Goldboro Mine 2021

Archaeological Resource Impact Assessment

A2021NS063

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FULL REPORT

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GOLDBORO MINE 2021:
ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT

Heritage Research Permit A2021NS063
Category C

Davis MacIntyre & Associates Limited
Project No.: 21-017.1

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Submitted to:

Anaconda Mining

-and-

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Cover: A watercourse flows through a mature spruce forest into Gold Brook Lake, looking east (upstream).

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EXECUTIVE SUMMARY

In April 2021, Davis MacIntyre & Associates Limited was contracted by Anaconda Mining to conduct an archaeological resource impact assessment of the proposed Goldboro Mine Project. Previous assessments have been conducted for Anaconda Mining to the west and southwest of this location, and this report includes a brief reiteration of those findings and recommendations. The 2021 assessment included a historic background study as well as a field reconnaissance of all areas to be impacted.

Based on the results of the 2021 reconnaissance, most of the study area has been evaluated to be of low potential for archaeological resources related to occupation by the Mi'kmaq and their ancestors. The general Proposed Goldboro Mine Project Area includes a registered archaeological site, BhDj-2, related to historic mining activity which includes cellars and a mill site. All archaeological sites (including known and unknown sites) are protected through the Special Places Protection Act from disturbance, unless it is conducted under the supervision of a qualified archaeologist working under a Heritage Research Permit issued by the Department of Communities, Culture & Heritage. Some cultural activity (logging, hunting blinds, and quarrying) has been documented during the 2021 reconnaissance, but all of these features noted within the new 2021 study area have been evaluated to be of low significance, and therefore, there are no further recommendations for these features.

It is recommended that prior to ground disturbance of any kind, any areas of elevated potential in proximity to the disturbance, as identified in this report, should be subjected to a programme of limited shovel testing prior to clearing, grubbing, or development, to determine the presence or absence of archaeological resources. It is our understanding that at least seven of these areas (Moderate Potential 10 through 16) are now beyond the development zone, but should this change to encompass the shore of Ocean Lake, these areas should be subjected to testing and the remainder of the lakeshore within any impact zone should be subjected to a reconnaissance.

It is also recommended that prior to any shovel testing activities, a robust project-specific health and safety plan be developed to ensure field safety. Many of the areas of elevated archaeological potential are located in close proximity to historic tailings deposits, which are known to contain high concentrations of arsenic and mercury. Arsenic occurs naturally in the rock, but is concentrated and made more accessible to organisms by the gold extraction process. Mercury has been used by historic mining companies, including the Boston-Richardson Company, to adhere to the gold in tailings for extraction, and the recovery process loses a certain amount of mercury into the tailings with each round of processing. Measures to protect field crew members from inhalation or skin absorption of these materials shall be necessary. Finally, although cyanide (known to have been used at the Boston-Richardson mine after the mercury process became obsolete) is known to dissipate in the environment relatively quickly in most instances, larger concentrations that may have been disposed of through burial

pose a serious health and safety risk, as has been the case at the Cochrane Hill gold mine in recent decades. An emergency procedure for encountering undocumented cyanide containers should be included in the health and safety plan.

The recommendations of the 2017, 2019, and 2020 reports are also re-iterated – if any impact is planned for the areas of low-moderate or moderate potential identified during the 2017-2020 reconnaissances, they should first be subjected to shovel testing. Impact includes grubbing, clearing, excavation, construction of roads or drill pads, or other types of ground disturbance.

The recommendations of the 2017, 2019, and 2020 reports regarding historic archaeological resources, which have been approved by Communities, Culture and Heritage, still stand and are reiterated:

> The historic mill complex by Gold Brook Lake is the most notable archaeological feature within the study area. This large complex is obviously industrial in nature, and given the size and the known date range of the site, it is unlikely that archaeological testing in this location would be an efficient means of learning more about the site. As such, if soil disturbance – including mechanical clearing of the trees – is proposed within approximately 50m of the provided GPS coordinate for the site, it is required that an archaeologist be contracted to monitor mechanical ground disturbance to ensure that the site is properly mitigated. The same is true of the two stone ramps, which lie approximately 60m northwest of the mill's centre. At the ramp location, a buffer of only 10m is recommended, and if disturbance encroaches upon this buffer, archaeological monitoring is similarly required. The isolated iron object nearby is of unknown function and age. As such it has not been collected for curation, but it would be recommended that prior to ground disturbance this object be more closely examined and the Museum of Industry in Stellarton be consulted to determine if the object is desirable for curation.
>
> It is required that a 20m buffer zone be established around Cellar #1 and Cellar #2, both of which were confirmed as late nineteenth to early twentieth century archaeological features in 1988. If a buffer zone is not feasible, further archaeological testing and recording is recommended to collect valuable information about these features before they are destroyed. This would likely take the form of formal test units (50cm x 50cm) spaced closely around and inside the features, or a series of trench-like excavation units designed to cross-section the features.
>
> Cellars #3 and #4 are smaller and less distinct, and may represent outbuildings or other historic activity of lower significance. As such, archaeological testing at these two locations is recommended prior to

ground disturbance within 20m of both features. If these areas will not be impacted by the development, then a 20m buffer would be sufficient to avoid disturbing any archaeological resources that they contain.
The artifact scatter identified near the former office site (gravel pad) does not appear to be associated with any intact archaeological feature. It is possible that a cellar or other feature once existed under the gravel pad, or that the area was simply a semi-modern dump area. As such, it is not currently a location of high concern. However, if during ground disturbance a large quantity of additional artifacts is encountered, it is required that ground disturbance activity cease and an archaeologist be contracted to assess and possibly monitor the area.

The two depressions of unknown function appear most likely to be related to mining activity, and as such it is unlikely that archaeological testing would be helpful in these locations. As such, it is required that if soil disturbance is likely to take place within 10m of these two depressions, an archaeologist should be contracted to monitor the disturbance and mitigate any significant archaeological resources.

The probable privy associated with Cellar #1 would similarly be unlikely to benefit from archaeological testing unless a test unit was placed directly inside it, which may be a difficult undertaking given the slope of the depression itself. It is therefore required that a 10m buffer be established around this feature, or if this is not possible, professional archaeological monitoring of ground disturbance at this location should be undertaken.

Furthermore, if the impact of the any planned current or future drilling or geotechnical testing (including any grubbing, clearing, excavation, access road construction, drill pad preparation, etc.) is anticipated to be located within the buffer zones of the archaeological features outlined above, it is recommended that monitoring of any ground disturbance activities is conducted by a qualified archaeologist. However, this assumes that the cellars themselves can be avoided. If the cellars or a 10m buffer around the outside edge of the cellars cannot be avoided, then as per the 2017 recommendations, they must be subjected to formal archaeological testing prior to any disturbance.

Finally, in the unlikely event that archaeological resources are encountered during ground disturbance activities, and an archaeologist is not already present, it is required that all activity cease and the Coordinator of Special Places be contacted (902-424-6475) regarding a suitable method of mitigation.

1.0 INTRODUCTION

In April 2021, Davis MacIntyre & Associates Limited was contracted by Anaconda Mining to conduct an archaeological resource impact assessment of the proposed Goldboro Mine Project. Previous assessments have been conducted for Anaconda Mining to the west and southwest of this location under HRP#A2017NS043, A2019NS102, and A2020NS126. The assessment included minor updates to the previously compiled historic background study, as well as a field reconnaissance of all areas to be impacted.

Due to the preferred timelines laid out by Anaconda Mining, an interim report was produced in advance of this full report, focusing exclusively on the footprint of the current outline of tailings management facility (TMF) #4. Although initial reconnaissance activity focused on TMF5 to the east (overlooking Ocean Lake), DM&A were directed to shift their priority to a modified (and scaled-down) TMF4 (overlooking Gold Brook Lake) several weeks after the survey began. As such, some data has already been collected for the landscape east of the area outlined in this report, and this data shall be described in this report.

The full area of the previous TMF5 outline was not completely covered by the reconnaissance before the team was redirected to the revised study area, and it is our current understanding that the areas not covered, along with a significant portion of the coverage that was achieved before the study area alteration, shall not be impacted by the proposed mine. However, the field data that was already collected has been presented below in the interest of complying with the professional expectations of this permit.

This assessment was conducted under Category C (Archaeological Resource Impact Assessment) Heritage Research Permit A2021NS063 issued by the Department of Communities, Culture, Tourism and Heritage. This report conforms to the standards required by the Culture and Heritage Development Division under the Special Places Protection Act (*R.S., c. 438, s. 1*).

2.0 STUDY AREA

The proposed Goldboro Mine (previously operated under other names including the Boston-Richardson Mine) is located in Goldboro, Guysborough County. At the commencement of the 2021 phase of the project, the Environmental Assessment study area encompassed most of Gold Brook Lake, and extended eastward to Ocean Lake, and southward towards the main road on the shore of Isaac's Harbour. Portions of the study area (predominantly in the center around Goldbrook Road and the outflow of Gold Brook Lake) were subjected to previous mining ventures in the late nineteenth and twentieth centuries. Goldboro Mine will likely consist of a primarily open-pit mine, and

as such, a large tailings management facility (TMF) must be constructed to store the expended ore. For the purposes of the 2021 archaeological assessment, the archaeological team was asked to assess approximately 925ha hectares (Figure 2.0-1). A significant reduction in size occurred later in the field reconnaissance (Figure 2.0-2).

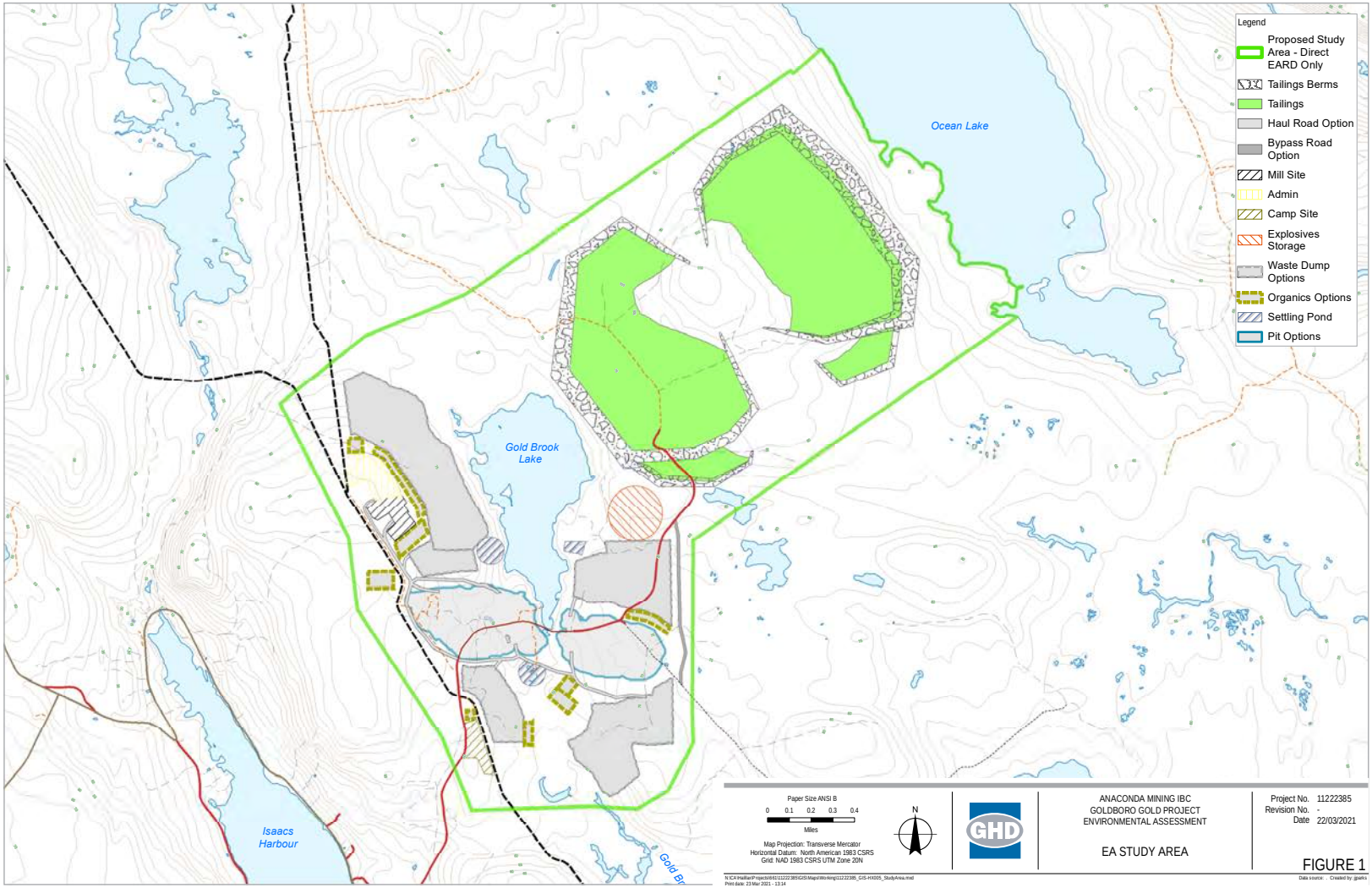

Figure 2.0-1: The study area as of April 2021, courtesy Anaconda Mining.

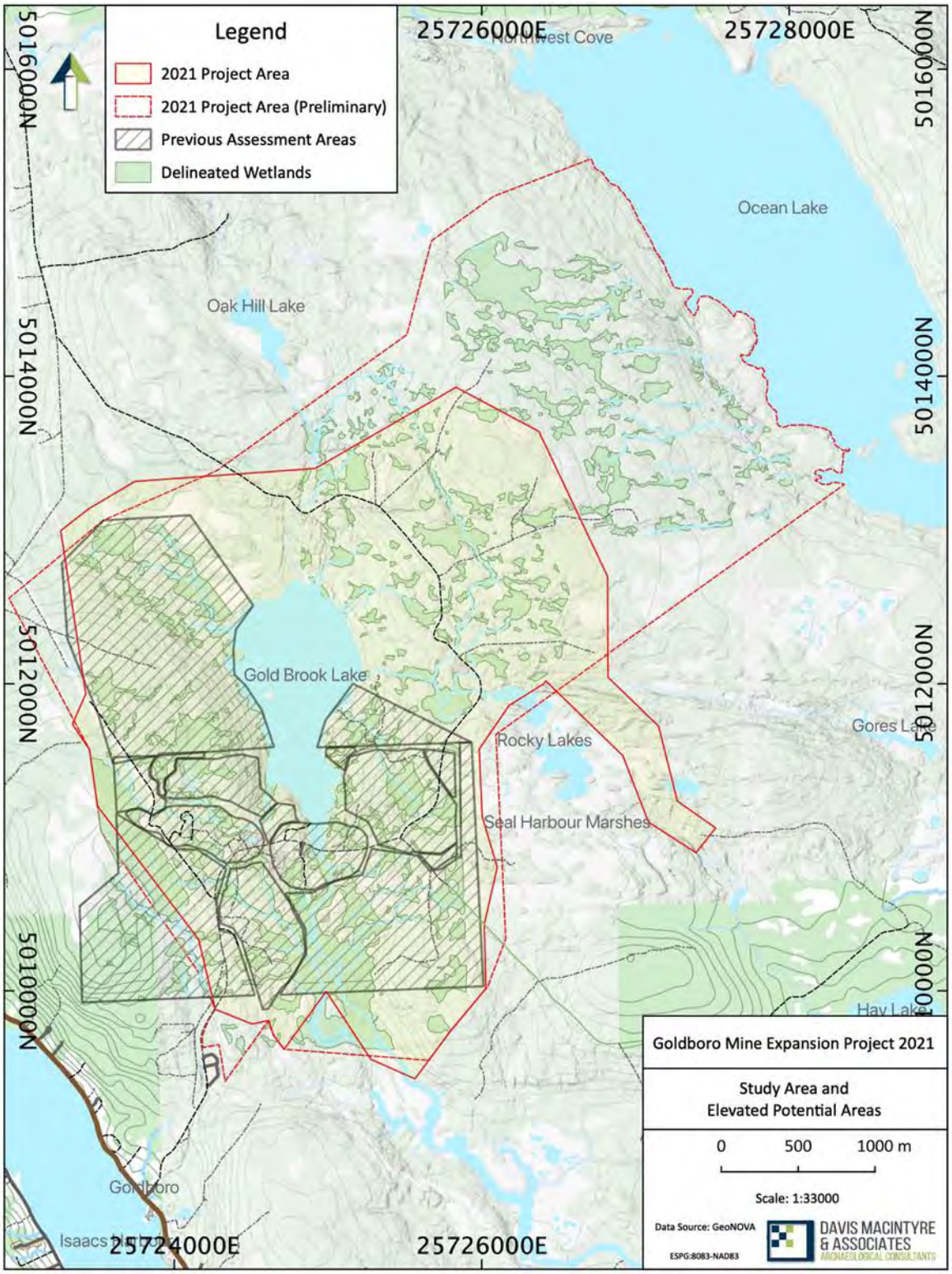

Figure 2.0-2: A map showing the preliminary and final 2021 study areas, along with previously assessed areas.

2.1 Natural Environment

The study area is located in the Guysborough Harbours Unit (Theme Region #842) which is part of the Quartzite Headlands district, Atlantic Coast region (Figure 2.2-1). This unit extends from Marie Joseph to New Harbour Cove and is characterized by a submerged coastline with drowned estuaries separated by headlands. Movements along the Chedabucto Fault have resulted in long, narrow, relatively straight valleys that have been inundated by the sea and now form long narrow inlets, including Country Harbour and Isaac's Harbour. A thin quartzite till overlays the predominately greywacke bedrock in this unit and exposed bedrock is also common. The greywacke bedrock also contains interfolded slates. Within the study area itself, the bedrock is generally Goldenville Formation of sandstone turbidites and slate, with some possible areas of Halifax Formation.[1] Coastal sediment is limited so that there are few sand beaches and the coastal fringes tend to be rocky or cobbly.[2]

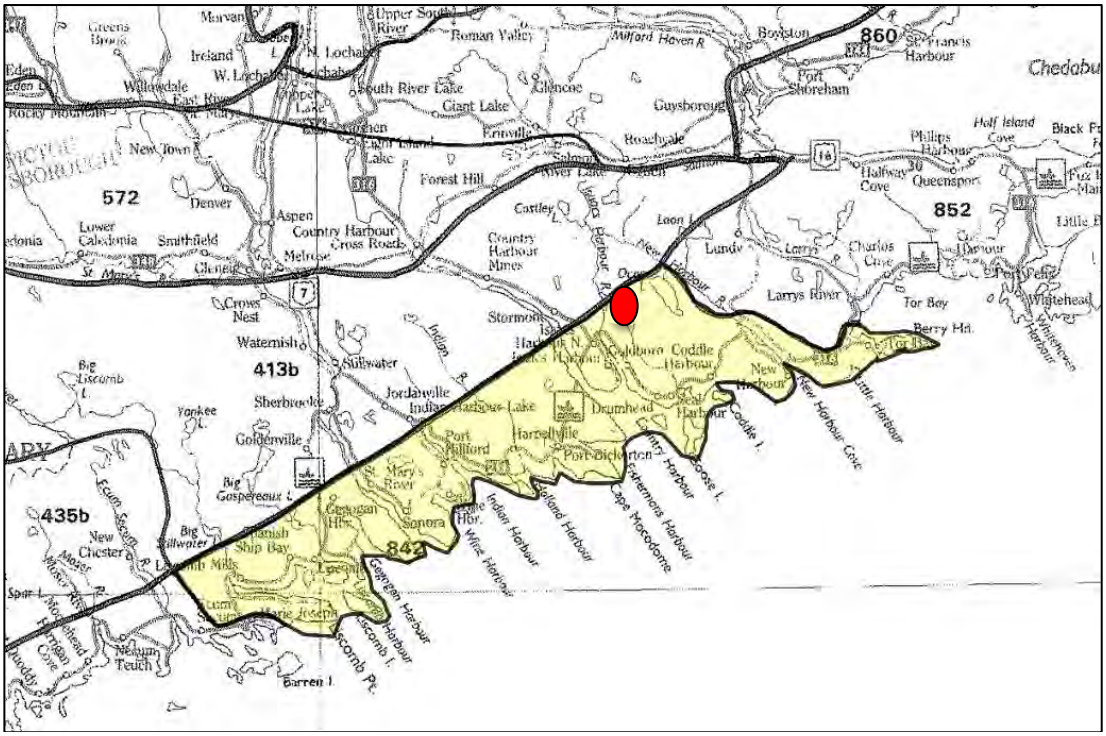

Figure 2.1-1: Natural Theme Regions of Nova Scotia, showing region #842 (highlighted) – Guysborough Harbour Unit.[3] The approximate location of the study area is marked in red.

[1] Keppie 2000.
[2] Davis and Browne 1996, 207–8
[3] Adapted from Davis and Browne, 1996.

Lakes in this unit tend to be oligotrophic meaning they contain relatively few plant nutrients but are high in oxygen at their depths. There are a few small freshwater wetlands and tidal marshes and some eel grass beds can be found. In better-drained areas, forests are predominantly softwood consisting of White Spruce, Balsam Fir, maple and birch. On wetter soils, Black Spruce, larch, and Balsam Fir predominate. Huckleberry is common on the barren and semi-barren areas. Peat bogs are also present in this area.[4] Within the study area, the surficial geology is generally a stony, sandy quartzite glacial till, with pockets of bogs, fens, and swamps containing soils like sphagnum moss, peat, gyttja, and clay. [5]

The study area also borders the Guysborough sub-Unit of the Quartzite Barrens. This unit is characterized by a bedrock-dominated topography of "ridge-swamp-swale", particularly in areas of thin glacial till. This unit has contained the most productive areas for gold mining. Some areas contain exposed bedrock, scraped of till by glacial ice. Areas of barrens are dominated by shrubs, with scattered trees present depending on soil and drainage conditions, including White Birch, Red Maple, aspen, Black Spruce and White Pine. Aside from glacial lakes, scattered bogs and swamps are present, including raised bogs associated with flat fens. Slow moving streams are surrounded by swampy areas with Balsam Fir, Red Maple, and Black Spruce.[6]

Of note in relation to the area's palaeoecology is the presence of several eskers, such as one near the northwest edge of TMF4, as well as evidence of ice rafting along the shoreline, both revealed by LiDAR imagery (Figure 2.1-2). The ice rafting is not as consistent as that found on the northwest shore of Gold Brook Lake during the 2020 assessment, nor as that found along the west shore of Ocean Lake in 2021, which seems to suggest that the predominant wind pushing the ice in the winter comes from the east.

[4] Davis and Browne 1996, 207–8
[5] Davis and Browne 1996, 207–8
[6] Davis and Browne 1996, 56–7

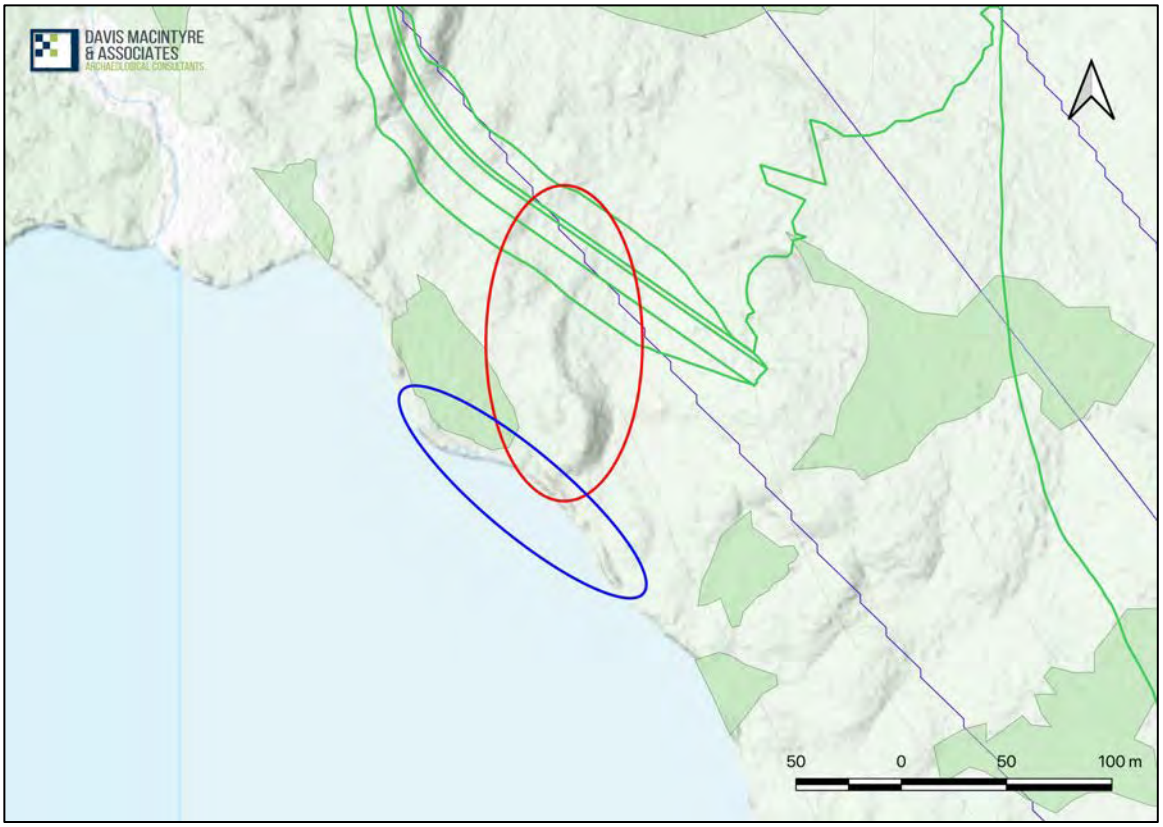

Figure 2.1-2: A curving esker (red) and signs of berms from ice rafting (blue) at the northeastern edge of Gold Brook Lake, showing the edge of the revised TMF4 in bright green.

3.0 METHODOLOGY

In 2017 and 2019, a total of 145 hectares was previously assessed (see HRP A2017NS043 and A2019NS102 reports), with an additional 370 hectares assessed in 2020 (HRP A2020NS126). These previous assessments included a historic background study and a reconnaissance. The results of these three prior assessments flagged a total of eight areas of low to moderate potential for precontact archaeological resources, as well as a historic mill, four cellars, and other signs of historic mining activity.

The 2021 assessment included an updated historic background study conducted in May and June 2021. Historic maps and manuscripts and published literature were consulted from the Nova Scotia Archives. It should be noted that the desktop research was conducted during the COVID-19 pandemic and, therefore, access to resources was limited. The Maritime Archaeological Resource Inventory, a database of known archaeological resources in the Maritime region, was searched in an effort to understand prior archaeological research and known archaeological resources neighbouring the study area. Staff at the Archaeology Research Division of Kwilmu'kw Maw-klusuaqn (KMKNO-ARD) were contacted as part of this assessment in order to

elicit information regarding past and traditional land use in the study area. Finally, a field reconnaissance of the study area was conducted. Approximately 795ha of additional area was assessed during the 2021 survey.

3.1 Maritime Archaeological Resource Inventory

The Maritime Archaeological Resource Inventory, a database of known archaeological sites in the Maritime Provinces, was consulted in September 2019, and again in November 2020, and June 2021. A total of 4 registered archaeological sites have been recorded within a 10-kilometre radius of the study area, which encompasses Goldboro, Isaac's Harbour and Country Harbour. Two of these sites represent Indigenous cultural heritage with one dating to the precontact period. Two sites are related to nineteenth and twentieth century use and occupation of the land. The lack of archaeological data for the area likely reflects a lack of extensive archaeological survey rather than an absence of archaeological sites. This is compounded by poor site preservation and visibility due to rapidly rising sea levels over the last several thousand years.

3.2 Historic Background in Brief

3.2.1 L'nuk Settlement During the Precontact and Historic Periods

Spatially and geographically, L'nuk land use throughout Mi'kma'ki is not considered in the same sense that European occupation is recorded in historic times. Colonialism has had a significant impact on Mi'kmaw lifeways but prior to European contact, the Mi'kmaq and their ancestors had a very dynamic relationship with the land which was reflected in their language, legends, songs, dances and oral tradition. The landscape was viewed as "sentient, ever-changing, and in a continual process of becoming".[7] Therefore, the euro-centric view of the land as discrete and definitive land parcels does not reflect the Mi'kmaw world view and references to site-specific pre-contact land use from the first-hand perspective of the Mi'kmaq (through oral tradition) are difficult to ascertain. However, historic references by Europeans do exist and Mi'kmaw land use and occupation is reflected in the archaeological record.

Nova Scotia has been home to the Mi'kmaq and their ancestors for at least 11,500 years. A legacy of experience built over millennia shaped cultural beliefs and practices, creating an intimate relationship between populations and the land itself. The complexity of this history, culturally and ecologically, is still being explored.

[7] Sable and Bernard Francis 2012, 18

Mi'kma'ki or Megumaage, which included all of Nova Scotia including Cape Breton, Prince Edward Island, New Brunswick (north of the Saint John River), the Gaspé region of Quebec, part of Maine and southwestern Newfoundland, has been the home of the Mi'kmaq and their ancestors for thousands of years. The study area is located within the Mi'kmaw territory known as Eskikewa'kik meaning "skin-dresser's territory."[8] Canoe and pedestrian footpaths, known today and likely in the past as well, connected coastal locations to the interior. The inlets, harbours, and river valleys of the Eastern Shore and Chedabuctou Bay allowed fluid movement between resource rich areas where shelter and resources were seasonally available.[9] A Mi'kmaw winter travel route, when rivers and lakes were frozen, is recorded between New Harbour and Isaac's Harbour, while through the nearby Salmon River Estuary one could travel along a number of connected travel routes to Antigonish Harbour, Country Harbour River, the St. Mary's River, Pictou Harbour and even as far as the Minas Basin.[10]

Several Mi'kmaq place names are known for landmarks within a 10-kilometre radius of the study area, which contain information useful for fishing and travel by water. The area surrounding Isaac's Harbour was known as Anakwe'katik; "at the flounder place". Nearby Country Harbour was called Mulapukwek or "gullied and deep place", Country Harbour Head, Wi'sikk "shaped like a beaver's den" and Holland Harbour was known as Wskitiamka'taqnek "where canoes are carried across the sandbar".[11]

Twentieth century historic sources detail Isaac's Harbour as home to at least two Mi'kmaq encampments prior to the arrival of European settlers in the vicinity of Goldboro. One is located at School House Brook, which is believed to be a burial ground, and the other at the head of Isaac's Harbour.[12] It is possible, however, that these encampments may reflect later 19th century encampments as well.[13] From these locations, the Mi'kmaw were able to fish the coastal and interior waterways, which also served as passage to interior headwater lakes and hunting territories. Locals have also indicated the possibility of a third encampment at Webb's Cove.

Mi'kmaw continued to live around Isaac's Harbour following European contact. Historic sources indicate that Country Harbour was a winter encampment for Etienne Jeannot, chief of the Unama'ki Mi'kmaq. In the autumn of 1753, he left his canoe at Canso and travelled with three other families to *Macodome* (Country Harbour).[14] This indicates that not only was this area an important winter hunting territory, but also that, at least in the eighteenth century, Mi'kmaq living around the study area had close ties to Cape Breton.

[8] Confederacy of Mainland Mi'kmaq 2007, 11
[9] Lewis 2006
[10] Membertou Geomatics Solutions 2017, 28
[11] Ta'n Weji-sqalia'tiek – Mi'kmaw Place Names URL
[12] Cooke 1976, 7
[13] Membertou Geomatics Solutions 2017, 34
[14] M de La Serelle a Raymond 1973 in Wicken 1994, 74

The Archaeological Research Division at Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO-ARD) was contacted on 16 November 2020 to inquire whether traditional Mi'kmaw land use is known in or near the 2020 study area. Additionally, Paq'tnkek Mi'kmaq Nation were also contacted on 16 November 2020 but no response has yet been received. A response from KMKNO-ARD was received on 3 December 2020 during a previous archaeological assessment for the Goldboro mine. While traditional use information is confidential it has been used to support the assessment of archaeological potential within the study, KMKNO-ARD did note the presence of one precontact Mi'kmaq site, ***BhCj-01***, within 5 kilometres of the study area.[15]

KMKNO also shared historical references to Mi'kmaw occupation, mainly related to Isaac's Harbour. When Isaac Webb arrived in Isaac's Harbour in 1817, he found Mi'kmaq living in the area[16] and by 1830, Webb and the local Mi'kmaq were the only residents of the harbour.[17] An 1872 report by the local Indian Agent, Rev. Thomkins, noted that there was one family residing within his parish but that more were present in the winter, and that local Mi'kmaq had complained of not receiving their usual share of blankets for the past two winters.[18] In that same year, Angus Cameron wrote that Mi'kmaq were present in Isaac's Harbour.[19] Finally, KMKNO noted that several mentions of Mi'kmaw occupation of the harbour and inland lakes were present in Cooke's 1976 *History and Stories of Isaac's Harbour and Goldboro*, as noted elsewhere in this section.

KMKNO was contacted on 30 April 2021 to inquire whether any additional information was on file regarding the expanded study area. As of the completion of this interim report, no additional response has been received.

3.2.2 European Contact and Settlement

In the seventeenth century, Isaac's Harbour was known to the French as Raspberry Harbour. After 1720, its name was changed to Port Hinchingbrook by the English, named after Viscount Hinchingbrook, Earl of Sandwich.[20] There is no documented European settlement in Port Hitchingbrook prior to 1817.

In 1784, disbanded members of the King's Rangers from the Carolinas settled at Country Harbour to the west. In 1817, the homes and buildings of these settlers were destroyed in the "August Gale" and many abandoned the settlement, moving further inland or returning to the United States. One Black Loyalist settler, Isaac Web, found himself

[15] Ta'n Weji-sqalia'tiek – Mi'kmaw Place Names URL
[16] Cooke 1976, 9
[17] Vincent 1886, 16–7
[18] Library and Archives Canada 1872b
[19] Library and Archives Canada 1872a
[20] Eastern Chronicle 1905; Cooke 1976

abandoned by his master and decided to move his family to the east side of Port Hinchingbrook which was unsettled save for a few Mi'kmaw encampments. Webb built a large white farmhouse and it is said that his family was "industrious and saving and soon were in prosperous circumstances."[21]

The name of Port Hinchingbrook was again changed after 1830 when some fishermen from the western end of the province were caught in a storm returning from Labrador. They took shelter in Port Hinchingbrook and there they met Isaac Webb who, as the story is often told, welcomed and provided hospitality for anyone in need or want of it.[22] The following spring, these fishermen and their families, along with settlers from Shelburne County and several remaining families of the King's Rangers from Country Harbour began moving to Port Hinchingbrook. The majority of them, it seems, settled on the west side of the harbour. The community became known as Isaac's Harbour after the hospitable pioneer the settlers found there. Several families of the Black Loyalists settled around what is now Webb's Cove. Among them were the Webbs, of course, along with the Clykes, Harrigans, and Parises. Most of the early Black Loyalists were fisherman.[23]

On March 11, 1898 Isaac's Harbour East was renamed "Goldboro" by an act of Legislature, due to the discovery of gold in the mid-nineteenth century.[24] This gold was first found in veins of quartz on the west side of Issacs Harbour's anticline on 14 September, 1861 by amateur prospector Joseph Hines. It was discovered a short time later on the east side of the harbour by two indigenous individuals, on what became known as the Mulgrave lead. By 1862, several leads had been discovered and were in operation throughout the district including the Mulgrave and Victoria leads in Goldboro. On the Mulgrave lead, 15 shafts were sunk varying from 15 to 60 feet in depth. The Mulgrave lead continued to be mine at varying rates and under various management firms well into the twentieth century.[25]

In 1892, Howard Richardson was the first to record the occurrence of gold in the slate belt found within the study area. Later that year, Richardson would develop this belt with the Richardson Mining Company. This belt would be named after its founder.[26] The Richardson Gold Mine went into operation in 1893 and was at full capacity in 1896. Ore grades averaged 0.38 ounces of gold per short ton, a gold recovery of 50%-60%. In 1897, three additional shafts were created to recover ore that was located at a depth of 60 meters. By the turn of the century, the main shaft was at a depth of 160 meters, and selective mining facilitated the need for two Wilfley concentrators. By 1901, yield was so

[21] Hart 1975, 153
[22] Cooke 1976, 9; Jost n.d., 86; MacMillian n.d., 98
[23] Cooke 1976, 9–10; Nova Scotia Archives n.d.
[24] Nova Scotia Archives 1898
[25] Malcolm 1912, 97–9
[26] Bourgoin 2004, 11

great that two more Wilfley tables were employed and a vertical mine shaft was sunk a year later.[27]

The East Goldbrook mine, located on the eastern side of Gold Brook Lake, opened with the sinking of its first shaft in 1907.[28]

Gold mining at the southern end of Gold Brook Lake appears to have continued sporadically into the 1930s, though subsurface work was limited. However, little ore was recovered, and work was eventually abandoned. During the 1980's further exploratory drilling into the Boston-Richardson belt was conducted by Patino Mines Ltd. Several other firms from then on had attempted to reproduce the earlier success of this belt through into the 1990's, even refurbishing the mineshaft, with little success turning these explorations into full operations.[29]

Historic maps reveal little about the settlement history of the study area, land not having been granted by the province until the nineteenth century. The 1776 Atlantic Neptune does not show any settlement on Isaac's Harbour (Port Hinchingbrook). Nor does the 1834 Great Map of Nova Scotia, although the main road along the shore is shown. Ambrose F. Church's map of Isaac's Harbour, published in 1876, shows no roads present to the south of Gold Brook Lake (former Seal Harbour Big Lake/ Upper Seal Harbour Lake) suggesting there was little to no historic settlement in the area previous to mining explorations during the late 19th century. Geological Survey maps from 1893 detail the extent of mining operations at the southern outlet of Gold Brook Lake and show a few woods roads connecting Ocean Lake and Long Lake to New Harbour to the east, suggesting logging operations may have been present, however no settlement or development is shown north of this location (Figure 3.2-1).

[27] Bourgoin 2004, 11
[28] Cooke 1976, 160
[29] Bourgoin 2004, 13

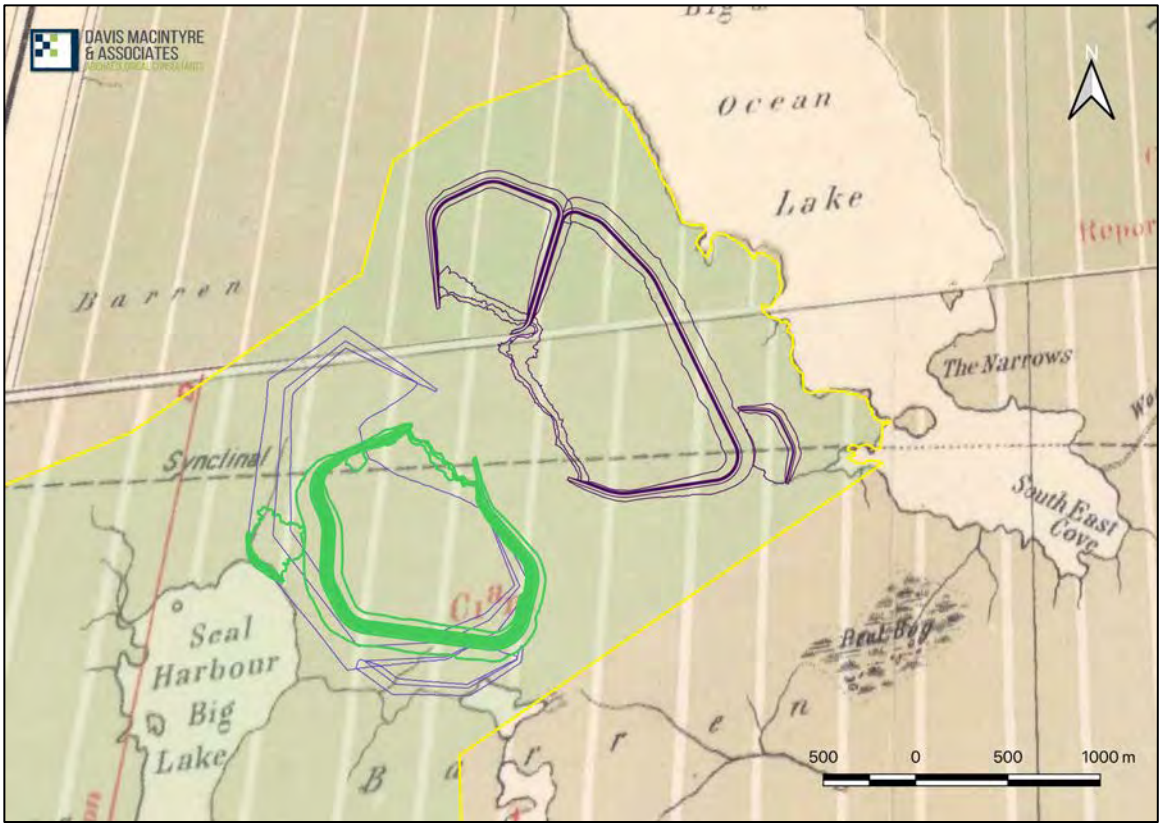

Figure 3.2-1: The current TMF4 study area (green) and earlier incarnations of TMF 4 and 5 (purple) overlaid on a georeferenced copy of two adjoining 1893 Geological Survey of Canada maps, showing no indications of cultural activity within the TMF footprints at this time.

Limited twentieth century aerial photography was reviewed for this interim report. The imagery revealed an absence of roads or trails visible from the air in 1939, and some limited road development by 1991, as well as evidence of two cleared roadside spaces which were revealed during the reconnaissance to be probable quarries or borrow-pits that appear to have been abandoned after short-term use (Figures 3.2-2 through 3.2-5). Both are still visible in LiDAR imagery, though they are now mostly covered by forest.

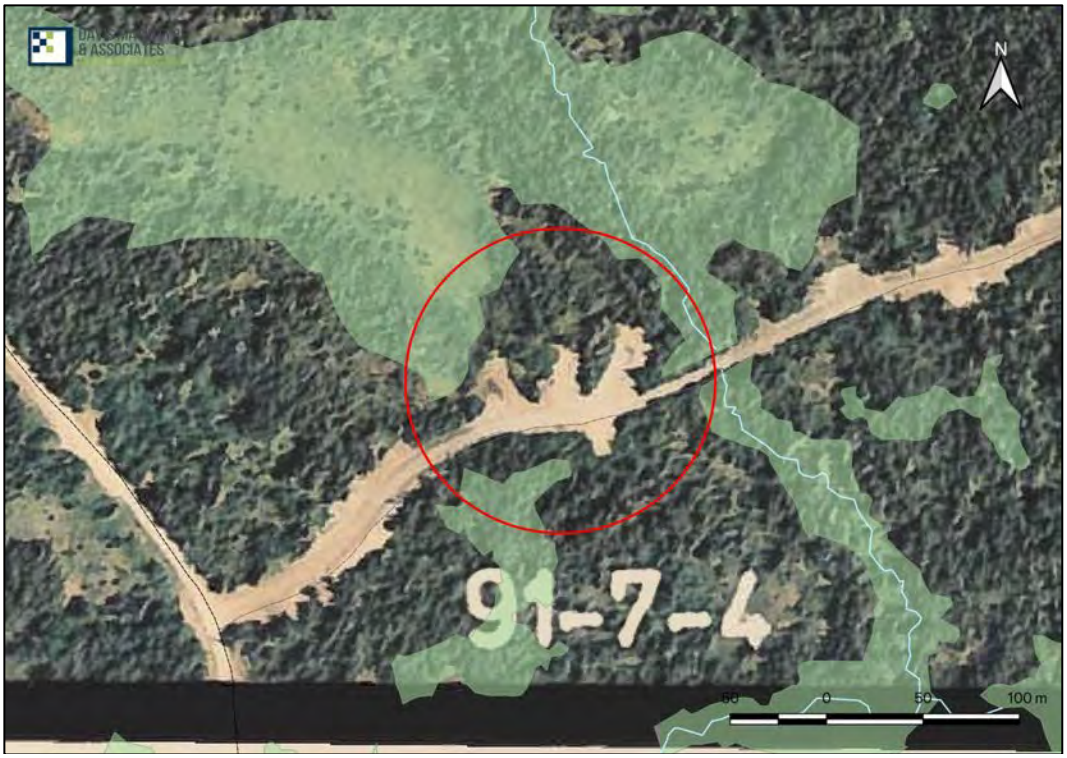

Figure 3.2-2: Georeferenced 1991 aerial photography (with overlaid wetland and road data) showing signs of borrow-pit or exploratory digging (red).

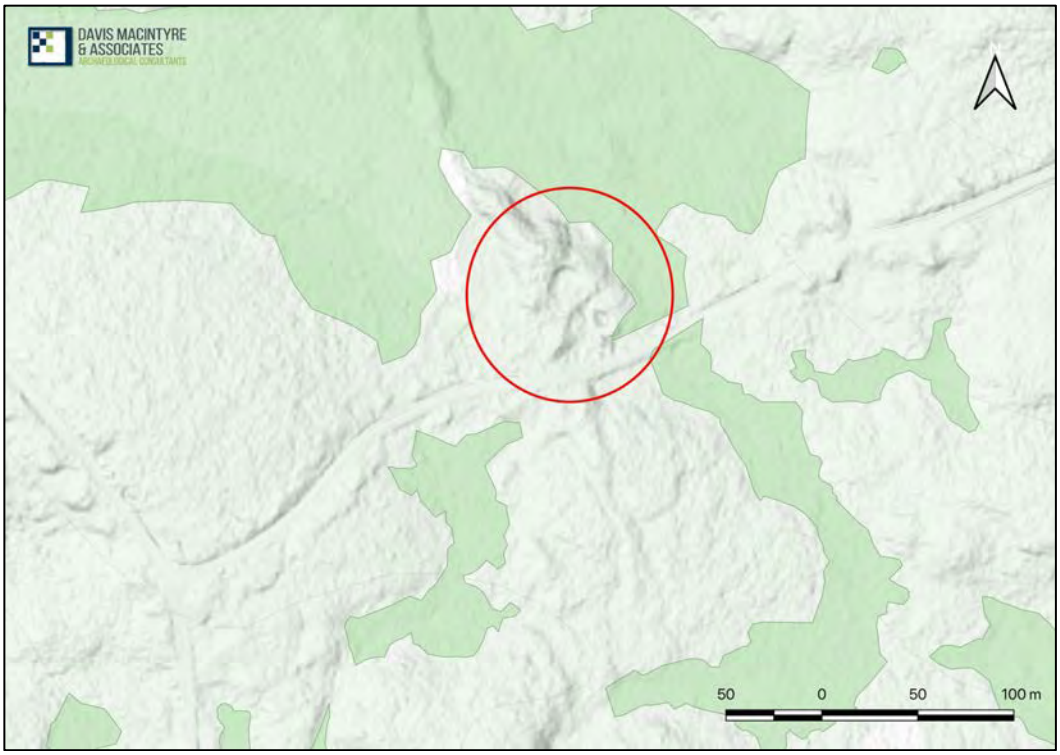

Figure 3.2-: The same area as the previous figure, shown in recent LiDAR imagery, revealing two broad holes or depressions.

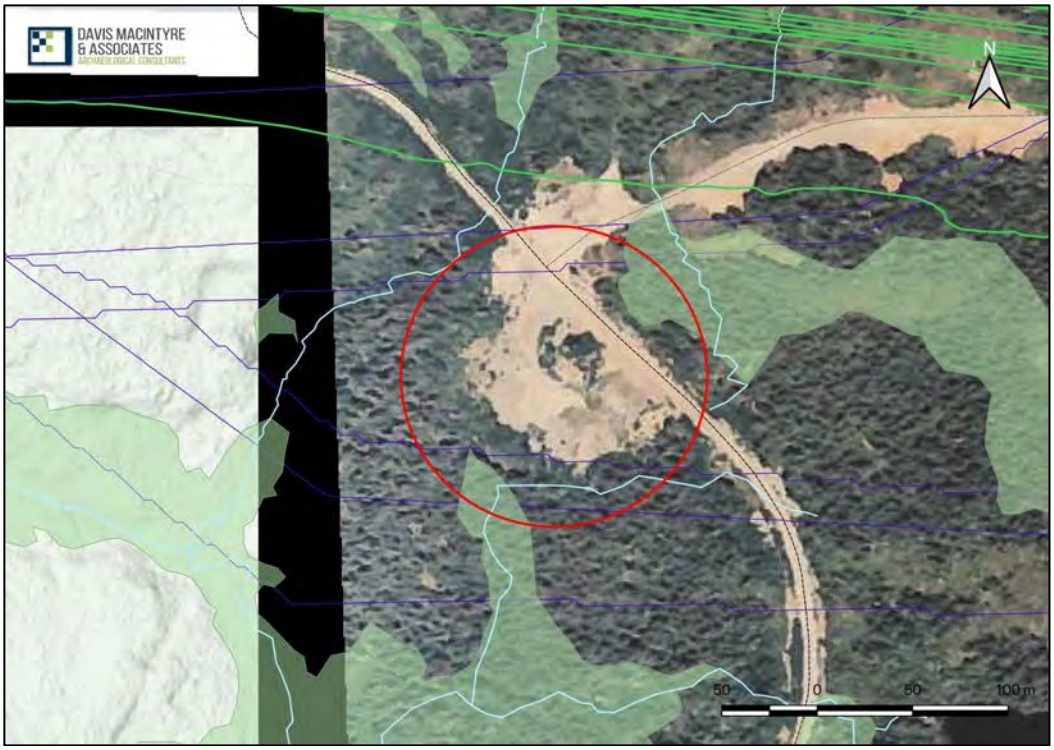

Figure 3.2-3: Georeferenced 1991 aerial photography (with overlaid wetland, TMF, and road data) showing signs of quarry (red).

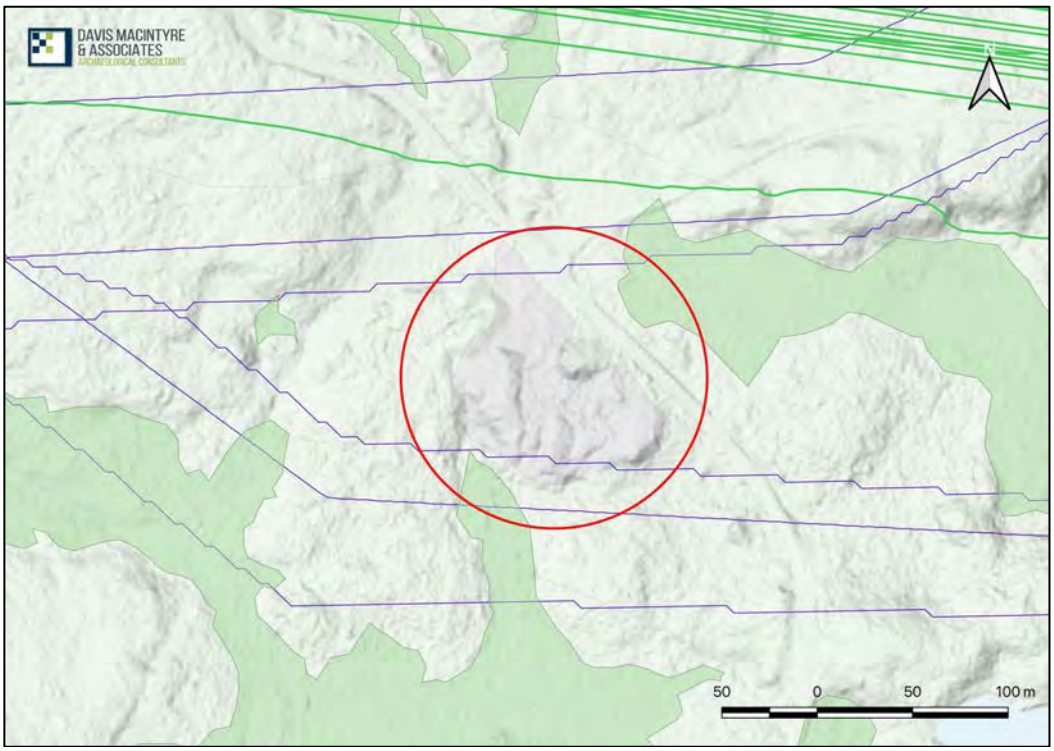

Figure 3.2-4: The same area as the previous figure, shown in recent LiDAR imagery, revealing altered topography due to resource extraction.

3.3 Predictive Modelling

Predicting the occurrence of L'nuk heritage resources during the Late Pleistocene to the Holocene is a difficult task. Understanding localized geomorphological factors that created this rapidly evolving landscape and how it may have been utilized by the ancestors is paramount for the prediction of site occurrence. Often, face value modern visual interpretations of these landscapes are not sufficient. This may lead to unintentionally overlooked resources for this vast time period.[30] Human movement is seldom tied solely to resource collection and to the ease of passage between resource collection areas. Exchange networks, familial histories, traditions, and ceremonial practices are important factors to consider when seeking the relationships of past peoples and a given landscape.[31] This difficulty in predicting landscape use is compounded by the lack of geomorphological and archaeological research conducted in a localized scope. Historic anthropogenic landscape alterations further complicate desktop models. However, broader regional trends may offer insight into how the landscape may have been utilized, thus, predicting the occurrence of previously unknown resources with greater accuracy and efficiency.

The earliest known occupation of the Maritime Peninsula roughly overlaps with the Late Pleistocene Younger Dryas cooling event that occurred from ~11,000 BP to 10,000 BP. During this time glaciers occupying highland areas throughout the province reactivated (See Section 2.1). The Guysborough County area during this time experienced significant glacial activity. The lack of ice marginal features in this area is believed to be proof of a largely stagnant ice sheet with its margins located eastward offshore. The coastal at this time sat at approximately -65 m from modern sea levels. Rapid sediment deposition from glacial activity may have made many lakes and streams near this sheet in Guysborough abiotic.[32] Due to this ice cover and late glacial activity, the Guysborough area may have been largely inaccessible and had been an unproductive region for Paleo substance. This may explain, in part, the lack of archaeological evidence of Paleo peoples occupying this region.

Predictive modeling for the early Holocene Archaic Period inland presents a unique set of challenges for archaeologist. Over this approximately 3,000-year period post deglaciation, riverine systems and ocean shorelines experienced a series of dramatic changes influenced by numerous factors including localized isostatic rebound, lake formation and collapse, changes in relative sea levels, and rapid sediment depositions.[33] Recent studies, following examples from Northern Maine suggest that during the period between 9,000 BP and 7,000 BP, river systems were largely unstable. Often, inland archaeological sites from this period are masked by deep aggraded deposits of alluvium.

[30] Suttie et al. 2007
[31] Lacroix 2015, 31
[32] Stea and R.J. Mott 1989
[33] Murphy 1998, 93

The small fraction of isolated finds representing this time period are likely "dislodged" by a multitude of natural and unnatural disturbances.[34] By 6,000 BP, sea levels had largely stabilized, rising approximately 0.36 m/100 years.[35] By 5,000 to 4,000 BP, the lake and river systems in Nova Scotia largely stabilized coinciding with the later half of the Late Archaic Period.[36] At 3,000 BP, the Halifax Harbour had resembled it current conditions with its shoreline residing less than 5 m from its modern levels.[37]

Woodland to Historic period occupation sites along the river systems and coastlines of Nova Scotia are largely predictable owing, in part, to river stabilization and the slow and the predictable sea level rise of this period. The increasing pace of 20th and 21st century sea level rise has also left near coastal sites from this period vulnerable to rapid erosion. Sea level rise and increasing storm severity will undoubtedly affect upstream watercourse alignments and sediment depositions, especially in low lying areas, in the years to come.

Understanding the geomorphological changes of individual river systems and shorelines is paramount in the prediction L'nuk heritage resource potential, however this is often limited to the amount of prior geological and archaeological research. Historic alterations can further complicate these interpretations. Ground-truthed archeological potential buffers can be used to highlight areas for further examination when previous research is unavailable. Following the model required to be used for archaeological consulting by New Brunswick Archaeological Services[38] (developed from the Sevogle River Test Plot), a 50-metre high and an 80-metre medium L'nuk archaeological potential buffer was created for the study area using the Nova Scotia Topographic DataBase - Water Features layer (Figure 3.3-1).

A further analysis of the 5 sites attributed to L'nuk activity recorded to date in within 20 km of the study area revealed that 3 of these sites lie within these buffers (or within a 10-meter grace given for pre-GPS coordinate recording errors).

[34] Murphy 1998, 93
[35] Baechler 2017, 394
[36] Shaw et al. 2002, 143
[37] Fader and Miller 2008
[38] Archaeological Services 2012

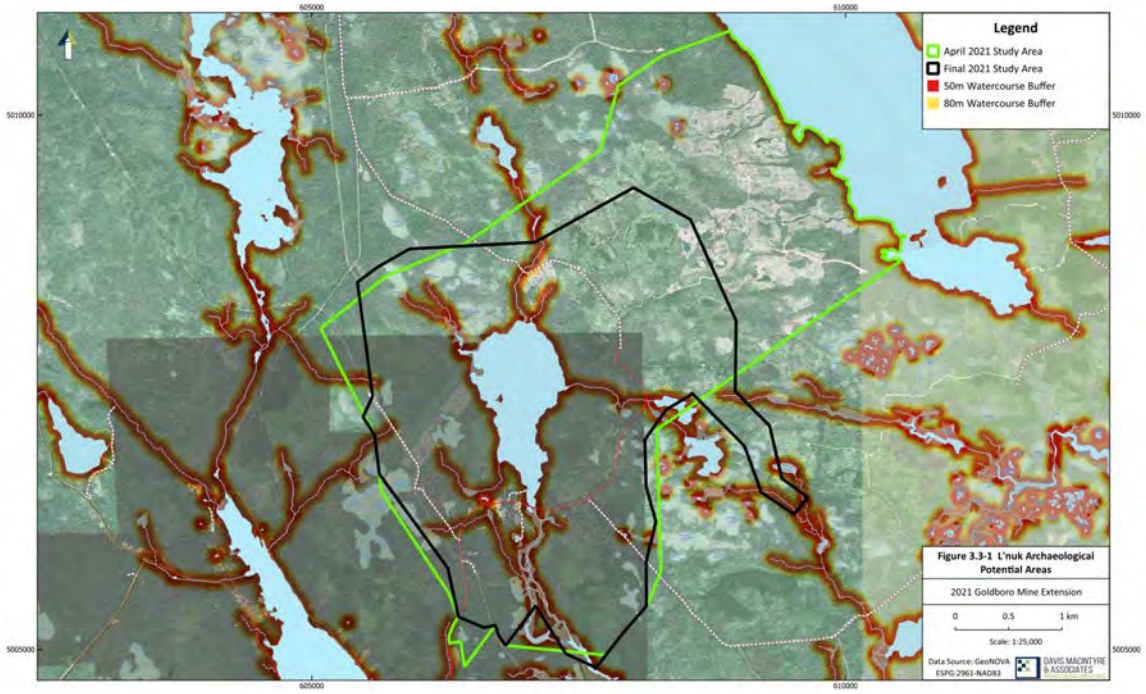

Figure 3.3-1: L'nuk predictive modeling for high and moderate potential activity buffers for the Goldboro Mine study area.

3.4 Field Reconnaissance

A field reconnaissance was conducted in May and June 2021 by an archaeological team that varied from two to four people, depending upon availability. Hand-held GPS units were utilized to guide transects and to collect track log data. In general, transects were spaced approximately 30m apart, with particular attention paid to areas most likely to contain elevated potential such as lakeshores and stream banks. In some areas, open bogs and wetlands were avoided, and account for a few gaps in the track log mapping. Findings and coverage are illustrated on Figures 3.4-1 through 3.4-3.

In many regions, wetlands had been delineated by McCallum Environmental Limited, though not all wetlands had yet been delineated by the time of the reconnaissance and map generation. There was also a high amount of variability in the condition of the wetlands; some were easily traversed, while others had to be skirted due to unstable ground, or could be assessed at a glance as they were open and level floating bogs.

Extremely difficult terrain has been created by areas of sharp hummocks and a combination of dense but patchy vegetation, including areas of blown-down mature trees, black spruce and tamarack swamps and shrubland in broad swales, open areas of recent logging (sometimes with regrowth of young spruce), and rhodora-dominated

barrens or heathlands. As such, the field team members were sometimes forced to zig-zag or skirt impassable areas while maintaining the straightest overall lines possible. Frequent signs of bear dens in isolated areas of more mature and open forest also necessitated short diversions from straight transects to avoid animal encounters.

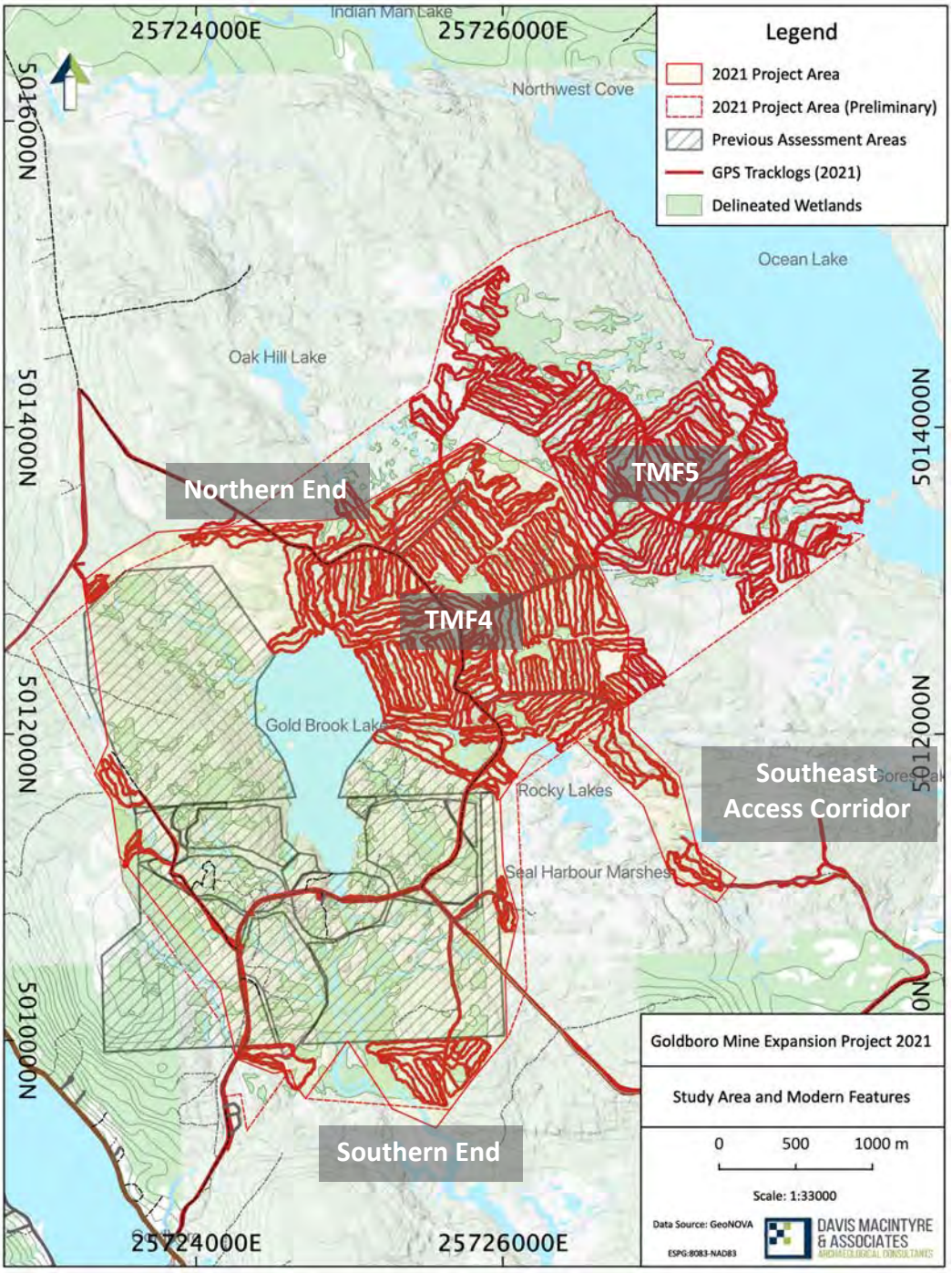

Figure 3.4-1: A map showing all tracklogs collected in 2021. Note that some areas were excluded when the study area was altered in May/June 2021, while other areas represent open wetlands that had not been fully delineated at the time of receipt of the GIS data.

Figure 3.4-2: A map showing modern features identified during the 2021 reconnaissance.

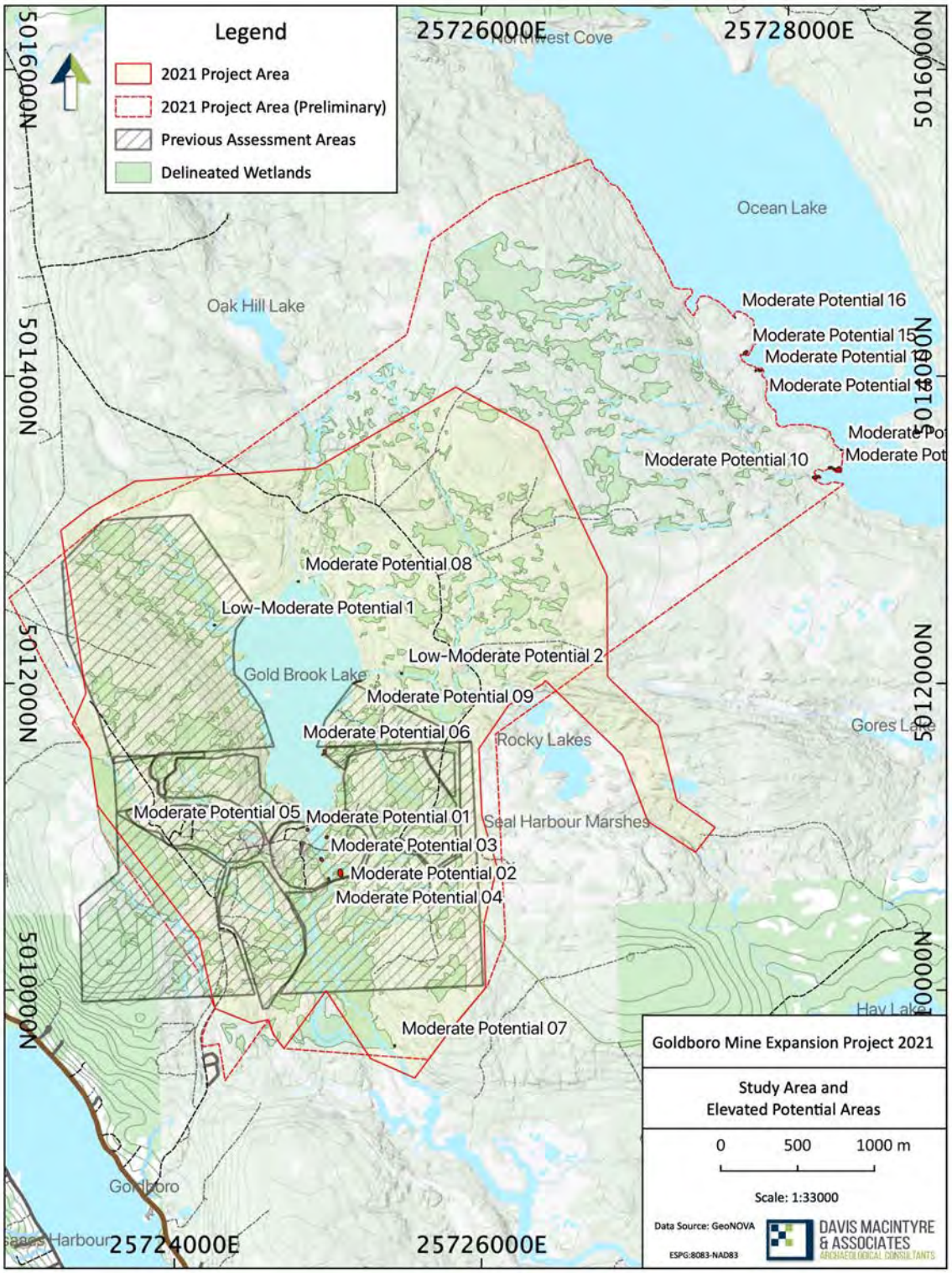

Figure 3.4-3: A map summarizing areas of elevated potential within the study area. Detailed maps of the newly identified areas follow below.

TMF4 Area (as reported in the previous interim report)

At the northern end of TMF4, the team encountered recently harvested forest regrowing in spruce and chokeberry, the latter which was in bloom during the reconnaissance (Plate 1). The terrain was interspersed with broad swales that had been left unharvested, covered in black spruce scrub. One notable stretch of open, moderately mature forest was encountered just north of the edge of the current TMF4 boundary, dominated by spruce but also including some birch and maple (Plate 2).

An overgrown logging road diverges from the western branch of the main logging road in this area, angling northeast towards Ocean Lake. On the south side of this road, the landscape included short swaths of mature forest and broader areas of recently clearcut ground, as well as areas of rhodora barrens. A hunting blind was noted on the edge of the clearcut overlooking TMF4's northern-most tip (Plate 3) (20 T 607949 5008922). A few hundred metres southeast of this, a high ridge contained a swath of mature forest dominated by hardwood, with the most open understorey of the entire study area (Plate 4). Remnant logging roads suggest that the forest was harvested in the past, but the elevated and well-drained nature of the ridge and the duration since the last harvest has allowed for better regeneration than much of the study area.

The TMF4 area can be divided into three sections by existing, driveable wood roads, with a few other overgrown logging roads extending from these main routes. The main road cuts east and then north from the historic mining area at the southern outlet of Gold Brook Lake, entering the TMF4 footprint before bifurcating into two branches just south of a large open wetland. Southeast of the open wetland, a small patch of unusual topography was observed both on available LiDAR imagery and during the reconnaissance. The area appears to have been utilized as a quarry or possibly for some form of exploratory testing by mechanically digging several large holes (Plate 5). It does not appear to represent historic prospecting, and most likely served as a borrow-pit to supply gravel for the adjacent logging road.

The western portion of TMF4 consists of a long, mostly gentle slope between the main logging road and the western shore of Gold Brook Lake. Like much of the study area, it is predominantly comprised of black spruce swamp, shrubland, and swaths of recently clearcut land (sometimes with evidence of follow-up silviculture thinning), with a few patches of open wetland. Almost the entire lakeshore is shrubland, with large areas of wetland where shoreline ice rafting has created earthen berms to prevent surface water from draining directly into the lake. In some locations, a rocky beach is exposed below the ice rafting, but examination of these areas revealed nothing but very consistent local rock (Plate 6 and Plate 7). As noted above, a short length of esker is evident near the northwestern edge of TMF4 adjacent to the lake, though it does not appear to have been suitable for use as a travelling route or encampment area.

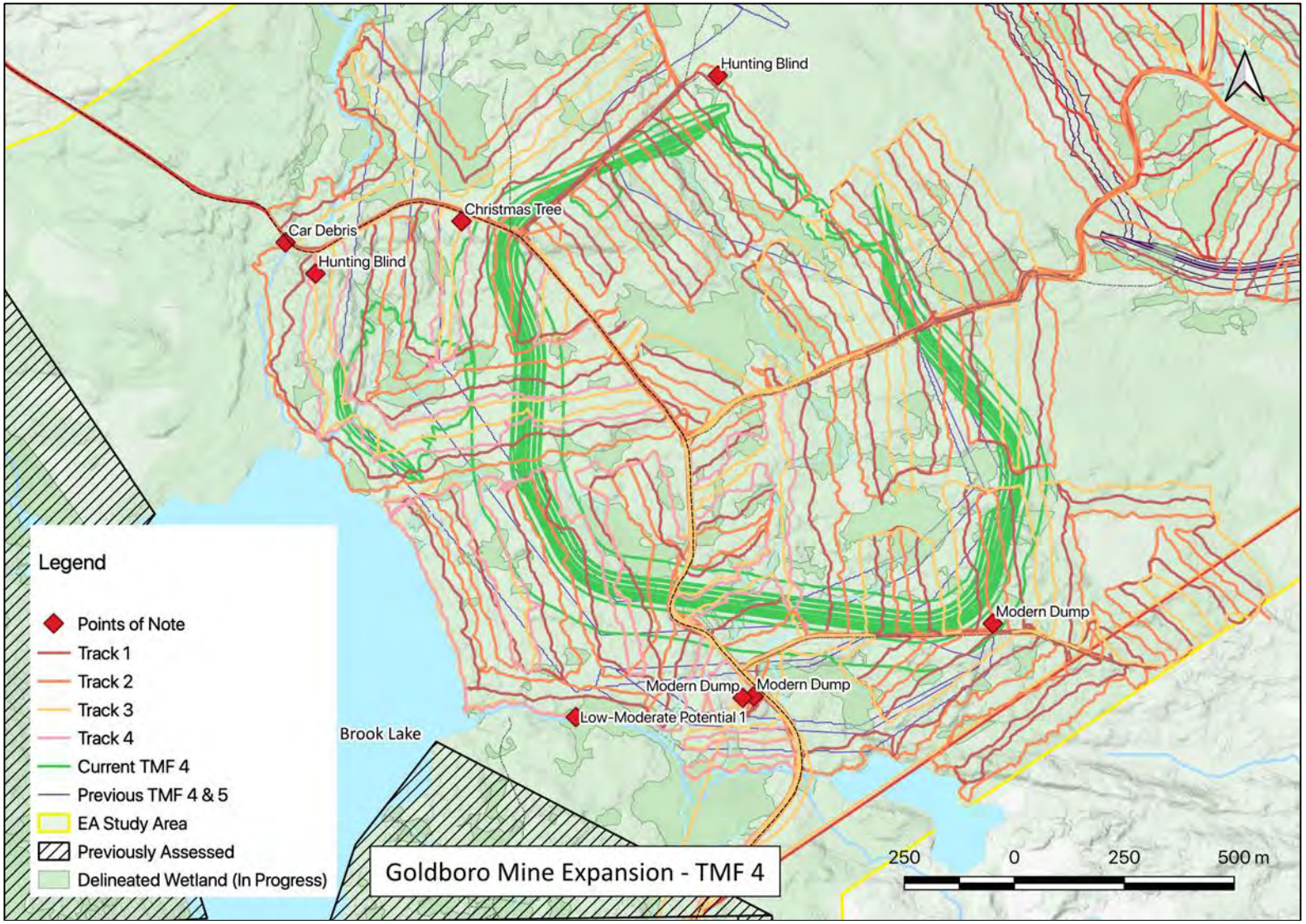

Figure 3.4-4: A map showing track log data and points of interest within and immediately surrounding the revised TMF4.

The area between the main logging road and Gold Brook Lake also included three instances of cultural activity (aside from logging activity): a discarded artificial Christmas tree below the logging road (Plate 8) (20 T 607367 5008590), an area of car debris and other garbage also adjacent to the logging road (Plate 9) (20 T 606967 5008542), and the remains of a hunting blind in an area of clear-cut, on a bluff overlooking the lower ground leading towards the lake (Plate 10) (20 T 607035 5008471).

Just beyond the southern extent of TMF4 is a stream running between Rocky Lakes (to the east) and Gold Brook Lake. While most of the stream's course is bounded by wetland, one small area of drier, somewhat level ground was observed, more suitable for encampment than any other area observed during the TMF4 survey. This area, approximately 15m by 15m, has been designated as Low-Moderate Potential 2 (Low-Moderate 1 being designated in 2020 on the west side of Gold Brook Lake) (20 T 607627 5007463) (Plate 11).

East of Low-Moderate Potential 2, a former quarry site is present adjacent to the main woods road, easily distinguishable from its surroundings as it is covered in moderately mature spruce and hardwood, while the surrounding landscape has been recently logged and is re-growing in sparse spruce saplings. The area includes clear ridges and trenches from mechanical quarrying (Plate 12), as well as a large quantity of mid-twentieth century garbage including car parts, appliances, and some household garbage (Plate 13) (20 T 608031 5007511).

Finally, the landscape at the southeast extents of TMF4 and between TMF4 and the currently-understood EA boundary included several large areas of open bog and wetland (Plate 14), large swaths of shrubland (Plate 15), land that had been clear-cut and was re-growing with spruce or exhibited signs of silviculture, and a few locations where mature spruce and limited hardwood remained (Plate 16), where evidence of springtime bear activity such as turned-over moss was present (Plate 17). The slope towards Rocky Lakes at the southern extents of the surveyed area was particularly notable for areas of heavy wind damage and windthrown trees (Plate 18). The occasional glacial erratic was also observed in this general area (Plate 19), and a twentieth century dump of modern garbage was observed next to an overgrown logging road (Plate 20) (20 T 608031 5007511).

Just south of the TMF4 area is another area of elevated potential (Moderate Potential 9) on the shore of Gold Brook Lake, where a long level terrace wraps around a point jutting out into the lake (Plate 21).

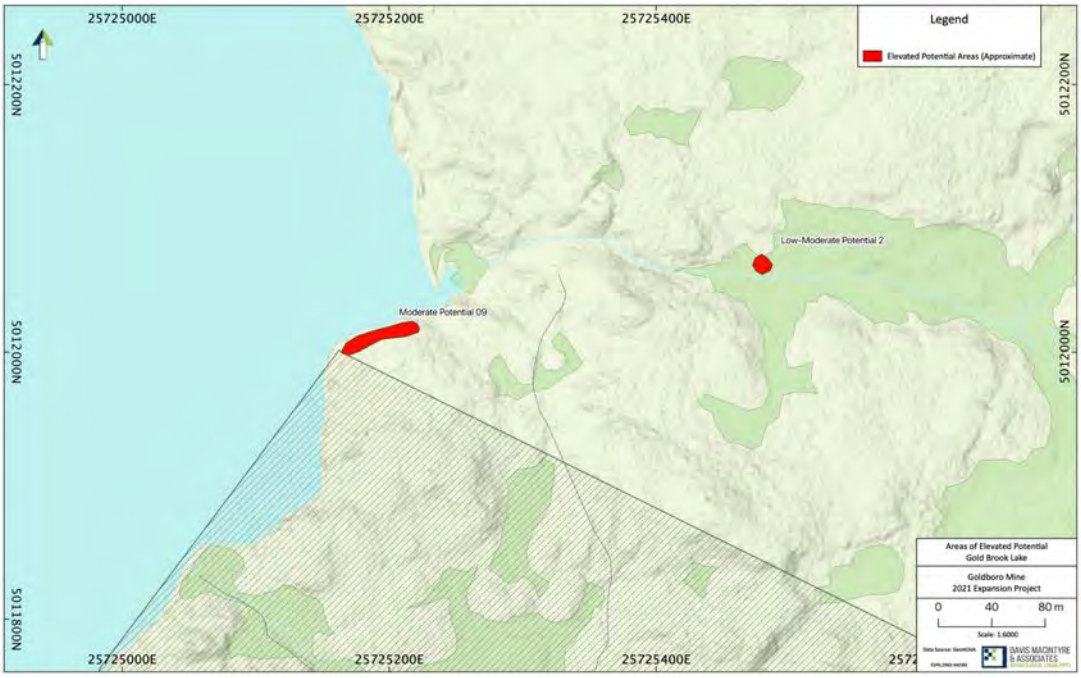

Figure 3.4-5: Two areas of elevated potential along Gold Brook Lake, at the south end of TMF4.

TMF5 Area, to Ocean Lake

Like the TMF4 area, this portion of the study area encompassed a variety of vegetation types, from recently logged to mature forest to wetlands. On the whole, the area slopes steadily to Ocean Lake, which comprises a separate watershed from Gold Brook Lake to the west, draining into New Harbour rather than Isaac's Harbour. Broad swaths of open wetland are present near the north and south ends of the area, on the more level ground between here and TMF4. Signs of springtime bear activity, such as ground scratched and grubbed at in large patches, were observed throughout.

A total of four hunting blinds in various states of repair were encountered in this area, disbursed surprisingly evenly across the space. The oldest included only a degrading tarp and fragments of rotten plywood (Plate 22), while others in various states of abandonment included a tree platform (
Plate 23 and Plate 24),

Aside from logging and these hunting blinds, the only evidence of cultural activity was an isolated cottage and dock fronting on Ocean Lake, which was noted by the field crew from the opposite side of a large cove (Plate 25), but was not investigated closely as the

study area was altered before the crew reached this area. There are no signs of a road or track used to access the cottage from the existing road system used during the reconnaissance; instead it appears likely that the cottage was built by bringing materials over water from access roads ending at the south end of Ocean Lake, well outside of the study area.

At the shore of Ocean Lake, significant ice rafting has created tall continuous berms along most of the shoreline, typically 2-3m wide at the base, 1m wide at the top, and 1-2m in height, though larger and smaller sections were sometimes observed. The mounded earth was also broken at intervals by the outflows of streams from the land above, though in many areas the intact berms acted as dams, creating a rim of wetland along the shoreline, unable to drain into the lake.

One particularly notable esker is present winding down into the lake, though due to uneven topography and dense vegetation cover, it was not readily visible to the field team during the reconnaissance, except at the shoreline where trees gave way to smaller bushes that densely cover the formation.

Of primary interest in the TMF5 / Ocean Lake area are seven areas of elevated archaeological potential for L'nuk archaeological resources, all along the shoreline of Ocean Lake. Two (Moderate Potential 10 and 11) are at the foot of the above-mentioned esker (Plate 26 and Plate 27), while the remaining five (Moderate Potential 12 through 16) (Plate 28 and Plate 29) are at locations where the ground is suitably level, dry, and accessible to create enticing locations for encampment. All except #12 are also located in proximity to stream outflows into the lake.

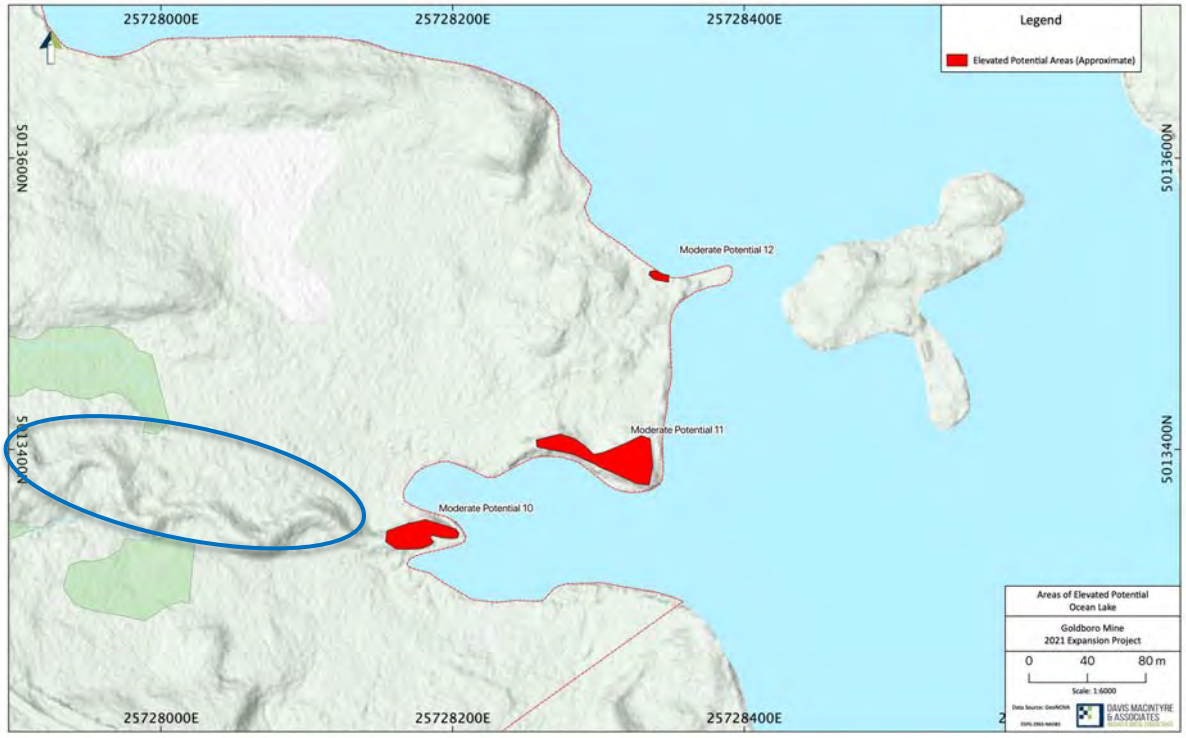

Figure 3.4-6: A map showing Moderate Potential areas 10, 11, and 12, as well as the esker formation revealed by LiDAR data (blue).

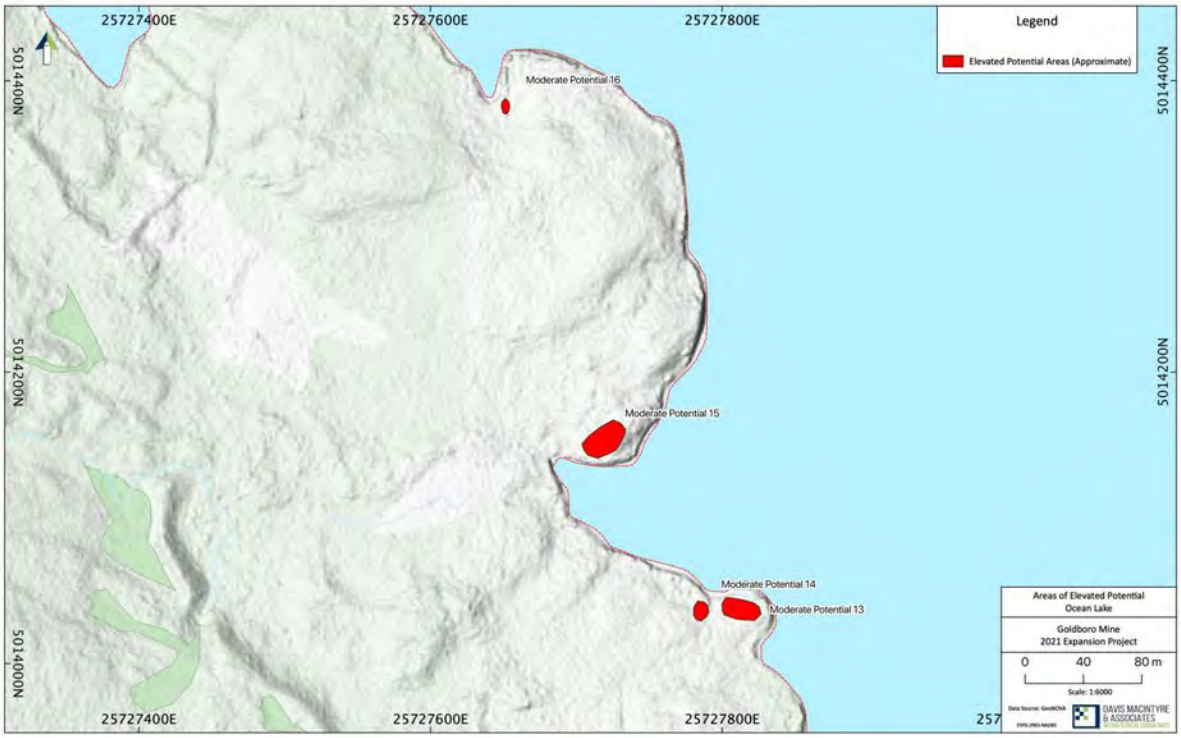

Figure 3.4-7: A map showing Moderate Potential 13 through 16 on Ocean Lake.

Southeast Access Corridor

Extending southeast from the TMF4 area is a broad proposed access corridor that is being considered for future use, connecting to existing woods roads that extend down towards Seal Harbour. The middle portion of this corridor is a broad band of the Seal Harbour Marshes, which broaden to the west and separate the historic Boston-Richardson mining area from the southern end of the proposed corridor.

The northern portion of the corridor was accessed from the north, and was found to traverse a series of dramatic up-and-down sweeps in the natural terrain, punctuated by low, wet areas in between the rises, which are covered on their sides with blown-down trees and on their tops with lower, scrubbier vegetation. Several probable bear dens were noted from a distance and skirted during the survey. The team's progress southward was interrupted by the Seal Harbour Marshes (Plate 30), and the reconnaissance doubled back to the north rather than extend all the way through the corridor.

The southern portion of the corridor was accessed by following a series of derelict logging roads to circumnavigate the Seal Harbour Marshes, moving south-east-north and then following an overgrown road on foot into the study area. The topography was found to be heavily undulating, and had experienced recent logging activity. A small unnamed body of open water is present on the east side of the corridor (Plate 31). The reconnaissance again doubled back when the southern edge of the Seal Harbour Marshes was encountered (Plate 32).

North End of Gold Brook Lake

Like many of the other portions of the study area, this section featured dense forest growth (Plate 33), heavy blowdown along the stream draining from wetlands to the north into Gold Brook Lake, and large areas of clear-cut forest. Bear activity was particularly abundant along the shallow ravine through which the stream flows into the lake; in several cases freshly disturbed vegetation and soil led the team members to believe they were travelling only a few minutes behind one or more foraging bears. The team also encountered a territorial osprey, whose nest was located in a lone tree standing on a clear-cut ridge.

A broad area of this section was found to be open wetland at the western extents, near the edge of the area assessed in 2020. The surrounding forest had been recently harvested in the north, but left relatively untouched in the south.

At the outlet of the previously mentioned stream flowing into Gold Brook Lake, a very small area of moderate potential (Moderate Potential 8) was identified (Plate 34 and

Plate 35). Though much of the lakeshore in this area is low and wet (Plate 36), this location is a small dry plateau that overlooks the water.

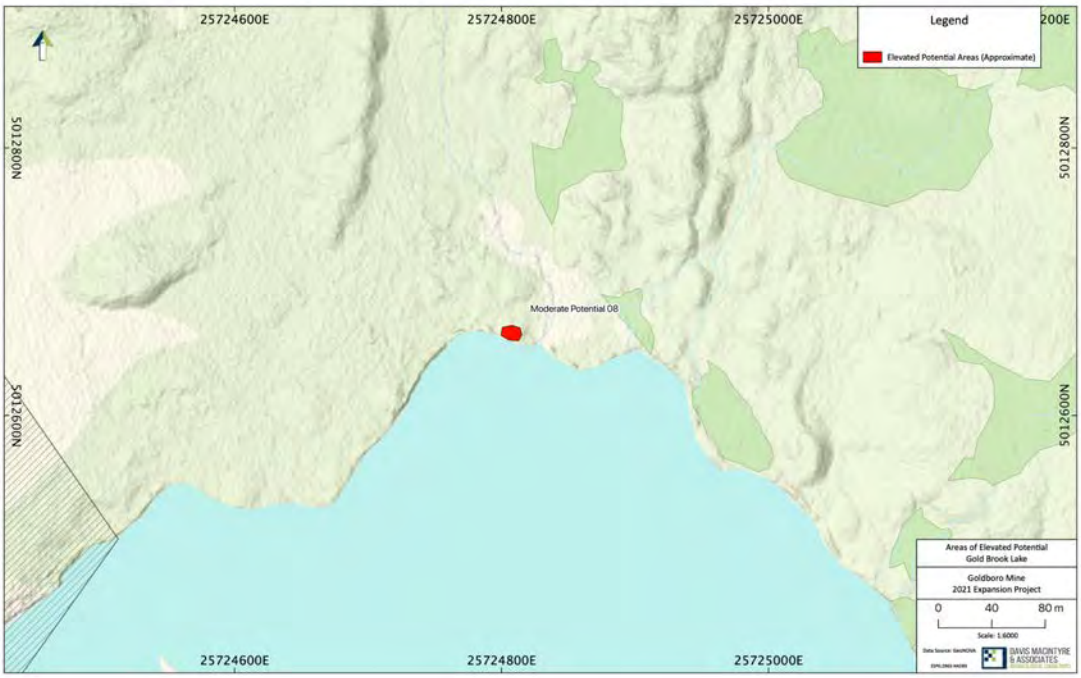

Figure 3.4-8: A map showing Moderate Potential 8 at the outlet of a brook into Gold Brook Lake.

Southern End – Gold Brook

At the southern-most tip of the study area, a small expansion from the previous assessments has been created on either side of Gold Brook below its outfall from the lake.

Gold Brook itself shows abundant signs of historic tailings deposits along its banks throughout the new portion of the study area, where a grey to tan sand forms broad flat stretches with extremely limited vegetation growth (Plate 37 and Plate 38). The complete absence of these sands in other portions of the study area makes it very clear that this material is the pulverized rock discarded from the stamp mill at the lake outlet, washing continuously downstream and seemingly inhibiting plant growth (Plate 39). One small area of elevated potential (Moderate Potential 7) was encountered on the brook bank, in the wooded uplands above the tailings flats (Plate 40). Though it is now positioned approximately 40m from Gold Brook, prior to the tailings being deposited it was likely positioned much closer to the water. The remainder of the brook bank above the tailings is either low and wet, or part of a steep slope leading upwards to the east.

Above the brook to the east, the team encountered a broad area of young spruce regrowth over a combination of harvested and blown-down older trees. The resulting downed and half-rotten logs, completely hidden by spruce boughs at waist- to head-height above, proved to be perhaps the most physically challenging vegetation conditions yet encountered by the DM&A team in Nova Scotia (Plate 41). Aside from several overgrown logging roads, no signs of cultural activity or areas of elevated potential were identified.

On the west side of Gold Brook in this southern area, terrain and ground cover was very different. The area is low, wet, and relatively level, with broad areas of scrub-covered wetland, frequent signs of twentieth century logging on drier stretches, and little else of note. The western bank of Gold Brook appears to be low and wet for a long stretch inland.

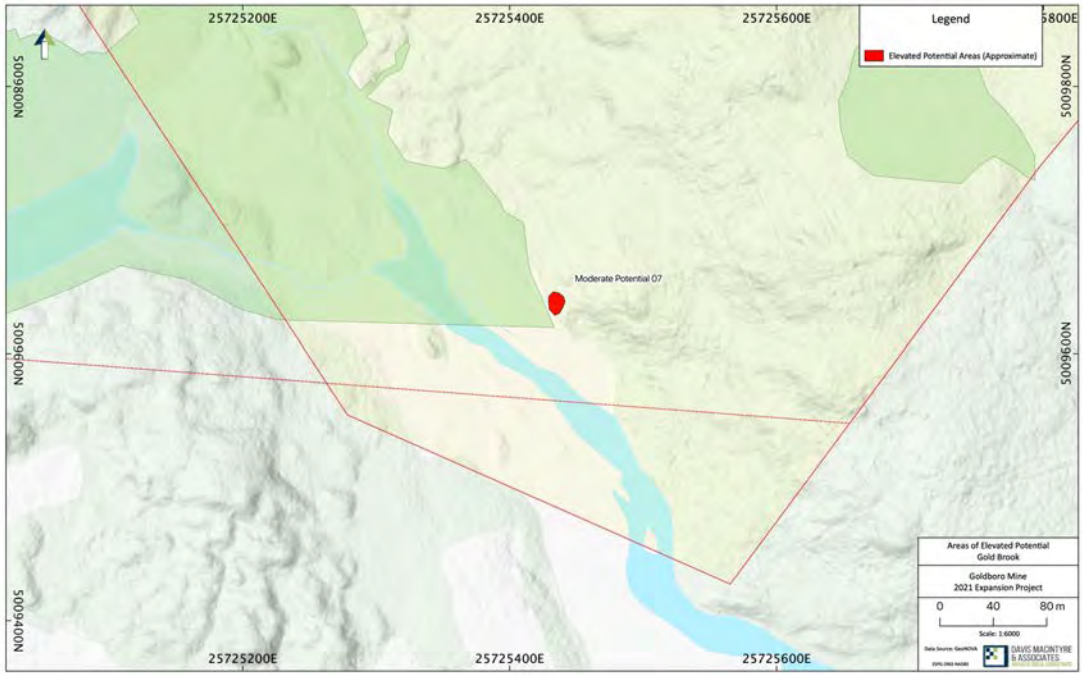

Figure 3.4-9: A map showing Moderate Potential 7 on Gold Brook.

4.0 RESULTS AND DISCUSSION

In all, the 2021 study area can be characterized as a landscape that shows cultural activity almost exclusively in the form of logging and silviculture, with very limited modern hunting (only seven hunting blinds, most if not all appearing abandoned), likely due to the density of the forest inhibiting movement and occupation by large mammals such as deer and bear, except in select areas. Two areas of late twentieth century quarry or borrow-pit activity were observed, and evidence of domestic garbage dumping is

present along most of the woods roads where a vehicle can or could once be driven to allow for illegal dumping.

Despite a long frontage on Gold Brook Lake, there were only two locations encountered during the 2021 survey that appeared suitable for L'nuk encampment, one along the brook that joins Rocky Lakes to Gold Brook Lake (Low-Moderate Potential 2) and another where a brook flows into the lake at its northern end (Moderate Potential 8). All other Gold Lake shorelines tended to be either very wet, or inhospitable for access due to high ice rafting and dense brush cover, or all of the above, with inland areas being inaccessible due to dense shrubland, even in areas that have not been altered by twentieth century logging.

One area of elevated potential was identified along Gold Brook below the lake (Moderate Potential 7). The remainder of the shoreline is predominantly low and wet, and much of the brook's banks are also lined with historic stamp mill tailings.

Seven areas of elevated potential were identified along Ocean Lake (Moderate Potential 10 through 16), with the remainder of the shoreline being low and wet due to a combination of low topography and ice drafting creating natural dams along much of the shoreline. It is probable that additional areas of elevated potential exist to the northwest along the Ocean Lake shore, but this area was not covered on foot as the study area was altered before the reconnaissance could be completed in that area.

Table 1: Summary of elevated potential areas at the Goldboro Mine site.

Area Name	Coordinates	Approximate Size
Moderate Potential 1 (2017)	20 T 607121 5006408	20m x 20m
Moderate Potential 2 (2017)	20 T 607205 5006192	30m x 60m
Moderate Potential 3 (2017)	20 T 607085 5006269	20m x 30m
Moderate Potential 4 (2017)	20 T 607127 5006140	15m x 20m
Moderate Potential 5 (2017)	20 T 607002 5006464	20m x 20m
Moderate Potential 6 (2019)	20 T 607115 5006959	40m x 15m
Moderate Potential 7	20 T 607537 5005041	10m x 20m
Moderate Potential 8	20 T 606967 6008073	10m x 15m
Moderate Potential 9	20 T 607340 5007418	60m x 10m
Moderate Potential 10	20 T 610345 5008691	50m x 20m
Moderate Potential 11	20 T 610469 5008741	80m x 30m
Moderate Potential 12	20 T 610513 5008865	15m x 5m
Moderate Potential 13	20 T 609995 5009392	30m x 15m
Moderate Potential 14	20 T 609967 5009392	10m x 15m
Moderate Potential 15	20 T 609903 5009510	30m x 20m
Moderate Potential 16	20 T 609840 5009740	5m x 10m
Low-Moderate Potential 1 (2020)	20 T 606416 5007799	10m x 20m
Low-Moderate Potential 2	20 T 607627 5007465	15m x 15m

5.0 RECOMMENDATIONS AND CONCLUSIONS

The entirety of the 2021 Environmental Assessment Study Area, as it has been depicted in mapping above, has now been assessed for its potential for archaeological resources.

Based on the results of the 2021 reconnaissance, most of the study area has been evaluated to be of low potential for archaeological resources related to occupation by the Mi'kmaq and their ancestors. The general Proposed Goldboro Mine Project Area includes a registered archaeological site, BhDj-2, related to historic mining activity which includes cellars and a mill site. All archaeological sites (including known and unknown sites) are protected through the Special Places Protection Act from disturbance, unless it is conducted under the supervision of a qualified archaeologist working under a Heritage Research Permit issued by the Department of Communities, Culture, Tourism & Heritage. Some cultural activity (logging, hunting blinds, and quarrying) has been documented in the 2021, but all of these features noted within the new 2021 study area have been evaluated to be of low significance, and therefore, there are no further recommendations for these features.

It is recommended that prior to ground disturbance of any kind, any areas of elevated potential identified above should be subjected to a programme of limited shovel testing prior to clearing, grubbing, or development, to determine the presence or absence of archaeological resources. It is our understanding that at least seven of these areas (Moderate Potential 10 through 16) are now beyond the development zone, but should this change to encompass the shore of Ocean Lake, these areas should be subjected to testing and the remainder of the lakeshore within any impact zone should be subjected to a reconnaissance.

It is also recommended that prior to any shovel testing activities, a robust project-specific health and safety plan be developed to ensure field safety. Many of the areas of elevated archaeological potential are located in close proximity to historic tailings deposits, which are known to contain high concentrations of arsenic and mercury. Arsenic occurs naturally in the rock, but is concentrated and made more accessible to organisms by the gold extraction process. Mercury has been used by historic mining companies, including the Boston-Richardson Company, to adhere to the gold in tailings for extraction, and the recovery process loses a certain amount of mercury into the tailings with each round of processing. Measures to protect field crew members from inhalation or skin absorption of these materials shall be necessary. Finally, although cyanide (known to have been used at the Boston-Richardson mine after the mercury process became obsolete) is known to dissipate in the environment relatively quickly in most instances, larger concentrations that may have been disposed of through burial pose a serious health and safety risk, as has been the case at the Cochrane Hill gold mine in recent decades. An emergency procedure for encountering undocumented cyanide containers should be included in the health and safety plan.

The recommendations of the 2017, 2019, and 2020 reports are also re-iterated – if any impact is planned for the areas of low-moderate or moderate potential identified during the 2017-2020 reconnaissances, they should first be subjected to shovel testing. Impact includes grubbing, clearing, excavation, construction of roads or drill pads, or other types of ground disturbance.

The recommendations of the 2017, 2019, and 2020 reports regarding historic archaeological resources, which have been approved by Communities, Culture and Heritage, still stand and are reiterated:

> The historic mill complex by Gold Brook Lake is the most notable archaeological feature within the study area. This large complex is obviously industrial in nature, and given the size and the known date range of the site, it is unlikely that archaeological testing in this location would be an efficient means of learning more about the site. As such, if soil disturbance – including mechanical clearing of the trees – is proposed within approximately 50m of the provided GPS coordinate for the site, it is required that an archaeologist be contracted to monitor mechanical ground disturbance to ensure that the site is properly mitigated. The same is true of the two stone ramps, which lie approximately 60m northwest of the mill's centre. At the ramp location, a buffer of only 10m is recommended, and if disturbance encroaches upon this buffer, archaeological monitoring is similarly required. The isolated iron object nearby is of unknown function and age. As such it has not been collected for curation, but it would be recommended that prior to ground disturbance this object be more closely examined and the Museum of Industry in Stellarton be consulted to determine if the object is desirable for curation.
>
> It is required that a 20m buffer zone be established around Cellar #1 and Cellar #2, both of which were confirmed as late nineteenth to early twentieth century archaeological features in 1988. If a buffer zone is not feasible, further archaeological testing and recording is recommended to collect valuable information about these features before they are destroyed. This would likely take the form of formal test units (50cm x 50cm) spaced closely around and inside the features, or a series of trench-like excavation units designed to cross-section the features.
>
> Cellars #3 and #4 are smaller and less distinct, and may represent outbuildings or other historic activity of lower significance. As such, archaeological testing at these two locations is recommended prior to ground disturbance within 20m of both features. If these areas will not be impacted by the development, then a 20m buffer would be sufficient to avoid disturbing any archaeological resources that they contain.

The artifact scatter identified near the former office site (gravel pad) does not appear to be associated with any intact archaeological feature. It is possible that a cellar or other feature once existed under the gravel pad, or that the area was simply a semi-modern dump area. As such, it is not currently a location of high concern. However, if during ground disturbance a large quantity of additional artifacts is encountered, it is required that ground disturbance activity cease and an archaeologist be contracted to assess and possibly monitor the area.

The two depressions of unknown function appear most likely to be related to mining activity, and as such it is unlikely that archaeological testing would be helpful in these locations. As such, it is required that if soil disturbance is likely to take place within 10m of these two depressions, and archaeologist should be contracted to monitor the disturbance and mitigate any significant archaeological resources.

The probable privy associated with Cellar #1 would similarly be unlikely to benefit from archaeological testing unless a test unit was placed directly inside it, which may be a difficult undertaking given the slope of the depression itself. It is therefore required that a 10m buffer be established around this feature, or if this is not possible, professional archaeological monitoring of ground disturbance at this location should be undertaken.

Furthermore, if the impact of the any planned current or future drilling or geotechnical testing (including any grubbing, clearing, excavation, access road construction, drill pad preparation, etc.) is anticipated to be located within the buffer zones outlined above of the archaeological features, it is recommended that monitoring of any ground disturbance activities is conducted by a qualified archaeologist. However, this assumes that the cellars themselves can be avoided. If the cellars or a 10m buffer around the outside edge of the cellars cannot be avoided, then as per the 2017 recommendations, they must be subjected to formal archaeological testing prior to any disturbance.

Finally, in the unlikely event that archaeological resources are encountered during ground disturbance activities, and an archaeologist is not already present, it is required that all activity cease and the Coordinator of Special Places be contacted (902-424-6475) regarding a suitable method of mitigation.

6.0 REFERENCES CITED

Archaeological Services. 2012. “Guidelines and Procedures for Conducting Professional Archaeological Assessments in New Brunswick.” . Archaeological Services, Heritage Branch, New Brunswick Department of Tourism, Heritage & Culture.

Baechler, F. 2017. “The Geology and Hydrogeology of Buried Bedrock Valley Aquifers on Cape Breton Island, Nova Scotia: An Overview.” *Atlantic Geology* (53):301–24.

Bourgoin, M. 2004. *Technical Report Goldboro Property*. Val D’or: MRB & Associates Mining Consultants.

Confederacy of Mainland Mi’kmaq. 2007. *Kekina’muek: Learning about the Mi’kmaq of Nova Scotia*. Truro: Eastern Woodland Print Communication.

Cooke, F. 1976. *History and Stories of Isaac’s Harbour and Goldboro*. Antigonish: Formac Publishing Company Limited.

Davis, D., and S. Browne. 1996. *Natural History of Nova Scotia, Volume II: Theme Regions*. Halifax: Nova Scotia Museum.

Eastern Chronicle. 1905. “An Old Name.” , October 10.

Fader, G.B., and R.O. Miller. 2008. *Surficial Geology, Halifax Harbour, Nova Scotia* Bulletin. Geological Survey of Canada.

Hart, H.C. 1975. *History of the County of Guysborough, Nova Scotia*. Ontario: Mika Publishing Company.

Jost, A.C. n.d. *Guysborough Sketches and Essays*. Kentville: Kentville Publishing Company.

Lacroix, D. 2015. “Mobility, Ceremonialism and Group Identity in Archaic Newfoundland.” Ph.D Thesis, Memorial University.

Lewis, R. 2006. “Pre-Contact Fish Weirs: A Case Study from Southwestern Nova Scotia.” MA Thesis, Memorial University.

Library and Archives Canada. 1872a. “Angus Cameron to John McKinnon.” . Library and Archives Canada.

———. 1872b. “Michael Thomkins to John McKinnon.” . Library and Archives Canada.

MacMillian, A.J. n.d. *The Pioneers and Descendants of Eastern Nova Scotia During the 1800s and Early 1900s.*

Malcolm, W. 1912. *Gold Fields of Nova Scotia*. Geological Survey of Canada. Ottawa: Queens Printer.

Membertou Geomatics Solutions. 2017. “Goldboro Project MEKS.” .

Murphy, B.M. 1998. “Researching the Early Holocene of the Maritime Provinces.” MA Thesis, Memorial University.

Nova Scotia Archives. 1898. *Statutes of Nova Scotia*. Nova Scotia Archives.

———. n.d. “Notes on the History of Isaac’s Harbour.” . MG100, Vol. 168. Nova Scotia Archives.

Sable, T. and Bernard Francis. 2012. *The Language of This Land: Mi’kma’ki*. Sydney: Cape Breton University Press.

Shaw, J., D. Piper J.W., and R.B. Taylor. 2002. “The Geology of the Bras d’Or Lakes, Nova Scotia.” *Geological Survey of Atlantic Canada* 42 (Part 1):127–47.

Stea, R.R. and R.J. Mott. 1989. “Deglaciation Environments and Evidence for Glaciers of Younger Dryas Age in Nova Scotia, Canada.” *Boreas* 18:169–87.

Suttie, B.D., Vincent Bourgeois, and Michael Nicholas. 2007. *Developing Localized Predictive Models for New Brunswick, Canada: The Sevogle River Test Plot*. Fredericton: Archaeology Services Unit, Heritage Branch, Department of Wellness, Culture and Sport.

Ta’n Weji-sqalia’tiek – Mi’kmaw Place Names. “Mi’kmaw Place Names Digital Atlas.” . https://placenames.mapdev.ca/.

Vincent, de P. 1886. *Memoir of Father Vincent de Paul* Translated by A.M. Pope. Charlottetown, PE: John Coombs.

Wicken, W.C. 1994. “Encounters with Tall Sails and Tall Tales: Mi’kmaq Society, 1500-1760.” Ph.D Thesis, McGill Unversity.

PLATES

Plate 1: The northern edge of TMF4, showing recently harvested forest regrowing in spruce and flowering chokeberry.

Plate 2: A swath of mature forest encountered at the northern extents to TMF4.

Plate 3: A large hunting blind observed near the northern tip of TMF4. (Inset: rolled plastic found nearby, presumably for sheltering or roofing the blind.)

Plate 4: Moderately mature open hardwood located near the northeastern end of TMF4.

Plate 5: One of the two shallow holes (likely borrow pits) observed north of the logging road within TMF4. Note that the camera has a flattening effect – the darker mossy area is approximately 1m lower than the surrounding landscape. Looking southwest.

Plate 6: The shore of Gold Brook Lake near the northern end of the TMF4 study area, showing a rocky beach and shrubland above.

Plate 7: The shore of Gold Brook Lake west of the middle of the TMF4, showing shrubland and a rocky shore.

Plate 8: A discarded artificial Christmas tree located near a main woods road in TMF4.

Plate 9: Car debris and other garbage near the main woods road at the northwest end of the TMF4 study area.

Plate 10: The remains of a hunting blind near the northwest corner of the TMF4 study area.

Plate 11: The Low-Moderate Potential 2 area, looking west, stream just out of frame to the left.

Plate 12: A rocky ridge left behind by quarrying activity beside the woods road, near the southwest corner of TMF4.

Plate 13: One of the multiple twentieth century garbage dumps in the old quarry west of the woods road, near the southwest corner of TMF4.

Plate 14: Open bog near the southeast end of the TMF4 study area. Note also the presence dense blackflies – two blurry objects in frame, right of centre.

Plate 15: Typical forest density in shrubland found throughout this region, in this case shown near the southeast end of TMF4. It is difficult to convey through photographs the extreme restriction of free movement for large animals, as well as humans, in this landscape.

Plate 16: One of the few moderately mature forests in the study area, near the southeast end of TMF4.

Plate 17: Evidence of bear activity (blue) in a somewhat mature portion of forest near the southeast end of TMF4, where large animals including bears can move more freely.

Plate 18: Heavy blowdown or windthrow on the steep slope down to the more northern of the two Rocky Lakes.

Plate 19: A notable glacial erratic observed near the southeast extent of TMF4.

Plate 20: A small garbage dump adjacent to a logging road at the southeastern end of TMF4.

Plate 21: Looking out (northwest) at Gold Brook Lake from Moderate Potential 9.

Plate 22: A small fragment of tarp and rotting plywood are all that remain of a probable hunting blind in a clearcut area overlooking Ocean Lake.

Plate 23: A hunting blind or tree stand in a recently clear-cut area overlooking Ocean Lake, looking north.

Plate 24: A hunting blind near the northern end of the study area, bordering several large open wetlands.

Plate 25: A cottage overlooking Ocean Lake, viewed from the south across a cove.

Plate 26: The top of the esker forming Moderate Potential 10, looking west/inland.

Plate 27: The top of the esker forming Moderate Potential 10, looking east into Ocean Lake.

Plate 28: Moderate Potential 15, densely covered in vegetation and blow-down, looking northeast from the shore.

Plate 29: Moderate Potential 16, looking south.

Plate 30: The view at the edge of the Seal Harbour Marshes from the northern side of the southeast access corridor. Additional open marsh exists beyond the narrow band of spruce trees in the distance.

Plate 31: An unnamed open water body on the east side of the southeast access corridor, looking north.

Plate 32: Looking north towards the Seal Harbour Marshes from the southern side of the southeast access corridor, in an area re-growing after clearcutting.

Plate 33: The mossy and wet understory along the stream flowing towards Gold Brook Lake from the north, looking south.

Plate 34: The shoreline of Gold Brook Lake at Moderate Potential 8, looking southeast.

Plate 35: A tree throw reveals extremely shallow soils near Moderate Potential 8 on the shore of Gold Brook Lake, looking northwest.

Plate 36: The low, wet shoreline of Gold Brook Lake at its northern end, looking north.

Plate 37: Large flat stretches of tailings deposits on Gold Brook, looking southwest.

Plate 38: Human and deer tracks in exposed tailings sand along Gold Brook.

Plate 39: Vegetation struggles to take root over tailings deposits along Gold Brook.

Plate 40: The treed area of Moderate Potential 7, looking west towards Gold Brook and the tailings flats below.

Plate 41: Dense spruce regrowth at the southern tip of the study area, looking west. In the distance, the most difficult terrain is visible, where spruce regrowth is shoulder or head-height and disguises downed logs and stumps below.

APPENDIX A: HERITAGE RESEARCH PERMIT

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:
A2021NS063

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

Surname de Boer	First Name Laura

Project Name
Anaconda (Goldboro) Mine Expansion 2021

Name of Organization Davis MacIntyre & Associates Limited

Representing (if applicable)
Anaconda Mining

Permit Start Date 3 May 2021	Permit End Date 30 September 2021

General Location:
Goldboro, Guysborough County

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)*

Gold Brook Lake and Ocean Lake and surrounds

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	Date 14 April 2021
Approved by Executive Director Digitally signed by Christopher Shore Date: 2021.04.26 17:14:40 -03'00'	Date April 26, 2021