APPENDIX C
TECHNICAL REPORTS - SOCIOECONOMIC

APPENDIX C.1
TOUQUOY GOLD PROJECT, ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT 2021

TOUQUOY GOLD PROJECT
ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT 2021
HALIFAX REGIONAL MUNICIPALITY, NOVA SCOTIA

FINAL REPORT

Submitted to:
Atlantic Mining Nova Scotia Inc.
and the
Special Places Program of the
Nova Scotia Department of Communities, Culture, and Heritage

Prepared by:
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Author: Kyle Cigolotti

Heritage Research Permit Number: A2021NS053
CRM Group Project Number: 21-0009-01

MAY 2021

The following report may contain sensitive archaeological site data. Consequently, the report must not be published or made public without the written consent of Nova Scotia's Coordinator of Special Places, Department of Communities, Culture and Heritage

EXECUTIVE SUMMARY

Between 2005 and 2008, Cultural Resource Management Group Limited (CRM Group) was retained on several occasions to undertake Archaeological Resource Impact Assessments (ARIA) of the Moose River Gold Mine area, in relation to the redevelopment of the Touquoy Mine. As a result of these assessments, an area of high archaeological potential for encountering archaeological resources, was identified within 50-metre buffers of Square Lake and Moose River.

In the spring of 2021 CRM Group was retained by Atlantic Mining Nova Scotia Inc. (Atlantic Gold) to undertake an ARIA, proposed expansions of the Waste Rock Storage Area (WRSA) and the Clay Borrow Pit.

The archaeological investigation, which included a background study, Mi'kmaw engagement, archaeological reconnaissance, and archaeological shovel testing was directed by CRM Group Archaeologist Kyle Cigolotti, with the assistance of five archaeological field technicians. Field work was undertaken between 27-29 April 2021, according to the terms of Category 'C' Heritage Research Permit A2021NS053.

A total of 103 shovel tests were excavated in 2 locations – 102 tests within the WRSA study area and 1 within the Clay Borrow Pit study area. No positive shovel tests were encountered, and no anomalies indicative of buried archaeological resources were observed within during reconnaissance. Significant disturbance was identified within the WRSA study area from a historic ground stripping/leveling event, removing any archaeological potential. This would have likely been forestry-related, given how significantly the area has been historically logged.

Given the rocky, wet, and sloped nature of the terrain encountered during field reconnaissance within the Clay Borrow Pit study area, the proposed impact area is ascribed low potential for encountering archaeological resources.

It is recommended that the WRSA and Clay Borrow Area be cleared of the need for further archaeological investigation. Should ground disturbance extend beyond the current proposed impact area as addressed in this report, further archaeological assessment is to be conducted.

PROJECT PERSONNEL

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ACKNOWLEDGEMENTS

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Kwilmu'kw Maw-klusuaqn Archaeological Research Division	Heather McLeod-Leslie, PHD, PCP *Senior Archaeologist* Kait MacLean, MA *Staff Archaeologist*
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NOVA SCOTIA

1.0 INTRODUCTION

Atlantic Mining NS Corp, a wholly owned subsidiary of St. Barbara Ltd. (Atlantic Gold), is proposing to expand operations at the Touquoy Gold Mine Project (Touquoy) in Middle Musquodoboit, approximately 60 kilometres northeast of Halifax. The existing operational gold mine includes administration offices, Control Room Complex, Mill Maintenance Office, Plant Site, Open Pit, Tailings Storage Facility (TSF), stockpiles, equipment laydown areas, collection and access roads, parking areas, Clay Borrow Pit, and Waste Rock Storage Area (WRSA) (Staples, et al., 2019, pp. 1-21). As proposed, Atlantic Gold is seeking to expand the existing 35-hectare WRSA an additional 7 hectares, along with a 5.9-hectare expansion of the previous approved Clay Borrow Area.

After a feasibility study was completed in 2015, mining of the current open pit at Touquoy commenced in 2017, with commercial production declared in 2018 (Staples, et al., 2019, pp. 1-4). At Touquoy, ore is hauled to a crusher 700 metres north of the pit, which feeds the process plant. Waste rock is deposited into a WRSA 1,000 metres east of the pit or is used as rock fill in construction at the TSF (Staples, et al., 2019, pp. 1-14).

In 2005, MGL Limited (MGL) initially retained Cultural Resource Management Group Limited (CRM Group) on behalf of Diamond Ventures NL (DDV) to undertake an Archaeological Resource Impact Assessment (ARIA) prior to the proposed surface gold mine and reclamation project at the historic Moose River Gold Mine District (Sanders & Stewart, 2005, p. 1). The archaeological investigation was conducted according to the terms of Heritage Research Permit (HRP) A2005NS42 (Category 'C'), issued through the Special Places Program of the Nova Scotia Department of Communities, Culture and Heritage (Special Places). This assessment identified surviving historic roads, trails, mine pits, shafts, houses, and outbuildings associated with the Moose River Gold Mine, established in 1866 (Sanders & Stewart, 2005, p. 9). Through engagement with Special Places, the extant features were judged to be too modern to have archaeological components. The remainder of the subject study area was determined to be of low archaeological potential. It was recommended that, given the historic significance of the Moose River Gold Mines, that DDV work with Special Places to develop a strategy for the documentation of the community before its impact from mining development (Sanders & Stewart, 2005, p. 11).

Subsequent to the completion of the 2005 ARIA, the proposed development plans for Touquoy were revised, requiring an additional ARIA to assess potential for encountering archaeological resources outside of the original 2005 study area. In order to investigate this potential, CRM Group was retained by Conestoga-Rovers & Associates (CRA) in 2006 to undertake an ARIA of the additional areas of possible disturbance (Sanders & Stewart, 2006, p. 1). The archaeological investigation was conducted according to the terms of HRP A2006NS60 (Category 'C'), issued through the Special Places. The 2006 assessment recommended that there be no ground impacts within 50 metres of Moose River or Square lake without the application of a program of subsurface testing. It also recommended archaeological clearance of the the remaining study area due to low archaeological potential (Sanders & Stewart, 2006, p. 9).

In 2008, CRM Group was retained by Atlantic Gold to produce a *Moose River Heritage Preservation Plan*, which was based on the recommendations of the 2005 ARIA (A2005NS42). The detailed

objectives of the document for Atlantic Gold were to:

- Ensure that cultural heritage of Moose River Gold Mines is not lost as a result of the mine development; and,
- Provide a mechanism to educate the public about modern mining practice (Sanders, Stewart, & Beanlands, 2008, p. 1).

In the spring of 2021, CRM Group was retained by retained by Atlantic Gold to conduct an ARIA comprised of a program of archaeological subsurface testing within portions of the proposed WRSA expansion footprint that overlap a 50-metre buffer of Square Lake, as well as an archaeological reconnaissance of the proposed Clay Borrow Pit study area. The archaeological program was directed by CRM Group Archaeologist Kyle G. Cigolotti.

The archaeological investigation was conducted according to the terms of HRP A2021NS053 (Category 'C'), issued to Cigolotti through Special Places. This report describes the archaeological engagement, background research, and fieldwork, presents the results of these efforts, and offers cultural resource management recommendations.

2.0 STUDY AREA

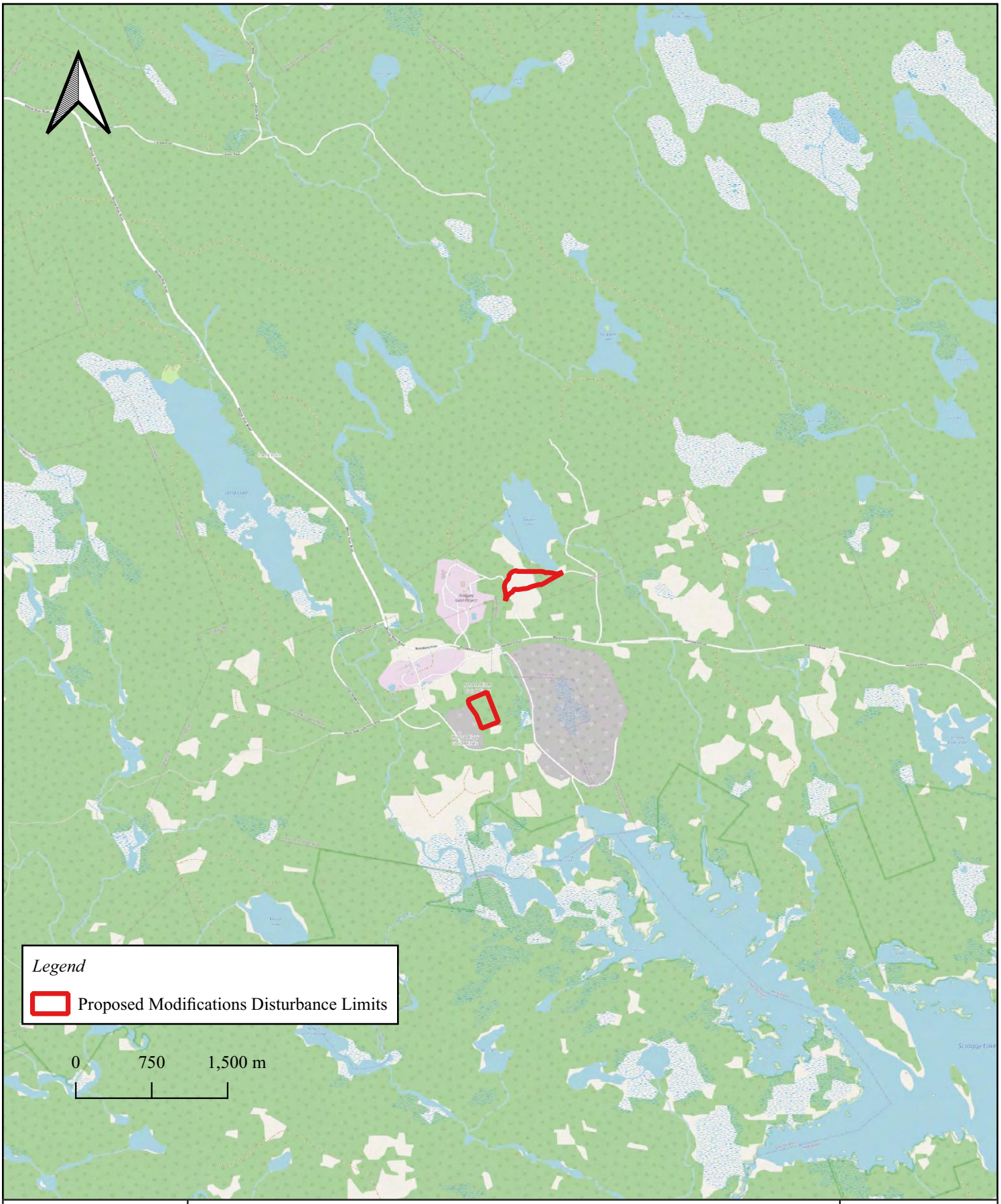
The Touquoy Gold Project study area is located at the village of Moose River Gold Mines, midway between Upper Musquodoboit and the head of Ship Harbour, near the geographic centre of Halifax Regional Municipality (***Figure 1***). This area overlies the Touquoy Gold deposit and includes the site of a former mine works, former residences, and a portion of the Moose River Gold Mines Provincial Park.

The existing developed area consists of a complex network of land parcels covering an area of approximately 400 hectares. This network lies east of Moose River, southeast of Square Lake, north of Scraggy Lake, and overlaps portions of the realigned segments of Moose River / Mooseland roads. From Halifax and Dartmouth, the Touquoy Property can be reached throughout the year by traveling northeast on Provincial Highway 102, east on Old Guysborough Road (Route 212), then east on Provincial Highway 224 from Elmsdale to the turn-off into Moose River Road, a short distance east of Middle Musquodoboit and via Moose River Rd to the former hamlet of Moose River Gold Mines for a total distance of 110 kilometres. Paved and gravel secondary roads also connect the Touquoy property to Provincial Highway 7 near Tangier. Several east–west and north– south trending bush and logging roads also cut the property (Staples, et al., 2019, pp. 5-1) (***Figure 2***).

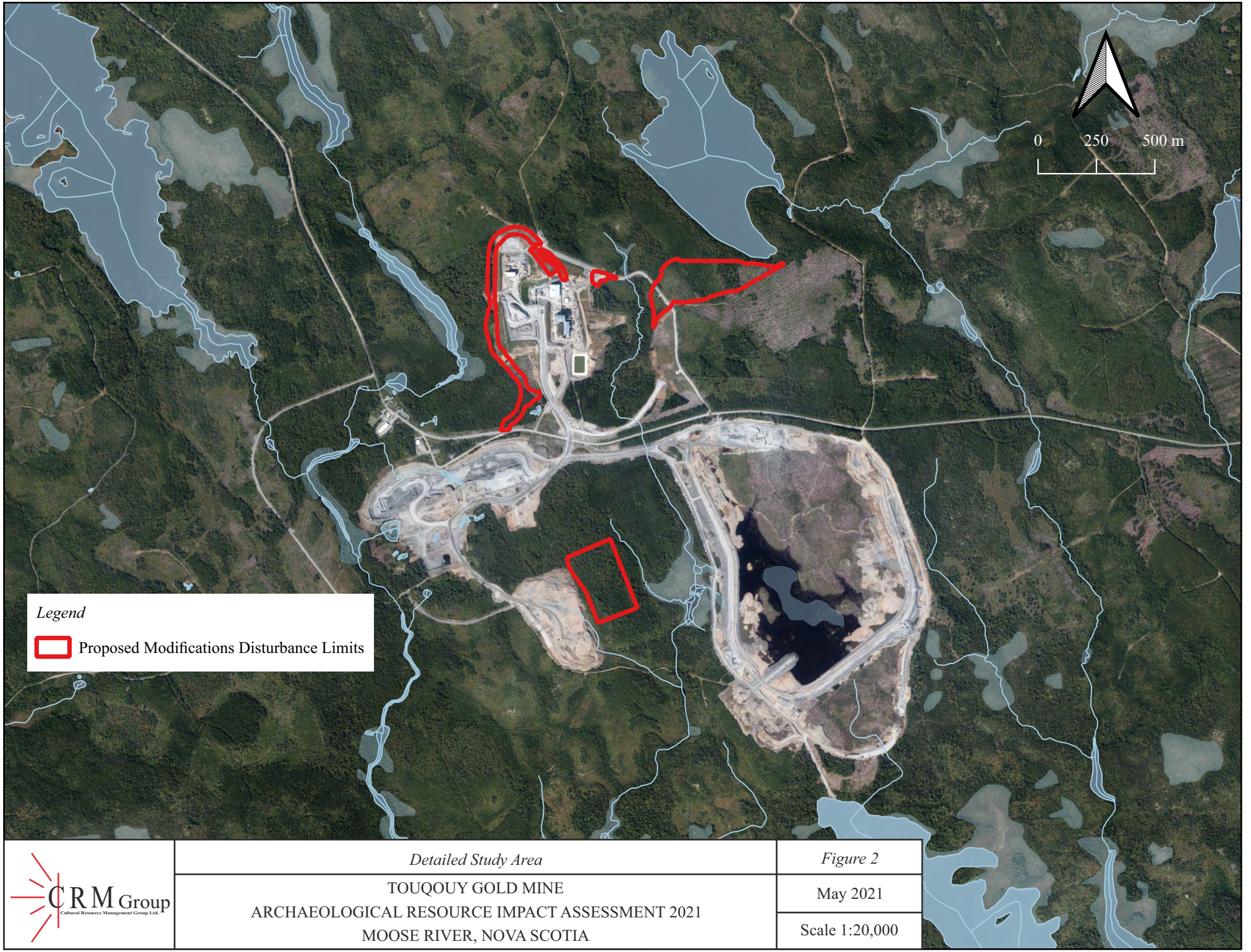
The property comprises the central portion of the historic Moose River Gold District and can be characterised as unpopulated, gently undulating, and forested (***Plate 1***). The existing infrastructure at the operational Touquoy Gold Mine includes a Plant Site, Open Pit, Tailings Pond, stockpiles, equipment laydown areas, collection and access roads, parking areas, and WRSA. Proposed infrastructure expansion includes expanding the WRSA, Clay Borrow Pit, In-Pit Tailings Disposal, and new Plant Access Road (***Figure 3***).

The specific areas assessed in this report include portions of the proposed WRSA expansion footprint that overlap a 50-metre buffer of Square Lake (PID 00437699; approximately 0.27 hectares), as well as the Clay Borrow Pit study area (PID 00642793; approximately 5.9 hectares).

Plate 1: General topography of the Touquoy study area, facing northwest; 27 April 2021.



CRM Group Cultural Resource Management Group Ltd.	*Approximate Study Area*	*Figure 1*
	TOUQOUY GOLD MINE ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT 2021 MOOSE RIVER, NOVA SCOTIA	May 2021 Scale 1:50,000



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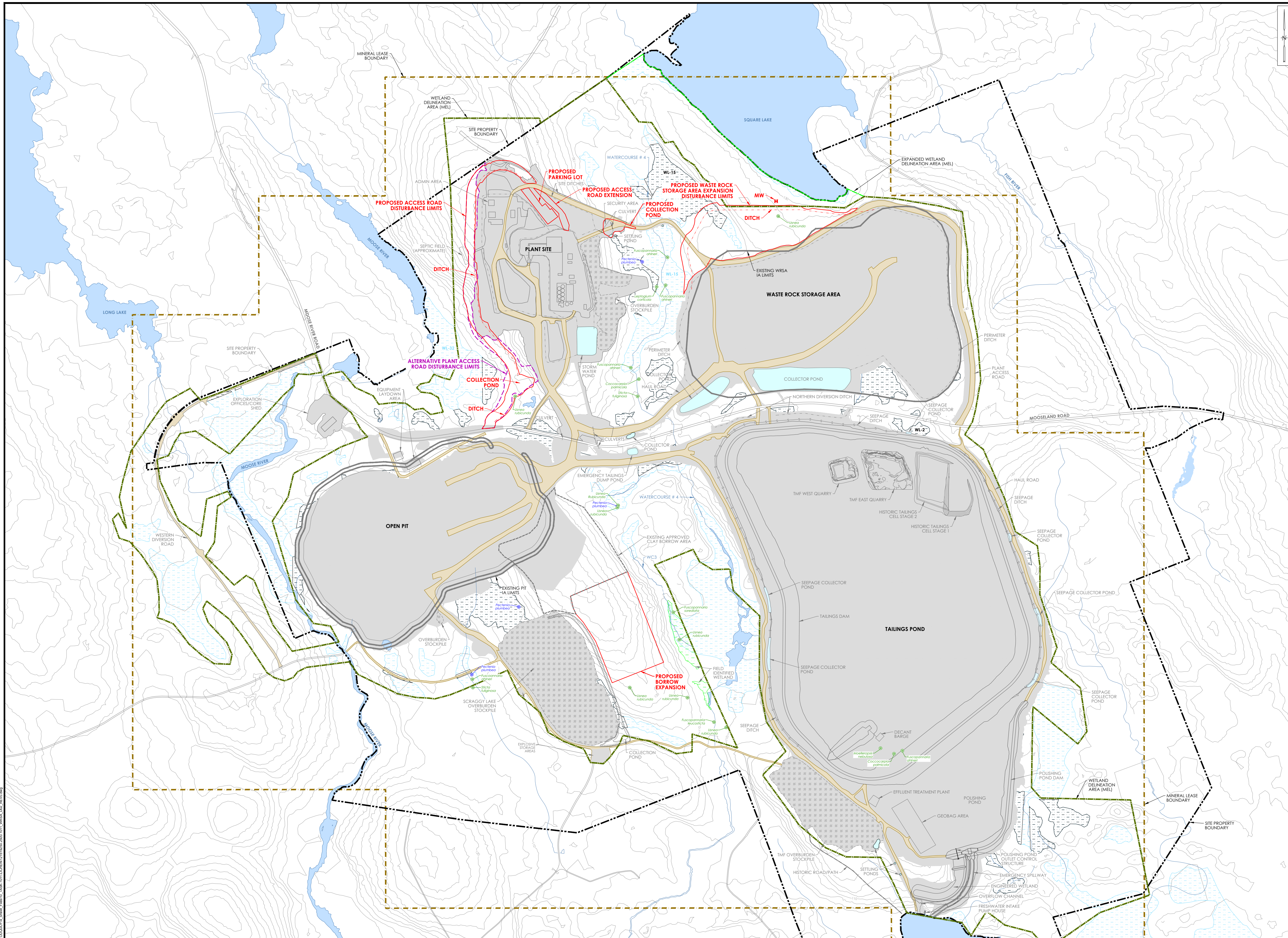
Detailed Study Area

TOUQOUY GOLD MINE
ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT 2021
MOOSE RIVER, NOVA SCOTIA

Figure 2

May 2021

Scale 1:20,000



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Client Logo

Legend

- CONTOUR, 2m (LIDAR, 2010)
- SITE PROPERTY BOUNDARY
- MINERAL LEASE BOUNDARY
- EXISTING PIT IA LIMITS / WRSA IA LIMITS
- EXISTING ROAD
- HISTORIC ROAD/PATH
- PERIMETER/SITE DITCH
- SEEPAGE DITCH
- EXISTING WATERCOURSE
- WATERBODY
- COLLECTOR / SETTLING POND
- DISTURBED AREAS (2019)
- OVERBURDEN STOCKPILE
- HAUL/ACCESS ROAD
- WETLAND
- FIELD IDENTIFIED WETLAND (McCALLUM ENVIRONMENTAL LTD.)
- PERMITTED WETLAND ALTERATION
- WETLAND DELINEATION AREA (McCALLUM ENVIRONMENTAL LTD.)
- EXPANDED WETLAND DELINEATION AREA (MEL)
- PROPOSED MODIFICATIONS DISTURBANCE LIMITS
- ALTERNATIVE MODIFICATIONS DISTURBANCE LIMITS
- PROPOSED DITCH
- SPECIES AT RISK LICHEN LOCATION
- SPECIES OF CONSERVATION INTEREST LICHEN LOCATION
- UPDATED WRW-1A/B LOCATION

Notes

1. BACKGROUND TOPOGRAPHY SHOWN IS BASED ON LIDAR DATA PROVIDED BY CONESTOGA-ROVERS & ASSOCIATES (2010). ACTUAL FIELD CONDITIONS MAY VARY.
2. SITE DATA PROVIDED BY ATLANTIC MINING NS INC & McCALLUM ENVIRONMENTAL LTD.
3. ACCESS ROAD FINAL DESIGN WILL ENSURE THE INTEGRITY OF THE SEPTIC TANK AND FIELD.
4. ACCESS ROAD EXTENSION AND PARKING LOT ARE APPROXIMATE PROPOSED LOCATIONS ONLY.

STAMP | STAMP

No.	DETAILS	BY	APPD.	DATE
-	-	-	-	-

REVISIONS

CLIENT: **ATLANTIC MINING NS INC.**

PROJECT: **TOUQUOY GOLD PROJECT**

PROJECT LOCATION: **HALIFAX COUNTY, NOVA SCOTIA**

JOB No.:	SCALE:	DATE:
121619250	1 : 5000	2020-12-23
DRAWN BY: JL	DESIGNED BY: SW	APPROVED BY: SW

DRAWING TITLE: **GENERAL SITE PLAN WITH PROPOSED MODIFICATIONS**

FIGURE No.: 2 REVISION No. 0

CRM Group
Cultural Resource Management Group Ltd.

General Site Plan with Proposed Modifications	Figure 3
TOUQUOY GOLD MINE ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT 2021 MOOSE RIVER, NOVA SCOTIA	May 2021 Scale Bar

3.0 METHODOLOGY

In the spring of 2021, Atlantic Gold retained CRM Group to conduct an ARIA comprised of a program of archaeological subsurface testing within portions of the proposed WRSA expansion footprint that overlap a 50-metre buffer of Square Lake, as well as an archaeological reconnaissance of the proposed Clay Borrow Pit study area as part of the ongoing Touquoy Gold project. The objective of the archaeological program was to utilize data compiled during previous ARIAs of the Touquoy Gold project area, in conjunction with additional fieldwork, to assess the potential for encountering cultural resources prior to any development related ground disturbances. To address this objective, CRM Group developed a work plan consisting of the following components: Mi'kmaw engagement; a background study of relevant site documentation (including the results of the 2005, 2006, and 2008 CRM Group fieldwork); archaeological shovel testing; reconnaissance; artifact analysis; and preparation of a HRP report summarizing the results of the background research and fieldwork, as well as providing cultural resource management recommendations.

3.1 Engagement

CRM Group contact the Kwilmu'kw Maw-klusuaqn Negotiation Office's Archaeological Research Division (KMKNO-ARD) to request any information pertaining to traditional or historical Mi'kmaw use of the broader Touquoy study area. As well, Atlantic Gold has developed a relationship of engagement and information sharing with Millbrook First Nation. Details of the proposed expansion project were previously shared with Millbrook.

The information provided assisted CRM Group in conducting background research and fieldwork with a multitemporal approach that considered the diversity of views witnessed and experienced by a broad range of representative groups. The knowledge gained was used to broaden archival research to better understand the cultural and archaeological importance of the land upon which the study area is located.

3.2 Background Study

The archival research component of the archaeological screening and reconnaissance was designed to explore the land use history of the study area and provide information necessary to evaluate the area's archaeological potential.

During this focused study, CRM Group utilized the resources of various institutions including documentation available through the Nova Scotia Archives, the Nova Scotia Land Information Centre, the Department of Natural Resources, the Nova Scotia Registry of Deeds, and the Nova Scotia Museum. Much of the background study was based on research previously conducted by CRM Group during the 2005, 2006, and 2008 archaeological assessments.

The background study included a review of relevant historic documentation incorporating land grant records, legal survey and historic maps, local and regional histories, and previous archaeological reports. Topographic maps and aerial photographs, both current and historic, were also used to evaluate the study area. Satellite and LiDAR data were reviewed to delineate historic infrastructure and evaluate topography. These data facilitated the identification of environmental and topographic features that may have influenced human settlement and resource exploitation patterns. The historical and cultural information was integrated with the environmental and topographic data to identify potential areas of archaeological sensitivity.

In preparation for the archaeological fieldwork, the information obtained from this suite of research materials was reviewed to facilitate the interpretation of any archaeological features encountered

during the subsurface activities.

3.3 Previous Archaeological Assessments

CRM Group archaeologists have conducted background research and field surveys under ARIAs undertaken for various components of the Touquoy Gold Mine project in 2005 (HRP A2005NS42), 2005 (HRP A2006NS60), and 2008. The research conducted under this HRP builds upon CRM Group's previous research of the study area, with an intensified with a focus on the proposed WRSA and Clap Borrow Pit expansion areas. All results and recommendations from previous assessments have been accepted by Special Places and continue to be upheld.

3.4 Archaeological Testing

Based on direction from Special Places and engagement with Atlantic Gold, a program of archaeological testing was recommended for the WRSA and Clay Borrow Pit. The proposed WRSA expansion area was subjected to a standardized program of archaeological shovel testing and the proposed Clay Borrow Pit expansion area was subjected to a systematic program of field reconnaissance.

3.4.1 Shovel Testing

Due to the elevated potential for encountering archaeological resources within 50 metres of Square Lakes, archaeological shovel test pits were proposed to be excavated at 5-metre intervals within portions of the proposed WRSA expansion footprint that extend to within 50-mtres of the shoreline. Up to 110 shovel tests were proposed to complete the presence/absence assessment.

Shovel test locations were positioned and recorded using a Juniper Systems Geode GPS/GLNSS sub-metre receiver, with 1 Hz update rate a horizontal accuracy of less than 30cm, tied to a georeferenced grid overlain across the study area. This serves to standardize and document the locations of the shovel tests and to facilitate detailed recordings of any find spots in order to re-establish their locations.

At each shovel test location, a shovel test measuring 40 centimetres in diameter was dug downward until it penetrated subsoil, encountered bedrock, was inundated by water, or reached a depth of 1.2 metres. All soil removed from the test pits was screened through 6-millimetre mesh hardware cloth in order to standardize artifact recovery within the excavated soil. By revealing the extent of possible modern ground disturbance in the area, as well as the overall stratigraphy, the subsurface testing contributed to the assessment of archaeological potential.

Field activities were documented in the form of field notes, georeferenced photographs, site plans, and all shovel tests were recorded digitally with Wildnote software using a standardized Shovel Test Pit Form.

3.4.2 Field Reconnaissance

The goals of the archaeological field reconnaissance were to conduct a visual inspection of the Clay Borrow Pit study area, document any areas of archaeological sensitivity or archaeological sites identified during either the background study or the visual inspection, and design a strategy for testing areas of archaeological potential, as well as any archaeological resources identified within the study area. Researchers were watchful for topographic or vegetative anomalies that might indicate the presence of buried archaeological resources. The members of the reconnaissance team generally walked approximately 10 to 30 metres apart, searching the ground surface for signs of historic land use (e.g. levelled ground, anomalous mounds or depressions, structural features and vestige populations of domestic plants, as well as Culturally Modified Trees) and the presence of

environmental conditions recognized as being conducive to past settlement – relatively flat, dry land close to transportation routes such as waterways, portage routes or early roads. Soil exposures within road-cuts and at the base of uprooted trees, were searched for artifacts and evidence of archaeological features. Prominent stone faces, whether on bedrock outcrops or exposed boulders, were searched for petroglyphs. Field geomatic data was recorded with handheld Garmin GPSmap 62s with +/- five-metre accuracy. Field observations were recorded through the combination of georeferenced photographs, field sketches, and field notes.

Had areas of elevated archaeological potential were identified within the Clay Borrow Pit study area during reconnaissance, CRM Group would have conducted strategic subsurface testing to investigate the depth and composition of soil/sediment stratigraphy within the area. Consisting of just one or two shovel tests or manual auger holes, this limited testing would have aided in scope evaluation for any additional stage of archaeological assessment, had it been required. Any shovel testing conducted would have been undertaken under the same criteria as in section ***3.4 Archaeological Shovel Testing***.

3.5 Artifact Analysis

Had any artifacts been recovered during the archaeological testing, they would have been processed and recorded in accordance with standards set by Special Places.

4.0 RESULTS

The following are the results of the ARIA for HRP A2021NS053.

4.1 Engagement

On 23 April 2021, CRM Group contacted KMKNO-ARD requesting information regarding traditional or historic Mi'kmaq use of the study area. On 30 April 2021, KMKNO-ARD provided information that was taken into consideration when preparing the archaeological assessment. The Mi'kmaq traditional knowledge shared by KMKNO-ARD is confidential in nature and, out of respect for the sensitivity of the information, is not reproduced in this report.

4.2 Background Study

The following discussion details the environmental and cultural setting of the study area, as well as previous archaeological research conducted in the general area. This background study provides a framework for the evaluation of archaeological potential and the initial interpretation of any resources encountered during the field component of the assessment.

4.2.1 Environmental Setting

Several environmental factors such as water sources, physiographic features, soil types, and vegetation have influenced settlement patterns and contribute to the evaluation of the archaeological potential of the area.

Wisconsinan Glaciation

During the Wisconsinan Glaciation period, the Laurentide Ice Sheet reached its maximum extent across the Atlantic region by approximately 24,000 radiocarbon years before present (BP) (***Plate 2***). Initially, glacial retreat was relatively slow (Dyke & Prest, 1987, p. 245), but ice began to thin rapidly during the Late Wisconsinan (16,000-15,000 BP) and led to more localized outflow from highland areas throughout the province by 13,000-12,500 BP (Mott, Walker, Palmer, & Lavoie, 2009, p. 639).

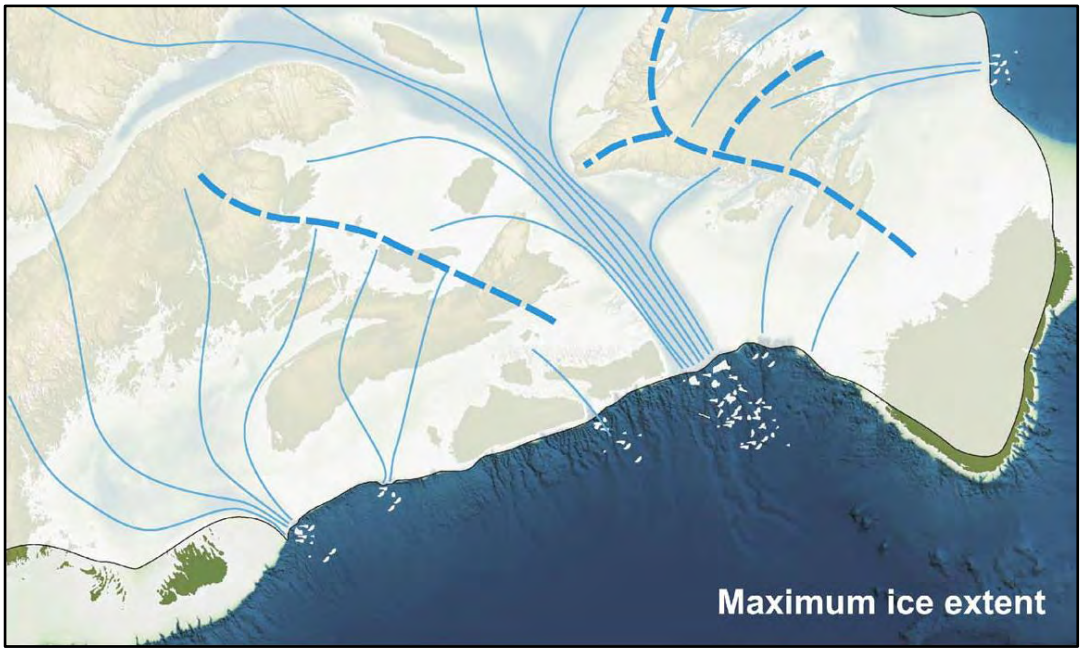


Plate 2: **Maximum Wisconsinan ice extent. Thin blue lines are generalized flow lines; heavy blue dashed lines are major ice divide**s *(Shaw, et al., 2006, p. 2066)*

By approximately 12,000 BP, the remaining ice sheets were largely terrestrial, and the study area was likely still covered with glacial ice caps (***Plate 3***) (Shaw, et al., 2006, p. 2073). Though humans were present in Nova Scotia around 11,000 BP, their record disappears shortly after, with a re-advance of glaciers from Prince Edward Island across peat deposits favoured by Caribou (Shaw, et al., 2006, p. 2076). The process of deglaciation had removed all of the ice from Nova Scotia by 10,000 BP.

Plate 3: **Ice margins at approximately 12,000 BP with accurately depicted distribution of land and sea** *(Shaw, et al., 2006, p. 2074)*

The eastern shore of Nova Scotia has never been inundated by the rising sea level following the retreat of glacial ice, as isostatic rebound following deglaciation, caused the land to lift faster than the rise of the sea level (Grant, 1970) (Mott, Walker, Palmer, & Lavoie, 2009, p. 639). The degree of marine transgression in the region eliminates the possibility of a paleo shoreline within the study area during the period of first human occupation of the region.

Topography

The study area is located towards the western extent of the greater ecological region known as the *Eastern – Eastern Interior* (Unit 440) eco-district (***Plate 4***). The *Eastern Interior* stretches from Pockwock Lake in the Halifax Regional Municipality in the west to Chedabucto Bay in Guysborough County in the east (Neily, Basquill, Quigley, & Keys, 2017, p. 121).

The geographically diverse *Eastern* ecoregion slopes gently toward the Atlantic Ocean and is made up of slate ridges, granite uplands, drumlin fields, wetlands and rolling glacial till plains (Neily, Basquill, Quigley, & Keys, 2017, p. 110). This expansive tract of upland topography is a rolling till-

plain comprised of generally gravelly and stony soils. Bedrock ridging is highly visible, and the topography follows the gentle rise and fall of underlying bedrock and glacial deposits (2017, p. 121). The most contemporary LiDAR data (Province of Nova Scotia, 2021) illustrates the undulating nature of the study area (***Figure 4***).

These hardwood-covered hills and slopes are 150-300 metres above sea level, with elevations within the Clay Borrow Pit study area ranging from approximately 117 to 131 metres above sea level and from approximately 129 to 130 metres above sea level within the WRSA expansion (Neily, Basquill, Quigley, & Keys, 2017, p. 69). The higher steep-sloped hills are underlain with older, erosion resistant rocks. the lower more gradually sloping hills are underlain by coarse sandstone, shale, and conglomerate (2017, p. 70).

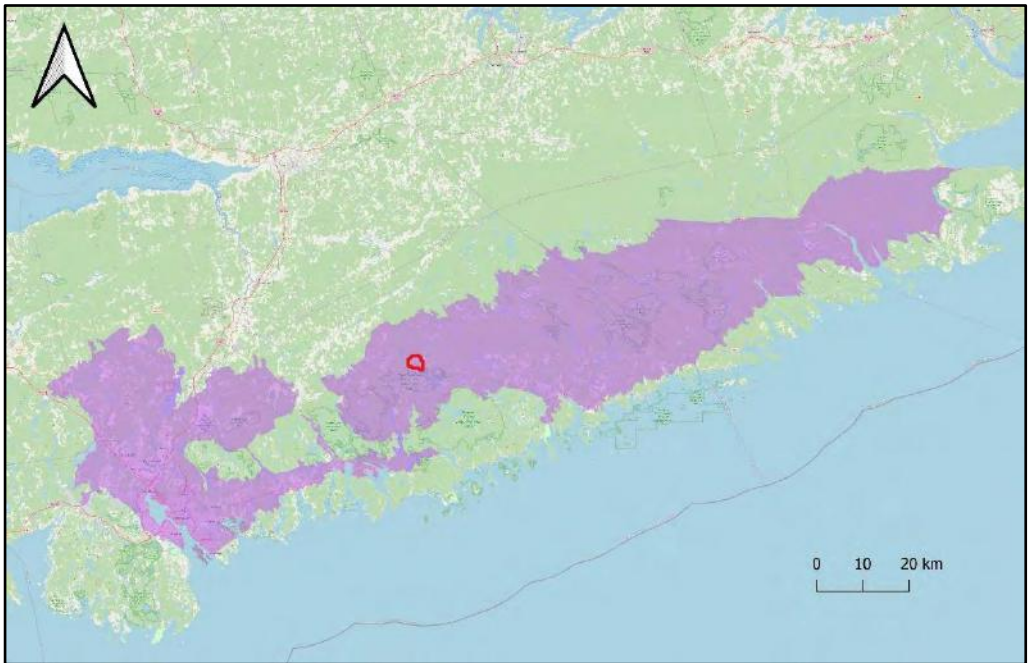


Plate 4: **Eastern – Eastern Interior (Unit 440) eco-district (purple) and approximate study area (red)** *(Province of Nova Scotia, 2021)*

Surficial Geology

The *Eastern Interior* ecodistrict is mainly underlain by meta-sedimentary rock from the Cambrian and Ordovician periods (quartzite, slate and greywacke, along with schist and migmatite). These rocks are part of the Halifax and Goldenville Formations, which make up the Meguma Group that runs from Yarmouth to Canso. The Goldenville Formation contains most of the gold deposits found in Nova Scotia. There are many historic and modern mining operations scattered across the ecodistrict—from Montague Gold Mines in the west, to Moose River in the interior, to Goldboro in the east, as well as Moose River (Neily, Basquill, Quigley, & Keys, 2017, p. 122). The Touquoy open pit is centred on a Moose River Formation, comprised of argillites and greywackes, and can be traced for at least 47 kilometres west of the Touquoy deposit to northeast of Fifteen Mile Stream (Staples, et al., 2019, pp. 7-4).

Soils

The Moose River area is covered primarily by *Danesville* (ST3) and *Wolfville* (ST5, ST2-L, ST11, ST8, ST6) series soils (***Plate 5***) (Keys, 2007, p. 8). Derived from quartzite, *Danesville* soils are

typically well-drained, gravelly sandy loams. *Wolfville* soils, derived from shale and sandstone, are typically well drained sandy clay loams. ST3 is mainly associated with moist, coarse-loamy soils dominated by sandy loam texture, but also includes moist sandy soils. ST3 is the imperfectly drained equivalent of ST2 and is found in association with these better drained soils throughout the province (usually in lower slope positions and level areas) (Keys, Neily, & Quigley, 2011, p. 38). ST5 is mainly associated with fresh, moist, fine loamy soils dominated by silt loam, clay loam, and/or sandy clay loam texture. Surface horizons are often more loamy, with clay content increasing with depth. Drainage is usually moderately well, despite clay content, and depending on slope position, slope percent, and subsoil permeability (Keys, Neily, & Quigley, 2011, p. 43).

Well drained soils provide conditions that can encourage human land utilization and higher archaeological potential, whereas poorly drained soils are often associated with low archaeological potential.

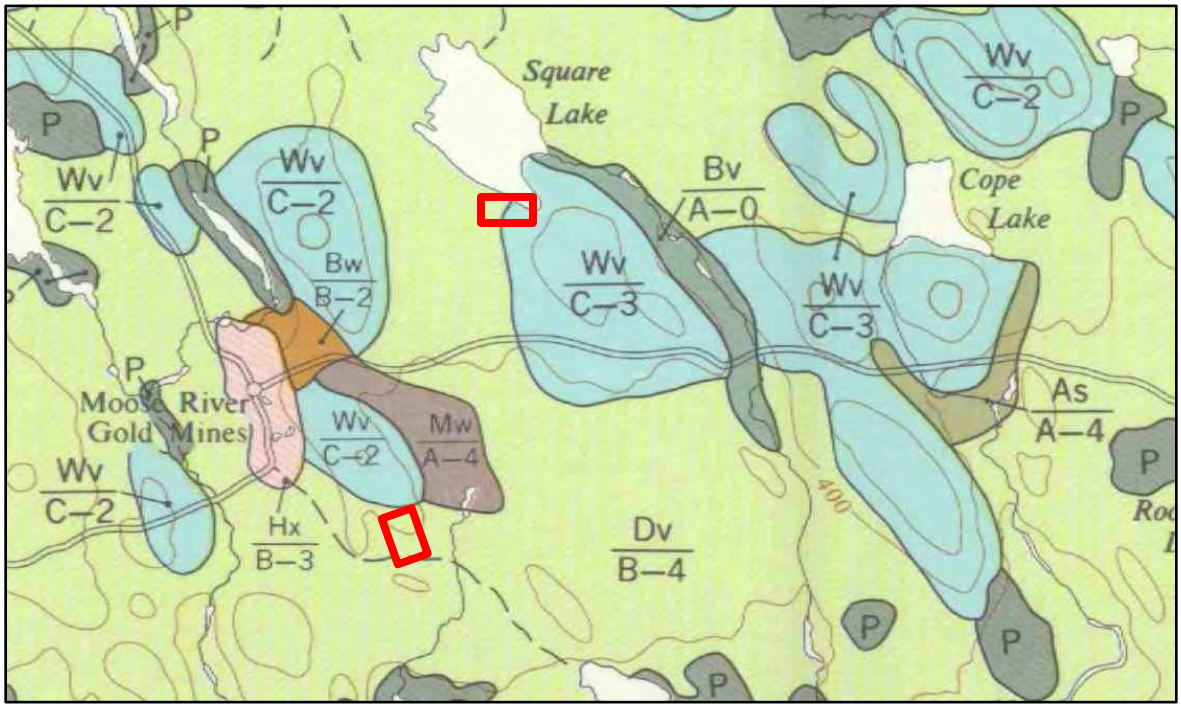


Plate 5: Soil types within the subject study areas (in red)

Hydrology

Proximity to water, for both drinking and transportation, is a key factor in identifying Pre-contact and historic Mi'kmaq, as well as early Euro-Canadian and African-Nova Scotian archaeological potential. Chains of lakes, streams and stillwaters comprise a significant portion of the *Eastern* ecoregion. These, along with large wetlands, provide headwaters for some of the ecoregions longest rivers including the Sheet Harbour River (Neily, Basquill, Quigley, & Keys, 2017, p. 110).

Drainage at the Touquoy location is sluggish due to numerous swamps and bogs and is controlled by numerous, north-northwest trending fault structures. There are three main drainage basins that all drain towards the southwest and the Atlantic Ocean (Staples, et al., 2019, pp. 5-3).

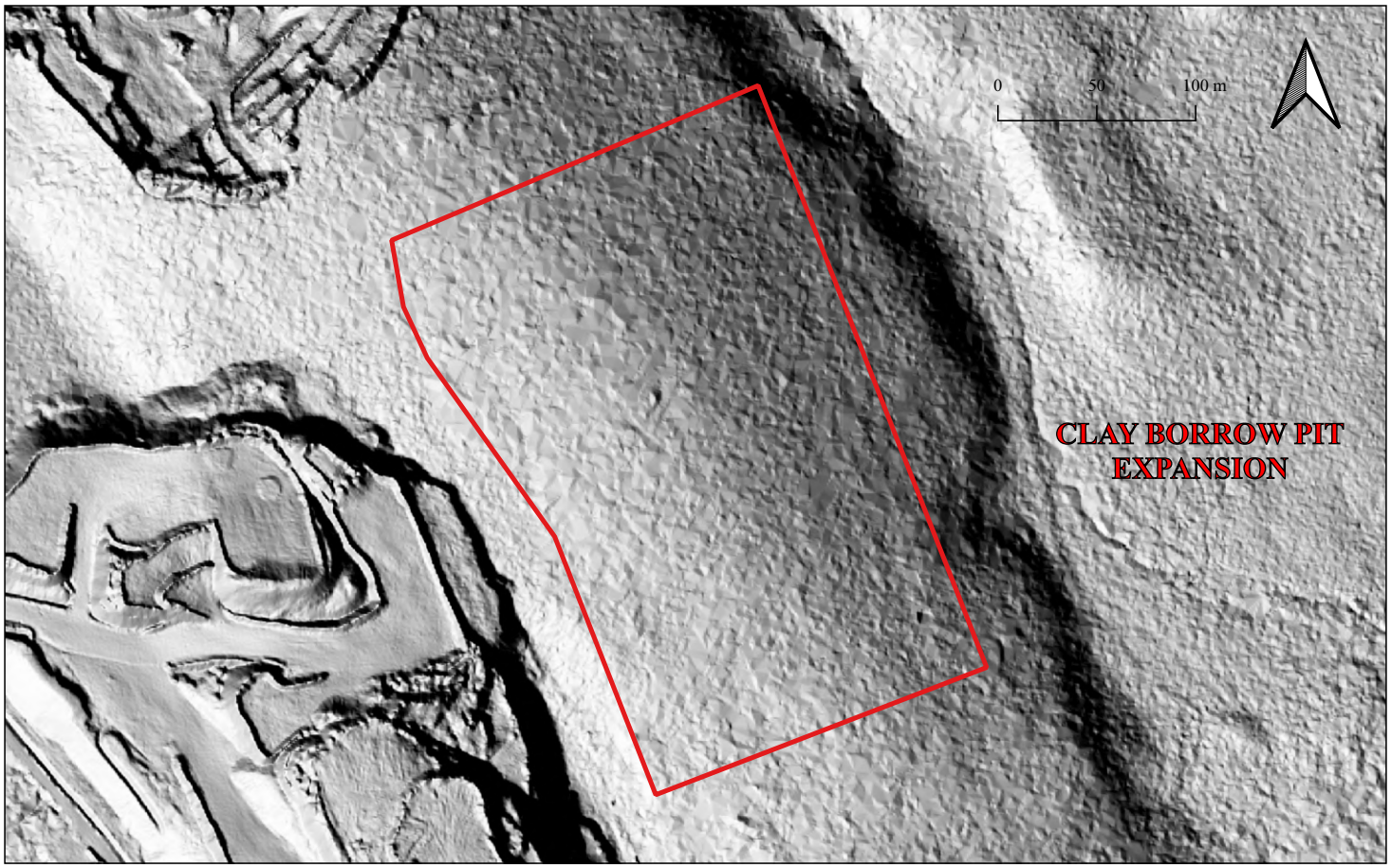
The Touquoy property is drained by way of Moose River in the west, Watercourse #4 at the centre of the property, and Fish River in the east. All three rivers drain into the northern end of Scraggy

Lake, which in turn drains to the Atlantic Ocean via a dense network of lakes and rivers, forming part of the Tangier River water basin. Moose River drains south from Long Lake to the northwest of the study area, Fish River drains south from Square Lake to the northeast of the study area, and Watercourse #4 drains south from Wetland 15, which persists in the approximate centre of the Touquoy mine workings. Watercourse #3, a low order tributary of Watercourse #4 and approximately 50 metres east of the northwest corner of the proposed Clay Borrow Pit study area, drains south from a small wetland to the northeast of the study area (***Figure 2***).

Vegetation

Within the *Eastern Interior* ecodistrict, there are several significant forest ecosystems: the Spruce Pine Forest Group, with black spruce; the Spruce Hemlock Forest Group, with red spruce, hemlock, yellow birch, and red maple; and, a Tolerant Hardwood forest, with sugar maple, yellow birch and red maple (Neily, Basquill, Quigley, & Keys, 2017, p. 123). The composition of the forests in this ecodistrict strongly reflects the depth of the soil profile. On shallow soils, scrub hardwoods are present underlain by a dense layer of ericaceous vegetation. On deeper soils, stands of red spruce are found. On crest and upper slopes of hills, drumlins and some hummocks, stands of tolerant hardwood occur. On the imperfectly and poorly drained soils, black spruce, tamarack and red maple dominate stand composition (2017, p. 122).

Several of the above-listed species are known traditional Mi'kmaq medicinal plants. Black spruce was used to make a tonic to treat infections like laryngitis (Lacey, 2012, p. 38). Maple softened in water can be applied to the chest to soothe congestion and colds (Lacey, 2012, p. 74). The Mi’kmaq used birch to treat rheumatism as well as diarrhea (Lacey, 2012, p. 51).



CRM Group Cultural Resource Management Group Ltd.	*LiDAR DEM of Study Areas*	*Figure 4*
	TOUQOUY GOLD MINE ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT 2021 MOOSE RIVER, NOVA SCOTIA	May 2021 Scale 1:2,500

4.2.2 Cultural Heritage Context

The following section details the cultural heritage of the study area in a broader context including an examination of nearby registered archaeological sites, protected areas, cemeteries, National Historic Sites, Historic Districts, and plaques and monuments to better our understanding of the study area's cultural significance.

Registered Archaeological Sites

In Nova Scotia, information regarding archaeological sites is stored in the Maritime Archaeological Resource Inventory (MARI), a provincial archaeological site database, maintained by the Nova Scotia Museum. This database contains information on archaeological sites registered with the province within the Borden system. The Borden system in Canada is based on a block of latitude and longitude. Each block is referenced by a four-letter designator. Sites within a block are numbered sequentially as they are recorded. The study area is located at the northern end of the BfCr Borden Block.

A review of MARI determined that there are no registered archaeological sites located within the study area. Below find a list and discussion of all registered archaeological sites within proximity of the study area (***Table 1***).

Table 1: Registered archaeological sites in proximity of the study area

Borden Number	Site Name	Tradition/ Nature Of Site	Location
BfCr-01	---	Historic Mi'kmaq Habitation Site	Approximately 10 kilometres southwest

BfCr-01, recorded in 1981, represents a lithic flake scatter that was identified under a treefall at the head of Lake Charlotte. The MARI form stats that the location had reported once been historically occupied by Mi'kmaq (Davis, 1981).

Historic Districts

After the first authenticated discovery of gold in Nova Scotia in 1858, the first mines began production in 1861. While large numbers of prospectors began to flood to the province, the Nova Scotian government was intent on avoiding the difficulties of the disorganized gold rushes in California (1848) and Australia (1851).

> *"In other Countries, the discovery of gold has attracted mixed multitudes to the mines, of which the reckless and dissolute have often formed a large proportion. Robbery, riot and murder, have characterized these mixed communities, both in California and Australia. In Nova Scotia, Gold mining, like everything else, has developed itself in an orderly and law-abiding spirit."* Joseph Howe, Provincial Secretary, 1861 (Art Gallery of Nova Scotia, 2013).

Beginning in 1861, gold mining districts were formally established in the province. In total, 65 gold mining districts had been established by the early 1900s. Three-quarters of the 65 gold districts are in the Halifax Municipality and Guysborough county; the other districts are spread out to the west and northeast in Cape Breton, Hants, Lunenburg and Queens Counties (***Plate 6***). The rules and regulations put in place to govern the districts meant that individuals and companies had to register claims and sign an agreement recognizing responsibilities and lease length (Day, Sellers, & Wilson,

2013).

The Touquoy study area comprises the central portion of the historic Moose River Gold District (***Figure 4***).

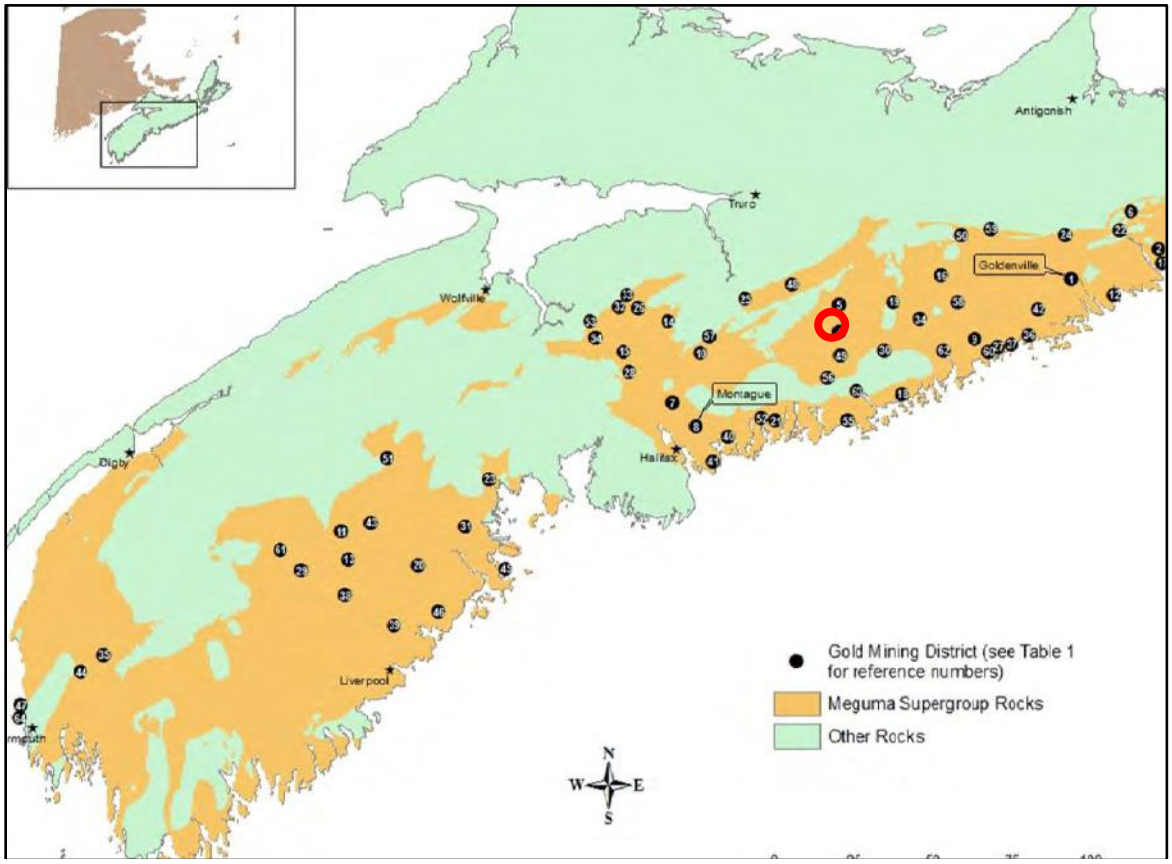


Plate 6: **Map of historic gold districts in Nova Scotia (Moose River in red)** *(Drage, 2015, p. 3)*

Cemeteries

During engagements with senior residents and researchers by CRM Group in 2008, it was suggested that there are no known cemeteries in Moose River Gold Mines (Castle, 2008). Due to the threat of disturbance by mining and subsidence, the dead were customarily interred in neighbouring communities, such as Higginsville, located 12.5 kilometres to the northwest. Despite this tradition, potential for unrecorded burials at Moose River Gold Mine remains (Belmore, 2008).

Protected Areas

The Touquoy study area encapsulates the original Moose River Gold Mines Provincial Park (***Plate 7***). The park was established in *ca.* 1986. It consisted of approximately 0.8 hectares of land (PIDs 00514695 & 40338972) donated to the Province of Nova Scotia by Murray Prest (Sanders, Stewart, & Beanlands, 2008, p. 6). The park is managed by the Nova Scotia Provincial Parks Division of the Nova Scotia Department of Lands and Forestry and is maintained by staff based at the Halifax East District Office in Middle Musquodoboit. Elements of the park interpretation area were relocated prior to the current redevelopment activities of the Touquoy Gold Mine, including a cairn, stamp mill, kiosk, interpretive signs, picnic tables, and restrooms. The Moose River Gold Mine Museum is also located at the related park (PIDs 00642926 & 00642942) and was relocated in 2012 (***Plate 8***).

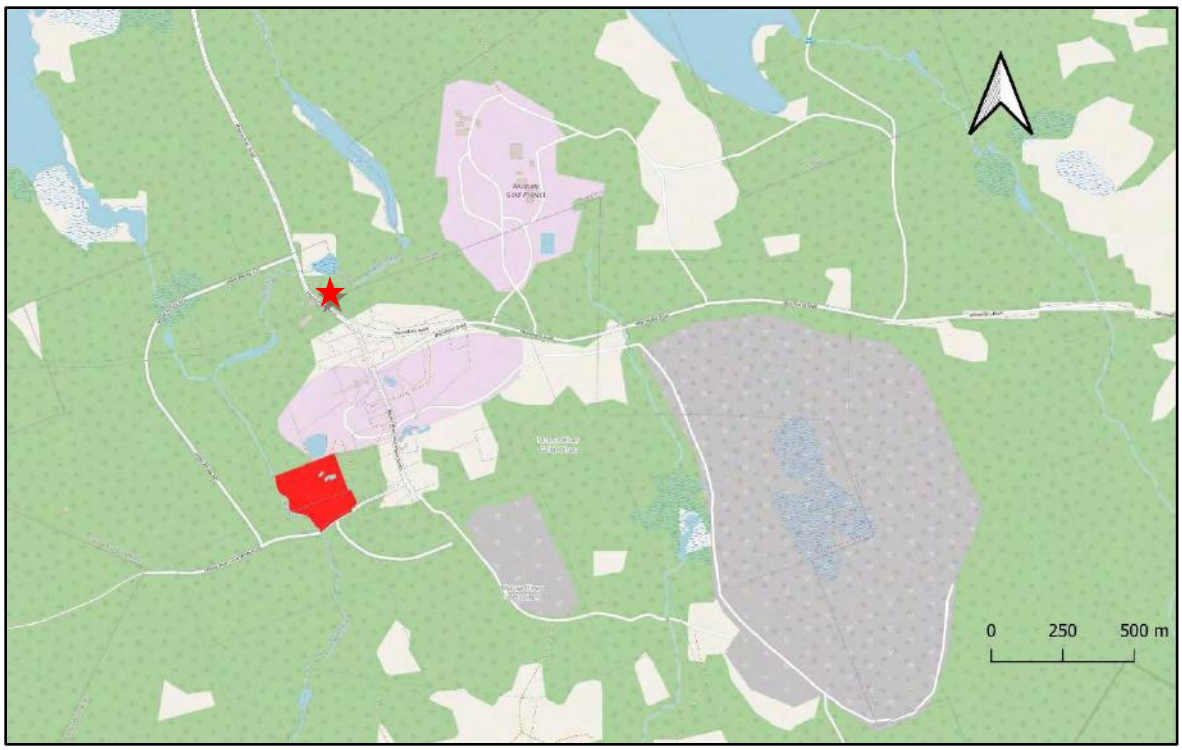


Plate 7: **Original Moose River Gold Mine Provincial Park (red), relocated park location (star), and surrounding Touquoy Mine** *(Province of Nova Scotia, 2021)*

Plate 8: **Relocation of the Moose River Gold Mines Museum in 2012 (Courtesy of the MRGMM)**

Mi'kmaq Cultural Landscape

> *Archaeology can tell us where the People lived, and much about their imperishable materials, like stone. It can show us the rocks of their hearth-fires and the bits of bone or seeds in the ash. None of this, however, can tell us much about what the People thought or felt, the conversations they had while they cooked and ate their moose and groundnuts. Archaeology can[not] show us their hearts, and neither can recorded history (*Whitehead R. , 2013, p. 1).

Recently, archaeological studies have trended towards a more comprehensive understanding of the ecological, socio-cultural, and economic values of a traditional Mi'kmaq cultural landscape, rather than a study solely based on cultural materials (artifacts). Geological features are of principal importance when considering cultural landscapes (Lewis, 2018, p. 1).

Roger Lewis, Curator of Mi'kmaq Cultural Heritage at the Nova Scotia Museum, identifies cultural landscapes fundamentally as landscapes that have been affected, influenced, or shaped by human involvement. A cultural landscape can be associated with a person or event or a combination of both. Collectively, cultural landscapes are narratives of culture, and expressions of identity (Lewis, 2018, p. 1)

Mi'kmaw legends and placenames illustrate the extensive knowledge Mi'kmaq had of the diverse resources found throughout Mi'kma'ki, including resources needed for tools. These tools themselves reflect the unique geological formations of the area. In turn, geological formations feature prominently in legends, which acted as oral maps of the area (Sable & Francis, 2012, p. 19). These traditions are experienced and interpreted through legends, stories, music, and spiritualism, which are all filled with knowledge and references relating to the landscape as 'place' (Lewis, 2018, p. 2).

There is no indication that the Mi'kmaq used gold, but its existence was likely known in Nova Scotia (***Plate 9***). Mi'kmaq guides accompanied both Captain L'Estrange and John Gerrish Pulsifer during the expeditions that led to their documented discoveries of gold, as discussed in **Section 4.2.3 Land Use** (Art Gallery of Nova Scotia, 2013)**.**

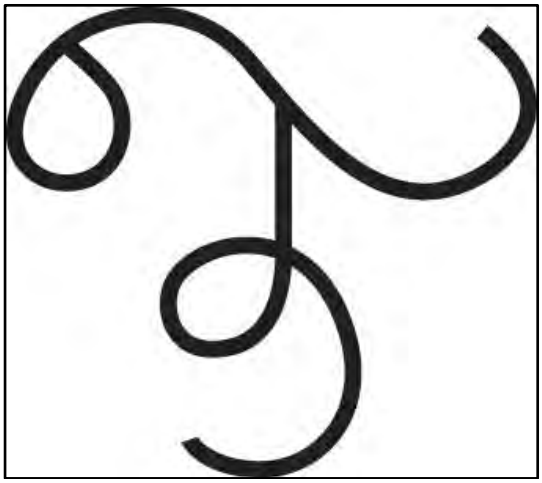


Plate 9: **The Mi'kmaq symbol for gold** *(Art Gallery of Nova Scotia, 2013)*

Most Mi'kmaw communities are not significantly displaced from traditional land and critical resource areas despite the "modern" disruptions of traditional ways of life (Sable & Francis, 2012, p. 22). The nearest First Nation land is at Beaver Lake Indian Reserve No. 17 (Beaver Lake IR 17)

(Millbrook First Nation, *We'kopekwitk*), approximately 15 kilometres to the northeast of Touquoy (Staples, et al., 2019, pp. 1-23). In 1852, 100 acres (40.5 hectares) of Crown Land was granted to Simon Francis. Francis stated that the reserve was a lot in "Halifax County, consisting of one hundred acres situated in the Sheet Harbour Road at the outlet of Beaver Lake occupied by one Indian family." In 1867, this plot was reconveyed to the federal government to be used as "reserve" land. In 1959-60, the Mi'kmaq were divided into several bands (First Nations) and the Millbrook (*We'kopekwitk)* band was allotted Beaver Lake IR 17, consisting of 120 acres (48.5 hectares) of land. In 1973, a survey conducted by John Colvert, of Energy, Mines and Resources, determined that the Beaver Lake IR 17 increased in size from 120.4 acres (48.7 hectares) to 122 acres (49.4 hectares) because of the change in the high-water mark of Beaver Lake (Mi'kmaq Environmental Services, 2005, p. 2) (Cape Breton University, 2021).

Geopolitical boundaries and foreign place names seen on contemporary maps did not exist prior to the European exploration and ultimate colonization of Mi'kma'ki beginning in the seventeenth-century. Rather, the Mi'kmaq recognized seven "districts," still organized today, with an eighth, *Ktaqmkuk* (Newfoundland) added in 1860 (Sable & Francis, 2012, p. 19). These district boundaries likely would have followed naturally existing water basins, formed by the principal river systems. The myriad of rivers, streams, and lakes in these systems provided a valuable resource base as well as acted as the main transportation routes for social, economic, and political interactions among the Mi'kmaq (Sable & Francis, 2012, p. 20).

The study area is part of the greater Mi'kmaw territory known as *Sipekne'katik* meaning 'area of wild potato/turnip' (***Plate 10***) (Sable & Francis, 2012, p. 21). These natural boundaries were most likely flexible and permeable, reflecting changing conditions and the needs of people in each area, rather than acting as geopolitical boundaries (Sable & Francis, 2012, p. 21).

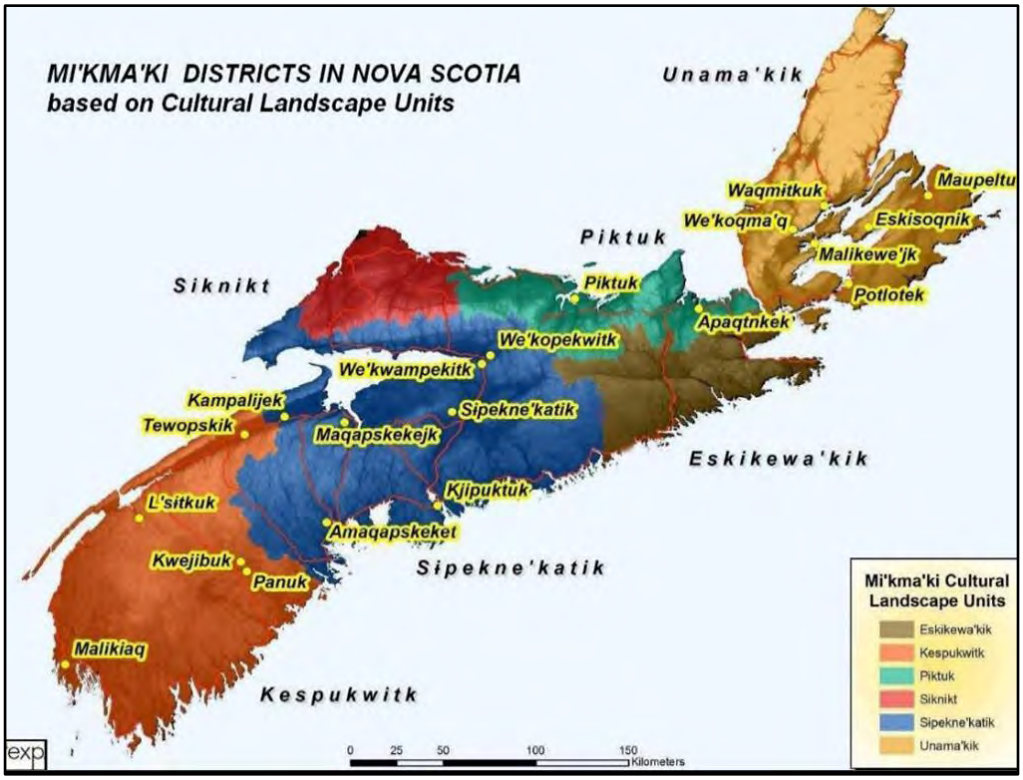


Plate 10: **Mi'kma'ki Districts in Nova Scotia based on Cultural Landscape Units** *(Mi'kma'ki All Points Services Inc., 2018, p. 16)*

The following is an excerpt from a letter written by the Rev. John Sprott to the editor of the Stanraer Free Press in 1845, which notes a claim by Chief Isidore, the Chief of Musquodoboit at that time, that the Mi'kmaq were the rightful owners of all of the Musquodoboit area:

> *Isidore, the chief of Musquodoboit, died lately, and his ten sons had all crossed the dark lake, and gone to the pleasant mountains before him. This venerable old hemlock, through whose branches the storms of ninety years had whistled, often visited me, kissed my hand, and called me his father. I was sorry that I had such a slender claim to such an honourable appellation, for his knowledge of divine things was imperfect and confused. He had been a thirsty soul in his earlier years, and when he got a glass of rum too much, a dream of dominion came over his mind. He still claimed sovereignty of the soil, for all the land of Musquodoboit belonged to him, and we were all intruders* (Morton, 1906, p. 81).

A Mi'kmaq Ecological Knowledge Study (MEKS) has previously been undertaken by Mi'kmaq Environmental Services, a program operated by the Lands, Environment, and Natural Resources directorate of The Confederacy of Mainland Mi'kmaq (CMM) in 2005 for the broader Moose River Gold Mine area, which continues to aid in CRM Group's understanding of the subject area.

Nova Scotia Department of Natural Resources
Mineral Resources Branch

Open File Map ME 2009-1 (Sheet 49 of 64)

Historical Gold Mining, Moose River Area, Part of NTS Sheets 11E/02 and 11D/15, Halifax County, Nova Scotia

P.K. Smith and T.A. Goodwin

Scale 1:9500

170 0 170 340 510 Metres

Halifax, Nova Scotia
2009

NOVA SCOTIA
Natural Resources

Map Notes

Universal Transverse Mercator Projection (UTM), Zone 20, Central Meridian 63°00' West.

North American Datum (NAD) 1983 Canadian Spatial Reference System (CSRS) 98.

Base and digital data derived from the Nova Scotia Topographic Database (NSTDB). Copyright Her Majesty the Queen in Right of the Province of Nova Scotia. The NSTDB is available from Service Nova Scotia and Municipal Relations (SNSMR), Land Information Services Division (LIS), Nova Scotia Geomatics Centre (NSGC), Amherst, Nova Scotia.

Property boundaries derived from the Nova Scotia Property Records Database, maintained by Service Nova Scotia and Municipal Relations. Updated March 1, 2009.

Crown Land Property Database (CLPD) provided by Nova Scotia Department of Natural Resources, Land Services Branch, Surveys Division. Updated March 5, 2009.

Colour aerial photography flown by the Nova Scotia Department of Natural Resources, 1996-2006.

Refer to Bates (1987, p. 33-35) for historical information and numbering of the gold districts.

Cartography and reproduction by Nova Scotia Department of Natural Resources, Geoscience Information Services Section, 2009.

Disclaimer

The information on this map has come from a variety of government and nongovernment sources. The Nova Scotia Department of Natural Resources does not assume any liability for errors that may occur. This map is intended for use at the published scale of 1:9500.

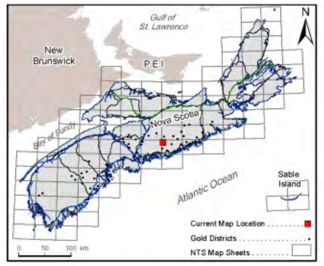
The location and the areal extent of the tailings have not been field checked. Additional tailings may exist. Natural dispersal of tailings has not been determined. The location of shafts and associated mine buildings have also not been field checked.

Please note, some maps in this series do not indicate the presence of former mine tailings. In these instances either, (1) there is no historical information regarding the presence or location of the tailings, or (2) the historical information is too vague to depict the approximate outline of the former mine tailings.

Safety Advisory

A number of safety issues are associated with former gold mining districts. Physical hazards such as open pits and open shafts may exist. Never enter any open holes or shafts. Falling rock debris may occur along high wall rock faces. Tailings may contain high concentrations of arsenic and mercury. Keep off any tailings containment areas.

Index Map



Legend

Approximate area of historical mining activity
Crown lands
Property boundaries
Faribault Data* (Faribault data do not appear on all maps.)
Shafts
Quartz veins
Tailings
Waste rock
Buildings
Buildings (crushers)
Buildings (cyanide plants)
Buildings (mills)
Buildings (stamp mills)
Faribault gold district outline
Basedata
100 Series highway
Trans-Canada Highway
Collector highway
Roads
Railway (active, inactive)
County boundary
Transmission lines (multi, single)
Coastline
Rivers, streams, lakes
Swamps

* Historical mining information digitized from detailed mapping by E.R. Faribault of the Geological Survey of Canada from the late 1800s to the early 1900s. Not all gold districts were mapped. Please contact the Nova Scotia Department of Natural Resources library for a list of the districts that have been mapped. The accuracy of the historical information (as shown on this map) cannot be guaranteed. This map should not be used for legal purposes.

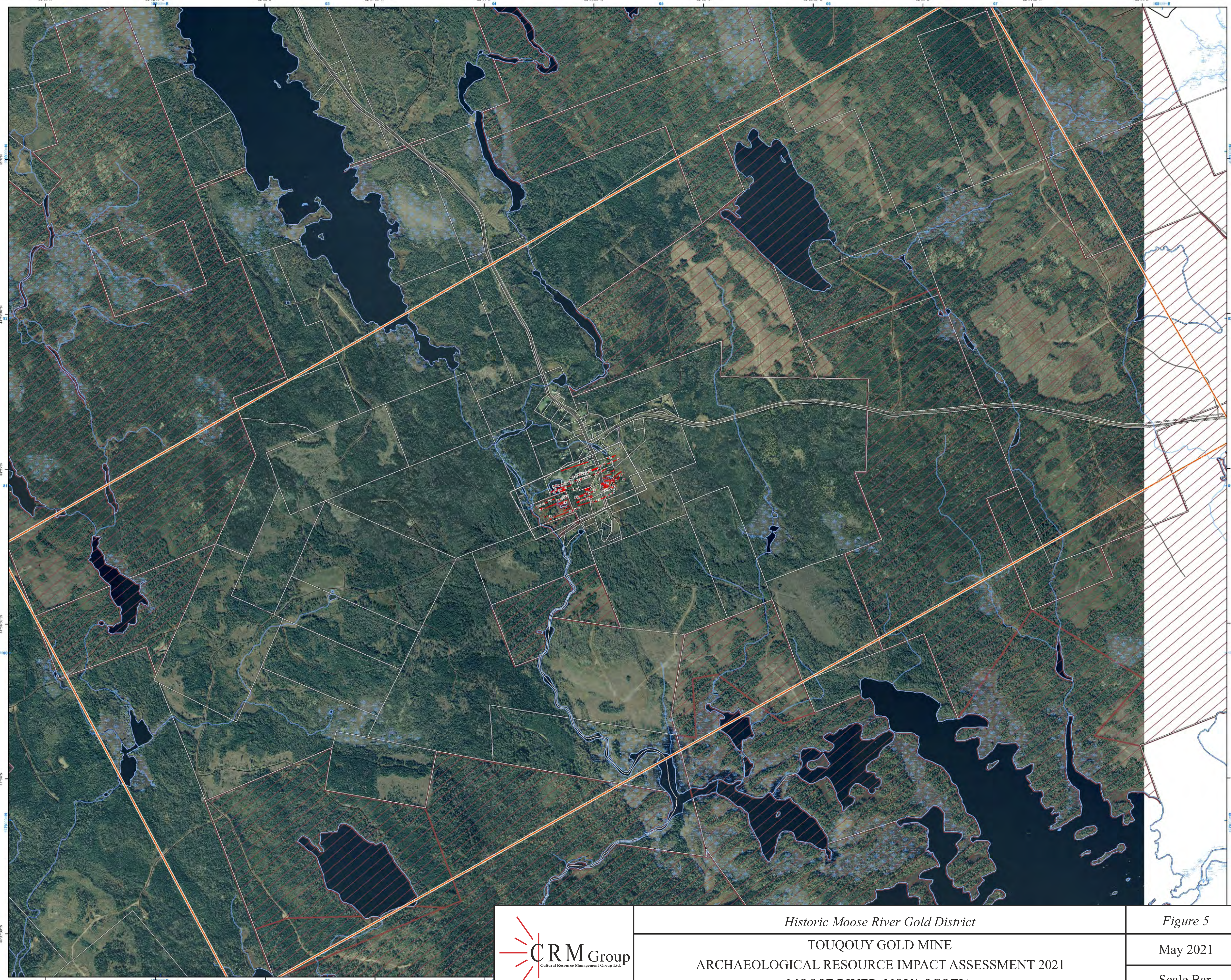
References

Bates, J. L. E. 1987: Gold in Nova Scotia; Nova Scotia Department of Mines and Energy, Information Series No. 13, 48 p.

Faribault, E. R. 1898: Plan, Moose River Gold District, Halifax County, Nova Scotia; Geological Survey of Canada, Map 646, scale 1:3000.

Recommended Citation

Smith, P.K. and Goodwin, T.A. 2009: Historical gold mining, Moose River area, part of NTS sheets 11E/02 and 11D/15, Halifax County, Nova Scotia; Nova Scotia Department of Natural Resources, Mineral Resources Branch, Open File Map ME 2009-1 (sheet 49 of 64), scale 1:9500.



CRM Group
Cultural Resource Management Group Ltd.

Historic Moose River Gold District	Figure 5
TOUQUOY GOLD MINE ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT 2021 MOOSE RIVER, NOVA SCOTIA	May 2021
	Scale Bar

4.2.3 Land Use

Investigating land use history – the modification of the natural environment for the purposes of habitation, agriculture, or other industry or activity – is essential in evaluating the archaeological potential of a given study area.

Pre-contact Land Use

The earliest human inhabitants of the Maritime Provinces are known as *Saqiwe'k L'nuk*, meaning the "Ancient People" (Confederacy of Mainland Mi'kmaq, 2007, p. 1). Present within what is known as the Palaeo Period (13,000 to 9,000 years BP), these ancient peoples may have arrived at the Maritime Peninsula at that time due to changing periglacial environmental conditions that made the area a haven for caribou and other game animals (Deal, 2016, p. 38) (Sanders, 2020).

The earliest-known evidence of people on the land in Mi'kma'ki was found in present day Debert, located approximately 60 kilometres northwest of the study area. The Paleo Period habitation sites in the Debert/Belmont Complex in the Debert National Historic Site and Provincially Designated Special Places of the Wapus and Ge'gupn sites, distributed along a sandy ridge south of the Cobequid Mountains, were occupied approximately 13,500 to 10,000 calibrated years BP. Radiocarbon dating has suggested that the site was occupied during the extreme cold of the Younger Dryas Chronozone (*ca*. 12,800 to 11,700 cal BP), when a global reduction of average annual temperature caused local forests to return to tundra, and caused remnant glaciers in the Cobequid Mountains to re-advance (Sanders, 2020, p. 22).

The surrounding area is dense with lakes and watercourses that would have been important transportation corridors and a resource base for the Mi'kmaq and their ancestors for millennia prior to the arrival of European settlers. Moose River in particular, located to the west of the study area, may have provided a travel route into the interior of *Sipekne'katik* from the Atlantic Ocean to Long Lake or *Sismoqne'katik* ('place of sugar') and Scraggy Lake or *Milnikejk* ('Scraggy Lake') via Ship Harbour or *Ketmenipukwek* ('where indian men were bludgeoned to death') and Lake Charlotte or *We'kwas*k ('end of the bay'). Access may have also been possible from Tangier or *Waspekiaq* ('the water shines/shiny water'), Tangier Lake or *Wisksoq* ('spruce bud'), O'Brien Lake or *Milpaqejk* ('flows erratically'), and Tangier Grand Lake or *Nene'saqnek* ('spread here and there') (Ta'n Weji-sqalia'tiek Mi'kmaw Place Names Digital Atlas, 2019).

Other place names, such as Indian Guzzle (at the northern end of Scraggy Lake), Portage Road (now Higgins Mine Road from Moose River to Fish River) and Cope Lake are indicators of Mi'kmaq heritage near the Touquoy study area (Sanders, Stewart, & Beanlands, 2008, p. 3).

As noted in section ***4.2.2 Cultural Heritage Context – Registered Archaeological Sites***, there are no registered archaeological sites with Mi'kmaq components located within or near the study area. The lack of archaeological data for the area may reflect a lack of archaeological investigation, rather than an absence of archaeological sites.

Historic Land Use

At the time of early European contact (ca. 1500), Mi'kmaw occupied the shores of virtually all waterbodies, both marine and freshwater. River systems and connected lakes were particularly important features in traditional Mi'kmaw land use as they offered a multitude of food resources as well as access to inland terrestrial habitats and their resources (Confederacy of Mainland Mi'kmaq, 2007). There were reports of large summer villages along the Eastern Shore with easy access to the interior and across to the Northumberland Shore (Hoffman, 1955, p. 536). Several long canoe and portage routes connected the shoreline settlements through the interior. Two primary travel routes

connected Country Harbour with Antigonish Harbour via the South River, and Sherbrooke with Pictou via the East River St. Mary' and the East River Pictou (*Ooasgog* or "drawing up the canoes") (***Plate 11***) (Mi'kma'ki All Points Services Inc., 2018, p. 18).

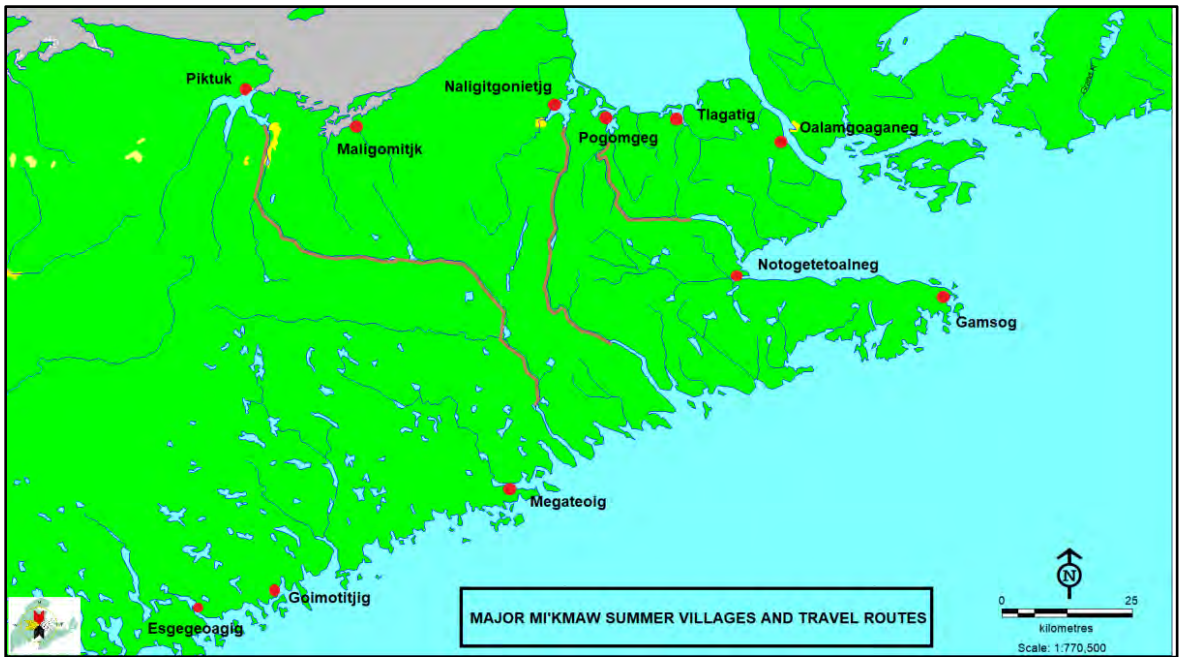


Plate 11: **Major historic Mi'kmaw summer villages (red dots) and travel routes (red lines)** (Mi'kma'ki All Points Services Inc., 2018, p. 18*)*

During King George's War (within which the French Fortress of Louisbourg was captured by the British in 1745), Louisbourg officials, alarmed that the Wolastoqey had signed a treaty and taken British presents, ordered Lois Le Loutre to remove his headquarters from Sipekne'katik and go to Beausejour and take with him "the Indians from Shubenacadie and the other tribes dependent on it as far away as Cape Sable, as they were too near Halifax." Some Mi'kmaq followed Le Loutre, and others declined (Patterson, 1993, p. 33). Those who did not want to follow Le Loutre and serve the French interest withdrew to lands on the eastern shore near Musquodoboit, which had traditionally been within the territory of the *Sipekne'katik* band (Mi'kmaq Environmental Services, 2005, p. 18)

Jean-Baptiste Cope was one of the Mi'kmaw who stayed in the Musquodoboit area instead of following Le Loutre. The Mi'kmaq along the Eastern Shore considered Cope their chief and they numbered 90 persons including men, women, and children (Patterson, 1993, p. 37). The Shubenacadie River and a series of lakes and streams traverse the province from Minas Basin to Musquodoboit, and this waterway was used as a travel route for seasonal migrations of the band, which was sometimes called the Shubenacadie-Musquodoboit "tribe" (Mi'kmaq Environmental Services, 2005, p. 18).

In an 1840 record of elder Euro-Canadian settlers by Rev. John Sprott, they describe accounts of Mi'kmaq in the Musquodoboit area and that, in previous years, moose and deer were plentiful. According to Sprott, as the moose population declined in the 1840s, the Mi'kmaq moved to the outskirts of the settlements (Morton, 1906, p. 80).

There are records of four Mi'kmaq camps along the Murchyville Road, between Murchyville and Shaw Big Lake, approximately 15 kilometres west of the study area (Upper Musquodoboit. 1783-

1983, p. 12)

By the mid-1860s, the Moose River area had been recognized as a logging district (Stephens, 1973, p. 12), but still had not been subject to Euro-Canadian Settlement. Historic maps dating to 1865 and earlier show no buildings or roads near the study area (Anonymous, 1797) (Lockwood, 1819) (Church, 1865). Consequently, it is considered unlikely that there are Euro-Canadian features present that pre-date the historic mining operations at the Moose River Gold Mine (Sanders, Stewart, & Beanlands, 2008, p. 5).

In 1866, gold was discovered in the bed of Moose River. There is debate as to whether this was a chance discovery made by lumbermen during a log drive or the result of careful prospecting inspired by previous discoveries in the Tangier and Mooseland areas (Higgins, 2002, pp. 65-66). In 1867, it is suggested in a letter by Captain L'Estrange from Halifax, that the Mi'kmaq had begun the search for gold in the area of Caribou Mines, which may have been called *Kalchoonkade*, meaning "caribou place" (Belmore E. , 1990, p. 3):

> *Dear Sir, - In answer to your communication of the 15th inst. I have much pleasure in informing you of my discovery of Gold in the Province in 1858. The circumstances are as follows: During a hunting trip on the Tangier River, in September, 1858, accompanied by the late Mr. Gilbert Elliot of H.M.S. "Indus," attended by three Indians, Noel Louis alias Plowitch, Joe Paul and Frank Cope, I found unmistakable traces of gold in the quartz of the district. I, with great difficulty, having no hammer, procured some specimens, shewing a trace of some metal, but was not chemist enough at the time to test them. However, I shewed them to Colonel Nelson, R.E., who sais that such traces may be found anywhere, to Dr. Cogswell and others, but was discouraged from prosecuting my discovery by the ridicule of the 'savans' in mineralogy. The only exception was Mr. Campbell who had also told me that he had discovered gold even in Halifax Harbour, on the sea-line of the province. Soon after this, I met with an accident when moose hunting, which again prevented me from going to this district, and it was not until my arrival in the Mauritius in 1868, that I saw a newspaper account of the discovery of Gold in Tangier, N.S. I believe that it was the Indians above-mentioned that started the search that ultimately led to such golden results.*

In 1860, John Gerrish Pulsifer, led by Mi'kmaq guides Joe Paul, James Paul, and Francis Paul, found gold in a quartz boulder in the same area of Mooseland. Pulsifer registered his gold find with the province, thus igniting the first gold rush in Nova Scotia (Art Gallery of Nova Scotia, 2013). Pulsifer describes the finds in Alexander Heatherington's, A practical guide for tourists, miners, and investors, and all persons interested in the development of the gold fields of Nova Scotia:

> *"While looking about me, I thought I saw quartz in the brook close by. I broke the stone up with my hammer, and in the fragments found pieces of gold sticking out. I then looked for more, and in nearly every piece that I broke - it was quartz, you see - got more or less gold. Then I concluded to take my specimens up to town with me, and dismissed the Indians. This was on the last Thursday or Friday in May, 1860. The Indians are ready to swear that no white man had ever found gold there before. Mr. Howe was Provincial Secretary at the time. At first he would not*

> *believe that I had found the specimens, but when I proved that I was telling him no lies and asked him to get me a government grant to work the mine, he told me to 'go home and mend my oId shoes.'"* (Heatherington, 1868, p. 26)

The abovementioned Frank (Francis) Cope is said to have been called "Doadaran" (a word recorded phonetically by Harry Piers, and without a contemporary translation). It is reported that Frank passed away near the head of Lake Charlotte at Fish River (Whitehead R. , 2015, p. 86). The is the same general location of registered archaeological site, BfCr-01. There is evidence that Frank Cope's son, John Noel Cope, continued to live and subsist in the general area, as well as continued to hunt with Captain L'Estrange. The following account was related to Harry Piers by Jeremiah Bartlett Alexis (Jerry Lonecloud) in 1918 (Whitehead R. , 1991, p. 310):

> *The death occurred at Stewarts, Upper Musquodoboit, on 31st, August, of an old and well-known Indian, John Cope, at the age of 71 years, he having been born at Beaver Dam, Halifax County, in April 1847, son of old Molly Cope who is said to have been 113 years of age when she passed away about 13 years ago . . . . John Cope had considerable fame as a hunter, at least judging by the number of moose he shot, and acted as a guide for various Halifax sportsmen some thirty years ago. He used to hunt back of Beaver Dam and Moose Head [?] with Captain C. Lestrange, who was formerly well-known here. One winter, probably about forty years ago, Cope by himself killed eighteen moose . . . . The meat of these he sold to Fifteen-Mile Stream gold camp, which was then in operation.*

In any case, the discovery prompted a "rush" of local surface prospecting and applications for land grants. The majority of the proposed pit property was granted to Robert Higgins III (a Middle Musquodoboit farmer) in 1866 (Crown Lands, Book 36: pp. 27-28). The remainder, consisting of the eastern end and southern edge, was granted in 1874 to Benjamin Young (a merchant from Calais, Maine) and John N. Hill (a merchant from Ship Harbour, Halifax County) (Crown Lands, Book 48: pp. 451-452) (Sanders, Stewart, & Beanlands, 2008, p. 5).

The gold mines the became the namesake and the mainstay of the Moose River Gold Mines developed primarily within the limits of the current Open Pit area of the Touquoy operation (Faribault, 1898a) (***Figure 6***). According to Crown Land Index Sheet 82, the proposed Clay Borrow Pit Expansion area was originally granted to the Moose River Gold Mining Company in 1888 (Crown Lands, Book 50A, 13868) and the proposed WRSA expansion area was originally granted to James McIsaac (Crown Lands, Book 84A, 18218) and William Bruce in 1888 (Crown Lands, Book 202A, 16098, p. 210), who worked as a miner at the Moose River Gold Mines, just south of Square Lake, identified here as "Birch Lake" (***Figure 7***).

Between 1875 and 1879, 32 Icelandic families arrived in Nova Scotia as a result of efforts by the Government of Nova Scotia to attract settlers. Over 3000 acres of land were divided into 100 acre lots for the settlers that would form the community known as Markland. The community was distributed between Mooseland and the Caribou Gold Mines. The location was chosen because of the ongoing successes of the surrounding gold production, including at Moose River. Most settlers subsided by ground simple crops, such as wheat and barley, but by 1884, it was clear that the boggy and rocky terrain could not host sustainable agriculture and most of the lots had been sold by the settlers (The Markland Settlement, n.d.).

The boom time for Moose River Gold Mines was between 1890 and 1909. During this time, the mines employed several hundred people (Higgins, 2002, p. 66). In 1898, the Moose River Gold Mining Company was operating in the northeastern corner of the current Open Pit area, while the

Touquoy Gold Mining Company was operating in the southwestern corner (Faribault, 1898b) (***Plate 12***) (***Figure 8)***. The Guilford & Kelly Gold Mining Company, established in 1904, operated a large 40-stamp mill on the original site of the Moose River Gold Mines Provincial Park, at or near the southwestern corner of the current Open Pit area (Higgins, 2002, p. 66).

Plate 12: Taylor lead on the crown of the anticline, Moose River Gold District, 1897 (Faribault)

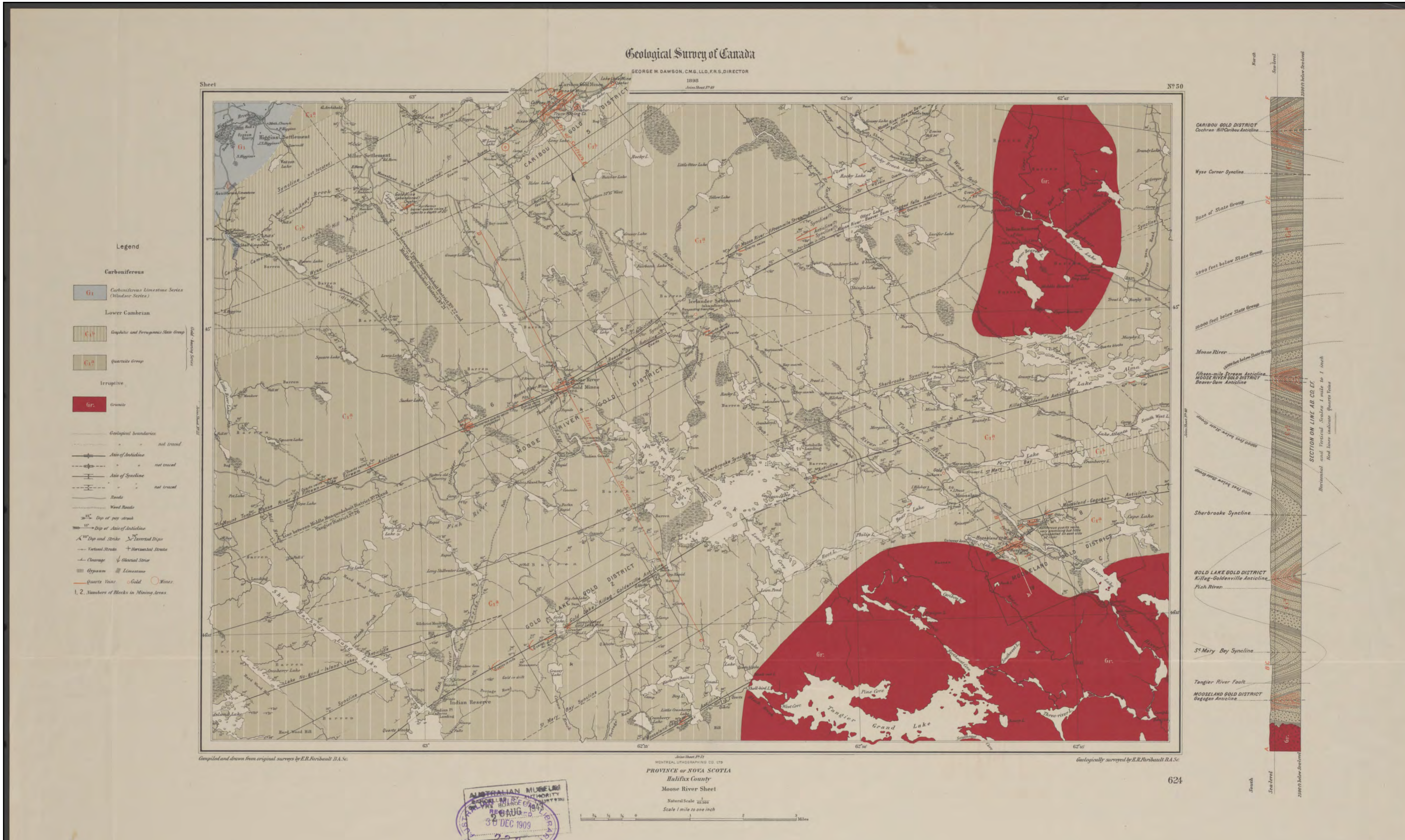
The mine works were essentially abandoned in the decade between 1910 and 1920, but, in 1928, some holdings were purchased by John A. Grant of Antigonish. The Moose River Gold Syndicate was formed in 1934, with Grant maintaining a share, along with Dr. David Edwin Robertson and principal owner Herman Russell Magill (both from Ontario). A shaft known as the Meyer Shaft was pumped out and reopened in January of 1936. This shaft collapsed on April 12,1936, trapping Robertson and mine timekeeper Charles Alfred Scadding for ten days and killing Herman Russell Magill (***Plate 13***) (Stephens, 1973, p. 13). The events leading up to and including the rescue of Robertson and Scadding were the subject of a sequence of live radio broadcasts that reached all 58 CRBC stations in Canada, as well as 650 other radio stations in the United States (Stephens, 1973, p. 71). This unprecedented level of radio coverage made Moose River's tragedy and rescue a renowned event in Canadian history.

Since the 1936 collapse, there have been only small, short-lived mining operations at Moose River Gold Mines (Higgins, 2002, p. 80). Many of the miner's residences remained until the modern redevelopment of the mine. At its peak, the Moose River community touted the Moose River General Store / Post Office and Herb Murphy's Dance Hall (Higgins, 2002, pp. 50-51). Other buildings that had a central role in the life of the community, such as the Moose River School (built in the late 1800s), the Moose River Mines United Church (constructed from 1909 to 1910) and the Wayside Inn (operated from 1920 to 1960) (Sanders, Stewart, & Beanlands, 2008, p. 6).

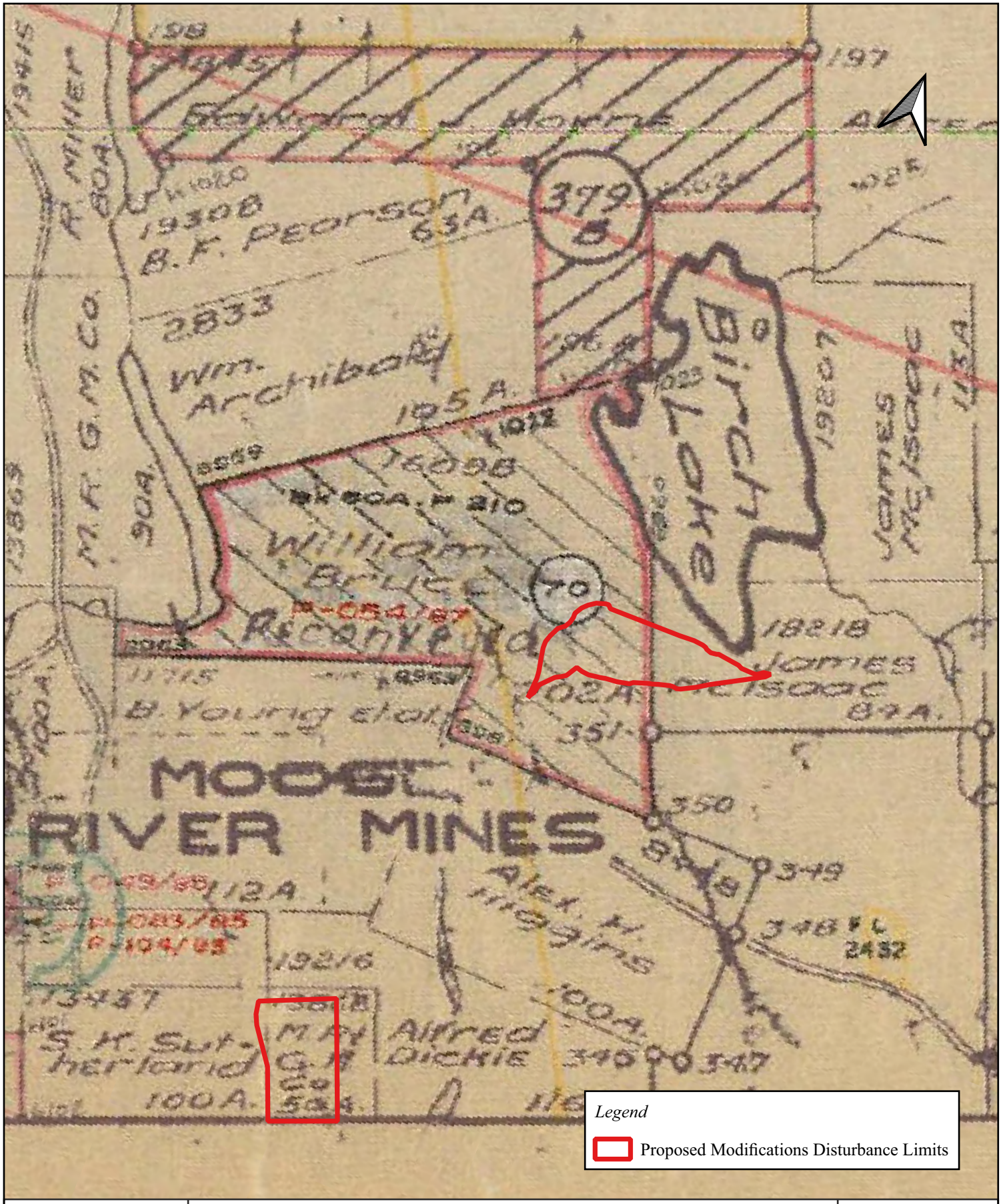
Plate 13: **Mine rescue workers working at the entrance to the rescue shaft at Moose River Mines, 1936** *(Resources)*

After a feasibility study was completed in 2015, mining of the current open pit at Touquoy commenced in 2017, with commercial production declared in 2018 (Staples, et al., 2019, pp. 1-4). Aerial photography from 1931, 1992, and 2021 illustrate the transition of the land from operational mine, abandonment, and back to operational again, respectively (***Figure 9***).

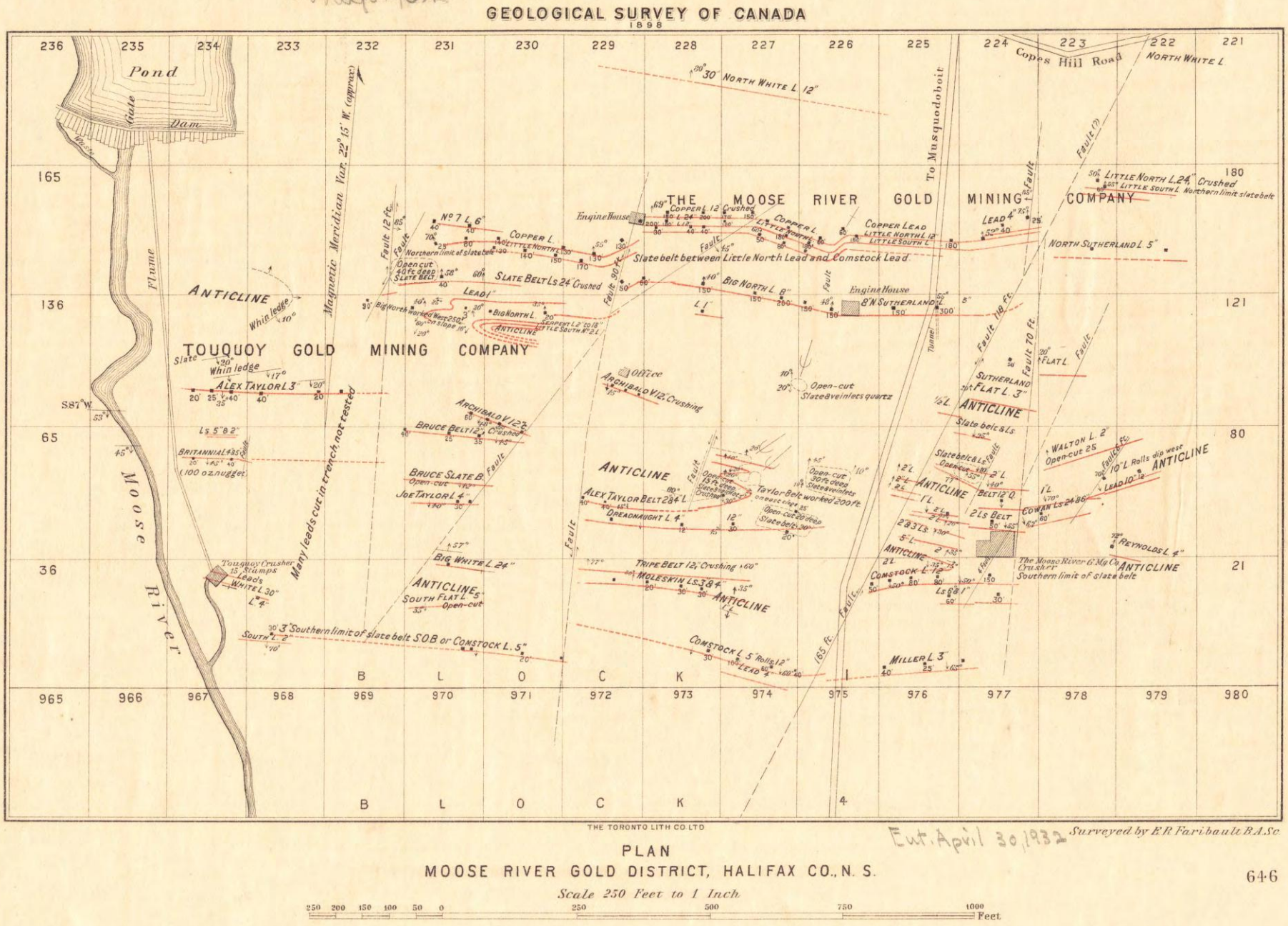
The Department of Natural Resources (DNR) Abandoned Mine Opening (AMO) Database was used to identify where open mine shafts were located. The data was used both as a safety measure and for identifying areas more likely to contain archaeological features. According to the database, no AMOs are located within the subject study areas.



CRM Group Cultural Resource Management Group Ltd.	*Faribault, 1898, Halifax County: Moose River Sheet, No. 50*	*Figure 6*
	TOUQUOY GOLD MINE ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT 2021 MOOSE RIVER, NOVA SCOTIA	May 2021
		Scale Bar

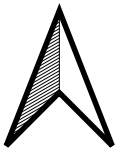


CRM Group Cultural Resource Management Group Ltd.	*Crown Land Index Sheet No. 82*	*Figure 7*
	TOUQOUY GOLD MINE ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT 2021 MOOSE RIVER, NOVA SCOTIA	May 2021



CRM Group Cultural Resource Management Group Ltd.	*Faribault, 1898, Plan Moose River Gold District, Halifax Co., N.S.*	*Figure 8*
	TOUQOUY GOLD MINE ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT 2021 MOOSE RIVER, NOVA SCOTIA	May 2021 Scale Bar

CRM Group Cultural Resource Management Group Ltd.	*Aerial Photographs 1931, 1992, & 2019*	*Figure 9*
	TOUQOUY GOLD MINE ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT 2021 MOOSE RIVER, NOVA SCOTIA	May 2021



4.3 Previous Archaeological Assessments

CRM Group has undertaken previous archaeological assessments of the Touquoy study area (2005, 2006, and 2008). As a result of these assessments, areas of cultural significance relating to the historic mining operations at Moose River were identified, as well as an area of elevated archaeological potential surrounding Square Lake (***Figure 10***). The following details the previous archaeological assessment undertaken in close proximity to the subject study area, the results therein, and recommendations for future cultural management.

4.3.1 A2005NS42

An ARIA comprised of a background screening and field reconnaissance was conducted in 2005 by W. Bruce Stewart and Mike Sanders in conjunction with an environmental screening of the proposed Touquoy redevelopment area (Sanders & Stewart, 2005, p. 1).

The results and recommendations stemming from the data collected identified the entirety of the study area to be of low archaeological potential. It was deemed that Moose River Gold Mines' surviving mine features, its standing buildings and the buried remains of those that are no longer standing, were not old enough to be considered archaeological features. However, they were deemed to have significant cultural and historical interest, as demonstrated by the Moose River Mines Museum. It was recommended that, given the significance of Moose River Gold Mines, a strategy for the documentation of the community be undertaken prior to the mine development impacts (Sanders & Stewart, 2005, p. 11).

4.3.2 A2006NS60

An ARIA comprised of a background screening and field reconnaissance was conducted in 2006 by W. Bruce Stewart and Mike Sanders in order to assess the archaeological potential of the revised redevelopment footprint of the Touquoy Gold Mine (Sanders & Stewart, 2006, p. 1).

The results and recommendations stemming from the data collected identified the entirety of the study area to be of low archaeological potential, with the exception of a 50-metre buffer of elevated potential surrounding Square Lake. It was recommended that any unavoidable ground impacts within that area should be preceded by archaeological assessment, including shovel testing (Sanders & Stewart, 2006, p. 9).

4.3.3 Moose River Heritage Preservation

As a result of the ARIAs undertaken in 2005 and 2006, CRM Group produced a Moose River Heritage Preservation Report, which documented the cultural and historic significance of the Moose River Gold Mine and made recommendations for cultural heritage preservation. Primary heritage preservation objectives of Atlantic Gold were to ensure that the cultural heritage of Moose River Gold Mines was not lost as a result of the mine development and to provide a mechanism to educate the public about modern mining practice (Sanders, Stewart, & Beanlands, 2008, p. 1).

Through engagement with various stakeholders including, Atlantic Gold, the Moose River Gold Mines Museum Society, Musquodoboit Valley Tourism Association, Special Places, and the Department of Natural Resources, procedures were put in place to ensure that the cultural heritage of the Moose River Gold Mines was not lost (Sanders, Stewart, & Beanlands, 2008, p. 21). A Level I Property Condition Assessment (PCA I) was also undertaken to assess the existing conditions of the Moose River Gold Mines Museum and the Moose River Mines United Church (Sanders, Stewart, & Beanlands, 2008, p. 11).

Based on the data collected during the production of the heritage report, the following management recommendations were made (Sanders, Stewart, & Beanlands, 2008, pp. 21-22):

1. Given that the existing Moose River Gold Mines Provincial Park will be lost due the proposed development of the Touquoy Gold Project open pit, it is recommended that a new park of equal or greater size be established elsewhere in the community, outside the proposed secure blasting area (***Section 3.4***). A candidate site has been identified immediately northwest of the Moose River Road bridge over Moose River. The layout of the new park would be designed by a DNR architect.

2. It is recommended that existing structures within the present Moose River Gold Mines Provincial Park (the existing cairn, stamp mill, kiosk, interpretive signs, picnic tables and one pit toilet) be incorporated into the design of the new park and, if possible, relocated to that site. If any of these structures cannot be relocated, it is recommended that they be replicated at the new park site.

3. Given that the existing Moose River Gold Mines Museum is within the proposed secure blasting area and is considered prohibitively expensive to move, it is recommended that a new museum building be constructed at the site of the new Moose River Gold Mines Provincial Park. It is further recommended that this new Moose River Gold Mines Museum be designed by an architect to the specifications outlined in Section 3.8 – specifications identified by the Moose River Gold Mines Museum Society. It is also recommended that every effort be made to have the new museum constructed by the spring of 2009 and ready for use by the customary opening date of July 1.

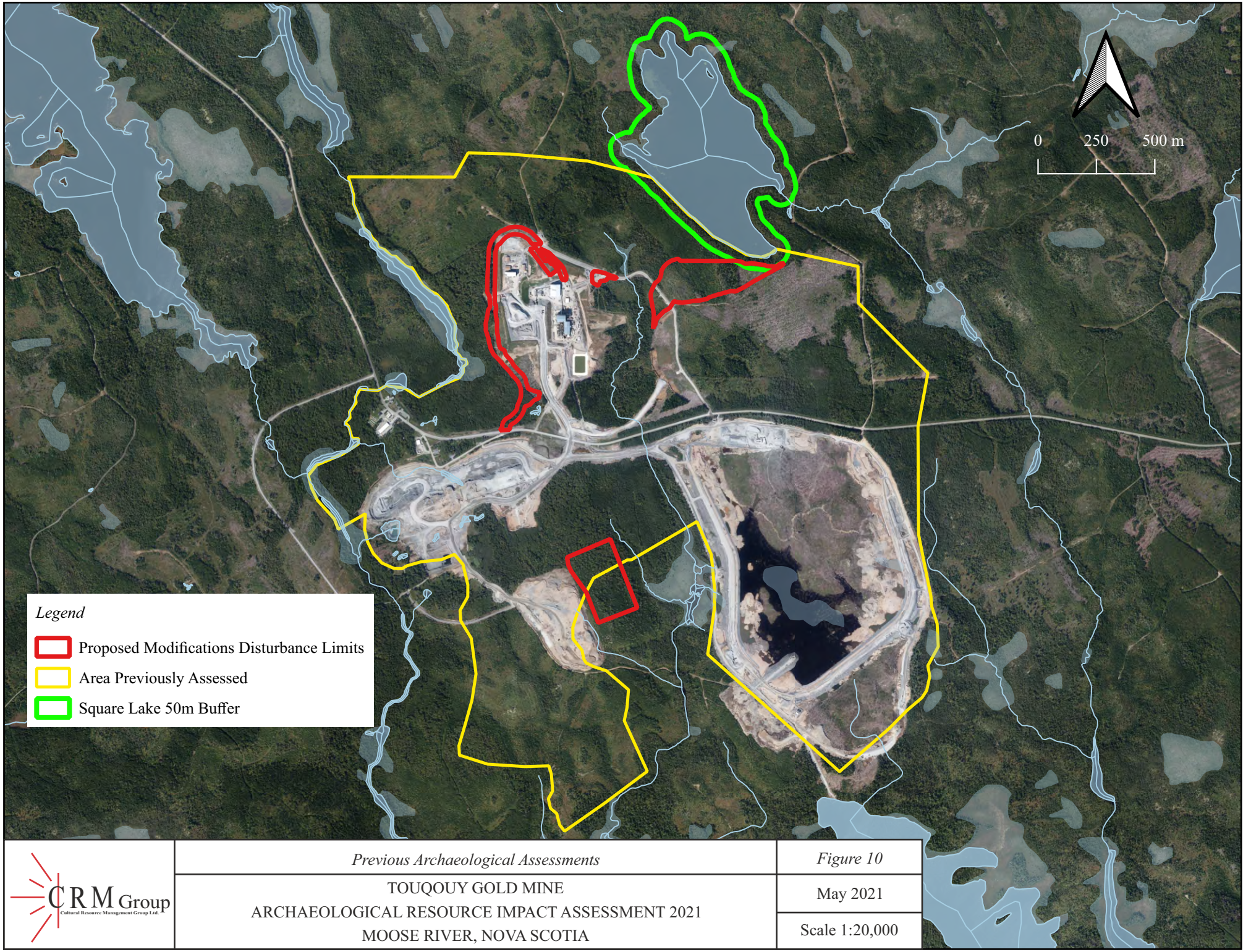
4. The Moose River Mines United Church is also within the proposed secure blasting area and is considered prohibitively expensive to move. In the event that the church is deconstructed, it is recommended that its location be marked by a commemorative plaque (in accordance with United Church of Canada policy) and that elements of the interior (pews, pulpit and plaques) be incorporated into the new museum.

5. It is recommended that the holdings of the existing Moose River Gold Mines Museum be transferred to the new museum. It is further recommended that existing museum displays and programs be expanded in accordance with suggestions offered by MVTA and the management of the Musquodoboit Valley Education Centre.

6. It is recommended that documentation of the history/cultural heritage of Moose River Gold Mines be expanded by funding additional interviews and video-documentation.

7. It is recommended that effort be made to increase visitation to the Moose River Gold Mines Museum by extending its season of operation, encouraging school group visits, providing promotion and by contacting key individuals and institutions to seek guidance, partnerships and funding.

8. In order to give the visiting public an opportunity to watch and understand modern mining techniques as they are undertaken throughout the Touquoy Gold Project, it is recommended that a look-off or viewpoint be established in a secure location at the edge of the proposed Open Pit Area. It is further recommended that interpretive panels be erected at this site to explain what is being seen and how it differs from the historic mining process.



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Previous Archaeological Assessments

TOUQOUY GOLD MINE
ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT 2021
MOOSE RIVER, NOVA SCOTIA

Figure 10

May 2021

Scale 1:20,000

4.4 Archaeological Testing

CRM Group undertook a program of archaeological subsurface shovel testing reconnaissance from 27 April to 29 April 2021. No material culture or areas of elevated cultural potential were identified. The following details the program of archaeological testing.

4.4.1 Shovel Testing

CRM Group archaeologists began a program of shovel testing on 28 April 2021. Completed on 29 April 2021, the shovel testing program resulted in the excavation of 102 shovel tests within the portion of proposed WRSA expansion that intersects with the 50-metre buffer of Square Lake (***Figure 11***). The shovel testing program was directed by CRM Group Archaeologist Kyle Cigolotti, with the assistance of Archaeological Field Technicians Shawn MacSween, Rod Peterson, Stewart MacPherson, Kyle Bedecki, and Logan Robertson. Fieldwork was conducted under seasonal conditions. Access to the area was gained from Billybell Way, via Mooseland Road.

Shovel test locations were positioned and recorded using a Juniper Systems Geode GPS/GLNSS sub-metre receiver, with 1 Hz update rate a horizontal accuracy of less than 30cm, tied to a georeferenced grid overlain across the study area. Shovel tests were completed at five-metre intervals within the proposed impact area.

Upon commencement of the shovel testing program, it was apparent that most of the study area had been cleared of trees (***Plate 14***) and a silt fence had been installed in a mechanically excavated trench at the northernmost edge of the impact area (***Plate 15***). Planned shovel tests within this trench were omitted, as the soil had been already excavated into subsoil. Terrain sloped down to the north and Square Lake, with the ground surface consistently moss covered and hummocky. Shallow soils were evident in tree throws, with surface boulders visible throughout the study area. Nearer to the northern edge of the testing, many of the shovel tests experienced shallow water influx (***Plate 16***).

The study area stradled between Wolfville and Danesville series soils, with till representing Danesville in the west portion of the study area and Wolfville in the east.

Plate 14: Testing area cleared of trees. Existing WRSA beyond Billybell Way. Mechanical test pit visible in bottom right corner of photo; facing southwest. 28 April 2021

Plate 15: **Silt fencing installed within mechanically excavated trench; facing northwest. 28 April 2021**

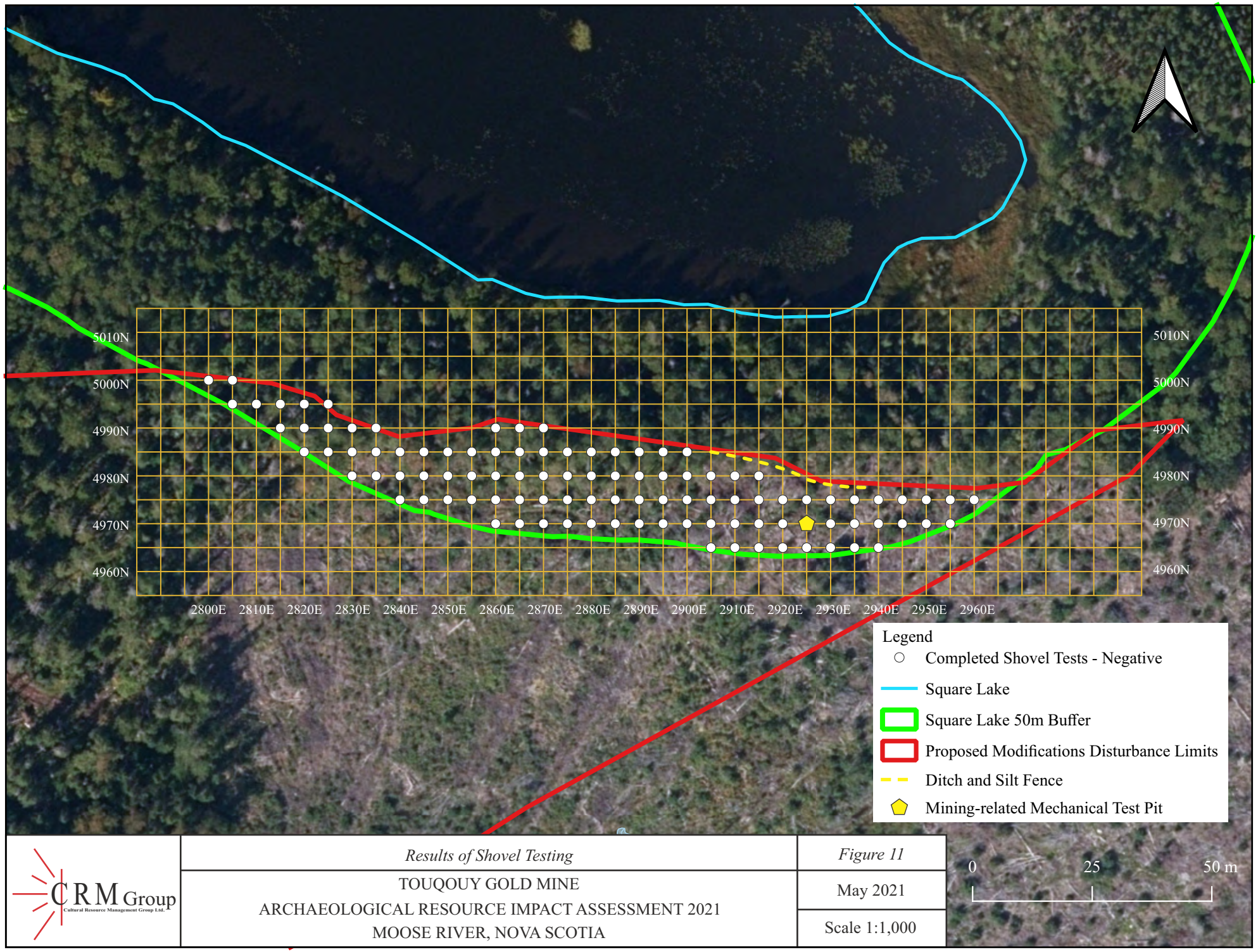
Plate 16: **Example of water influx in unit 4975N 2850E; south profile. 29 April 2021**

The majority of the shovel tests excavated showed evidence of a historic soil stripping event, with stratigraphic columns consisting primarily of a moss and leaf litter directly overlying fill material over glacial till, or directly on top of glacial till (***Plate 17***). The terrain within this previously stripped area was relatively level.

Plate 17: Example of topsoil stripping event in unit 4980N 2830E; south profile. 29 April 2021

However, several of the shovel tests did provide evidence of undisturbed A- and B-Horizons overlying glacial till (***Plate 18***). These units were generally at or beyond the treeline and often correlated with water influx. The depths of shovel tests ranged from a minimum of 18 centimetres to a maximum depth of 62 centimetres. Depth to till ranged from 5 centimetres, in the most disturbed units, to 40 centimetres, in more intact units. No cultural material was recovered.

Plate 18: Example of intact LFH, A, Ae, B, and C horizons in unit 4975N 2840E; north profile. 29 April 2021



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Results of Shovel Testing

TOUQOUY GOLD MINE
ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT 2021
MOOSE RIVER, NOVA SCOTIA

Figure 11

May 2021

Scale 1:1,000

4.4.2 Field Reconnaissance

In conjunction with shovel testing, archaeological reconnaissance was undertaken within the proposed Clay Borrow Pit expansion, on April 27, 2021. Weather conditions were overcast with scattered showers and mild. The primary purpose of the visit was to assess the area for archaeological potential and investigate any topographical and/or cultural features that had been identified as areas of elevated potential during the background research (***Figure 12***).

The survey began in the south portion of the study area, from the southern edge of the existing Scraggy Lake Overburden Stockpile. The study area gently rises approximately 10 metres from the south to the north and more steeply from its centre to the east, towards Watercourse 3.

The area is forested with immature mixed wood, with many of the more mature trees fallen due to high winds (***Plate 19***). Evidence of forestry was visible throughout the study area (***Plate 20***), with abandoned skid trails encountered (***Plate 21***). Standing water was visible in low areas (***Plate 22***) and ground surface was consistently moss-covered and hummocky (***Plate 23***). Shallow soils were evident in tree throws, with surface boulders visible throughout the study area (***Plate 24***).

Plate 19: Immature softwood growth surround tree falls; facing north. 27 April 2021

Plate 20: Evidence of historic logging activities; facing north. 27 April 2021

Plate 21: Abandoned forestry road; facing south. 27 April 2021

Plate 22: Standing water in low lying area; facing north; 27 April 2021

Plate 23: Moss covered and hummocky forest floor; facing south. 27 April 2021

Plate 24: Tree throw exhibiting shallow soils and underlying boulders; facing west. 27 April 2021

The northeast corner of the study area falls within 80 metres of the Watercourse 3 (***Figure 11***). Though this is a wetland fed, low order stream, a single shovel test was undertaken at grid unit 6220N 3555E (UTM 20T 505280.85 mN 4980930.32 mE) (***Plate 25***). The shovel test was excavated through the A-Horizon, Ae, B, and into till at 40 centimetres below surface. Water inundated the shovel test at approximately 35 centimetres (***Plate 26***). No cultural materials were identified.

Plate 25: Archaeologist screening soil excavated from shovel test; facing east, downslope toward Watercourse 3. 27 April 2021

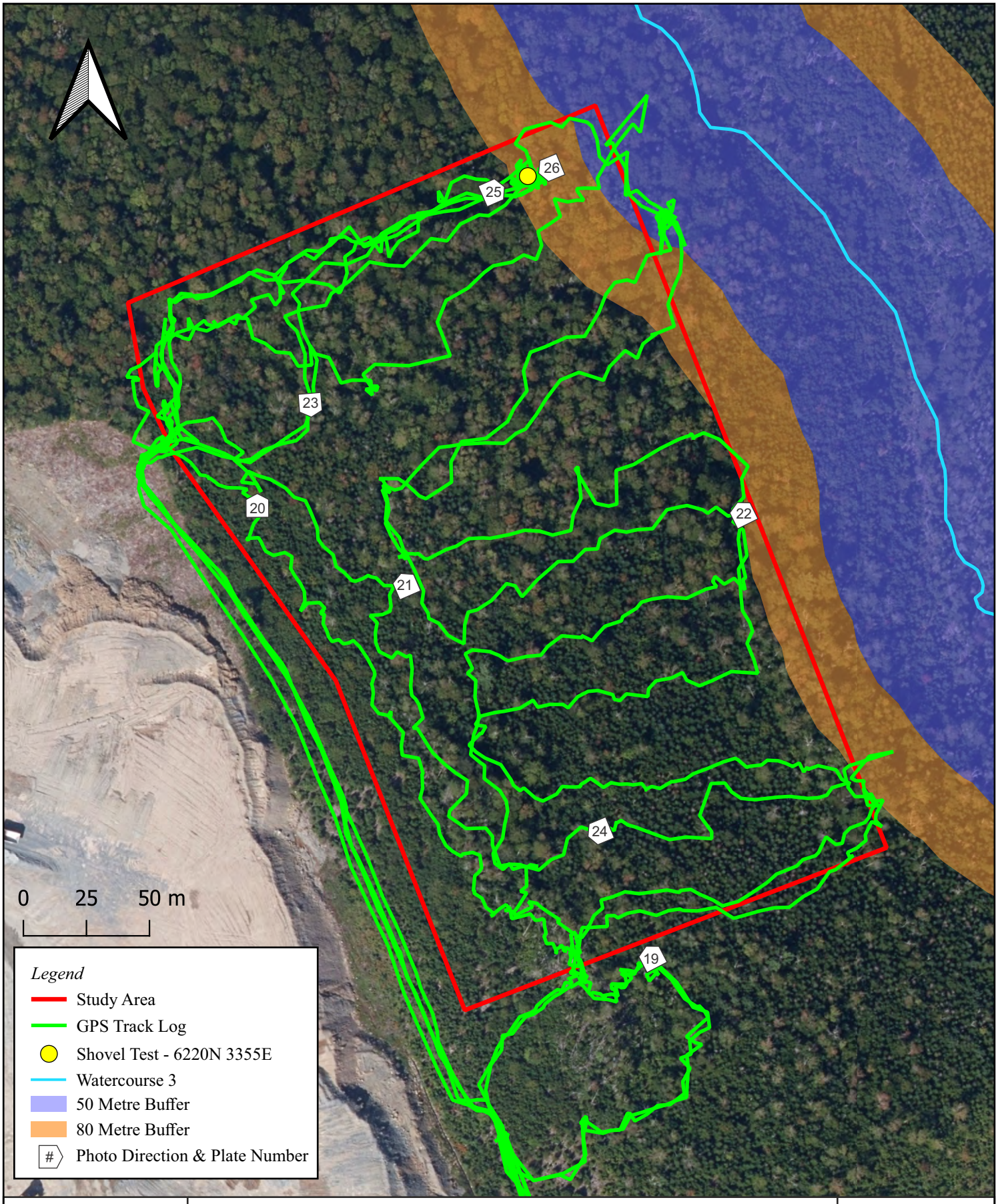
Plate 26: Completed shovel test 6220N 3355E with water filling bottom; west profile. 27 April 2021

Despite a portion of the study area being within 80 metres of water, this area was steeply sloped toward the east and Watercourse 3 would have been non-navigable, based on its size.

Given the rocky, wet, and sloped nature of the terrain encountered during field reconnaissance, as well as disturbance resulting from forestry and mining activities, the proposed Clay Borrow Pit impact area is ascribed low potential for encountering archaeological resources.

4.5 Artifact Analysis

No artifacts or cultural materials (modern, historic, or Pre-contact) were recovered during the field-testing portion of the ARIA, therefore no analysis was required or undertaken.



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Results of Reconnaissance

TOUQOUY GOLD MINE
ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT 2021
MOOSE RIVER, NOVA SCOTIA

Figure 12

May 2021

Scale 1:2,000

5.0 CONCLUSIONS AND RECOMMENDATIONS

The 2021 ARIA of the proposed WRSA and Clay Borrow Pit expansions at Touquoy consisted of background research, Mi'kmaw engagement, archaeological field reconnaissance (at the Clay Borrow Pit), and archaeological shovel testing (at the WRSA). A total of 103 shovel tests were completed, with negative results for cultural material. This work built upon the 2005, 2006 and 2008 archaeological and cultural heritage assessments conducted by CRM Group archaeologists. The preliminary archaeological background research and field reconnaissance conducted in 2006 identified a 50-metre buffer surrounding Square Lake that exhibited high potential for archaeological resources, based on its proximity to water sources and topographic features. No additional areas of high archaeological potential were identified during the 2021 assessment.

Given the rocky, wet, and sloped nature of the terrain encountered during field reconnaissance, the proposed Clay Borrow Pit study area is ascribed low potential for encountering archaeological resources.

Based on the various components of the background study, including environmental setting, land use, property history, shovel testing, and field reconnaissance, the study areas, as described in this report, are considered to exhibit low potential for encountering archaeological resources.

CRM Group recommends adhering to the recommendations below provided in the 2005, 2006, and 2008 reports, as well as offers the following recommendations for the subject study areas:

1. It is recommended that the proposed Clay Borrow Pit expansion study area, as defined in this report, be cleared of any requirement for further archaeological investigation.

2. It is recommended that the proposed Waste Rock Storage Area expansion study area, as defined in this report, be cleared of any requirement for further archaeological investigation.
3. It is recommended that no ground impacts occur within 50 metres of Moose River or Square Lake, outside of the study area tested in this report. Any unavoidable ground impacts within that area should be preceded by archaeological assessment, including shovel testing.

4. If any further changes are made to the layout of the mine and associated facilities beyond the area of previous archaeological assessment (***Figure 10***), it is recommended that those proposed areas be subjected to an Archaeological Resource Impact Assessment.

5. In the event that archaeological deposits or human remains are encountered during construction activities associated with the Touquoy Gold Mine, all work in the associated area(s) should be halted and immediate contact made with the Special Places Program (John Cormier: 902-424-4542).

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8.0 APPENDICES

8.1 Shovel Test Records

Permit #	Unit Reference North / East	Survey Date	Excavator(s)	Recorder	Base Excavation (cm DBS)	Unit Dimensions (cm)	Presence Absence: Till	Presence Absence: Till (cm DBS)	Presence Absence: Artifacts
A2021NS053	4965 / 2905	4/29/2021	SAM	KGC	40	40	Present	28	Absent
A2021NS053	4965 / 2910	4/29/2021	KGC	KGC	44	40	Present	10	Absent
A2021NS053	4965 / 2915	4/29/2021	SM	KGC	56	40	Present	16	Absent
A2021NS053	4965 / 2920	4/28/2021	LR	KGC	42	40	Present	30	Absent
A2021NS053	4965 / 2925	4/28/2021	LR	KGC	62	40	Present	30	Absent
A2021NS053	4965 / 2930	4/28/2021	RP	KGC	54	40	Present	28	Absent
A2021NS053	4965 / 2935	4/28/2021	KB	KGC	42	40	Present	12	Absent
A2021NS053	4965 / 2940	4/28/2021	SAM	KGC	38	40	Present	30	Absent
A2021NS053	4970 / 2860	4/29/2021	LR	KGC	30	40	Present	20	Absent
A2021NS053	4970 / 2865	4/29/2021	SAM	KGC	30	40	Present	20	Absent
A2021NS053	4970 / 2870	4/29/2021	SM	KGC	40	40	Present	20	Absent
A2021NS053	4970 / 2875	4/29/2021	SAM	KGC	30	40	Present	12	Absent
A2021NS053	4970 / 2880	4/29/2021	LR	KGC	20	40	Present	5	Absent
A2021NS053	4970 / 2885	4/29/2021	SAM	KGC	38	40	Present	32	Absent
A2021NS053	4970 / 2890	4/29/2021	LR	KGC	36	40	Present	16	Absent
A2021NS053	4970 / 2895	4/29/2021	KB	KGC	44	40	Present	24	Absent
A2021NS053	4970 / 2900	4/29/2021	KB	KGC	30	40	Present	10	Absent
A2021NS053	4970 / 2905	4/29/2021	SM	KGC	34	40	Present	26	Absent
A2021NS053	4970 / 2910	4/29/2021	KB	KGC	45	40	Present	25	Absent
A2021NS053	4970 / 2915	4/29/2021	LR	KGC	30	40	Present	10	Absent
A2021NS053	4970 / 2920	4/28/2021	KB	KGC	40	40	Present	25	Absent
A2021NS053	4970 / 2930	4/28/2021	KB	KGC	42	40	Present	12	Absent
A2021NS053	4970 / 2935	4/28/2021	LR	KGC	44	40	Present	24	Absent
A2021NS053	4970 / 2940	4/28/2021	SAM	KGC	25	40	Present	15	Absent
A2021NS053	4970 / 2945	4/28/2021	LR	KGC	50	40	Present	16	Absent
A2021NS053	4970 / 2950	4/28/2021	SM	KGC	36	40	Present	10	Absent
A2021NS053	4970 / 2955	4/28/2021	SM	KGC	34	40	Present	5	Absent
A2021NS053	4975 / 2840	4/29/2021	LR	KGC	36	40	Present	16	Absent
A2021NS053	4975 / 2845	4/29/2021	KB	KGC	32	40	Present	23	Absent
A2021NS053	4975 / 2850	4/29/2021	SAM	KGC	40	40	Present	30	Absent
A2021NS053	4975 / 2855	4/29/2021	LR	KGC	40	40	Present	25	Absent

A2021NS053	4975 / 2860	4/29/2021	LR	KGC	45	40	Present	25	Absent
A2021NS053	4975 / 2865	4/29/2021	SAM	KGC	42	40	Present	12	Absent
A2021NS053	4975 / 2870	4/29/2021	KB	KGC	32	40	Present	22	Absent
A2021NS053	4975 / 2875	4/29/2021	LR	KGC	18	40	Present	5	Absent
A2021NS053	4975 / 2880	4/29/2021	RP	KGC	30	40	Present	20	Absent
A2021NS053	4975 / 2885	4/29/2021	SM	KGC	38	40	Present	5	Absent
A2021NS053	4975 / 2890	4/29/2021	SAM	KGC	50	40	Present	30	Absent
A2021NS053	4975 / 2895	4/29/2021	LR	KGC	40	40	Present	30	Absent
A2021NS053	4975 / 2900	4/29/2021	RP	KGC	40	40	Present	10	Absent
A2021NS053	4975 / 2905	4/29/2021	KB	KGC	26	40	Present	14	Absent
A2021NS053	4975 / 2910	4/29/2021	LR	KGC	40	40	Present	25	Absent
A2021NS053	4975 / 2915	4/29/2021	RP	KGC	50	40	Present	10	Absent
A2021NS053	4975 / 2920	4/28/2021	SM	KGC	45	40	Present	25	Absent
A2021NS053	4975 / 2925	4/28/2021	SM	KGC	44	40	Present	24	Absent
A2021NS053	4975 / 2930	4/28/2021	SM	KGC	40	40	Present	30	Absent
A2021NS053	4975 / 2935	4/28/2021	SM	KGC	35	40	Present	20	Absent
A2021NS053	4975 / 2940	4/28/2021	RP	KGC	40	40	Present	20	Absent
A2021NS053	4975 / 2945	4/28/2021	RP	KGC	25	40	Present	15	Absent
A2021NS053	4975 / 2950	4/28/2021	KB	KGC	40	40	Present	20	Absent
A2021NS053	4975 / 2955	4/28/2021	RP	KGC	50	40	Present	30	Absent
A2021NS053	4975 / 2960	4/28/2021	RP	KGC	28	40	Present	8	Absent
A2021NS053	4980 / 2830	4/29/2021	SM	KGC	33	40	Present	23	Absent
A2021NS053	4980 / 2835	4/29/2021	SAM	KGC	38	40	Present	28	Absent
A2021NS053	4980 / 2840	4/29/2021	SAM	KGC	42	40	Present	26	Absent
A2021NS053	4980 / 2845	4/29/2021	SAM	KGC	38	40	Present	20	Absent
A2021NS053	4980 / 2850	4/29/2021	LR	KGC	28	40	Present	18	Absent
A2021NS053	4980 / 2855	4/29/2021	SAM	KGC	30	40	Present	20	Absent
A2021NS053	4980 / 2860	4/29/2021	SM	KGC	32	40	Present	22	Absent
A2021NS053	4980 / 2865	4/29/2021	KB	KGC	40	40	Present	30	Absent
A2021NS053	4980 / 2870	4/29/2021	RP	KGC	34	40	Present	24	Absent
A2021NS053	4980 / 2875	4/29/2021	SM	KGC	56	40	Present	6	Absent
A2021NS053	4980 / 2880	4/29/2021	KB	KGC	32	40	Present	12	Absent
A2021NS053	4980 / 2885	4/29/2021	SAM	KGC	32	40	Present	12	Absent
A2021NS053	4980 / 2890	4/29/2021	SAM	KGC	42	40	Present	22	Absent

A2021NS053	4980 / 2895	4/28/2021	LR	KGC	50	40	Present	30	Absent
A2021NS053	4980 / 2900	4/28/2021	RP	KGC	42	40	Present	22	Absent
A2021NS053	4980 / 2905	4/28/2021	SM	KGC	50	40	Present	40	Absent
A2021NS053	4980 / 2910	4/28/2021	RP	KGC	34	40	Present	14	Absent
A2021NS053	4980 / 2915	4/28/2021	KB	KGC	45	40	Present	25	Absent
A2021NS053	4985 / 2820	4/29/2021	SAM	KGC	35	40	Present	25	Absent
A2021NS053	4985 / 2825	4/29/2021	LR	KGC	30	40	Present	10	Absent
A2021NS053	4985 / 2830	4/29/2021	KB	KGC	34	40	Present	24	Absent
A2021NS053	4985 / 2835	4/29/2021	RP	KGC	44	40	Present	20	Absent
A2021NS053	4985 / 2840	4/29/2021	SM	KGC	40	40	Present	30	Absent
A2021NS053	4985 / 2845	4/29/2021	RP	KGC	25	40	Present	15	Absent
A2021NS053	4985 / 2850	4/29/2021	KB	KGC	25	40	Present	15	Absent
A2021NS053	4985 / 2855	4/29/2021	RP	KGC	30	40	Present	25	Absent
A2021NS053	4985 / 2860	4/29/2021	LR	KGC	52	40	Present	30	Absent
A2021NS053	4985 / 2865	4/29/2021	SM	KGC	28	40	Present	20	Absent
A2021NS053	4985 / 2870	4/29/2021	KB	KGC	40	40	Present	30	Absent
A2021NS053	4985 / 2875	4/29/2021	SM	KGC	31	40	Present	19	Absent
A2021NS053	4985 / 2880	4/29/2021	SAM	KGC	42	40	Present	22	Absent
A2021NS053	4985 / 2885	4/29/2021	SM	KGC	38	40	Present	10	Absent
A2021NS053	4985 / 2890	4/29/2021	SAM	KGC	28	40	Present	18	Absent
A2021NS053	4985 / 2895	4/28/2021	LR	KGC	50	40	Present	40	Absent
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A2021NS053	4990 / 2825	4/29/2021	LR	KGC	35	40	Present	25	Absent
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A2021NS053	4990 / 2860	4/28/2021	SM	KGC	40	40	Present	30	Absent
A2021NS053	4990 / 2865	4/29/2021	KB	KGC	38	40	Present	30	Absent
A2021NS053	4990 / 2870	4/29/2021	RP	KGC	45	40	Present	34	Absent
A2021NS053	4995 / 2805	4/29/2021	SAM	KGC	30	40	Present	25	Absent
A2021NS053	4995 / 2810	4/29/2021	KB	KGC	22	40	Absent	Boulder	Absent
A2021NS053	4995 / 2815	4/29/2021	SAM	KGC	22	40	Absent	Boulder	Absent
A2021NS053	4995 / 2820	4/29/2021	LR	KGC	34	40	Present	24	Absent

A2021NS053	4995 / 2825	4/29/2021	SM	KGC	34	40	Present	30	Absent
A2021NS053	5000 / 2800	4/29/2021	SM	KGC	32	40	Absent	Boulder	Absent
A2021NS053	5000 / 2805	4/29/2021	LR	KGC	28	40	Absent	Water Influx	Absent
A2021NS054	6220 / 3355	4/27/2021	SAM	KGC	45	40	Present	35	Absent

General Stratigraphic Descriptions:

	Colour	*Matrix*	*Texture*	*Structure*	*Inclusions*
LFH	Blackish brown	Sandy Loam	Fine	Loose	Roots, leaves, organics
A	Dark brown	Sandy Loam	Medium	Med-Loose	Roots, pebbles
Ae	Grey	Silty Sand	Fine	Compact	Rootlets
B	Greyish brown	Sandy Loam to sandy clay	Medium	Med-Loose	Pebbles
C (Danesville)	Dark Brown	Sandy Loam	Fine-Medium	Compact	Some quartzite pebbles
C (Wolfville)	Reddish Brown	Sandy Loam	Fine-Medium	Compact	Some sandstone pebbles
Fill	Yellowish Brown	Silty Sand	Med-Coarse	Compact	Pebbles, stones

8.2 Heritage Research Permit Documents

NOVA SCOTIA

Heritage Research Permit (Archaeology)

Special Places Protection Act 1989

(Original becomes Permit when approved by Communities, Culture and Heritage)

Office Use Only
Permit Number:
A2021NS053

Greyed out fields will be made publically available. Please choose your project name accordingly

Surname Cigolotti | First Name Kyle

Project Name: Touqouy Gold Mine Archaeological Resource Impact Assessment 2021

Name of Organization: Cultural Resource Management Group Limited

Representing (if applicable): Atlantic Mining NS Inc.

Permit Start Date: 12 April 2021 | Permit End Date: 31 December 2021

General Location: Moose River Gold Mines, Middle Musquodoboit, Nova Scotia

Specific Location: *(cite Borden numbers and UTM designations where appropriate and as described separately in accordance with the attached Project Description. Please refer to the appropriate Archaeological Heritage Research Permit Guidelines for the appropriate Project Description format)*

505346.72 m E 4980910.74 m N

Permit Category:
Please choose one

- ☐ Category A – Archaeological Reconnaissance
- ☐ Category B – Archaeological Research
- ☑ Category C – Archaeological Resource Impact Assessment

☑ I certify that I am familiar with the provisions of the *Special Places Protection Act* of Nova Scotia and that I have read, understand and will abide by the terms and conditions listed in the Heritage Research Permit Guidelines for the above noted category.

Signature of applicant: Kyle Cigolotti | Date: 01 April 2021

Approved by Executive Director: Digitally signed by Christopher Shore Date: 2021.04.12 17:13:54 -03'00' | Date: April 12, 2021

NOVA SCOTIA

Communities, Culture & Heritage

1741 Brunswick Street
3rd Floor
P.O. Box 456
Halifax, NS
B3J 2R5

Tel: (902) 424-6475
Fax: (902) 424-0560

June 17, 2021

Kyle Cigolotti
Cultural Resource Management Group
Ten Mile House
Bedford, NS B4A 1E3

Dear Kyle Cigolotti:

RE: Heritage Research Permit Report
A2021NS053 Torquoy Gold Mine

We have received and reviewed the report on work conducted under the terms of Heritage Research Permit A2021NS053 for an archaeological resource impact assessment of the Torquoy Gold Mine in Halifax County, conducted by Cultural Resource Group Limited (CRM Group) on behalf of Atlantic Mining Nova Scotia Inc. (Atlantic Gold) in April 2021.

This ARIA consisted of a background study, Mi'kmaw engagement, archaeological reconnaissance, and subsurface testing. The study area was portions of an expansion of the Waste Rock Storage Area (WRSA) that overlapped a 50 m buffer of Square Lake, as well as an archaeological reconnaissance of a proposed Clay Borrow Pit. Although there are no registered archaeological sites in the area, this is likely due to a lack of archaeological survey in the area and not an absence of occupation by Indigenous Mi'kmaq peoples. The surrounding area is dense with lakes, ponds and watercourses that would have been important transportation corridors and resource bases for Mi'kmaq and their ancestors for millennia before the arrival of European Settlers. Euro-Canadian colonization began in the early 17th century and continued into the late 19th & early 20th centuries. By the mid-1860's the Moose River Area had been recognized as a logging district but had not been settled by Europeans, as there is no documentation and no historic maps of the area showing settlement. In 1866, gold was discovered in the bed of Moose River. This sparked a "gold rush" in the area, and Euro-Canadian presence increased dramatically.

A total of one hundred three (103) shovel tests were conducted in two (2) locations. One hundred two (102) tests were conducted within the WRSA study area, and one (1) shovel test was placed within the Clay Borrow Pit. No cultural materials were encountered in any of the shovel test pits. The Clay Borrow Pit study area has been deemed of low potential for encountering archaeological resources due to the rocky, wet, and sloped terrain the area sits within. Due presumably to historic logging activities in the area, the WRSA study area exhibited heavy disturbance from ground stripping and leveling, which has removed any archaeological potential. Field reconnaissance revealed no areas exhibiting moderate to high potential for encountering archaeological resources.

Based on the above, the ARIA concluded the study area was considered to exhibit low potential encountering archaeological resources. CRM Group recommends adhering to the recommendations below provided in the 2005, 2006, and 2008 reports, as well as offers the following recommendations for the subject study areas:

1. It is recommended that the proposed Clay Borrow Pit expansion study area, as defined in this report, be cleared of any requirement for further archaeological investigation.

2. It is recommended that the proposed Waste Rock Storage Area expansion study area, as defined in this report, be cleared of any requirement for further archaeological investigation.

3. It is recommended that no ground impacts occur within 50 metres of Moose River or Square Lake, outside of the study area tested in this report. Any unavoidable ground impacts within that area should be preceded by archaeological assessment, including shovel testing.

4. If any further changes are made to the layout of the mine and associated facilities beyond the area of previous archaeological assessment, it is recommended that those proposed areas be subjected to an Archaeological Resource Impact Assessment.

5. In the event that archaeological deposits or human remains are encountered during construction activities associated with the Touquoy Gold Mine, all work in the associated area(s) should be halted and immediate contact made with the Special Places Program (John Cormier: 902-424-6475).

CCH Staff agrees with the recommendations and finds the report acceptable as submitted. Please do not hesitate to contact me should you have any questions or concerns.

Sincerely,

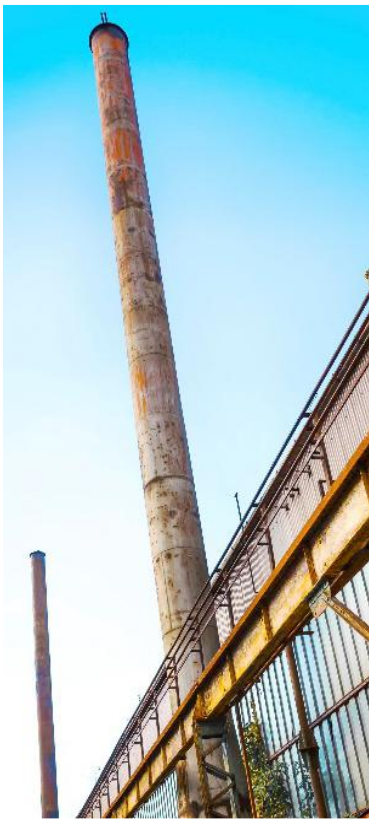
John Cormier
Coordinator, Special Places

APPENDIX C.2
VIEWSHED ANALYSIS, WASTE ROCK STORAGE AREA EXPANSION, TOUQUOY MINE

Viewshed Analysis

Waste Rock Storage Area Expansion
Touquoy Mine
Moose River Gold Mines, NS

Atlantic Mining NS Inc



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1. Introduction

Atlantic Mining NS Inc (Atlantic Mining) is currently operating the Touquoy Gold Mine at Moose River Gold Mines, Nova Scotia. The operation requires an expansion of the Waste Rock Storage Area (WRSA) at the existing location. The need for Viewshed Analysis on this site was first identified during the Environmental Assessment (EA) Focus Report conducted for The Touquoy Mine in 2007. The Terms of Reference for the Focus Report specifically requested the provision of "a visual impact assessment of the mine site on the [Focus Report Study Area] FRSA (including visual impacts from Scraggy Lake)", and to "provide mapping to indicate the range of mine site visibility and discuss potential effects". These parameters are carried forward to the current analysis in order to use the same impact assessment framework as was used in the original EA.

1.1 Description of the WRSA Expansion

The proposed WRSA expansion is required to create additional capacity for waste rock management associated with ongoing approved operations. The expanded WRSA will be in its current location; however the maximum elevation will be raised to 190 m (Figure 1).

1.2 Purpose of the Analysis

The purpose of this focused scoped viewshed assessment is to identify and evaluate the potential visual impacts of the proposed expansion of the Touquoy WRSA. This report shall be read in conjunction with the any plans, reports, or observations that accompany an application for expansion with the appropriate regulatory body.

The visual environment was identified as a Valued Component (VC) during the original EA. The expansion of the WRSA may result in changes to the landscape and scenery. The landscape is the visual presentation of an area of land. Scenery refers to the aesthetic qualities of the landscape.

Stakeholders may be concerned with the potential negative visual effects associated with the expansion of the WRSA at the mine. This analysis addresses the viewshed using a modelled approach. An aesthetic assessment of the scenery from observer locations may be undertaken from time to time to assess the validity of the model and assist in the consideration of mitigation options, if required.

Visual impacts refer to a change in the character and scenic value of the landscape and the effects of those changes on people. The direct visual impacts of any development will affect the landscape through intrusion or obstruction in some manner, the reactions of viewers, and the overall impact on visual amenity (Zhang *et al.* 2000). In the life of a project, many different sources of impact occur at different stages, such as development, operation, decommissioning and restoration. The erosion of scenic value can occur with changes in land use, including rapid or uncontrolled developments (Millward and Allen 1994).

2. Methodology

GHD has completed a viewshed analysis estimate of the potential impact on the visual environment with respect to the expansion of the WRSA. This assessment is strictly an estimate, given that visual assessment is an individual and subjective experience because it depends on preferences related to social conditioning, personal experience, temperament, sensibilities, and even formal artistic training (NSM 1996).

The visual impact assessment of a proposed development addresses three factors: spatial, quantitative and qualitative.

- ***Spatial*** includes where the development is visible from or, more specifically, what or whom it is visible to;
- ***Quantitative*** refers to how much of the development is visible, how much of the surrounding area is affected, and to what degree; and,
- ***Qualitative*** is the visual character of the development and its compatibility with its surroundings (Zhang *et al.* 2000).

Presently, there are no legislation for visual impact assessment in Nova Scotia or in Canada. The Province of British Columbia has created a Visual Impact Assessment Guidebook (BC Ministry of Forests, 2001) as a component of their Forest Practices Code. This guidebook primarily applies to forest harvesting activities, planning and development. The Canada Impact Assessment Agency provides a Case Study for a transportation corridor in its Cumulative Effects Assessment Practitioners Guide. While not directly relevant to mining projects, these guides were used to the extent possible for conceptual design of this assessment.

2.1 Data Development and Analysis Process

The analyses address the spatial aspect of the project within scope of the proposed WRSA expansion. GHD used Geographic Information System (GIS) software (ESRI ArcGIS© and ESRI Spatial Analyst©) to create projective and reflective mapping of the area. The focus of the viewshed analysis was directed to the south, which has a documented higher recreational value. The area near the south end of Lake Charlotte was not included in the data because this area is of lower elevation and more than 19 km from the mine site so will not be visible – anything seen from this distance would not be discernable from its surroundings.

Projective mapping (inside looking out) was initiated from a viewpoint on the WRSA to reveal the potential extent of visibility of the stockpile to the surroundings, and therefore, inferring from where the stockpile is potentially visible.

Reflective mapping was initiated from viewpoints in the surrounding landscape (outside looking in) and has the objective of determining whether and to what extent the development is visible from its surroundings.

The following assumptions and factors were built into the model.

- No vegetative cover within the mine boundaries as indicated by the current mine footprint and future WRSA expansion.
- Forest cover and vegetation height as per the current Nova Scotia Department of Lands & Forestry (NSDLF 2020) forest data.
- Complete (full height and footprint) of the WRSA development.
- No progressive reclamation of the WRSA.
- Observer viewing radius is 360 degrees.

Using these assumptions and factors, the model is intended to be a worst-case scenario, since the mine will be developed in a gradual manner over the Project duration and other factors such as viewing direction and weather can greatly affect what is seen. For example, a foggy or snowy day may result in less than 1 kilometre viewing distance over prolonged periods.

The Base DEM or terrain data was comprised of both LiDAR and NS Enhanced Topographic Database (NSETDB) (GeoNova 2020). The LiDAR data is gridded to 2 m pixels and supplemented, where LiDAR data is absent, with data modelled from the NSETDB elevation (5 m contours). The NSETDB was also gridded to 2 m pixels. Topographic data was mosaiced to create one data set that was clipped to the FRSA boundary used in the original analysis (CRA 2007). Most of the Tangier Grand Lake Wilderness Area was covered by the NSETDB.

The tallest mine site building (Mill Building 169 masl) was added to the model to provide site context in the analysis.

The viewshed analysis was run on a stockpile scenario of 190 masl elevation based on a similar footprint to what has already been approved.

The Forest Inventory database (NSDLF 2020) provides the forest height information. The heights were gridded at the same resolution as the DEM (2 m) and added to the Base DEM to provide the data for analysis. Completing the analysis on the Base DEM would provide a worst case scenario in viewshed analysis the only barriers to the view would be topography, distance and the curvature of the earth. Adding the Forest height data provides additional screening between the observer and the Project.

The ArcGIS (ESRI 2019) tool *Visibility* was used to determine the surface locations visible to a set of observer features. Each Observer location was analyzed independent of other locations.

Projective mapping (inside looking out) was initiated from a viewpoint on the stockpile to reveal the potential extent of visibility of the stockpile to the surroundings, and therefore, inferring from where the stockpile is potentially visible.

The analysis does not consider the curvature of the earth and thus provides a worst-case scenario for visibility in this application. Consider that the top of the WRSA is at least 15 km from the furthest Observation points used, then it is unlikely that if the WRSA could be visible from this distance it would likely be below the horizon. For an observer standing on the ground with a height of 1.5 m (5 ft), the horizon would be at a distance of 4.37 km. For an observer standing on the ground with a height of 1.85 m (6 ft), the horizon would be at a distance of 4.85 km (Line of Sight Calculator 2020).

2.2 Viewshed Scenarios

Road access within the FRSA (54,337 ha) is limited. Except for perimeter access from the east (Mooseland Road), south (Highway 7) and north (Moose River and Caribou Roads), the area is only accessible by unnamed loose surface resource roads and by water. The Tangier Grand Lake Wilderness Area (16,040 ha) is located in the southern portion of the FRSA and a portion of Ship Harbour Long Lake Wilderness Area (11,360 ha) spans the central portion of the FRSA just south of the mine. The whole FRSA landscape consists of lakes of all sizes (12 % of FSA) including the largest - Lake Charlotte (1555 ha, 11 km SW of the site), Tangier Grand Lake (698 ha, 10 km S), and Scraggy Lake (700 ha, 150 m S).

Considering the recreational potential and documented use of the area, the viewshed analysis was based on viewpoints placed in the following scenarios (Table 2.1) for reflective mapping.

Table 2.1 Viewshed Scenarios and Observer Locations

Scenario	Location	Activity	Viewer Height	Figure No.	Comment
1	Scraggy Lake - 1	Canoeing	0.7 5m	3	Specified in Focus Report TOR
2	Scraggy Lake - 2	Canoeing	0.75 m	4	Specified in Focus Report TOR
3	Tangier Grand Lake	Canoeing	0.75 m	5	Analysis based on recreational value
4	Lake Charlotte	Boating	0.75 m	6	Analysis based on recreational value
5	Camp Kidston	Camping	1.5 m	7	Analysis based on recreational value
6	Tangier Grand Lake Wilderness Area	Camping	1.5 m	8	Analysis based on recreational value
7	Mooseland Road	Driving	1.5 m	9	Analysis based on recreational value
8	Moose River	Canoeing	0.75 m	10	Analysis based on recreational value

Viewing heights for the canoeing/boating activity locations were set at 0.75 m (sitting in the boat) above the topographic height, and for the vantage point on Mooseland Road, the Tangier Grand Lake Wilderness Area, and the waste rock storage pile, 1.5 m (child or person of average height) was used.

2.3 Limitations

A GIS-generated viewshed analysis has been conducted to assess potential visual impacts to resources that are located near the site. The analysis was based on the parameters of the proposed WRSA expansion, and the topography and forest height within the FRSA. The projected viewsheds as indicated in yellow on the enclosed maps have not been field verified from any of the observer locations.

A digital viewshed analysis is only as good as the data and methods that are used. Every effort is made to include the most up-to-date and accurate data that have the most relevant resolution for the task. The forest data was last updated more than 10 years ago so heights may be higher in 2020, especially in younger forests, thereby further masking the WRSA from an observer. Forest harvesting occurs regularly and therefore the height information may not accurately reflect the current situation.

LiDAR does provide a highly accurate terrain (1 m resolution), while the NSETBD is modelled on 5 m contours which will tend to smooth local features, but regional terrain features are maintained when gridded to 2 m.

The method used is an off the shelve ArcGIS solution. Other methods or tools may provide similar or differing results depending on application and data requirements.

3. Results

3.1 Projective Mapping

From the vantage point at the top of the WRSA (190 m) looking out (projective) (Figure 2), the analysis has determined that none of the surrounding mine site is visible. However, except for areas of Scraggy Lake and some open forest cuts west of Ship Harbour Long Lake and Lake Charlotte (364 ha of open ground or water visible), most of what is predicted to be seen from the WRSA are the tops of the forest canopy (4223 ha) within the FRSA. Visible open areas and water account for 0.67% of the FRSA.

3.2 Reflective Mapping

Figures 3 to 10 represent the results of viewshed analysis for a canoeist/boater on Scraggy Lake, Tangier Grand Lake, Lake Charlotte and Moose River and to a standing hiker or camper at Tangier Grand Lake Wilderness Area, Camp Kidston and Mooseland Road. Viewpoints were chosen to give the longest open view across water or a cleared area. In all cases the low vantage point and the height of trees surrounding the lakes and rivers, effectively screen the view.

The observer locations/viewpoints are summarized below.

Scenarios 1 & 2 – Scraggy Lake

A canoeist north of the narrow channel between the two larger sections of Scraggy Lake (Figure 3) will be able to see clearly up the lake to the Tailings Facility and some parts of the Processing/Admin area. The WRSA can be seen from this location however only the top of the south side is visible. Of the 123 ha visible from this vantage point, 93% of the view is of the lake or the forest surrounding the lake.

Moving to the southern body of water in Scraggy Lake (Figure 4), the vantage point depicted is not visually impacted by the mine development. The areas that may be visible (108 ha) are the lake – including some near shore forest (97 ha) and tree canopy (10 ha). Less than 1 ha of the top of the WRSA is visible.

Scenario 3 – Tangier Grand Lake

Tangier Grand Lake, located in the Tangier Grand Lake Wilderness Area (see Scenario 6) 15 km south of the WRSA, shows a viewpoint (Figure 5) with a long view axis that looks roughly west. The analysis for the WRSA predicts 236 ha will be visible (lake/ surrounding trees - 211 ha; tree canopy – 25 ha). Most of the visible canopy is less than 10 km from the observer's location and the WRSA is not visible.

Scenario 4 – Lake Charlotte

The observer location was chosen to provide the longest vista along the length of Lake Charlotte (Figure 6). The long axis, however, is not oriented in the direction of the mine, so limitations to the length of the viewshed are expected to be screened by nearshore forests. Due to the size of Lake Charlotte (1555 ha, <3% of the study area), an extensive portion of the lake/surrounding trees (529 ha) is visible within in a viewshed of 607 ha. The viewpoint is not impacted by the WRSA that is approximately 16 km to the north.

Scenario 5 – Camp Kidston

Camp Kidston is a United Church of Canada summer camp located on the north end of Long Lake, approximately 3.4 km from the Mine site and 4 km from the WRSA. Projective mapping does not indicate that the Camp can be seen from the WRSA; however, for completeness it is included since it is the single largest establishment of its kind in proximity of the mine site. The camp consists of a lodge, cabins, washhouse, and staff quarters located on the edge of an open field at that extends to the shoreline. The observer location is placed high on the field next to a cabin (Figure 7). The visible areas from the viewshed analysis show that only the lake and some near tree canopy is visible. The viewpoint is not impacted by the WRSA scenario and as mentioned above is not expected to be from any location on the camp property.

Scenario 6 – Tangier Grand Lake Wilderness Area

The Tangier Grand Lake Wilderness Area (16,040 ha) is a largely inaccessible area in the southeast quarter of the FRSA. Only a few cart roads or trails are depicted in the provincial 10,000-scale mapping. A review of aerial photography (Bing and Google Maps) confirms that there are few visible access roads and by many community accounts the hiking trails are limited in number as well. The Wilderness Area is considered to require a higher degree of camping/hiking skill and the draw is mostly for paddlers, however, campers are known to enjoy the ruggedness of the Area. For this scenario, a wilderness camper is the observer located on a viewpoint on the highest ground in the largest open area depicted south of Tangier Grand Lake. From this viewpoint (Figure 8) a person may have an open view (88 ha viewshed) for several kilometres – mainly in a northerly direction. Very little of the Wilderness Area is open ground or cleared, other than the lakes. While much of the immediate area is visible to this point only tree canopy is visible up to 10 km to the north. The observer might see the WRSA; however, the area seen in both is less than 0.5 ha. This viewpoint which is located 17 km SE of the mine, is not visually impacted by the WRSA since anything seen from this distance would not be discernable from its surroundings on the horizon.

Scenario 7 – Mooseland Road

Mooseland Road (Figure 9), for the most part, is a 25 m wide open swath of road in the forest. The observer's angle of line of sight with respect to their surroundings (*i.e.* to tops of trees) would be steep at the sides of the road and therefore provide a very limited viewscape. The angle of the observer's line of sight would be shallower depending on the length of the straightest stretch of road. From this observer location 53 ha is visible and the top and east side of the WRSA (3.5 ha) is visible. It is predicted that any viewpoint chosen along this road, depending on the elevation and openness of the surroundings would warrant the same results. The viewpoint chosen, north of the village of Mooseland on the edge of the FRSA, is within the observer's viewshed; however given the small amount of area visible, it is unlikely that the scene will be visually impacted by the proposed WRSA scenario.

Scenario 8 – Moose River

A canoeist, on a wide part of Moose River (Figure 10) north of the mine site, may have a very narrow view into the development for a short period while paddling or drifting southward (downriver). Most of the result of the viewshed is along the linear axis of the river and to the northwest. The angle of the vantage point to the surrounding trees has nearly completely insulated the viewpoint and the viewshed is negligible at the depicted scale for the WRSA scenario.

3.3 Comparison of Results

The results of the 2021 analysis were compared with the 2007 results to show the difference in visibility of the WRSA. The summary of the results is presented in Table 3.1. Note that the Mooseland Road location is different in both analytical years and Camp Kidston was not analyzed in 2007. Since Mooseland Road is a linear feature, visibility may be impacted or not impacted depending on the viewer's location and sight line conditions with respect to either revised WRSA plan.

Table 3.1 Summary of WRSA visibility from Observer Locations 2007 and 2021 Analytical Results

Scenario/Location		2007 Analysis WRSA 165 m	2021 Analysis WRSA 190 m
1	Scraggy Lake - 1	Visible / Moderate impact	Visible / High Impact
2	Scraggy Lake - 2	Not visible /no impact	Visible / Low impact
3	Tangier Grand Lake	Not visible /no impact	Not visible /no impact
4	Lake Charlotte	Not visible /no impact	Not visible /no impact
5	Camp Kidston	Not analyzed	Not visible /no impact
6	Tangier Grand Lake Wilderness Area	Visible / not discernable /no impact	Visible / not discernable / low impact
7	Mooseland Road	Not visible /no impact	Visible / Low-moderate impact
8	Moose River	Not visible /no impact	Not visible /no impact

The observer locations that may have a change in impact as a result of a proposed higher WRSA are Scraggy Lake 1 & 2 and Mooseland Road (especially in closer approaches for the road to the WRSA).

4. Summary

The analysis assumes the full height (190 m scenario) and footprint of the WRSA in the current conditions (terrain, tree height). Based on this scenario the waste pile may be visible from very few remote vantage points and may only be in view close to the actual development. The FRSA is heavily forested, and has been and continues to be subject to logging by various factions over. The viewshed analysis is based on forest heights form the currently available data but conditions could change over time as forested areas are harvested and the forest regenerates. Also, stand heights may increase over time, thereby limiting visual impact. Viewsheds may only consist of tree canopy and any changes (*e.g.* growth, logging, and other development) may alter the predicted effect.

Given the current conditions, it is expected that the proposed WRSA expansion will visually impact less than two percent of the FRSA. Given the distance from the mine of most of the observer locations analyzed the WRSA may be in the viewshed but may not be discernable on the horizon from other features. Areas of Scraggy Lake and Mooseland Road may have a viewshed that includes the WRSA depending on the observer's location and thus these closer areas may have impacts to a viewer.

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All of Which is Respectfully Submitted,

GHD

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Project Manager

Peter Oram, P.Geo.
Senior Reviewer

Paper Size ANSI A

0 175 350 525 700

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983 CSRS
Grid: NAD 1983 CSRS UTM Zone 20N

N

GHD

ATLANTIC MINING NS CORP
TOUQUOY MINE
WASTE ROCK STORAGE AREA EXPANSION

SITE PLAN

Project No. **820933-02**
Revision No. **-**
Date **16/03/2021**

FIGURE 1

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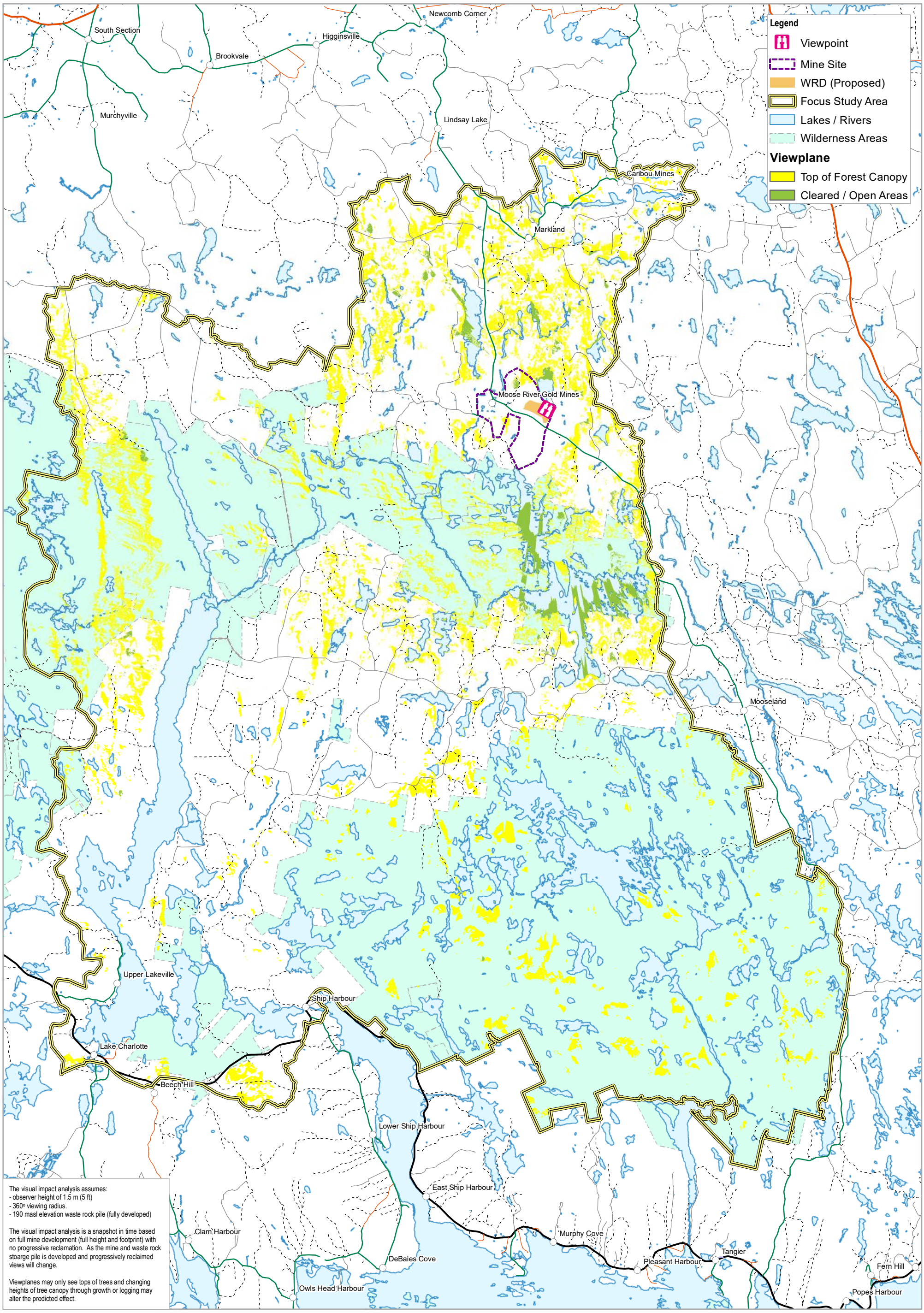

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GHD

ATLANTIC MINING NS INC
TOUQUOY MINE
WASTE ROCK STORAGE AREA EXPANSION

VIEWSHED ANALYSIS
STOCKPILE OBSERVER
WRSA - 190 M ELEVATION

Project No. **820933-02**
Revision No. **-**
Date **17/03/2021**

FIGURE 2

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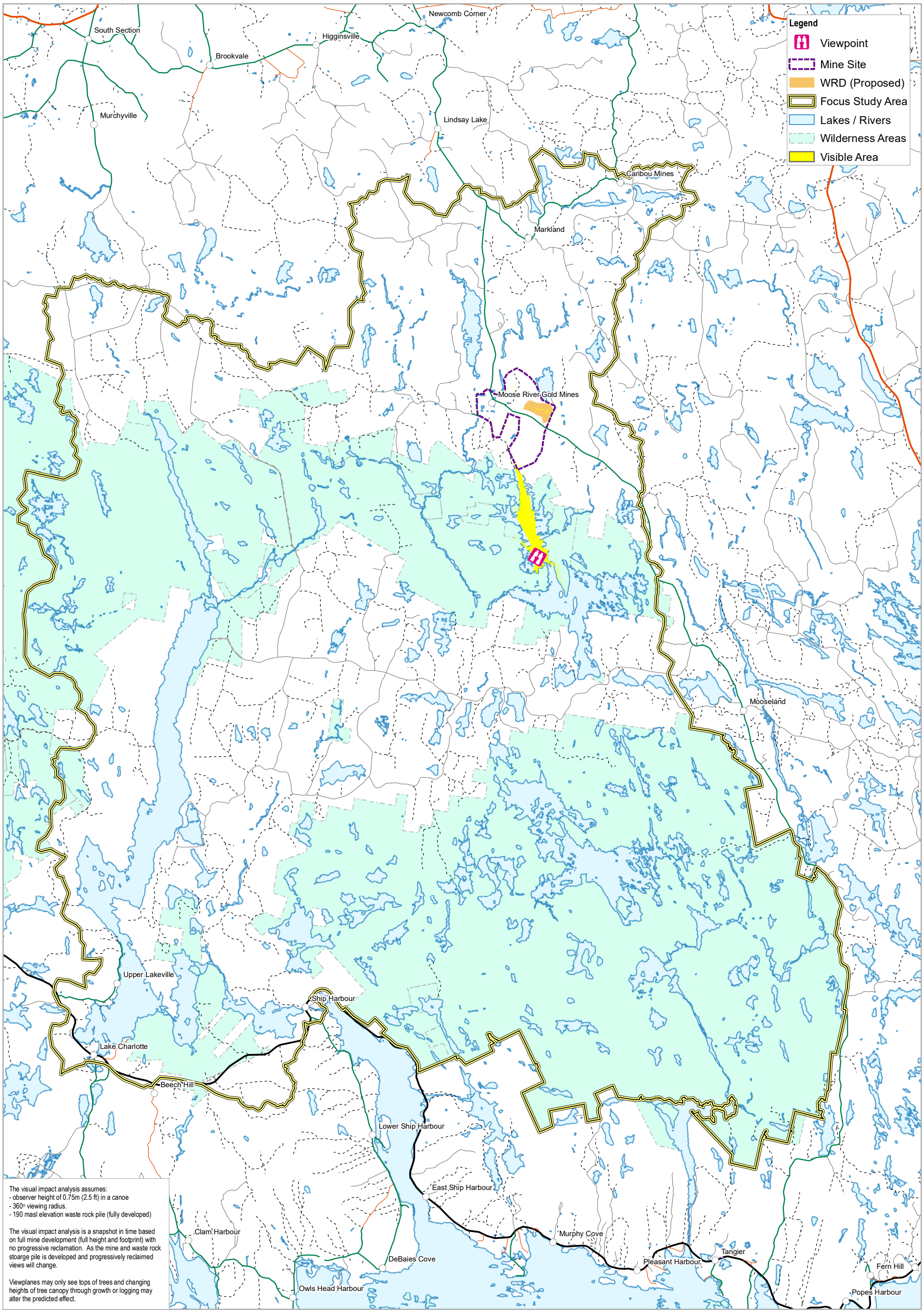

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ATLANTIC MINING NS INC
TOUQUOY MINE
WASTE ROCK STORAGE AREA EXPANSION

VIEWSHED ANALYSIS
SCRAGGY LAKE OBSERVER 1
WRSA - 190 M ELEVATION

Project No. **820933-02**
Revision No. **-**
Date **17/03/2021**

FIGURE 3

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ATLANTIC MINING NS INC
TOUQUOY MINE
WASTE ROCK STORAGE AREA EXPANSION

VIEWSHED ANALYSIS
SCRAGGY LAKE OBSERVER 2
WRSA - 190 M ELEVATION

Project No. **820933-02**
Revision No. **-**
Date **17/03/2021**

FIGURE 4

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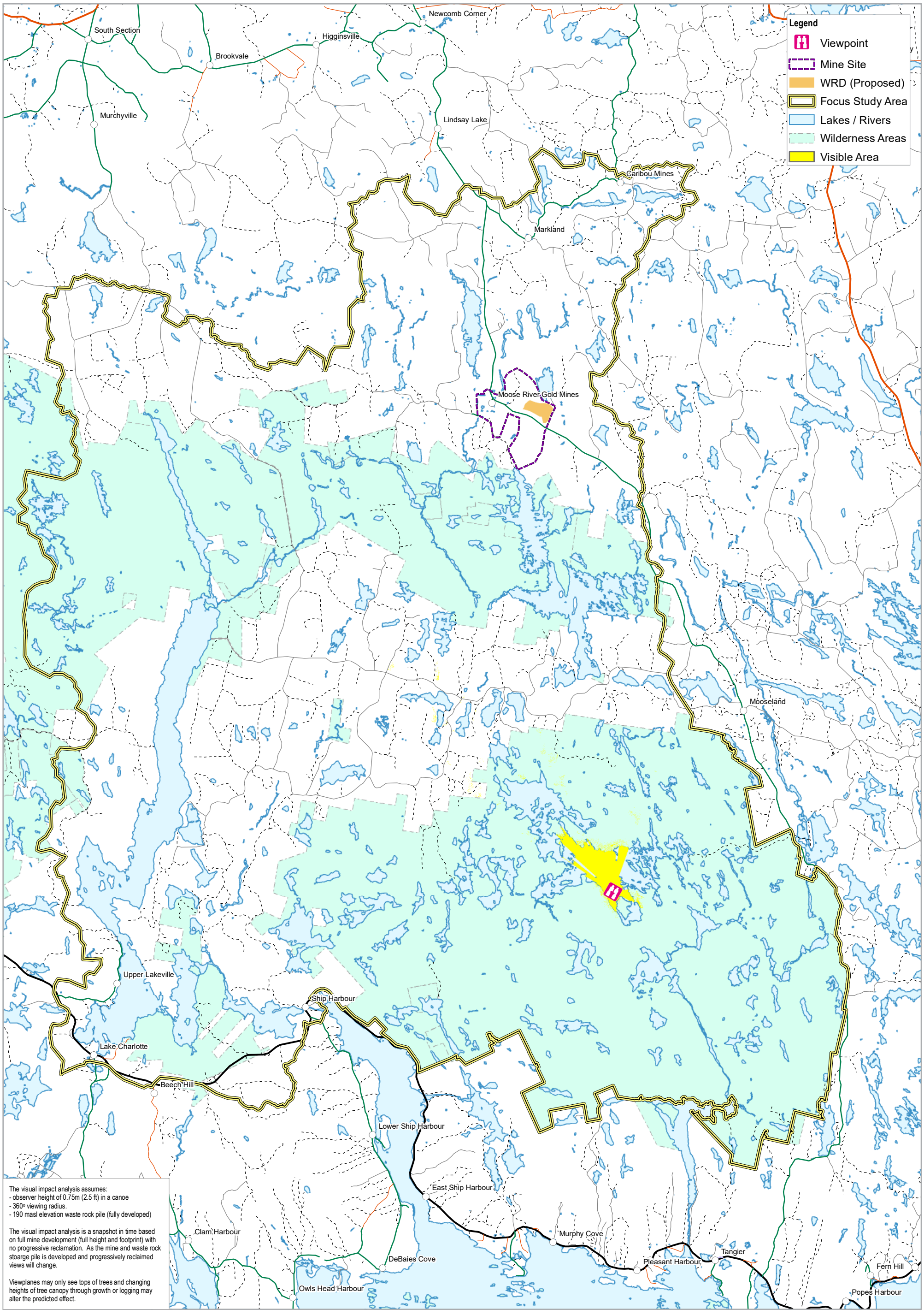

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ATLANTIC MINING NS INC
TOUQUOY MINE
WASTE ROCK STORAGE AREA EXPANSION

VIEWSHED ANALYSIS
TANGIER GRAND LAKE OBSERVER 1
WRSA - 190 M ELEVATION

Project No. **820933-02**
Revision No. **-**
Date **17/03/2021**

FIGURE 5

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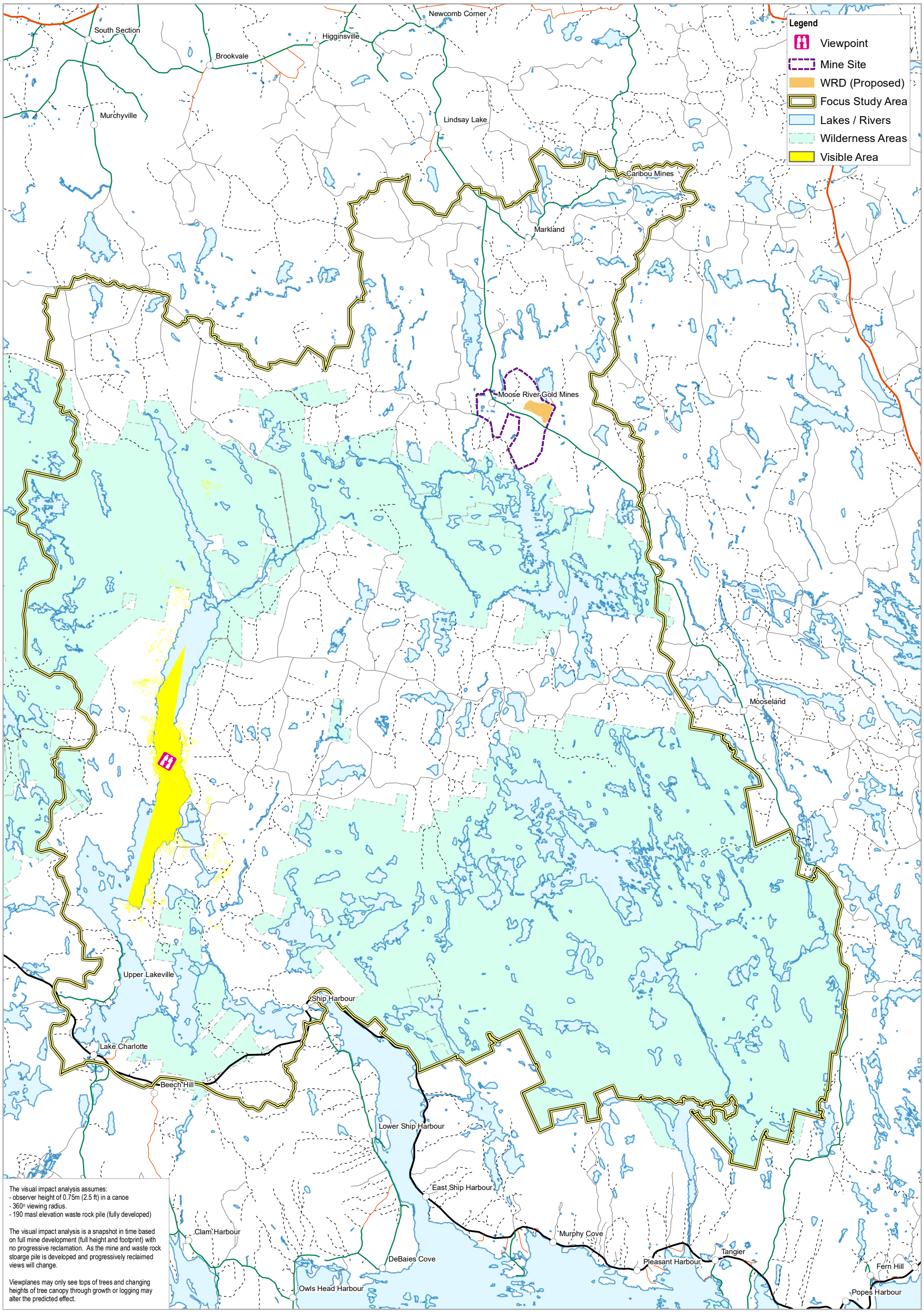

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ATLANTIC MINING NS INC
TOUQUOY MINE
WASTE ROCK STORAGE AREA EXPANSION

VIEWSHED ANALYSIS
LAKE CHARLOTTE OBSERVER
WRSA - 190 M ELEVATION

Project No. **820933-02**
Revision No. **-**
Date **17/03/2021**

FIGURE 6

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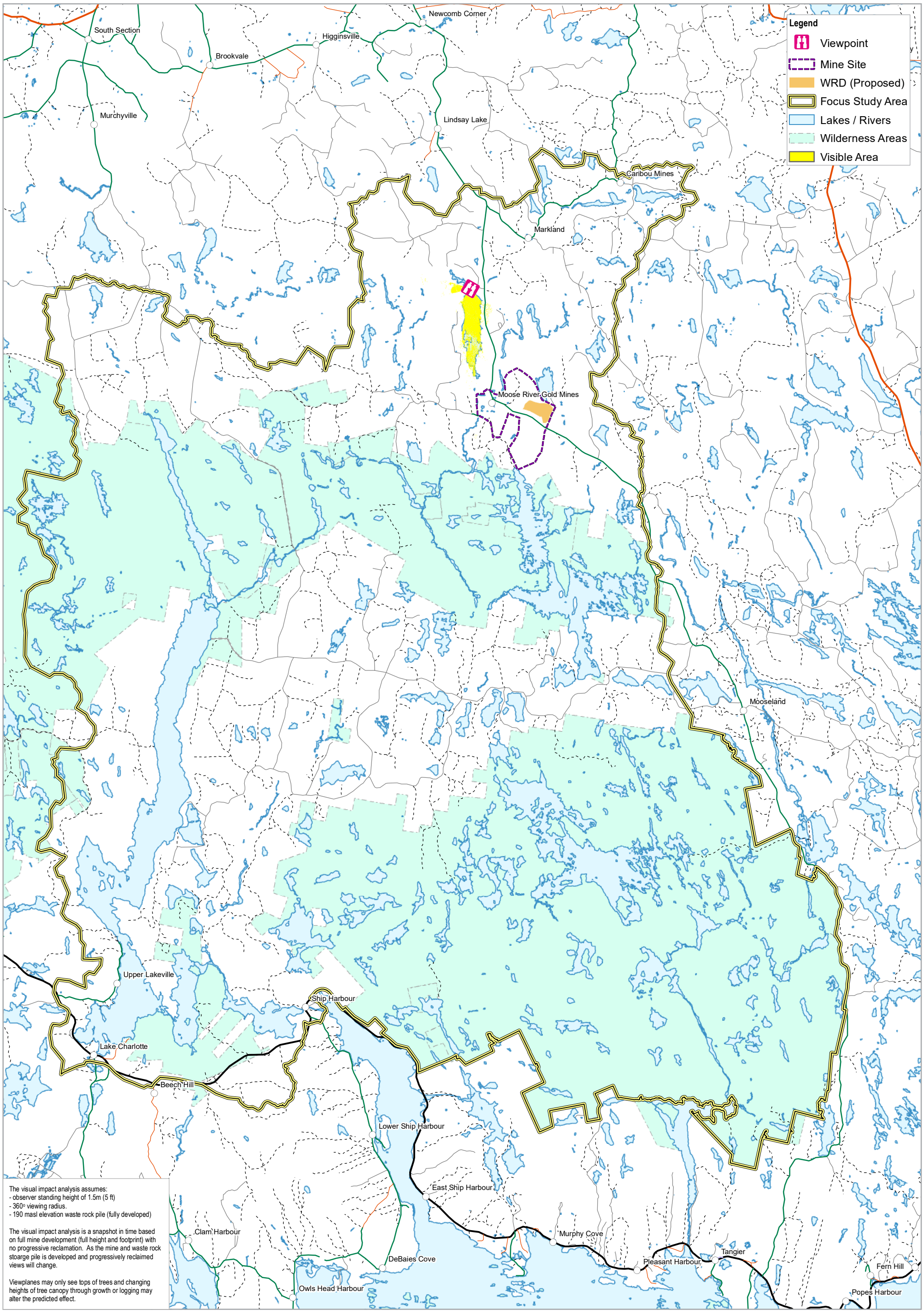

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ATLANTIC MINING NS INC
TOUQUOY MINE
WASTE ROCK STORAGE AREA EXPANSION

VIEWSHED ANALYSIS
CAMP KIDSTON OBSERVER
WRSA - 190 M ELEVATION

Project No. **820933-02**
Revision No. **-**
Date **17/03/2021**

FIGURE 7

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ATLANTIC MINING NS INC
TOUQUOY MINE
WASTE ROCK STORAGE AREA EXPANSION

VIEWSHED ANALYSIS
TANGIER GRAND LAKE OBSERVER 2
WRSA - 190 M ELEVATION

Project No. **820933-02**
Revision No. **-**
Date **17/03/2021**

FIGURE 8

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ATLANTIC MINING NS INC
TOUQUOY MINE
WASTE ROCK STORAGE AREA EXPANSION

VIEWSHED ANALYSIS
MOOSELAND ROAD OBSERVER
WRSA - 190 M ELEVATION

Project No. **820933-02**
Revision No. **-**
Date **17/03/2021**

FIGURE 9

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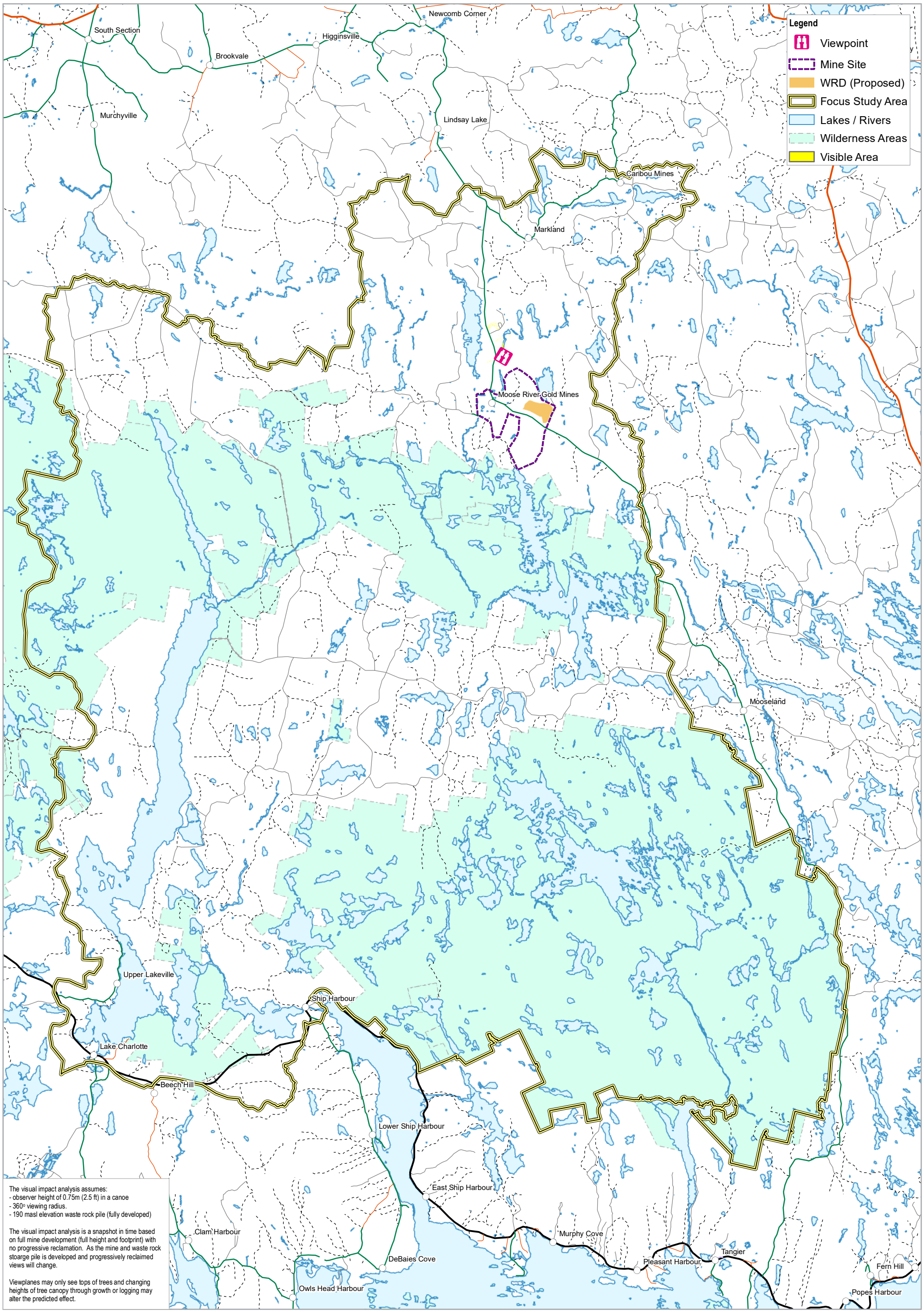

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ATLANTIC MINING NS INC
TOUQUOY MINE
WASTE ROCK STORAGE AREA EXPANSION

VIEWSHED ANALYSIS
MOOSE RIVER OBSERVER
WRSA - 190 M ELEVATION

Project No. **820933-02**
Revision No. **-**
Date **17/03/2021**

FIGURE 10

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