identified as a key concern, and as such, appropriate trigger conditions and mitigation measures have been considered in the trial study and have been identified in the TARP (including policies and procedures for the detection, determination, notification, and corrective action associated with potential dust generating conditions).

In addition to the measures outlined in the TARP, the following management procedures and mitigation measures will be incorporated into the trial study:

- To the extent possible, tailings are to always remain saturated. Should conditions require, mechanical saturation of the tailings will be implemented (e.g., spraying) or deposition location will be re-situated to facilitate saturation. Other alternatives that have been used at the Flin Flon TIS will also be explored including erosion mats, straw placement, or the use of environmentally friendly emulsions (i.e., ENTAC).
- Hudbay employees will visually monitor tailings daily to identify and respond to dusting events. Inspection frequency will be increased during high wind or other adverse weather conditions.
- Hudbay will develop and implement a Dust Management Plan that outlines the policies and procedures for the ongoing monitoring and mitigation of dusts that may potentially be generated by exposed tailings during the Project. This Dust Management Plan will include, at minimum, the following information:
    - Roles and responsibilities of Hudbay staff and other individuals responsible for developing, implementing, and ensuring compliance with the Plan.
    - Description of potential dust sources, with a map showing the location of these sources.
    - Site specific mitigation measures developed for the Project, including details on the mitigation measures that are in place or could be implemented if required, conditions that result in the implementation of mitigation measures, locations in which mitigation should be conducted, estimated effectiveness of the mitigation measure, and a list of equipment and/or chemicals to be used to provide mitigation.
    - Contingency measures to be considered if mitigation measures are ineffective.
    - Monitoring activities, which would initially include regular visual monitoring. As the project evolves, and depending upon the results of visual observations, this section could be expanded to include monitoring with devices or sampling media and would describe type of sampling, frequency of sample collection, threshold limits, and reporting requirements.
    - Inspection and maintenance requirements, such as daily visual monitoring, checking the condition of sampling and recording devices, and checking the condition of mitigation devices and equipment.
    - Recordkeeping and reporting requirements, including information to be included in reports, frequency of reporting, and events that require immediate communication with the EAB, other regulatory agencies, or members of the community.

- Hudbay will be in regular contact with provincial agencies throughout the trial study, and should any additional monitoring or sampling be required, Hudbay will implement programs as necessary.

Based on the above observations and the implementation of the TARP, Dust Management Plan, and other monitoring and mitigation measures, the potential impact from dust poses only a negligible risk to the environment and human health.

The effect of dust that may be generated from vehicle traffic on unpaved roads and during the installation of the site trailer is expected to be negligible when considering the following:

- Dust suppression activities, such as the use of approved dust control agents will be undertaken on the access roads.
- At all times, vehicles will be required to adhere to Hudbay's speed limits on main roads, highways, and access roads. Hudbay access roads have a speed limit of 40 km/hr (or less), and these limits will continue to be imposed.
- No clearing is required for the installation of the site trailer, and no new access roads are required. Therefore, the existing vegetated buffers will be maintained to minimize the transport of dust generation.

Dust generated during the construction and operation of the Project has the potential to affect vegetation in the surrounding environment through the accumulation of ore dust on the surrounding vegetation or by interfering with the photosynthetic ability. However, with the implementation of mitigation measures outlined above, the environmental impacts to vegetation resulting from dust deposition is expected to be negligible.

Conclusion: The impact from dust poses a negligible risk to the environment and human health with the continuance of existing mitigation measures currently in place at the Anderson TIA and the proposed mitigation measures identified in the trial study.

10.2.2 Surface Water

Hudbay is aware that the tailings deposited in the Anderson TIA are potentially acid generating, and if not managed appropriately, ARD and metal leaching could occur. As stated previously, there is no current evidence to suggest the subaerial deposition that has occurred during the shoulder seasons has resulted in a significant deterioration of water quality within Anderson TIA, including ARD and metal leaching. This is likely because although tailings are exposed, they remain saturated and therefore do not oxidize when exposed to air.

Based on the results of the most recent seasonal water quality sampling program conducted at the Anderson TIA (June 2023) and a comparison of these results to the historical studies, there have been no exceedances of the MDMER guidelines for any metals at any sampling location, even during sampling events in the shoulder seasons when exposed tailings have typically been observed. As previously discussed, water quality at the final discharge point has generally been, and continues to be, in compliance with applicable discharge limits.

Based on the results of the water quality modelling, all modeled parameters included in EAL No. 3263 are simulated to be below maximum discharge limits for the modelled timeframe under current and proposed future operating conditions. During the future operating period (proposed trial study), the simulated concentrations of most metals, including arsenic, cadmium, mercury, nickel, and lead met CCME WQG_{PAL} and are not likely to pose a risk to the receiving environment.

If planned subaerial tailings deposition is allowed to proceed, Hudbay will ensure saturation of exposed tailings (to the extent possible) as a primary mitigation measure at any time that tailings are potentially exposed to air. This will be accomplished via natural processes (wind and wave action, precipitation) or mechanically using irrigation devices (spraying, evaporators) or raising water levels in the Anderson TIA by controlling discharge.

In addition to minimizing the potential for oxidation, keeping the exposed tailings wet and/or covered with erosion matting or similar protective measure will also prevent the generation and dispersion of dust.

Adverse impacts to water quality within the Anderson TIA will be further prevented by continuing to maintain most of the subaerial tailings confined to the northern and western portions of the Anderson TIA, the area furthest from the discharge location. This will provide the maximum retention time to allow for suspended metals to precipitate out of solution prior to discharge to environment at the discharge location.

During the period of subaerial deposition Hudbay will develop and implement tailings management practices that focus on ensuring water quality meets regulatory requirements. This will include a focus on water quality testing programs and procedures designed to regularly assess water quality and allow for the early identification of any changes in water quality that may be occurring due to subaerial deposition. These measures are outlined in the TARP and will include daily inspections of areas subject to subaerial deposition to identify any signs of tailings oxidation and to ensure exposed tailings are adequately saturated.

Hudbay will also continue the ongoing seasonal water quality monitoring program, EEM studies, and will consider any additional regular and ongoing analysis of water quality at a frequency to be determined through discussion with the EAB. Monitoring programs will include a suitable suite of analytical parameters to allow for comparison of results to historical data, evaluate trends, and enable future evaluation of complex geochemical processes. Water balance and water quality models will be updated regularly to allow for identification of potential impacts that may occur in advance and allow for appropriate mitigation and/or operation controls to be established.

<u>Conclusion:</u> The impact of the proposed subaerial tailings trial study poses a negligible risk to water quality with the continued implementation of the existing mitigation measures and the implementation of the proposed new mitigation measures.

10.2.3 Fish and Fish Habitat

The Anderson TIA is not considered to be “fish bearing” in accordance with the *Fisheries Act* and fishing would not at any time be permitted in the TIA. However, discharge from Anderson TIA flows into Anderson Creek, which flows into Anderson Bay of Wekusko Lake, which is considered an area of fish habitat and has an active commercial fishery for walleye, sauger, whitefish, and northern pike.

Mitigation measures as outlined above in **Section 10.2.2** “Surface Water” will be implemented to mitigate any potential risk to fish and fish habitat. Hudbay will also continue the ongoing EEM studies and will consider any additional regular and ongoing evaluation of fish and fish habitat in the downstream environment at a frequency to be determined through discussion with the EAB.

<u>Conclusion:</u> The impact of the proposed subaerial tailings trial study poses a negligible risk to fish and fish habitat with the continued implementation of the existing mitigation measures and the proposed new mitigation measures.

10.3 Accidents and Malfunctions

To prevent accidents and malfunctions, all activities associated with the trial study will be conducted in accordance with applicable regulatory requirements. In addition to standard safety controls and procedures (alarm systems, training, and operating procedures), the following sections provide additional details on precautionary measures that will be implemented by Hudbay to further minimize the potential for accidents and malfunctions to occur.

10.3.1 Spills and Leaks

Impacts to the environment can be caused by spills of fuel and chemicals such as diesel fuel, lubricants, oils, and hydraulic fluids. An accidental release of hazardous materials and/or equipment fluids could occur from improper storage and handling procedures or equipment and vehicle maintenance. Accidental releases have the potential to affect air, surface water, groundwater, and soils, with consequential effects on vegetation, aquatic resources, and human health and safety.

The following standard procedures will be employed to prevent spills from occurring during operation activities:

- When servicing requires drainage or pumping of lubricating oils or other fuels from equipment, a groundsheet of suitable material and size will be spread on the ground to catch all fluid in the event of a leak or spill. An adequate supply of suitable absorbent material and any other supplies and equipment necessary to immediately clean up spills will also be available.
- Storage and disposal of liquid wastes and filters from equipment maintenance, and any residual material from spill clean-up will be contained in an environmentally safe manner and in accordance with any existing regulations.
- Waste oils, fuels, and hazardous wastes (if any) will be handled in a safe manner. Staff will be required to transport, store, and handle all such substances as recommended by the suppliers and/or manufacturers and in compliance with applicable Federal, Provincial, and Municipal regulations. The province will be notified immediately if a reportable spill occurs.
- Oils or other hazardous materials will be stored only in designated areas.
- Storage sites will be inspected periodically for compliance.
- Personnel on-site will be trained in how to deal with spills, including knowledge of how to properly deploy site spill kit materials.
- Service and repairs of equipment shall only be performed by trained personnel.
- Vehicles and equipment will be maintained to minimize leaks. Regular inspections of hydraulic fuel systems on machinery will be completed on a routine basis; when detected, leaks will be repaired immediately.

With the implementation of the above mitigation measures as necessary and assuming the implementation of safe work practices, the risk of spills is considered appropriately mitigated.

10.3.2 Fire and Explosion

The presence of mechanical equipment, fuels, and other hazardous materials creates a potential for fires and explosions. Such incidents can harm on-site personnel, cause equipment damage, and lead to a release of contaminants, resulting in consequent effects to other environmental components (air, surface water, groundwater, flora, fauna, aquatic resources, and aesthetics).

All precautions necessary will be taken to prevent fire hazards throughout the Project site, including but not limited to:

- All flammable waste will be removed on a regular basis and disposed of at an appropriate disposal site.
- Appropriate fire extinguisher(s) will be available on site. Such equipment will comply with and be maintained to the manufacturers' standards.
- Storage and use of hazardous materials, including flammable waste, will follow regulatory requirements.
- All on-site fire prevention/response equipment will be checked on a routine basis, in accordance with local fire safety regulations, to ensure the equipment is always in proper working order.

- Greasy or oily rags or materials subject to spontaneous combustion will be deposited and stored in appropriate receptacles. This material will be removed from the site on a regular basis and be disposed of at an appropriate waste disposal facility.
- Smoking will be restricted to designated areas.

With the measures outlined above, and assuming implementation of typical safe work practices, the risk of fires and explosions is assessed to be appropriately mitigated.

11. Conclusion and Recommendations

In summary, the residual environmental effects will be negligible in magnitude with the continued implementation of existing mitigation and monitoring measures in place at the Anderson TIA, and the implementation of new measures, including the TARP.

The measures described to mitigate the risk of occurrence of accidents and malfunctions are deemed appropriate in mitigating such risks. Therefore, it is our opinion that based on the available information and documented assumptions, the overall potential adverse effects of the proposed trial study will be negligible in magnitude.

There are various long term environmental benefits in optimizing tailings deposition, design, and operation of the Anderson TIA, which include:

- Reduced dam heights and associated risk for stability and potential environmental impacts during operation and closure phases.
- Reduced land disturbances (i.e., less land for inundation, reduced vegetation clearing, smaller footprint, less need for quarried materials, including rock, sand, and clay).
- Reduced need for heavy equipment, trucking, blasting, and construction resulting in a reduction of greenhouse gas emissions.

Hudbay believes a trial study approach will achieve goals for both Hudbay and the EAB by providing proven, real-time data and observations which in turn will help to make:

- Improved operational decisions and long-range plans to optimize the use of the Anderson TIA; and
- Better informed licensing decisions which ensure that Hudbay minimizes its impact on the environment.

The Project will be considered a success if the monitoring results demonstrate that tailings can be stored subaerially in the ATIA with minimal to no degradation to downstream water quality and aquatic habitat. Other important environmental aspects, including air quality (specifically the impact of dust from exposed tailings), will also be assessed to confirm the viability of subaerial tailings deposition in the Anderson TIA.

Should the Project prove to be successful, Hudbay will submit a Notice of Alteration to permanently alter the terms of EAL No. 3263 to allow for the long-term subaerial deposition of tailings in the Anderson TIA.

12. References

AECOM Canada Ltd. (AECOM), 2012e. *Lalor Mine – Noise Baseline and Impact Assessment. Report No. 60212403*. Report prepared for Hudson Bay Mining and Smelting Co., Ltd. 63 pp.

AECOM Canada Ltd. (AECOM), 2016. *Environmental Assessment of the Proposed Expansion of the Anderson Tailings Impoundment Area*. Report prepared for Hudson Bay Mining and Smelting Co., Ltd.

AECOM Canada Ltd. (AECOM), 2016. *Environmental Assessment of the Proposed Expansion of the Lalor Mine to add the Lalor Paste Plant.* Report prepared for Hudbay Minerals Inc.

AECOM Canada Ltd. (AECOM), 2019. *New Britannia Notice of Alteration for the refurbishing of the Mill.* Report for Hudbay Minerals Inc.

AECOM Canada Ltd. (AECOM), 2020. Notification Letter for Construction and Operation of an External Ore Crushing and Conveyance System at the Stall Concentrator. Report for Hudbay Minerals Inc.

AECOM Canada Ltd. (AECOM), 2021. *Environmental Review of a Proposed Waste Transfer Station at the New Britannia Mill.* Report for Hudbay Minerals Inc.

AECOM Canada Ltd. (AECOM), 2021. *Anderson Tailings Impoundment Area – Water Balance and Water Quality Assessment*. Report prepared for Hudson Bay Mining and Smelting Co., Ltd.

AECOM Canada Ltd. (AECOM), 2021[b]. *New Britannia Mill – Noise Impact Assessment – Operations Update Notice of Alteration*. Report prepared for Hudson Bay Mining and Smelting Co., Ltd.

AECOM Canada Ltd. (AECOM), 2023. Anderson Tailings Impoundment Area - June 2023 Water Quality Sampling Summary. Report prepared for Hudson Bay Mining and Smelting Co., Ltd.

Berger, R. P. 2018. *Olive-sided Flycatcher in Artuso, C., A. R. Couturier, K. D. De Smet, R. F. Koes, D. Lepage, J. McCracken, R. D. Mooi, and P. Taylor (eds.).* The Atlas of the Breeding Birds of Manitoba, 2010-2014. Bird Studies Canada. Winnipeg, Manitoba. Accessed at: http://www.birdatlas.mb.ca/accounts/speciesaccount.jsp?sp=OSFL&lang=en

COSEWIC. 2007. *COSEWIC Assessment and Status Report on the Common Nighthawk Chordeiles minor in Canada*. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

COSEWIC. 2009. *COSEWIC Assessment and Status Report on the Eastern Whip-poo-will (Caprimulgus vociferus) in Canada 2009*. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

COSEWIC. 2011. *COSEWIC Assessment and Status Report on the Barn Swallow, Hirundo rustica, in Canada*. Canadian Committee on the Status of Endangered Wildlife in Canada. 37 pp. Accessed at: https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/cosewic/sr_barn_swallow_0911_eng.pdf

COSEWIC. 2013a. *COSEWIC Assessment and Status Report on the Little Brown Myotis (Myotis lucifugus) and Northern Myotis (Myotis septentrionalis) in Canada*. Canadian Committee on the Status of Endangered Wildlife in Canada. xxiv + 93 pp. Accessed at: https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/cosewic/sr_Little%20Brown%20Myotis&Northern%20Myotis&Tri-colored%20Bat_2013_e.pdf

COSEWIC. 2013b. *COSEWIC Assessment and Status Report on the Bank Swallow (Riparia riparia) in Canada*. Canadian Committee on the Status of Endangered Wildlife in Canada. ix + 48 pp. Accessed at: https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/cosewic/sr_hirondelle_rivage_bank_swallow_1213_e.pdf

COSEWIC. 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. Ottawa.

COSEWIC. 2018. *COSEWIC Assessment and Status Report on the Olive-sided Flycatcher (Contopus cooperi) in Canada 2018*. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

COSEWIC. 2020*. COSEWIC Assessment and Status Report on the Canada Warbler Cardellina canadensis in Canada 2020*. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

EcoReg Solutions. 2022. Anderson Tailings Impoundment Area Phase 7 Environmental Effects Monitoring Interpretive Report. Project #1039. June 2022.

Environment Canada. 2012. *Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population in Canada*. Species at Risk Act Recovery Strategy Series. Environment Canada. 138 pp.

Environment Canada. 2023. *Canadian Climate Normals (1981-2010) – Flin Flon - A*. Accessed on September 18, 2023 from: Canadian Climate Normals 1981-2010 Station Data - Climate - Environment and Climate Change Canada (weather.gc.ca)

Groundwater Information Network (GIN), 2021. *Groundwater Information Network – Basic Map Viewer*. Accessed at: GIN - GIN Basic Map Viewer - Groundwater (gw-info.net)

Manitoba Boreal Woodland Caribou Management Committee. 2015. *Conserving a Boreal Icon, Manitoba's Boreal Woodland Caribou Recovery Strategy.* Manitoba Conservation and Water Stewardship. 30 pp.

Manitoba Environment and Climate (MBEC). 2022. *Information Bulletin – Environment Act Proposal Report Guidelines*. Accessed at: https://www.gov.mb.ca/sd/pubs/environmental-approvals/eap_report_guidelines.pdf

Manitoba Historical Society, 2023. *Historic Sites of Manitoba Interactive Map*. Accessed at: Historic Sites of Manitoba: Map (mb1870.org)

Manitoba Natural Resources and Northern Development. 2022*. 2022-2023 Trapping Guide*. Accessed at the Province of Manitoba website: https://www.gov.mb.ca/nrnd/fish-wildlife/pubs/fish_wildlife/trapping_guide.pdf

Manitoba Natural Resources and Northern Development. 2023. *Formerly published under Manitoba Conservation and Water Stewardship, 2013*. Northwest Region Parks: Wekusko Falls Provincial Park – Management Plan. Accessed at the Province of Manitoba website: https://www.gov.mb.ca/nrnd/pubs/parks-protected-spaces/management_plan/wekusko_falls_management_plan.pdf

MEMD (Manitoba Environmental Management Division), 2016. *The Review of Use of an Elevated Water Table as a Method to Control and Reduce Acidic Drainage from Tailings*. MEND Report 2.17.1

MEMD (Manitoba Environmental Management Division), 2000. *Guidelines for Sound Pollution*. Winnipeg, MB.

Mills, A. 2018. *Eastern Whip-poor-will in Artuso, C., A. R. Couturier, K. D. De Smet, R. F. Koes, D. Lepage, J. McCracken, R. D. Mooi, and P. Taylor (eds.)*. The Atlas of the Breeding Birds of Manitoba, 2010-2014. Bird Studies Canada. Winnipeg, Manitoba http://www.birdatlas.mb.ca/accounts/speciesaccount.jsp?sp=WPWI&lang=en

Nisokapawino Forest Management Corporation (NFMC) and Canadian Kraft Paper Industries Ltd. (CKP), 2022. *20-Year Forest Management Plan for Forest Management Licence #2*. Terms of Reference.

Poole, T. F. 2018. *Barn Swallow in Artuso, C., A. R. Couturier, K. D. De Smet, R. F. Koes, D. Lepage, J. McCracken, R. D. Mooi, and P. Taylor (eds.).* The Atlas of the Breeding Birds of Manitoba, 2010-2014. Bird Studies Canada. Winnipeg, Manitoba http://www.birdatlas.mb.ca/accounts/speciesaccount.jsp?sp=BARS&lang=en

Roberto-Charron, A. 2018. *Canada Warbler in Artuso, C., A. R. Couturier, K. D. De Smet, R. F. Koes, D. Lepage, J. McCracken, R. D. Mooi, and P. Taylor (eds.).* The Atlas of the Breeding Birds of Manitoba, 2010-2014. Bird Studies Canada. Winnipeg, Manitoba http://www.birdatlas.mb.ca/accounts/speciesaccount.jsp?sp=CAWA&lang=en

Schindler, D.W., Walker, D., Davis, T., Westwood, R. 2007. *Determining effects of an all weather logging road on winter woodland caribou habitat use in south-eastern Manitoba*. Rangifer. 27(17):209-217.

SGS Canada Inc. (SGS), 2017. *An Investigation into Environmental Characterization of Cyanide Destruct Tailing Samples from the Lalor Lake Deposit*, December.

SGS Canada Inc. (SGS), 2018. *An Investigation into Environmental Characterization of Stall Tailing Samples*. SGS Reference No.: 12622-04A

Sigurdson, R., and C. Artuso. 2018. *Common Nighthawk in Artuso, C., A. R. Couturier, K. D. De Smet, R. F. Koes, D. Lepage, J. McCracken, R. D. Mooi, and P. Taylor (eds.).* The Atlas of the Breeding Birds of Manitoba, 2010-2014. Bird Studies Canada. 2014. Winnipeg, Manitoba. Accessed at: http://www.birdatlas.mb.ca/accounts/speciesaccount.jsp?sp=CONI&lang=en

Snoman, 2023. *Manitoba North – Snowmobile Trail Guide 2023*. Accessed at : https://snoman.mb.ca/map-downloads/

Statistics Canada, 2021. *Population and dwelling counts: Canada, provinces and territories, and census subdivisions (municipalities)*. Accessed at: Population and dwelling counts: Canada, provinces and territories, and census subdivisions (municipalities) (statcan.gc.ca)

Taylor, P. 2018. *Bank Swallow in Artuso, C., A. R. Couturier, K. D. De Smet, R. F. Koes, D. Lepage, J. McCracken, R. D. Mooi, and P. Taylor (eds.). The Atlas of the Breeding Birds of Manitoba, 2010-2014*. Bird Studies Canada. Winnipeg, Manitoba http://www.birdatlas.mb.ca/accounts/speciesaccount.jsp?sp=BANS&lang=en

Town of Snow Lake, 2023. Out Community. Accessed at: Town of Snow Lake - Home

Williamson, D.A. 2011. *Manitoba Water Quality Standards, Objectives and Guidelines. Report No. 2011-01*. Manitoba Water Stewardship: Water Science and Management Branch. 72 pp.

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