ARCHAEOLOGICAL IMPACT ASSESSMENT – SUMMARY REPORT (PUBLIC VERSION)
Pioneer High Arctic Bundle Sites, Various Locations, Nunavut

Public Services and Procurement Canada

Permit Number: 2021-32A

Final Report

Prepared for:
Public Services and Procurement Canada
Western Region

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Executive Summary

This report is intended to represent a summary of the final Archaeological Impact Assessment Report prepared as required under the conditions of the Archaeological Permit. This summary report can be made public as it does not contain detailed archaeological site information. The complete confidential Archaeological Impact Assessment Report has been provided to the Department of Culture and Heritage, Government of Nunavut, as required, and the confidential report and data have been provided to the proponent for use in Project planning and design.

At the request of Public Services and Procurement Canada (PSPC), Stantec Consulting Ltd. (Stantec) conducted an Archaeological Impact Assessment (AIA) under Nunavut Archaeological Permit 2021-32A for the Pioneer High Arctic Bundle Sites at various contaminated site locations in Nunavut (the Project). The seven sites proposed for assessment in 2021 are located between 180 km and 580 km from Resolute Bay, Nunavut.

Stantec was contracted by Dillon Consulting Limited and Outcome Inc. in Joint Venture (Dillon-Outcome). Dillon-Outcome was contracted by PSPC on behalf of their client, Crown Indigenous Relationships and Northern Affairs Canada (CIRNAC) to carry out field investigations to conduct an environmental study on seven contaminated sites.

Although all seven sites were planned for assessment in 2021, access and logistical constraints for the two most northern locations (Kristoffer Bay and Cape Isachsen) resulted in these two locations being removed from the planned 2021 program prior to mobilization for the Project. In addition, during the field program access could not be obtained for Cape Ahnighito as the aircraft could not safety land at this location. As such, this location was also removed from the 2021 program. The remaining four locations were subject to assessment, and the results of the archaeological studies for these four locations are presented in this report, including Pioneer Island, Playfair Point, Stupart Island, and Skybattle Bay.

During the studies at these four locations, a larger area encompassing each contaminated site was subject to ground truthing relative to archaeology, including buffer areas to allow for use of peripheral areas for borrow material should future remediation activities require borrow material or burial of contaminated material. Shovel tests were not conducted at identified archaeological sites as the sites will be avoided, and thus impact from shovel testing was not warranted.

During the studies, three archaeological sites were newly identified near Northumberland Sound on Devon Island during a stop-over while waiting for weather to clear on Pioneer Island. Two previously recorded sites were also revisited visually from the air only on the Grinnell Peninsula of Devon Island. None of these sites are near the Project.

At the Project locations, a total of eight new archaeological sites were recorded, all at Pioneer Island. No archaeological sites were identified at Playfair Point, Stupart Island or Skybattle Bay.

At Pioneer Island, eight new archaeological sites were recorded during the archaeological assessment. One site is a historic aerial photo marker (RfLc-7) with low interpretive potential. The remaining sites are all prehistoric stone features with between one and five stone features present at each site. One site is a tent ring (RfLc-6) that may be associated with Independence I culture (which dates to 2000 – 1700 years BC), although this would need to be confirmed during further archaeological studies as no artifacts were observed during the current study. The remaining stone features recorded during the current study are generally of unknown function based on appearance. Each feature is represented by a collection of cobbles; some features are small and generally circular in shape, others are larger and more linear in shape. The features may represent different activities that could possibly be discerned if additional investigation such as archaeological excavation were to be undertaken. Some of the features are suggestive of caches where meat was stored, but they could also represent inuksuit or other feature types. No artifacts were identified at any of the sites, however, to indicate age, function, or cultural affiliation.

Ongoing avoidance of all features is recommended with the exception of RfLc-7, the historic aerial photo marker which has low interpretive value. Site locations and descriptions have been provided to PSPC and Dillon-Outcome to facilitate long-term avoidance of these archaeological features.

Archaeological studies are considered to be complete at Pioneer Island, Playfair Point, Stupart Island and Skybattle Bay, assuming ongoing avoidance of archaeological sites at Pioneer Island. Archaeological studies remain outstanding at the three Pioneer High Arctic Bundle Sites that were not accessed in 2021, including Cape Ahnighito, Kristoffer Bay and Cape Isachsen.

Study Limitations

This document was prepared by Stantec Consulting Ltd. at the request of the proponent relative to their obligations under the Nunavut Archaeological and Palaeontological Sites Regulations (Nunavut Government 2001). The material in it reflects Stantec's best judgment in light of the information available at the time of preparation. Any use that a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. Stantec is not responsible for any unauthorized use or modification of this document.

The findings of this study pertain only to the Project as outlined within this report. Any changes or additions to the Project must be reviewed in terms of archaeological concerns and the potential need for further assessment.

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1.0 INTRODUCTION

At the request of Public Services and Procurement Canada (PSPC), Stantec Consulting Ltd. (Stantec) conducted an Archaeological Impact Assessment (AIA) under Nunavut Archaeological Permit 2021-32A for the Pioneer High Arctic Bundle Sites at various contaminated site locations in Nunavut (the Project). Stantec was contracted by Dillon Consulting Limited and Outcome Inc. in Joint Venture (Dillon-Outcome). Dillon-Outcome was contracted by PSPC on behalf of their client, Crown Indigenous Relationships and Northern Affairs Canada (CIRNAC) to carry out field investigations to conduct an environmental study on seven contaminated sites located between 180km and 580km from Resolute Bay, Nunavut.

This report is intended to represent a summary of the final Archaeological Impact Assessment Report prepared as required under the conditions of the Archaeological Permit. This summary report can be made public as it does not contain detailed archaeological site information. The complete confidential Archaeological Impact Assessment Report has been provided to the Department of Culture and Heritage, Government of Nunavut, as required, and the confidential report and data have been provided to the proponent for use in Project planning and design.

1.1 PROJECT BACKGROUND

The Project Terms of Reference (TOR) requested assessment at seven contaminated sites; brief descriptions of each site are provided in Table 1-1 below (PSPC 2021), and the site locations are illustrated in Figure 1-1.

Table 1-1 Pioneer High Arctic Bundle Site Descriptions

Site	Identifier	Location	Brief Description from TOR
Pioneer Island	EK007 – Devon Island (West) and EK011 – Pioneer Island/Devon Island in the Northwest Territories/Nunavut contaminated site database	76º 57' 59.47" N latitude and 96º 58' 21.30" W longitude	Site includes an airstrip, approximately 25 drums scattered around the site (five full, four partially fully, six empty, and at least 10 of unknown condition and contents), minor amounts of metal and wood debris, and a burn pit.
Playfair Point	NB012 – Playfair Point in the Northwest Territories/Nunavut contaminated site database, southwest coast of Bathurst Island	75º 21' N latitude and 100º 43' W longitude	Site was used by the Canadian Wildlife Service (CWS) from 1989 to 1995 to support caribou research at the CWS Walker River Camp on the east side of Bathurst Island. During the aerial reconnaissance of the area by WESA in 2006, a small drum cache was observed.
Cape Ahnighito	NB048 in the Northwest Territories/Nunavut contaminated site database, northern tip of Lougheed Island	77º 43' 43.53" 3 N latitude and 106º 03' 59.92" W longitude	Site is a fuel cache site; it currently consists of three historical drum caches of approximately 85 drums (mostly empty, some partially full and some full), scattered drums, debris pits and significant amounts of scattered debris.

Table 1-1 Pioneer High Arctic Bundle Site Descriptions - continued

Site	Identifier	Location	Brief Description from TOR
Stupart Island	NB070 – Stupart Island in the Northwest Territories/Nunavut contaminated site database	77º 07' 53.71" N latitude and 104º 26' 32.32" W longitude	Site consists of the remains of an historic camp, including two old tent platforms, approximately 60 drums (mostly empty) piled in caches and scattered around the site, and several debris piles with evidence of burning.
Skybattle Bay	NB034 in the Northwest Territories/Nunavut contaminated site database, southwest portion of Lougheed Island	77º 14' 41.95" N latitude and 105º 07' 51.72" W longitude	Site is a former Panarctic Oils Ltd. site, where explorations for oil and gas reserves were carried out in the past. The site currently consists of two former exploration wells and an associated airstrip. There are three caches of over 100 drums (mostly empty) located at various points along the airstrip and a minimal amount of metal and wood debris scattered throughout the site. Some roadways and trails are visible and the airstrip is quite large and appeared to be in good condition. The well site associated with the airstrip currently consists of disturbed ground and some debris.
Kristoffer Bay	NB043 – Kristoffer Bay/Ellef Ringnes Island in the Northwest Territories/Nunavut contaminated site database, western coast of Ellef Ringnes Island	78º 15' 04.07" N latitude and 102º 32' 35.36" W longitude	Site is a former Panarctic Oils Ltd. site, where explorations for oil and gas reserves were carried out in the past. The site currently consists of the suspended exploration well and four abandoned test holes. The site also has trails, minor debris, a suspected sump area and disturbed ground that is suspected to have been where some of the former site drilling and camp infrastructure were located.
Cape Isachsen	NB076 – Cape Isachsen – Ellef Ringnes Island in the Northwest Territories/Nunavut contaminated site database, northwest tip of Ellef Ringnes Island	79º 16' 40.44" N latitude and 105º 16' 37.78" W longitude	Site is a former Panarctic Oils Ltd. site where exploration for oil and gas reserves were carried out in the past. The site consists of a former exploration well, an airstrip, a suspected former camp area, at least two suspected sumps, at least three disturbed areas and a minor amount of partially buried metal debris.

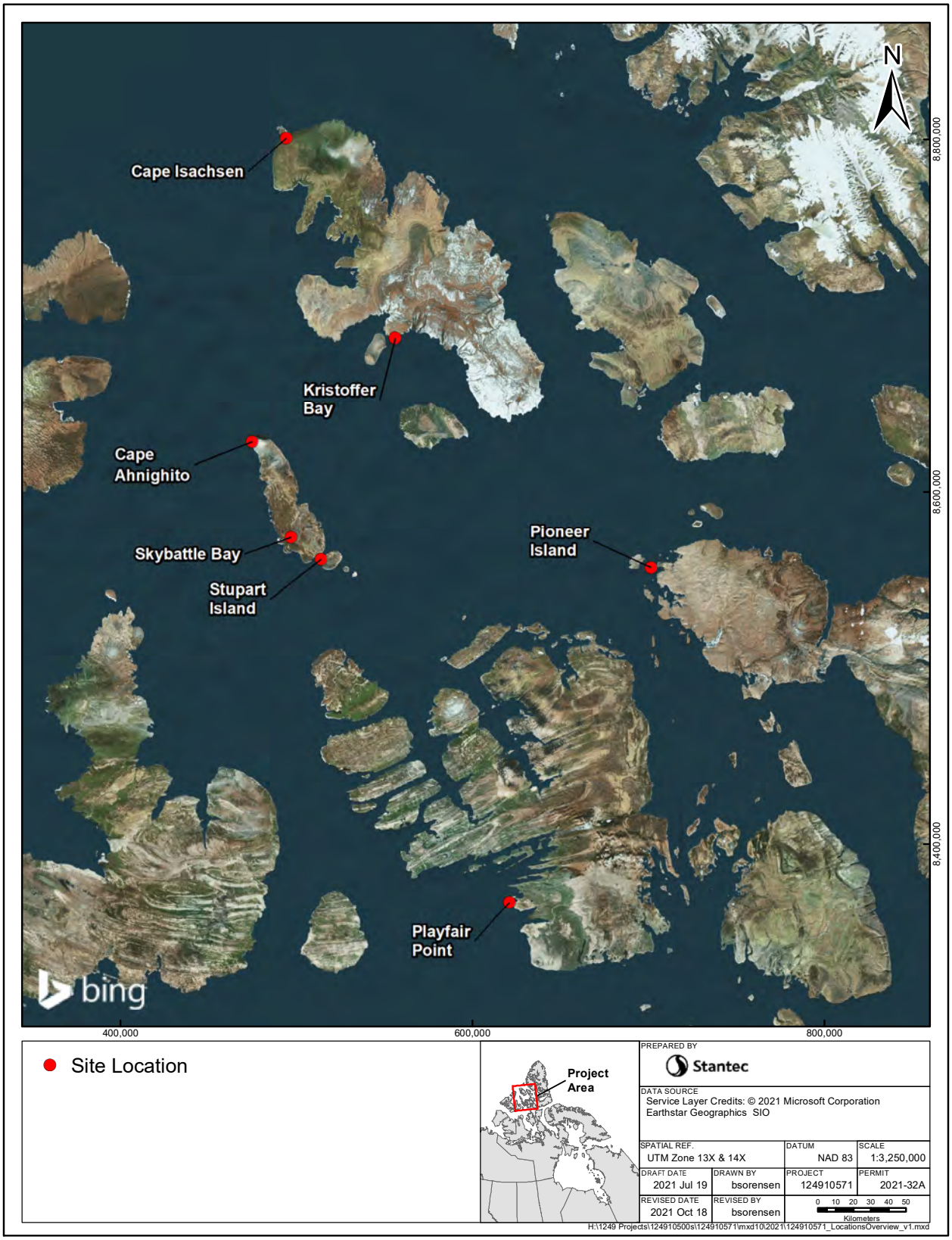

Figure 1-1 Project Location

Although all seven sites were planned for assessment, access and logistical constraints for the two most northern locations (Kristoffer Bay and Cape Isachsen) meant that these two locations were removed from the planned 2021 program prior to mobilization for the Project. In addition, during the field program access could not be obtained for Cape Ahnighito as the aircraft could not safety land at this location. As such, this location was also removed from the 2021 program. The remaining four locations were subject to assessment (Figures 1-2 to 1-4), and the results of the archaeological studies for these four locations are presented in this report, including:

- Pioneer Island
- Playfair Point
- Stupart Island
- Skybattle Bay

1.2 OBJECTIVES

The objectives of the archaeological studies were to document any previously recorded or newly identified archaeological sites relative to the contaminated sites and potential future remediation activities. Specifically, the field program was designed to identify archaeological sites, to assess the nature of potential project impacts on identified sites relative to site heritage value, to provide Dillon-Outcome and PSPC with information necessary to assist in project planning to avoid archaeological sites, and to formulate recommendations for further site management and mitigation.

1.3 SCOPE OF WORK

The scope of work for the consisted of the following components:

1. **Record Review** - to identify previously recorded sites within proximity of the study locations and to determine the nature of the database in the general area.
2. **Ground Reconnaissance** - to re-identify, in the field, any archaeological sites that were previously recorded within proximity of the study locations, as well as to identify and document any unrecorded archaeological sites.
3. **Site Evaluation** - to evaluate the nature of the existing archaeological database, the quantity and quality of observable remains (***e.g.*** site condition, content, uniqueness, and complexity) and the potential of the archaeological site to contribute to the regional archaeological database.
4. **Impact Assessment** - to assess the potential for impacts to the identified archaeological sites, as well as the local and regional database, and to recommend site specific mitigative and avoidance measures commensurate with the assigned value of the site.

Figure 1-2 Pioneer High Arctic Bundle Sites Assessed in 2021 – Pioneer Island

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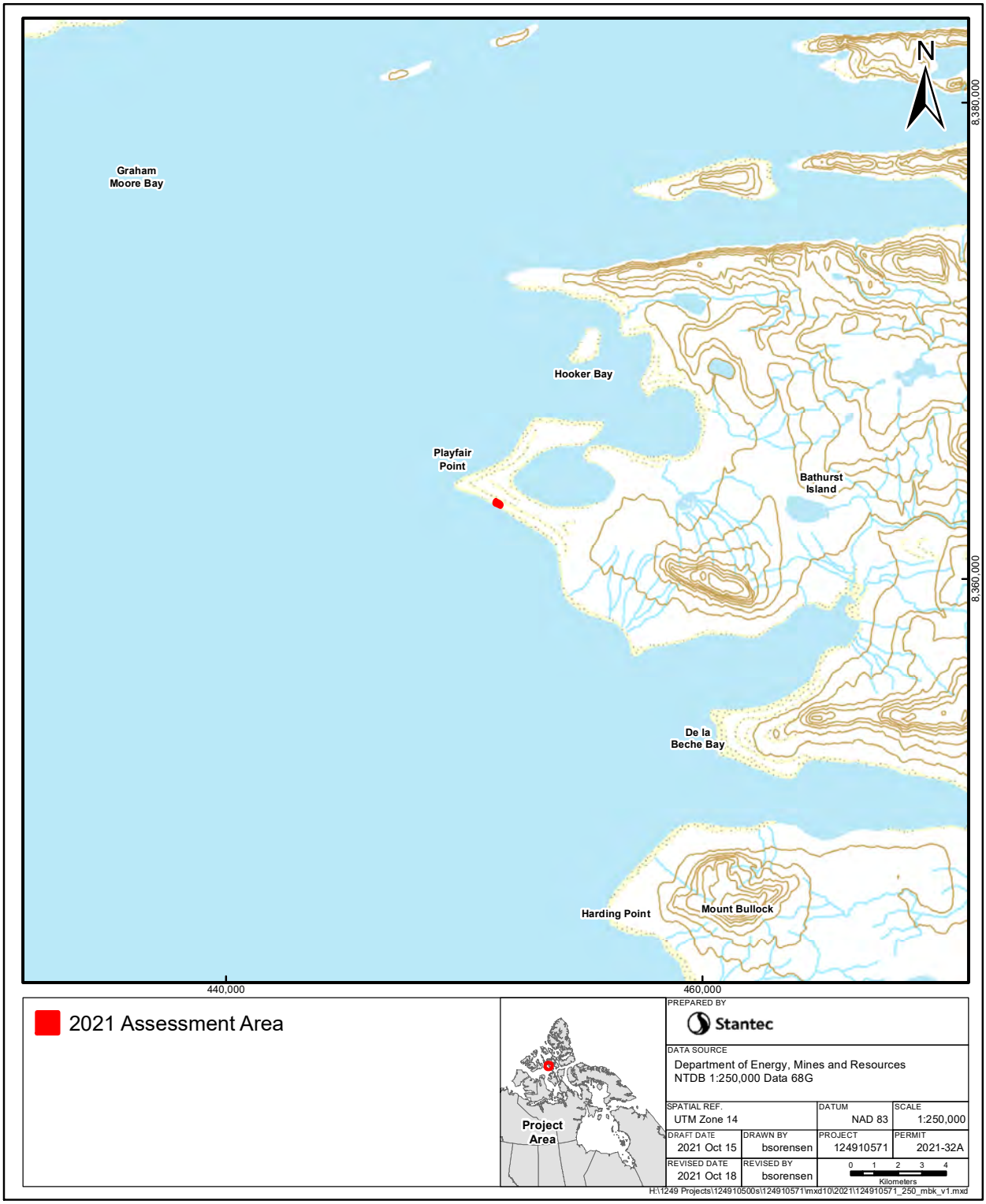

Figure 1-3 Pioneer High Arctic Bundle Sites Assessed in 2021 – Playfair Point

Figure 1-4 Pioneer High Arctic Bundle Sites Assessed in 2021 – Stupart Island and Skybattle Bay

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2.0 ENVIRONMENTAL SETTING

2.1 INTRODUCTION

Environment has always provided the parameters within which human cultures may develop by providing both opportunities and limitations. As a result, elements of the regional environment are important considerations in the understanding of cultural development, as they influenced not only the types of activities that could be conducted, but the ways in which they could be accomplished. In the archaeological record, this pattern is observed in the type and location of archaeological sites found in specific environments. In Nunavut, archaeological sites are often found associated with a specific set of landforms (including beaches, coastlines, eskers, valley edges, knolls, rivers, narrows and lakes) which would direct travel, bias routes of communication and enhance or restrict resource procurement and occupation. Due to this close relationship of human settlement and the environment, a brief overview of the regional and local environments is presented.

2.2 REGIONAL ENVIRONMENT

The four locations investigated during the current program are all situated in the Northern Arctic Ecozone which extends over most of the non-mountainous areas of the arctic islands and parts of northeastern Keewatin, western Baffin Island, and northern Quebec.

The Playfair Point location on southern Bathurst Island and the Pioneer Island location just off the Grinnell Peninsula of northwestern Devon Island are both situated within the Parry Islands Plateau Ecoregion (Figure 2-1). Within this ecoregion, the mean annual temperature is -17.5°C with a summer mean of -1.5°C and a winter mean of -31°C. The mean annual precipitation ranges from 100 mm to 150 mm (Northern Arctic Ecozones 2021). The ecoregion has a sparse and discontinuous vegetation cover consisting of moss, mixed low-growing herbs, and shrubs such as purple saxifrage, Dryas spp., arctic willow, kobresia, sedge, and arctic poppy. The terrain of this plateau is strongly ridged with the ridges composed of folds of Palaeozoic carbonates, shales, and sandstones. Turbic Cryosols with Static Cryosols are the dominant soils that have developed on morainal and colluvial deposits. This ecoregion is underlain by deep, continuous permafrost with medium ice content. Characteristic wildlife includes muskox, caribou, arctic hare, arctic fox, polar bear, seal, whale, seabirds, and waterfowl (Northern Arctic Ecozone 2021).

The Stupart Island and Skybattle Bay locations are situated within the Sverdrup Islands Lowland Ecoregion (Figure 2-1) which is characterized by low relief and sparse vegetative cover. The mean annual temperature is -18°C, with a summer mean of -1.5°C and a winter mean of -32°C. The mean annual precipitation ranges about from 100 mm to 150 mm (Northern Arctic Ecozones 2021). Mosses, lichens, and cold-hardy vascular plants such as sedge and cottongrass are the dominant vegetation. Arctic willow and Dryas spp. occur infrequently. The ecoregion is developed on generally soft, poorly consolidated, and little-deformed Mesozoic rocks. Its surface is a rolling, scarped lowland typically less than 150 m above sea level.

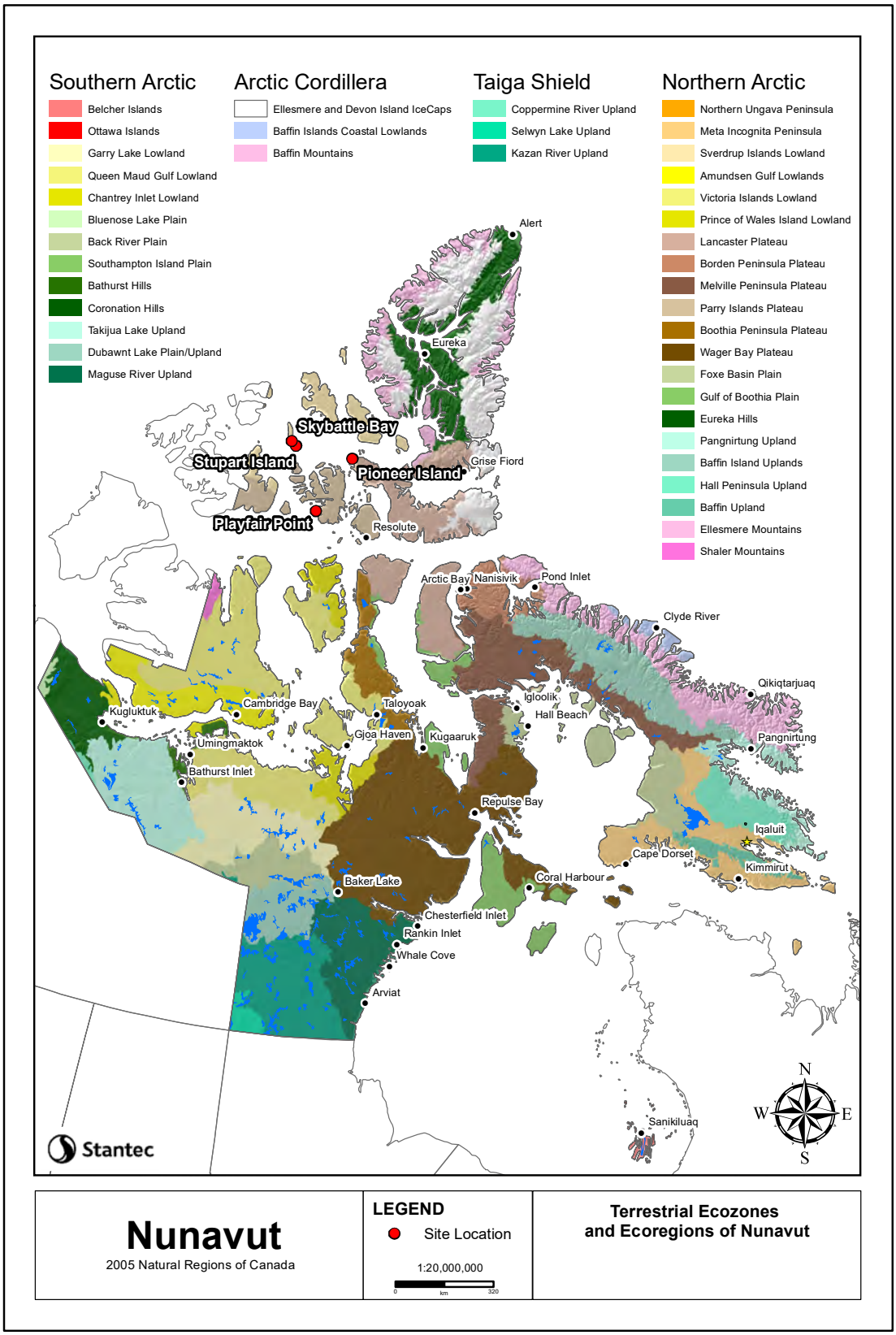

Figure 2-1 Terrestrial Ecozones and Ecoregions of Nunavut

Regosolic Static and Orthic Turbic Cryosols are the dominant soils that have developed on colluvial, alluvial, morainal, and marine deposits, and are intermixed with areas of exposed bedrock. The entire ecoregion is underlain by deep, continuous permafrost with medium ice content (Northern Arctic Ecozones 2021). Characteristic wildlife includes muskox, arctic hare, arctic fox, caribou, seal, polar bear, ptarmigan, and king eider.

2.3 PROJECT ENVIRONMENT

2.3.1 Pioneer Island

The Pioneer Island site is situated on the western portion of Pioneer Island, which is immediately west of the tip of the Grinnell Peninsula of Devon Island. The site was observed to primarily consist of a dump/burn pit, various types of debris such as metal, glass and wood, and barrels, although most of the barrels observed in prior environmental reports (WESA 2012a) were not present during the current visit. The site dates to the early 1970s when prospecting activities were undertaken. This site is located at an elevation of approximately 90 m above sea level and slopes steeply to the northwest to the coast and more gently to the southeast towards the main part of the island. Vegetation is very sparse but the location is well drained and affords excellent views of surrounding terrain and islands.

Pioneer Island is at the eastern extent of the Queens Channel and Penny Strait Polynya and wildlife including polar bears, walrus and narwhal were observed in the water/ice immediately surrounding the island during the 2021 program. Given the proximity of the location to Devon Island, the resources afforded by the surrounding polynya and the elevated terrain, the Pioneer Island site is of high potential to contain archaeological sites (Plates 2-1 to 2-4).

2.3.2 Playfair Point

The Playfair Point site is located on the southwest coast of Bathurst Island. The site consists of fuel drums cached in support of caribou research which was conducted from 1989 to 1995 at the CWS Walker River Camp on the east side of Bathurst Island (WESA 2007). Caribou antlers were observed to be piled in the area immediately adjacent to the drums and are also scattered around the general area; most of the antlers were sawn, some had been shed, and some remain attached to skulls. The Inuit wildlife monitor indicated that although hunting by residents of Resolute is sometimes undertaken in this general area (although typically at inland locations), the antlers observed at Playfair Point are not archaeological in nature. Field observations confirm that the antlers do not appear to be archaeological in nature. It is assumed that the antlers are associated with the use of the fuel cache during caribou research activities.

The drum cache is located approximately 100 m from the shore in relatively level terrain that slopes gently to the ocean, characterized by low beach ridges. The ocean water was observed to be largely open during the current program and seals were observed in the water. The location is perceived to have moderate archaeological potential (Plates 2-5 to 2-8).

Plate 2-1 **View northeast showing general terrain at Pioneer Island; the can dump is just to the north of the aircraft, and the airstrip to the south.**

Plate 2-2 **View northwest showing open water associated with the polynya at Pioneer Island.**

Plate 2-3 View east at dump/burn pit at Pioneer Island.

Plate 2-4 Close view of example of contents of dump/burn pit at Pioneer Island.

Plate 2-5 View southwest to Playfair Point; site generally at arrow.

Plate 2-6 View southeast at Playfair Point; fuel barrels are just to north of aircraft.

Plate 2-7 View north at Playfair Point.

Plate 2-8 View northwest to barrels and antler collection at Playfair Point.

2.3.3 Stupart Island

The Stupart Island site is located on Stupart Island, a small island just off the southern tip of Lougheed Island, north of Bathurst Island. The site consists of a historic camp site with tent platforms, drums, burn pits and scattered debris. The Phase I and II assessment report for the site (WESA 2012b) indicates that air photos for the site dating to 1960 show no obvious sign of human activity and it is thus assumed that the camp site post dates this, but the date of occupation or reason for occupation are unknown.

The site is located at the highest point on Stupart Island which is overall of very low relief and level, although the terrain at the site is dry and well drained (suitable for landing the aircraft in summer). During the current program the water immediately surrounding the island was observed to be largely ice free, but substantial amounts of sea ice remained present particularly to the west. Given the well-drained nature of the terrain with a gravelly surface, but the long distance from islands to the south, the archaeological potential of this location is low to moderate (Plates 2-9 to 2-12).

2.3.4 Skybattle Bay

The Skybattle Bay site is a former exploration well site and associated airstrip dating to around 1971 located on Lougheed Island (WESA 2012c). The setting is extremely level and generally poorly drained; the western portion of the airstrip was sufficiently well drained to land the aircraft, but the area becomes much wetter towards the middle of the airstrip and the majority of the airstrip could only be used in winter due to the saturation level. A drainage that extends west to the ocean (approximately 4 km away) is present to the north of the airstrip. During the current study (conducted in August), Lougheed Island was entirely surrounded by sea ice; although it is recognized that ice levels vary from year to year, it is likely that this island often remains surrounded by ice except in warmer periods, which may affect accessibility to the island.

The drill site is located to the south of the east end of the airstrip and again is situated in very low, level, featureless terrain. The drill area is substantially disturbed by built up drill pad/camp locations.

Given the lack of relief, distance from the coast, potential challenges accessing the island due to sea ice, and disturbance factors, the archaeological potential of the Skybattle location is low (Plates 2-13 to 2-16).

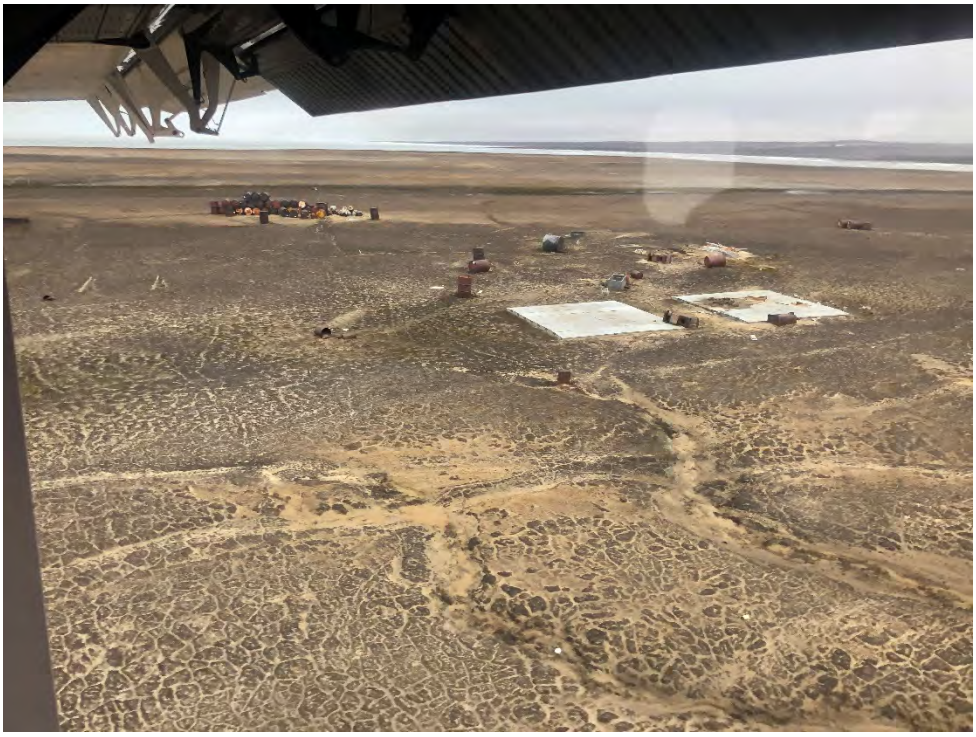

Plate 2-9 Aerial view west at Stupart Island.

Plate 2-10 View northwest at Stupart Island; campsite and barrel caches are mainly to west of aircraft.

Plate 2-11 View east at dump (foreground), camp (to north) and fuel drum cache at Stupart Island.

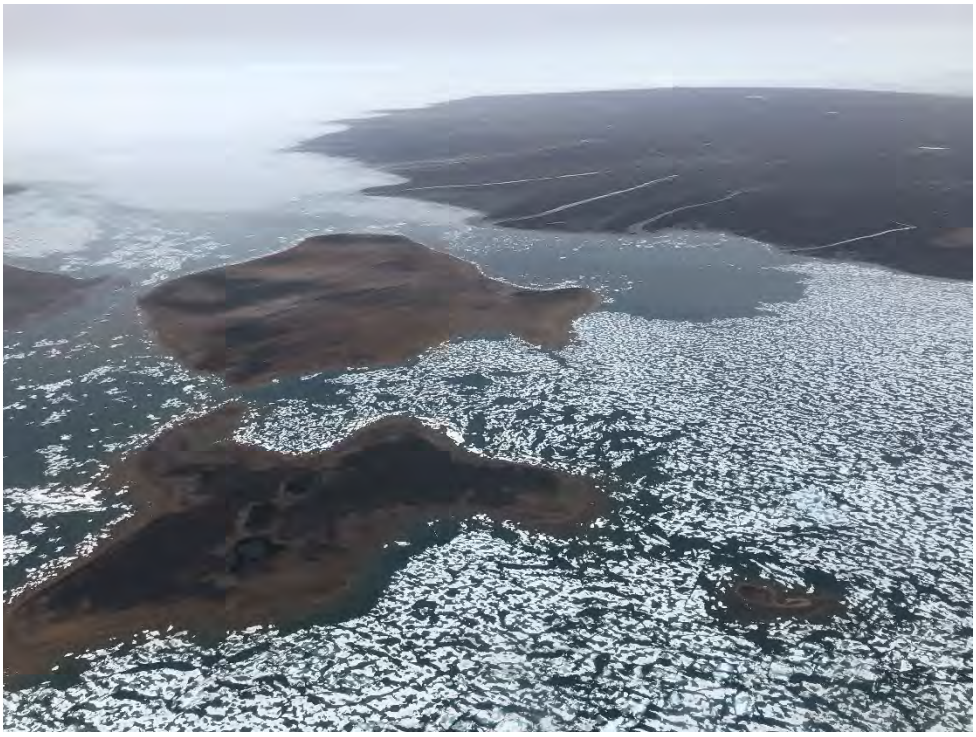

Plate 2-12 View east to Stupart Island (at center)

Plate 2-13 **View east along western end of airstrip at Skybattle Bay; the airstrip becomes more poorly drained further east (winter use only).**

Plate 2-14 **View east at drum cache 1 at Skybattle Bay.**

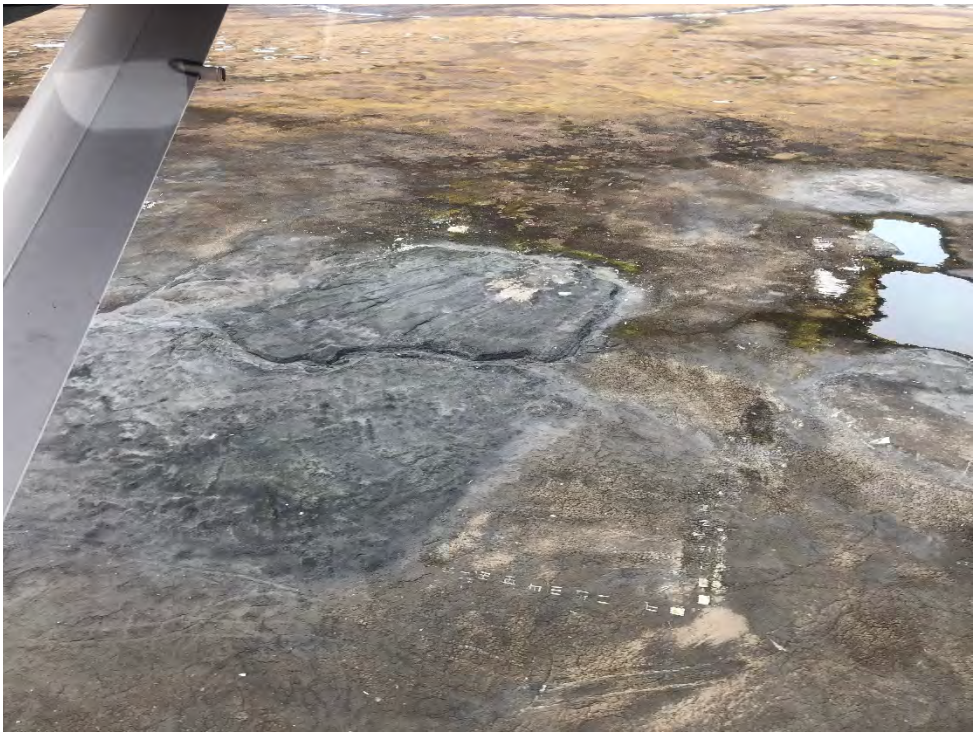

Plate 2-15 **Aerial view west at the drill site at the far southeast of the site, Skybattle Bay; note surrounding saturated terrain.**

Plate 2-16 **View south showing extensive disturbance associated with the drill location at Skybattle Bay.**

3.0 HERITAGE RESOURCES

3.1 DEFINITION

Heritage resources are identified by the Nunavut Archaeological and Palaeontological Sites Regulations (Nunavut Government 2001) and consist of archaeological artifacts more than 50 years old and fossils including natural casts, preserved tracks, coprolites, and plant remains as well as shells, exoskeletons of invertebrates, and vertebrate remains. Prehistoric archaeological sites are composed of artifacts, features, and residues of Indigenous origin. They predate the arrival of Europeans and are typically characterized by modified bone and stone, and stone structures. Historic sites are characterized by structures, features, and objects of European influence. These sites date back to contact with the Europeans but also include remains of more recent activity (i.e., more than 50 years). Historic sites less than 50 years old are generally associated with contemporary land use and document continued use and occupation of an area to the present time. Cultural landscapes consisting of either natural or human-made features important to a society's sense of place are also important heritage resources. Although palaeontological sites contain fossils of plants or animals or fossilized evidence of their existence, also of geological interest are type sites for geological formations.

3.2 POTENTIAL IMPACTS

Due to the fact that prehistoric archaeological, historical, palaeontological and traditional land use sites represent discrete episodes of past activities, they are non-renewable and, therefore, are susceptible to alteration or removal by development. Prehistoric and historical archaeological resources are comprised of residues of past cultures. Although the cultural entities responsible for deposition of the archaeological material are unavailable for observation, the preserved context and associations in which the remains functioned can reveal many clues about past human behaviour, adaptations and relationships to the natural world. The key to the interpretation of these resources, however, is in their pattern of cultural deposition, which is extremely fragile, ephemeral and the product of unique processes and conditions of preservation. Consequently, once they are disturbed, they cannot be replaced, recreated or restored. Due to the nature of their origin and preservation, archaeological resources are finite in quantity. As a result, archaeological resources are increasingly susceptible to destruction and depletion through natural and cultural disturbances.

3.3 MITIGATIVE OPTIONS

Adverse primary impacts to heritage resource sites, identified prior to the construction stage of development, can be significantly reduced or eliminated by avoidance or adequate study. Site avoidance can be achieved through alteration of the Project footprint. If avoidance is not feasible, adequate study of archaeological sites generally involves scientific investigations that are designed to systematically explore and reconstruct the activities that are represented at the site. These investigations may involve the systematic collection of surface site materials, detailed mapping, photographic documentation of sites, or the excavation of buried sites. In cases where the heritage value of an archaeological site is considered to be low, photographic documentation, recording, and collection of surface specimens may represent

sufficient mitigative measures. In cases where the heritage value of a site is identified as high, however, more detailed investigative measures, such as controlled excavation, may be necessary.

3.4 CULTURAL CONTEXT

The four Project sites are situated in four relatively widely spaced locations in the High Arctic: Pioneer Island, just off the tip of Devon Island's Grinnell Peninsula; Playfair Point on the southwest coast of Bathurst Island; Stupart Island located just south of Lougheed Island; and Skybattle Bay on southern Lougheed Island. Based upon the site file search provided by Government of Nunavut (2021), previous archaeological investigations in the general Project area are limited. Sites on record on the northern part of Devon Island and on Pioneer Island were recorded between 1962 and 1982. Sites on Bathurst Island within 50 km of the Playfair Point site were recorded in 1977 during a University of Calgary project and in 1996 during a survey conducted for the then-proposed North Bathurst Island National Park. No archaeological sites are on record on Lougheed Island or Stupart Island.

The first inhabitants of this High Arctic Island region were the Palaeoeskimos, part of the Arctic Small Tool tradition. The Palaeoeskimo inhabitants represent a relatively rapid and widespread migration of people from Alaska across to Greenland, into previously unoccupied regions starting perhaps 5000 years ago. In the High Arctic, occupation by Palaeoeskimos is suggested to be sporadic, with periods of occupation interspersed by periods in which the area was abandoned. The first phase of this Palaeoeskimo tradition in the High Arctic Islands is part of Independence I complex (dating to 2000 – 1700 years BC), represented by sparsely distributed sites found in the High Arctic and often characterized by small box hearths and tiny stone tools located on raised beach ridges (McGhee 1990). Sites associated with the Pre-Dorset complex (1700 – 800 years BC) are less common in the High Arctic than further south, but Pre-Dorset sites have been recorded on Devon Island (McGhee 1990). It is likely that the Pre-Dorset people relied heavily on marine mammal resources with styles of harpoon heads changing through time.

A cooling climate and subsequent reduction in the abilities to acquire marine mammals around 3000 years ago may have resulted in a decline in population, and set the stage for a new culture, the Dorset (800 BC to AD 1000), although Independence II sites (1000 – 500 BC) are known from both Bathurst and Devon Islands. Independence II culture may have derived from Independence I but also shares some similarities with Pre-Dorset sites or may be a northern variant of Dorset (McGhee 1990).

The Dorset people appear to have lived more secure and rich lives than the Independence/Pre-Dorset before them, as evidenced by larger, more permanent, and more complex sites. This may relate to different methods of obtaining marine mammals which involved hunting from sea ice. Because of different adaptations, it seems that the Dorset were more suited to the colder climate that prevailed in the Arctic during this time.

Dorset winter houses were large, semi-subterranean, and contained a mid-passage similar to that present at Pre-Dorset sites. Dorset longhouses are also known from the region, including at Brooman Point on Bathurst Island (McGhee 1984; Park 2003). Dorset artifact assemblages are dominated by finely made, small, specialized tools, often made from specially selected lithic materials. Most notably, the Dorset are known for their carvings of organic materials such as ivory and antler, possibly suggestive of a shamanic religious belief (McGhee 1990).

Approximately 1000 years ago, the climate in the Arctic was warming, and resource availability would have changed significantly. At this time, the Dorset culture is suddenly replaced by the Thule culture. Central arctic oral traditions include references to the 'Tunit' (Dorset) people, and it is probable that the two groups occupied the Arctic at the same time, although likely briefly. Tradition suggests that the Inuit may have been responsible for chasing the Tunit out of their territories, and are partly responsible for the demise of the Dorset culture (McGhee 1996).

The Thule culture has origins in Alaska and the spread of this culture across the Arctic appears to represent a very rapid movement of people (McGhee 1990). The hunting of large whales appears to be a key component of the Thule way of life, supplemented by acquisition of seal, fish, caribou and fowl. Whales were hunted from the sea using kayak and umiak and using floating harpoons. Characteristic Thule winter houses are made of stones and whale bones in a semi-subterranean construction including a cold-trap at the door.

The Thule people were present in the High Arctic but again this occupation was likely sporadic in nature depending on climatic conditions. A large Early Thule site is present on the east side of Bathurst Island at Brooman Point, which also contained Pre-Dorset and Dorset occupations (McGhee 1984).

Modern day Inuit are directly related to the Thule people. Although the expanse of Thule culture across the Arctic resulted in the development of widely varying ways of life for the inhabitants based on the varied resources available in the different regions, modern Inuit did not regularly inhabit the High Arctic Islands until the 1950s when Inuit were relocated to communities such as Resolute Bay and Grise Fiord.

4.0 METHODS

To meet the objectives of the AIA, the archaeological studies included a record review of previously recorded archaeological sites in proximity of the study areas. Field studies were subsequently conducted using aircraft (Twin Otter) for access, and ground reconnaissance and inspection to identify archaeological sites. Analysis of findings and reporting was conducted after completion of the field studies, including site evaluation, impact assessment and formulation of recommendations.

4.1 RECORD REVIEW

An updated site file search of the Nunavut Archaeological Sites Database was obtained from the Nunavut Department of Culture and Heritage to review the locations and nature of archaeological sites on record within proximity (50 km) each of the Project site areas (GN 2021). In order to obtain records from the database, a data license was submitted to the Department of Culture and Heritage, GN, as required.

As part of the pre-field studies, a permit application was submitted to the Department of Culture and Heritage, GN, outlining the study methods and proposed assessment coverage. Archaeological permit 2021-32A was subsequently issued for the field studies.

4.2 FIELD STUDIES

During the AIA, archaeological impact assessment studies were completed for the four Project sites that could be accessed, including Pioneer Island, Playfair Point, Stupart Island and Skybattle Bay. Two Inuit participants were included in the program, including a wildlife monitor from Resoulte Bay, and an environmental assistant from Qikiqtarjuaq.

Ground reconnaissance included visual inspection to identify stone features such as tent rings, stone circles, caches, hearths, and inuksuit, as well as historic items or prehistoric lithic artifacts. No areas with significant deposition (such as floodplain deposits along major watercourses) were identified that warranted shovel testing. Shovel testing was not conducted at identified archaeological sites pending determination of future potential impacts; currently ongoing avoidance of all identified archaeological sites is assumed and thus shovel testing was not conducted to avoid impacting the sites unnecessarily.

The Project sites are contaminated sites of varying description (see Table 1-1). At each location a larger area encompassing the contaminated area was subject to ground truthing relative to archaeology, including buffer areas to allow for use of peripheral areas for borrow material should future remediation activities require borrow material or burial of contaminated material.

4.3 SITE EVALUATION

The nature of site assessment completed at each archaeological site identified is largely contingent on the nature of the site and its physical relationship to both previous and proposed disturbance activities. For the current assessment, ongoing avoidance was assumed to be the primary planned mitigation measure at identified sites pending determination of possible future project impacts. As such, detailed site assessment (including shovel testing) was not undertaken, but individual features were documented (UTM location taken with hand held GPS, site mapping, photography, feature description); site forms and site sketch maps were completed for each site. If identified sites are proposed for impact (i.e. if avoidance is not possible due to design constraints), further assessment and/or mitigation activities would need to be conducted during subsequent studies.

4.4 SITE DESIGNATION

Archaeological sites are referred to by a Borden Number which consists of a four letter symbol accompanied by a number (eg., LdNs-11). This uniform site designation scheme for archaeological sites in Canada was developed by archaeologist Charles Borden (1954). Within this system and north of latitude 62° (Figure 4-1), the upper case letters represent major blocks 2° by 4° in size (i.e., L = 64° to 66° latitude; N = 104° to 112° longitude) and the lower case letters denote 10’ and 20’ units within the major block (i.e. d = 30’ to 40’ latitude; s = 0’ to 20’ longitude). The numbers are assigned sequentially by the Archaeological Survey of Canada, Canadian Museum of Civilization and refer to specific sites within each unit.

4.5 SITE DOCUMENTATION

Hand-held GPS units are used to record the location of sites encountered during ground reconnaissance; site locales are recorded using the Universal Transverse Mercator (UTM) Grid Reference (NAD 83). The relationship of each site to the proposed Project is denoted. The condition of each site and site characteristics are documented and include apparent site integrity, estimated site dimensions, content, setting, and complexity. Each site is photographed and documented relative to the Project in a sketch map prepared to illustrate the site setting, shovel test locations, and the relationship to the Project.

4.6 SITE CLASSIFICATION

Each site identified is classified on the basis of its primary physical attributes and/or predicted primary function. Prehistoric and historic site types include isolated finds, artifact scatters, campsites, quarries and stone features. Stone feature sites are stone alignments or configurations resulting from past human activity. Depending on the configuration of these features, function may be ascribed to these sites, for example campsites, fishing sites or caches. The site type ascribed to each identified site was assigned based on the nature of the features and artifacts, as well as the site setting and the perceived function or activities taking place at the site.

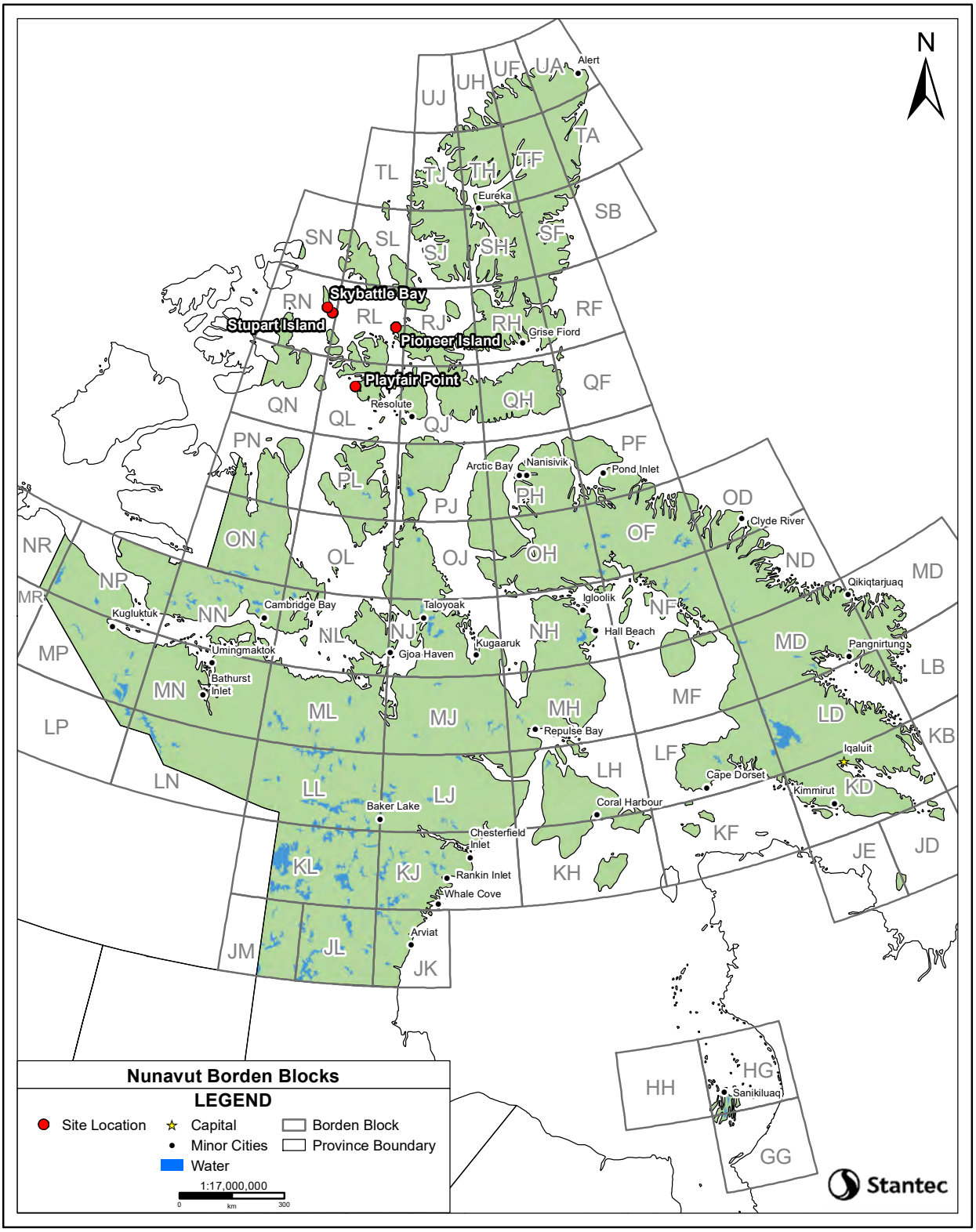

Figure 4-1 Borden Units north of 60° relevant to the Project area

4.7 SITE VALUE AND INTERPRETIVE POTENTIAL

Site values are determined on the basis of the results of the field program as well as the regional archaeological context and Indigenous perspective. Generally, relative site value and interpretive potential is based on the data obtained to date. Factors considered include site type, size, and complexity, presence or absence of subsurface materials and features, and number of artifacts observed. The scientific value of a specific site is deemed to be low if substantial disturbance or exposure has occurred or at sites with single artifacts or single features of limited antiquity. Sites at which large quantities of artifacts or diagnostic artifacts are present, or at which cultural stratification or multiple stone features are present, particularly if they contain unusual features or diagnostic artifacts or have the potential to contain diagnostic artifacts, are classified as having high site value and interpretive potential.

In addition to these tangible variables, each site is viewed from the perspective of the regional data base. Indigenous and public perspective of site value may also an important criterion in evaluating identified sites if available depending on the nature and location of sites.

4.8 FORMULATION OF RECOMMENDATIONS

Site specific recommendations are formulated primarily on the basis of the level of available information and the perceived values within the context of the predicted impact. Because of the non-renewable nature of heritage resources, avoidance as a mitigation measure is recommended as the preferred option at sites with established heritage values. Sites of limited scientific value and of limited ethnic value (for example, isolated artifact finds or fossil fragments) are generally not recommended for further study and are not considered for avoidance mitigation as the data collected at the archaeological impact assessment stage has effectively reduced or eliminated impact from the proposed development.

In general, site-specific mitigative measures recommended reflect the nature and content of each site and the site value ascribed to each site. As such, the site-specific scope of studies recommended at each site represents a professional judgment as to an appropriate balance in compensation for scientific and community information lost through site destruction.

The site-specific recommendation made for an identified site is based primarily on its location relative to proposed disturbance activities. Should disturbance to identified sites be anticipated as a result of the Project, further assessment and/or mitigation studies may be required. Mitigation requirements are determined by the Nunavut Department of Culture and Heritage.

5.0 RESULTS

5.1 RECORD REVIEW

The record review provided by the Department of Culture and Heritage, GN (2021), covered large areas (50 km) around the Project sites to allow for a review of cultural context of each area. As a result, the file search acquired prior to the field studies included 15 archaeological sites on record within proximity of Pioneer Island and 16 sites on record within proximity of Playfair Point. No sites are on record within 50 km of the Stupart Island or Skybattle Bay sites.

Three previously recorded sites are in relatively close proximity to the Pioneer Island site, including one site on Pioneer Island, a cairn observed from the air only in 1981, which likely dates to the 1850s and is associated with the Belcher HMS Assistance search for Franklin. Two other sites are on record close to Pioneer Island on Devon Island including another historic cairn again associated with the Belcher expedition, and a nearby prehistoric site with multiple Thule stone features. The remaining 13 archaeological sites on record within 50 km of the Pioneer Island site are largely found on the west coast of Devon Island, although two are on the northeast coast of Bathurst Island. Sites on record include a Dorset campsite/burial, another prehistoric campsite with tent rings, and multiple sites associated with the Belcher HMS Assistance expedition, including a winter camp.

There are no sites within close proximity of the Playfair Point site, but 16 sites have been previously recorded within a 50 km radius from this location. Sites on record are all generally associated with the Polar Bear Pass (Nanuit Itillinga) National Wildlife Area in the center of Bathurst Island, although several sites are situated just to the west of the Wildlife Area boundary. Sites on record include Dorset campsites, Thule campsites, and multiple other prehistoric campsites with no noted cultural affiliation.

5.2 FIELD STUDIES

Field studies consisted of ground reconnaissance of the contaminated site areas and surrounding terrain. Assessment areas are illustrated in Figures 5-1 to 5-4.

At Pioneer Island, the site currently consists of a dump/burn pit and associated debris scattered around the area. The fuel drums reported in 2012 (WESA 2012a) were largely observed to be absent, but the former locations of these drums were also included in the archaeological assessment. An area of minimally 800 m x 200 m in size was assessed during the archaeological assessment (Figure 5-1).

At Playfair Point, the contaminated site area is very small, consisting of just four fuel drums. This immediate area was subject to archaeological assessment, and a larger area approximately 300 m x 100 m was subject to inspection (Figure 5-2).

Figure 5-1 Archaeological Assessment and Site Locations – Pioneer Island

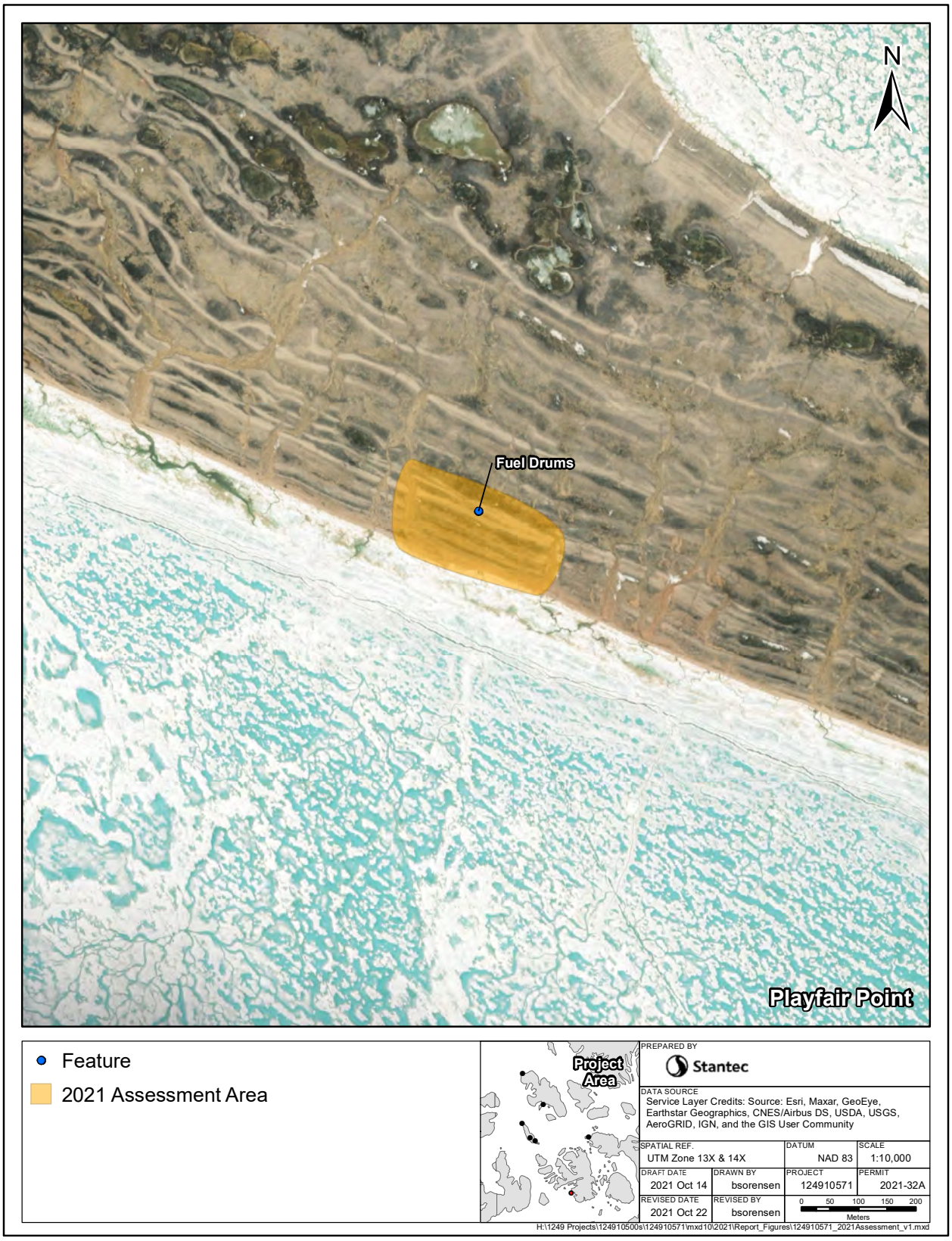

Figure 5-2 Archaeological Assessment and Site Locations – Playfair Point

Figure 5-3 Archaeological Assessment and Site Locations – Stupart Island

Figure 5-4 Archaeological Assessment and Site Locations – Skybattle Bay

The Stupart Island site incudes two tent platforms, one large barrel cache and multiple other barrels around the site, as well as at least two dumps/burn pits and abundant debris scattered in the area. This area was assessed for archaeological sites and additional assessment was also completed in the surrounding terrain, covering an area of minimally approximately 800 m x 200 m in size (Figure 5-3).

The Skybattle Bay site was the largest but also had the lowest archaeological potential, being very poorly drained, level, and distant from the coast. The western portion of the airstrip was subject to assessment on foot as it was better drained; the eastern portion was assessed on foot and by ATV and is generally wet with standing water. The drill site located to the south and east of the airstrip was also assessed and was found to be heavily disturbed in very low relief terrain that is poorly drained. Generally the assessment area that was ground truthed was 4.5 km in a linear transect minimally 50 meters in width (Figure 5-4).

In addition to these four Project sites, a flyover was also completed while the aircraft was trying to access the Pioneer Island site during which two archaeological sites were observed from the air on Devon Island, and a stop-over on Devon Island also resulted in the fortuitous recording of three new archaeological sites.

5.3 IDENTIFIED SITES

During the studies, 13 archaeological sites were investigated including two previously recorded sites that were observed from the air only while accessing Pioneer Island, and 11 newly recorded sites. Of the 11 newly recorded sites, three were identified while on Devon Island waiting for the weather to clear at Pioneer Island, and the remaining eight sites were identified on Pioneer Island while assessing the Pioneer Island contaminated site and surrounding areas. Table 5-3 provides a summary of the sites investigated.

Of the 13 sites investigated during the current study, one site is a previously recorded historic cairn associated with the HMS Assistance expedition and dates to the 1850s; the site was visually observed during overflight. One previously recorded prehistoric Thule site was also revisited visually during overflight. The remaining 11 sites are new including three sites recorded fortuitously on Devon Island, tentatively suggested to represent to two meat caches and one campsite. Eight remaining sites identified on Pioneer Island include a historic aerial photo survey marker, one prehistoric tent ring, and six additional prehistoric sites with stone features that may include caches and inuksuit. Detailed assessment such as shovel testing and excavation was not undertaken as all sites are currently expected to be avoided by environmental sampling and potential future remediation activities.

Detailed descriptions, maps and photos of sites investigated are provided in the confidential final AIA report.

Note that for all sites 30 m buffers around the archaeological features have been provided to PSPC and Outcome-Dillon as shapefiles to assist in ongoing avoidance of impacts and project design.

Table 5-1 Summary of Archaeological Sites

Site	New or Previously Recorded	Site Class and Type	Description	Geographical Setting	Interpretive Potential	Proposed Mitigation Measures	Relationship to Project
ReLb-2	New	Prehistoric Cache	Single stone feature – possible cache	Northumberland Sound, beach ridge below Mount Blanche	Moderate	Ongoing avoidance, or further investigation	Not near Project; site was recorded fortuitously during a stop-over to wait for weather to clear
ReLb-3	New	Prehistoric Campsite?	Two stone features – possible hearth, cache	Northumberland Sound, beach ridge below Mount Blanche	Moderate	Ongoing avoidance, or further investigation	Not near Project; site was recorded fortuitously during a stop-over to wait for weather to clear
ReLb-4	New	Prehistoric Cache	Single stone feature – possible cache	Northumberland Sound, beach ridge below Mount Blanche	Moderate	Ongoing avoidance, or further investigation	Not near Project; site was recorded fortuitously during a stop-over to wait for weather to clear
RfLc-3	Previously Recorded	Thule, British Navy	Site data indicates this large cairn was built from rocks taken from adjacent Thule houses, and was built during Belcher's HMS Assistance expedition. During the current study the site was observed from the air and appears to be undisturbed.	Grinnell Peninsula, Devon Island	High	Ongoing avoidance, or further investigation	Not in proximity to the Project; site was observed from the air while accessing the Project site
RfLc-4	Previously Recorded	Thule	Site data indicates that the site is a Thule campsite, extensive in size. During the current study the site was observed from the air and appears to be undisturbed.	Grinnell Peninsula, Devon Island	High	Ongoing avoidance, or further investigation	Not in proximity to the Project; site was observed from the air while accessing the Project site

Table 5-1 Summary of Archaeological Sites - continued

Site	New or Previously Recorded	Site Class and Type	Description	Geographical Setting	Interpretive Potential	Proposed Mitigation Measures	Relationship to Project
RfLc-5	New	Prehistoric	Single stone feature – possible cache	High ridge on northwest side of Pioneer Island	Moderate	Ongoing avoidance, or further investigation	Identified relative to Pioneer Island site; no impact currently proposed
RfLc-6	New	Prehistoric	Single tent ring	High ridge on northwest side of Pioneer Island	Moderate - High	Ongoing avoidance, or further investigation	Identified relative to Pioneer Island site; no impact currently proposed
RfLc-7	New	Historic	Aerial photo survey marker (survey pin and stones)	High ridge on northwest side of Pioneer Island	Low	Ongoing avoidance, or further investigation	Identified relative to Pioneer Island site; no impact currently proposed
RfLc-8	New	Prehistoric	Four or five stone features - possible collapsed inuksuk, three or four other features may be caches	High ridge on northwest side of Pioneer Island	Moderate	Ongoing avoidance, or further investigation	Identified relative to Pioneer Island site; no impact currently proposed
RfLc-9	New	Prehistoric	Single stone feature – possible cache	High ridge on northwest side of Pioneer Island	Moderate	Ongoing avoidance, or further investigation	Identified relative to Pioneer Island site; no impact currently proposed
RfLc-10	New	Prehistoric	Single stone feature – possible cache	High ridge on northwest side of Pioneer Island	Moderate	Ongoing avoidance, or further investigation	Identified relative to Pioneer Island site; no impact currently proposed

Table 5-1 Summary of Archaeological Sites - continued

Site	New or Previously Recorded	Site Class and Type	Description	Geographical Setting	Interpretive Potential	Proposed Mitigation Measures	Relationship to Project
RfLc-11	New	Prehistoric	Two stone features - possible stone caches	High ridge on northwest side of Pioneer Island	Moderate	Ongoing avoidance, or further investigation	Identified relative to Pioneer Island site; no impact currently proposed
RfLc-12	New	Prehistoric	Single stone feature – possible cache	High ridge on northwest side of Pioneer Island	Moderate	Ongoing avoidance, or further investigation	Identified relative to Pioneer Island site; no impact currently proposed

5.4 DISCUSSION

With the exception of two sites revisited on Devon Island (RfLc-3 and RfLc-4), the historic aerial photo marker (RfLc-7), and one tent ring (RfLc-6), the stone features recorded during the current study are generally of unknown function based on appearance. Essentially all of them are a collection of cobbles, some small and generally circular in shape, others larger and more linear in shape. The Inuit wildlife monitor suggested that some of these sites are prehistoric caches where meat would have been stored under cobbles while people were travelling through the area. Given the proximity of the location to Queens Channel and Penny Strait Polynya and the wildlife observed in this area during the current study (including walrus, polar bear and narwhal), this location may have been a good area to hunt and cache meat for use later if needed while travelling through the area north to Ellesmere Island or back south. The location of the features on a high landform well above the beach may have been a strategy used to keep polar bears from raiding the meat caches. Most of the caches do not appear to be open, although the more scattered features (eg. the linear features at RfLc-8, RfLc-10 and RfLc-11) may represent caches that were opened to access the meat within.

Alternately some of these features may represent different types of activities; one feature at RfLc-8 is suggested to be in inuksuk based on the presence of just five flat rocks that could have been stacked to form an inuksuk. Other features may also represent inuksuit that have over time collapsed and settled into the landform, giving them a flat appearance not reflective of their original function, or represent other functions/activities that can't be ascertained from surface inspection alone.

As no bone or artifacts were observed during the current study, the age or cultural affiliation of these sites is unknown, but further investigation such as excavation could provide information. The archaeological sites recorded during the current study will not be impacted by the project, and their locations will be provided to PSPC and consultants involved in the contaminated site remediation activities to facilitate ongoing avoidance. However, if future impacts are planned for any of these archaeological features, further investigation is recommended in the form of shovel testing and archaeological excavation of the features.

6.0 SUMMARY AND RECOMMENDATIONS

At the request of PSPC and Dillon-Outcome, Stantec conducted an Archaeological Impact Assessment (AIA) under Nunavut Archaeological Permit 2021-32A for the Pioneer High Arctic Bundle Sites at various contaminated site locations in Nunavut (the Project). The seven sites proposed for assessment in 2021 are located between 180 km and 580 km from Resolute Bay, Nunavut.

Although all seven sites were planned for assessment in 2021, access and logistical constraints for the two most northern locations (Kristoffer Bay and Cape Isachsen) resulted in these two locations being removed from the planned 2021 program prior to mobilization for the Project. In addition, during the field program access could not be obtained for Cape Ahnighito as the aircraft could not safety land at this location. As such, this location was also removed from the 2021 program. The remaining four locations were subject to assessment, and the results of the archaeological studies for these four locations are presented in this report, including Pioneer Island, Playfair Point, Stupart Island, and Skybattle Bay.

During the studies at these four locations, a larger area encompassing each contaminated site was subject to ground truthing relative to archaeology, including buffer areas to allow for use of peripheral areas for borrow material should future remediation activities require borrow material or burial of contaminated material. Shovel tests were not conducted at identified archaeological sites as the sites will be avoided, and thus impact from shovel testing was not warranted.

During the studies, three archaeological sites were newly identified near Northumberland Sound on Devon Island during a stop-over while waiting for weather to clear on Pioneer Island. Two previously recorded sites were also revisited visually from the air only on the Grinnell Peninsula of Devon Island. None of these sites are near the Project.

At the Project locations, a total of eight new archaeological sites were recorded, all at Pioneer Island. No archaeological sites were identified at Playfair Point, Stupart Island or Skybattle Bay.

At Pioneer Island, eight new archaeological sites were recorded during the archaeological assessment. One site is a historic aerial photo marker (RfLc-7) with low interpretive potential. The remaining sites are all prehistoric stone features with between one and five stone features present at each site. One site is a tent ring (RfLc-6) that may be associated with Independence I culture (which dates to 2000 – 1700 years BC), although this would need to be confirmed during further archaeological studies as no artifacts were observed during the current study. The remaining stone features recorded during the current study are generally of unknown function based on appearance. Each feature is represented by a collection of cobbles; some features are small and generally circular in shape, others are larger and more linear in shape. The features may represent different activities that could possibly be discerned if additional investigation such as archaeological excavation were to be undertaken. Some of the features are suggestive of caches where meat was stored, but they could also represent inuksuit or other feature types. No artifacts were identified at any of the sites, however, to indicate age, function, or cultural affiliation.

Ongoing avoidance of all features is recommended with the exception of RfLc-7, the historic aerial photo marker which has low interpretive value. Site locations and descriptions have been provided to PSPC and Dillon-Outcome to facilitate long-term avoidance of these archaeological features.

Archaeological studies are considered to be complete at Pioneer Island, Playfair Point, Stupart Island and Skybattle Bay, assuming ongoing avoidance of archaeological sites at Pioneer Island. Archaeological studies remain outstanding at the three Pioneer High Arctic Bundle Sites that were not accessed in 2021, including Cape Ahnighito, Kristoffer Bay and Cape Isachsen.

7.0 REFERENCES CITED

Borden, C. E. 1954. A uniform site designation scheme for Canada. *Anthropology in British Columbia*, Vol. 4: 44-48.

Government of Nunavut. 2021. Unpublished archaeological site dataset provided to Stantec 2021.

McGhee, R. 1984. The Thule Village at Brooman Point, High Arctic Canada. *National Museum of Man Mercury Series* Archaeological Survey of Canada Paper No. 125. National Museums of Canada.

McGhee, R. 1990. *Canadian Arctic Prehistory*. Canadian Museum of Civilization. Hull.

McGhee, R. 1996. *Ancient People of the Arctic*. Canadian Museum of Civilization. Hull.

Northern Arctic Ecozones. 2021. ecozones.ca/English/zone/NorthernArctic/ecoregions.html. Accessed October 2021.

Park, R.W. 2003. The Dorset culture longhouse at Brooman Point, Nunavut. *Etudes/Inuit/Studies*, 27(1-2), 239-253. https://doi.org/10.7202/010803ar.

PSPC (Public Services and Procurement Canada). 2021. *Terms of Reference Consultant Services for Pioneer Sites Assessment Various Locations, Nunavut*.

WESA Inc. 2007. *Limited Phase II Environmental Site Assessment of Site Number NB012, Playfair Point Fuel Cache Bathurst Island, Nunavut.* Prepared for Indian and Northern Affairs Canada Nunavut Regional Office. Iqaluit.

WESA Inc. 2012a. *Integrated Phase I and Phase II Environmental Site Assessment EK007/EK011 Pioneer Island.* Prepared for Aboriginal Affairs and Northern Development Canada Contaminated Sites Directorate. Iqaluit.

WESA Inc. 2012b. *Integrated Phase I and Phase II Environmental Site Assessment NB070 Stupart Island.* Prepared for Aboriginal Affairs and Northern Development Canada Contaminated Sites Directorate. Iqaluit.

WESA Inc. 2012c. *Integrated Phase I and Phase II Environmental Site Assessment Skybattle Bay*. Prepared for Aboriginal Affairs and Northern Development Canada Contaminated Sites Directorate. Iqaluit.