ATLANTICGOLD

Appendix N.1

Archaeological Assessment
Beaver Dam Mine Site

CONESTOGA-ROVERS & ASSOCIATES

BEAVER DAM GOLD PROJECT
ARCHAEOLOGICAL ASSESSMENT
HALIFAX REGIONAL MUNICIPALITY, NOVA SCOTIA

FINAL REPORT

Submitted to:
Conestoga-Rovers & Associates
and the
Special Places Program of the Nova Scotia Department of Communities, Culture and Heritage

Prepared by:
Cultural Resource Management Group Limited
6040 Almon Street
Halifax, Nova Scotia
B3K 1T8

Consulting Archaeologist: Kathryn J. Stewart
Report Preparation: Kathryn J. Stewart & Kyle G. Cigolotti

Heritage Research Permit Number: A2014NS101

CRM Group Project Number: 2014-0015-01

MARCH 2015

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 Consequently, the report must not be published or made public without the written consent of Nova Scotia's Coordinator of Special Places Program, Department of Communities, Culture and Heritage.

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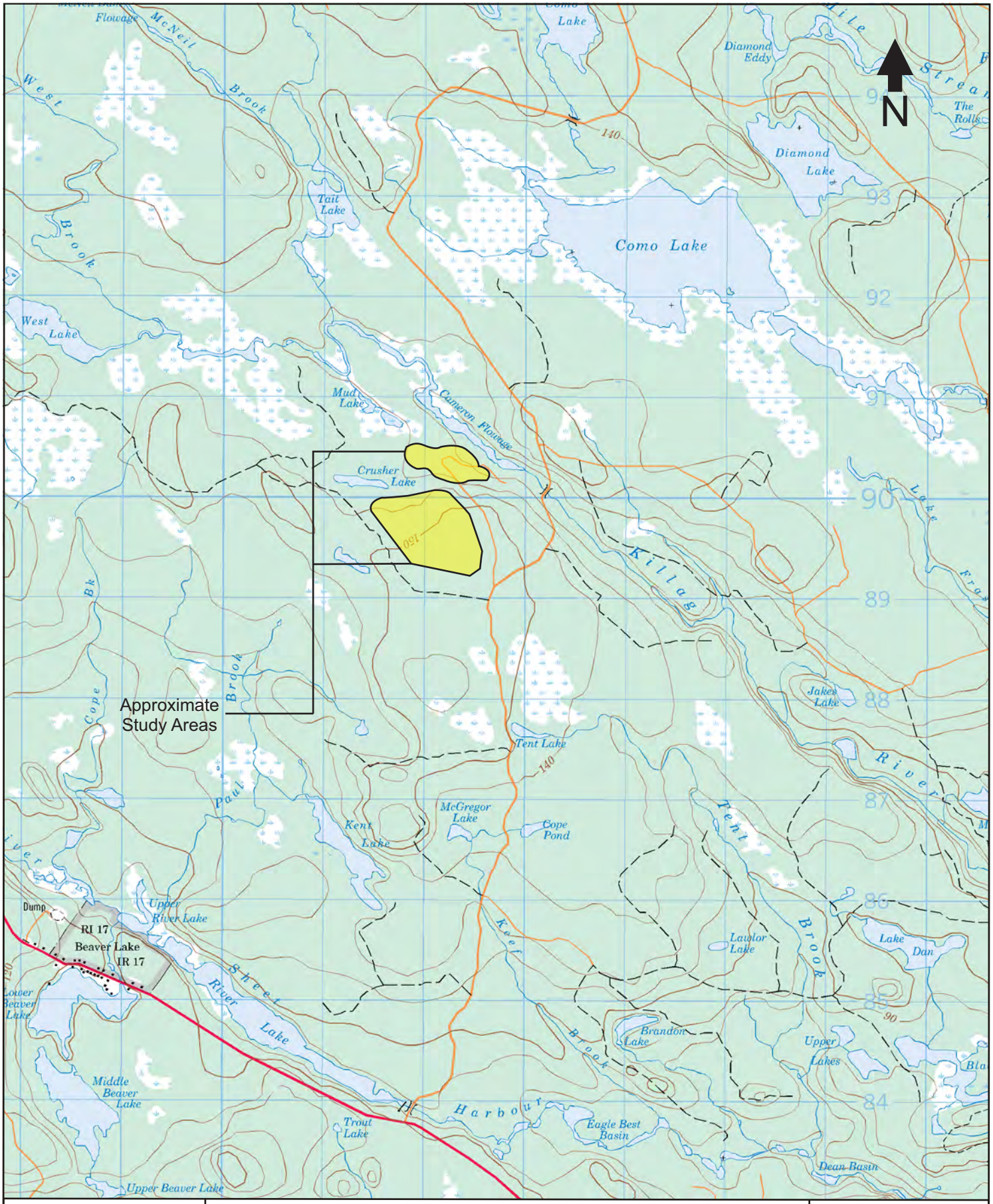
1.0 INTRODUCTION

Atlantic Gold Corporation (Atlantic Gold) is proposing to develop the Beaver Dam Gold Project located in the north-eastern corner of Halifax Regional Municipality, approximately 21 kilometres northwest of Sheet Harbour (***Figures 1 & 2***). The present assessment builds upon the research and reconnaissance of the Beaver Dam property on behalf of Acadian Mining (Acadian) undertaken by Cultural Resource Management (CRM) Group in 2008 (Beanlands 2008). Atlantic Gold is proposing to develop an open pit, as well as establish a waste rock storage pile (WRSP) and a crusher location.

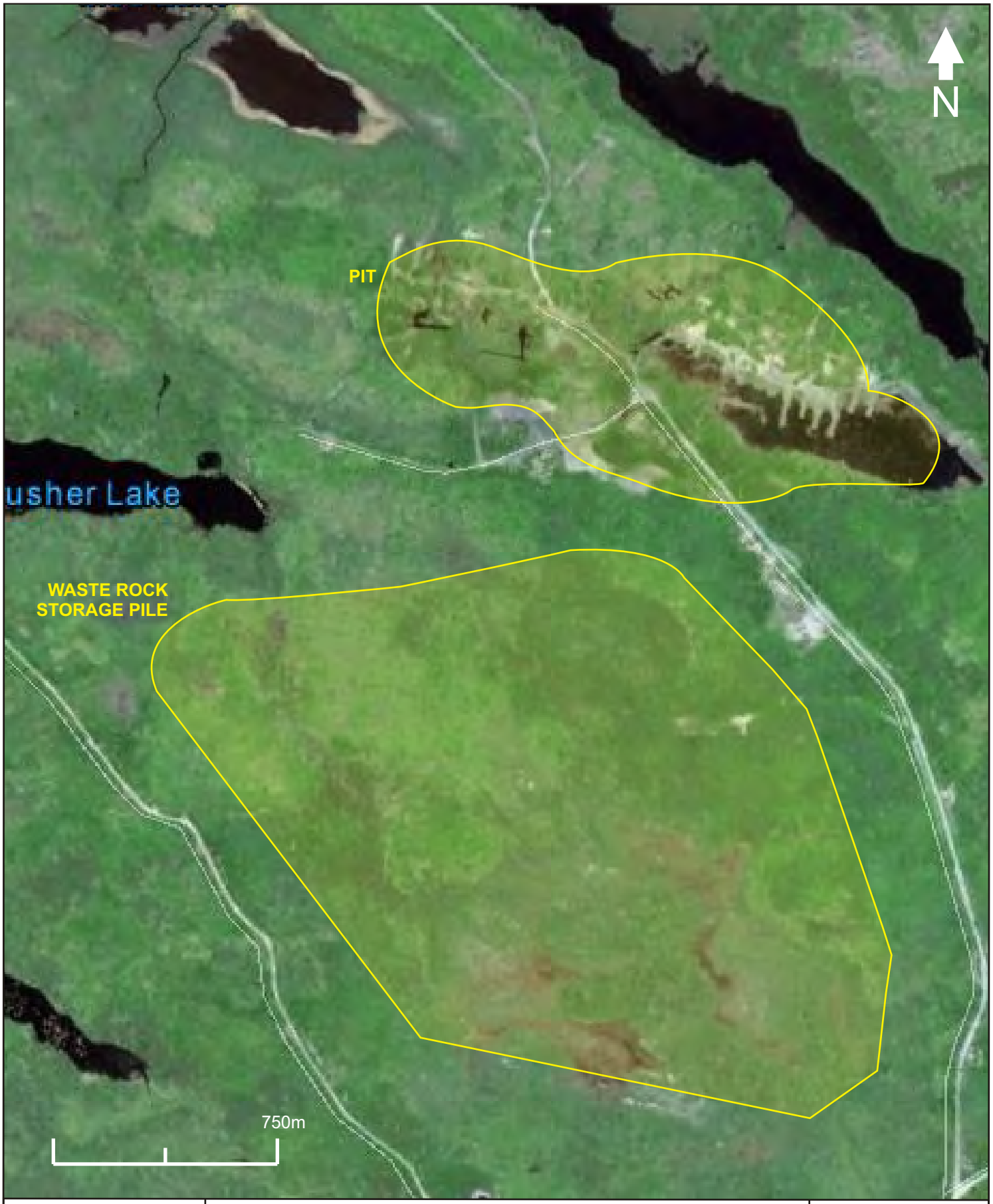
In order to investigate the potential for encountering archaeological resources during any redevelopment of the facility, CRM Group was retained by Conestoga-Rovers & Associates (CRA) on behalf of Atlantic Gold to undertake archaeological screening and reconnaissance of the proposed mine expansion and conduct limited shovel testing where proposed development overlapped with previously identified archaeological features. However subsequent changes to the project study area removed from consideration the area of identified archaeological features that were to be shovel tested.

The fieldwork was undertaken by Staff Archaeologist, Kathryn J. Stewart with the assistance of W. Bruce Stewart, President and Senior Technical Advisor of CRM Group.

The archaeological investigation was conducted according to the terms of Heritage Research Permit A2014NS101 (Category 'C'), issued to K. Stewart through the Special Places Program (SPP). In addition to the elimination of the requirement for shovel testing, the proposed location of the crusher site was also modified so that it now falls within the overall area of the WRSP. This report describes the archaeological assessment of the proposed redevelopment area, presents the results of these efforts and offers cultural resource management recommendations.



CRM Group Cultural Resource Management Group Ltd.	*Approximate Study Areas*	*Figure 1*
	BEAVER DAM GOLD PROJECT ARCHAEOLOGICAL ASSESSMENT HALIFAX REGIONAL MUNICIPALITY	March 2015 Scale 1:50 000



CRM Group Cultural Resource Management Group Ltd.	*Pit and Waste Rock Storage Pile*	*Figure 2*
	BEAVER DAM GOLD PROJECT ARCHAEOLOGICAL ASSESSMENT HALIFAX REGIONAL MUNICIPALITY	March 2015

2.0 STUDY AREA

The Beaver Dam Gold Project property is located on the western side of Killag River in the northeastern corner of Halifax Regional Municipality, approximately 21 kilometres northwest of Sheet Harbour (***Figure 1***). The property comprises the historic Beaver Dam Gold District situated between Crusher Lake and Cameron Flowage (***Figure 2; Plate 1***). The study area, consisting of proposed pit and WRSP, covers an area of approximately 87 hectares. Access to the property can be gained by following Highway 224 approximately 17 kilometres northwest from Highway 7 to Beaver Dam Mines Road, then following Beaver Dam Mines Road north.

PLATE 1: Abandoned mining pit within the Beaver Dam Gold Project area; facing southeast. October 21, 2014.

3.0 METHODOLOGY

CRA retained CRM Group to undertake archaeological reconnaissance of the Beaver Dam study area. To address the potential of encountering significant archaeological resources within the study area, CRM Group developed a work plan consisting of the following components: review relevant site documentation to develop archaeological potential model (screening); archaeological reconnaissance of the area(s) to be impacted by development activities; and, prepare a report summarizing the results of the background research, and field survey, as well as recommend strategies for assessment and management of areas exhibiting high archaeological potential and/or features.

3.1 Background Research

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. To achieve this goal, CRM Group utilized the resources of various institutions including documentation available through Nova Scotia Archives, the Department of Natural Resources (DNR) and Crown Land Information Management Centre.

The background study included a review of relevant historic documentation incorporating land grant records, legal survey and historic maps, as well as local and regional histories. Topographic maps and aerial photographs, both current and historic, were also used to evaluate the study area. This data facilitated the identification of environmental and topographic features which would 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 reconnaissance, the information obtained from this suite of research materials was reviewed to facilitate the interpretation of any archaeological features encountered within the study area.

3.2 Field Reconnaissance

The goals of the archaeological field reconnaissance were to conduct visual inspection of the study areas, document any areas of archaeological sensitivity or archaeological sites identified during the course of visual inspection, and design a strategy for testing areas of archaeological potential, as well as any archaeological resources identified within the study areas. Although the ground search did not involve sub-surface testing, the researchers were alert for topographic or vegetative anomalies that might indicate the presence of buried archaeological resources. The process and results of the field reconnaissance were documented in field notes and photographs.

A hand-held Global Positioning System (GPS) unit was used to record UTM coordinates (NAD 83) for all survey areas, as well as any identified diagnostic artifacts, formal tools, isolated finds and site locations.

4.0 RESULTS OF SCREENING AND RECONNAISSANCE

4.1 Background Study

The following discussion details the environmental and cultural setting of the study 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.

4.1.1 Environmental Setting

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

Water Sources

The Beaver Dam Development property is drained by way of the Killag River, a tributary of West River Sheet Harbour that flows south across the eastern portion of the study area. The Killag River has been dammed creating a reservoir along the eastern edge of the study area, known as Cameron Flowage. The dam is located at the southeastern end of Cameron Flowage. Several small lakes also fall in close proximity to the study area, including Crusher Lake and Mud Lake. Proximity to water, for both drinking and transportation, is a key factor in identifying Precontact and historic Native, as well as early Euro-Canadian, archaeological potential.

Topography

The study area is located within the greater terrestrial region known as the Atlantic Interior – Quartzsite Barrens (Guysborough) Unit (Davis & Browne 1996: 134). The bedrock-dominated topography can be generally described as undulating to rolling. Elevation within the study area ranges from approximately 109 metres to 171 metres above sea level. Low-lying areas are typically swampy. Elevated areas within the study area may have provided important vantage points for viewing the surrounding region and for sighting large game. The Beaver Dam Gold Project property is located within the Goldenville Group of the Meguma terrane of Nova Scotia, a sequence of Cambro-Ordovician-aged metasedimentary rocks and Devonian-aged granitoid intrusives. Gold deposits are present throughout much of the exposed stratigraphy of the Goldenville Group (Sangster & Smith 2007).

Soils

The Beaver Dam area is covered primarily by *Halifax* series (ST2, ST14) soils, although concentrations of *Bridgewater* (ST2 and ST8) and *Aspotogan* (ST4) series soils and peat are also found within the study area. *Halifax* soils are well drained but typically shallow, stony and porous. The parent material is olive to yellowish-brown sandy loam to gravelly sandy loam glacial till derived primarily from quartzite. In general, *Halifax* soils are too stony for agriculture (MacDougall *et. al.* 1963: 32-33). The well-drained *Bridgewater* soils are developed from a medium-textured, olive coloured glacial till that is derived principally from Precambrian slates. The *Bridgewater* soils in the Beaver Dam area are moderately stony and unsuitable for cultivation (MacDougall *et. al.* 1963: 28). *Aspotogan* soils are described as a dark grayish brown sandy loam overlaying and mottled with a dark reddish brown sandy loam. The soil has poor drainage and is considered too stony for cultivation. The parent material is an olive stony loam till derived from quartzite or granite (MacDougall *et. al.* 1963: 35)

Vegetation

The forest growth within this ecological region includes Balsam Fir, Red Spruce, White Spruce, Eastern Hemlock and Yellow Birch. Slow-moving streams are bordered by broad swampy areas populated with

Balsam Fir, Red Maple and Black Spruce. The nature of the soils found within the study area does not encourage heavy forest growth (Davis & Browne 1996: 56-57).

4.1.2 Native Land Use

The land within the study area was once part of the greater Mi'kmaq territory known as *Eskikewa'kik*, meaning 'skin dressers territory'. The rivers in the surrounding area 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. The West River Sheet Harbour in particular, located approximately 700 metres south of the study area, would have been part of a transportation route facilitating travel inland from Sheet Harbour on the Atlantic Ocean.

A review of the Maritime Archaeological Resource Inventory, a provincial archaeological site database maintained by the SPP, determined that there are no registered archaeological sites within 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. According to an environmental screening prepared by the SPP (Ogilvie 2008), the greater project area, which is dense with lakes and watercourses, is considered to exhibit moderate to high potential for encountering Precontact archaeological sites. It should be noted, however, that the project area as reviewed by the SPP encompassed a larger area than that subjected to archaeological screening and reconnaissance by CRM Group.

Based on available historic documentation, there is evidence to suggest a historic Mi'kmaq presence in the Beaver Dam area. The following account was related to Harry Piers by Jeremiah Bartlett Alexis (Jerry Lonecloud) in 1918 (Whitehead 1991: 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.*

Based on the environmental setting and Native land use, the Beaver Dam Development property is ascribed elevated potential for encountering Precontact and/or early historic Native archaeological resources.

4.1.3 Property History

The Beaver Dam Development property has a long history of industrial use. Gold was discovered in the Beaver Dam district in 1868. By 1871, two belts of veins had been opened and a 15-stamp mill erected (Malcolm 1976: 57). However, the property remained largely inactive until 1886, when extensive prospecting and development work began. A 4-stamp mill run by water power was constructed at this time. In 1891, the Beaver Dam Mining Company acquired the site. This new company expanded operations on the property with the construction of a 10-stamp mill. Four years later, the property was leased to G.M. Christie and William Tupper, who employed fifteen men at the Beaver Dam Mine. In 1896, the mine was acquired by J. H. Austin, who erected a 10-stamp mill. Work at the Beaver Dam Mine site continued intermittently until the late 80s, changing mining rights at least a dozen times (Jacques Whitford 1986). More recently, a number of other companies, including Seabright Resources Inc., have conducted

extensive exploration on the property.

Euro-Canadian settlement of the Beaver Dam area began in the second half of the nineteenth century and centered on mining activities. A cursory examination of historic mapping revealed that the study area occupies portions of at least eight historic lots. These properties were granted to, or otherwise obtained by, George H. Starr, David Allison, James F. Avery, J. Moll, R. Moseley, D. W. Archibald and the Pittsburgh Mining Co. (Crown Land Grant Sheet 89). An examination of the A. F. Church map of Halifax County failed to identify any structures depicted within the study area as of 1865. The 1899 Faribault map indicates the presence of approximately seven features within the study area (***Figures 3***). Four of those features, however, are depicted as overlying a quartz vein located near the centre of the Pit study area. This area was subsequently mined and the abandoned pit is now partially flooded (***Plate 1***). The other three features are depicted in the vicinity of another quartz vein running along the northern shore of Crusher Lake.

In 1928, Faribault did a geological survey of the Beaver Dam mine site, at this time indicating 10 structures associated with the mine (***Figure 4***). This includes 2 cookhouses, an engine house, the Austen mill, an office, an old mill 5 stamps and sluice, Gordon Zwicker & Levi Dimock's cabin, an old mill 8 stamps, the Bellemore cabin and an unnamed structure. According to a compilation of Faribault's memoirs (Malcolm 1976: 57), Zwicker and Dimock's cabin would date to between 1896 and 1904. He identifies the 5-stamp mill as being constructed in 1904 by W. H. Redding. The Austen mill may correspond with the 10-stamp mill erected by J. H. Austin when he became the owner of the mine in 1896 (Malcolm 1976: 57).

According to artist Joseph Purcell, the cabin portrayed in the painting below was built during the late 1920s by a miner named Johnnie Crouse who apparently lived and worked just north of Crusher Lake (***Plate 2***).

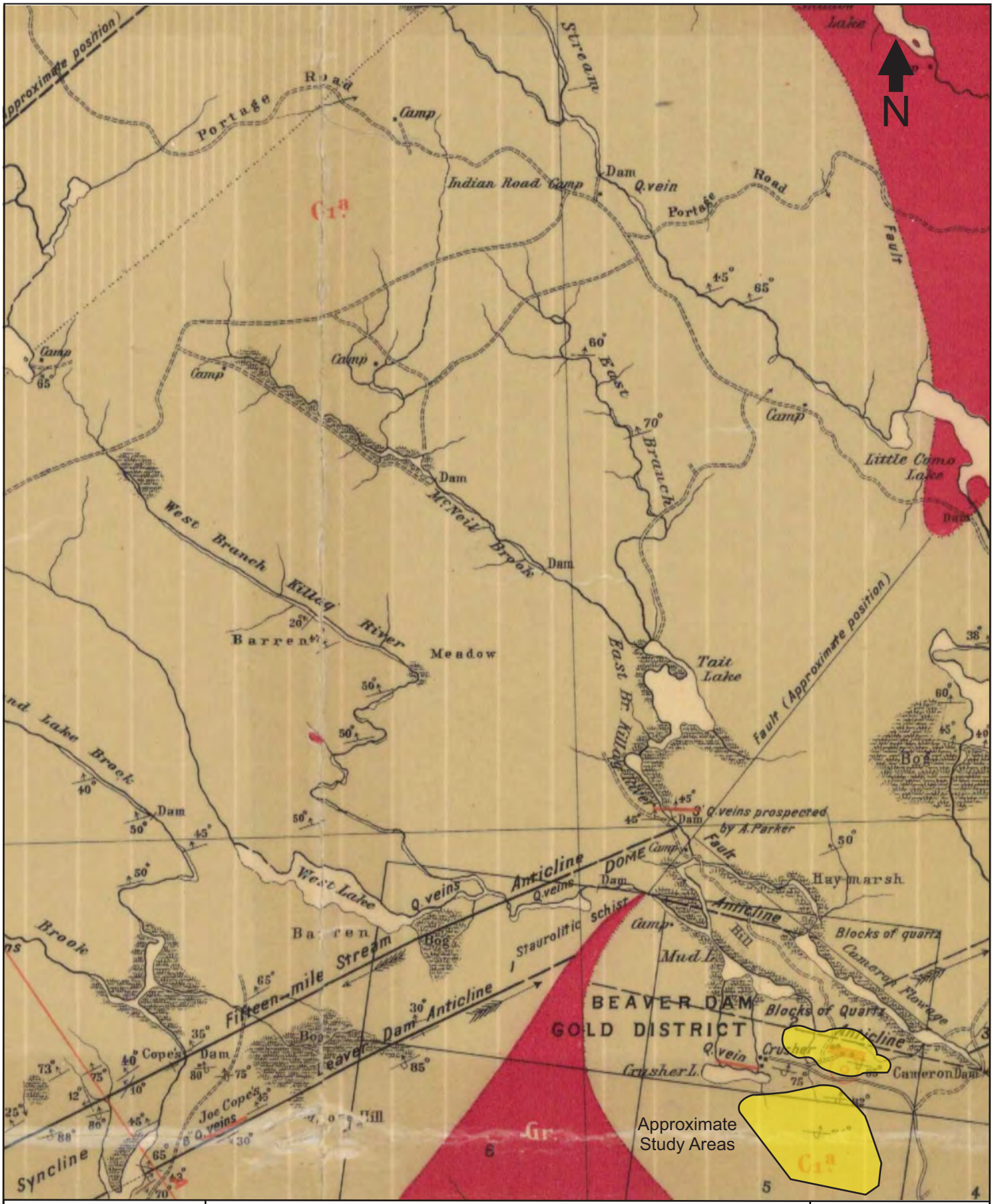
Aerial photographs from 1982 and 1992 show that the mine underwent a significant amount of development in this time period. This development likely destroyed any remains of features in this area, such as one of the cookhouses, the Austen mill, the Bellemore cabin and the unnamed structure.

The 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 as well as for identifying areas more likely to contain archaeological features. According to the database, 20 AMOs are associated with Beaver Dam.

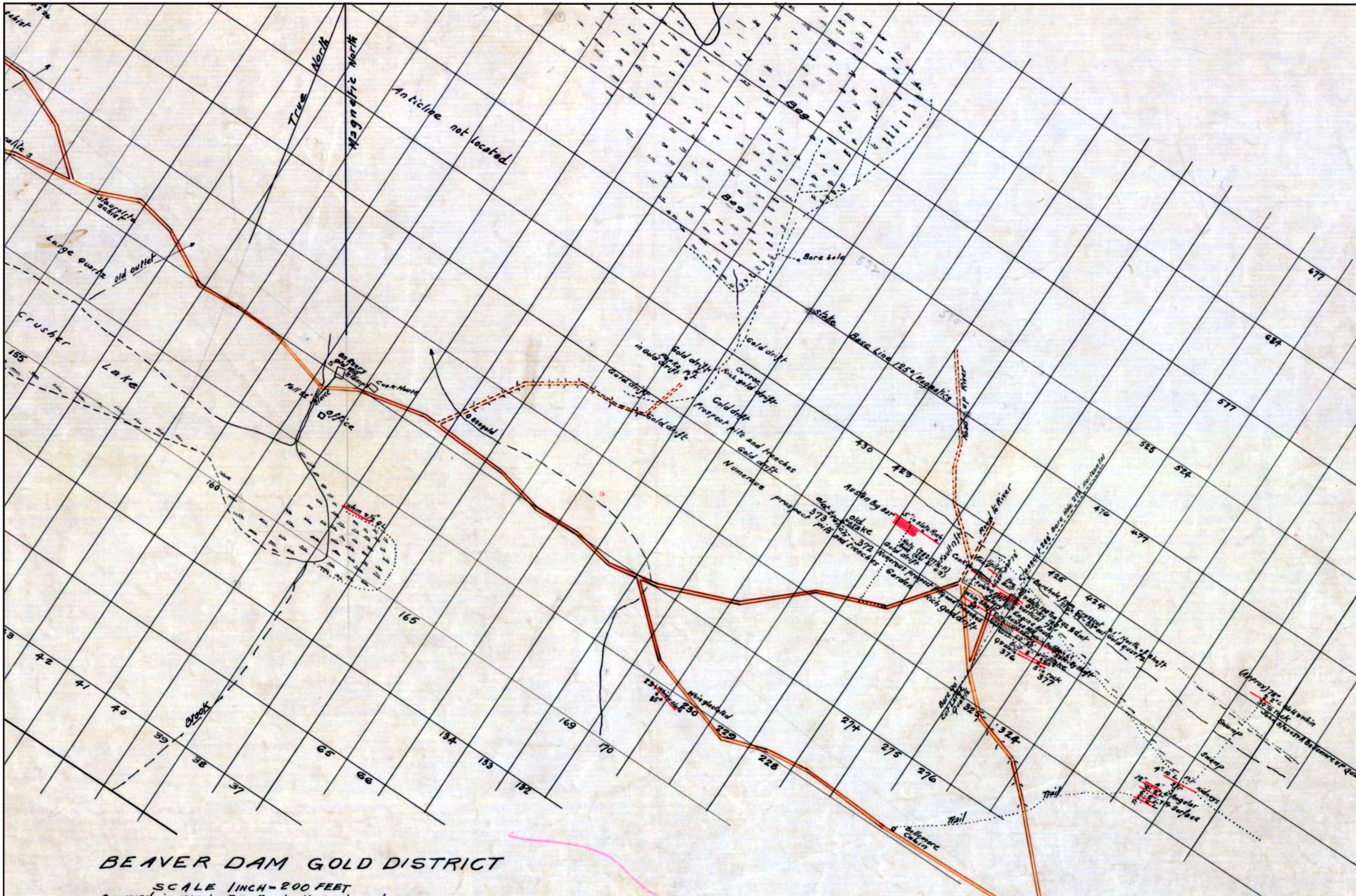
Based on the historical setting within the study area, the Beaver Dam Development property is ascribed elevated potential for encountering historic Euro-Canadian archaeological resources.

4.1.4 Archaeological Potential

Based on the various components of the background study, including environmental setting, Native land use and property history, the Beaver Dam Development property is considered to exhibit high potential for encountering Precontact and historic Native archaeological resources and high potential for encountering historic Euro-Canadian archaeological resources.



CRM Group Cultural Resource Management Group Ltd.	*Faribault, 1899*	*Figure 3*
	BEAVER DAM GOLD PROJECT ARCHAEOLOGICAL ASSESSMENT HALIFAX REGIONAL MUNICIPALITY	March 2015



CRM Group	*Faribault, 1928*	*Figure 4*
	BEAVER DAM GOLD PROJECT ARCHAEOLOGICAL ASSESSMENT HALIFAX REGIONAL MUNICIPALITY	March 2015

PLATE 2: "Crouse's Cabin, Beaver Dam Mine" by Joseph Purcell.

4.2 Field Reconnaissance

Fieldwork, consisting of a visual inspection of the study area, was conducted by CRM Group archaeologists on October 21 and November 8, 2014. The primary goals of the visit were to assess the archaeological potential of the proposed development area and to investigate various topographical and cultural features, which had been identified as areas of elevated potential during the background research.

The majority of the reconnaissance was focused within the Pit and WRSP study areas, but CRM Group was also asked to further investigate the area to the north of Crusher Lake. Each area will be discussed separately.

Pit

The Pit study area is located to the southwest of the Cameron Flowage. Background research indicated that four mine structures had been located within the study area. These include a cookhouse, the Austen Mill, the Engine house and an unnamed structure. According to the DNR AMO Database, 18 of the 20 open mine shafts associated with Beaver Dam are within the Pit study area (***Plates 3 & 4***).

Reconnaissance demonstrated that the area was heavily disturbed by exploration and mining activities. Large spoil piles and borrow pits dominated the landscape and much of the vegetation consists of young trees and brush (***Plate 5***). A pond, measuring approximately 90 metres (north/south) by 550 metres (east/west) covers areas that had been mined in the past (***Plate 1***). At least since the damming of the Cameron Flowage, the area of the pond has been low and marshy. The pond was developed as settling pond for the mine development activities in the mid-80s. No remains of the four features could be found.

Waste Rock Storage Pile

The WRSP study area is located to the south of the Pit. Background research did not identify any features within the area. The area has been heavily cut in recent years as can be seen with the vast sections of new growth and patchwork of skidder trails (***Plate 6***). According to the base mapping provided by CRA, a portion of the WRSP study area is marshy, particularly along the southern part. Low, wet areas were noted elsewhere as well. No features were noted or areas of high archaeological potential.

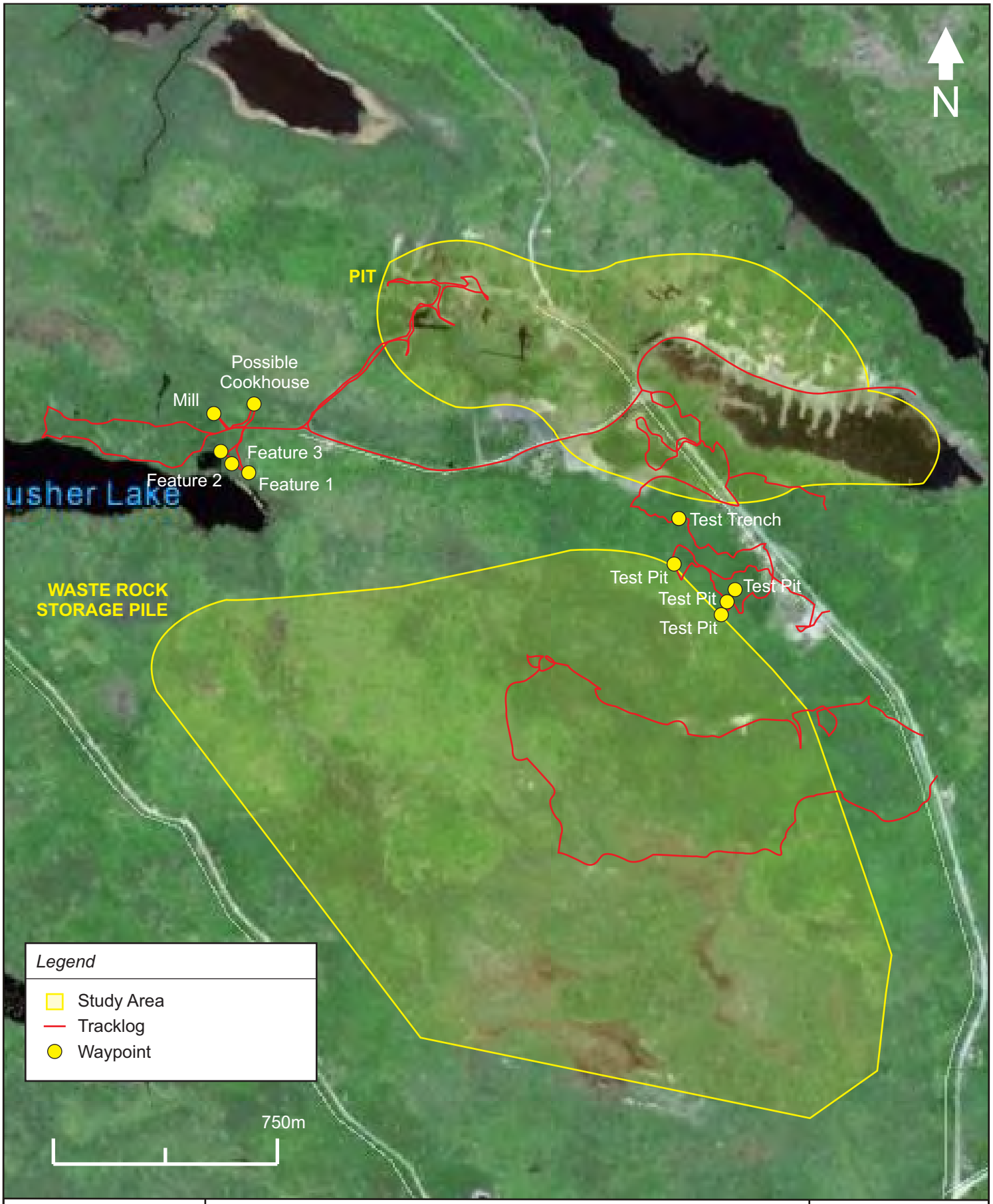
It was originally suspected that the Bellemore Cabin marked on Faribault's 1928 map would be within WRSP area. Upon further review, it seems it would have been between the WRSP and Pit study areas. A return to the Beaver Dam Development was made on November 8 in an attempt to identify any remains of the cabin in case of later changes to the boundaries of the study areas. This further assessment determined that extensive exploration/mining and woods clearing activities had occurred within this section, likely in conjunction with the same activities relating to the pit and had destroyed any architectural remains (see ***Figure 5*** for test pits and trenches; ***Plate 7***).

While conducting reconnaissance on the northern side of Crusher Lake, Historic and Modern features were noted. Features 1 and 2, documented in the 2008 screening and reconnaissance report, were revisited.

Historic Features

Feature 1 (Corresponds with Site 1 from 2008)

Reconnaissance in 2008: Feature 1, located approximately 40 metres north of Crusher Lake, includes the remains of a wooden structure measuring approximately 6.5 metres east-west by 6 metres north-south (UTM: 20T 521571E, 4990205N). Visual examination of the collapsed feature revealed the remains of a log cabin with interlocking saddle-notch corners. The cabin had a cellar, however, visibility was obscured



CRM Group Cultural Resource Management Group Ltd.	*Pit and Waste Rock Storage Pile Tracklog*	*Figure 5*
	BEAVER DAM GOLD PROJECT ARCHAEOLOGICAL ASSESSMENT HALIFAX REGIONAL MUNICIPALITY	March 2015

Plate 3: AMO included in DNR Database; facing southeast. October 21, 2014.

Plate 4: Either an abandoned mine shaft or borrow pit; facing north. October 21, 2014.

Plate 5: Example of disturbance in the Pit study area; facing north. October 21, 2014.

Plate 6: Following a skidder trail in WRSP study area; facing northwest. October 21, 2014.

Plate 7: Borrow pit; facing north. November 8, 2014.

due to the structural collapse. Careful inspection of the remains revealed the presence of wire nails and linoleum flooring. The presence of these materials suggests the feature was occupied during the twentieth century.

A cursory review of historic property documentation revealed that the parcel of land encompassing Feature 1 was originally obtained by the Pittsburgh Mining Co. (Crown Land Grant Sheet 89). The Faribault map indicates the presence of three unidentified features situated in the vicinity of Feature 1 at the turn of the century. Based on the observed artifacts, however, it is possible that Feature 1 represents the remains of a twentieth-century structure, much like the Crouse cabin.

Reconnaissance in 2014: The wooden structure has now completely collapsed and most of the remaining wood is obscured by moss (***Plate 8***). More recent modern refuse is also present. Based the background research, this structure could correspond with the office depicted on Faribault's 1928 map. The location was recorded on current GPS technology at UTM 20T 521579E, 4990205N

Feature 2 (Corresponds with Site 2 from 2008)
Reconnaissance in 2008: Feature 2, located approximately 20 metres southeast of Feature 1, includes the potential remains of a partially in-filled cellar hole (UTM: 20T 521584E, 4990190N). The feature measures approximately 5 metres east-west by 4 metres north-south and is littered with twentieth-century refuse. Careful examination of the feature revealed no visible structural remains.

A cursory review of historic property documentation revealed that the parcel of land encompassing Feature 2 was originally obtained by the Pittsburgh Mining Co. (Crown Land Grant Sheet 89). The Faribault map indicates the presence of three unidentified features situated in the vicinity of Feature 2 at the turn of the

century. Based on the Faribault map, it is assumed that Feature 2 represents the remains of one of these nineteenth-century features.

Reconnaissance in 2014: There was no change noted with Feature 2 except for the possible accumulation of more refuse within the depression (***Plate 9***). The location was recorded on current GPS technology at UTM 20T 521586E, 4990192N.

Old Mill - Five Stamps (Feature 4)
Faribault's 1928 map indicated the presence of a mill on the north side of the mine road that runs on the north side of Crusher Lake. During reconnaissance the remains of the mill were noted, now just a rough outline composed of several large foundation stones (***Plate 10***). It measured approximately 10 metres north/south and 4 metres east/west. The remains are situated 14 metres east of a small unnamed stream flowing from Crusher Lake. Although there are no remains of the sluice depicted on the Faribault map, at the north end of the depression, a number of large stones and timber were observed, which could have formed the tail race (***Plate 11***). According to Faribault, this mill was built in 1904. The mill feature was recorded at UTM 20T 521571E, 4990253N.

Possible Cookhouse (Feature 5)
Faribault's 1928 map (***Figure 4***) of the Beaver Dam mine depicts a cookhouse on the north side of the mine road that runs along the north side of Crusher Lake. During reconnaissance, no structural remains were encountered to suggest the presence of the cookhouse, but a slight depression was noted and a heavy iron pot was discovered *in situ* in conjunction with the depression (***Plate 12***). It may indicate the site of the former cookhouse. The possible cookhouse feature was recorded at UTM 20T 521612E, 4990254E.

Plate 8: Feature 1; facing northwest. October 21, 2014.

Plate 9: Feature 2 with accumulation of refuse; facing southeast. October 21, 2014.

Plate 10: Standing in approximate centre of mill foundation; facing north. October 21, 2014.

Plate 11: Possible tailrace along the north side of mill foundation; facing southwest. October 21, 2014.

Plate 12: Possible cookhouse location; facing northwest. October 21, 2014.

Modern Features

Feature 3

Feature 3 was present but not recorded in 2008. During previous reconnaissance, a single cabin and outhouse had been noted which was likely used as a hunting cabin. On returning to the site in 2014, the original cabin had been updated with new siding and a shed had been erected nearby (***Plate 13***). The additional accumulation of garbage within the depression of Feature 2 may have come from these cabins. The centre point of the cabins was recorded at UTM 20T 521602E, 4990184N.

Plate 13: Modern hunting cabin and shed; facing northwest. October 21, 2014.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The 2014 archaeological screening and reconnaissance of the Beaver Dam Gold Project site consisted of a visual inspection of the ground surface and did not involve sub-surface testing. The archaeological background research conducted by CRM Group archaeologists identified numerous historic features within the Pit study area, which through reconnaissance were determined to have been destroyed by mining activities undertaken in the 1980s. No archaeological features were identified within the WRSP study area, either during the background or the field reconnaissance.

Based on these results, CRM Group offers the following management recommendations for the study areas:

1. It is recommended that the current orientation of the Pit and WRSP study areas be cleared of any requirement for further archaeological investigation.

2. It is recommended that if any development is to occur within 100 metres of Crusher Lake, intensified reconnaissance should be conducted to identify any additional features.

3. It is recommended that if any development is to occur specifically around the historic features identified during the 2008 and/or 2014 reconnaissance, intensified historical research and archaeological shovel testing should be conducted in advance of disturbance.

4. It is recommended that any further changes in the layout of the mine and associated facilities be evaluated as to potential impacts to archaeological resources.

5. In the event that archaeological deposits or human remains are encountered during any ground disturbance associated with the Beaver Dam Development, all work in the associated area(s) should be halted and immediate contact made with the Special Places Program (Sean Weseloh-McKeane: 902-424-6475).

6.0 REFERENCES CITED

Church, Ambrose F.
1865 *Topographical Township Map of Halifax County, Nova Scotia*. Halifax: A.F. Church & Co.

Davis, Derek & Sue Browne, eds.
1996 *The Natural History of Nova Scotia*. Vol. 2. *Theme Regions*. Halifax: Nimbus, Nova Scotia Museum.

Department of Land and Forests.
1946 *Crown Land Grant Index Sheet 89 – Halifax County*. Nova Scotia Department of Natural Resources.

Faribault, E. R.
1899 *Province of Nova Scotia, Colchester & Halifax Counties, Upper Musquodoboit Sheet, No 49*. Geological Survey of Canada.

MacDougall, J.I. et. al.
1963 *Soil Survey of Halifax County, Nova Scotia*. Report No. 13. Nova Scotia Soil Survey. Truro: Minister of Supply and Services.

Malcolm, W.
1976 *Gold Fields of Nova Scotia*. Geological Survey of Canada, Memoir 156.

Ogilvie, Robert.
2008 Environmental Screening 07-12-20d – Beaverdam Site. Report on file with the SPP-HD, Halifax.

Sangster, Alan & Paul Smith.
2007 Metallogenic Summary of the Meguma Gold Deposits, Nova Scotia in *Mineral Deposits of Canada.* Geological Association of Canada, Special Publication No. 5.

White, C.E. & S.M. Barr
2012 *Revised Stratigraphy and Tectonic Evolution of the Meguma Terrane,* Nova Scotia Department of Natural Resources, Halifax.

Whitehead, Ruth Holmes.
1991 *The Old Man Told Us: Excerpts from MicMac History 1500-1950*. Halifax: Nimbus.

NOVA SCOTIA
Communities, Culture & Heritage
1741 Brunswick Street
Halifax, Nova Scotia
B3J 2R5
Tel: (902) 424-6475
Fax: (902) 424-0710

June 3, 2015

Kathryn Stewart
CRM Group Ltd.
6040 Almon St.
Halifax, NS B3K 1T8

Dear Ms. Stewart:

RE: Heritage Research Permit Report
A2014NS101 – Beaver Dam Redevelopment

We have received and reviewed your report on work conducted under the terms of Heritage Research Permit A2014NS101 for an archaeological resource impact assessment of the Beaver Dam Redevelopment Project.

The report details the archaeological assessment of the proposed waste rock storage pile and pit areas within the Beaver Dam Gold Project property near the Killag River, Halifax County, by CRM Group Ltd. in the fall of 2014. Based on the background and environmental research the project area was determined to exhibit high potential for archaeological resources. The field reconnaissance focused on the pit and WRSP areas as well as an area north of Crusher Lake. Several features identified during the background research required field inspection. Reconnaissance determined the features within the Pit study area to have been destroyed by mining activities. No archaeological features were identified within the WRSP study area.

Based on the above, the reporter recommends that the current layout of the Pit and WRSP study areas be cleared of any requirement for further archaeological investigation. It is recommended that if any development is to occur within 100 meters of Crusher Lake, intensified reconnaissance should be undertaken. It is recommended that if any development is to occur around the historic features identified during the 2008 and/or 2014 reconnaissance, intensified historical research and shovel testing should be conducted in advance of disturbance. It is recommended that any further changes in the mine layout and associated facilities be evaluated as to potential impacts to archaeological resources. Finally, in the event that archaeological deposits or human remains are encountered during any ground disturbance activities, all work in the associated areas should stop and contact made with the Coordinator of Special Places.

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

Sincerely,
<Original signed by>
Sean Weseloh McKeane
Coordinator, Special Places

GHD

BEAVER DAM GOLD PROJECT
ADDITIONAL ARCHAEOLOGICAL RECONNAISSANCE 2015
HALIFAX REGIONAL MUNICIPALITY, NOVA SCOTIA

FINAL REPORT

Submitted to:
GHD
and the
Special Places Program of the Nova Scotia Department of Communities, Culture and Heritage

Prepared by:
Cultural Resource Management Group Limited
6040 Almon Street
Halifax, Nova Scotia
B3K 1T8

Consulting Archaeologist: Kathryn J. Stewart
Report Preparation: Kathryn J. Stewart & Kyle G. Cigolotti

Heritage Research Permit Number: A2015NS043

CRM Group Project Number: 2014-0015-02

MARCH 2016

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 Program, Department of Communities, Culture and Heritage.

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HALIFAX REGIONAL MUNICIPALITY
NOVA SCOTIA

1.0 INTRODUCTION

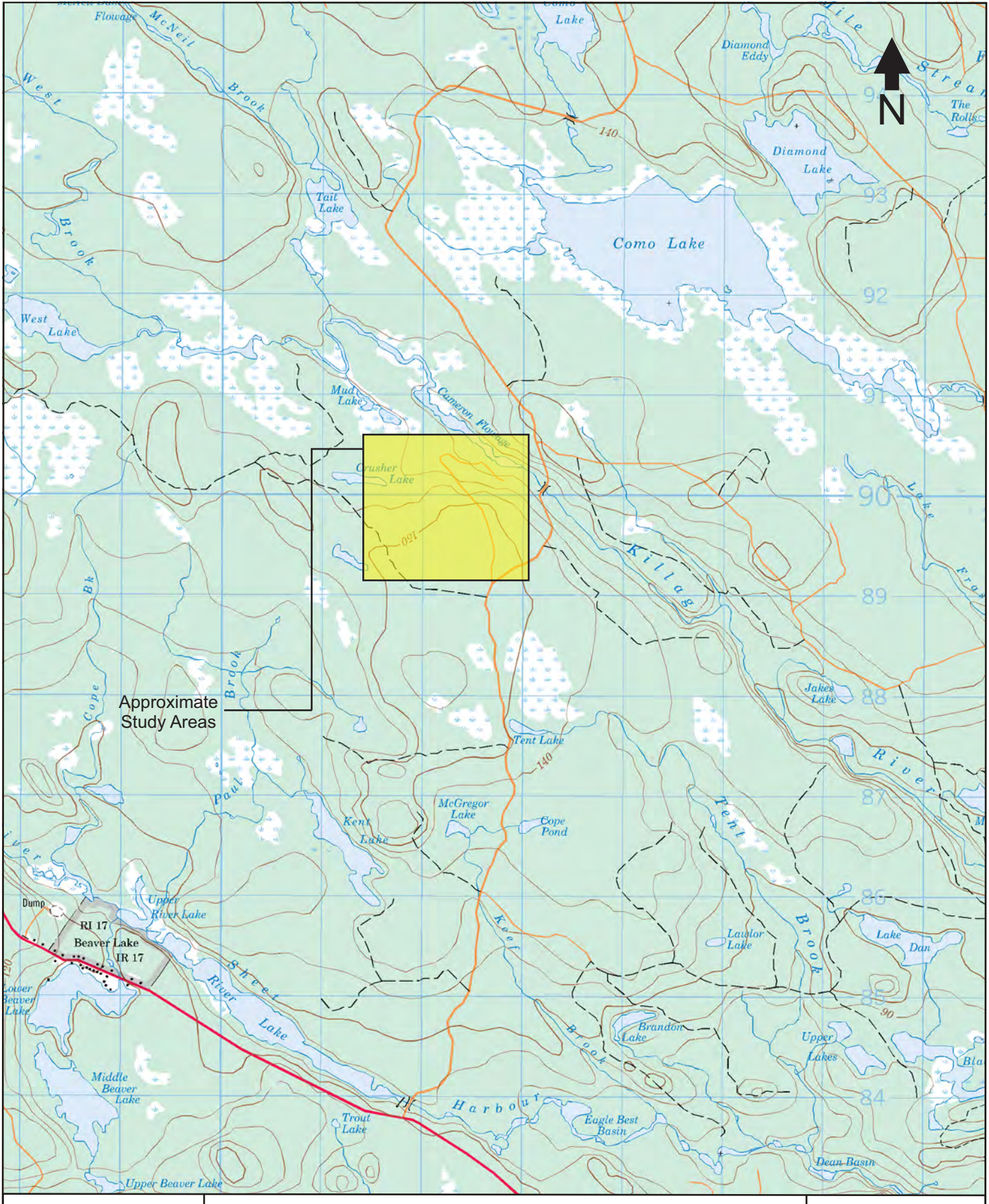
Atlantic Gold Corporation (Atlantic Gold) is proposing to redevelop the Beaver Dam Gold Project located in the north-eastern corner of Halifax Regional Municipality, approximately 21 kilometres northwest of Sheet Harbour (***Figures 1 & 2***).

In the fall of 2014, Cultural Resource Management (CRM) Group was retained by GHD (then Conestoga-Rovers & Associates) on behalf of Atlantic Gold to undertake archaeological screening and reconnaissance of the proposed mine expansion. The archaeological investigation was conducted under to the terms of Heritage Research Permit A2014NS107 (Category 'C'), issued to Kathryn J. Stewart through the Special Places Program (Special Places).

Subsequent changes to the layout of the proposed facility led to additional archaeological reconnaissance being undertaken in the summer of 2015. Previously investigated mine features, such as the waste rock storage (WRS) and the crusher site had been shifted to a different configuration. New work areas (two till piles, two ore piles, two settling ponds and a Run-of-Mine (ROM)/crusher/service pad site) were added to the project. The archaeological investigation was conducted according to the terms of Heritage Research Permit A2015NS043 (Category 'C'), issued to Stewart. The fieldwork was undertaken by Stewart with the assistance of Staff Archaeologist Kiersten Green.

The primary focus of the study was to assess the potential for encountering archaeological resources during redevelopment of the mine site. The assessment builds upon the research and reconnaissance of the Beaver Dam property undertaken on behalf of Acadian Mining (Acadian) by CRM Group in 2008 (Beanlands 2008).

It should be noted that the final design of the Beaver Dam Gold Mine has yet to be determined. This report describes the archaeological reconnaissance of the current orientation of features at the mine site, presents the results of these efforts and offers cultural resource management recommendations.



CRM Group Cultural Resource Management Group Ltd.	*Approximate Study Areas*	*Figure 1*
	BEAVER DAM GOLD PROJECT ARCHAEOLOGICAL ASSESSMENT HALIFAX REGIONAL MUNICIPALITY	March 2016 Scale 1:50 000

Mud Lake

Cameron Flowage

SETTLING POND

PIT PERIMETER BERM

Ten Mile Lake

Pleasant Valley

Marinette

PIT

Crusher Lake

TILL STOCKPILE

SETTLING POND

Pleasant Valley

TILL STOCKPILE

KILLAG RIVER

Waste Rock Storage

STOCKPILE

WATER DIVERSION STRUCTURE

FACILITIES & ROM PAD

STOCKPILE

SETTLING POND

Marinette

Pleasant Valley

Marinette

Ten Mile Lake

Beaver Dam Mines Rd

Legend

- Pit
- PIt Berm
- Waster Rock Storage
- Ore Stockpiles
- Till Stockpiles
- Crusher Area
- Haul Roads
- Settling Ponds; Water Diversion
- Community Boundary
- Assessed in 2014

Roads

- Local
- Dry Weather / Seasonal
- Track

Source: Atlantic Gold, Service Nova Scotia, NS Natural Resources, NS Environment

CRM Group
Cultural Resource Management Group Ltd.

Detailed Study Areas	*Figure 2*
BEAVER DAM GOLD PROJECT ARCHAEOLOGICAL ASSESSMENT HALIFAX REGIONAL MUNICIPALITY	March 2016 Scale 1:10 000

0 100 200 300
Metres

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

N

GHD

ATLANTIC GOLD CORPORATION
MARINETTE, NOVA SCOTIA
BEAVER DAM MINE

GENERAL MINE ARRANGEMENT

2.0 STUDY AREA

The Beaver Dam Gold Project property is located on the western side of Killag River in the northeastern corner of Halifax Regional Municipality, approximately 21 kilometres northwest of Sheet Harbour (***Figure 1***). The property comprises the historic Beaver Dam Gold District situated between Crusher Lake and Cameron Flowage (***Figure 2; Plate 1***). The study area, consisting of proposed pit, WRS, two till piles, two ore pills, two settling ponds and a ROM/crusher/service pad site, covers an area of approximately 87 hectares. Access to the property can be gained by following Highway 224 approximately 17 kilometres northwest from Highway 7 to Beaver Dam Mines Road, then following Beaver Dam Mines Road north.

PLATE 1: The Settling Pond within the Pit study area; facing west. June 19, 2015.

3.0 METHODOLOGY

GHD retained CRM Group to undertake additional archaeological reconnaissance of the Beaver Dam study area. To address the potential of encountering significant archaeological resources within the study area, CRM Group developed a work plan consisting of the following components: archaeological reconnaissance of the areas to be impacted by development activities; and, prepare a report summarizing the results of the field survey, as well as recommend strategies for assessment and management of areas exhibiting high archaeological potential and/or features.

3.1 Background Research

The archival research had already been completed during the initial screening and reconnaissance, so no additional background research was conducted. This 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. To achieve this goal, CRM Group utilized the resources of various institutions including documentation available through Nova Scotia Archives, the Department of Natural Resources (DNR) and Crown Land Information Management Centre.

The background study included a review of relevant historic documentation incorporating land grant records, legal survey and historic maps, as well as local and regional histories. Topographic maps and aerial photographs, both current and historic, were also used to evaluate the study area. This data facilitated the identification of environmental and topographic features, which would 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 reconnaissance, the information obtained from this suite of research materials was reviewed to facilitate the interpretation of any archaeological features encountered within the study area.

3.2 Field Reconnaissance

The goals of the archaeological field reconnaissance were to conduct visual inspection of the study areas, document any areas of archaeological sensitivity or archaeological sites identified during the course of visual inspection, and design a strategy for testing areas of archaeological potential, as well as any archaeological resources identified within the study areas. Although the ground search did not involve sub-surface testing, the researchers were alert for topographic or vegetative anomalies that might indicate the presence of buried archaeological resources. The process and results of the field reconnaissance were documented in field notes and photographs.

A hand-held Global Positioning System (GPS) unit was used to record UTM coordinates (NAD 83) for all survey areas, as well as any identified diagnostic artifacts, formal tools, isolated finds and site locations.

4.0 RESULTS OF SCREENING AND RECONNAISSANCE

4.1 Background Study

The following discussion details the environmental and cultural setting of the study 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.

4.1.1 Environmental Setting

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

Water Sources

The Beaver Dam Development property is drained by way of the Killag River, a tributary of West River Sheet Harbour that flows south across the eastern portion of the study area. The Killag River has been dammed creating a reservoir along the eastern edge of the study area, known as Cameron Flowage. The dam is located at the southeastern end of Cameron Flowage. Several small lakes also fall in close proximity to the study area, including Crusher Lake and Mud Lake. Proximity to water, for both drinking and transportation, is a key factor in identifying Precontact and historic Native, as well as early Euro-Canadian, archaeological potential.

Topography

The study area is located within the greater terrestrial region known as the Atlantic Interior – Quartzsite Barrens (Guysborough) Unit (Davis & Browne 1996: 134). The bedrock-dominated topography can be generally described as undulating to rolling. Elevation within the study area ranges from approximately 109 metres to 171 metres above sea level. Low-lying areas are typically swampy. Elevated areas within the study area may have provided important vantage points for viewing the surrounding region and for sighting large game. The Beaver Dam Gold Project property is located within the Goldenville Group of the Meguma terrane of Nova Scotia, a sequence of Cambro-Ordovician-aged metasedimentary rocks and Devonian-aged granitoid intrusives. Gold deposits are present throughout much of the exposed stratigraphy of the Goldenville Group (Sangster & Smith 2007).

Soils

The Beaver Dam area is covered primarily by *Halifax* series (ST2, ST14) soils, although concentrations of *Bridgewater* (ST2 and ST8) and *Aspotogan* (ST4) series soils and peat are also found within the study area. *Halifax* soils are well drained but typically shallow, stony and porous. The parent material is olive to yellowish-brown sandy loam to gravelly sandy loam glacial till derived primarily from quartzite. In general, *Halifax* soils are too stony for agriculture (MacDougall *et. al.* 1963: 32-33). The well-drained *Bridgewater* soils are developed from a medium-textured, olive coloured glacial till that is derived principally from Precambrian slates. The *Bridgewater* soils in the Beaver Dam area are moderately stony and unsuitable for cultivation (MacDougall *et. al.* 1963: 28). *Aspotogan* soils are described as a dark grayish brown sandy loam overlaying and mottled with a dark reddish brown sandy loam. The soil has poor drainage and is considered too stony for cultivation. The parent material is an olive stony loam till derived from quartzite or granite (MacDougall *et. al.* 1963: 35)

Vegetation

The forest growth within this ecological region includes Balsam Fir, Red Spruce, White Spruce, Eastern Hemlock and Yellow Birch. Slow-moving streams are bordered by broad swampy areas populated with

Balsam Fir, Red Maple and Black Spruce. The nature of the soils found within the study area does not encourage heavy forest growth (Davis & Browne 1996: 56-57).

4.1.2 Native Land Use

The land within the study area was once part of the greater Mi'kmaq territory known as *Eskikewa'kik*, meaning 'skin dressers territory'. The rivers in the surrounding area 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. The West River Sheet Harbour in particular, located approximately 700 metres south of the study area, would have been part of a transportation route facilitating travel inland from Sheet Harbour on the Atlantic Ocean.

A review of the Maritime Archaeological Resource Inventory, a provincial archaeological site database maintained by the SPP, determined that there are no registered archaeological sites within 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. According to an environmental screening prepared by the SPP (Ogilvie 2008), the greater project area, which is dense with lakes and watercourses, is considered to exhibit moderate to high potential for encountering Precontact archaeological sites. It should be noted, however, that the project area as reviewed by the SPP encompassed a larger area than that subjected to archaeological screening and reconnaissance by CRM Group.

Based on available historic documentation, there is evidence to suggest a historic Mi'kmaq presence in the Beaver Dam area. The following account was related to Harry Piers by Jeremiah Bartlett Alexis (Jerry Lonecloud) in 1918 (Whitehead 1991: 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.*

Based on the environmental setting and Native land use, the Beaver Dam Development property is ascribed elevated potential for encountering Precontact and/or early historic Native archaeological resources.

4.1.3 Property History

The Beaver Dam Development property has a long history of industrial use. Gold was discovered in the Beaver Dam district in 1868. By 1871, two belts of veins had been opened and a 15-stamp mill erected (Malcolm 1976: 57). However, the property remained largely inactive until 1886, when extensive prospecting and development work began. A 4-stamp mill run by water power was constructed at this time. In 1891, the Beaver Dam Mining Company acquired the site. This new company expanded operations on the property with the construction of a 10-stamp mill. Four years later, the property was leased to G.M. Christie and William Tupper, who employed fifteen men at the Beaver Dam Mine. In 1896, the mine was acquired by J. H. Austin, who erected a 10-stamp mill. Work at the Beaver Dam Mine site continued intermittently until the late 80s, changing mining rights at least a dozen times (Jacques Whitford 1986). More recently, a number of other companies, including Seabright Resources Inc., have conducted

extensive exploration on the property.

Euro-Canadian settlement of the Beaver Dam area began in the second half of the nineteenth century and centered on mining activities. A cursory examination of historic mapping revealed that the study area occupies portions of at least eight historic lots. These properties were granted to, or otherwise obtained by, George H. Starr, David Allison, James F. Avery, J. Moll, R. Moseley, D. W. Archibald and the Pittsburgh Mining Co. (Crown Land Grant Sheet 89). An examination of the A. F. Church map of Halifax County failed to identify any structures depicted within the study area as of 1865. The 1899 Faribault map indicates the presence of approximately seven features within the study area (***Figures 3***). Four of those features, however, are depicted as overlying a quartz vein located near the centre of the Pit study area. This area was subsequently mined and the abandoned pit is now partially flooded (***Plate 1***). The other three features are depicted in the vicinity of another quartz vein running along the northern shore of Crusher Lake.

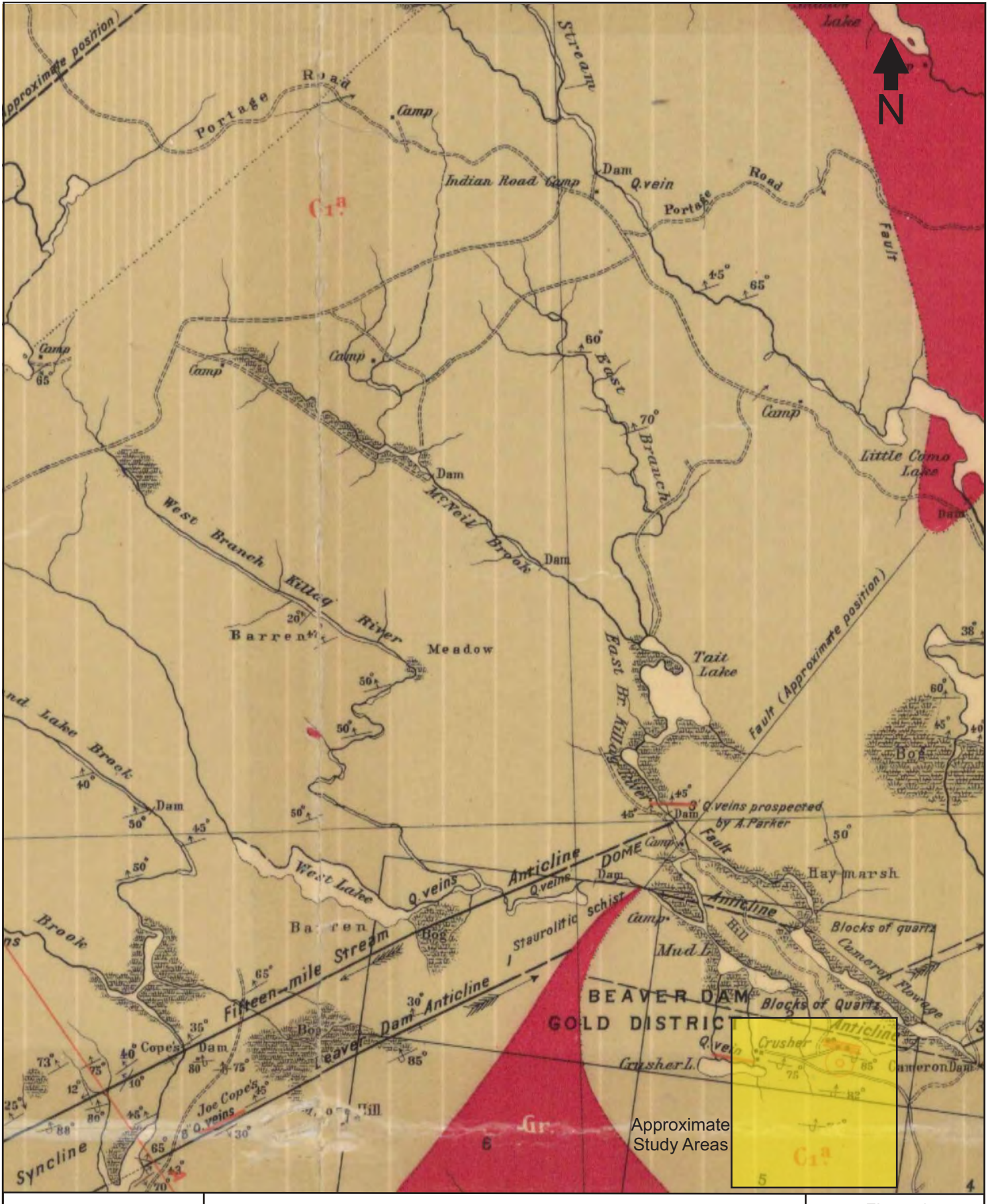
In 1928, Faribault did a geological survey of the Beaver Dam mine site, at this time indicating 10 structures associated with the mine (***Figure 4***). This includes 2 cookhouses, an engine house, the Austen mill, an office, an old mill 5 stamps and sluice, Gordon Zwicker & Levi Dimock's cabin, an old mill 8 stamps, the Bellemore cabin and an unnamed structure. According to a compilation of Faribault's memoirs (Malcolm 1976: 57), Zwicker and Dimock's cabin would date to between 1896 and 1904. He identifies the 5-stamp mill as being constructed in 1904 by W. H. Redding. The Austen mill may correspond with the 10-stamp mill erected by J. H. Austin when he became the owner of the mine in 1896 (Malcolm 1976: 57).

According to artist Joseph Purcell, the cabin portrayed in the painting below was built during the late 1920s by a miner named Johnnie Crouse who apparently lived and worked just north of Crusher Lake (***Plate 2***).

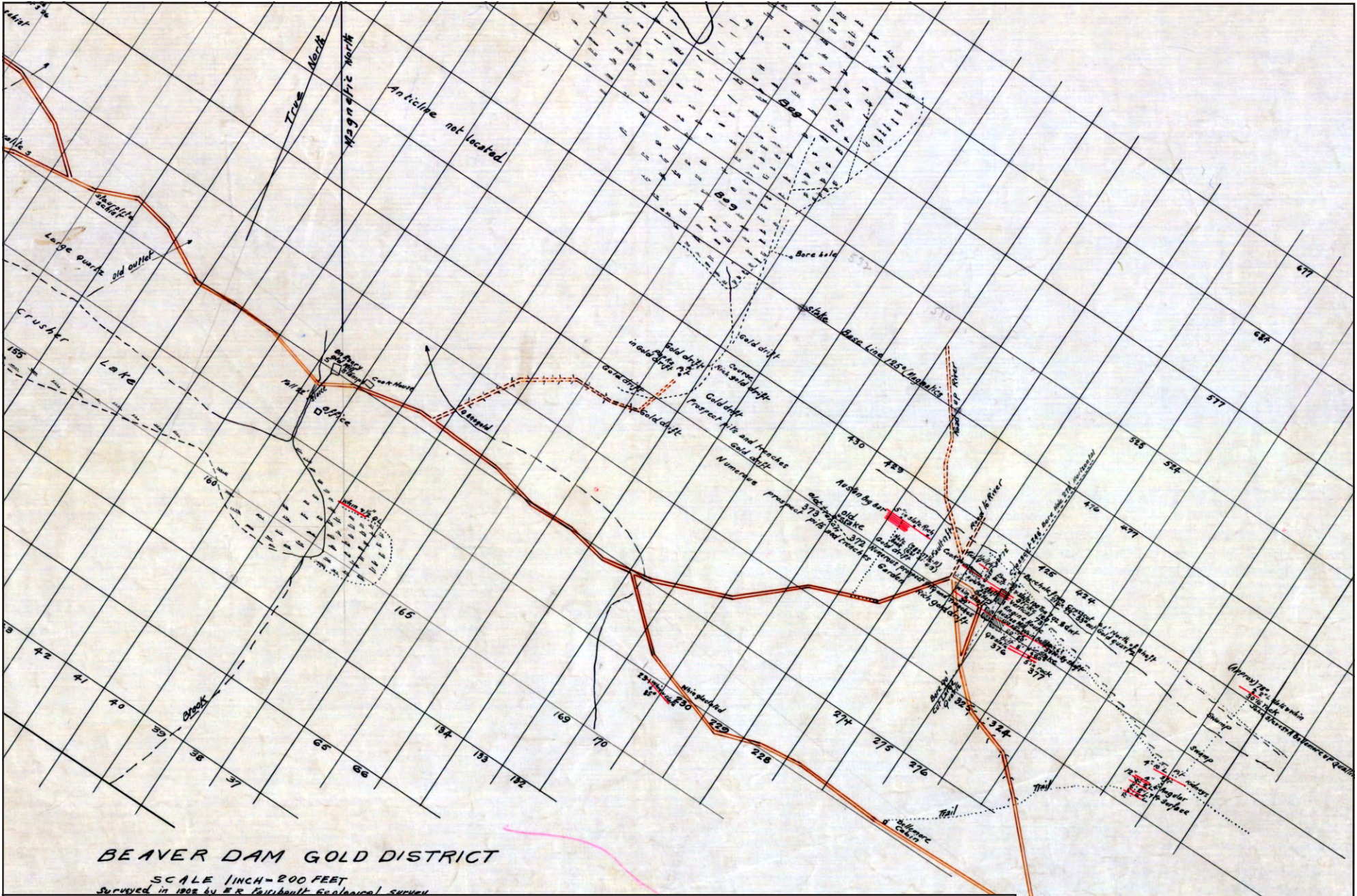
Aerial photographs from 1982 and 1992 show that the mine underwent a significant amount of development in this time period. This development likely destroyed any remains of features in this area, such as one of the cookhouses, the Austen mill, the Bellemore cabin and the unnamed structure.

The 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 as well as for identifying areas more likely to contain archaeological features. According to the database, 20 AMOs are associated with Beaver Dam (Stewart and Cigolotti 2015).

Based on the historical setting within the study area, the Beaver Dam Development property is ascribed elevated potential for encountering historic Euro-Canadian archaeological resources.



CRM Group Cultural Resource Management Group Ltd.	*Faribault, 1899*	*Figure 3*
	BEAVER DAM GOLD PROJECT ARCHAEOLOGICAL ASSESSMENT HALIFAX REGIONAL MUNICIPALITY	March 2016



CRM Group Cultural Resource Management Group Ltd.	*Faribault, 1928*	*Figure 4*
	BEAVER DAM GOLD PROJECT ARCHAEOLOGICAL ASSESSMENT HALIFAX REGIONAL MUNICIPALITY	March 2016

PLATE 2: "Crouse's Cabin, Beaver Dam Mine" by Joseph Purcell.

4.2 Field Reconnaissance

CRM Group archaeologists conducted fieldwork, consisting of a visual inspection of the study area, on June 19, 2015. The primary goals of the revisit were to assess the archaeological potential within the expanded development area and to investigate various topographical and cultural features that had been identified as areas of elevated potential during the background research.

The reconnaissance was focused within the pit, the WRS, the till piles, the ore piles, the settling ponds and the ROM/crusher/service pad site study areas (***Figure 5***). Each of these areas will be discussed separately.

Pit

The pit study area is located southwest of the Cameron Flowage. The layout of the pit remained the same as when the reconnaissance was conducted in the fall of 2014, so a return visit was not required. Reconnaissance in the fall had demonstrated that the area was heavily disturbed by exploration and mining activities.

Waste Rock Storage

The WRS study area is located to the southwest of the pit. Background research did not identify any features within the new layout of the proposed WRS. The area has been heavily cut in recent years as can be seen in the vast sections of new growth (***Plate 3***). According to the base mapping provided by GHD, parts of the WRS study area are marshy, particularly along the southeast and western portions. A large pit was noted along the mine road, just outside of the study area, likely attributable to recent mining/exploration activities (***Plate 4***). No features or areas of high archaeological potential were noted within the WRS study area.

Till Piles

Till Pile 1, although a new mine feature added this year, had already been addressed by the field reconnaissance conducted in the fall of 2014. It is suspected that the Bellemore Cabin marked on Faribault's 1928 map had been located within the Till Pile 1 footprint or immediately adjacent to it. Reconnaissance determined that extensive exploration/mining and tree clearing activities had occurred within this section, likely in conjunction with the same activities relating to the pit, and had destroyed any architectural remains that might have been found in that area.

Till Pile 2 is located to the southwest of the pit and north of the WRS. While it overlaps with the historic mine road, the only feature that appears within or immediately adjacent to the study area is the possible location of the cookhouse (Feature 5) identified during reconnaissance in 2014. The location was revisited and was confirmed to be on the western edge of the Till Pile 2 study area (***Plate 5***). No other areas of high archaeological potential were noted.

Ore Piles

The two ore piles are located to the southeast of the pit and immediately east of Till Pile 1. Portions of these two study areas had been heavily harvested and much of the two areas was wet, marshy and undulating (***Plate 6***). No areas of archaeological potential were noted within either of the ore piles.

Settling Ponds

The two proposed settling pond locations were investigated during the course of the reconnaissance. The first was located at the southeastern end of the existing settling pond, where there is an outflow to Cameron Flowage. This section was heavily disturbed by extensive exploration and mining activities related to the mine development activities in the mid-80s (***Plate 7***). In addition to the disturbance, much of

the area was undulating, low and marshy, with the small outflow winding its way to the Cameron Flowage (***Plate 8 & 9***).

The second proposed settling pond location is situated to the northwest of the pit area and encompasses a small stream that flows out of Mud Lake (***Plate 10***). This location was also undulating, low and marshy (***Plate 11***). No areas of archaeological potential were noted within either of these study areas.

ROM/Crusher/Service Pad

The west side of the ROM/crusher/service pad study area was covered in the reconnaissance conducted in the fall of 2014 as part of for the old layout for the WRS. Reconnaissance undertaken this spring focused on the east side of the study area (***Plate 12***). The area was similar to that of the nearby ore piles, with undulating ground that was often low and marshy. Particular attention was paid to the area where the service road connecting the crusher and service pad crossed over the Beaver Dam Mine Road. No areas of archaeological potential were noted.

Access Road

The layout of the proposed access road was covered both by reconnaissance conducted in the fall of 2014 and the spring of 2015. Areas of the access road close to the pit were heavily disturbed by exploration/mining activities. Undulating and marshy, no areas of archaeological potential were noted.

After the reconnaissance had been completed, another settling pond was added, as well as a water diversion structure. Although these were not in the initial plans when the reconnaissance was conducted, their orientation fell within areas that had been assessed in the spring of 2015.

Plate 3: WRS study area; facing northeast. June 19, 2015.

SETTLING POND 2
PIT
N
Cookhouse
Mill
Feature 2
Feature 3
Feature 1
TILL 2
Test Trench
Test Pit
Test Pit
Test Pit
Test Pit
SETTLING POND 1
ACCESS ROAD
WRS
ORE 1
ORE 2
TILL 1
ROM
CRUSHER
SERVICE

Legend

- Study Areas
- 2014 Tracklog
- 2015 Tracklog
- Waypoint

600 m

CRM Group Cultural Resource Management Group Ltd.	*Pit and Waste Rock Storage Pile Tracklog*	*Figure 5*
	BEAVER DAM GOLD PROJECT ARCHAEOLOGICAL ASSESSMENT HALIFAX REGIONAL MUNICIPALITY	March 2016

Plate 4: **Recent exploration/mining activities; facing northeast. June 19, 2015.**

Plate 5: **Possible location of the cookhouse (Feature 5) within the footprint of Till Pile 2; facing east. June 19, 2015.**

Plate 6: Ore Pile 2 study area; facing east. June 19, 2015.

Plate 7: Investigating the outlet of the Settling Pond; facing southeast. June 19, 2015.

Plate 8: Small winding stream; facing north. June 19, 2015.

Plate 9: Low and marshy area around Cameron Flowage; facing northeast. June 19, 2015.

Plate 10: Mud Lake; facing northwest. June 19, 2015.

Plate 11: Marshy area by Mud Lake; facing west. June 19, 2015.

Plate 12: Access Road study area; facing east. June 19, 2015.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The additional archaeological reconnaissance of the Beaver Dam Gold Project site undertaken in the spring of 2015 consisted of a visual inspection of the ground surface and did not involve sub-surface testing. The archaeological background research conducted by CRM Group archaeologists for the screening and reconnaissance conducted in 2008 and 2014 identified numerous historic features within the pit study area. Reconnaissance determined that the features had been destroyed by mining activities undertaken in the 1980s. One historic feature (Feature 5) was identified within the Till Pile 2 study area. No archaeological features or areas of archaeological potential were identified within any of the other study areas, either during the background or field reconnaissance.

Based on these results, CRM Group offers the following management recommendations for the study areas:

1. It is recommended that the current orientation of the Pit, the WRS, Till Pile 1, the Ore piles, the Settling Ponds and the ROM/crusher/service pad study areas as identified in this report (***Figure 5***) be cleared of any requirement for further archaeological investigation.

2. It is recommended that either a program of shovel testing be conducted around the possible cookhouse (Feature 5) or a buffer of 20 metres be put in place around the feature to protect it from any mining activities. No further archaeological work is required for the rest of the Till Pile 2 study area.

3. It is recommended that if any development is to occur specifically around the historic features identified during the 2008 and/or 2014 reconnaissance, intensified historical research and archaeological shovel testing should be conducted in advance of disturbance.

4. It is recommended that any further changes in the layout of the mine and associated facilities be evaluated as to potential impacts to archaeological resources.

5. In the event that archaeological deposits or human remains are encountered during any ground disturbance associated with the Beaver Dam Development, all work in the associated area(s) should be halted and immediate contact made with the Special Places Program (Sean Weseloh-McKeane: 902-424-6475).

6.0 REFERENCES CITED

Beanlands, Sara
2009 *Beaver Dam Development Archaeological Screening & Reconnaissance, Halifax Regional Municipality, Nova Scotia*. Manuscript. Report for Heritage Research Permit A2008NS21. On file with the Nova Scotia Museum.

Church, Ambrose F.
1865 *Topographical Township Map of Halifax County, Nova Scotia*. Halifax: A.F. Church & Co.

Davis, Derek & Sue Browne, eds.
1996 *The Natural History of Nova Scotia*. Vol. 2. *Theme Regions*. Halifax: Nimbus, Nova Scotia Museum.

Department of Land and Forests.
1946 *Crown Land Grant Index Sheet 89 – Halifax County*. Nova Scotia Department of Natural Resources.

Faribault, E. R.
1899 *Province of Nova Scotia, Colchester & Halifax Counties, Upper Musquodoboit Sheet, No 49*. Geological Survey of Canada.

MacDougall, J.I. et. al.
1963 *Soil Survey of Halifax County, Nova Scotia*. Report No. 13. Nova Scotia Soil Survey. Truro: Minister of Supply and Services.

Malcolm, W.
1976 *Gold Fields of Nova Scotia*. Geological Survey of Canada, Memoir 156.

Ogilvie, Robert.
2008 Environmental Screening 07-12-20d – Beaverdam Site. Report on file with the SPP-HD, Halifax.

Sangster, Alan & Paul Smith.
2007 Metallogenic Summary of the Meguma Gold Deposits, Nova Scotia in *Mineral Deposits of Canada.* Geological Association of Canada, Special Publication No. 5.

White, C.E. & S.M. Barr
2012 *Revised Stratigraphy and Tectonic Evolution of the Meguma Terrane,* Nova Scotia Department of Natural Resources, Halifax.

Whitehead, Ruth Holmes.
1991 *The Old Man Told Us: Excerpts from MicMac History 1500-1950*. Halifax: Nimbus.

NOVA SCOTIA

Communities, Culture & Heritage

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

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

April 20, 2016

Kathryn Stewart
Cultural Resource Management Group
6040 Almon Street, Halifax, NS
B3K 1T8

Dear Ms. Stewart:

RE: Heritage Research Permit Report
A2015NS043 – Beaver Dam Gold Project

We have received and reviewed your report on work conducted under the terms of Heritage Research Permit A2015NS043 for the archaeological resource impact assessment of the Beaver Dam Gold Project expansion in HRM County.

The report details the additional archaeological reconnaissance of the proposed Beaver Dam Gold Project expansion area northwest of Sheet Harbour, HRM, by CRM Group Ltd. in the summer of 2015. The assessment included a review of previously compiled background and historical research, including indigenous land use, as well as previous archaeological assessments of the study area, and field reconnaissance of the new project layout. The goal of the assessment was to assess the potential for encountering archaeological resources during redevelopment of the mine site. One historic feature (Feature 5) was identified within Till Pile 2. No archaeological features or areas of archaeological potential were identified within any of the other study areas, either during the background review or field reconnaissance.

Based on the above, it is recommended that the current orientation of the Pit, the WRS, Till Pile 1, the Ore piles, the Settling Ponds and the ROM/crusher/service pad areas as defined in the report be cleared of any requirements for further archaeological investigation. It is recommended that either a program of shovel testing around the possible cookhouse (Feature 5) or a buffer of 20 meters be put in place around the feature for protection. No other archaeological work is required for the rest of Till Pile 2. It is recommended that if any development is to occur around the historic features identified in 2008 and/or 2014, reconnaissance, intensified historical research and shovel testing should be conducted in advance of disturbance. It is recommended that any further changes in the layout of the mine and associated facilities be evaluated as to potential impacts to archaeological resources. Finally, in the event that archaeological deposits or human remains are encountered during any ground disturbance associated with the Beaver Dam Gold Project, all work in the associated areas should stop and the Coordinator of Special Places contacted.

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,
<Original signed by>

Sean Weseloh McKeane
Coordinator, Special Places

ATLANTICGOLD

Appendix N.2

Archaeological Assessment
Beaver Dam Mine Site (WRSP West)

McCALLUM ENVIRONMENTAL LIMITED

BEAVER DAM GOLD - WRSP WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 BEAVER DAM, NOVA SCOTIA

FINAL REPORT

Submitted to:
McCallum Environmental Limited
and the
Special Places Program of the
Nova Scotia Department of Communities, Culture & Heritage

Prepared by:
Cultural Resource Management Group Limited
Ten Mile House
1519 Bedford Highway
Bedford, Nova Scotia
B4A 1E3

Consulting Archaeologist: Kyle G. Cigolotti
Report Preparation: Kyle G. Cigolotti and W. Bruce Stewart

Heritage Research Permit Number: A2018NS085

CRM Group Project Number: 2018-0015-02

JANUARY 2019

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 Program, Department of Communities, Culture and Heritage.

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BEAVER DAM GOLD - WRSP WEST
ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018
BEAVER DAM, NOVA SCOTIA

1.0 INTRODUCTION

Atlantic Mining Nova Scotia Corporation (Atlantic Gold) is proposing to redevelop the Beaver Dam Gold Mine located in the northeast corner of Halifax Regional Municipality, approximately 21 kilometres northwest of Sheet Harbour. Atlantic Gold is proposing to develop a surface mine, composed of a waste rock storage pile, a tailing pond, stockpiles and an associated plant. The mine site will be connected to processing facilities at Moose River Gold Mine by means of a haul road running between the mine site and the plant.

In 2008, Cultural Resource Management (CRM) Group was retained by Acadian Mining Corporation (Acadian) to undertake a screening and reconnaissance of the Beaver Dam property. As a result of the archaeological assessment, several historic mining features were identified. The archaeological investigation was conducted under the terms of Heritage Research Permit A2008NS21 (Category 'C'), issued to CRM Group President and Senior Technical Advisor, W. Bruce Stewart, through the Special Places Program (Special Places).

In the fall of 2014, CRM Group was retained by GHD (formerly Conestoga-Rovers & Associates) on behalf of Atlantic Gold to undertake archaeological screening and reconnaissance of the proposed mine expansion. The archaeological investigation was conducted under the terms of Heritage Research Permit A2014NS107 (Category 'C'), issued to Staff Archaeologist Kathryn J. Stewart through Special Places.

Subsequent changes to the layout of the proposed facility led to additional archaeological reconnaissance in the summer of 2015. Previously investigated proposed mine features were relocated and added to the project. The archaeological investigation was conducted according to the terms of Heritage Research Permit A2015NS043 (Category 'C'), issued to Kathryn J. Stewart. No additional features were identified during this reconnaissance.

In the fall of 2015, CRM Group was retained to conduct archaeological screening and reconnaissance of the proposed haul road connecting the Beaver Dam Mine and the Touquoy Mine sites. The work was conducted under the terms of Heritage Research Permit A2015NS101 by Archaeologist Kiersten Green with the assistance of Kathryn J. Stewart. The primary focus of the study was to assess the potential for encountering archaeological resources during upgrading of the haul road. No archaeological resources were identified during this reconnaissance. In the spring of 2016, a second option was proposed for that section of the haul road located to the west of Highway 224. The reconnaissance work was conducted under the terms of Heritage Research Permit A2016NS044 by Kathryn J. Stewart with the assistance of Archaeologist Kyle G. Cigolotti.

In the summer of 2018, CRM Group was retained by McCallum Environmental Limited (McCallum) on behalf of Atlantic Gold to undertake archaeological screening and reconnaissance of a proposed waste rock storage pile related to the associated Beaver Dam mining plant and features. This proposed WRSP was located on the east end of the proposed mine layout, on the east side of Crusher Lake.

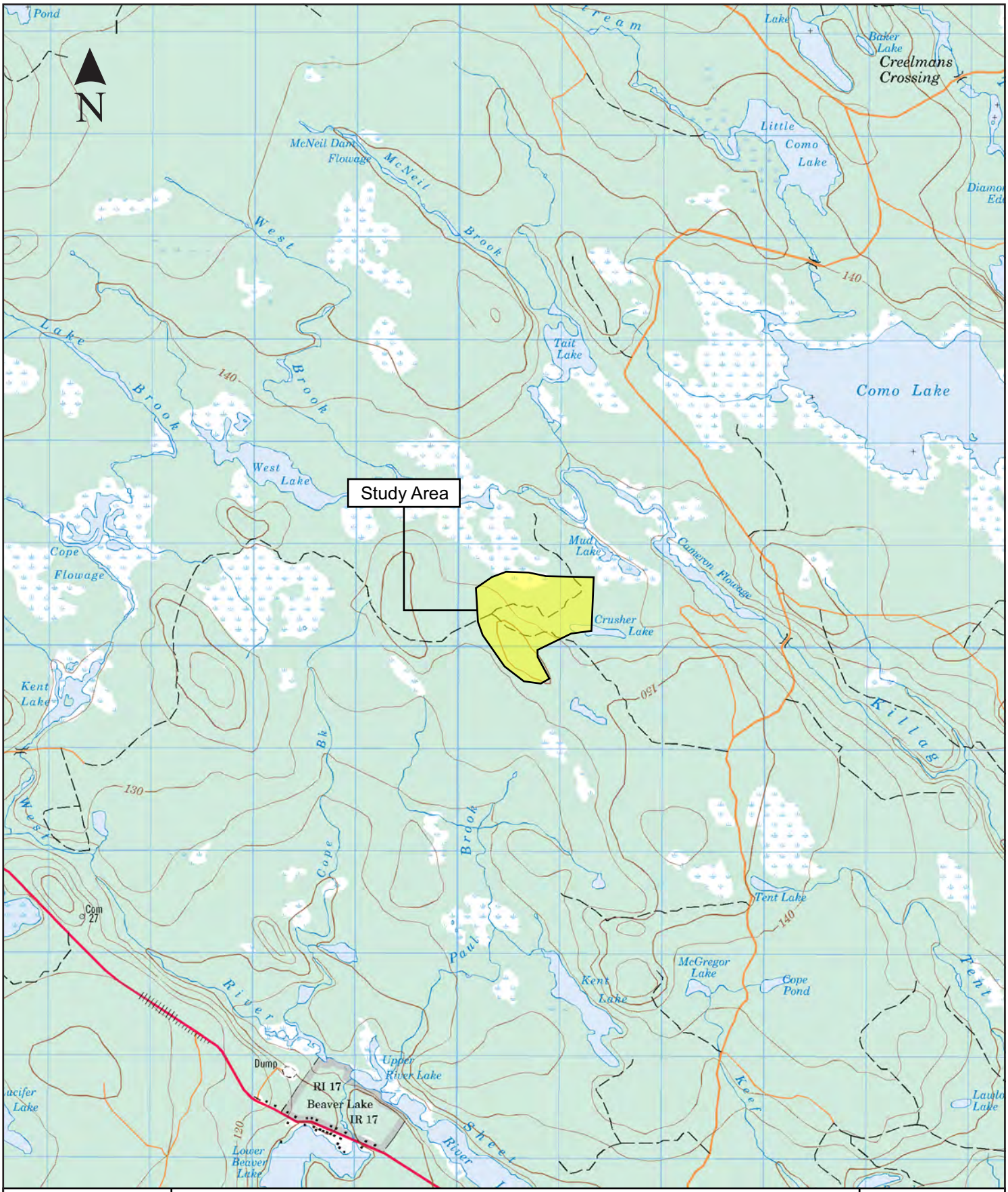
The archaeological screening and reconnaissance was directed by CRM Group Archaeologist Kyle G. Cigolotti. Cigolotti was assisted during the field reconnaissance by Archaeological Technicians Shawn MacSween and Matthew Cigolotti. Technical input on the project was provided by CRM Group President and Senior Technical Advisor W. Bruce Stewart.

The archaeological investigation was conducted according to the terms of Heritage Research Permit A2018NS085 (Category 'C'), issued to Cigolotti through Special Places of the Nova Scotia Department of Communities, Culture and Heritage. This report describes the archaeological screening and reconnaissance of McCallum's proposed Beaver Dam WRSP study area, presents the results of these efforts and offers cultural resource management recommendations.

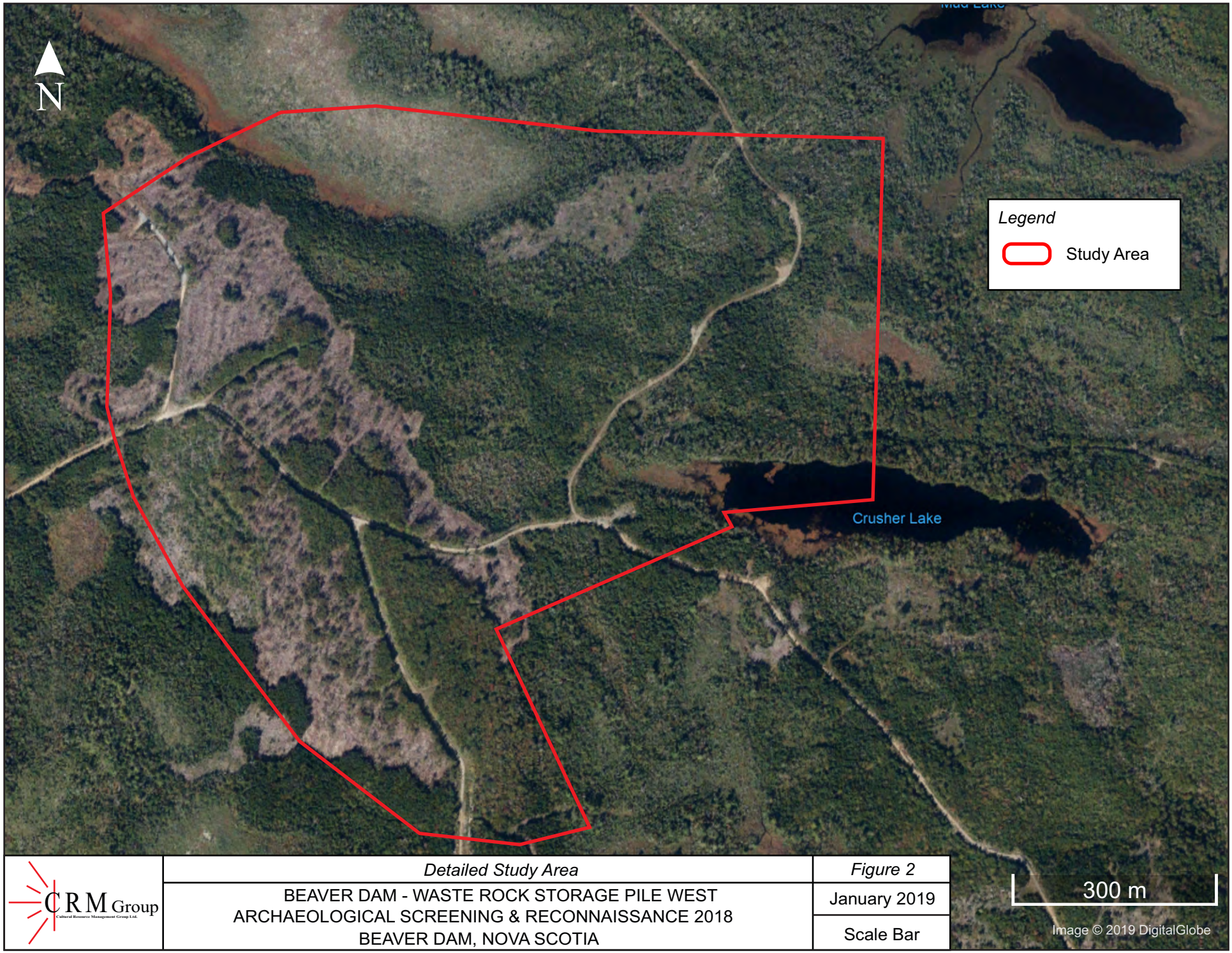
2.0 STUDY AREA

The Beaver Dam Mine Waste Rock Storage Pile West (WRSP) study area is located on the western side of the Killag River in the northeastern corner of Halifax Regional Municipality, approximately 21 kilometres northwest of Sheet Harbour. (***Figures 1 & 2***). The property comprises portions of the historic Beaver Dam Gold District situated between Crusher Lake and Cameron Flowage and the area to the west of Crusher Lake (***Plate 1***). The survey addressed two properties (PID 40200990 and 40201006), with the proposed WRSP area covering approximately 85 hectares. Access to the study area was gained from Beaver Dam Mines Road, via Highway 224.

PLATE 1: **WRSP West study area, Beaver Dam. Facing north, overlooking Crusher Lake; September 26, 2018.**



CRM Group Cultural Resource Management Group Ltd.	*Study Area*	*Figure 1*
	BEAVER DAM - WASTE ROCK STORAGE PILE WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 BEAVER DAM, NOVA SCOTIA	January 2019 Scale 1:50 000



CRM Group Cultural Resource Management Group Ltd.	*Detailed Study Area*	*Figure 2*
	BEAVER DAM - WASTE ROCK STORAGE PILE WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 BEAVER DAM, NOVA SCOTIA	January 2019
		Scale Bar

3.0 METHODOLOGY

In the autumn of 2018, McCallum retained CRM Group on behalf of Atlantic Gold to undertake archaeological screening and reconnaissance of the proposed Beaver Dam Mine Waste Rock Storage Pile West. The objective of the archaeological assessment was to evaluate archaeological potential within the area that may be disturbed by subsequent development activities. To address this objective, CRM Group developed a work plan consisting of the following components: a background study of relevant site documentation to identify areas of high archaeological potential; Mi'kmaw engagement; archaeological reconnaissance of the areas that may be impacted by development activities; and, preparation of a report summarizing the results of the background research and field survey, as well as providing cultural resource management recommendations.

3.1 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. To achieve these goals, CRM Group utilized the resources of various institutions including documentation available through the Nova Scotia Archives, Nova Scotia Land Information Centre, the Department of Natural Resources, the Nova Scotia Registry of Deeds, Dalhousie University Archives and the Nova Scotia Museum.

The background study included a review of relevant historic documentation incorporating land grant records, legal survey and historic maps, local and regional histories, previous archaeological reports and consultation with knowledgeable parties. Topographic maps and aerial photographs, both current and historic, were also used to evaluate the study area. This data facilitated the identification of environmental and topographic features that would 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.

3.2 Mi'kmaw Engagement

Although there was no known Mi'kmaq association with this study area, CRM Group contacted the Kwilmu'lw Maw-klusuaqn Negotiation Office's Archaeological Research Division (KMKNO's ARD) to see if they have any information pertaining to traditional or historical Mi'kmaw use of the study area. Millbrook and Sipekne'katik First Nations were also approached regarding potential traditional or historic Mi'kmaw use of the area. CRM Group staff engaged with Gerald Gloade and Shelly Martin from the Millbrook First Nation in reference to the production of a Mi'kmaw Ecological Knowledge Study (MEKS) and Traditional Land Use Study (TLUS) of the proposed Beaver Dam Mine project.

3.3 Field Reconnaissance

The goals of the archaeological field reconnaissance were to conduct a visual inspection of the study area, document any areas of archaeological sensitivity or archaeological sites identified during the course of 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. Although the ground search did not involve sub-surface testing, the researchers were watchful for topographic or vegetative anomalies that might indicate the presence of buried archaeological resources. The process and results of the field reconnaissance were documented in field notes and photographs.

Hand-held Global Positioning System (GPS) units were used to record track logs and UTM coordinates for all survey areas, as well as any identified diagnostic artifacts, formal tools, isolated finds and site locations.

4.0 RESULTS

4.1 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.

4.1.1 Environmental Setting

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

Water Sources

The Beaver Dam Gold Project property is drained by way of the Killag River, a tributary of West River Sheet Harbour that flows south across the eastern portion of the study area. The Killag River has been dammed creating a reservoir along the eastern edge of the study area, known as Cameron Flowage (Faribault 1899). The dam is located at the southeastern end of Cameron Flowage, approximately one kilometre northeast of Crusher Lake. Several small lakes also fall in close proximity to the study area, including Crusher Lake and Mud Lake. Proximity to water, for both drinking and transportation, is a key factor in identifying Precontact and historic Native, as well as early Euro-Canadian, archaeological potential.

Topography

The study area is located within the greater terrestrial region known as the Quartzite Barrens Unit – Guysborough (Davis & Browne 1996: 56). This region is characterized by rocks belonging to the Meguma supergroup, which in this region is greywacke dating to between the Cambrian and Ordovician periods (White & Barr 2010; Davis & Browne 1996: 44). The topography of the bedrock-dominated barrens could be described as "ridge-swamp-swale". The area is almost completely covered by a quartzite till that ranges in thickness from 1 to 10 metres (Davis & Browne 1996: 56). The general topography of the Beaver Dam region is described as rolling, and elevation within the study area ranges from approximately 130 metres to 165 metres above sea level (Hilchey et al. 1964; 134).

Soils

The Beaver Dam area is covered by *Gibraltar* (ST2) and *Halifax Series* soils (ST2, ST14) (Keys 2007: 8). ST2 is mainly associated with fresh, coarse-loamy soils dominated by sandy loam texture with moderate drainage. ST2 is generally poor to medium in fertility with moisture limited during the growing season (Keys, Neily and Quigley 2011: 36). ST14 is mainly associated with thick organic layers derived from wetland vegetation. Drainage is poor to very poor with fertility ranging from poor to rich, both depending on seepage inputs or ground water quality (Keys et al. 2011: 60).

Flora

The forest growth within this ecological region includes Balsam Fir, Red Spruce, White Spruce, Eastern Hemlock and Yellow Birch. Slow-moving streams are bordered by broad swampy areas populated with Red Maple and Black Spruce. The nature of the soils found within the study area does not encourage heavy forest growth (Davis & Browne 1996: 56-57).

4.1.2 Mi'kmaw Land Use

The land within the study area was once part of the greater Mi'kmaw territory known as *Eskikewa'kik*, meaning 'skin dressers territory' (Rand 1875). The rivers in the surrounding area 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. The West River Sheet Harbour in particular, which the previously assessed section of the haul road crosses at an established bridge, would have been part of a transportation route facilitating travel inland from Sheet Harbour on the Atlantic Ocean, and a significant source of salmon and other fish species.

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 within the BgCq Borden Block.

A review of MARI determined that there are no registered archaeological sites within or close to 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. The nearest registered archaeological sites are BhCp-01, BfCo-01, BfCo-02, BfCo-03, BgCp-01, BgCp-02, BgCp-03, BgCp-04 and BfCp-1. BhCp-01, the site of a historic Mi'kmaq burial, is located approximately 21 kilometres northeast from the study area and recorded by Harry Piers in 1900. According to Piers, Seloam Lake was named after Matteo Seloam, a local Mi'kmaq resident, who buried his wife on one of the islands in the lake. BfCo-01 and 02, located approximately 22 kilometres southeast from the study area, are both Precontact lithic finds identified during a survey of the Nova Scotia Power Incorporated (NSPI) Malay Falls Reservoir conducted by Darryl Kelman in 2013 while water levels in the Reservoir were below normal seasonal levels. BfCo-03 is a historic complex consisting of a road, three foundations and a slipway, all identified during the same survey at Malay Falls. BgCp-01 through BgCp-04, located approximately 18 kilometres east of the study area, are Precontact lithic finds indentified during a survey of NSPI's water drawn down related to the Malay Falls Dam. These were identified in 2013 by Darryl Kelman near Marshall Falls while water levels were below seasonal levels. BfCp-1, located approximately 25 kilometres south of the study area, is a historic house cellar identified in 2016 by Davis MacIntyre & Associates.

According to an environmental screening prepared by the Special Places (Ogilvie 2008), the greater project area, which is dense with lakes and watercourses, is considered to exhibit moderate to high potential for encountering Precontact archaeological sites. It should be noted, however, that the project area as reviewed by the Special Places encompassed a larger area than that subjected to archaeological screening and reconnaissance by CRM Group for this particular study.

Based on available historic documentation, there is evidence to suggest a historic Mi'kmaq presence in the Beaver Dam area. The following account was related to Harry Piers by Jeremiah Bartlett Alexis (Jerry Lonecloud) in 1918 (Whitehead 1991: 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.*

CRM Group contacted KMKNO's ARD requesting information regarding traditional or historic Mi'kmaq use of the study area and they provided information that was taken into consideration when preparing the archaeological assessment. This information is confidential in nature and cannot be reproduced in this report. CRM Group staff also engaged with Gerald Gloade and Shelly Martin from Millbrook First Nation in reference to the production of a Mi'kmaw Ecological Knowledge Study (MEKS) and Traditional Land Use Study (TLUS) of the proposed Beaver Dam Mine project. These reports were not available prior to field investigations or report production.

Based on the environmental setting and Mi'kmaw land use, the Beaver Dam Gold Project Waste Rock Storage Pile West is ascribed elevated potential for encountering Precontact and/or early historic Mi'kmaw archaeological resources.

4.1.3 Historic Land Use

The Beaver Dam Development property has a long history of mining activity. Gold was discovered in the Beaver Dam district in 1868. By 1871, two belts of veins had been opened and a 15-stamp mill erected (Malcolm 1976: 57). However, the property remained largely inactive until 1886, when extensive prospecting and development work began. A 4-stamp mill run by water power was constructed at this time. In 1891, the Beaver Dam Mining Company acquired the site. This new company expanded operations on the property with the construction of a 10-stamp mill. Four years later, the property was leased to G.M. Christie and William Tupper, who employed fifteen men at the Beaver Dam Mine. In 1896, the mine was acquired by J. H. Austin, who erected a 10-stamp mill. Work at the Beaver Dam Mine site continued intermittently until the late 1980s, changing mining rights at least a dozen times. More recently, a number of other companies, including Seabright Resources Incorporated, have conducted extensive exploration on the property.

Euro-Canadian settlement of the Beaver Dam area began in the second half of the nineteenth century and centered on mining activities. An examination of historic mapping revealed that the study area occupies portions of four historic lots (Crown Land Grant Sheet 89). According to the Crown Land Index Sheet 89, these four properties were granted to the Pittsburg Mining Company to the south of Crusher Lake, R. Mosseley to the north of Crusher Lake, Havelock McCall Hart to the west of Crusher Lake and W.D. Veadon also to the west of Crusher Lake.

The 1899 Faribault map indicates the presence of approximately seven features within the Beaver Dam Mine Gold District but no features within the proposed WRSP study area (***Figure 4***). Four of those features in the mine study area, however, are depicted as overlying a quartz vein located near the centre of the Pit study area. This area was subsequently mined and the abandoned pit is now partially flooded. The other three features are depicted in the vicinity of another quartz vein running along the northern shore of Crusher Lake. This map also identifies an "Old Indian Road" as well as a "Portage Road" approximately six kilometres north of the study area. These roads are no longer visible on satellite images but the 1899 map shows several unnamed camps along the routes.

In 1928, Faribault did a geological survey of the Beaver Dam mine site, at this time indicating 10 structures associated with the mine (***Figure 5***). This includes 2 cookhouses, an engine house, the Austen mill, an office, an old 5-stamp mill and sluice, Gordon Zwicker & Levi Dimock's cabin, an old 8-stamp mill, the Bellemore cabin and an unnamed structure (***Figure 6***). According to a compilation of Faribault's memoirs (Malcolm 1976: 57), Zwicker and Dimock's cabin would date to between 1896 and 1904. He identifies the 5-stamp mill as being constructed in 1904 by W. H. Redding. The Austen mill may correspond with the 10-stamp mill erected by J. H. Austin when he became the owner of the mine in 1896 (Malcolm 1976: 57).

According to artist Joseph Purcell, the cabin portrayed in the painting below was built during the late 1920s by a miner named Johnnie Crouse who apparently lived and worked just north of Crusher Lake (***Plate 2***).

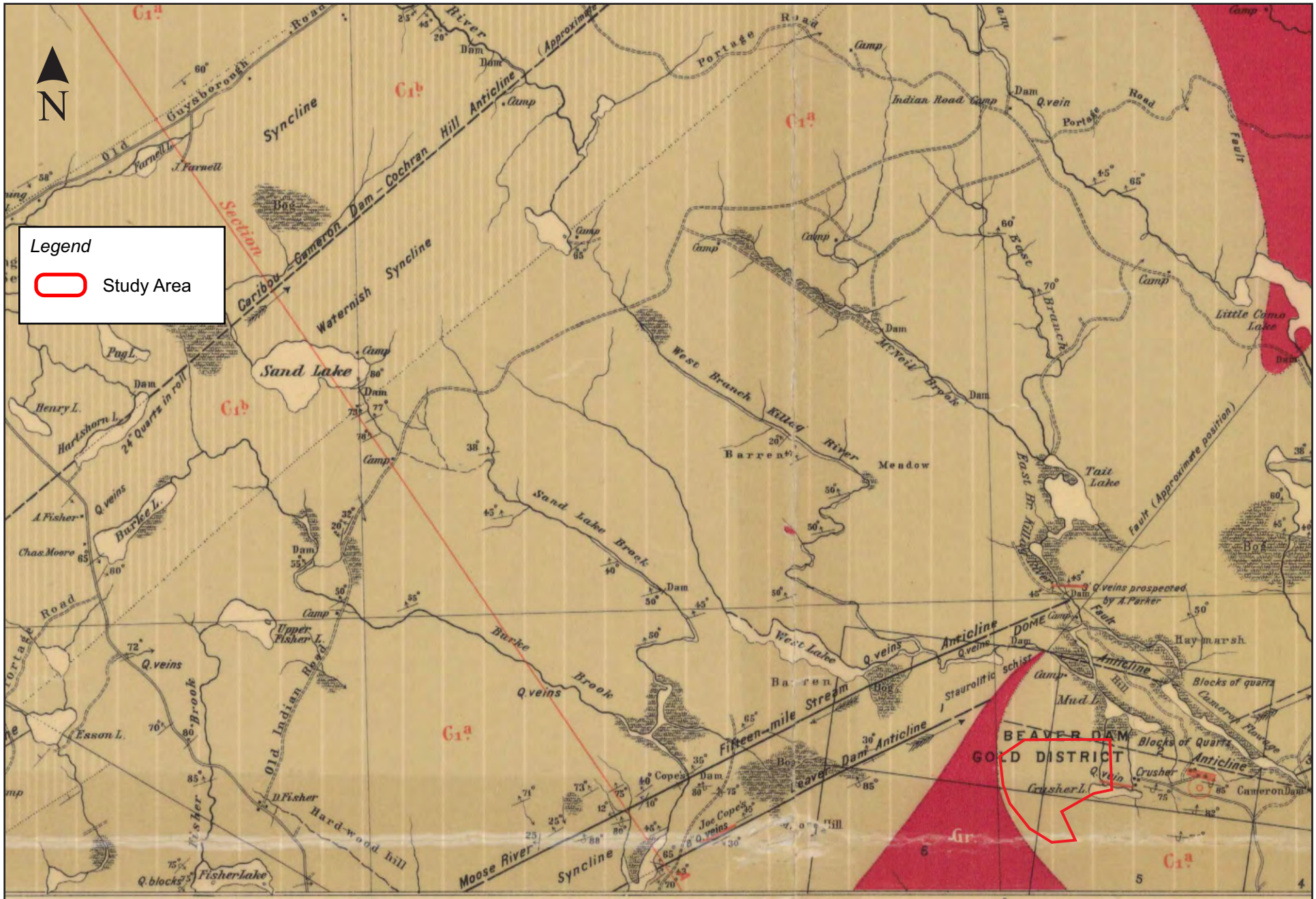
An aerial photo from 1931 identifies what is possibly the Zwicker and Dimock cabin intact as well as features of the old 8-stamp mill on the west end of Crusher Lake (***Figure 7***). Aerial photographs from 1982 and 1992 (***Figure 8***) show that the mine underwent a significant amount of development in this time period. This development likely destroyed any remains of features in the area east of Crusher Lake, such as one of the cookhouses, the Austen mill, the Bellemore cabin and the unnamed structure.

The 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, 20 AMOs are associated with Beaver Dam Mine site (Stewart and Cigolotti 2015).

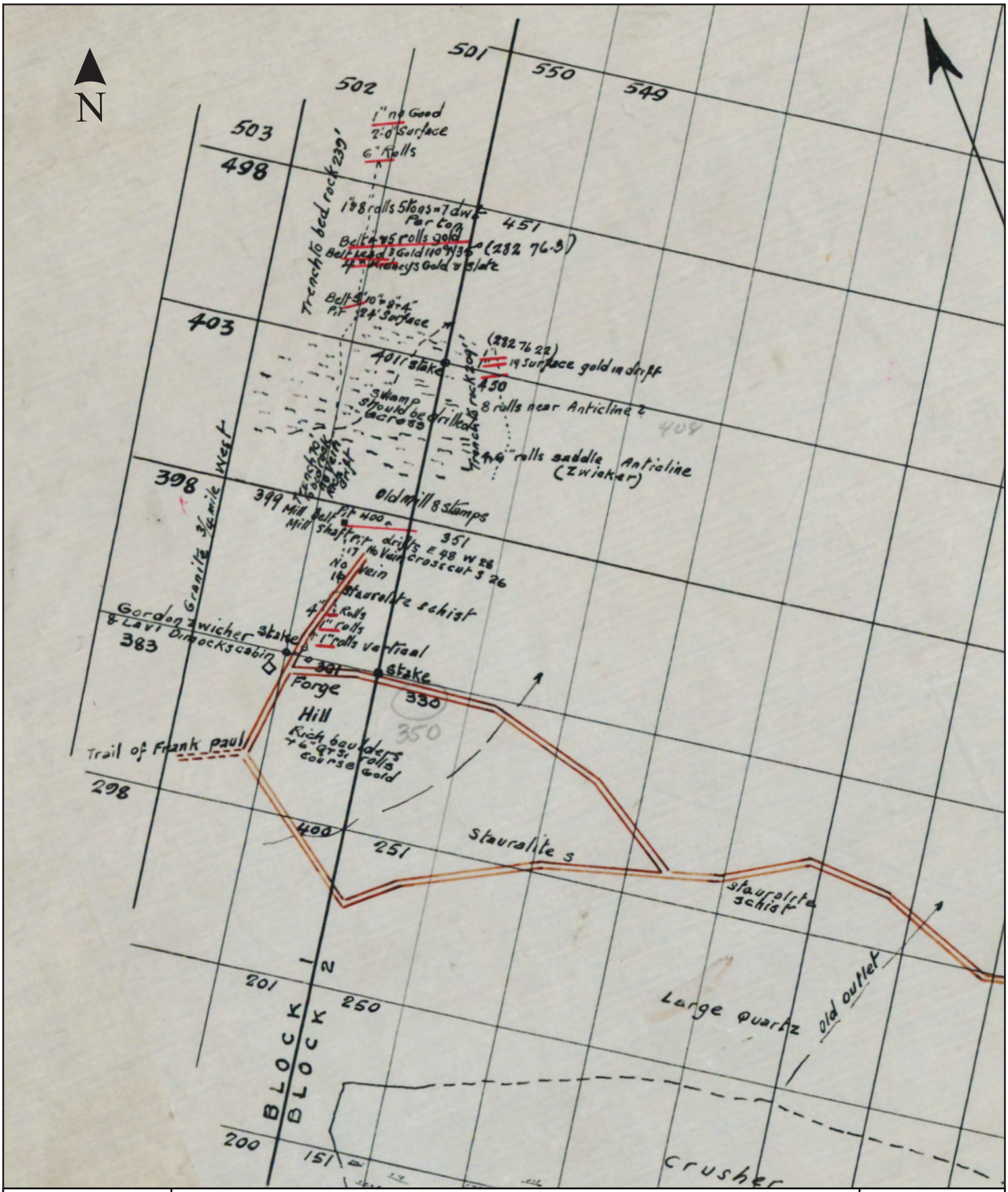
Based on the historical setting within the study area, the Beaver Dam Development property is ascribed elevated potential for encountering historic Euro-Canadian archaeological resources.

PLATE 2: "Crouse's Cabin, Beaver Dam Mine" by Joseph Purcell.

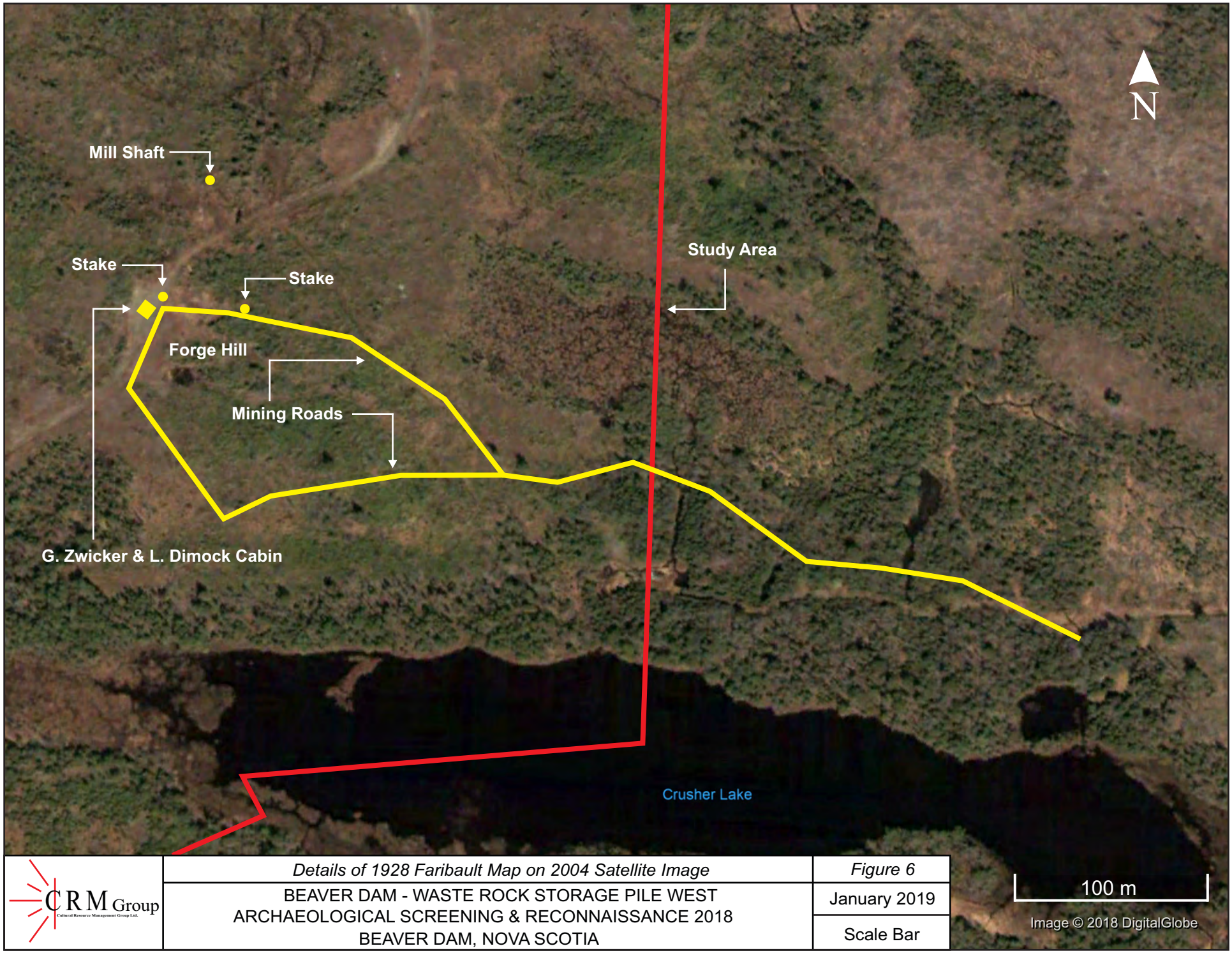
CRM Group Cultural Resource Management Group Ltd.	*Crown Land Index Sheet 89*	*Figure 3*
	BEAVER DAM - WASTE ROCK STORAGE PILE WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 BEAVER DAM, NOVA SCOTIA	January 2019



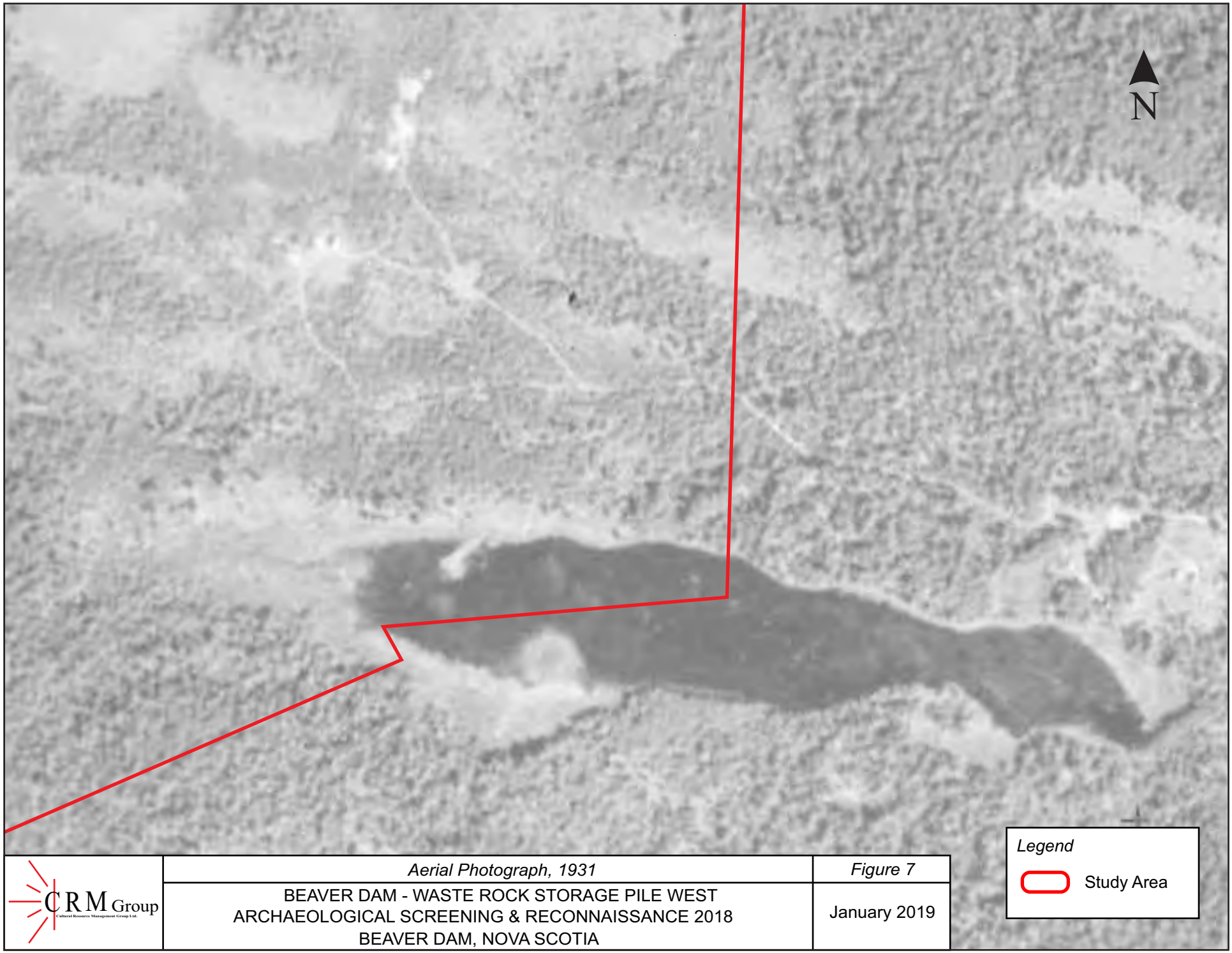
CRM Group	*Faribault Map, 1899*	*Figure 4*
	BEAVER DAM - WASTE ROCK STORAGE PILE WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 BEAVER DAM, NOVA SCOTIA	January 2019



CRM Group Cultural Resource Management Group Ltd.	*Faribault Map, 1928*	*Figure 5*
	BEAVER DAM - WASTE ROCK STORAGE PILE WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 BEAVER DAM, NOVA SCOTIA	January 2019



CRM Group Cultural Resource Management Group Ltd.	*Details of 1928 Faribault Map on 2004 Satellite Image*	*Figure 6*
	BEAVER DAM - WASTE ROCK STORAGE PILE WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 BEAVER DAM, NOVA SCOTIA	January 2019
		Scale Bar



CRM Group Cultural Resource Management Group Ltd.	*Aerial Photograph, 1931*	*Figure 7*
	BEAVER DAM - WASTE ROCK STORAGE PILE WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 BEAVER DAM, NOVA SCOTIA	January 2019

CRM Group Cultural Resource Management Group Ltd.	*Aerial Photographs, 1982 & 1992*	*Figure 8*
	BEAVER DAM - WASTE ROCK STORAGE PILE WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 BEAVER DAM, NOVA SCOTIA	January 2019

4.2 Field Reconnaissance

CRM Group archaeologists conducted fieldwork, consisting of a visual inspection of the study area, on September 26 and October 25, 2018 (***Figure 9***). Weather conditions were overcast, cool and, at times, rainy. 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 or during the previous field visits.

Archaeological reconnaissance was undertaken within the Beaver Dam Gold District in 2008 that identified several areas of elevated archaeological potential. It was recommended that these areas be subject to intensified historic research and field truthing if they could not be avoided by potential mine infrastructure. "Site 6" from the 2008 survey is located within the proposed WRSP West study area and was revisited during the 2018 reconnaissance.

CRM Group archaeologists accessed the study area via Beaver Dam Road from Highway 224 and existing logging and mining roads while on site. The terrain through the study area was a mix of low lying wet and marshy areas, undulating boulder fields and steep slopes (***Plate 3***). The proposed WRSP West borders the western half of Crusher Lake with no other major water courses within the study area. The landscape directly north of Crusher Lake is wet and boggy, with drainage leading directly from the lake into the bog (***Plate 4***).

Tree throws exhibited the area's shallow topsoil and underlying bedrock (***Plate 5***). Vegetation consisted of a mix of mature hardwood and softwood species typical of Nova Scotian forests. Ground cover consisted of a mix of moss, ferns and small shrubs (***Plate 6***).

Several large areas, covering much of the western half of the study area, had been cleared of trees by modern skid-steers following current forest harvesting practices (***Plate 7***). The northernmost area of the proposed WRSP West is another wet and boggy landscape. Several late twentieth or twenty-first century dirt mining roads have been constructed along the southern shore of Crusher Lake and the western half of the study area (***Plate 8***). These roads are visible on 2004 satellite imagery as rough roads and appear to be fully constructed by 2011.

The DNR AMO Database identified 2 of the 20 open mine shafts within the Beaver Dam Gold District as being located within the proposed WSRP West study area. These are identified as the G. Zwicker & L. Dimock Mill Shaft and Test Pit (DNR 2013). The Faribault map had placed the Zwicker and Dimock Cabin approximately 100 metres south of these features. Both of the pits were located during the field reconnaissance but no intact features were found in association (***Plate 9***). The cabin was likely destroyed during construction of the modern mine road where a turnaround spot is now located (***Plate 10***).

Site 6, as described in the 2008 CRM Group report, is located on the eastern side of a logging road that runs through the western portion of the study area (***Figure 10***). The site, situated on a small elevated plateau, is bounded to the south, east and west by a transition to a more densely forested and naturally hummocky terrain (***Plate 11***) (Beanlands & Stewart 2009:21).

Visual examination in 2008 revealed the presence of two depressions. The first measured approximately 3 metres east-west by 3 metres north-south (UTM: 20T 521 077E; 4 990 410N). The second, smaller depression measured approximately 2 metres east-west by 2 metres north-south (UTM: 20T 521 077E; 4 990 422N) (***Plate 12***).

Upon revisiting Site 6 the flat area with depressions to the south were relocated and documented. An area measuring approximately 25 metres by 25 metres displays moderate to high potential for

encountering historic Euro-Canadian archaeological resources. The area directly corresponds with what Faribault had called "Forge Hill", approximately 5 metres east of the Zwicker and Dimock Cabin. A historic mining road was identified but running east/west for approximately 100 metres through rocky and wet terrain (***Plate 13***). Several depressions, likely test pits, were identified during the intensified reconnaissance to the north of Site 6. One pit contained portions of a broken cast iron stove. No identifying markings could be found on the stove to assign it an approximate date range (***Plate 14***).

An area measuring approximately 100 metres east/west by 15 metres north/south and approximately 25 metres north of Crusher Lake was identified as having elevated archaeological potential for encountering Precontact and/or early historic Native archaeological resources (***Figure 10***). This is based on its close proximity to water and its relatively high and flat location (***Plate 15***). This plateau will be referred to as *Area 1*.

LiDAR data from 2014 (GeoNova, 2017) illustrates the high elevation of Area 1 as well, as pits potentially associated with the historic Beaver Dam Gold District operations (***Figure 11***)

Based on the various components of the background study, including environmental setting, Mi'kmaw land use, property history and field reconnaissance, the proposed Beaver Dam Mine Waste Rock Storage Pile West study area is ascribed moderate potential for encountering Precontact and early historic Mi'kmaw archaeological resources and elevated potential for encountering historic Euro-Canadian archaeological resources.

PLATE 3: Example of topography. Facing north; September 26, 2018.

PLATE 4: Example of wet, boggy area, north of Crusher Lake. Facing north; September 26, 2018.

PLATE 5: Example of tree throw within study area. Facing west; September 26, 2018.

PLATE 6: Example of ground cover. Facing west; September 26, 2018.

PLATE 7: Example of modern forestry activities. Facing east; September 26, 2018.

PLATE 8: **Example of forestry road. Facing south; September 26, 2018.**

PLATE 9: **Zwicker and Dimock pit. Facing west; September 26, 2018.**

PLATE 10: **Road turnaround at site of Zwicker and Dimock Cabin. Facing northwest; October 25, 2018.**

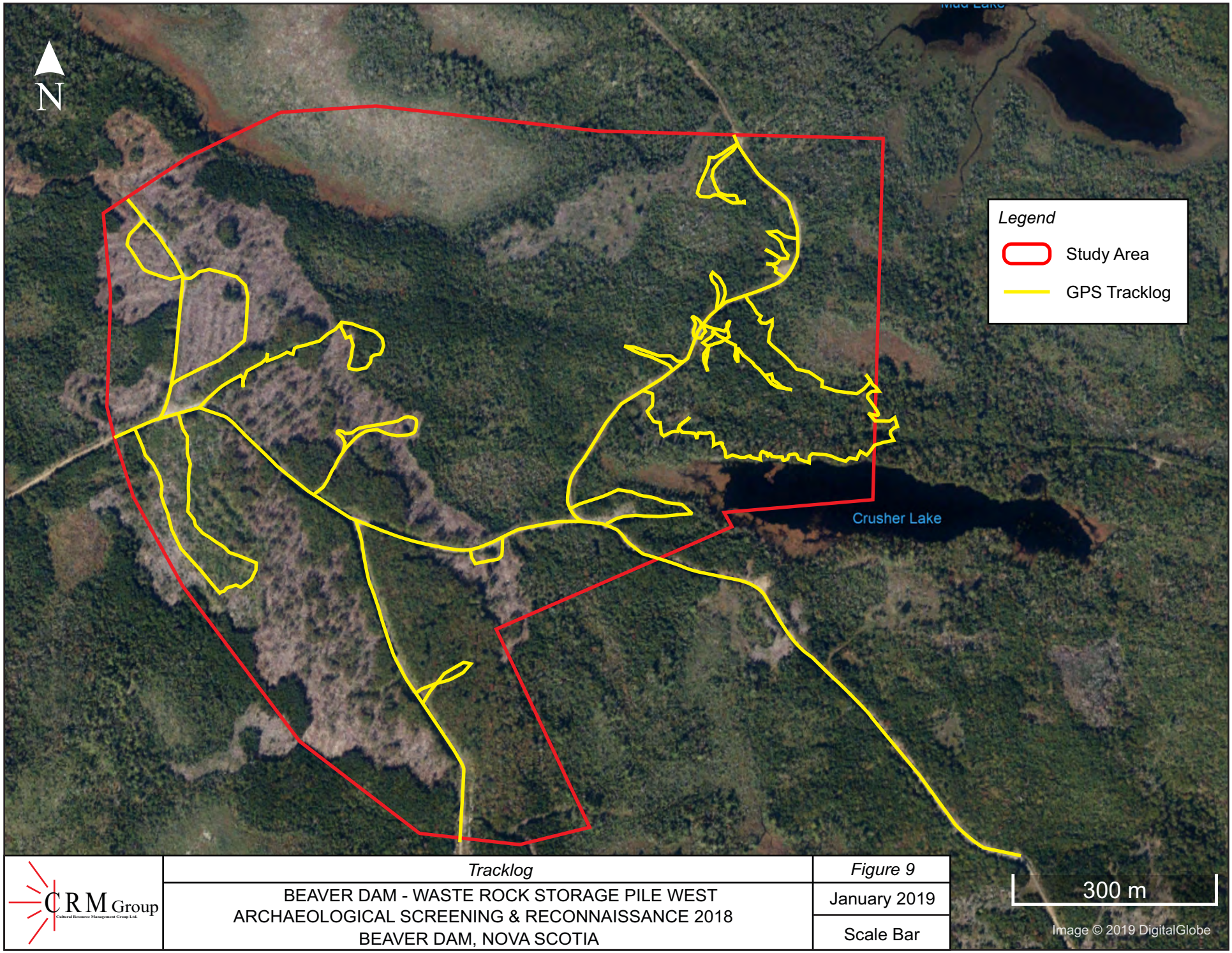
PLATE 11: **Site 6. Facing west; October 25, 2018.**

PLATE 12: Depression south of Site 6. Facing south; October 25, 2018.

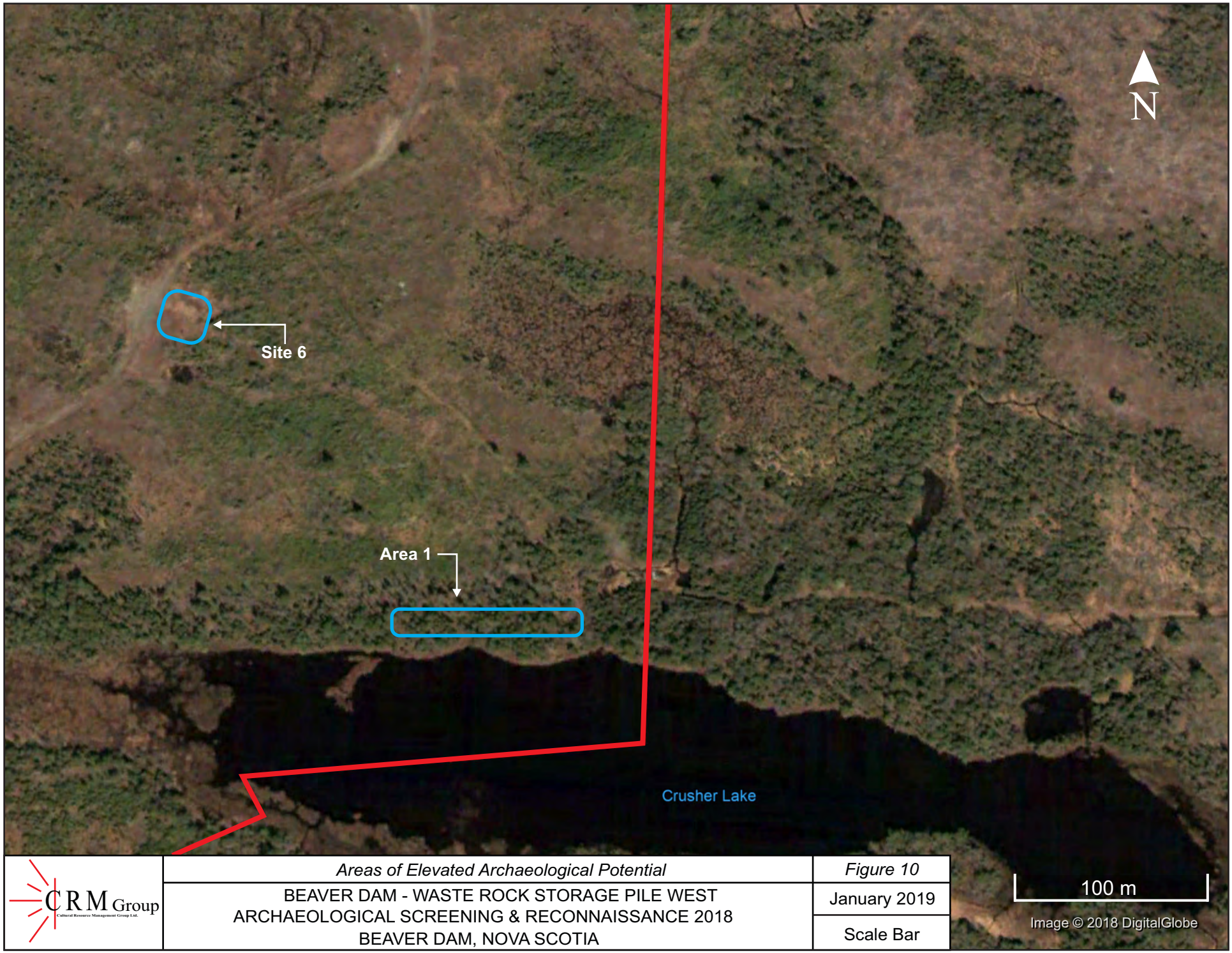
PLATE 13: Portion of historic road leading from Site 6. Facing west; October 25, 2018.

PLATE 14: Cast iron stove in pit near Site 6. Facing northwest; October 25, 2018.

PLATE 15: High and flat terrain of Area 1. Facing east; September 26, 2018.



CRM Group Cultural Resource Management Group Ltd.	*Tracklog*	*Figure 9*
	BEAVER DAM - WASTE ROCK STORAGE PILE WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 BEAVER DAM, NOVA SCOTIA	January 2019
		Scale Bar



CRM Group
Cultural Resource Management Group Ltd.

Areas of Elevated Archaeological Potential

BEAVER DAM - WASTE ROCK STORAGE PILE WEST
ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018
BEAVER DAM, NOVA SCOTIA

Figure 10

January 2019

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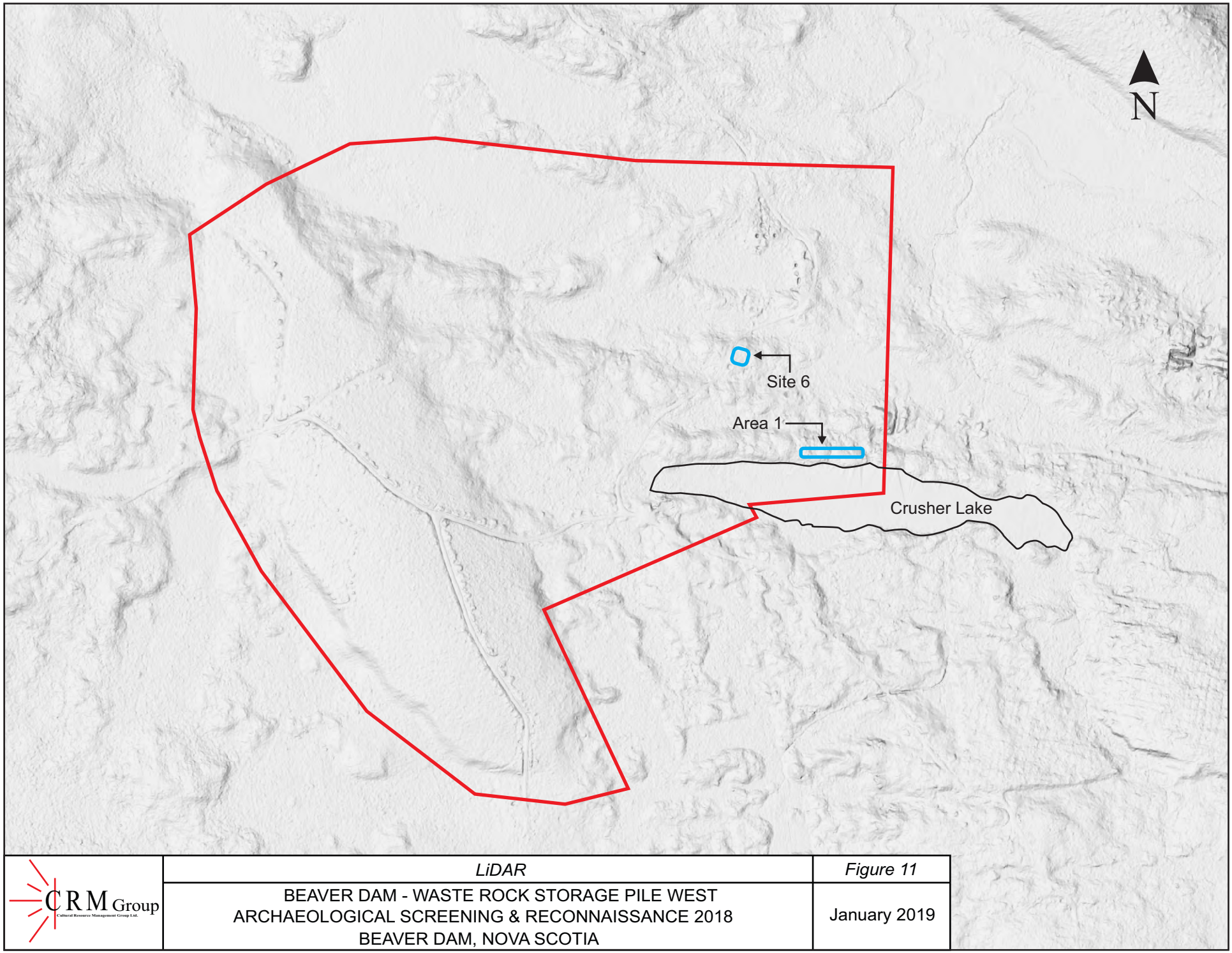

CRM Group Cultural Resource Management Group Ltd.	*LiDAR*	*Figure 11*
	BEAVER DAM - WASTE ROCK STORAGE PILE WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 BEAVER DAM, NOVA SCOTIA	January 2019

5.0 CONCLUSIONS AND RECOMMENDATIONS

The 2018 archaeological screening and reconnaissance of the Beaver Dam Mine Waste Rock Storage Pile West study area consisted of historical background research and a visual inspection. It did not involve sub-surface testing. Based on background research alone, the study area was ascribed elevated potential for encountering Precontact and/or early historic Mi'kmaw archaeological resources and elevated potential for encountering Euro-Canadian archaeological resources.

Based on the background screening in conjunction with the field reconnaissance, Site 6 is ascribed elevated potential for encountering archaeological resources related to the historic Beaver Dam Gold District. Based on the field reconnaissance and the background screening, Area 1 is ascribed elevated potential for encountering Mi'kmaw archaeological resources.

Given the rocky, wet and isolated nature of the terrain encountered during field reconnaissance, the remainder of the Beaver Dam Mine WRSP West study area was ascribed low potential for encountering Mi'kmaw (either Precontact or historic) or Euro-Canadian archaeological resources.

Based on these results, CRM Group offers the following management recommendations for the study area:

1. If any development is to occur within 100 metres of Crusher Lake, it is recommended that a program of intensified reconnaissance be conducted to identify any additional features.

2. If any development is to occur at Site 6 or Area 1, it is recommended that a program of archaeological shovel testing be conducted in advance of any disturbance.

3. Furthermore, if any development is to occur specifically around the historic features identified during the 2008 and/or 2014 reconnaissance, it is recommended that a program of intensified historical research and archaeological shovel testing be conducted in advance of any disturbance.

4. It is recommended that the remainder of the current layout for the proposed WRSP West study areas be cleared of any requirement for further archaeological investigation.

5. If any further changes are made to the layout of the mine and associated facilities it is recommended that those new areas be evaluated as to potential impacts to archaeological resources.

6. In the event that archaeological deposits or human remains are encountered during any ground disturbance associated with the Beaver Dam Development, all work in the associated area(s) should be halted and immediate contact made with the Special Places Program (Sean Weseloh-McKeane: 902-424-6475).

6.0 REFERENCES CITED

Beanlands, Sara & W. Bruce Stewart
2009 *Beaver Dam Development Archaeological Screening & Reconnaissance, Halifax Regional Municipality, Nova Scotia*. Report for Heritage Research Permit A2008NS21. Manuscript on file with the Nova Scotia Museum.

Davis, Derek & Sue Browne, eds.
1996 *The Natural History of Nova Scotia*. Vol. 2. *Theme Regions*. Halifax: Nimbus, Nova Scotia Museum.

Department of Land and Forests.
1946 *Crown Land Grant Index Sheet 89 – Halifax County*. Nova Scotia Department of Natural Resources.

Department of Natural Resources
1931 *Aerial Photo A4133-88.* Department of Energy, Mines and Resources.
1982 *Aerial Photo 82304-69.* Department of Energy, Mines and Resources.
1992 *Aerial Photo 92343-49.* Department of Energy, Mines and Resources.

Faribault, E. R.
1899 *Province of Nova Scotia, Colchester & Halifax Counties, Upper Musquodoboit Sheet, No 49*. Geological Survey of Canada.

Faribault, E. R.
1928 *Beaver Dam Gold District*. Geological Survey of Canada

Keys, Kevin
2007 *Forest Soil Types of Nova Scotia: Identification, Description, and Interpretation* Nova Scotia Department of Natural Resources.

Keys, K., Neily, P., & Quigley, P.
2007 *Forest Ecosystem Classification for Nova Scotia Part II: Soil Types (2010)* Nova Scotia Department of Natural Resources.

Hilchey, J.D., D.B. Cann, and J.I. MacDougall
1964 *Soil Survey of Guysborough County, Nova Scotia*. Nova Scotia Soil Survey Report No. 14. Department of Agriculture.

Malcolm, W.
1976 *Gold Fields of Nova Scotia*. Geological Survey of Canada, Memoir 156.

Ogilvie, Robert.
2008 Environmental Screening 07-12-20d – Beaverdam Site. Report on file with the SPP-HD, Halifax.

Rand, Silas T.
1875 *A First Reading Book in the Micmac Language*. Halifax: Nova Scotia Printing Company.

Stewart, Kathryn & Kyle G. Cigolotti
2015 *Beaver Dam Gold Project Archaeological Assessment, Halifax Regional Municipality, Nova Scotia*. Report for Heritage Research Permit A2015NS107. Manuscript on file with the Nova Scotia Museum.

White, C.E. & S.M. Barr
2012 *Revised Stratigraphy and Tectonic Evolution of the Meguma Terrane*, Nova Scotia Department of Natural Resources, Halifax.

Whitehead, Ruth Holmes.
1991 *The Old Man Told Us: Excerpts from MicMac History 1500-1950*. Halifax: Nimbus.

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:
A2018NS085

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

Surname Cigolotti | First Name Kyle

Project Name Beaver Dam Gold Project WRSP
Archaeological Screening & Reconnaissance

Name of Organization **Cultural Resource Management Group Ltd**

Representing (if applicable) McCallum Environmental Limited

Permit Start Date September 24, 2018 | Permit End Date December 31, 2018

General Location: Beaver Dam, Halifax Regional Municipality

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)*

A parcel of land measuring approximately 900 square metres located to the west of Crusher Lake and the historic Beaver Dam Gold District.

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

<Original signed by>

Signature | Date September 13, 2018

PER KYLE CIGOLOTTI

<Original signed by>

Approved by Executive Director | Date SEPT 21-18

ATLANTICGOLD

Appendix N.3

Archaeological Assessment
Haul Road

GHD LIMTED

BEAVER DAM GOLD PROJECT
HAUL ROAD ARCHAEOLOGICAL RECONNAISSANCE
HALIFAX REGIONAL MUNICIPALITY, NOVA SCOTIA

FINAL REPORT

Submitted to:
GHD Limited
and the
Special Places Program of the Nova Scotia Department of Communities, Culture and Heritage

Prepared by:
Cultural Resource Management Group Limited
6040 Almon Street
Halifax, Nova Scotia
B3K 1T8

Consulting Archaeologist: Kiersten Green
Report Preparation: Kathryn J. Stewart & Kyle G. Cigolotti

Heritage Research Permit Number: A2015NS101

CRM Group Project Number: 2014-0015-02

MARCH 2016

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 Program, Department of Communities, Culture and Heritage.

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NOVA SCOTIA

1.0 INTRODUCTION

Atlantic Gold Corporation (Atlantic Gold) is proposing to redevelop the Beaver Dam Gold Project located in the northeastern corner of Halifax Regional Municipality, approximately 21 kilometres northwest of Sheet Harbour (***Figures 1 & 2***). In the fall of 2014 CRM Group was retained by GHD Limited (formerly Conestoga-Rovers & Associates) on behalf of Atlantic Gold to undertake archaeological screening and reconnaissance of the proposed mine expansion. The archaeological investigation was conducted under to the terms of Heritage Research Permit A2014NS107 (Category 'C'), issued to Staff Archaeologist Kathryn J. Stewart through the Special Places Program (Special Places).

Subsequent changes to the layout of the proposed facility led to additional archaeological reconnaissance in the summer of 2015. Previously investigated mine features such as the waste rock storage (WRS) and the crusher site had shifted to different locations within the overall development site. New work areas were added to the project, in the form of two till piles, two ore piles, two settling ponds and a Run-of-Mine (ROM)/crusher/service pad site. The archaeological investigation was conducted according to the terms of Heritage Research Permit A2015NS043 (Category 'C'), issued to K. J. Stewart. No additional features were identified during this reconnaissance.

In the fall of 2015, CRM Group was retained to conduct archaeological screening and reconnaissance of the proposed haul road connecting the Beaver Dam Mine and the Touquoy Mine sites. The work was conducted under the terms of Heritage Research Permit A2015NS101 by Staff Archaeologists Kiersten Green and K. J. Stewart. The primary focus of the study was to assess the potential for encountering archaeological resources during upgrading of the haul road. The assessment builds upon the research and reconnaissance of the Beaver Dam property undertaken on behalf of Acadian Mining (Acadian) by CRM Group in 2008 (Beanlands 2008). This report describes the archaeological reconnaissance of the proposed haul road, presents the results of these efforts and offers cultural resource management recommendations.

Proposed Haul Road

Approximate Study Area

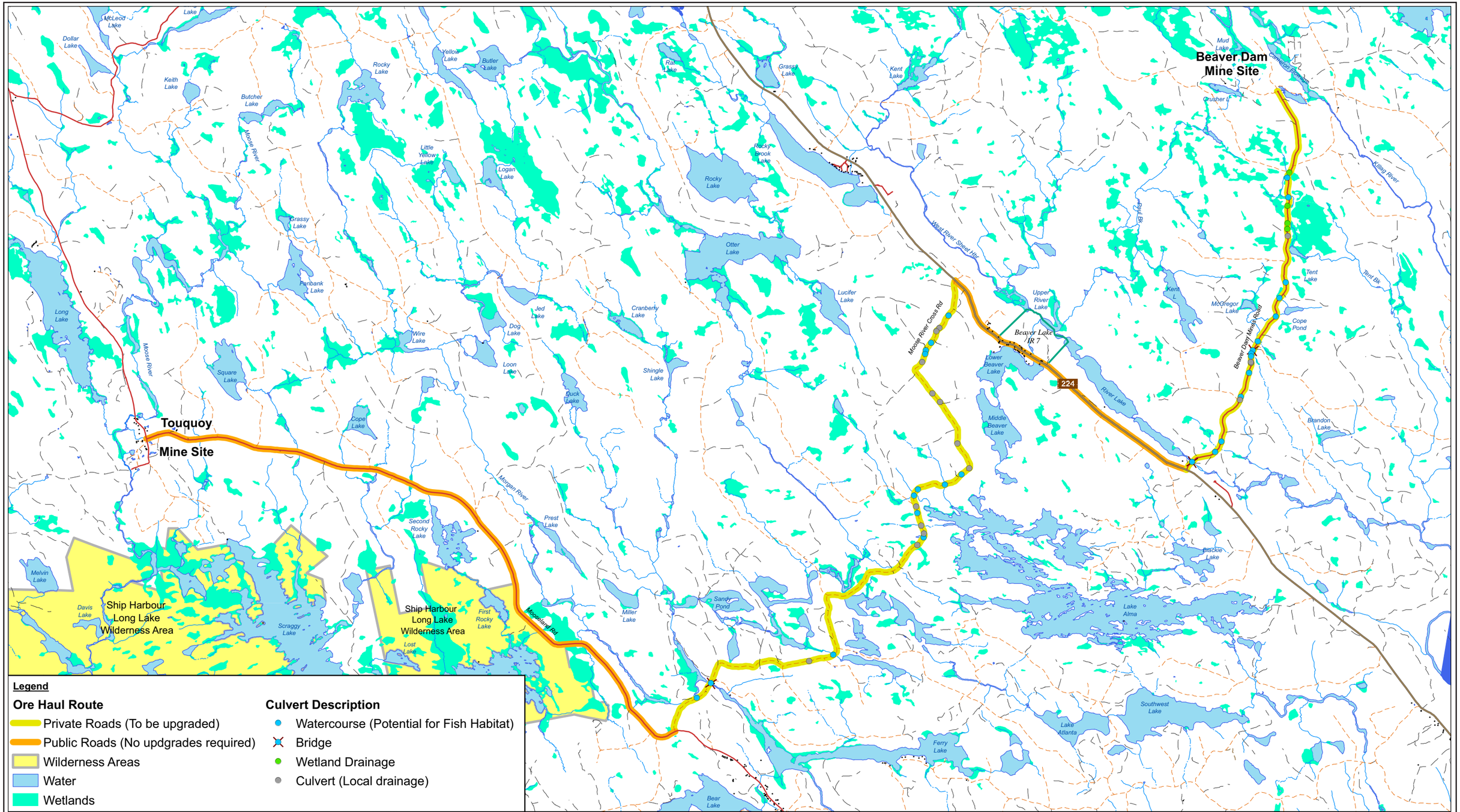
Figure 1

BEAVER DAM GOLD PROJECT HAUL ROAD
ARCHAEOLOGICAL DESKTOP REVIEW & RECONNAISSANCE
HALIFAX REGIONAL MUNICIPALITY

March 2016

Scale 1:50 000

CRM Group
Cultural Resource Management Group Ltd.



Legend

Ore Haul Route
- Private Roads (To be upgraded)
- Public Roads (No updgrades required)
- Wilderness Areas
- Water
- Wetlands

Culvert Description
- Watercourse (Potential for Fish Habitat)
- Bridge
- Wetland Drainage
- Culvert (Local drainage)

Source: Service Nova Scotia, NS Environment, GHD (Field)

CRM Group	*Detailed Study Area*	*Figure 2*
	BEAVER DAM GOLD PROJECT HAUL ROAD ARCHAEOLOGICAL RECONNAISSANCE HALIFAX REGIONAL MUNICIPALITY	March 2016

GHD

ATLNATIC GOLD CORPORATION
MARINETTE, NOVA SCOTIA
BEAVER DAM MINE

HAUL ROAD CONFIGURATION

0 250 500 750 1,000
Meters

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

N

2.0 STUDY AREA

The Beaver Dam Gold Project mine site is located on the western side of Killag River in the northeastern corner of Halifax Regional Municipality, approximately 21 kilometres northwest of Sheet Harbour (***Figure 1***). Access to the property can be gained by following Highway 224 approximately 17 kilometres northwest from Highway 7 to Beaver Dam Mines Road, then following Beaver Dam Mines Road north. The haul road overlaps with Beaver Dam Mine Road, which is the access road to the mine, then follows Highway 224 for 5.1 kilometres to the northwest (***Figure 2***). Turning left onto Moose River Cross Road, the haul road meanders for 12.1 kilometres along gravel roads heading southwest toward Mooseland Road. Upon reaching Mooseland Road, it turns northwest again, reaching the Touquoy Mine site after 11.2 kilometres.

Only portions of the proposed haul road require upgrades to allow for truck travel, so the focus of the reconnaissance was on Beaver Dam Mines Road and Moose River Cross Road. It is projected the upgrade will expand these sections of haul road to 20 metres wide.

PLATE 1: Small water crossing in the haul road study area; facing southwest. November 13, 2015.

3.0 METHODOLOGY

GHD retained CRM Group to undertake archaeological reconnaissance of the proposed haul road connecting the Beaver Dam Mine and Touquoy Mine sites. To address the potential of encountering significant archaeological resources within the proposed haul route, CRM Group developed a work plan consisting of the following components: archaeological reconnaissance of the area to be impacted by development activities; and, preparation of a report summarizing the results of the field survey, as well as recommending strategies for assessment and management of areas exhibiting high archaeological potential and/or features.

3.1 Background Research

The archival research had already been completed during the initial screening and reconnaissance of the Beaver Dam Mine site, so no additional background research was conducted. This 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. To achieve this goal, CRM Group utilized the resources of various institutions including documentation available through Nova Scotia Archives, the Department of Natural Resources (DNR) and Crown Land Information Management Centre.

The background study included a review of relevant historic documentation incorporating land grant records, legal survey and historic maps, as well as local and regional histories. This data facilitated the identification of environmental and topographic features, which would 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 reconnaissance, the information obtained from this suite of research materials was reviewed to facilitate the interpretation of any archaeological features encountered within the study area.

3.2 Field Reconnaissance

The goals of the archaeological field reconnaissance were to conduct visual inspection of the study area, document any areas of archaeological sensitivity or archaeological sites identified during the course of visual inspection, and design a strategy for testing areas of archaeological potential, as well as any archaeological resources identified within the study area. Although the ground search did not involve sub-surface testing, the researchers were alert for topographic or vegetative anomalies that might indicate the presence of buried archaeological resources. The process and results of the field reconnaissance were documented in field notes and photographs.

A hand-held Global Positioning System (GPS) unit was used to record UTM coordinates (NAD 83) for all survey areas, as well as any identified diagnostic artifacts, formal tools, isolated finds and site locations.

4.0 RESULTS OF SCREENING AND RECONNAISSANCE

4.1 Background Study

The following discussion details the environmental and cultural setting of the study 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.

4.1.1 Environmental Setting

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

Water Sources

The Beaver Dam Gold Project property is drained by way of the Killag River, a tributary of West River Sheet Harbour that flows south across the eastern portion of the study area. The Killag River has been dammed creating a reservoir along the eastern edge of the study area, known as Cameron Flowage. The haul road runs adjacent or crosses a number of watercourses and lakes, including River Lake, West River Sheet Harbour, Lake Alma and Ferry Lake. Proximity to water, for both drinking and transportation, is a key factor in identifying Precontact and historic Native, as well as early Euro-Canadian, archaeological potential.

Topography

Part of the study area is located within the greater terrestrial region known as the Quartzite Barrens Unit – Guysborough (Davis & Browne 1996: 56). This region is characterized by rocks belonging to the Meguma supergroup, which in this region is greywacke dating to between the Cambrian and Ordovician periods (White & Barr 2010; Davis & Browne 1996: 44). The topography of the bedrock-dominated barrens could be described as "ridge-swamp-swale". The area is almost completely covered by a quartzite till that ranges in thickness from 1 to 10 metres (Davis & Browne 1996: 56). In addition, a portion of the haul road is with the region known as Eastern Shore Drumlins Unit - Tangier River. This region is underlain by greywacke and slate interfolded into a series of wide bands that are oriented east-west (Davis & Browne 1996: 74). The general topography of the Beaver Dam region varies from level to rolling, and elevation within the study area ranges from approximately 92 metres to approximately 165 metres above sea level (Hilchey et al. 1964; 134).

Soils

The Beaver Dam area is covered primarily by *Halifax Series* (ST2, ST14) soils, although concentrations of *Bridgewater* (ST2 and ST8), *Aspotogan* (ST4), *Danesville* (ST3) and *Gibraltar* (ST2) S*eries* soils and peat are also found within the study area (Keys 2007: 8). *Halifax Series* soils are well drained but typically shallow, stony and porous. The parent material is olive to yellowish-brown sandy loam to gravelly sandy loam glacial till derived primarily from quartzite. In general, *Halifax Series* soils are too stony for agriculture (MacDougall *et. al.* 1963: 32-33). The well-drained *Bridgewater* S*eries* soils are developed from a medium-textured, olive coloured glacial till that is derived principally from Precambrian slates. The *Bridgewater* S*eries* soils in the Beaver Dam area are moderately stony and unsuitable for cultivation (MacDougall *et. al.* 1963: 28). *Aspotogan* S*eries* soils are described as a dark grayish brown sandy loam overlaying and mottled with a dark reddish brown sandy loam. The soil has poor drainage and is considered too stony for cultivation. The parent material is an olive stony loam till derived from quartzite or granite (MacDougall *et. al.* 1963: 35). *Danesville* S*eries* is a glacial till comprised of a grayish-brown gravelly sandy loam. This composition, principally derived from quartzite, is imperfectly drained (MacDougall *et. al.* 1963: 33-34). The parent material of *Gibraltar* S*eries* soils has a sandy loam texture

derived from granite. It is a shallow soil, with poor moisture-holding capabilities and is extremely stony (MacDougall *et. al.* 1963: 34).

Vegetation
The forest growth within this ecological region includes Balsam Fir, Red Spruce, White Spruce, Eastern Hemlock and Yellow Birch. Slow-moving streams are bordered by broad swampy areas populated with Red Maple and Black Spruce. The nature of the soils found within the study area does not encourage heavy forest growth (Davis & Browne 1996: 56-57).

4.1.2 Native Land Use

The land within the study area was once part of the greater Mi'kmaq territory known as *Eskikewa'kik*, meaning 'skin dressers territory'. The rivers in the surrounding area 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. The West River Sheet Harbour in particular, which the haul road crosses at a previously established bridge, would have been part of a transportation route facilitating travel inland from Sheet Harbour on the Atlantic Ocean.

A review of the Maritime Archaeological Resource Inventory, a provincial archaeological site database maintained by the SPP, determined that there are no registered archaeological sites within or close to 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. According to an environmental screening prepared by the SPP (Ogilvie 2008), the greater project area, which is dense with lakes and watercourses, is considered to exhibit moderate to high potential for encountering Precontact archaeological sites. It should be noted, however, that the project area as reviewed by the SPP encompassed a larger area than that subjected to archaeological screening and reconnaissance by CRM Group.

Based on available historic documentation, there is evidence to suggest a historic Mi'kmaq presence in the Beaver Dam area. The following account was related to Harry Piers by Jeremiah Bartlett Alexis (Jerry Lonecloud) in 1918 (Whitehead 1991: 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.*

Based on the environmental setting and Native land use, the Beaver Dam Gold Project haul road is ascribed elevated potential for encountering Precontact and/or early historic Native archaeological resources.

4.1.3 Property History

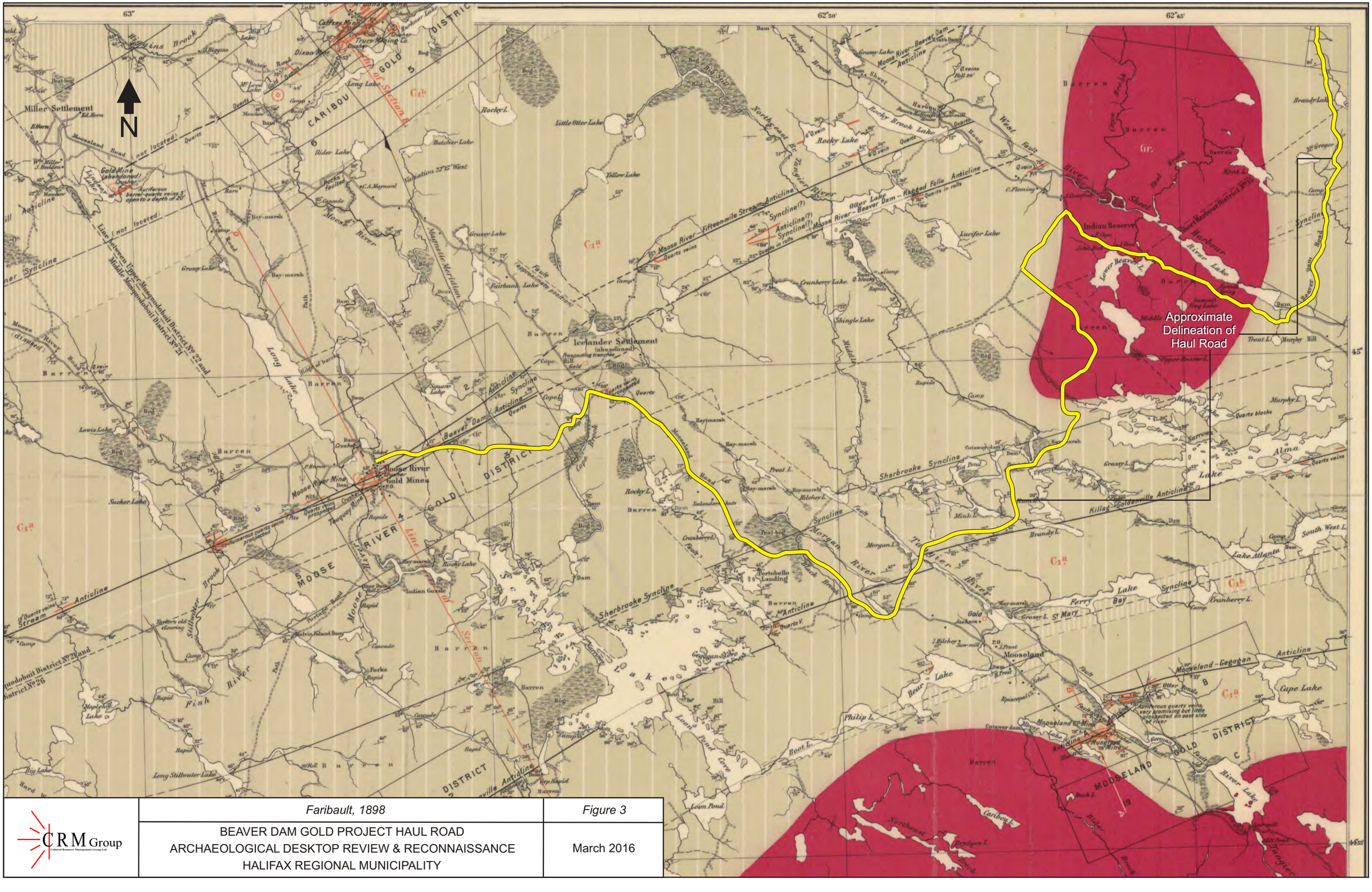
The Beaver Dam Development property has a long history of industrial use. Gold was discovered in the Beaver Dam district in 1868. By 1871, two belts of veins had been opened and a 15-stamp mill erected (Malcolm 1976: 57). However, the property remained largely inactive until 1886, when extensive prospecting and development work began. A 4-stamp mill run by water power was constructed at this time.

In 1891, the Beaver Dam Mining Company acquired the site. This new company expanded operations on the property with the construction of a 10-stamp mill. Four years later, the property was leased to G.M. Christie and William Tupper, who employed fifteen men at the Beaver Dam Mine. In 1896, the mine was acquired by J. H. Austin, who erected a 10-stamp mill. Work at the Beaver Dam Mine site continued intermittently until the late 80s, changing mining rights at least a dozen times (Jacques Whitford 1986). More recently, a number of other companies, including Seabright Resources Inc., have conducted extensive exploration on the property.

Euro-Canadian settlement of the Beaver Dam area began in the second half of the nineteenth century and centered on mining activities. A cursory examination of historic mapping revealed that the study area including the haul road occupies portions of at least two dozen historic lots (Crown Land Grant Sheet 89). An examination of the A. F. Church map of Halifax County failed to identify any structures depicted within the study area as of 1865. The 1898 Faribault map indicates the presence of approximately seven features within the mine study area but no features along or adjacent to the haul road (***Figures 3***). Four of those features in the mine study area, however, are depicted as overlying a quartz vein located near the centre of the Pit study area. This area was subsequently mined and the abandoned pit is now partially flooded. The other three features are depicted in the vicinity of another quartz vein running along the northern shore of Crusher Lake.

The 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, 20 AMOs are associated with Beaver Dam Mine site, and no AMOs are associated with the haul road (Stewart and Cigolotti 2015).

Based on the historical setting within the study area, the Beaver Dam Mine Project haul road is ascribed low potential for encountering historic Euro-Canadian archaeological resources.



CRM Group

Faribault, 1898

Figure 3

BEAVER DAM GOLD PROJECT HAUL ROAD
ARCHAEOLOGICAL DESKTOP REVIEW & RECONNAISSANCE
HALIFAX REGIONAL MUNICIPALITY

March 2016

4.2 Field Reconnaissance

CRM Group archaeologists conducted fieldwork, consisting of a visual inspection of the study area, on November 13, 2015 under sunny and warm conditions. The primary goals of the reconnaissance were to assess the archaeological potential of the proposed haul road area and to investigate various topographical and cultural features, which had been identified as areas of elevated potential during the background research.

The water crossings exhibited the highest potential in the background research and were the focus of the reconnaissance.

The survey began by driving to the mine development site and then returning to Highway 224. All water crossings were investigated along the Beaver Dam Mines Road (***Plates 2 & 3***). The only crossing of significant size was West River Sheet Harbour, flowing out of River Lake alongside the highway. Areas immediately adjacent to the bridge were heavily disturbed as a result of bridge construction - bulldozing and importing gravel to build up the road. Outside the disturbance, the land is mostly low, wet and rocky (***Plates 4, 5 & 6***). In other areas the land dropped sharply down to the water over a bald rock face. The crossing exhibits low archaeological potential.

The other section of haul road that requires upgrading is Moose River Cross Road. Survey of this section resulted in the identification of one water crossing of significant size: Morgan River. The area around the river exhibits low potential as it is low and wet, with large boulders scattered throughout. As with the bridge over the West River Sheet Harbour, some disturbance was identified immediately adjacent to the bridge. The area had been built up for the construction of the bridge (***Plates 7 & 8***).

During the reconnaissance for the Beaver Dam Mine haul road, no areas were ascribed high archaeological potential.

Plate 2: A flooded area along the proposed haul road; facing southeast. November 13, 2015.

Plate 3: Water crossing along the proposed haul road; facing south. November 13, 2015.

Plate 4: West River Sheet Harbour crossing; facing northeast. November 13, 2015.

Plate 5: **West River Sheet Harbour crossing; facing southeast. November 13, 2015.**

Plate 6: **West River Sheet Harbour crossing, exhibiting some disturbance; facing north. November 13, 2015.**

Plate 7: Morgan River crossing; facing east. November 13, 2015.

Plate 8: Morgan River crossing; facing west. November 13, 2015.

5.0 CONCLUSIONS AND RECOMMENDATIONS

In the fall of 2015, CRM Group was retained by GHD to conduct archaeological screening and reconnaissance of the proposed haul road connecting the Beaver Dam Mine and the Touquoy Mine sites. Archaeological reconnaissance was conducted on November 13, 2015 under sunny and warm conditions. Visual inspection of the study area did not identify any areas exhibiting high archaeological potential.

Based on these results, CRM Group offers the following management recommendations for the study area:

1. It is recommended that the alignment of the haul road, as specified in this report, be cleared of any requirement for further archaeological investigation.

2. In the event that archaeological deposits or human remains are encountered during any ground disturbance associated with the Beaver Dam Gold Project haul road, all work in the associated area(s) should be halted and immediate contact made with the Special Places Program (Sean Weseloh-McKeane: 902-424-6475).

6.0 REFERENCES CITED

Beanlands, Sara
2009 *Beaver Dam Development Archaeological Screening & Reconnaissance, Halifax Regional Municipality, Nova Scotia*. Report for Heritage Research Permit A2008NS21. Manuscript on file with the Nova Scotia Museum.

Church, Ambrose F.
1865 *Topographical Township Map of Halifax County, Nova Scotia*. Halifax: A.F. Church & Co.

Davis, Derek & Sue Browne, eds.
1996 *The Natural History of Nova Scotia*. Vol. 2. *Theme Regions*. Halifax: Nimbus, Nova Scotia Museum.

Department of Land and Forests.
1946 *Crown Land Grant Index Sheet 89 – Halifax County*. Nova Scotia Department of Natural Resources.

Faribault, E. R.
1899 *Province of Nova Scotia, Colchester & Halifax Counties, Upper Musquodoboit Sheet, No 49*. Geological Survey of Canada.

MacDougall, J.I. et. al.
1963 *Soil Survey of Halifax County, Nova Scotia*. Report No. 13. Nova Scotia Soil Survey. Truro: Minister of Supply and Services.

Malcolm, W.
1976 *Gold Fields of Nova Scotia*. Geological Survey of Canada, Memoir 156.

Ogilvie, Robert.
2008 Environmental Screening 07-12-20d – Beaverdam Site. Report on file with the SPP-HD, Halifax.

Sangster, Alan & Paul Smith.
2007 Metallogenic Summary of the Meguma Gold Deposits, Nova Scotia in *Mineral Deposits of Canada.* Geological Association of Canada, Special Publication No. 5.

Stewart, Kathryn & Kyle G. Cigolotti
2015 *Beaver Dam Gold Project Archaeological Assessment, Halifax Regional Municipality, Nova Scotia*. Report for Heritage Research Permit A2015NS107. Manuscript on file with the Nova Scotia Museum.

White, C.E. & S.M. Barr
2012 *Revised Stratigraphy and Tectonic Evolution of the Meguma Terrane*, Nova Scotia Department of Natural Resources, Halifax.

Whitehead, Ruth Holmes.
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NOVA SCOTIA

Communities, Culture & Heritage

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

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

June 10, 2016

Kathryn Stewart
Cultural Resource Management Group
6040 Almon Street, Halifax, NS
B3K 1T8

Dear Ms. Stewart:

RE: Heritage Research Permit Report
A2015NS101 – Beaver Dam Gold Haul Road Project

We have received and reviewed your report on work conducted under the terms of Heritage Research Permit A2015NS101 for the archaeological resource impact assessment of the Beaver Dam Gold Project expansion in HRM County.

The report details the archaeological screening and reconnaissance of the proposed Beaver Dam Gold Project haul road area near Sheet Harbour, HRM by CRM Group Ltd. in November 2015. The screening and reconnaissance project included a review of past archaeological work for the area, a review of compiled background and historical research, and detailed field inspection of two sections of road planned for upgrading. No areas of elevated archaeological potential or areas with archaeological resources were identified.

Based on the above, the reporter recommends that the alignment of the haul road, as specified in the report, be cleared of any requirement for further archaeological investigation. In the event that archaeological deposits or human remains are encountered during any ground disturbance associated with the Beaver Dam Gold Project haul road, all work in the associated areas should stop and contact made with the Coordinator of Special Places.

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,
<Original signed by>

Sean Weseloh McKeane
Coordinator, Special Places

ATLANTICGOLD

Appendix N.4

Archaeological Assessment
Haul Road Option 2

GHD

BEAVER DAM GOLD PROJECT
HAUL ROAD OPTION 2
ARCHAEOLOGICAL RECONNAISSANCE
HALIFAX REGIONAL MUNICIPALITY, NOVA SCOTIA

FINAL REPORT

Submitted to:
GHD
and the
Special Places Program of the
Nova Scotia Department of
Communities, Culture and Heritage

Prepared by:
Cultural Resource Management Group Limited
6040 Almon Street
Halifax, Nova Scotia
B3K 1T8

Consulting Archaeologist: Kathryn J. Stewart
Report Preparation: Kathryn J. Stewart & Kyle G. Cigolotti

Heritage Research Permit Number: A2016NS044

CRM Group Project Number: 2014-0015-02

MARCH 2017

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ARCHAEOLOGICAL RECONNAISSANCE
HALIFAX REGIONAL MUNICIPALITY
NOVA SCOTIA

1.0 INTRODUCTION

Atlantic Gold Corporation (Atlantic Gold) is proposing to redevelop the Beaver Dam Gold Project located in the northeastern corner of Halifax Regional Municipality, approximately 21 kilometres northwest of Sheet Harbour (***Figures 1, 2 & 3***). In the fall of 2014, CRM Group was retained by GHD (formerly Conestoga-Rovers & Associates) on behalf of Atlantic Gold to undertake archaeological screening and reconnaissance of the proposed mine expansion. The archaeological investigation was conducted under to the terms of Heritage Research Permit A2014NS107 (Category 'C'), issued to Staff Archaeologist Kathryn J. Stewart through the Special Places Program (Special Places).

Subsequent changes to the layout of the proposed facility led to additional archaeological reconnaissance in the summer of 2015. Previously investigated mine features had shifted to different locations and new work areas were added to the project. The archaeological investigation was conducted according to the terms of Heritage Research Permit A2015NS043 (Category 'C'), issued to K. J. Stewart. No additional features were identified during this reconnaissance.

In the fall of 2015, CRM Group was retained to conduct archaeological screening and reconnaissance of the proposed haul road connecting the Beaver Dam Mine and the Touquoy Mine sites. The work was conducted under the terms of Heritage Research Permit A2015NS101 by Archaeologist Kiersten Green with the assistance of K. J. Stewart. The primary focus of the study was to assess the potential for encountering archaeological resources during upgrading of the haul road. No archaeological resources were identified during this reconnaissance. In the spring of 2016, a second option was proposed for the section of the haul road located to the west of Highway 224. The reconnaissance work was conducted under the terms of Heritage Research Permit A2016NS044 by K. J. Stewart with the assistance of Archaeologist Kyle G. Cigolotti. This report describes the archaeological reconnaissance of the second option for the proposed haul road, presents the results of these efforts and offers cultural resource management recommendations.

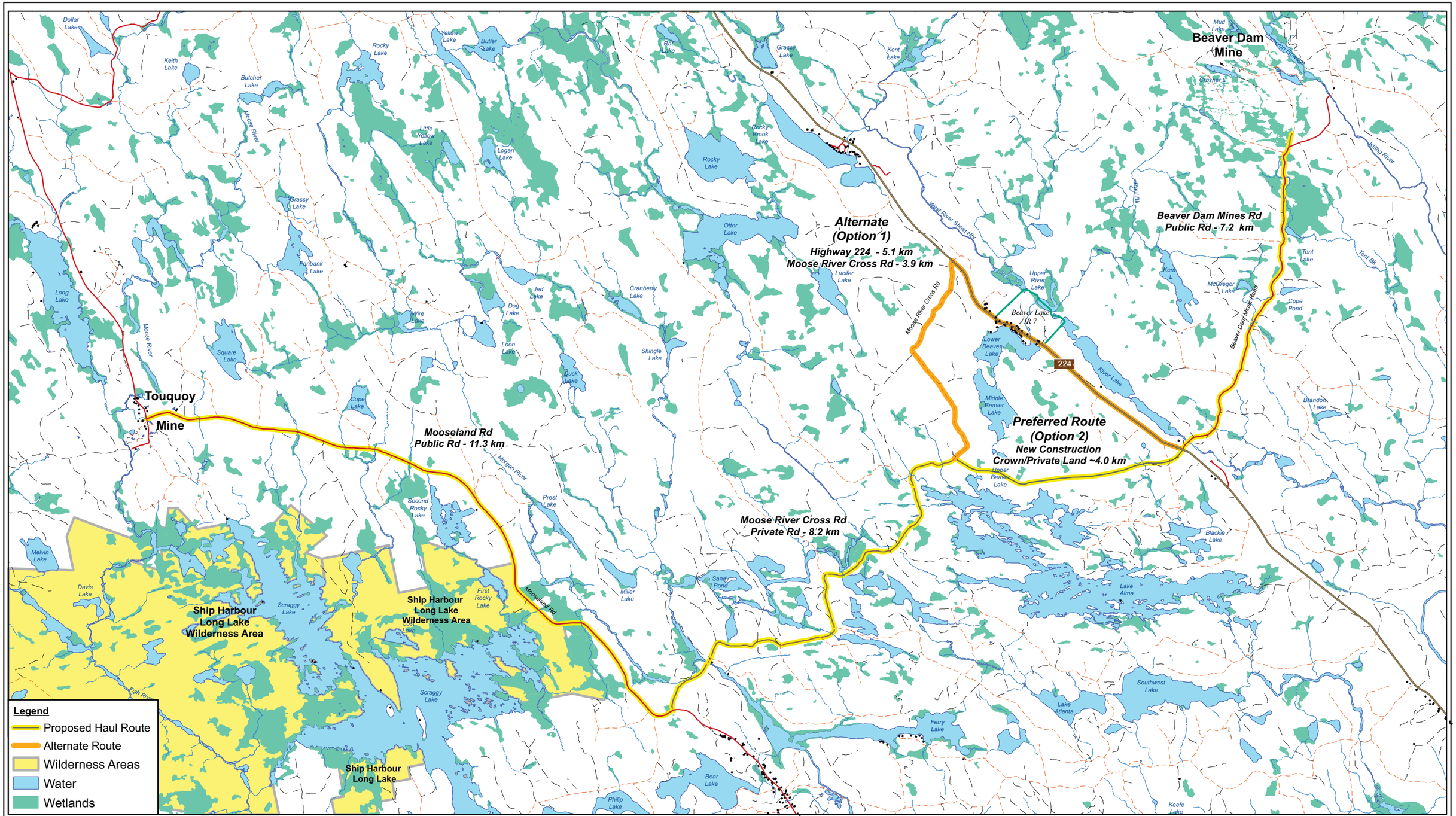
Haul Road Option 1

Proposed Haul Road

Proposed Haul Road

Haul Road Option 2 (Approximate Study Area)

CRM Group	*Approximate Study Area*	*Figure 1*
	BEAVER DAM GOLD PROJECT HAUL ROAD OPTION 2 ARCHAEOLOGICAL RECONNAISSANCE HALIFAX REGIONAL MUNICIPALITY	March 2017 Scale 1:50 000



Source: Service Nova Scotia (Water, Wetlands, Roads), NS Environment (Protected Areas), Atlantic Gold (Route)

CRM Group	*Haul Road with Option 2*	*Figure 2*
	BEAVER DAM GOLD PROJECT HAUL ROAD OPTION 2 ARCHAEOLOGICAL RECONNAISSANCE HALIFAX REGIONAL MUNICIPALITY	March 2017

0 600 1,200 1,800
Meters

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

N

GHD

ATLANTIC GOLD CORPORATION
MARINETTE, HALIFAX CO., NOVA SCOTIA
BEAVER DAM MINE - HAUL ROAD OPTION 2

088664
Jun 7, 2016

HAUL ROAD CONFIGURATION

River Lake

Beaver Lake
IR 17

River Lake

HAUL ROAD OPTION 1

224

Beaver Dam Mines Rd

PID 40231581
NORTHERN TIMBER
NS CORP

Lower Beaver Lake

PID 40219179
NORTHERN TIMBER
NS CORP

PID 40231581
NS NATURAL RESOURCES

PID 40231896
NORTHERN TIMBER
NS CORP

Middle Beaver Lake

Moose River Cross Rd

PID 40231581
NS NATURAL RESOURCES

PID 40231581
NATURAL RESOURCES

Upper Beaver Lake

Haul Road Option 2

Lake Alma

PID 00596031
NORTHERN TIMBER
NS CORP

Legend

- Indian Reserve (IR 17)
- Buildings
- Collector Highway
- Local Road
- Dry Weather / Seasonal
- Diveways (>300 m)
- Track
- Contours

Ore Haul Route

- Proposed Haul Route
- Alternate Route **(Option 1)**

Source: Insert source text here.

CRM Group
Cultural Resource Management Group Ltd.

Haul Road Option 2 Detail	*Figure 3*
BEAVER DAM GOLD PROJECT HAUL ROAD OPTION 2 ARCHAEOLOGICAL RECONNAISSANCE HALIFAX REGIONAL MUNICIPALITY	March 2017

0 150 300 450
Meters

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

N

GHD

ATLANTIC GOLD CORPORATION
MARINETTE, NOVA SCOTIA
BEAVER DAM MINE - HAUL ROAD OPTION 2

088664
Jun 7, 2016

HAUL ROAD OPTION 2 - DETAIL

2.0 STUDY AREA

The Beaver Dam Gold Project mine site is located on the western side of Killag River in the northeastern corner of Halifax Regional Municipality, approximately 21 kilometres northwest of Sheet Harbour (***Figure 1***). Access to the property can be gained by following Highway 224 approximately 17 kilometres northwest from Highway 7 to Beaver Dam Mines Road, then following Beaver Dam Mines Road north. Option 2 for the haul road overlaps with Beaver Dam Mine Road, which is the access road to the mine, then crosses Highway 224 to follow a new alignment for 4 kilometres before connecting with Moose River Cross Road (so called for this project), the haul road meanders for 8.4 kilometres along gravel roads heading southwest toward Mooseland Road. Upon reaching Mooseland Road, it turns northwest again, reaching the Touquoy Mine site after 11.2 kilometres.

As the other sections of the haul road have already been subject to archaeological reconnaissance, only Option 2 of the haul road was addressed under this permit.

PLATE 1: The beginning of the Haul Road Option 2 alignment off Highway 224. The orange flagging tape denotes the alignment. Facing west. June 23, 2016.

3.0 METHODOLOGY

GHD retained CRM Group to undertake archaeological reconnaissance of the proposed haul road connecting the Beaver Dam Mine and Touquoy Mine sites. To address the potential of encountering significant archaeological resources within the proposed haul route, CRM Group developed a work plan consisting of the following components: background research; archaeological reconnaissance of the area to be impacted by development activities; and, preparation of a report summarizing the results of the field survey, as well as recommending strategies for assessment and management of areas exhibiting high archaeological potential and/or features.

3.1 Background Research

This 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. To achieve this goal, CRM Group utilized the resources of various institutions including documentation available through Nova Scotia Archives, the Department of Natural Resources (DNR) and Crown Land Information Management Centre.

The background study included a review of relevant historic documentation incorporating land grant records, legal survey and historic maps, as well as local and regional histories. This data facilitated the identification of environmental and topographic features, which would 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 reconnaissance, the information obtained from this suite of research materials was reviewed to facilitate the interpretation of any archaeological features encountered within the study area.

3.2 Field Reconnaissance

The goals of the archaeological field reconnaissance were to conduct visual inspection of the study area, document any areas of archaeological sensitivity or archaeological sites identified during the course of visual inspection, and design a strategy for testing areas of archaeological potential, as well as any archaeological resources identified within the study area. Although the ground search did not involve sub-surface testing, the researchers were alert for topographic or vegetative anomalies that might indicate the presence of buried archaeological resources. The process and results of the field reconnaissance were documented in field notes and photographs.

A hand-held Global Positioning System (GPS) unit was used to record UTM coordinates (NAD 83) for all survey areas, as well as any identified diagnostic artifacts, formal tools, isolated finds and site locations.

4.0 RESULTS OF SCREENING AND RECONNAISSANCE

4.1 Background Study

The following discussion details the environmental and cultural setting of the study 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.

4.1.1 Environmental Setting

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

Water Sources

The Beaver Dam Gold Project property is drained by way of the Killag River, a tributary of West River Sheet Harbour that flows south across the eastern portion of the study area. The Killag River has been dammed creating a reservoir along the eastern edge of the study area, known as Cameron Flowage. The second option for the haul road runs between Lake Alma and Upper Beaver Lake. It also crosses an unnamed stream feeding into Blackie Lake. Proximity to water, for both drinking and transportation, is a key factor in identifying Precontact and historic Native, as well as early Euro-Canadian, archaeological potential.

Topography

The study area is located within the greater terrestrial region known as the Quartzite Barrens Unit – Guysborough (Davis & Browne 1996: 56). This region is characterized by rocks belonging to the Meguma supergroup, which in this region is greywacke dating to between the Cambrian and Ordovician periods (White & Barr 2010; Davis & Browne 1996: 44). The topography of the bedrock-dominated barrens could be described as "ridge-swamp-swale". The area is almost completely covered by a quartzite till that ranges in thickness from 1 to 10 metres (Davis & Browne 1996: 56). The general topography of the Beaver Dam region is described as rolling, and elevation within the study area ranges from approximately 95 metres to 145 metres above sea level (Hilchey et al. 1964; 134).

Soils

The Beaver Dam area is covered by *Gibraltar* (ST2) and *Halifax Series* soils (ST2, ST14) (Keys 2007: 8). The parent material of *Gibraltar* S*eries* soils has a sandy loam texture derived from granite. It is a shallow soil, with poor moisture-holding capabilities and is extremely stony (MacDougall *et. al.* 1963: 34). *Halifax Series* soils are well drained but typically shallow, stony and porous. The parent material is olive to yellowish-brown sandy loam to gravelly sandy loam glacial till derived primarily from quartzite. In general, *Halifax Series* soils are too stony for agriculture (MacDougall *et. al.* 1963: 32-33).

Vegetation

The forest growth within this ecological region includes Balsam Fir, Red Spruce, White Spruce, Eastern Hemlock and Yellow Birch. Slow-moving streams are bordered by broad swampy areas populated with Red Maple and Black Spruce. The nature of the soils found within the study area does not encourage heavy forest growth (Davis & Browne 1996: 56-57).

4.1.2 Native Land Use

The land within the study area was once part of the greater Mi'kmaq territory known as *Eskikewa'kik*, meaning 'skin dressers territory'. The rivers in the surrounding area 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. The West River Sheet Harbour in particular, which the previously assessed section of the haul road crosses at an established bridge, would have been part of a transportation route facilitating travel inland from Sheet Harbour on the Atlantic Ocean.

A review of the Maritime Archaeological Resource Inventory, a provincial archaeological site database maintained by the SPP, determined that there are no registered archaeological sites within or close to 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. According to an environmental screening prepared by the SPP (Ogilvie 2008), the greater project area, which is dense with lakes and watercourses, is considered to exhibit moderate to high potential for encountering Precontact archaeological sites. It should be noted, however, that the project area as reviewed by the SPP encompassed a larger area than that subjected to archaeological screening and reconnaissance by CRM Group.

Based on available historic documentation, there is evidence to suggest a historic Mi'kmaq presence in the Beaver Dam area. The following account was related to Harry Piers by Jeremiah Bartlett Alexis (Jerry Lonecloud) in 1918 (Whitehead 1991: 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.*

Based on the environmental setting and Native land use, the Beaver Dam Gold Project Haul Road Option 2 is ascribed elevated potential for encountering Precontact and/or early historic Native archaeological resources.

4.1.3 Property History

The Beaver Dam Development property has a long history of industrial use. Gold was discovered in the Beaver Dam district in 1868. By 1871, two belts of veins had been opened and a 15-stamp mill erected (Malcolm 1976: 57). However, the property remained largely inactive until 1886, when extensive prospecting and development work began. A 4-stamp mill run by water power was constructed at this time. In 1891, the Beaver Dam Mining Company acquired the site. This new company expanded operations on the property with the construction of a 10-stamp mill. Four years later, the property was leased to G.M. Christie and William Tupper, who employed fifteen men at the Beaver Dam Mine. In 1896, the mine was acquired by J. H. Austin, who erected a 10-stamp mill. Work at the Beaver Dam Mine site continued intermittently until the late 80s, changing mining rights at least a dozen times (Jacques Whitford 1986). More recently, a number of other companies, including Seabright Resources Inc., have conducted extensive exploration on the property.

Euro-Canadian settlement of the Beaver Dam area began in the second half of the nineteenth century and

centered on mining activities. A cursory examination of historic mapping revealed that the study area, including the haul road, occupies portions of at least two dozen historic lots (Crown Land Grant Sheet 89). An examination of the 1865 A. F. Church map of Halifax County identifies three structures around Blackie Lake, though they do not appear to be within the study area. The 1898 Faribault map indicates the presence of approximately seven features within the mine study area but no features along or adjacent to the haul road (***Figures 3***). Four of those features in the mine study area, however, are depicted as overlying a quartz vein located near the centre of the Pit study area. This area was subsequently mined and the abandoned pit is now partially flooded. The other three features are depicted in the vicinity of another quartz vein running along the northern shore of Crusher Lake.

The 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, 20 AMOs are associated with Beaver Dam Mine site, and no AMOs are associated with the haul road (Stewart and Cigolotti 2015).

Based on the historical setting within the study area, the Beaver Dam Mine Project Haul Road Option 2 is ascribed low potential for encountering historic Euro-Canadian archaeological resources.

Approximate Delineation of Haul Road Option 2

CRM Group	*Faribault, 1898*	*Figure 4*
	BEAVER DAM GOLD PROJECT HAUL ROAD OPTION 2 ARCHAEOLOGICAL RECONNAISSANCE HALIFAX REGIONAL MUNICIPALITY	March 2017

4.2 Field Reconnaissance

CRM Group archaeologists conducted fieldwork, consisting of a visual inspection of the study area, on June 23, 2016 under sunny and muggy conditions (***Plate 2***). The primary goals of the reconnaissance were to assess the archaeological potential of the proposed Haul Road Option 2 area and to investigate any topographical and cultural features, identified as areas of elevated potential during the background research.

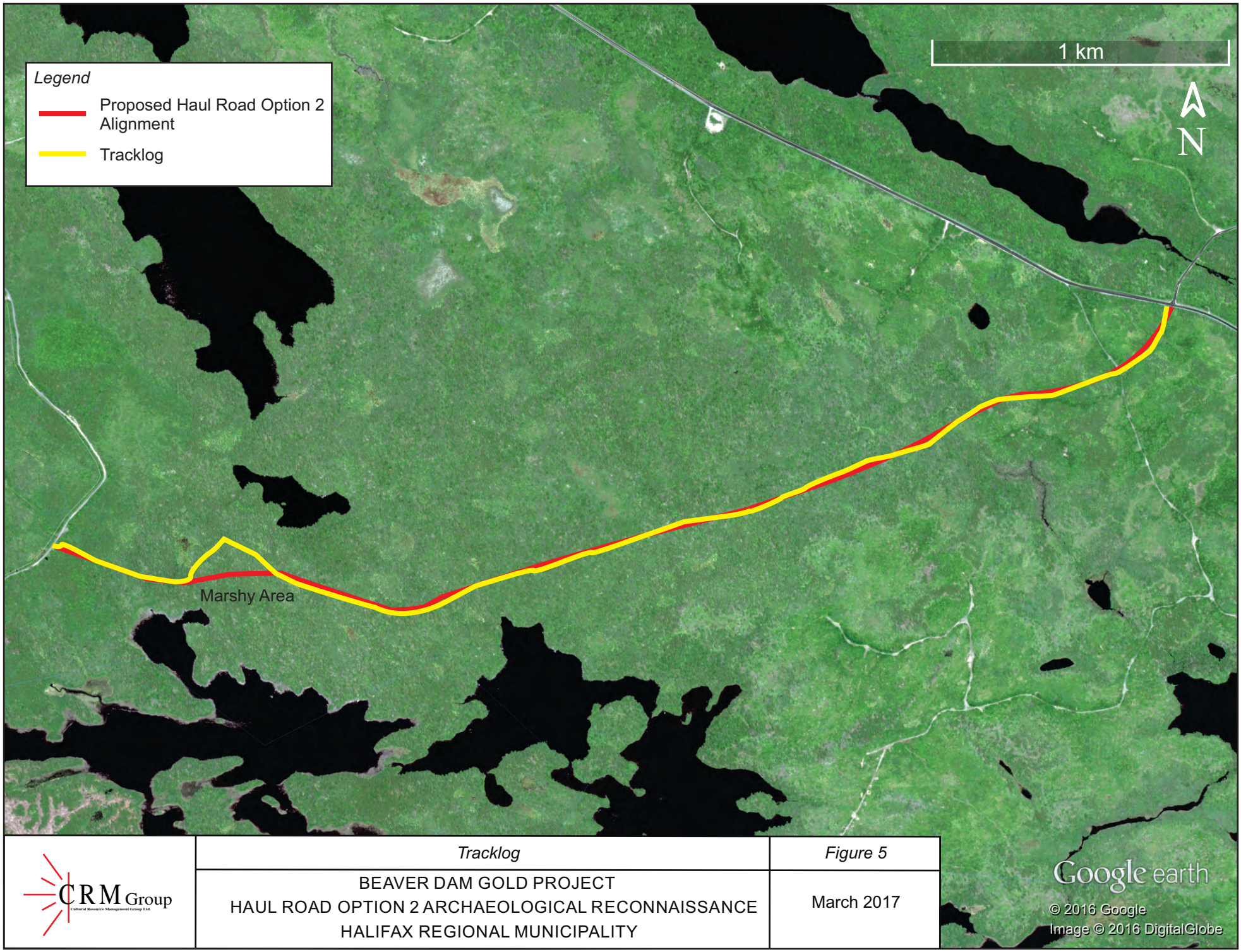
CRM Group archaeologists started at Highway 224 (***Plate 1***) and walked the 4 kilometre length of Haul Road Option 2, eventually meeting up with Moose River Cross Road (***Plate 3***). The terrain through Option 2 was a mix of low lying wet and marshy areas, undulating boulder fields and steep slopes (***Plates 4 & 5***).

Option 2 crossed several small brooks, too small to appear on any mapping or aerial photographs (***Plate 6***). Although the haul road passed between Lake Alma and Upper Beaver Lake, these bodies of water were still at least 80 metres from the alignment.

Within the first 400 metres of Option 2 from Highway 224, two recent roads were encountered, both likely associated with logging operations in the area by Northern Timber Nova Scotia Corporation. One of the roads, oriented northwest-southeast, was heavily used and had been recently regraded. The second road, oriented northeast-southwest, was overgrown with young saplings and brush and constructed of crushed stone (***Plate 7***). This road is an off-shoot of the other road, though no longer in use.

During the reconnaissance for the Beaver Dam Mine Haul Road Option 2, no areas were ascribed high archaeological potential.

Plate 2: Haul Road Option 2; facing southwest. June 23, 2016.



CRM Group Cultural Resource Management Group Ltd.	*Tracklog*	*Figure 5*
	BEAVER DAM GOLD PROJECT HAUL ROAD OPTION 2 ARCHAEOLOGICAL RECONNAISSANCE HALIFAX REGIONAL MUNICIPALITY	March 2017

Plate 3: Option 2 connecting with Moose River Cross Road; facing east. June 23, 2016.

Plate 4: Mossy boulder field; facing southwest. June 23, 2016.

Plate 5: Typical terrain within the study area; facing southwest. June 23, 2016.

Plate 6: Small water crossing; facing west. June 23, 2016.

Plate 7: Disused logging road; facing southeast. June 23, 2016.

5.0 CONCLUSIONS AND RECOMMENDATIONS

In the spring of 2016, CRM Group was retained by GHD to conduct archaeological screening and reconnaissance of the proposed Haul Road Option 2 connecting Highway 224 to Moose River Cross Road. Archaeological reconnaissance was conducted on June 23, 2016 under sunny and muggy conditions. Visual inspection of the study area did not identify any areas exhibiting high archaeological potential.

Based on these results, CRM Group offers the following management recommendations for the study area:

1. It is recommended that the alignment of the haul road, as specified in this report, be cleared of any requirement for further archaeological investigation.

2. In the event that archaeological deposits or human remains are encountered during any ground disturbance associated with the Beaver Dam Gold Project haul road, all work in the associated area(s) should be halted and immediate contact made with the Special Places Program (Sean Weseloh-McKeane: 902-424-6475).

6.0 REFERENCES CITED

Beanlands, Sara
2009 *Beaver Dam Development Archaeological Screening & Reconnaissance, Halifax Regional Municipality, Nova Scotia*. Report for Heritage Research Permit A2008NS21. Manuscript on file with the Nova Scotia Museum.

Church, Ambrose F.
1865 *Topographical Township Map of Halifax County, Nova Scotia*. Halifax: A.F. Church & Co.

Davis, Derek & Sue Browne, eds.
1996 *The Natural History of Nova Scotia*. Vol. 2. *Theme Regions*. Halifax: Nimbus, Nova Scotia Museum.

Department of Land and Forests.
1946 *Crown Land Grant Index Sheet 89 – Halifax County*. Nova Scotia Department of Natural Resources.

Faribault, E. R.
1899 *Province of Nova Scotia, Colchester & Halifax Counties, Upper Musquodoboit Sheet, No 49*. Geological Survey of Canada.

MacDougall, J.I. et. al.
1963 *Soil Survey of Halifax County, Nova Scotia*. Report No. 13. Nova Scotia Soil Survey. Truro: Minister of Supply and Services.

Malcolm, W.
1976 *Gold Fields of Nova Scotia*. Geological Survey of Canada, Memoir 156.

Ogilvie, Robert.
2008 Environmental Screening 07-12-20d – Beaverdam Site. Report on file with the SPP-HD, Halifax.

Sangster, Alan & Paul Smith.
2007 Metallogenic Summary of the Meguma Gold Deposits, Nova Scotia in *Mineral Deposits of Canada.* Geological Association of Canada, Special Publication No. 5.

Stewart, Kathryn & Kyle G. Cigolotti
2015 *Beaver Dam Gold Project Archaeological Assessment, Halifax Regional Municipality, Nova Scotia*. Report for Heritage Research Permit A2015NS107. Manuscript on file with the Nova Scotia Museum.

White, C.E. & S.M. Barr
2012 *Revised Stratigraphy and Tectonic Evolution of the Meguma Terrane*, Nova Scotia Department of Natural Resources, Halifax.

Whitehead, Ruth Holmes.
1991 *The Old Man Told Us: Excerpts from MicMac History 1500-1950*. Halifax: Nimbus.

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:
A2016NS044

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

Surname Stewart	First Name Kathryn

Project Name: Beaver Dam Gold Project Haul Road Option 2 Archaeological Screening and Reconnaissance

Name of Organization: Cultural Resource Management Group Ltd

Representing (if applicable): GHD (formerly Conestoga Rovers & Associates)

Permit Start Date: June 15, 2016	Permit End Date: December 31, 2016

General Location: Beaver Dam, Halifax Regional Municipality

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)*

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 <Original signed by>	Date June 2, 2016
Approved by Executive Director <Original signed by>	Date June 13-16

Appendix N.5

Archaeological Assessment Preferred Alternative Haul Road (Haul Road West)

McCALLUM ENVIRONMENTAL LIMITED

BEAVER DAM GOLD - HAUL ROAD WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 MOOSELAND, NOVA SCOTIA

FINAL REPORT

Submitted to:
McCallum Environmental Limited
and the
Special Places Program of the
Nova Scotia Department of Communities, Culture & Heritage

Prepared by:
Cultural Resource Management Group Limited
Ten Mile House
1519 Bedford Highway
Bedford, Nova Scotia
B4A 1E3

Consulting Archaeologist: Kyle G. Cigolotti
Report Preparation: Kyle G. Cigolotti and W. Bruce Stewart

Heritage Research Permit Number: A2018NS086

CRM Group Project Number: 2018-0015-01

JANUARY 2019

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 Program, Department of Communities, Culture and Heritage.

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BEAVER DAM GOLD - HAUL ROAD WEST
ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018
MOOSELAND, NOVA SCOTIA

1.0 INTRODUCTION

Atlantic Mining Nova Scotia Corporation (Atlantic Gold) is proposing to redevelop the Beaver Dam Gold Mine located in the northeast corner of Halifax Regional Municipality, approximately 21 kilometres northwest of Sheet Harbour. Atlantic Gold is proposing to develop a surface mine, composed of a waste rock storage pile, a tailing pond, stockpiles and an associated plant. The mine site will be connected to processing facilities at Moose River Gold Mine by means of a haul road between the mine site and the plant.

In 2008, Cultural Resource Management (CRM) Group was retained by Acadian Mining Corporation (Acadian) to undertake a screening and reconnaissance of the Beaver Dam property. As a result of the archaeological assessment, several historic mining features were identified. The archaeological investigation was conducted under the terms of Heritage Research Permit A2008NS21 (Category 'C'), issued to CRM Group President and Senior Technical Advisor, W. Bruce Stewart, through the Special Places Program (Special Places).

In the fall of 2014, CRM Group was retained by GHD (formerly Conestoga-Rovers & Associates) on behalf of Atlantic Gold to undertake archaeological screening and reconnaissance of the proposed mine expansion. The archaeological investigation was conducted under the terms of Heritage Research Permit A2014NS107 (Category 'C'), issued to Staff Archaeologist Kathryn J. Stewart through Special Places.

Subsequent changes to the layout of the proposed facility led to additional archaeological reconnaissance in the summer of 2015. Previously investigated proposed mine features were relocated and added to the project. The archaeological investigation was conducted according to the terms of Heritage Research Permit A2015NS043 (Category 'C'), issued to Kathryn J. Stewart. No additional features were identified during this reconnaissance.

In the fall of 2015, CRM Group was retained to conduct archaeological screening and reconnaissance of the proposed haul road connecting the Beaver Dam Mine and the Touquoy Mine sites. The work was conducted under the terms of Heritage Research Permit A2015NS101 by Archaeologist Kiersten Green with the assistance of Kathryn J. Stewart. The primary focus of the study was to assess the potential for encountering archaeological resources during upgrading of the haul road. No archaeological resources were identified during this reconnaissance. In the spring of 2016, a second option was proposed for that section of the haul road located to the west of Highway 224. The reconnaissance work was conducted under the terms of Heritage Research Permit A2016NS044 by Kathryn J. Stewart with the assistance of Archaeologist Kyle G. Cigolotti.

In the summer of 2018, CRM Group was retained by McCallum Environmental Limited (McCallum) on behalf of Atlantic Gold to undertake archaeological screening and reconnaissance of a proposed realignment of the mine haul road. This proposed portion of haul road, representing the western end of the overall haul road leading from the Beaver Dam mine site, was located on the eastern side of Mooseland Road.

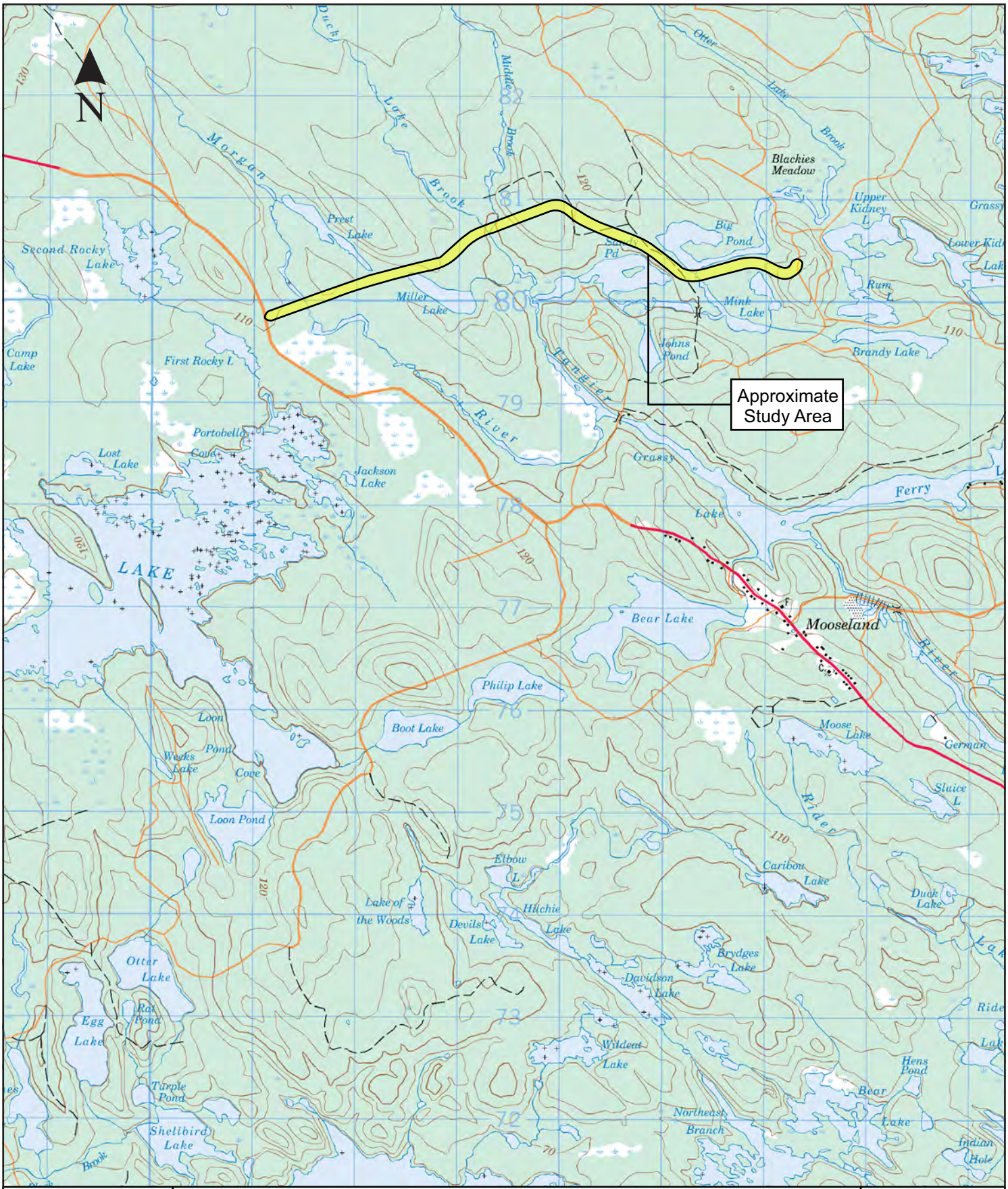
The archaeological screening and reconnaissance was directed by CRM Group Archaeologist Kyle G. Cigolotti. Cigolotti was assisted during the field reconnaissance by Archaeological Technician Shawn MacSween. Technical input on the project was provided by CRM Group President and Senior Technical Advisor W. Bruce Stewart.

The archaeological investigation was conducted according to the terms of Heritage Research Permit A2018NS086 (Category 'C'), issued to Cigolotti through Special Places of the Nova Scotia Department of Communities, Culture and Heritage. This report describes the archaeological screening and reconnaissance of McCallum's proposed Beaver Dam Haul Road West study area, presents the results of these efforts and offers cultural resource management recommendations.

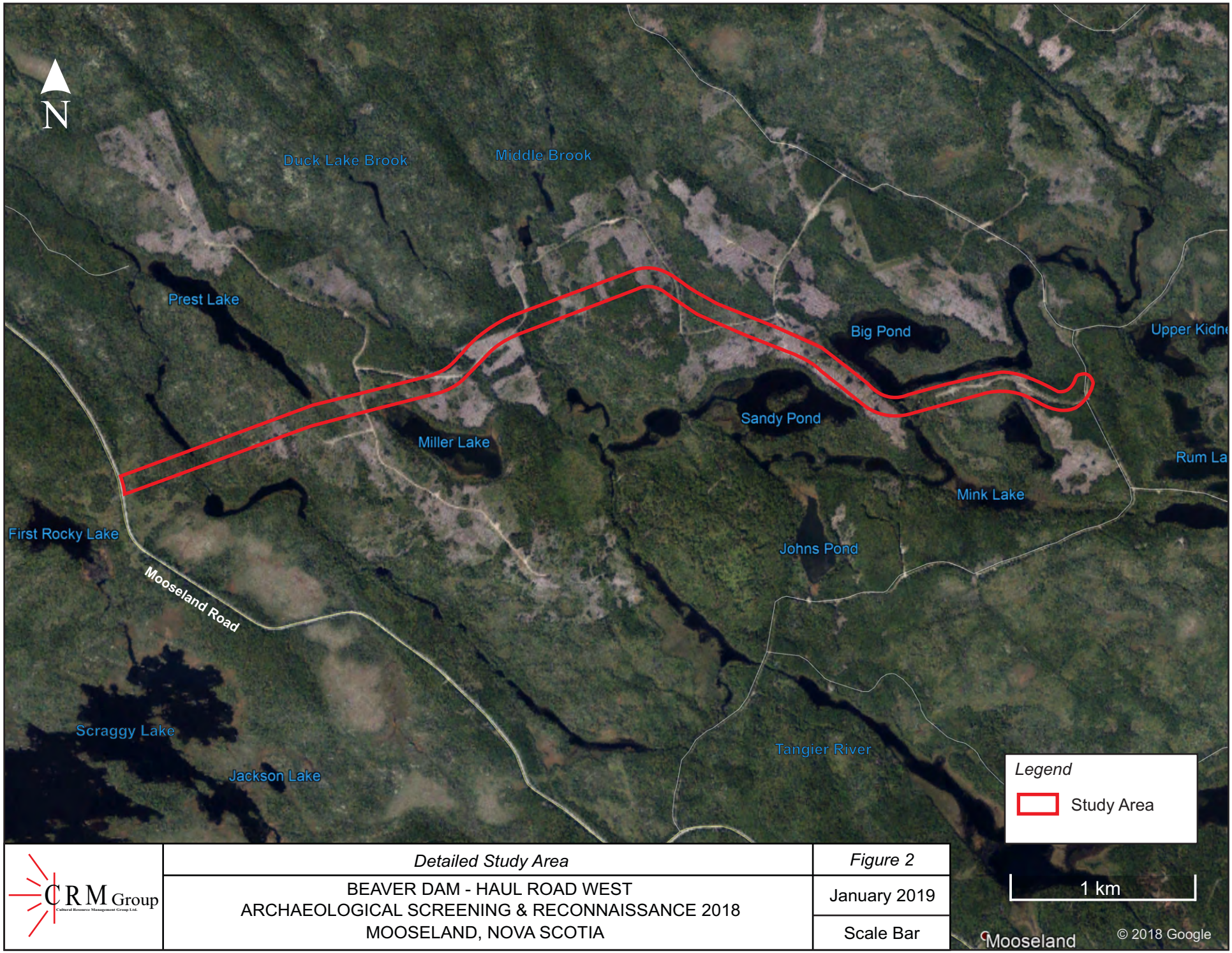
2.0 STUDY AREA

The Beaver Dam Haul Road West study area is located to the northeast corner of Halifax Regional Municipality, approximately 29 kilometres northwest of Tangier and on the east side of Mooseland Road (***Figures 1 & 2***). The survey addressed three properties (PID 00437368; 00437715; 40231367), with the proposed haul road being approximately six kilometres in length with a potential impact area of 100 metres in width. Access to the western end of the study area was gained off Mooseland Road, while the central and eastern portions of the study area were accessed via Moose River Cross Road existing forestry roads (***Plate 1***). The proposed portion of Haul Road West will tie into these existing roads.

PLATE 1: **Haul Road West study area, Halifax Regional Municipality. Facing northeast; September 25, 2018.**



CRM Group Cultural Resource Management Group Ltd.	*Study Area*	*Figure 1*
	BEAVER DAM - HAUL ROAD WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 MOOSELAND, NOVA SCOTIA	January 2019 Scale 1:50 000



CRM Group Cultural Resource Management Group Ltd.	*Detailed Study Area*	*Figure 2*
	BEAVER DAM - HAUL ROAD WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 MOOSELAND, NOVA SCOTIA	January 2019
		Scale Bar

3.0 METHODOLOGY

In the autumn of 2018, McCallum retained CRM Group on behalf of Atlantic Gold to undertake archaeological screening and reconnaissance of the proposed Beaver Dam Mine Haul Road West. The objective of the archaeological assessment was to evaluate archaeological potential within the area that may be disturbed by subsequent development activities. To address this objective, CRM Group developed a work plan consisting of the following components: a background study of relevant site documentation to identify areas of high archaeological potential; Mi'kmaw engagement; archaeological reconnaissance of the areas that may be impacted by development activities; and, preparation of a report summarizing the results of the background research and field survey, as well as providing cultural resource management recommendations.

3.1 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. To achieve these goals, CRM Group utilized the resources of various institutions including documentation available through the Nova Scotia Archives, Nova Scotia Land Information Centre, the Department of Natural Resources, the Nova Scotia Registry of Deeds, Dalhousie University Archives and the Nova Scotia Museum.

The background study included a review of relevant historic documentation incorporating land grant records, legal survey and historic maps, local and regional histories, previous archaeological reports and consultation with knowledgeable parties. Topographic maps and aerial photographs, both current and historic, were also used to evaluate the study area. This data facilitated the identification of environmental and topographic features that would 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.

3.2 Mi'kmaw Engagement

Although there was no specific Mi'kmaq association anticipated with this study area, CRM Group contacted the Kwilmu'lw Maw-klusuaqn Negotiation Office's Archaeological Research Division (KMKNO's ARD) to see if they have any information pertaining to traditional or historical Mi'kmaw use of the study area. Millbrook and Sipekne'katik First Nations were also approached regarding potential traditional or historic Mi'kmaq use of the area. CRM Group staff engaged with Gerald Gloade and Shelly Martin from the Millbrook First Nation in reference to the production of a Mi'kmaw Ecological Knowledge Study (MEKS) and Traditional Land Use Study (TLUS) of the proposed Beaver Dam Mine project.

3.3 Field Reconnaissance

The goals of the archaeological field reconnaissance were to conduct a visual inspection of the study area, document any areas of archaeological sensitivity or archaeological sites identified during the course of 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. Although the ground search did not involve sub-surface testing, the researchers were watchful for topographic or vegetative anomalies that might indicate the presence of buried archaeological resources. The process and results of the field reconnaissance were documented in field notes and photographs.

Hand-held Global Positioning System (GPS) units were used to record track logs and UTM coordinates for all survey areas, as well as any identified diagnostic artifacts, formal tools, isolated finds and site locations.

4.0 RESULTS

4.1 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.

4.1.1 Environmental Setting

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

Water Sources

The Beaver Dam Gold Project property is drained by way of the Killag River, a tributary of West River Sheet Harbour that flows south across the eastern portion of the study area. The Killag River has been dammed creating a reservoir along the eastern edge of the study area, known as Cameron Flowage (Faribault 1899). The proposed Haul Road West passes through or near several water courses including, Morgan River, Prest Lake, Miller Lake, Duck Lake Brook, Middle Brook, Sandy Pond, Big Pond and Mink Lake, and is approximately 1.5 kilometres north of Tangier River. Proximity to water, for both drinking and transportation, is a key factor in identifying Precontact and historic Native, as well as early Euro-Canadian, archaeological potential.

Topography

The study area is located within the greater terrestrial region known as the Quartzite Barrens Unit – Guysborough (Davis & Browne 1996: 56). This region is characterized by rocks belonging to the Meguma supergroup, which in this region is greywacke dating between the Cambrian and Ordovician periods (White & Barr 2010; Davis & Browne 1996: 44). The topography of the bedrock-dominated barrens could be described as "ridge-swamp-swale". The area is almost completely covered by a quartzite till that ranges in thickness from 1 to 10 metres (Davis & Browne 1996: 56). The general topography of the Beaver Dam region is described as rolling, and elevation within the study area ranges from approximately 97 metres to 135 metres above sea level (Hilchey et al. 1964; 134).

Soils

The Beaver Dam area is covered by *Gibraltar* (ST2) and *Halifax Series* soils (ST2, ST14) (Keys 2007: 8). ST2 is mainly associated with fresh, coarse-loamy soils dominated by sandy loam texture with moderate drainage. ST2 is generally poor to medium in fertility with moisture limited during the growing season (Keys, Neily, and Quigley 2011: 36). ST14 is mainly associated with thick organic layers derived from wetland vegetation. Drainage is poor to very poor with fertility ranging from poor to rich, both depending on seepage inputs or ground water quality (Keys et al. 2011: 60).

Flora

The forest growth within this ecological region includes Balsam Fir, Red Spruce, White Spruce, Eastern Hemlock and Yellow Birch. Slow-moving streams are bordered by broad swampy areas populated with Red Maple and Black Spruce. The nature of the soils found within the study area does not encourage heavy forest growth (Davis & Browne 1996: 56-57).

4.1.2 Mi'kmaw Land Use

The land within the study area was once part of the greater Mi'kmaw territory known as *Eskikewa'kik*, meaning 'skin dressers territory' (Rand 1875). The rivers in the surrounding area 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. The West River Sheet Harbour in particular, which the previously assessed section of the haul road crosses at an established bridge, would have been part of a transportation route facilitating travel inland from Sheet Harbour on the Atlantic Ocean, and a significant source of salmon and other fish species.

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 within the BfCq Borden Block.

A review of MARI determined that there are no registered archaeological sites within or close to 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. The nearest registered archaeological sites are BfCo-01, BfCo-02, BfCo-03, and BfCp-1. BfCo-01 and 02 located, approximately 24 kilometres from the study area, are both Precontact lithic finds identified during a survey of NSPI's Malay Falls Reservoir conducted by Daryl Kelman in 2013 while water levels in the Reservoir were below normal seasonal levels. BfCo-03 is a historic complex consisting of a road, three foundations and a slipway, all identified during the same survey at Malay Falls. BfCp-1, located approximately 20 kilometres from the study area, is a historic house cellar identified in 2016 by Davis MacIntyre & Associates.

According to an environmental screening prepared by the Special Places (Ogilvie 2008), the greater project area, which is dense with lakes and watercourses, is considered to exhibit moderate to high potential for encountering Precontact archaeological sites. It should be noted, however, that the project area as reviewed by the Special Places encompassed a larger area than that subjected to archaeological screening and reconnaissance by CRM Group for this particular study.

Based on available historic documentation, there is evidence to suggest a historic Mi'kmaq presence in the Beaver Dam area. The following account was related to Harry Piers by Jeremiah Bartlett Alexis (Jerry Lonecloud) in 1918 (Whitehead 1991: 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.*

CRM Group contacted KMKNO's ARD requesting information regarding traditional or historic Mi'kmaq use of the study area and they provided information that was taken into consideration when preparing the archaeological assessment. This information is confidential in nature and cannot be reproduced in this report. CRM Group staff also engaged with Gerald Gloade and Shelly Martin from the Millbrook First Nation in reference to the production of a Mi'kmaw Ecological Knowledge Study (MEKS) and Traditional Land Use Study (TLUS) of the proposed Beaver Dam Mine project. These reports were not available prior to field investigations or report production.

Based on the environmental setting and Native land use, the Beaver Dam Gold Project Haul Road West is ascribed elevated potential for encountering Precontact and/or early historic Native archaeological resources.

4.1.3 Historic Land Use

The Beaver Dam Development property has a long history of mining activity. Gold was discovered in the Beaver Dam district in 1868. By 1871, two belts of veins had been opened and a 15-stamp mill erected (Malcolm 1976: 57). However, the property remained largely inactive until 1886, when extensive prospecting and development work began. A 4-stamp mill run by water power was constructed at this time. In 1891, the Beaver Dam Mining Company acquired the site. This new company expanded operations on the property with the construction of a 10-stamp mill. Four years later, the property was leased to G.M. Christie and William Tupper, who employed fifteen men at the Beaver Dam Mine. In 1896, the mine was acquired by J. H. Austin, who erected a 10-stamp mill. Work at the Beaver Dam Mine site continued intermittently until the late 80s, changing mining rights at least a dozen times. More recently, a number of other companies, including Seabright Resources Incorporated, have conducted extensive exploration on the property.

Euro-Canadian settlement of the Beaver Dam area began in the second half of the nineteenth century and centered on mining activities. An examination of historic mapping revealed that the study area, including the haul road, occupies portions of at least two dozen historic lots (Crown Land Grant Sheets 83 & 89). According to Crown Land Index Sheet 83 (***Figure 3***), the proposed Haul Road West is located within eight historic lots granted to Alfred Dickie, Benjamin Young & Co., George Everett Faulkner, Hill & French, John M. & Martin B. Prest, H. McC. Hart, W. Archibald and Angus D. McLellan. Dickie, a prominent business man, was known for a time as the "lumber king" of Nova Scotia (DUA MS-4-64). Faulkner, also a businessman, appears to be a distant cousin of the last Prime Minister of Northern Ireland, Arthur Faulkner (Cahill 2003). McLellan immigrated to Nova Scotia from Scotland in 1816, landing at Malignant Cove, Antigonish County and settled in Broad Cove, Lunenburg County (McDougall 1922).

An examination of the 1865 A. F. Church map of Halifax County does not identify any structures within or near the study area (***Figure 4***). The 1898 Faribault map indicates the presence of approximately seven features within the Beaver Dam Mine study area but no features along or adjacent to the proposed haul road (***Figure 5***). Four of those features in the mine study area, however, are depicted as overlying a quartz vein located near the centre of the Pit study area. This area was subsequently mined and the abandoned pit is now partially flooded. The other three features are depicted in the vicinity of another quartz vein running along the northern shore of Crusher Lake.

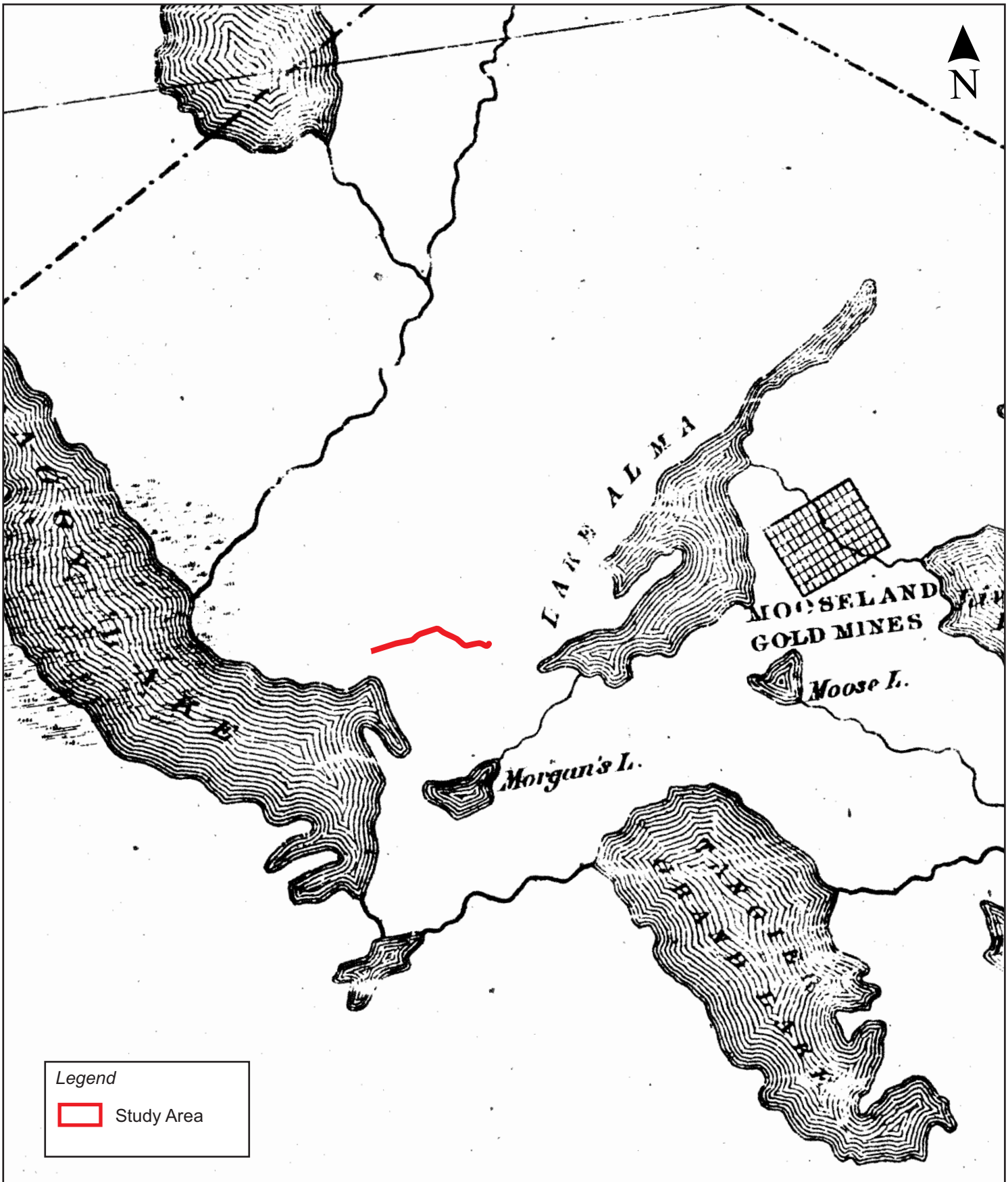
The closest community to the study area is Mooseland, a settlement located on the Tangier River northwest of Sheet Harbour. In 1897, the name was changed from Mooseland, so named for its abundance of moose, to Arlington though the new name did not persist. Much of the land was

granted in 50 and 100 acre lots to the Leslie family in 1872 and the Prest family in 1884, who are likely the namesake of nearby *Prest Lake*. In 1875, approximately 80 Icelanders settled in the area of Mooseland (PANS 1967: 450). The Faribault map identifies an abandoned "Icelander Settlement" approximately four kilometres north of the study area as well as two "Icelanders huts" northwest of Mooseland Road, approximately 600 metres from the study area. These are located on lands that were granted to Bjorn Siqualdson and Benjamin Anderson. Gold was discovered in the area in 1858 but not proclaimed to be a gold district until 1861 (PANS 1967: 450).

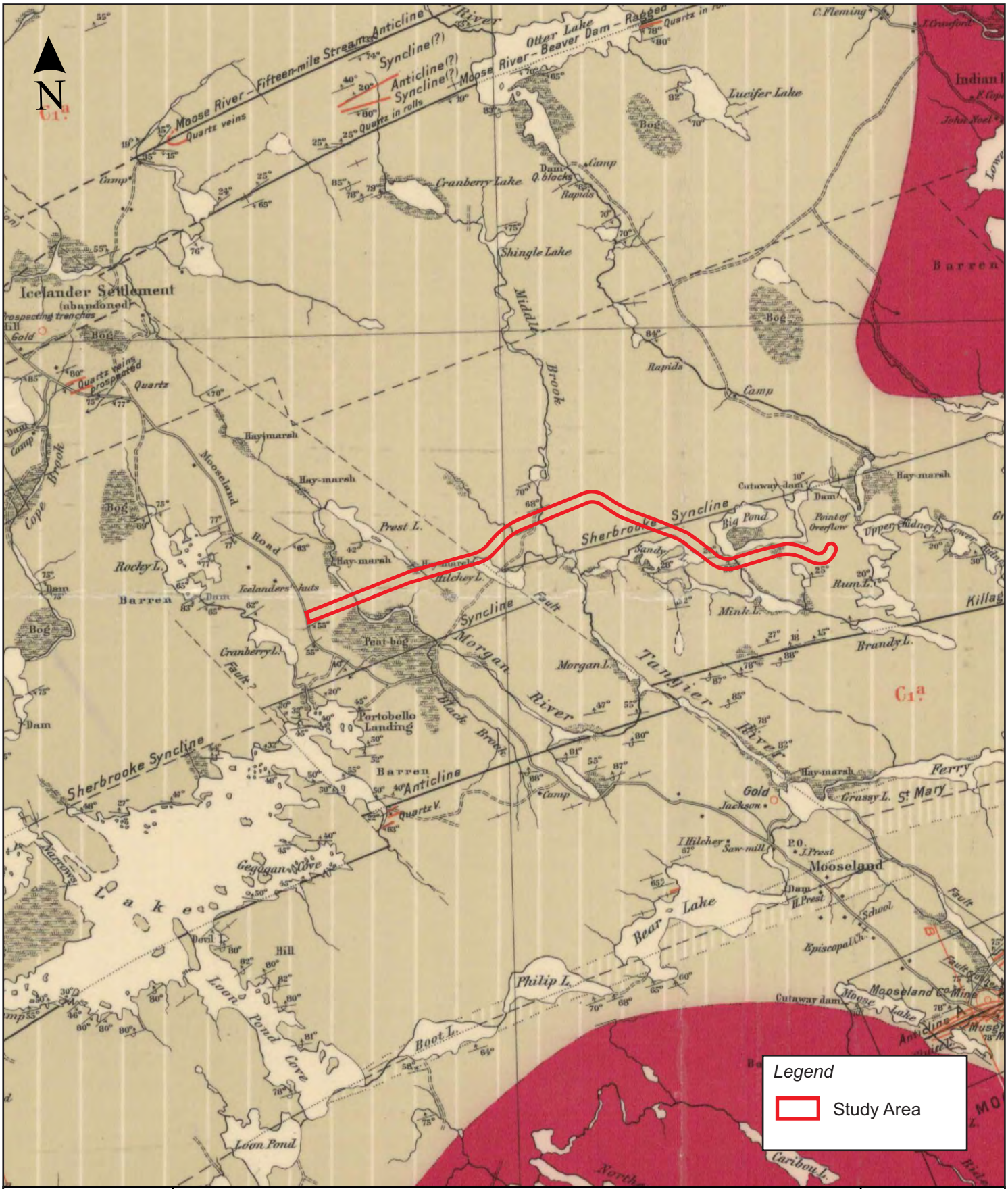
The DNR Abandoned Mine Opening (AMO) Database was used to identify where open mine shafts were located. The data was used both as a safety measure and for identifying areas more likely to contain archaeological features. According to the database, 20 AMOs are associated with Beaver Dam Mine site. No AMOs are associated with the haul road (Stewart and Cigolotti 2015).

Based on the area being relatively low, wet and without the evidence of historic activity, the study area is ascribed low potential for encountering historic archaeological resources.

CRM Group	*Crown Land Index, Sheet 83*	*Figure 3*
	BEAVER DAM - HAUL ROAD WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 MOOSELAND, NOVA SCOTIA	January 2019



CRM Group Cultural Resource Management Group Ltd.	*A. F. Church Map, 1865*	*Figure 4*
	BEAVER DAM - HAUL ROAD WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 MOOSELAND, NOVA SCOTIA	January 2019



CRM Group Cultural Resource Management Group Ltd.	*Faribault Map, 1898*	*Figure 5*
	BEAVER DAM - HAUL ROAD WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 MOOSELAND, NOVA SCOTIA	January 2019

4.2 Field Reconnaissance

CRM Group archaeologists conducted visual inspection of the study area, on September 25-26, 2018, under overcast and cool conditions (***Figure 6***). 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 (***Plate 2***).

The terrain varied little along the 6 kilometre corridor, consisting mainly of ridge-and-valley topography, where the high points are windswept bedrock outcrops and the valleys are low lying, wet areas (***Plate 3***). Several tree throws exhibited the area's shallow topsoil and under lying bedrock (***Plate 4***). Vegetation consisted of a mix of mature hardwood and softwood species typical of Nova Scotian forests. Ground cover consisted of a mix of moss, ferns and small shrubs (***Plate 5***).

CRM Group archaeologists accessed the western end of the study area from Mooseland Road (***Plate 6***) and walked approximately one kilometre through the brush, crossing Morgan River, which was surrounded by low, wet terrain.

Access to the remainder of the Haul Road West study area was gained via Moose River Cross Road and existing logging roads, running throughout the length of the study area. The terrain through the study area was a mix of low lying wet and marshy areas, undulating boulder fields and steep slopes (***Plate 7***). The proposed haul road crossed two small brooks, Duck Lake Brook and Middle Brook, as well as a narrow channel between Big Pond and Mink Lake (***Plate 8***). This channel was bordered by low, wet and rocky conditions, leading to a steep slope on the west and a more gradual slope on the east. Modern bridges had been constructed along the forestry roads where they crossed Duck Lake Brook and Middle Brook (***Plate 9***).

There were indications of mid twentieth century and modern logging activities across much of the site (***Plate 10***). Several areas had recently been cleared of trees by modern skid-steers during forestry harvesting practices (***Plates 11***). Approximately 850 metres of the proposed haul road had previously been partially developed at the eastern end of the proposed haul road (***Plates 12***). No evidence of settlement, such as foundations or fencing, were observed.

Based on the various components of the background study, including environmental setting, Native land use, property history and field reconnaissance, the proposed Beaver Dam Mine Haul Road West study area is ascribed low potential for encountering Precontact and early historic Native archaeological resources and low potential for encountering historic Euro-Canadian archaeological resources.

PLATE 2: **Example of topography. Facing north; September 25, 2018.**

PLATE 3: **Example of wet, boggy area. Facing northeast; September 25, 2018.**

PLATE 4: **Example of tree throw within study area. Facing north; September 25, 2018.**

PLATE 5: **Example of ground cover. Facing northeast; September 25, 2018.**

PLATE 6: Access from Mooseland Road. Facing east; September 25, 2018.

PLATE 7: Example of forestry road. Facing north; September 25, 2018.

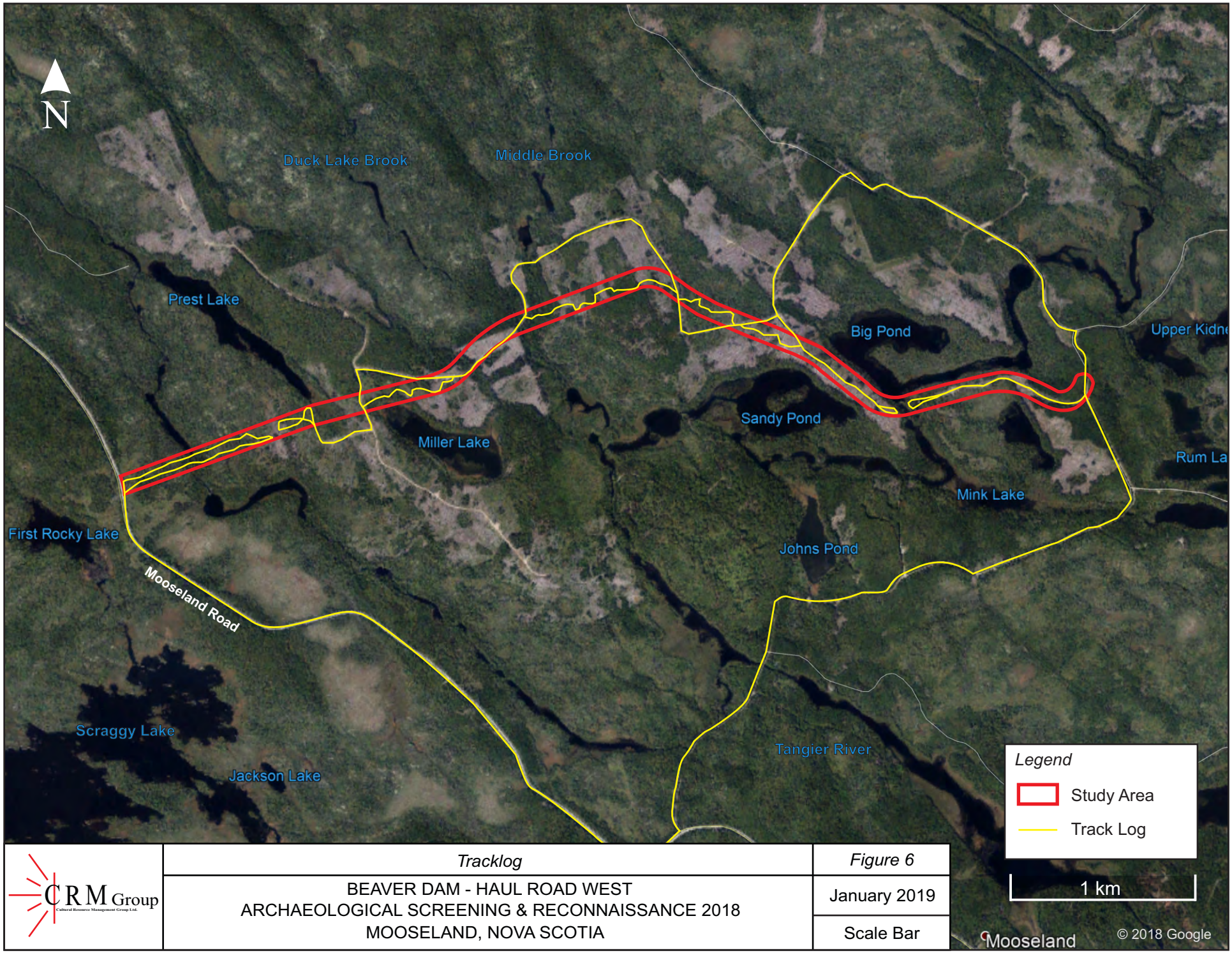
PLATE 8: **Example of low and wet conditions on the east bank of channel between Big Pond and Mink Lake. Facing west; September 26, 2018.**

PLATE 9: **Bridge crossing Middle Brook. Facing west; September 25, 2018.**

PLATE 10: Example of historic logging activities. Facing west; September 25, 2018.

PLATE 11: Example of modern clear cutting. Facing north; September 25, 2018.

PLATE 12: Portion of newly developed road. Facing west; September 26, 2018.



CRM Group Cultural Resource Management Group Ltd.	*Tracklog*	*Figure 6*
	BEAVER DAM - HAUL ROAD WEST ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2018 MOOSELAND, NOVA SCOTIA	January 2019
		Scale Bar

5.0 CONCLUSIONS AND RECOMMENDATIONS

The 2018 archaeological screening and reconnaissance of the Beaver Dam Mine Haul Road West study area consisted of historical background research and a visual inspection. It did not involve sub-surface testing. Based on background research alone, the study area was ascribed elevated potential for encountering Precontact and/or Early Historic Native archaeological resources but low potential for encountering Euro-Canadian archaeological resources. However, given the rocky, wet and isolated nature of the terrain encountered during field reconnaissance, the Beaver Dam Mine Haul Road West study area, was ascribed low potential for encountering Native (either Precontact or Historic) or Euro-Canadian archaeological resources.

Based on these results, CRM Group offers the following management recommendations for the study area:

1. It is recommended that the study area, as defined and depicted in this report, be cleared of any requirement for further archaeological investigation.

2. In the unlikely event that archaeological deposits or human remains are encountered during activities associated with the Beaver Dam Mine Haul Road West development, all work in the associated area(s) should be halted and immediate contact made with the Special Places Program (Sean Weseloh McKeane: 902-424-6475).

6.0 REFERENCES CITED

Alfred Dickie Fonds
2018 Dalhousie University Archives and Special Collections, Halifax, Nova Scotia, Canada.

Beanlands, Sara
2009 *Beaver Dam Development Archaeological Screening & Reconnaissance, Halifax Regional Municipality, Nova Scotia*. Report for Heritage Research Permit A2008NS21. Manuscript on file with the Nova Scotia Museum.

Cahill, Barry
2003 Dictionary of Canadian Biography, vol. 16. University of Toronto / Université Laval. http://www.biographi.ca/en/bio/faulkner_george_everett_16E.html

Church, Ambrose F.
1865 *Topographical Township Map of Halifax County, Nova Scotia*. Halifax: A.F. Church & Co.

Davis, Derek & Sue Browne, eds.
1996 *The Natural History of Nova Scotia*. Vol. 2. *Theme Regions*. Halifax: Nimbus, Nova Scotia Museum.

Department of Land and Forests.
1946 *Crown Land Grant Index Sheet 83 – Halifax County*. Nova Scotia Department of Natural Resources.

Faribault, E. R.
1899 *Province of Nova Scotia, Colchester & Halifax Counties, Upper Musquodoboit Sheet, No 49*. Geological Survey of Canada.

Keys, Kevin
2007 *Forest Soil Types of Nova Scotia: Identification, Description, and Interpretation* Nova Scotia Department of Natural Resources.

Keys, K., Neily, P., & Quigley, P.
2007 *Forest Ecosystem Classification for Nova Scotia Part II: Soil Types (2010)* Nova Scotia Department of Natural Resources.

MacDougall, J.L.
1922 *History of Inverness County, Nova Scotia*. https://www.electricscotland.com/canada/inverness/chapter26.htm

Malcolm, W.
1976 *Gold Fields of Nova Scotia*. Geological Survey of Canada, Memoir 156.

Ogilvie, Robert.
2008 Environmental Screening 07-12-20d – Beaverdam Site. Report on file with the SPP-HD, Halifax.

Public Archives of Nova Scotia.
1967 *Place-names and Places of Nova Scotia*. Halifax: PANS.

Rand, Silas T.
1875 *A First Reading Book in the Micmac Language*. Halifax: Nova Scotia Printing Company.

Sangster, Alan & Paul Smith.
2007 Metallogenic Summary of the Meguma Gold Deposits, Nova Scotia in *Mineral Deposits of Canada.* Geological Association of Canada, Special Publication No. 5.

Stewart, Kathryn & Kyle G. Cigolotti
2015 *Beaver Dam Gold Project Archaeological Assessment, Halifax Regional Municipality, Nova Scotia*. Report for Heritage Research Permit A2015NS107. Manuscript on file with the Nova Scotia Museum.

White, C.E. & S.M. Barr
2012 *Revised Stratigraphy and Tectonic Evolution of the Meguma Terrane*, Nova Scotia Department of Natural Resources, Halifax.

Whitehead, Ruth Holmes.
1991 *The Old Man Told Us: Excerpts from MicMac History 1500-1950*. Halifax: Nimbus.

ATLANTICGOLD

Appendix O.1

Preliminary Environmental Effects Monitoring Plan

Preliminary Environmental Effects Monitoring Plan

Atlantic Gold
Beaver Dam Gold Project

February 2019

PRESENTED TO THE CANADIAN ENVIRONMENTAL ASSESSMENT AGENCY

ATLANTICGOLD

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

This document was developed with input from the following resources:

- McCallum Environmental Ltd. – Bedford, NS – Wetlands, terrestrial habitat contribution, report compilation
- GHD – Dartmouth, NS – Air quality, noise, light, groundwater, surface water, MDMER, geology, soils, and sediment contributions
- Stantec – NS and NB – MDMER contributions
- Wood – Dartmouth, NS – Air quality contributions - Touquoy
- Intrinsik Environmental Sciences Inc. – Halifax, NS – Surface water contributions
- Atlantic Gold, Environment Department – General site information, Surface water and groundwater contributions

1 INTRODUCTION

1.1 Background

The Beaver Dam Mine Project (the Project) proposed by Atlantic Mining NS Corp (AMNS), a wholly owned subsidiary of Atlantic Gold Corporation (the Proponent) will operate as a satellite surface mine with an approximate ore extraction rate of 2 million tonnes per year (t/y). Processing of ore from the Beaver Dam Mine Site will occur at the existing Touquoy Mine Site upon completion of mining ore from the Touquoy deposit.

The Project is subject to both federal and provincial Environmental Assessment (EA) processes. The Environmental Impact Statement was submitted June 2017.

1.2 Environmental Effects Monitoring Program

This Preliminary Environmental Effects Monitoring Plan (EEM) was prepared to outline proposed monitoring to support the Project. This EEM is intended to fulfil the CEAA Information Request 1-10 of the Environmental Assessment Technical Review Information Requirements (Round 1 Part 1 August 9, 2017) for the Project, along side commitments made throughout the revised Environmental Impact Statement (EIS).

This Preliminary EEM was preceded by the Touquoy Environmental Effects Monitoring During Construction document (Updated October 31, 2016) that focused on the environmental monitoring during construction of the Touquoy Mine Site and the Touquoy Operations EEM document (Submitted to NSE July 31, 2017) that focused on environmental management throughout operations and processing of Touquoy ore. This EEM encompasses the construction and operations of the Project including the Beaver Dam Mine Site, Haul Road, and Touquoy Mine Site components. Ownership of this EEM will solely be the responsibility of the Proponent, however, monitoring will be carried out under the supervision of the Manager Environment and Permitting by both contracted specialists and trained and competent Proponent Environment Department personnel.

1.3 Purpose

The EEM focuses on environmental monitoring throughout the construction, operational, decommissioning and reclamation, and post closure phases of the mine, which aims to verify predictions made in the EIS and baseline monitoring. The EEM also aims to provide guidance for thresholds of action to, at minimum, maintain compliance with commitments and regulatory requirements. The EEM focuses on the main Valued Components (VCs) for the Project that require active monitoring: noise, air, geology/soils/sediment, surface water quality and quantity, groundwater quality and quantity, wetlands, terrestrial fauna, birds, and archaeological and cultural resources. Within each VC section of this report is an overview of the VC, the effects monitoring approach, and thresholds for action for that VC.

This EEM is designed to be a living document; allowing environmental management to adapt to changing conditions, apply an iterative approach to management, meet recommendations/expectations from regulators, assess monitoring methods and allow for improvements where necessary. Advice from regulators will be incorporated over time as part of the adaptive management approach to this program.

The Proponent recognizes that additional monitoring efforts may be required by provincial and federal government agencies that are not necessarily reflected in this document through additional approvals that could be granted should the project be granted EA Approval.

2 VALUED COMPONENTS

2.1 Noise and Vibration

2.1.1 Summary

Beaver Dam Mine Site and Touquoy Mine Site noise will be periodically measured when requested by regulator or via a complaint from the public. Representative noise level data collection has begun to establish baseline values.

Noise from the equipment and lack of effective mufflers is a source of noise. Procurement of equipment that meets best practices in terms of noise emissions, and regular maintenance of the equipment will reduce noise levels. Site workers will be trained to ensure equipment is used in ways that minimize noise and are maintained regularly. As part of the workplace health and safety program, noise monitors may be attached to workers from time to time to measure and monitor noise exposure over a shift.

The majority of mining operations will occur in the pit well below ground surface and thereby provide excellent noise shielding. Blasting will be restricted to daytime hours, per the NSE Pit and Quarry Guidelines. Additionally, traffic on the Haul Road will generally be restricted to 16 hours per day during the operational phase. This will minimize noise along the Haul Road during overnight hours. The forest surrounding the Beaver Dam Mine Site and the Haul Road will also provide a dampening effect to any noise generated, and topography and distance from receptors will provide contribute to a reduction of Project-generated sound at a distance.

Under the existing IA for the Touquoy Mine Site, maximum sound levels are prescribed at property boundaries for days, evenings and weekends and monitoring and is only required when requested by NSE in response to a complaint or concern. Mitigation measures will be implemented as necessary where sound levels are a concern, i.e., causing annoyance, and monitoring demonstrates exceedances. To date, no noise complaints have been received or are anticipated

This combination of measures will adequately mitigate potential noise impacts. Noise monitoring will be conducted, especially during construction and early in the operational phase to verify compliance with regulatory approvals. The results will be submitted to regulators as required by approvals.

Additionally, noise monitoring would be completed during each blasting event, as required by the conditions of any approval and as is typically the practice in Nova Scotia. Blast monitoring generally involves noise and vibration monitoring during each blasting event, and will include monitoring at the nearest residence to the Beaver Dam Mine Site, which in this case would be at Beaver Lake IR 17.

Environmental monitoring plans, to be implemented following IA, will facilitate the comparison of baseline and operational data with regulatory requirements for reporting and management to ensure and monitor that requirements in the *Guidelines for Environmental Noise Measurement and Assessment* (NSE 1990), the Nova Scotia *Pit and Quarry Guidelines,* and *Workplace Health and Safety Regulations* are met.

Monitoring activities will examine the effectiveness of mitigation measures taken, and signal a need to implement environmental control measures if adverse environmental effects due to Project activities are

detected. An Environmental Management System (EMS) and Environmental Protection Plan (EPP) will be developed as part of the Project implementation that will confirm the responsibility and system of accountability for the compliance and effects monitoring program.

2.1.2 Monitoring Approach

Beaver Dam Mine Site noise will be periodically measured when requested by regulator or via a complaint from the public and the data recorded. Noise monitoring will be completed during each blasting event, will include vibrations, as well as monitoring at the nearest residence (over 5 km away) to the Beaver Dam Mine Site, which in this case would likely be at Beaver Lake IR 17 depending on housing at the time of Project initiation. Ongoing noise monitoring data for the Touquoy facility will also be reviewed for regulatory compliance. An operational methodology and protocols will be established following granting of the IA with NSE.

2.1.3 Thresholds for Action and Regulatory Thresholds

Noise within the Project site is regulated provincially by the *Workplace Health and Safety Regulations*, which establishes the noise environment needed to maintain worker health. The Nova Scotia *Pit and Quarry Guidelines* (NSE 1999) indicate that noise levels at the boundaries of the Project site are not to exceed the following levels:

- ≤ 65 dBA between 0700 to 1900 hours (daytime)
- ≤ 60 dBA between 1900 to 2300 hours (evening)
- ≤ 55 dBA between 2300 to 0700 hours (night-time, Sunday and statutory holidays)

The *Guidelines for Environmental Noise Measurement and Assessment* (NSE 1990) also require these noise levels to be met at locations where people normally live, work, or take part in recreation.

While the limits stated in these guidelines are clear and specific, they are not considered practical to meet for open pit mines with operations located close to the property lines. Mitigation of these noise excesses is not considered to be critical, as the predicted noise levels at the worst-case points of reception are within the applicable limits.

Any public complaint will also be a trigger for investigative and/or corrective action.

2.2 Air Quality and Particulate Emissions

2.2.1 Summary

Dust emissions generated at the Beaver Dam Mine Site and Haul Road may have an environmental effect. Air-borne particulate matter will be generated during the construction, operation and active reclamation phases of the Project. Sources of Project-related particulate matter on the Beaver Dam Mine Site and Haul Road may include: overburden removal, blasting, rock crushing, onsite heavy truck traffic, material loading, wind erosion of material storage piles, construction of roads, construction of the Haul Road, and operation of other heavy machinery.

During construction most of the dust generated will be from stripping operations and waste rock pile development. During operation, some dust will be generated at the Beaver Dam Mine Site from crushing processes and trucking operations, and the majority of the dust will be generated on the Haul Road from trucking operations. During active reclamation most of the dust generated will be from final shaping and contouring of the waste rock pile.
For the Beaver Dam Mine Site and the Touquoy Mine Site, maximum predicted concentrations occurred at the property boundary. Predicted concentrations for all indicator compounds and averaging periods were lower than existing background concentrations, and well below relevant assessment criteria.

For the Haul Road, maximum predicted concentrations occurred within 30 m of the road, and predicted concentrations decreased, with increasing distance from the road. Predicted concentrations for TSP were found to be greater than the assessment criteria and existing background, indicating that TSP will not meet provincial guideline values at close proximity to the road. Isopleth figures (concentration gradients) illustrate the reduction of concentrations with increasing distance from the road, and the small size of area affected by either the Project or cumulative effects exceedances.

PM10 predicted concentrations were also above assumed background concentrations and greater than the interim Ontario standard at the maximum point of impingement, however this is not a regulated compound in Nova Scotia, or federally. PM2.5 concentrations from road operations alone at the maximum point of impingement were below assessment criteria for this compound, but when added to assumed background, it is possible that annual PM2.5 concentrations in close proximity to the road may exceed annual guideline values (but not on a 24 hour basis).

Environmental monitoring plans to be implemented following IA requirements will facilitate the comparison of baseline and operational data with regulatory requirements for reporting and management to ensure and monitor that requirements in the *Nova Scotia Air Quality Regulations* and *Canadian Ambient Air Quality Standards* are met, as well as those in the *NSDEL Pit and Quarry Guidelines* and *Environmental Code of Practice for Base Metal Smelters and Refineries*. Monitoring activities will examine the effectiveness of mitigation measures taken, and signal a need to implement environmental control measures if adverse environmental effects due to Project activities are detected. An Environmental Management System (EMS) and Environmental Protection Plan (EPP) will be developed as part of the Project implementation that will confirm the responsibility and system of accountability for the compliance and effects monitoring program.

2.2.2 Monitoring Approach

Air quality monitoring including dust and ambient-air monitoring will be conducted regularly at select baseline sampling locations along the Haul Road as well as any additional monitoring required by regulatory agencies. Ongoing air monitoring data for the Touquoy facility will also be reviewed for regulatory compliance.

An operational monitoring plan, methodology, and protocols will be established following IA requirements. Baseline atmospheric monitoring locations described in Section 6.2 of the revised EIS. Additional locations along the Haul Road will be included to evaluate predicted Project impacts to the nearby residences and surrounding landscape. A monitoring station will be set up in close proximity to the Deepwood estates receptor. Monitoring plan development will review these to determine if any reconfiguration is needed during all Project phases.

2.2.3 Thresholds for Action and Regulatory Thresholds

NSE regulates ambient air quality via the *Nova Scotia Air Quality Regulations*. The maximum ground level concentrations for the parameters governed by this legislation are listed below in Table 2.1-2 below.

Table 2.2-1 Nova Scotia Air Quality Standards

Contaminant	Averaging Period	Maximum Permissible Ground Level Concentration	
		µg/m3	pphm
Carbon Monoxide	1 hour	34,600	3,000
	8 hours	12,700	1,100
Hydrogen Sulfide	1 hour	42	3
	24 hours	8	0.6
Nitrogen Dioxide	1 hour	400	21
	Annual	100	5
Ozone	1 hour	160	8.2
Sulphur Dioxide	1 hour	900	34
	24 hours	300	11
	Annual	60	2
Total Suspended Particulate	24 hours	120	-
	Annual	70	-

Source: Nova Scotia Air Quality
Regulations, Schedule A- Maximum Permissible Ground Level Concentration
pphm – parts per hundred million
µg/m^3 – micorgrams per meter cubed

The Canadian Ambient Air Quality Standards (CAAQS) are the driver for air quality management in Canada. Standards have been developed for fine particulate matter (PM2.5) and ozone (O3), and work has begun to develop standards for nitrogen dioxide (NO2) and sulphur dioxide (SO2). The CAAQS for PM2.5 and ozone were established in May 2013 as objectives under the Canadian Environmental Protection Act (CEPA) 1999 and replace the Canada-wide Standards for Particulate Matter and Ozone. The standards for 2015 and 2020 for the parameters governed by this legislation are listed in Table 2.1-3.

Table 2.2-2 Canadian Ambient Air Quality Standards

Contaminant	Averaging Period	Standards	
		2015	2020
Fine Particulate Matter (PM 2.5)	24 hours	28 µg/m3	27 µg/m3
	Annual	10 µg/m3	8.8 µg/m3
Ozone	8 hours	63 ppb	62 ppb

Thresholds for action will also include *NSE Pit and Quarry Guidelines* and the *Environmental Code of Practice for Base Metal Smelters and Refineries*. If a laboratory result indicates a potential issue above regulatory or environmental variation for air quality, corrective action will be taken. Operations staff will be notified and an

investigation of the possible contributing factors will take place to identify and attempt to rectify the cause. In the case of a potential issue with elevated TSP levels, additional dust suppression options will be explored in consultation with Nova Scotia Environment (NSE). NSE will be contacted regarding any exceedance of regulatory thresholds as per requirements in the IA. Any public complaint will also be a trigger for investigative and/or corrective action.

2.3 Light

No monitoring for light is anticipated currently. AMNS will continue to liaise with regulatory agencies and the Mi'kmaq through the EA and IA process and should monitoring be mandated or agreed upon this EEM document will be updated to reflect the monitoring program.

2.4 Greenhouse Gases

Based on the GHG emissions predicted for the project there will not be a requirement for GHG monitoring.

2.5 Geology, Soils, and Sediment

2.5.1 Overview

Geology, soil, and sediment as a VC is centered on: the potential for acid rock drainage (ARD) to be produced during exposure of Halifax Group or sulphide-bearing bedrock to oxygen and surface water runoff; and the potential for contamination of soil and sediment from mining activities. ARD is provincially regulated through the *Sulphide Bearing Material Disposal Regulations*.

Extensive baseline sampling of soils and sediment have been conducted at the Touquoy and Beaver Dam Mine Sites, full details of which are contained in Section 6.5 of the EIS.

The purpose of this program was to establish a baseline for comparison of sediment quality before and after site activities commence. Each sample was collected as a grab sample and analyzed for metals, including mercury (Hg). Baseline sample locations for the Beaver Dam Mine Site are presented in Table 2.5-1 below.

Table 2.5-1 Baseline Sediment Locations for Beaver Dam Mine Site

Sample ID	Sample Location	Sample Location Rationale
SED1	Downstream of Cameron Flowage	To characterize sediment quality downstream and south of Project activities
SED2	Upstream of Cameron Flowage	To characterize sediment quality upstream and north of Project activities
SED3	Down-gradient of till stockpile and outflow from Crusher Lake	To characterize sediment quality downstream of Project activities
SED4	Down-gradient of till stockpile	To characterize sediment quality downstream of Project activities
SED5	Down-gradient of till stockpile into Wetland 20	To characterize sediment quality downstream of Project activities

Sample ID	Sample Location	Sample Location Rationale
SED6	Downstream of Cameron Flowage	To characterize sediment quality downstream and south of Project activities
SED7	Downstream of facilities, ore storage and crushing facilities	To characterize sediment quality downstream and south of Project activities
SED8	Downstream of waste rock pile	To characterize sediment quality downstream of waste rock storage
SED9	Downstream of waste rock pile	To characterize sediment quality downstream of waste rock storage

Analytical results were compared to the CCME Sediment Quality Guidelines for the Protection of Aquatic Life (Freshwater Interim Sediment Quality Guidelines (ISQG)/ and Probable Effect Level (PEL)). The CCME PEL guidelines represent the maximum authorized concentrations in a grab sample, above which adverse effects are expected to occur frequently. ISQGs represent the maximum total concentration in surficial sediments (i.e. top 5 centimetres). Baseline exceedances of these guidelines are included below in Table 2.5-2 below. Full analytical results compared to CCME Freshwater Sediment Quality Guidelines are included in Appendix C of the EIS.

Table 2.5-2 Summary of Sediment Quality for Beaver Dam Mine Site

Sample ID	Sample Location	Parameters Exceeding CCME Freshwater Sediment Quality Guidelines (ISQG)	Parameters Exceeding CCME Freshwater Sediment Quality Guidelines (PEL)
SED1	Downstream of Cameron Flowage	Arsenic	Arsenic
SED2	Upstream of Cameron Flowage	Arsenic	Arsenic
SED3	Down-gradient of till stockpile and outflow from Crusher Lake	Arsenic, Mercury	Arsenic
SED4	Down-gradient of till stockpile	Arsenic	Arsenic
SED5	Down-gradient of till stockpile into Wetland 20	Arsenic, Cadmium, Copper	Arsenic
SED6	Downstream of Cameron Flowage	Arsenic	Arsenic
SED7	Downstream of facilities, ore storage and crushing facilities	Arsenic	Arsenic
SED8	Downstream of waste rock pile	N/A	N/A
SED9	Downstream of waste rock pile	N/A	N/A

A sediment quality investigation at the Touquoy Mine Site consisted of the collection of ten sediment samples from the site and surrounding area watercourses in January 2007. Three of these locations had organic substrate not suitable for chemical analysis for soils. Arsenic levels above the CCME probable effects level (PEL) were found at Sediment Sites 1, 2, 3, 5, 6, 7 and 8. Sites 1, 6, 7 and 8 are above the existing open pit or in a different catchment. All the locations exceed the CCME interim sediment quality guideline (ISQG).

Only Station 5 (0.81 mg/kg) exceeds the ISQG (0.6 mg/kg) but not the PEL (3.5 mg/kg) limits for cadmium. Station 9 along the shore of Scraggy Lake is close to the ISQG at 0.58 mg/kg.

Sediment at Site 3, 5, 6 and 10 exceed the ISQG limit (35 mg/kg Pb) for lead but not the PEL limit (91.3 mg/kg Pb). Sediment from the shore at Scraggy Lake far exceeded both limits at 1100 mg/kg Pb. Such a high concentration in a relatively pristine area appears to be anomalous and suggests that the lake requires further investigation.

Mercury was found at Sites 3 and 9 at concentrations above the ISQG limit (0.17 mg/kg), and at Site 2 (0.52 mg/kg) above the PEL (0.48 mg/kg). It was detected at all sites between concentrations of 0.02 to 0.16 mg/kg. The concentration of zinc was relatively consistent across all sites. Site 9 at 150 mg/kg was elevated above the ISQG limit of 123.0 mg/kg, but well below the PEL of 315.0 mg/kg.

Cyanide was included in the analysis and was detected at low levels in Sites 5, 9 and 10, all sites that are well removed from the open pit. It was below the detection limit of 0.5 mg/kg at all other sites.

Environmental monitoring plans to be implemented following IA to facilitate the comparison of baseline and operational data with regulatory requirements for reporting and management to ensure and monitor that requirements in the *Sulphide Bearing Material Disposal Regulations*, *Contaminated Sites Regulations*, and the *CCME Sediment Quality Guidelines for the Protection of Aquatic* Life (Freshwater Interim Sediment Quality Guidelines (ISQG)/ and Probable Effect Level (PEL)) are met.

Monitoring activities during the Project will examine the effectiveness of mitigation measures taken, and signal a need to implement environmental control measures if adverse environmental effects due to Project activities are detected. An Environmental Management System (EMS) and Environmental Protection Plan (EPP) will be developed as part of the Project implementation that will confirm the responsibility and system of accountability for the compliance and effects monitoring program.

2.5.2 Monitoring Approach

It is anticipated that monitoring and reporting will follow a similar approach to the Acid Rock Contingency Measures outlined in Industrial Approval (IA) 2012-084244-03 for the Touquoy Mine Site:

- Drainage water pumped from the open pit (surface) mine and draining from the waste rock stockpiles shall be monitored weekly for pH
- Records of this monitoring shall be maintained on the Site for inspection by the Department
- The Approval Holder shall collect and analyze samples of fresh waste rock and tailings. A sampling frequency of 8 to 10 samples per 100,000 tonnes of rock generated is recommended based on the guidelines in Price (2009).
- Samples shall be analyzed for acid base accounting, total sulphur and percent sulphide

- The B.C. Confirmation Test or alternate acceptable acid rock drainage kinetic testing shall be conducted on all samples which have an acid consuming to acid generating ratio of 3:1 or less
- Should the results of testing indicate potentially acid generating conditions, the Approval Holder shall notify the Department immediately and may be required to conduct additional monitoring/testing or implement a plan to monitor and mitigate potential acid mine drainage, if so directed by Department
- A summary of the results of acid rock drainage testing shall be provided with the annual report

The objectives of the rock, soil and sediment sampling programs are to:

- Verify effects predicted in the EIS
- Confirm the continuing effectiveness of mitigation measures
- Identify the need for any new mitigation measures
- Confirm compliance with regulatory approvals and requirements

2.5.3 Thresholds for Action

A sampling frequency of 8 to 10 samples per 100,000 tonnes of rock generated is recommended based on the guidelines in Price (2009). Should the results of testing indicate potentially acid generating conditions, the Approval Holder shall notify the Department immediately and may be required to conduct additional monitoring/testing or implement a plan to monitor and mitigate potential acid mine drainage, if so directed by Department.

NSE will be contacted regarding any exceedance of regulatory thresholds as per requirements in the IA. Any public complaint will also be a trigger for investigative and/or corrective action.

2.5.4 Regulatory Thresholds

Regulatory numerical thresholds are comprehensive including a range between approximately 20-30 parameters and other qualitative criteria such as effluent drainage requirements and supporting land contouring. Full regulatory requirements can be accessed for direct reference via the following links:

Sulphide Bearing Material Disposal Regulations: https://novascotia.ca/just/regulations/regs/env5795.htm

Nova Scotia Contaminated Sites Regulatory Protocols:
http://novascotia.ca/nse/contaminatedsites/protocols.asp

CCME Sediment Quality Guidelines for the Protection of Aquatic Life:
http://ceqg-rcqe.ccme.ca/en/index.html#void

2.6 Groundwater Resources

2.6.1 Overview

Groundwater and surface water at the site interact in multiple areas with the main control being topography. Areas of recharge are typically the higher areas and areas of discharge being in the lower areas. Evidence of groundwater discharge to surface water systems are abundant and mainly appear in the form of seeps and wetlands. The site has features that create these abundant interactions such as high precipitation (1.4 metres per year), shallow bedrock that is relatively impermeable, permeable soil and till units, and undulating topography. Effects will be short term and range from locally significant to insignificant.

The key sensitive receptor in the area of the Beaver Dam Mine Site is the Beaver Lake IR 17; a satellite community of the Millbrook First Nation located approximately 5 km south of the Beaver Dam mine site. The nearest domestic well is 5.5 km southwest from and up-gradient of the site, at a residence along Hwy 224. Impacts to groundwater quality and quantity are not anticipated to affect Beaver Lake IR 17 based on the results of predictive modelling as described in Section 6.6 of the revised EIS.

The maximum radius of groundwater drawdown influence under dry (conservative) conditions has been simulated at 1 km (in a southerly direction) and less in all other directions from the pit. At the horizontal extent of this radius of influence, there is a predicted drawdown of 10cm. Beyond this radius of influence, there is little to no potential impact from the Beaver Dam Mine Site development on groundwater quantity interactions with surface water features or potable wells.

GHD also applied the Beaver Dam Model to simulate the transport of COCs from potential source zones (e.g., waste rock piles, low grade ore stock pit, and pit lake) to surface water bodies. COC concentrations discharging to surface water were estimated for both base case and upper case source term concentrations developed by Lorax (2018) for end of mine life and post-closure conditions. A conservative tracer (i.e., considering the solute transport processes of advection and dispersion only) at a unit concentration was applied to simulate COC migration from each source.

The maximum simulated COC concentrations discharge to east end of Crusher Lake. All COC concentrations in the simulated groundwater discharge are below Tier 2 PSS guidelines under end of mine life conditions, with the exception of arsenic that exceeds its Tier 2 PSS guideline, but is within the range of background arsenic concentrations observed in groundwater. Therefore, COC concentrations are not predicted to have a significant impact to groundwater discharge under end of mine life conditions.

Applying the base case source concentrations, under post-closure conditions, aluminum, arsenic, and cadmium are simulated to exceed Tier 2 PSS guidelines, but remain within the range of background concentrations observed in groundwater at the Beaver Dam Mine Site. Silver and copper concentrations exceed both observed background groundwater concentrations and Tier 2 PSS guidelines. Using the base case source term concentrations under post-closure conditions, simulated COC exceedances in groundwater discharge only occur at the east end of Crusher Lake within the PA.

Applying upper case source term concentrations under post-closure conditions, aluminum, silver, arsenic, cadmium, and copper are simulated to exceed both Tier 2 PSS guidelines and observed background groundwater concentrations. Again, the simulated COC exceedances occur primarily at the east end of Crusher Lake within the PA. Two exceptions to this occur for aluminum and copper that have simulated exceedances of Tier 2 PSS guidelines in groundwater discharge towards the west end of Mud Lake, and to the tributary immediately adjacent to the west waste rock pile.

Maximum concentrations that potentially exceed Tier 2 PSS guidelines are simulated at the east end of Crusher Lake within the PA. Simulated concentrations discharging to surface water bodies are below Tier 2 PSS guidelines outside the LAA, supporting that any significant impact to groundwater quality is confined to within the LAA.

The approved Touquoy Environmental Assessment stated that the pit would be allowed to fill naturally with water over a period of time through precipitation, surface flow and groundwater in-flow. No change to this

method is planned following the deposition of Beaver Dam tails, except that the time frame for refilling will be shorter given the decrease in available volume taken by the tailings.

The deposition of Beaver Dam tailings in the open pit at the Touquoy Mine Site will degrade the water quality in the pit, including the pore water quality in the tailings within the open pit. This lower quality water has the potential to migrate toward Moose River via groundwater. The Touquoy groundwater model was used to simulate the migration of solutes from the open pit to Moose River. The model simulated the release of water from the pore spaces in the deposited tailings, and the pit lake quality based on a relative contribution basis. This process simulates the transport of a conservative solute with a concentration of 1 mg/L through the groundwater to the receiving environment over time. The relative concentrations are multiplied by the source term concentrations for the contaminants of primary concern (COC) in the open pit to predict the concentrations and mass loadings to the receiving environment over time. The average concentrations in the discharge to the river stabilize after about 150 years.

2.6.2 Monitoring Approach

It is anticipated that water levels will be collected monthly and chemistry samples will be collected quarterly throughout pre-construction, construction, operations phases for the Beaver Dam Mine Site. Additional well placements will be considered to monitor for predicted groundwater seepage at Beaver Dam Mine Site near the shores of Crusher and Mud Lakes. The Touquoy Mine Site would continue its current monitoring program for the operations phase. The decommissioning phase will likely start out with the same frequency, locations and parameters and, if the data supports this, a reduction in monitoring may occur until such time that the Proponent is released from monitoring requirements. Groundwater monitoring will be developed in association with requirements of wetland and watercourse alteration permits issued for direct wetland and watercourse alterations associated with the Project. The details of the monitoring programs will be determined in consultation with regulatory agencies and will be described in the application for an IA for the site operations following the EA process.

Any program developed will be specific in terms of goals to outline temporal, quality, and quantity changes so that a determination can be made on changes from baseline and if these are an issue for the groundwater VC or connected surface water and wetland VCs.

The objectives of the groundwater monitoring programs are to:

- Verify effects predicted in the EIS;
- Confirm the continuing effectiveness of mitigation measures;
- Identify the need for any new mitigation measures; and
- Confirm compliance with regulatory approvals and requirements.

Section 6.6 and associated figures describes current baseline monitoring locations at the Beaver Dam Mine Site and Touquoy Mine Site. As mentioned, additional groundwater wells will be considered at the Beaver Dam Mine Site to monitor for predicted groundwater seepage towards Mud and Crusher Lakes. No additional monitoring wells are currently planned for the Touquoy Mine Site.

2.6.3 Threshold for Action and Regulatory Thresholds

If a monitoring result indicates a potential issue beyond environmental baseline variation of groundwater quality or quantity or permit requirements, corrective action will be taken. Operations staff will be notified and an investigation of the possible contributing factors will take place to identify and attempt to rectify the cause. Specific action levels and response procedures will be outlined in the Groundwater Contingency Plan. NSE will be contacted regarding any exceedance of regulatory thresholds as per requirements in the IA. Any public complaint will also be a trigger for investigative and/or corrective action.

2.7 Surface Water Quality Resources

2.7.1 Overview

The Beaver Dam Project lies within the West River Sheet Harbour drainage basin, which discharges north to south to the West River and its tributaries. The headwaters of the drainage basin are located along the topographic divide separating the Musquodoboit River valley to the northwest. The complex of streams, lakes, bogs and wetlands ultimately drains to the south via the West River. Discharge peaks are likely attenuated to a large degree by the lakes and wetlands that runoff must pass through.

Water pumped from the open pit as well as surface water generally across the Beaver Dam Mine Site will be directed to settling ponds located near the surface mine. Storage and management of site contact water generally will require discharge from the settling pond on a regular basis. Defined points of discharge will be established to Cameron Flowage during operations through a settling pond. There will be a higher potential near-field effect from tailings effluent entering Cameron Flowage until adequate mixing occurs. This process is subject to Federal Metal Mining Effluent Regulations (MDMER) under the Fisheries Act.

Effluent discharge to the receiving environment including mixing in receiving waters is subject to MDMER. The Beaver Dam Mine will become subject to the MDMER when the effluent flow rate from all final discharge points exceeds 50 m^3/day and includes a deleterious substance, as defined under MDMER and Section 36 (3) of the Fisheries Act. This is expected to occur when construction begins at the site and discharges occur. The MDMER has a prescriptive EEM program that all metal mines must follow, as specified in Schedule 5 of the Regulation. The discharge point to Cameron Flowage during operations will be monitored for compliance with established regulatory criteria for water quality. Cameron Flowage will be subjected to extensive evaluations of fish health, sediment, and water quality to meet the MDMER. The MDMER is administered by Environment and Climate Change Canada (ECCC) and is coordinated through the Atlantic Regional Authorization Officer and the EEM Coordinator of ECCC, and includes review and input from provincial and federal regulators in the Technical Advisory Panel (TAP).

EEM includes two parts, with separate reporting and schedules as follows:

- Part 1 – Effluent and water quality monitoring studies: This involves quarterly sampling of effluent and water for specified parameters, and twice yearly sub-lethal toxicity testing. An annual report is required. This is additional to effluent monitoring requirements under *MDMER* Sections 12 to 25.

- Part 2 – Biological monitoring studies: These studies are conducted in typically three-year phases, with each phase including submission of a Study Design, implementation of the design, and submission of an Interpretive Report.

In addition to the federal MDMER requirements outlined above, the Project is subject to provincial and federal water quality guidelines. Provincially, the Project is subject to Industrial Approval issued under the Nova Scotia *Environment Act*, S.N.S. 1994-95, c.1 (NSE 2017). The IA requires that surface water quality monitoring at all monitoring stages be conducted during construction and one-year post operation for water quality parameters specified in the MDMER. The requirement to conduct surface water quality monitoring, in conjunction with the biological monitoring of fisheries and benthic communities, provides a comprehensive evaluation of the potential risks to aquatic life associated with mine releases via the predominant exposure route of release of effluent from the final discharge point of the mine into the aquatic receiving environment.

For any required surface water monitoring in receiving water bodies, the data will be assessed through the comparison of surface water quality to CCME Canadian Water Quality Guidelines for the Protection of Aquatic (freshwater) Life and the Nova Scotia Environmental Quality Standards (NS EQS). These CCME guidelines are generic, national recommendations, which reflect the most current scientific data at the time each guideline was developed. They are intended to provide protection to all forms of aquatic life and aquatic life cycles, including the most sensitive life stages, at all locations across Canada (CCME, 2007). Since they are generic and do not always account for site-specific factors that can alter toxicity, these national guidelines can be modified using widely accepted procedures, to derive site-adapted or site-specific water quality objectives (SSWQOs) for a given project or location (CCME, 2003; 2007). Modifications to the generic guidelines allow for protection of aquatic species while accounting for specific conditions in the receiving environment, such as natural enrichment (where guidelines can be exceeded due to the presence of naturally occurring metals), presence of modifying factors not accounted for in existing guidelines, availability of newer scientific literature and protocols since the establishment of the existing CCME guideline (CCME, 2003).

Therefore, assessment of surface water quality could include either existing CCME surface water quality guidelines, a statistical metric of natural background (where natural enrichment is evident), or a revised, site-specific water quality guideline, developed using the standardized protocol of the CCME (2007), following regulatory approval. Discussions with Environment Canada staff relative to MDMER for the Beaver Dam Mine Site will be needed to make a final determination on discharge requirements.

The surface water monitoring program aims to verify the predictions of negligible significant adverse effects on surface water, changes in surface water quantify in response to Project activities, examine the effectiveness of mitigation measures taken, and signal a need to change environmental control measures if monitoring indicates adverse environmental effects are, or may be, occurring due to activities of the Project. The monitoring program can also trigger the requirement to develop a more advanced monitoring program, focused on specific issues of concern identifying through the existing monitoring program and the development of site specific water quality guidelines.

2.7.2 Monitoring Approach

A surface water-monitoring program is in place to monitor and report on nine surface water-monitoring stations around the Beaver Dam mine site and 29 locations along the Haul Road during Facility construction, operation, and reclamation as described in the EIS. These stations are located at the following locations and these are expected to be compliance locations depending on the approval process with NSE and CEAA.

Baseline Surface Water Locations for Beaver Dam Mine Site:

SW-1 Killag River – Downstream and east of mine site.
SW-2A Upstream of Cameron Flowage – Upstream and north of mine site.
SW-4A Wetland downstream of Mud Lake – Downstream and north of mine site.
SW-5 Existing settling pond outlet – Water exiting settling pond into Cameron Flowage near mine site.
SW-6A Unnamed stream between Crusher Lake and Mud Lake – Downstream and west of mine site.
SW-9 West River Sheet Harbour
SW-10 Upstream of existing settling pond
SW-11 Tent Lake
SW-12 Unnamed lake/wetland – headwaters of Paul Brook

Baseline Surface Water Locations for Haul Road:

WC-2 Watercourses along mine site portion of haul road
WC-3 Watercourses along mine site portion of haul road
WC-7 to WC-17 Watercourses along mine site portion of haul road
SW-41 Watercourses along new construction through greenfield environment
SW-42 Watercourses along new construction through greenfield environment
WC-23 to WC-31 Watercourses along Moose River Cross Road portion of haul road
SW43 to SW-47 Watercourses along the Mooseland Road portion of the haul road

Sampling at the Beaver Dam Mine Site began in October 2014 and was conducted until August 2015, all seven of the locations were sampled during multiple sampling events at the site during this time period. All locations along the haul road were sampled in June of 2015 in one sampling event. Additional samples were collected in 2017 from SW-11 and SW-12 to provide additional baseline information. 16 surface water monitoring stations were established and are monitored on a monthly basis for parameters including; metals, nutrients, and other general water chemistry (i.e. pH). These stations include natural watercourses both upstream and downstream of the facility, including Moose River and effluent from the Touquoy facility. It is likely that similar monitoring activities will be approved and required under the IA. Additional monitoring locations are not anticipated to be necessary at the open pit at Touquoy Mine Site following the deposition of the Beaver Dam tailings.

Monitoring activities will examine the effectiveness of mitigation measures taken, and signal a need to implement environmental control measures if adverse environmental effects due to Project activities are detected. An Environmental Management System (EMS) and Environmental Protection Plan (EPP) will be developed as part of the Project implementation that will confirm the responsibility and system of accountability for the compliance and effects monitoring program.

2.7.3 Aquatic Receiving Environment MDMER

Stantec has a prepared a supplementary document on MDMER requirements specific to Touquoy Mine Site that provides an overview of the monitoring, regulatory thresholds, and thresholds for action that are specific to effluent discharge from the settling pond and interaction of effluent with aquatic receiving environment. This document will have value in the final development of monitoring programs for the Beaver Dam Project due to proximity, similar hydrology, hydrogeology, and operations. The will likely be similar to the following standard general guidelines:

Briefly, under the MDMER, a Phase 1 EEM Study Design will be required within 12 months of the mine becoming subject to MDMER*,* and the Phase 1 EEM Interpretive Report will be required within 36 months of the mine becoming subject to MDMER.

The timetable for submission of the Study Design and the Interpretive Report for Phase 1 will be set based on the date that the mine becomes subject to MDMER. If, for example, the mine becomes subject to MDMER on January 1, 2018, then the basic timetable for the EEM biological studies will be as follows:

- Submit Phase 1 EEM Study Design for ECCC approval by January 1, 2019 or at least six months in advance of associated field work, whichever is earlier;
- Implement the approved Phase 1 EEM Study Design in 2019 or 2020; and
- Submit Phase 1 EEM Interpretive Report to ECCC (including associated data) by no later than January 1, 2021.

No advance biological studies are required before the mine becomes subject to MDMER; however, a baseline study prior to mining start-up is anticipated to be conducted at Touquoy in 2017, prior to effluent discharge and water withdrawal from Scraggy Lake. The baseline EEM objectives are as follows:

- Establish the pre-mining state of the receiving environment that can be used to:
    - select suitable exposure and reference sites for the eventual EEM program to address MDMER Part 1 and Part 2;
    - explain differences between sites, which might otherwise be considered “environmental effects” of the mine effluent once the mine is operating (risk management);

- Inform the scope and design of the required EEM program so that:
    - it meets regulatory requirements;
    - the sampling number and locations are refined and appropriate to EEM questions;
    - it confirms existing baseline conditions prior to mine effluent discharge; and
    - it provides a basis for determining the scope of work for implementing the full EEM program (Study Design, Field studies, Interpretive Report).

2.7.4 Thresholds for Action

If a visual or laboratory result indicate a potential issue above normal variation and/or in exceedance of regulatory thresholds, corrective action will be taken. Initial corrective actions include resampling and verification of the initial result. If verified, Operations Management and the Senior Management Team is to be notified and an investigation of the possible contributing factors of the anomalous result initiated. The results of the investigation will inform corrective actions to be taken. NSE will be contacted and consulted in

the instance that further action is required. Any public complaint will also be a trigger for investigative and/or corrective action.

With respect to the EEM program under MDMER, if the results of previous EEM studies indicate the magnitude and geographic extent of an effect on fish population, fish tissue or benthic invertebrate community, an investigation of cause (IOC) study will be required (*MDMER*, Schedule 5, subsection 19(2)). The goal of IOC is to determine the cause of each confirmed effect (Environment Canada's "Metal Mining Technical Guidance for Environmental Effects Monitoring", 2012).

2.7.5 Regulatory Thresholds

Surface water monitoring will adhere to the Federal MDMER. Surface water quality data will be compared to the CCME guidelines for protection of aquatic life, the Nova Scotia Environmental Quality Standards, and/or approved site-specific water quality guidelines, as needed. MDMER is regulated and takes precedence over CCME guidelines

2.8 Wetlands

2.8.1 Overview

Potential project-related effects of the Project on wetlands were identified in the EIS. Bogs, fens, swamps, marshes, and shallow water wetlands are present within the PA, with many wetlands forming complexes consisting of more than one wetland type. The Beaver Dam Mine Site and Haul Road have been adjusted to minimize impacts to wetlands and watercourses in the area. The EIS included studies utilizing both provincial wetland databases and field studies. The EIS evaluated 197 freshwater wetlands within the Beaver Dam Mine Site and Haul Road, of which, a total of 21 wetlands are expected to be completely altered to support Project development, and 86 wetlands are expected to require partial alteration to support Project infrastructure and development. Recent micro siting has reduced the total area of wetland loss within the Beaver Dam Mine Site from 317,293 m^2 to 221,080 m^2.

Wetlands are protected under the provincial *Environment Act* and an approval is required for alteration. Wetland alteration applications will be submitted and permitting will be obtained prior to any construction in a wetland. Wetlands removed by the Project will be compensated at the ratio determined in the Wetland Compensation Plan in consultation with NSDLF and NSE. The Proponent will continue to work with NSDLF and NSE to develop the required mitigation measures including wetland compensation to mitigate any loss of habitat based on function and relative value. Assuming that the proposed compensation and mine site reclamation mitigation measures are applied, and that existing site drainage conditions are maintained, the Project is not likely to have significant adverse effects on wetland functional attributes in the area.

Wetland management aims to describe actions taken to verify the predictions of negligible significant adverse effects on wetland functional attributes, quantify wetland response to project activities and alteration events, examine the effectiveness of mitigation measures taken, and signal a need to implement environmental control measures if monitoring indicates adverse environmental effects are or may be occurring due to activities of the Project.

2.8.2 Monitoring Approach

The wetland management program is intended to verify that the Project is not likely to have significant adverse effects on wetland functional attributes in the area. The methods for monitoring will be those submitted within the Wetland Monitoring Plan, Wetland Protection Plan, and Wetland Compensation Plan. The Wetland Monitoring Plan and Wetland Protection Plan will be developed as part of the IA process. The Preliminary Wetland Compensation Plan can be found within the EIS in Appendix I-3. Full monitoring details can be found within each corresponding plan, but a brief discussion of each is provided below.

Wetland Protection Plan –The purpose of the Wetland Protection Plan is to provide an overview of methods by which wetlands existing within the Project area, adjacent to the development area and down-gradient of the development area are protected. It will also focus on the protection of permitted wetlands (*i.e.* planned for alteration) and their associated downstream receptors during the construction phase of the Project.

Wetland Compensation Plan – Annual surveys of the Project site will be completed to identify land areas disturbed as a result of Project related activities. An annual update will be submitted to NSE indicating actual areas of wetland altered. This update will be provided at the end of each calendar year, as well as an updated schedule for the alteration areas expected for the upcoming year. Refer to the Preliminary Wetland Compensation Plan (EIS Appendix I-3) for further details.

Wetland Monitoring Plan – Outlines the methods used to evaluate remaining wetlands and portions of wetlands not altered by infrastructure but exist down-gradient of the Project construction. Notably, larger receiving features which act as receptors from wetlands and watercourses being altered as part of the Project will be a focus. Monitoring stations will be established which include shallow water level loggers that collect wetland hydrological data. This data will be combined with SW monitoring data to evaluate any potential post alteration impacts to wetlands. Transects will also be used to evaluate wetland habitat. Monitoring stations will be established in wetland habitat at the Beaver Dam Mine Site and along the Haul Road and will monitor using similar methods as defined through permitting requirements. Baseline monitoring (pre-construction) of vegetation, topography, hydrology, general assessments and visual observations will take place before construction commences. Post-construction monitoring of these variables will also be completed at the established locations. Conditions recorded during baseline monitoring will be compared to post construction monitoring to determine whether areas of unaltered wetland habitat remain viable, and healthy wetland characteristics are present. Annual monitoring results will be provided to NSE annually.

The wetland monitoring program will include the following assessments:

- Wetland Hydrology: Baseline hydrological conditions within planned partially altered wetlands and wetlands located downgradient of alteration locations (including beyond the PA boundary that fall within the LAA) will be evaluated prior to construction activities. Techniques will range from installation of shallow monitoring wells in combination with automated water level recording equipment to visual qualitative observations of hydrological conditions within remaining wetland habitat in the PA. Monitoring wells equipped with level loggers (Solinst 3001 Edge) have the ability to record water levels twice daily. Visual assessments will occur annually, in conjunction with vegetation surveys. Post-construction monitoring will be compared to baseline conditions to evaluate potential impacts to remaining wetland habitats.
- Wetland Vegetation: Techniques will range from the completion of specified vegetation transects and plots to visual qualitative observations. Baseline vegetative conditions will be evaluated before Project

commencement. Annual vegetation surveys will be completed in monitored wetlands within the Beaver Dam Mine Site and Haul Road. Baseline conditions will be compared with post-construction conditions.

- Water Quality: In combination with other monitoring requirements associated with the Project, water quality will be monitored in downgradient aquatic receptors to ensure that up-gradient activities are not compromising water quality conditions.

- Other direct and indirect impacts: General observations will be completed pre-construction, during the construction phase, and post-construction to determine whether partially altered wetlands or unaltered adjacent and downgradient wetlands are subject to other direct or indirect impacts. Impacts could include disturbances to wetland surfaces (e.g., rutting, heaving), improper vegetation management, improper access of construction vehicles, sedimentation and erosion, and unplanned changes in hydrological inflow and outflow (e.g., damming, de-watering, disturbance to natural swales and drainage corridors).

Implementation of the strategies discussed above will support the mitigation process associated with wetland protection. A final wetland monitoring plan will be developed prior to construction in conjunction with wetland alteration permitting. The plan will be refined in order to meet the specific activities and timing of activities within the PA. Annual reports related to wetland monitoring will include information on actual area of wetland altered that year, a schedule of alteration expected in the upcoming year and updates regarding wetland compensation efforts, options, methods, and any ongoing work to happening satisfy compensation requirements.

Should post construction wetland monitoring and/or ongoing construction monitoring indicate a potential issue above normal variation (i.e. atypical wetland responses to adjacent land activities), corrective action will be taken. Operations staff will be notified and an investigation of the possible contributing factors will take place to identify and attempt to rectify the cause. Specific action levels and response procedures will be based on the Project related activity responsible for the variation in wetland conditions being observed. NSE will be contacted and consulted in the instance of direct and/or in-direct wetland response as a result of such activities, and a determination to what degree further action is required will be determined by all parties.

2.8.3 Thresholds for Action

Should post construction wetland monitoring and/or ongoing construction monitoring indicate a potential issue above normal variation (i.e. atypical wetland responses to adjacent land activities), corrective action will be taken. Operations staff will be notified and an investigation of the possible contributing factors will take place to identify and attempt to rectify the cause. Specific action levels and response procedures will be based on the Project related activity responsible for the variation in wetland conditions being observed. NSE will be contacted and consulted in the instance of direct and/or in-direct wetland response as a result of such activities, and a determination to what degree further action is required will be determined by all parties.

2.9 Terrestrial Fauna

2.9.1 Overview

Potential project-related effects on terrestrial habitat were initially identified in the EIS. Studies of mammals and herptiles were conducted, and two main potential project related impacts to fauna were focused on. These fauna were mainland moose and snapping turtle and are described in more detail below:

- *Mainland Moose*

The Mainland Moose (*Alces alces americana*) population has been designated as Endangered under the Nova Scotia Endangered Species Act (NSESA). Mainland Moose are known to occur in the general location of the Project Area. As stated in the EIS, within the PA, mainland moose tracks were observed within the Beaver Dam Mine Site in disturbed, roadside habitat north of Wetland 56 on May 24th, 2015 during a pellet group inventory (PGI) survey. Moose tracks were observed incidentally in two locations on September 9th, 2014. One set of tracks was observed in Wetland 210 and a second set of tracks was observed just north of the Beaver Dam Mine Site. No signs of mainland moose were observed during any survey within the Haul Road. No incidental sightings, or evidence of Moose have been observed within the Project area during other biophysical field programs undertaken from 2015 to 2018.

- *Snapping Turtle*

The Snapping Turtle (*Chelydra serpentina*) is listed as vulnerable under the provincial NSESA and Special Concern under the federal Species at Risk Act (SARA) and Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Snapping turtle habitat is present within the PA and snapping turtles have been incidentally observed along the Haul Road and at the Touquoy Mine Site. It is expected that they use habitat within the PA, at least periodically.

The Wildlife Management Program (Wildlife Management Plan and Mainland Moose Management Plan) will be developed in consultation with regulators, conservation organizations, and first nation representatives. The associated monitoring within these plans will aid in verifying whether the Project is having a significant adverse effect on terrestrial fauna (specifically mainland moose and snapping turtle) in the general location of the PA.

2.9.2 Monitoring Approach

The Wildlife Management Program is comprised of the Wildlife Management Plan and the Mainland Moose Monitoring Plan. These plans will be implemented as part of the IA process and monitoring details and specific methods will be outlined within them. Brief descriptions of the monitoring plans are provided below:

Mainland Moose Management Plan (MMMP) **–** The objective of the MMMP is to quantify mainland moose response to project activities and alteration events, examine the effectiveness of mitigation measures taken, and signal a need to implement environmental control measures if monitoring indicates significant adverse environmental effects are, or may be occurring due to activities of the Project.

The MMMP will outline protocols to monitor usage of the PA and surrounding landscape by mainland moose and minimization of moose-human interaction. The MMMP will also support research, education, and stewardship related to mainland moose recovery. The MMMP aims to describe frequency of occurrence of Moose around the Project area. Track surveys will be completed annually – preferably prior February 1st, for moose and deer track, scat, and browse (survey numbers subject to change to meet IA terms and conditions). The winter track survey will be followed by one Pellet Group Inventory (PGI) survey, to be completed in the spring (survey numbers subject to change to meet IA terms and conditions). The same transects established for the winter track survey will be used for the PGI survey. These monitoring surveys will be completed annually throughout the life of the Project. Survey results will be presented to Nova Scotia Department of Lands and Forestry (NSDLF) in an annual report. Any sightings of mainland moose are to be reported immediately to the Atlantic Gold Environmental Technician.

Indigenous groups will be contacted prior to commencement of monitoring and representatives will be invited to conduct the surveys in partnership with Project Team Biologists.

If mainland moose monitoring results indicate a potential variance in results noted to date, monitoring results will be conveyed to NSDLF, and a dialogue will be initiated with them to determine further action. If mainland moose activity within and/or adjacent to the mine site occurs, operations staff will be notified and moose awareness program will be implemented to ensure all staff are well informed regarding increased moose presence. Additionally, NSDLF and NSE will be advised of the increased presence of mainland moose, and a determination of necessary further action will be made.

Wildlife Management Plan (WMP) **–**The purpose of the WMP is to outline protocols to minimize interactions between terrestrial wildlife and Project activities, including snapping turtles. Strategies are outlined in the plan to help site personnel identify and track where wildlife are using the PA, as well as outline the management strategies to help reduce interactions. Wildlife sightings or interactions are recorded through wildlife sighting cards and included in an annual report to NSDLF.

If snapping turtle activity is occurring within and/or adjacent to the Beaver Dam Mine Site, Haul Road, or Touquoy Mine Site, a turtle awareness and management program will be implemented to ensure all staff are well informed regarding the increased turtle activity, especially during breeding season. The Proponent will consult with regulatory agencies to determine the necessary action to be taken. Actions could include: instruction on how to safely move a turtle; turtle crossing signs installed near major watercourse crossings or in areas where snapping turtles have been observed in an effort to increase awareness and reduce vehicular collisions; increased dust suppression on roads to improve visibility during nesting season and hatchling emergence; and use of predator excluders on identified nests.

In addition to the Wildlife Management Program; regular construction monitoring and wetland monitoring will be conducted. Construction monitoring will be completed to ensure protective measures are being implemented. Monitoring during remedial activities will be completed to evaluate its success in establishing habitat for wildlife. Wetland monitoring will be completed to ensure wetland condition and integrity is maintained.

2.9.3 Thresholds for Action

Moose

If Moose monitoring results indicate a potential variance in results noted to date, monitoring results will be conveyed to NSDLF, and a dialogue will be initiated with them to determine further action.

If Moose activity within and/or adjacent to the mine site occurs, operations staff will be notified and Moose awareness program will be implemented to ensure all staff are well informed regarding increased Moose presence. Additionally, NSDLF will be advised of the increased presence of Moose, and a determination of necessary further action will be made.

NSE will be contacted and consulted for both of the instances described above.

Snapping Turtles

If snapping turtle activity is occurring within and/or adjacent to the Beaver Dam Mine Site or Haul Road, a turtle awareness and management program will be implemented to ensure all staff are well informed

regarding the increased turtle activity, especially during breeding season. This could include: instruction on how to safely move a turtle; turtle crossing signs installed near major watercourse crossings or in areas where snapping turtles have been observed in an effort to increase awareness and reduce vehicular collisions; increased dust suppression on roads to improve visibility during nesting season and hatchling emergence; and use of predator excluders on identified nests. If mortalities are occurring, the Proponent will consult with regulatory agencies to determine the necessary action to be taken.

2.10 Birds

2.10.1 Overview

Breeding birds in Canada are protected under the Migratory Birds Convention Act, 1994. A number of the bird species recorded during the EA breeding bird survey or desktop review of known bird sightings are considered to be rare in Nova Scotia or particularly sensitive to anthropogenic activities. Clearing or grubbing that could potentially impact breeding birds is to be conducted outside the breeding season or a nesting bird survey conducted if clearing activities occur during this time.

2.10.2 Monitoring Approach

All site workers shall comply with regulations outlined in the Migratory Bird Convention Act, which prohibits the disturbance of migratory birds, their nests and eggs. If a nest or evidence of breeding bird activity is identified, an Atlantic Gold Environmental Technician must be notified immediately, so steps can be taken to identify the species and determine appropriate mitigation or avoidance if required. Species identified of particular risk and several species of birds known to nest around active construction sites will be included in the Wildlife Sighting Report Card, like those required at Touquoy Mine Site. If construction is required during the active nesting season, an avian specialist will monitor for nesting activity. If evidence of nesting is observed, the Proponent will consult with appropriate regulatory agencies to determine an appropriate spatial and temporal buffer, based on site and seasonal specific parameters at the time of the observation. To ensure the effectiveness of the buffers, known nests around will be monitored during construction. Routine inspections will also be conducted as directed by regulators.

In addition to bird monitoring, the monitoring of wetlands will be completed to ensure that wetland condition and integrity is maintained. Wetlands provide habitat to several priority bird species (e.g. olive sided flycatcher).

If construction is required within Wetland 64 during the greater yellow-legs active nesting season, an avian specialist will monitor for nesting activity within the wetland and adjacent undisturbed habitat. The Proponent will consult with appropriate regulatory agencies to determine an appropriate spatial and temporal buffer, based on site and seasonal specific parameters at the time of the observation. A contractor awareness program will be implemented to inform contractors of greater yellowlegs identification and signs of nesting behavior. Contractors will be informed of their responsibility to remain inside approved work areas, and to report signs of nesting behavior of the greater yellowlegs to the Proponent's staff. If nests are found, they will be monitored from a distance using binoculars or a spotting scope to avoid further human disturbance from monitoring. If new breeding evidence is observed during construction monitoring activities, an acceptable setback (to be established in consultation with regulatory authorities) will be established and monitoring will take place.

2.10.3 Thresholds for Action

Should evidence of breeding bird activity be identified during construction activities, action levels and response procedures will be determined in order to comply with the Migratory Birds Convention Act, 1994. If construction is required during the active nesting season, an avian specialist will monitor for nesting activity. This will be completed from existing roads using binoculars to reduce disturbance to nesting birds. If evidence of nesting is observed, the Proponent will consult with appropriate regulatory agencies to determine an appropriate spatial and temporal buffer, based on site and seasonal specific parameters at the time of the observation.

2.11 Archaeological and Cultural Resources

As part of the EA, an archaeological screening was conducted with low archaeological potential found. A Mi'kmaq Knowledge Study was also conducted for the area which reviewed the historical use and occupation of the area and further consultation with Millbrook and Sipekne'katik First Nations was done to understand current use of the project area. Historical and current use of the study area, especially for hunting and gathering existed; however, a significant impact was not expected. Mi'kmaq archaeological resources, however, are irreplaceable and any disturbance of these resources would constitute a significant impact.

The Proponent has committed that, in the event that archaeological deposits or human remains are encountered during construction, all work in associated area(s) should halt and immediate contact should be made with the Nova Scotia Museum. Similarly, in the event that Mi'kmaw archaeological deposits are encountered during construction or operation of the Project, all work should be halted, and immediate contact should be made with the Nova Scotia Museum and The Confederacy of Mainland Mi'kmaq.

3 CLOSING

This Environmental Effects Monitoring Program was prepared to fulfil information requests under CEAA 1-10. This EEM has been completed utilizing subject experts and taking into consideration regulatory instruction for Provincial and Federal regulations for the Touquoy Gold Mine Project and forecasting for the Beaver Dam Project. This EEM is designed to be a living document; allowing environmental management to adapt to changing conditions, apply an iterative approach to management, meet recommendations/expectations from regulators, assess monitoring methods and allow for improvements where necessary. Advice from regulators will be incorporated over time as part of the adaptive management approach to this program.

4 REFERENCES

CCME 2007. Protocol for the Derivation of Water Quality Guidelines for the Protection of Aquatic Life 2007. http://ceqg-rcqe.ccme.ca/download/en/220

CCME (Canadian Council of Ministers of the Environment). 2003. Canadian water quality guidelines for the protection of aquatic life: Guidance on the site-specific application of water quality guidelines in Canada: Procedures for deriving numerical water quality objectives. In: Canadian environmental quality guidelines, 1999. Winnipeg, MB.

CRA (Conestoga-Rovers & Associates). 2007a. Environmental Assessment Registration Document for the Touquoy Gold Project, Moose River Gold Mines, Nova Scotia. Ref. No. 820933(3).

CRA (Conestoga-Rovers & Associates). 2007b. Focus Report Touquoy Gold Project, Moose River Gold Mines, Nova Scotia. Ref. No. 820933(8).

Environment Canada. 2012. Metal Mining Technical Guidance for Environmental Effects Monitoring. ISBN 978-1-100-20496-3.

Nova Scotia Environment and Labour. 2008. Environmental Assessment Approval. Touquoy Gold Project

Nova Scotia Environment. 2017. Industrial Approval No. 2012-084244-03 for Atlantic Mining NS Corp. (Touquoy Gold Project).