

# Vulnerability assessment of selected key sites in Aasivissuit – Nipisat UNESCO World Heritage Area, West Greenland

## Nipisat, Arajutsisut, Innap nuua & Itinnerup Tapersuai

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Arajutsisut World Heritage Area Key Site © M. Myrup

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## Abstract

Harmsen, H., Hagen, D. & Buschman, V.Q. 2022. Vulnerability assessment of selected key sites in Aasivissuit – Nipisat UNESCO World Heritage Area, West Greenland. Nipisat, Arajutsitut, Innapp nuua & Itinnerup Tupersuui. NINA Report 2168. Norwegian Institute for Nature Research.

This report details an assessment of vulnerability of the four key sites of Nipisat, Arajutsitut, Innapp nuua and Itinnerup Tupersuui in West Greenland's UNESCO Heritage Area, *Aasivissuit – Nipisat, Inuit Hunting Ground Between Ice and Sea* (inscribed 2018). The work was performed in August 2021 by researchers from the Greenland National Museum and Archives (NKA), Norwegian Institute for Nature Research (NINA), Greenland Institute of Natural Resources (GINR) and National Museum of Denmark. This current study is part of a broader effort to develop a suite of baseline data for identifying current 'weak spots' in the terrain and provide metrics by which changes to the cultural heritage, wildlife, and vegetation can be measured in the coming years. The data produced from this report will also facilitate the future drafting of Site-Specific Guidelines at these localities by informing tourists, cruise operators, and community members of the location of protected ancient cultural remains, vulnerable vegetation and sensitive wildlife in the area. This assessment serves as a prerequisite for ensuring Aasivissuit - Nipisat remains a unique and sustainable cultural landscape and that the area's Outstanding Universal Values (OUV) are protected for the future.

## Kalaallisuuata Naalisarnera

Uuma Nalunaarusiap imarivaa Sisimiut eqqaata Aasivissuit-Nipisat UNESCO-up allattorsimaffianut 2018-imi ilanngunneqarsimasumi sumiiffiit pingaarnert Nipisat, Arajutsitut, Innapp Nuua aamma Itinnerup Tupersuui qanoq ilisukkut innarlerneqarsinnaaneri nalunaarsussallugit. Suliaq august 2021-imi Nunatta Katersugaasivianiit (NKA), Norsk Institut for Naturforskning (NINA), Pinngortitalerif-fimminngaaniit (GINR) aamma Danmarkimi Katersugaasivissuarminngaaniit suliarineqarpoq. Mas-sakut suliaq ingerlasoq tassaavoq, sumiiffinni nunap innarlerneqarsinnaaneranut ulorianartorsiorne-rusut, taamatuttaarlu kulturikkut eriagisassat uumasut, naasoqassutsillu misissornissaat. Nalunaaru-siami misissuinerup inerneru siunissami sumiiffinni takornarianut, takornariartitsisartunut, innuttaas-ullu allat mianerinninnissaannut innersuussutinik tikkuussinissamut atornerqarumaassapput. Innar-litsaaliinissamut nalilersuineq Aasivissuit – Nipisat siunissami kulturikkut kingornussatut immikkuul-larilluinnartut inissisimajuarnissaanut illersortuarnissaanullu tikkuussisuullunilu iluaqutaassaaq.

## Sammendrag

I denne rapporten vurderes sårbarhet for de fire nøkkellokaliteter Nipisat, Arajutsitut, Innapp nuua og Itinnerup Tupersuui i området Aasivissuit - Nipisat, Inuit Hunting Ground Between Ice and Sea, som i 2018 ble tatt inn på UNESCOs verdensarvsliste. Arbeidet ble utført i august 2021 av forskere fra Grønlands Nationalmuseum og Arkiv (NKA), Norsk institutt for naturforskning (NINA), Grønlands Naturinstitut (GINR) og Nationalmuseet. Undersøkelsen er en del av en bredere innsamling av grunnlagsdata, som kan identifisere sensitive (eller 'svake') steder i terrenget med bruk av kvantifiserbar metodikk. Resultatene fra sårbarhetsvurderingen vil bidra i fremtidige retningslinjer for ferdsel i terrenget på og omkring nøkkellokalitetene. Sårbarhetsvurderingen vil informere turister, reiselivsoperatører og lokalbefolkningen om plassering av fredede kulturminner, sårbar vegetasjon og dyrearter i området. Sårbarhetsvurderingen skal bidra til å sikre at Aasivissuit - Nipisat forblir et unikt og bærekraftig kulturlandskap og at områdets enestående verdier er beskyttet for fremtiden.

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## Preface

The UNESCO Heritage Area, Aasivissuit – Nipisat holds high nature- and cultural values and the tourism and visitation to the area is increasing. As a baseline for future Visitor Site Guidelines the Qeqqata Kommunia and the UNESCO Site Managers wanted to assess potential vulnerabilities or ‘weak spots’ on the landscape in relation to future development and propose possible mitigation strategies to minimize future impacts from increasing tourism and visitation in the region.

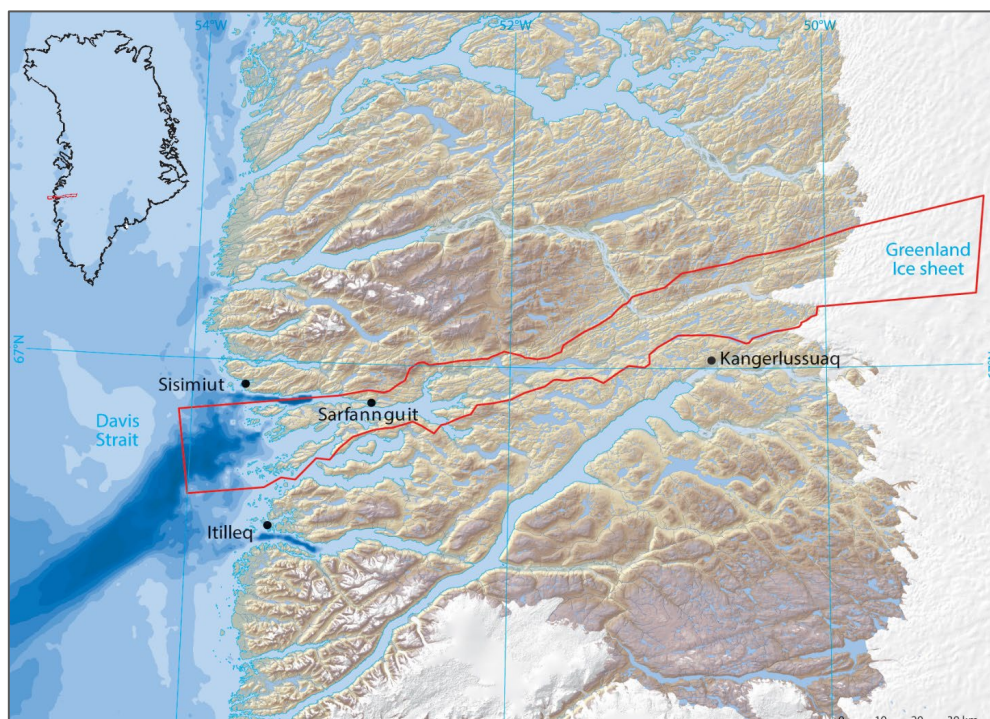
The Norwegian Institute for Nature Management (NINA) has developed a model for vulnerability assessment in Arctic and other northern areas with high or increasing tourism. With some minor adjustments this model can be applied to Greenland and key sites within the UNESCO Heritage Area, Aasivissuit – Nipisat and Qeqqata Kommunia and the UNESCO Site Managers made a request to the Norwegian Institute for Nature Research (NINA) to adopt the Norwegian model for vulnerability assessment for a selection of sites within the World Heritage Area.

From August 16<sup>th</sup>-23<sup>rd</sup>, 2021, researchers from the Greenland National Museum and Archives (NKA), the Greenland Institute of Natural Resources (GINR), the Norwegian Institute for Nature Research (NINA), and the National Museum of Denmark conducted vulnerability assessments at four Key Sites within the Aasivissuit – Nipisat UNESCO World Heritage Area to evaluate and quantify the current state of vulnerability for cultural heritage, wildlife, and vegetation. Field activities were organized between the UNESCO Site Manager and the Greenland National Museum and Archives. Additional logistical support was provided through the Activating Arctic Heritage project.

This Report is a joint product between NINA, NKA and GINR, and is published in the NINA Report series to be citable, open and accessible. The authors want to thank UNESCO Site Manager, Qeqqata Kommunia, and participants in the Activating Arctic Heritage project for all support and contributions during the planning and the field work.

Trondheim, 24.09.2022

Dagmar Hagen



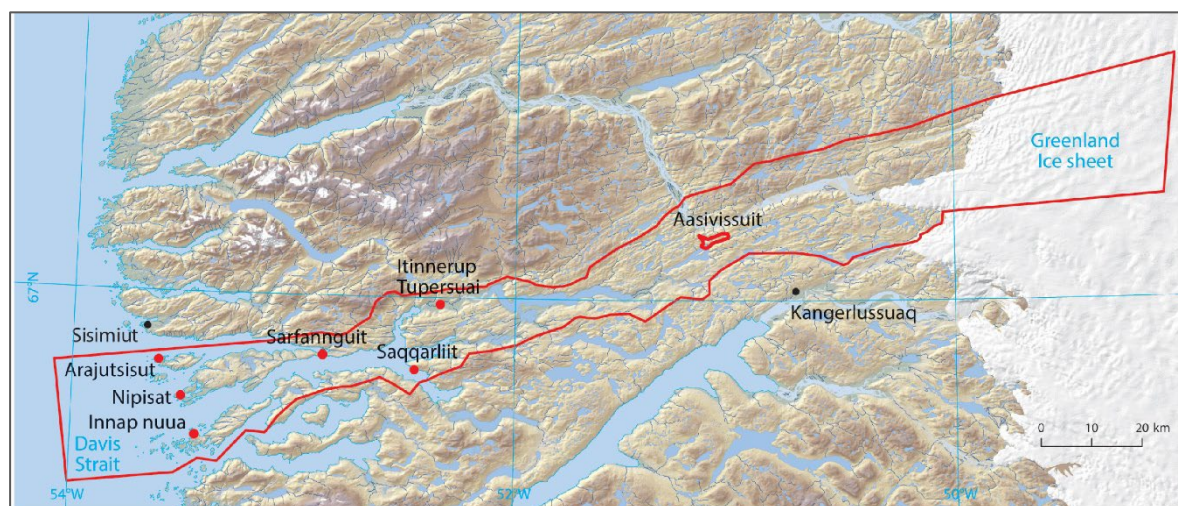
**Figure 1.** The inscribed Aasivissuit -Nipisat UNESCO World Heritage Area in central West Greenland, Qeqqata Kommunia (source: Jensen, et al. 2017).

# 1 Introduction

Inscribed to the UNESCO World Heritage list in 2018, Aasivissuit – Nipisat covers an area of 417,800 ha in central West Greenland (**Figure 1**), just north of the Arctic Circle. The property extends a length of roughly 235 km from east to west in the heart of the largest ice-free area in Greenland and is representative of an exceptional hunting ground for Arctic peoples over the last several millennia. The borders of the property follow the natural topography of the landscape, delimited by natural features such as fjords, lakes, hilltops, rivers and watersheds. In fjords, lakes, sounds and sea passages, the boundary is set midway between the nearest land on either side, and in the open sea it lies at Greenland's open water territorial demarcation line.

Researchers from the Greenland National Museum and Archives (NKA), the Greenland Institute of Natural Resources (GINR), the Norwegian Institute for Nature Research (NINA), and the National Museum of Denmark conducted a series of assessments at four of the seven Key Sites within the Aasivissuit – Nipisat UNESCO World Heritage Area<sup>1</sup> to evaluate and quantify the current state of vulnerability for cultural heritage, wildlife, and vegetation. Evaluations were conducted at the request of Qeqqata Kommunia (Municipality) and field activities organized between the UNESCO Site Manager and the Greenland National Museum and Archives. Additional logistical support was provided through the Activating Arctic Heritage project.

The four Key Sites investigated in 2021; (1) Nipisat, (2) Arajutsisut, (3) Innap nuua, and (4) Itinnerup Tupersuai, share many similarities but are also unique regarding the character of their natural and cultural resources, as well as the ways these sites are used, both today and in the past (**Figure 2**). The purpose of these field visits was to assess potential vulnerabilities or 'weak spots' on the landscape in relation to future development and propose mitigation strategies to minimize future impacts from increasing tourism and visitation in the region. This collaborative work represents a broad assessment of the natural and cultural values and vulnerabilities present at the four Key Sites and the potential risks to degrading of the Outstanding Universal Value (OUV) of the property as a whole<sup>1</sup>. The outcome of these evaluations serves as a baseline measurement for future management initiatives of the Key Sites and provides the necessary background data and interpretation required for the drafting of future Site-Specific Guidelines (SSGs).



**Figure 2.** Locations of the seven Key Sites in the Aasivissuit – Nipisat UNESCO WH area. These include Arajutsisut, Nipisat, Innap nuua, Sarfanguit, Saqqarliit, Itinnerup Tupersuai and Aasivissuit (source: Jensen, et al. 2017).

<sup>1</sup> See Section 1.2 of this report, and the 2017 UNESCO World Heritage Site nomination document: *Aasivissuit – Nipisat: Inuit Hunting Ground Between Ice and Sea*.



Aasivissuit – Nipisat possesses seven Key Sites representative of the major chronological phases in the early and later periods of Greenland's cultural development, with the contemporary settlement of Sarfannguit linking present day Inuit hunting practices and land use with the past. The World Heritage Area possesses a high concentration of archaeological remains that include ancient graves, winter settlements with turf house ruins along the coast, stone-built hunting features, *inussuit* (cairns) and ancient foot trails leading from the coast to the inland. The property is also noted for its extensive caribou drive system (Aasivissuit, 'the Great Summer Camp') located in the interior. Seasonal climatic variations and their effects on the accessibility of game and the natural topography of the area have shaped the pattern of human settlement beginning with the arrival of the first humans in the region ca. 2500 BC through to the present day.

The seven Key Sites were selected as typical of the principal hunting and fishing activities associated with traditional subsistence practices and land use in the region. Historically, winter settlements on the coast were oriented toward marine mammal hunting, and spring and summer camps in the inland were focused towards catching capelin and arctic char. Autumn sites in the interior high plains and valleys were representative of caribou hunting. These traditional hunting grounds are still visited by community members from Sisimiut, Kangerlussuaq, Sarfannguit, and other parts of Greenland.

The 417.800 ha property was inscribed to the UNESCO World Heritage list in 2018 based on Criterion (V): a cultural landscape that serves as an outstanding example of a traditional human settlement, land-use, or sea-use representative of a culture (or cultures), and human interaction with the environment vulnerable to irreversible change.

The inscribed area is owned by Naalakkersuisut (Government of Greenland) and administered by Qeqqata Kommunia and a Steering Committee composed of various stakeholders and agencies within both Qeqqata Kommunia and the Government of Greenland. Currently the easternmost part of the nominated area overlaps with the Ramsar Area no. 386, Eqalummiut Nunaat and Nassuttuup Nunaa, a protected wetland area extending northwards along the margin of the ice sheet beyond the property. As of December 2021, additional efforts are underway to create a National Park in the same vicinity that would overlap the eastern portion of the World Heritage Area.

## 1.1 Aasivissuit – Nipisat: Tourism Alongside Natural and Cultural Values

The World Heritage Area is protected and conserved by an established framework of national legislation, protective designations, and local planning policies described in more detail in Aasivissuit – Nipisat's management plan (Aasivissuit – Nipisat. Inuit Hunting Ground between Ice and Sea [1557], Annex 2)<sup>2</sup>. The management plan was formulated by a working group, with participants from the Greenland National Museum and Archives, Qeqqata Kommunia, and the Government of Greenland.

Destination Arctic Circle, the regional DMO of Qeqqata Kommunia, offers a wide selection of tourism activities that cover all seasons with a variety of different products and services that overlap, or are conducted within, the UNESCO World Heritage Area. However, a current lack of tourism infrastructure at the Key Sites currently limits the extent of these activities and products. Local businesses offer a variety of excursions from Kangerlussuaq and Sisimiut year-round within the nominated property and these services are expected to expand with the completion of the Sisimiut-Kangerlussuaq Nature Road project<sup>3</sup>. Most summer activities are offered in the coastal areas and close to the ice sheet. Winter activities are possible in the hinterland, with local operators offering dog sledging, snowmobiling, hunting, skiing, and fat bike touring between Kangerlussuaq and Sisimiut.

<sup>2</sup> <https://whc.unesco.org/en/documents/160522>

<sup>3</sup> [https://www.qeqqata.gl/emner/om-kommunen/arcticcircleroad/kangerlussuaq-vej?sc\\_lang=da](https://www.qeqqata.gl/emner/om-kommunen/arcticcircleroad/kangerlussuaq-vej?sc_lang=da)

Of the four sites visited in 2021, cruise ship tourism and local day-trip excursions provide the most relevant focus for determining potential future impacts to the Key Sites along the coast. However, as the Arctic Circle Trail (ACT) attracts more backpackers, and the Sisimiut-Kangerlussuaq Nature Road opens easier possibilities for community member use of the World Heritage Area, a new set of challenges for protecting Itinnerup Tupersuai's natural and cultural values are emerging.

The development and expansion of tourism in Qeqqata Kommunia has been ongoing for several years. However, the inscription of Aasivissuit – Nipisat as a UNESCO World Heritage Area has accelerated this process. An increase in tourism is expected to affect the natural and cultural values of the area if proper precautions, planning, and infrastructure development are outpaced by incoming visitors in the coming years. Although natural, long-term threats to the archaeological sites through climate change are recognized as inevitable (Hollesen, et al. 2018; Hollesen, et al. 2016), increased foot traffic in several areas could result in rapid and irreversible permanent damage to historical and archaeological features, accelerated erosion and damage to rare and vulnerable vegetation, as well as negative impacts to vulnerable and important wildlife species.

Subsequently, a demand for accessibility to the Key Sites and a lack of proper infrastructure and clear guidelines for use has already led to some unintended degradation to the natural and cultural values of the area. On-site tourist facilities, such as safe landing areas, trails and raised boardwalks, dissemination points and signs, as well as lavatories and waste management disposal and collection are absent at all of the Key Sites in Aasivissuit - Nipisat. On the other hand, the difficulty of access to land and to roam in these areas has also protected them. Travel to the Key Sites and within the UNESCO World Heritage Area are seasonal. In the summer access is limited to hiking, all-terrain vehicle (ATV), mountain bike, and in the winter by boat and skis, dog sledge, or snowmobile. Given better access to the Key Sites via the Sisimiut-Kangerlussuaq Nature Road, as well as better marine infrastructure and formalized access to the coastal sites by expedition cruise ships, it is expecting more community members and tourists may access these Key Sites in the coming years.

The Greenland Visitors Centre (GVC), in collaboration with Qeqqata Kommunia and the Aasivissuit – Nipisat Steering Committee, have proposed new measures to ensure sustainable development at Nipisat, Aasivissuit and Sarfannguit (see *Qeqqata Kommunia, turistanlaeg ved nationale sevaerdigheder*, 2021). The current study was performed regarding the proposed plan at Nipisat so that greater knowledge and consideration of the property's assets could be quantified, assessed and evaluated at the site level in alignment with the GVC's proposed development plan.

## 1.2 UNESCO Outstanding Universal Value (OUV) and the Key Sites

In 2018, Aasivissuit - Nipisat was inscribed to the UNESCO World Heritage list, based on Criterion (v.), that designates the property as:

*...[an] outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change.*

What this means is that the UNESCO World Heritage status implies that the property and its various components possess **Outstanding Universal Value (OUV)**. OUV means that the specific natural and cultural significance of an area is so exceptional that it transcends national boundaries and is of common importance to present and future generations and for all of humanity. The permanent protection of the OUV is of the highest importance, and loss of the natural and cultural values could result in the property's removal from the World Heritage list. The World Heritage Committee defines the criteria for the inscription of properties on the World Heritage List.<sup>4</sup>

Qeqqata Kommunia has outlined several goals for developing tourism in the World Heritage Area in accordance with Greenland's national strategy for investing in a more diversified economy. This

<sup>4</sup> [https://whc.unesco.org/en/compendium/action=list&id\\_faq\\_themes=962](https://whc.unesco.org/en/compendium/action=list&id_faq_themes=962)



includes development of a robust private tourism sector in the coming decade. These goals can be summarised as the following:

- Ensure cultural features in the inscribed area remain visible to promote a living history;
- Establish easier access to the inscribed area through construction of a Nature Road between Kangerlussuaq and Sisimiut;
- Promote and support increased tourism in the inscribed World Heritage Area;
- Protect all natural assets in the World Heritage Area;
- Encourage and support sustainable hunting and fishing in the World Heritage Area;
- Encourage and support the recreational and occupational use of the World Heritage Area;
- Support sustainable fisheries and occupational subsistence hunting in the World Heritage Area;
- Encourage and support the sustainable use of game animals in the World Heritage Area.

### 1.3 National Protective Designations

The inscribed World Heritage property is regulated by extensive legal restrictions that include national legislation and municipal planning. Parliamentary Acts and Executive Orders defining the use and protective status of the inscribed World Heritage property of Aasivissuit – Nipisat and its values are outlined in **Table 1**.

**Table 1.** Current legislation and executive orders defining the use and protection of the inscribed World Heritage property of Aasivissuit – Nipisat.

Year	Designated legislation
1937	Letter of 10 April 1937 to the Colony Manager at Angmagssalik regarding protected sites, j.nr. 556/36 (cf. Nipisat)
2010	Inatsisartut Act no. 11, 19 May 2010 on Cultural Heritage Protection and Conservation.
2010	Inatsisartut Act no. 17, 17 November 2010 on Planning and Land Use.
2011/2012	Inatsisartut Act no. 9 of 22 November 2011 on Environmental Protection, revised in Inatsisartut Act no. 1 of 29 May 2012.
2015	The Museum Act – Inatsisartut Act no. 8, 3 June 2015 on museum activities
2016	Executive Order no. 12 of 21 June 2016 on protection of Greenland's internationally appointed wetlands and protection of some species of water birds ('The Ramsar Executive Order').
2018	Executive Order no. 1 of 30 January 2018 on the second cultural heritage protection of a defined area in West Greenland around Aasivissuit-Nipisat.
2020	Executive Order No. 38 of 1 October 2020 on the assessment of the impact on cultural heritage in cultural history areas.

### 1.4 Vulnerability Assessment

The challenges related to increased tourism in areas of natural and cultural value share similarities across northern alpine and Arctic regions. Tourist operators in Svalbard and Greenland encounter similar environments and offer similar products, for example small and medium sized cruise-operations offering excursions and landings to accessible and scenic sites. From 2008 to 2019, researchers developed a method for vulnerability assessment of visitor sites based on studies in

Svalbard (Hagen, et al. 2014) and on the Norwegian mainland (Hagen, et al. 2019). The High Arctic Svalbard archipelago has experienced strong tourism trends over the last decade and tourism, as well as research, are expected to serve as the main drivers for economic development of the region in the future.

A conceptual model for vulnerability assessments of vegetation, wildlife, and cultural heritage was also published in 2012, and has been used by the Svalbard tourist industry and management authorities since. This model has served as the basis for developing Arctic Expedition Cruise Operators (AECO) visitor site guidelines for many landing sites on Svalbard.<sup>5</sup> In 2015 the Norwegian Environmental Agency decided to expand this approach for protected areas on the Norwegian mainland, including alpine areas, forest, and coastal sites. The mainland model covers vegetation and wildlife, however not cultural heritage. During the project period 2015 to 2019, vulnerability assessments were completed for localities of several Norwegian National Parks and Landscape Protected Areas that included defining broad categories for different types of tourists and visitor activities. Together the experiences from Svalbard and the Norwegian mainland cover a variety of nature classifications and human activities (e.g., tourist categories and user groups) that provide a relevant methodological approach for Greenland and the Aasivissuit – Nipisat UNESCO WH Area. To supplement the cultural heritage assessments within the Aasivissuit – Nipisat Area, the conceptual model for Svalbard has been further developed to include archaeological feature types and to make the model valid for Greenland's unique needs and conditions.

## 1.5 Report Aims

The UNESCO Site Manager for the Aasivissuit – Nipisat World Heritage Area and Qeqqata Kommunia made a request to the Norwegian Institute for Nature Research (NINA) to adopt the Norwegian model for vulnerability assessment for a selection of sites within the World Heritage Area. The assessment involved joint field assessment and reporting by the Greenland National Museum and Archives (NKA), the Norwegian Institute for Natural Research (NINA), and the Greenland Institute of Natural Resources (GINR) to evaluate vulnerabilities for cultural heritage, wildlife, and vegetation. The purpose of this collaboration is to establish a set of baselines for known Key Site vulnerabilities, gathering information and input on future management of the area, and to initiate the development of Site-Specific Guidelines (SSGs).

The assessment found in this report is based on both existing knowledge, research, and field reports, and supported by the site visits conducted by this team in summer 2021. The field studies included performing vulnerability assessments for cultural heritage, wildlife, and vegetation through the mapping of sensitive areas and special terrain features, species, and archaeological remnants of particular interest within the tourism sphere, as well as assessment of the plans for future use and development of the World Heritage Area. On Nipisat, evaluations followed the proposed infrastructure planning provided by the GVC for development of the island's interpretation as a Key Site and the possibilities for greater access and higher annual visitor volumes from expedition cruise ship landings. The findings included in this report are based on both written and oral sources and published and unpublished data to compile a comprehensive and more nuanced picture of the natural and cultural values and present use of the Key Sites. Additionally, mitigation measures that may contribute to reducing the various vulnerabilities in these Key Sites are suggested and discussed at the end of each chapter.

<sup>5</sup> See Site Guidelines - AECO

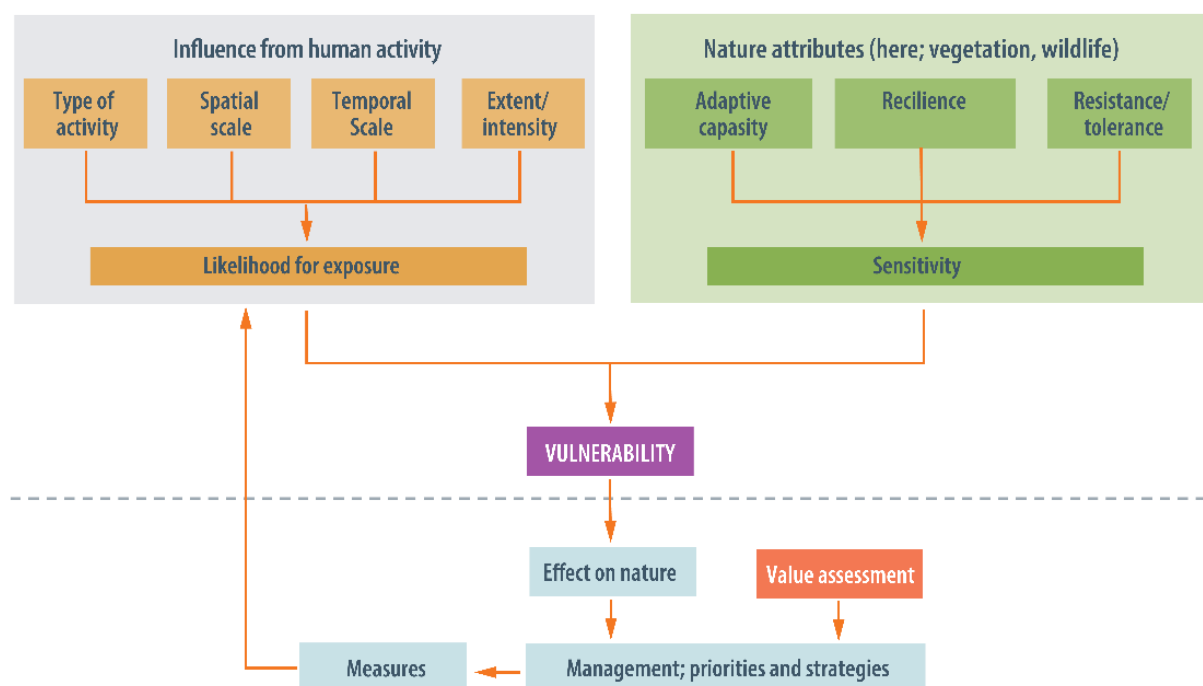
## 2 Assessing Vulnerability

### 2.1 Method and Approach

Natural and cultural values are basically intrinsic and not inherently vulnerable. However, when exposed to an external influence, such as human disturbance, they can become vulnerable. Some attributes of nature or cultural remains, for example, **sensitivity** in combination with **exposure** (e.g., tourism) can provoke or influence vulnerability. The different attributes of nature or cultural remains can trigger sensitivity, and different types of human traffic will cause different levels of exposure. **Figure 3** shows how these concepts are used in this study.

**Sensitivity** is defined here as how sensitive the resource (such as a species, nature type, or cultural remnant) is adversely affected by exposure, and to what extent it can adapt or repair itself if the exposure has caused an effect. Factors that determine the sensitivity of a species or area are **adaptability** (adaptive capacity; the extent to which a species manages to adapt to, for example, increased traffic), **resilience** (ability to recover or to what extent can nature repair itself after a negative impact, such as vegetation recovery after tearing) and **tolerance** (resistance; how much impact can a species or area tolerate before significant changes occur?).

The probability of a species or area being affected by human activity and the extent to which this **influence** causes a problem is related to when, where and how an activity takes place. Different types of activities, how many people, how they behave on/offshore, and when traffic takes place are important for whether a species or an area is exposed.



**Figure 3.** The concepts and understanding of vulnerability as used in this study.

## 2.1.1 Vegetation

### Sensitive Units

The sensitivity of vegetation to disturbance depends on the tolerance and resilience of individual vegetation and different terrain types. A limited number of ecological gradients determines the sensitivity, such as soil conditions (grain size, nutrient level, etc.), moisture, geology, species composition (functional plant groups), and state of disturbance.

- **Tolerance/resistance.** *How much exposure can the vegetation tolerate before it tears and the soil below is exposed?*
- **Recovery/resilience.** *To what degree can the vegetation recover after disturbance if the exposure is mitigated?*

Some areas or vegetation types have poor tolerance but good recovery capacity (such as flat, wet areas). Other areas have high tolerance and poor recovery capacity (such as medium dry alpine heath). However, some areas have combination of poor tolerance and poor recovery capacity, making them particularly sensitive to human impacts, both in the short- and long-term. These **sensitive units** are identified and monitored by the vulnerability assessment.

Previous studies from Svalbard and mainland Norway<sup>6</sup> has specified a long list of sensitive units (Hagen, et al. 2014; Hagen, et al. 2019), and based on experiences from these projects in quite similar alpine environment, we specified sensitive units for the Aasivissuit - Nipisat Area. Core ecological factors that determine the sensitive units under these conditions: degree of inclination, moisture, grain size, vegetation density (see **Table 2**). Some species or nature types are redlisted in the national list or by the IUCN (rare or endangered). Redlisted species are not necessarily sensitive, but could be, and it is important to include known occurrences (observations during fieldwork, citizen data, research etc.) of these species for vulnerability assessment at sites. Knowledge of redlisted species is relevant for the management of the area.

**Table 2.** *Sensitive units identified for vegetation and terrain in West Greenland, described by ecological gradients and associated tolerance and recovery capacity. (For details and description of types see Hagen et al. 2019).*

Sensitive units for vegetation and terrain
Exposed ridge / shallow soil
Brink / steep cliff
Steep slope with fine soil (>10% slope)
Peatland/wetland
Wet hollow
Sparse vegetation on fine-grained soil
Exposed alpine heath on fine or unstable soil

### Vulnerability assessment for vegetation – calculations for area and location

When sensitive units are mapped, the next step is the calculation of the 'expected' vulnerability as influenced by human impact. This calculation describes to what degree there is a potential conflict between vegetation and the ongoing or planned use and activities of people (including local users, tourists, researchers and others) using the area. This calculation is an essential but also sometimes complicated part of the assessment. This is particularly true in sites where there is a lack of knowledge about present and future human use, which entail high uncertainty in the analyses.

For vegetation, the two components of interest for the vulnerability assessment are **area** and **location**.

<sup>6</sup> <https://www.nina.no/S%C3%A5rbarhetsvurdering>

**Area (A)** expresses how much of the site is covered by sensitive units. As sites are very different in size, we avoid using absolute areas or % cover, instead try to estimate how many small and large units that are present in the site. This gives a relevant indication of the relevance of the area for management authorities by quantifying how many and how large the areas of concern are present.

Some sensitive units are always small, such as wet hollows and steep brinks, and some are normally large, such as peatland/wetland, but most sensitive units can be both small and large. For this purpose, we indicate that small units are <10 m, while large areas are >10 meters. The **Area (A)** will anyway be merged when calculating the vulnerability of a site:

1	One small unit
2	Several (2-5) small units One large unit One large and one small unit
3	One large and several small units Many (6-10) small units Two large units Two large and one small unit
4	Many (> 10) small units Three or more large units (even in combination with several small) Most part of the total site

**Location (L)** indicates where the sensitive units are placed, relative to the disturbance, including present or future use of the site. Each sensitive unit is classified related to the direct contact, and possible conflict to the disturbance, e.g. between the trail (or Area) used by humans and the unit. The classification of location is merged for all units of the same time within the total site, by the “one-out, all-out” principle.

A. Assessment along a path/hiking route. Consequently, the sensitive unit is always close to the area of use.	
0,1	Well defined and prepared path/road (easy to walk side by side) – might be located along a vehicle track or on a constructed boardwalk etc.
2	Distinct path, narrow or broad
4	Diffuse path/route, possible to roam in a wide sector (often a number of parallel paths)

B. Assessment in a larger site/area (e.g. camping site, viewpoint-area)	
1	The sensitive unit is located at a distance away from typical human activity at the site
3	The sensitive unit is located next to or close by the typical human activity at the site
4	The sensitive unit is located just at the core area of human activity at the site (such as at the main attraction in the site).

Finally, the vulnerability for each type of sensitive units is calculated by multiplying the area by location. Total vulnerability for the site is the sum of vulnerability for all sensitive units.

$$\text{Vulnerability (V)} = \sum_{i=1}^n (\text{area} \times \text{location}),$$

where  $i$  = sensitive unit, and *area x location* is summed for all sensitive units of each type in the total site.

Redlisted or rare species are not a part of the calculation, however such observations are relevant for all future management and should be recorded.

### Mitigation

In some sites there might be an option to perform management actions or to implement mitigating to reduce the risk of wear and tear and erosion. The effect of such efforts depends on local conditions and can improve tolerance or eliminate the risk for wear and tear. How these measures reduce the vulnerability (V) can be illustrated in the assessment by reduction in the sum-score values in



the tables. In each site we suggest mitigating actions to reduce the risk from human disturbance (trampling) on vegetation.

## 2.1.2 Wildlife

### Approach and Limitations

Aasivissuit-Nipisat is home to many resident and migratory species. To account for spatiotemporal variations in wildlife population dynamics, distributions, and sensitivity to anthropogenic disturbance, wildlife vulnerability must be assessed at a larger and coarser-grained scale than for vegetation and cultural heritage. Comprehensive assessments of species presence, population estimates, or fine-grained identification of habitat preferences for critical life cycle stages are not available for this area. Some compiled biodiversity information is available through the original Aasivissuit -Nipisat nomination document (Jensen, et al. 2017).

Many species have broader scales of habitat use that transcend individual sites within the area and also account for seasonal changes. As wildlife observations during single field surveys provide only limited information on wildlife population dynamics and their sensitivity to anthropogenic disturbance, this report provides an overarching assessment of wildlife vulnerability that relies on the following information:

- in-person identification of species presence and potential preferred habitat (limited due to single field survey)
- the 2018 Greenland Red List for vulnerable and endangered species<sup>7</sup>
- previous mapping of species' habitats within the area
- previous, local knowledge of the area involving local hunters' and fishermens'

Some species are ubiquitous across Aasivissuit-Nipisat, but this report chooses to roughly separate species into (a) marine-associated species (marine and coastal species), and (b) inland-associated species (terrestrial and freshwater species). This categorical divide helps us separate the wildlife in this study between the western half of Aasivissuit-Nipisat, concerning primarily marine-associated species, and the eastern half, concerning primarily inland-associated species. Further details on the species included in this study can be found in **Tables 3, 4, and 5**. **Table 6** provides additional species of interest present in Aasivissuit-Nipisat area that are relevant for tourism and culture but retain no special status in Greenland.

This report generalizes species presence by compiling relevant wildlife information in the following ways:

**Western half** of the protected area— characterized by the biogeographical makeup at the mouth of the Aasivissuit-Nipisat Fjord, comprised of small barrier islands, shallow channels, and presence of primarily marine and coastal-associated species such as marine mammals and seabirds.

**Eastern half** of the protected area – characterized by the biogeographical makeup of the inner fjord and the mountains and valleys of Aasivissuit, and where species of interest are primarily terrestrial and freshwater, including terrestrial mammals and waterfowl.

**Additional species of interest** – Characterized as species that do not appear on the Greenland Red List but are either of interest to tourism or cultural activities.

<sup>7</sup> <https://natur.gl/raadgivning/roedliste/>

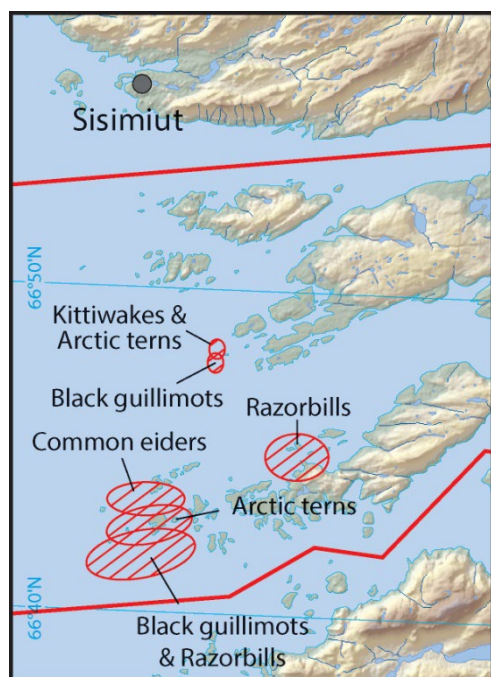
**Table 3.** *Species status categories. International standards for evaluating the vulnerability of wild-life species at local and global scales help track species that require species management and attention. The Greenland Redlist is informed by the vulnerability status and criteria system developed by the International Union for the Conservation of Nature (IUCN). These international standards help to summarize the species' vulnerabilities. Additional information for individual species' exact conditions and known vulnerabilities can be found on the IUCN website database. Many countries also carry out their own local assessments and maintain country-wide Red Lists.*

tatus	Definition
Status - NE	Not Evaluated – A taxon is NE when it has not been evaluated or assessed against these criteria.
Status - LC	Least Concern – A taxon is LC when it has been evaluated against the Red List criteria and does not qualify for Critically Endangered, Endangered, Vulnerable, or Near Threatened status.
Status - NT	Near Threatened – A taxon is NT when it has been evaluated against criteria but does not qualify for Critically Endangered, Endangered, or Vulnerable status now, but is close to qualifying for, or is likely to qualify for, a threatened category in the near future.
Status - VU	Vulnerable – A taxon is VU when the best available evidence indicated that it meets any of the criteria A to E for Vulnerable status, and it is therefore considered to be facing a high risk of extinction in the wild.
Status - EN	Endangered – A taxon is Endangered when the best available evidence indicated that it meets any of the criteria A to E for Endangered status, and it is therefore considered to be facing a very high risk of extinction in the wild.
Status - CR	Critically Endangered – A taxon is CR when the best available evidence indicated that it meets any of the criteria A to E for Critically Endangered status, and it is therefore considered to be facing an extremely high risk of extinction in the wild.
Status – EW	Extinct in the Wild – A taxon is EW when it is known only to survive cultivation, in captivity, or as a naturalized population (or populations) well outside the past range. A taxon is presumed EW when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
Status - EX	Extinct – A taxon is EX when there is no reasonable doubt that the last individual has died. A taxon is presumed EX when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range has failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
Status - DD	Data Deficient – a taxon is DD when there is inadequate information to make direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking.

### Wildlife Presence in the Western Half of Aasivissuit-Nipisat

Both resident and migratory species occupy the area around Nipisat and the other barrier islands at the mouth of the fjord. A full catalogue of species presence and their population estimates is not available for this area, though some previous research conducted is available for key species of birds such as the Greenland white-fronted goose. The status of species listed under the Greenland Red List (updated 2018) are included here.

The western half of Nipisat is largely ice-free in the winter and its shallow, warm waters in the summer are rich in biodiversity. These warmer waters are very productive, serving as spawning grounds for capelin (LC), their high concentrations benefitting seabirds and predatory marine mammals. Ice-adapted seals such as ringed seal (LC) and bearded seal (LC) also overwinter in the area.



**Figure 4.** Species of birds nesting, breeding, and feeding in the vicinity of Nipisat.

This area is home to many critical wildlife species that appear on the Greenland Red List (**Figure 4**), and many of these species are additionally protected under international conventions. The most common of these protected species are the seabirds that occur on the islands around Nipisat which play host to various seabird colonies, including those of black-legged kittiwakes (VU), Arctic terns (NT), Black guillimots (LC), and Razorbills (LC), as well as nesting grounds for common eiders (LC) and various species of gulls (Figure 4). The listed marine mammal species such as walrus (VU) and polar bears (VU) are highly uncommon along the islands around Nipisat though they may appear occasionally, while whales may occasionally be seen in the waterways around Nipisat as they move in and out of the fjords. Other species of interest, either listed as least concern or unassessed, are also present (Table 5). White-fronted geese (EN) are listed in the western half as well as the eastern half despite their officially recognized breeding grounds in the Ramsar site adjacent to the inland portion of Aasivissuit-Nipisat. This subspecies of bird is particularly vulnerable as it breeds only in West Greenland, and no other place in the world, and may stop over in the western half of the protected area to rest and feed during its migration.

**Table 4.** Greenland redlisted species present in the western half of Aasivissuit-Nipisat at various times during the year. This is not an exhaustive list of all species present. Additional redlisted species may have yet to be identified.

Species – English	Species – Greenlandic	Species – Latin	Status	Criteria
Arctic tern	Imeqqutaalaq	<i>Sterna paradisaea</i>	NT	A2a
Black-legged kittiwake	Taateraaq	<i>Rissa tridactyla</i>	VU	A2a
Greenland white-fronted goose	Nerleq	<i>Anser albifrons flavirostris</i>	EN	A4ab; C1
Harbor seal	Qasigiaq	<i>Phoca vitulina</i>	CR	C2ai
Hooded seal	Natsersuaq	<i>Cystophora cristata</i>	VU	A3ac
Walrus – West Greenland	Aaveq	<i>Odobenus rosmarus</i>	VU	A2ad
Beluga	Qilalugaq qaqortaq	<i>Delphinapterus leucas</i>	VU	A2ad
Bowhead whale	Arfivik	<i>Balaena mysticetus</i>	VU	D
Polar bear	Nanoq	<i>Ursus maritimus</i>	VU	A3c

#### Wildlife Presence in the eastern half of Aasivissuit-Nipisat

Aasivissuit and the surrounding area are characterized by a low valley of tundra, wetlands, and a small river situated between mountains and accessible by a small river at the base of the fjord. The obvious wildlife species dominating this landscape are the caribou (LC) and muskox (LC) that are easily found near the site during the summer months. Population estimates for both populations are conducted annually and are easily available. Additionally, the eastern half of the protected area is adjacent to the Ramsar site that is designated as a migratory bird area particularly for the Greenland white-fronted goose (EN), which breeds in the Ramsar site and no other place in the world. Other terrestrial species are less researched, and a full catalogue of wildlife species presence and population estimates is not available.

The area is known to also support several unprotected species of swans, geese, and cormorants that migrate and breed in the area, as well as immature and nonbreeding species of gulls that primarily occupy the inner fjord. For redlisted marine species, both harbour seals (CR) and hooded seals (VU), can occasionally be found in the inner-fjord where they may feed and haul out. The redlisted species found in this half of the protected area are listed in **Table 4**.

**Table 5.** Greenland redlisted species present in the eastern half of Aasivissuit-Nipisat at various times during the year. This is not an exhaustive list of all species present. Additional redlisted species may have yet to be identified.

Species – English	Species – Greenlandic	Species – Latin	Status	Criteria
Greenland white-fronted goose	Nerleq	<i>Anser albifrons flavirostris</i>	EN	A4ab; C1
Harbor Seal	Qasigiaq	<i>Phoca vitulina</i>	CR	C2ai
Hooded Seal	Natsersuaq	<i>Cystophora cristata</i>	VU	A3ac

**Table 6.** Additional species of interest present in Aasivissuit-Nipisat that are relevant for tourism and culture, though retain no special status in Greenland.

Species – English	Species – Greenlandic	Species – Latin
Black guillemot	Serfaq	<i>Cephus grylle</i>
Glaucous Gull	Naajarujussuaq	<i>Larus hyperboreus</i>
Common eider	Miteq siorartooq	<i>Somateria mollissima</i>
Razorbill	Apparluk	<i>Alca torda</i>
Rock ptarmigan	Aqisseq	<i>Lagopus mutus</i>
Canada goose	Nerlernaarsuk	<i>Branta canadensis</i>
Arctic hare	Ukaleq	<i>Lepus arcticus</i>
Arctic fox	Terianniaq	<i>Alopex lagopus</i>
Caribou	Tuttu	<i>Rangifer tarandus</i>
Muskox	Umimmak	<i>Ovibos moschatus</i>
Bearded seal	Ussuk	<i>Erignathus barbatus barbatus</i>
Harp Seal	Aataaq	<i>Pagophilus groenlandicus</i>
Ringed Seal	Natseq	<i>Phoca hispida</i>
Harbour porpoise	Niisa	<i>Phocoena phocoena</i>
Humpback whale	Qipoqqaq	<i>Megaptera novaeangliae</i>
Fin whale	Tikaagulliusaaq	<i>Balaenoptera physalus</i>
Minke whale	Tikaagullik	<i>Balaenoptera acutorostrata</i>
Capelin	Ammassak	<i>Mallotus villosus</i>
Arctic Char	Egaluk	<i>Salvelinus alpinus</i>

### Known Wildlife Sensitivities

Overall wildlife vulnerability is related to each species' **sensitivity** (i.e., adaptability/ability to recover), and **tolerance** of anthropogenic disturbance. Assessing wildlife sensitivity to an increase in tourism activities is complex, as many of these species are migratory, occupying their preferred habitat only seasonally and/or changing their preferred habitat throughout the year.

Wildlife vulnerability is largely dependent on a sensitivity to projected increases in anthropogenic disturbances and the related effects that include:

#### Species Occupying Marine and Coastal Environments

- Increases in human presence (e.g., sight, smell, noise)
- Increase in underwater noise pollution from large passenger ships (in deeper waters)
- Increase in underwater noise pollution from zodiac and Targa (in deeper and shallower waters)
- Increase in above-water noise pollution from zodiac and Targa, particularly on seabird colonies

By which these anthropogenic disturbances may adversely affect:

- The feeding, nesting, moulting, and breeding activities of seabirds
- The feeding and spawning activities of marine fishes
- The birthing, calving, hauling, feeding, and migrating activities of marine mammals
- The feeding and migrating activities of whales



*For species occupying terrestrial and freshwater environments*

- Increases in human presence (e.g., sight, smell, noise)
- Increase in noise pollution from 4-wheelers and ATVs
- Increases in above-water noise pollution from zodiacs and small motorboats along rivers and lakes

By which these anthropogenic disturbances may adversely affect:

- The feeding, nesting, moulting, and breeding activities of wetland-associated waterfowl
- The feeding and spawning activities of freshwater fishes
- The birthing, calving, feeding, and migrating activities of terrestrial mammals

These disturbances may lead to disruptions of activities at critical life cycle stages and to overall reductions in species' survival and fecundities. This report cannot estimate these sensitivities as these sensitivities are species dependent and not enough information is currently available.

### **Community Considerations**

An increase in wildlife vulnerability will translate to impacts on local communities, whose subsistence hunting and fishing practices represent a living, intangible cultural tradition in the area. Increases in anthropogenic disturbance from tourism activities could change wildlife spatiotemporal population dynamics, survival, and fecundity, thereby changing the condition by which local communities can hunt and fish for food. The activities potentially impacted include:

- Small-scale hunting of primarily waterfowl, seabirds, reindeer, and muskox
- Small-scale fishing of both marine and freshwater fishes
- Small-scale collecting of seabird and waterfowl eggs

Changes to hunting and fishing conditions could lead to potential reductions in the access, availability, stability, and use of traditional foods, as well as adverse impacts to local food security and disruptions to cultural practices related to harvesting traditional foods. As cultural heritage and local use of the area was an important factor in Aasivissuit-Nipisat's nomination to the UNESCO World Heritage list, this report includes considerations and recommendations for mitigating potential impacts to local harvesting, hunting, and fishing where appropriate.

### **Mitigation**

The wildlife present at some sites may be more sensitive to anthropogenic disturbance than others. Additional protocols to protect wildlife, tourists, and local activities may mitigate some of the related disturbances. Seasonal protocols may also serve to protect migratory species, or those using individual sites during critical life cycle stages. What these protocols should be, and how they may improve vulnerability of individual species is not calculated in this report, though some preliminary suggestions are made.

## **2.1.3 Cultural Heritage**

Ancient monuments, ruins, and archaeological features at Nipisat, Arajutisut, Innap nuua and Itinerup Tupersuai were first documented in several earlier surveys and excavations conducted in the area by archaeologists from the National Museums of Denmark, Greenland National Museum and Sisimiut Local Museum over the last 70 years. For the purposes of this report, identification and registration of ancient remains was derived from this earlier documentation and supplemented by the identification of new features and high precision GPS point mapping of their exact locations on the landscape. Archaeological features were segregated into individual 'units' based on their diagnostic type (e.g., winter house ruin, tent ring, shooting blind, grave, etc.) and presumed age. These 'units' include all associated components found adjacent to or near the feature (for example surface artifacts or displaced architectural components not found in situ). The evaluation of each individual unit included assigning a point value to seven separate categories that include: (1) the remoteness of the site, (2) presence or absence of a clear path, (3) accessibility to the unit, (4)

readability of the unit, (5) state of preservation of the unit, (6) presence/absence of portable or loose objects, and (7) pull-factor of the site (i.e. what story or quality draws visitors to the site). Once point values were assigned to each unit, a unit value was calculated using a formula to calculate its Vulnerability Index Value (VIV). An average VIV score is then calculated for each Key Site. The categories for determining the vulnerability of each unit are defined as follows:

**Remoteness factor (R):** Heritage sites in Greenland are often widely dispersed and difficult to reach by land or sea. The 'remoteness factor' is a determination of how difficult or easy it is for visitors to reach the site overland, by sea or in some cases by helicopter. This category is comprehensive in that it applies generally to the geographical location and logistical barriers which may increase or decrease the overall vulnerability of the site.

1	Extremely remote. The site is rarely or never visited by tourists. Reaching the site is very expensive (for example, only by helicopter) and is not possible without extensive logistical support and/or specialized knowledge of the area.
2	Very remote. Access to the site is possible but some logistical support/local knowledge is required.
3	Remote. The site can only be accessed by a chartered private or commercial boat (e.g. a Targa) or reached overland by foot within a 24-hour period.
4	Out-of-the-way. The site is within a short journey (less than half day's hike) from a major town or settlement by foot.
5	In the neighbourhood. Site is located inside or within a short walk or drive from a major town or settlement. In some cases, a remote site <i>could be included</i> in this category if it is known to be a target destination for expedition and/or larger class cruise ships and landings are not obstructed by difficult terrain.

**Path (p):** This category designates whether a pre-defined walkway or footpath is present to guide visitors directly or intuitively to a safe distance directly to or near the unit. Note: sheep, caribou and musk ox trails—although visible paths—are not *intentional* paths. In many cases these trails increase vulnerability directly passing within 2-meters of a protected feature.

0,1	Well-defined, wide path, dirt road or track (possible to walk side by side)
2	Clear path, narrow or wide
4	No path and/or unclear path; movement is unrestricted, and it is possible to walk over large area

**Access (a):** This category asks to assess how easy or difficult is it for a visitor to approach within 2-meters of the vulnerable unit? This category also includes considerations of terrain and safety (e.g., loose soil or gravel or slippery rocks), vegetation overgrowth, natural and/or artificial obstructions, etc.

1	Difficult
2	Moderately easy
3	Easy
4	Very easy

**Readability (r):** The readability of a unit is a determination of how easy or difficult for a visitor (non-specialist) to understand that they are looking at an ancient or historic feature. This could also include how densely overgrown a unit is with vegetation, making it difficult for a layperson to identify without prior knowledge of the site. A lack of readability increases vulnerability as people may inadvertently enter or disturb the ancient feature or its components.

1	Easy to understand
2	Moderately easy to understand
3	Difficult to understand

**State of preservation (S):** This category describes how robust the integrity of a unit is at the time of the site visit by the evaluator. Indications of a poor state of preservation include any type of damage from human, animal and natural sources. These include trampling, visible signs of erosion (water, wind, coastal processes), physical disturbance or collapse of standing/built remains, vegetation overgrowth (i.e. grey willow and dwarf birch), looting and/or obvious missing components, modern construction, farming activities, evidence of camping, litter and garbage, and of course previous archaeological investigations. Note: a high state of 'poor preservation' will *always* lead to increased vulnerability over the long-term.

1	Good to excellent: little to no disturbance
2	Medium: some disturbances
3	Poor: heavy disturbances but historic integrity is still present
4	Extremely poor; heavy disturbances – this can also mean that the historical integrity of unit has been irreversibly compromised

**Objects (o):** Does the unit have loose objects or architectural elements that can be picked up, moved, or manipulated? For example: whale bones, wood, human remains, antlers, loose grave-stones, scattered surface artifacts, etc.

1	No visible objects
2	A few (1-5)
3	Some (6-10)
4	Many (10+)

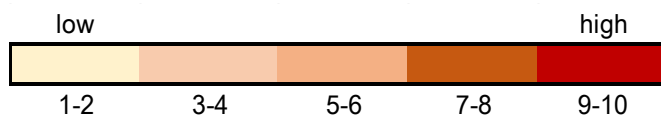
**Pull-factor (f):** Is the site or destination advertised as a destination by local operators or well-known as a point of interest, or does the unit exist as special class of ruins that draws visitors to the site (for example, a unique historic feature with a story or visually impressive archaeological remains).

1	Little to no significance
2	Significant, the unit is an attraction for visitors
4	Highly significant or main attraction

Once the unit is scored, the numbers are entered into the equation below, where  $V$  equals the overall Vulnerability Index Value (VIV) for the unit:

$$V = \frac{(R * .1) + (p * a) + r + S + o + f}{3,2}$$

The final value of  $V$  is expressed as an integer between 1 and 10, where a score of 1 indicates the lowest measure of vulnerability and 10 is extremely vulnerable (**Figure 5**). Once all VIVs are calculated, they are averaged to provide a final VIV for the site.



**Figure 5.** The Vulnerability Index Value scale.

**Emergency stop**

In some cases, a unit may be considered extremely vulnerable due to a pre-existing external factor (e.g., resting on a loose gravel surface that could be easily disturbed by foot traffic) or because it represents a certain type of archaeological feature (e.g., an ancient grave) that has been determined not to be made into a public attraction. In these situations, regardless of the score, the unit is denoted with a red triangle that identifies that the unit should be completely avoided and/or requires special protective measures.

**Mitigation**

The utility of the index lies in the opportunity for archaeologists, project planners and site managers to assess where specific interventions can be made to decrease a unit (or a site's) overall VIV (for example adding a path or boardwalk to reduce the p value of an individual unit to 0,1). Comparative scores are calculated to show how the construction of formal paths, controlled or limited access through visual markers and barriers, and interpretive signage can all help lower or reduce either a single unit or a site's overall VIV.



**Figure 6.** The Vulnerability Assessment team was able to take advantage of the basecamp established by the Activating Arctic Heritage project on Nipisat in August 2021. Photo: D. Hagen, Norwegian Institute for Nature Research.

## 2.2. Field Work and Background Documentation

### 2.2.1 Field Survey

The field surveys were performed at four of the UNESCO Key Sites of Nipisat, Arajutsisut, Innappuua and Itinnerup Tupersuai in the Aasivissuit – Nipisat World Heritage Area between 16.-23. August, 2021. The Vulnerability Assessment Team was able to take advantage of logistical support and transport provided by the National Museum of Denmark and Greenland National Museum, which had established a base camp at Nipisat as part of an ongoing field campaign for the Activating Arctic Heritage project<sup>8</sup> (**Figure 6**).

The purpose of the field surveys was to establish a comprehensive overview and improve knowledge of the sites, map sensitive units for vegetation, wildlife, and cultural remnants and identify weak points in the future use of the sites as interpretive destinations for citizens, local operators and cruise ship visitors.

### 2.2.2 Background Sources

Various digital and online resources are available for the Aasivissuit – Nipisat World Heritage Area, as well as the individual Key Sites (**Table 7**). We do not reproduce all available information in this report but will refer to sources when relevant. The background description of the World Heritage Area and reason for the nomination is well documented by Jensen et al. (2017), and very useful for our report.

Observations of wildlife cannot be based on a single intervention nor field survey, so information provided in this report originates from various sources. There are in general very few data on vegetation and plant species in Greenland, and we refer to relevant sources for the study area, or in general, when these exists. Observations made during the field survey adds to existing data.

**Table 7.** Overview of relevant data sources for available data on cultural heritage, vegetation, wildlife, and tourism/visitors.

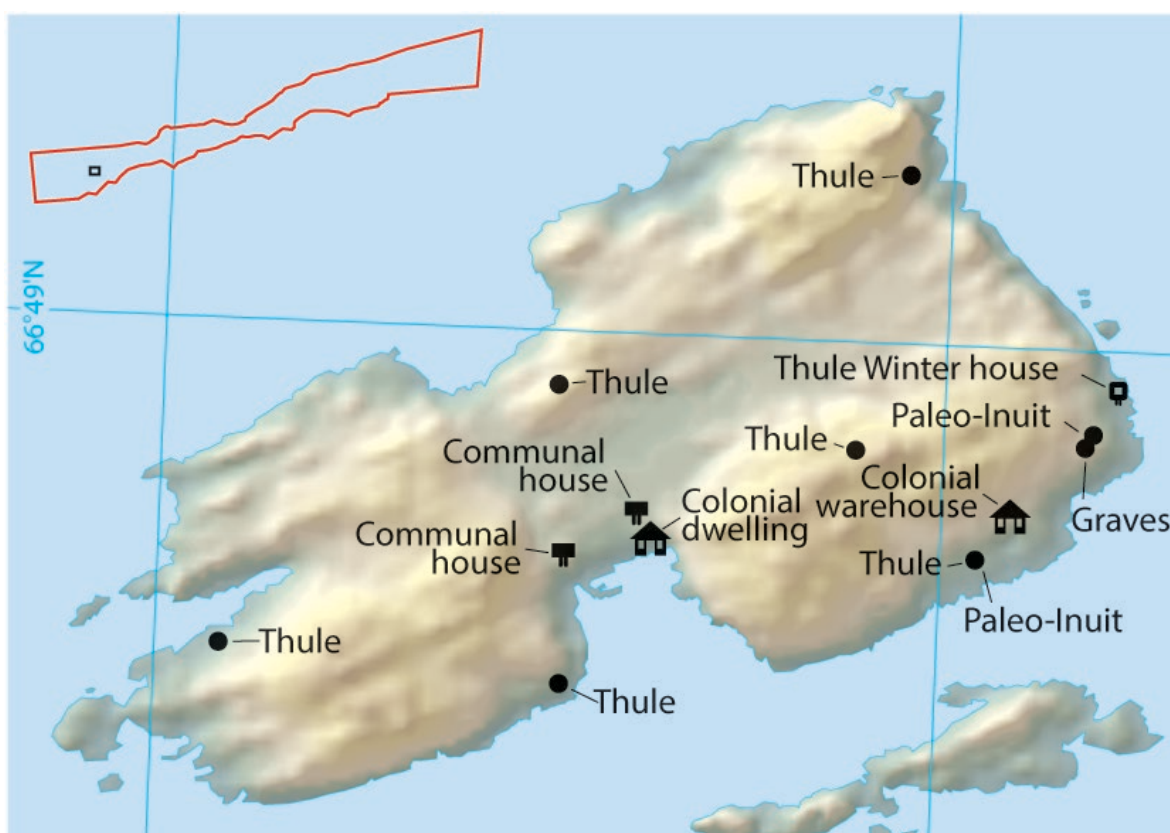
Sources	Data and availability
World Heritage Area resources	UNESCO.org; Jensen, et al. (2017); Poulsen, et al. (2017)
Heritage databases	Nunniffiit (Greenland National Museum online database)
Other historical sources	Sisimiut Museum; Greenland National Archives; Danish National Library
Wildlife and vegetation databases	Asimi.gl, Greenland Institute of Natural Resources
Greenland Redlist	Vascular plants, mammals, birds, and fish
Species information	National and international databases of recorded species distribution; GBIF
Tourism data	Greenland Statistics Bureau, Qeqqata Kommunia, Destination Arctic Circle, Association of Arctic Expedition Cruise Operators (AECO)

<sup>8</sup> Activating Arctic Heritage: Exploring UNESCO World Heritage in Greenland



### 3 Vulnerability Assessment for Nipisat<sup>9</sup>

The island of Nipisat is located approximately 20 km south of present-day Sisimiut and possesses a suite of archaeological sites and features that include Saqqaq culture and Thule Inuit culture settlements in addition to the remains of the failed Danish-Norwegian colony of Nipisene (**Figure 7**). Micro-climatic and environmental conditions on the island have resulted in a high degree of preservation which have contributed significantly to our knowledge of the earliest settlement of West Greenland by Paleo-Inuit peoples over 4,000 years ago. The island is probably most well-known for the colonial settlement of Nipisene, established in 1724. Visible ruins include the walls of the former colonial house (*vaaningshuset*) and warehouse (*pakhus*), as well as the remains of several Inuit cultural features most likely dating to the period following the second abandonment of the Nipisene colony in 1731. The island also contains numerous isolated Inuit hunting features, ancient graves and a very rare children's 'playground' replete with a miniature stone-built playhouse and kayaks.



**Figure 7.** Island of Nipisat (from Jensen et al. 2017:70, Box 9 'Colony of Nipisene').

Nipisene was the second colonial settlement established by the Danish-Norwegian administration in Greenland, shortly after the founding of the first colony near present-day Nuuk in the Nuup Kangerlua in 1721. Norwegian missionary and leader, Hans Egede, heard rumour of Dutch whalers active in the Ikertoq fjord and the rich whale hunting along the coast further to the north. By 1724, a decision was made to establish a permanent Danish presence on the island of Nipisat in an attempt to monopolize whaling and trade with the local Greenlanders (Gad 1973; Haan and Bobé 1914) in the area. However, no whales were caught during the first year and the following summer the colony ran low on supplies and was hastily abandoned. Dutch whalers seized the opportunity to get rid of the competition and in September 1725 Hans Egede heard that the buildings on Nipisat had been razed by the Dutch. A second attempt to establish a permanent settlement was attempted in 1729. In this year, a large contingent of men and supplies was sent north with plans for the

<sup>9</sup> The island possesses several registered sites/features that include **NKAH 307, 5526, 5527 and 5534**.

construction of a defensive fortress on the island. The first stage involved construction of a dwelling and administration house on the bank of the little cove found on the south side of Nipisat along with a large warehouse approximately 800 m to the southeast. In 1731, after a disastrous winter, the colonists were recalled to Denmark by Royal Order. What could be salvaged at Nepisene was dismantled and taken back to Godthab (present day Nuuk) and the remaining buildings were burned down by Dutch privateers.

Today, the ruins of 1) the warehouse, 2) the colonial house and 3) the cannon battery are still visible on the island. The remains of the colonial house form a U-shaped ground plan with flat areas to north. At least three Inuit built turf houses (constructed after the colonial occupation) lie inside and adjacent to the footprint of the colony house. The first lies outside the colonial house sharing the northern wall of the facade. Inside and along the eastern side of the colonial house, a two chambered Inuit communal house is visible. Inside the southern wing of the colony house, a third Inuit turf house has been built into the ruin. It possesses a 4 m long entrance passage running southward towards the shore with a cooking niche on its eastern side.

Approximately 100 m to the west of the colonial house is a reinforced earthen mound that served as the rampart for three cannons. This bastion appears as a slightly raised area with clearly defined edges. A few meters to the north are the remains of a circular house structure that may have been utilized by both colonists and Inuit and different times. Approximately 50 meters to the west, a cluster of several Inuit turf house remains, and tent rings are present, all demonstrating evidence of multiple phases of occupation and rebuilding.

Approximately 500 m to the southeast of the colony house, the remains of the colonial warehouse (**Figure 8**) are observed. This structure originally stood two stories high, measuring 34 x 9.6 m<sup>2</sup> with a two-meter-wide opening found in the northern wall and a second doorway along the eastern gable wall. Today, the walls stand between 0.75-1 m high and roughly 1.25 m wide creating a well-defined landmark on the island.

A Saqqaq culture settlement is also found on the southeastern part of the island, situated on an ancient beach ridge located 50 m from the shore at an elevation of 9 m above sea level. Archaeological excavations of the site were conducted between 1989 and 1994 which showed no evidence of disturbance from later human activity (Gotfredsen and Møbjerg 2004). However, the excavation of the site was extremely thorough, resulting in very little remaining archaeological materials or visible evidence of the settlement. Today a sparse vegetation has recovered over the area, but it is still vulnerable to wind-blown erosion and human traffic.

### 3.1 Present and Expected Use – Demarcation of the Site

Prior to 2019, the island was a popular local destination with several day-visit tours offered by local operators from Sisimiut. Visitors arrive by Targa or small boat with groups consisting of usually 5-15 individuals, including crew. Data from AECO also suggest the island was also visited by expedition cruise ships in 2018 with a total of 756 visitors to the island during that summer season (Association of Arctic Expedition Cruise Operators 2019).

In 2019, a line of 1.5 m high wooden posts was installed at 10 m intervals across a portion of the island with the intention of creating a temporary path for visitors. The temporary path stretched from the Saqqaq settlement on the eastern side of the island crossing the rocky inland terrain with a terminus at a vantage point that looked over the ruins of the former colonial house. A few temporary wooden signs were installed to serve as interpretation points, however these signs consisted of laminated paper stapled to plywood boards and have subsequently disappeared. In early 2021, general consensus between the UNESCO Site Manager and the Steering Committee favoured removal of the posts due to their visually intrusive quality on the natural landscape. In December of 2021, the UNESCO Park Ranger began cutting and removal of the posts on Nipisat.

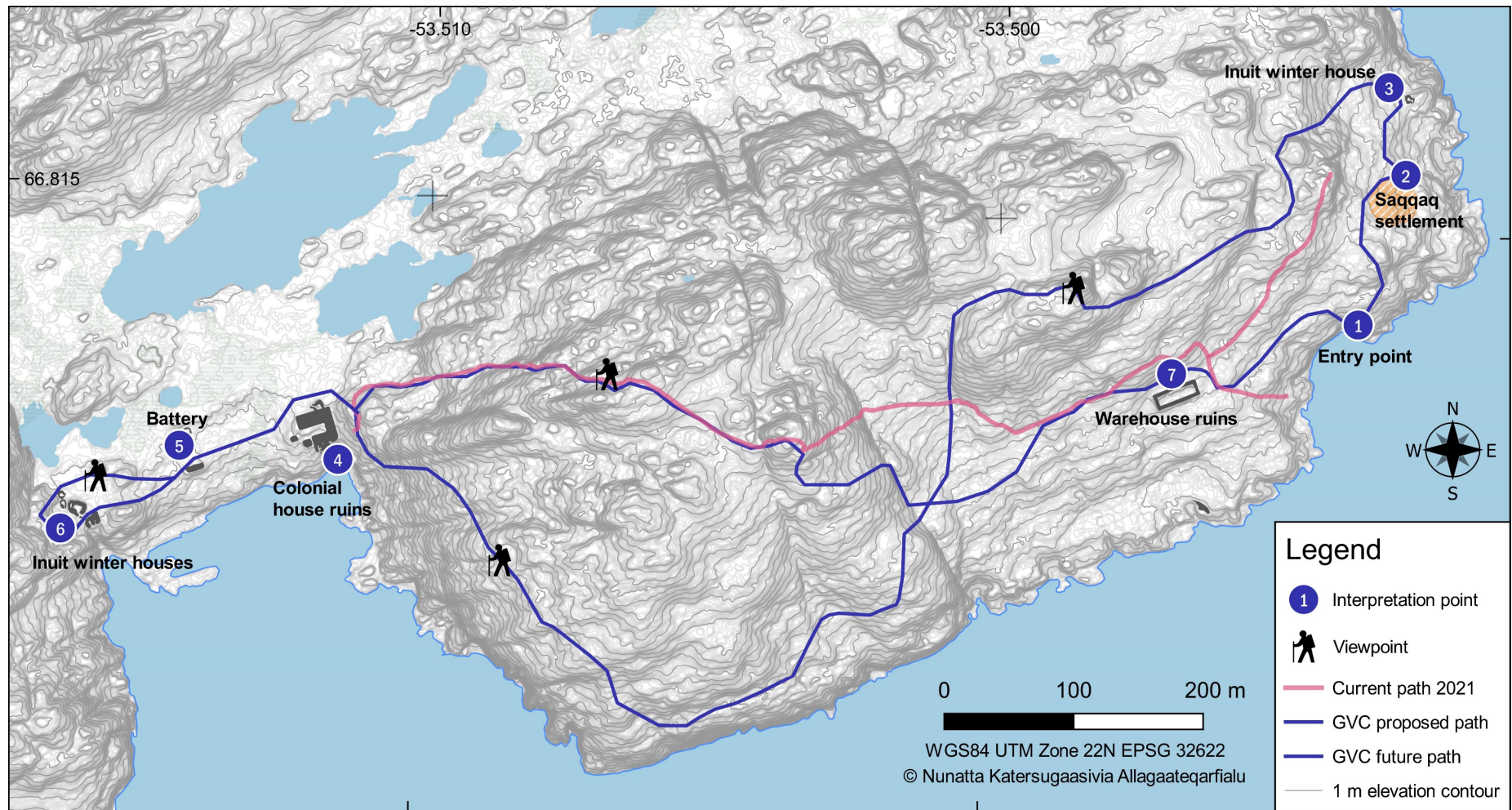


**Figure 8.** The colonial warehouse ruins on Nipisat. Many cultural remains on the island exhibit a high degree of sensitivity and their vulnerability could increase if new visitor paths are created on the island. Photo: J. Fog Jensen, National Museum of Denmark, 2016.

As of 2021, the island has a total of sixty-five ( $N=65$ ) registered cultural units, however there are probably many more features on the island that have not yet been identified. This number is likely to increase in the future as more surveys are performed along remote parts of the island. A current plan is in place for the establishment of a tidal landing area or pontoon dock on the south shore of Nipisat that will greatly increase accessibility for visitors. The current collaboration between the Qeqqata Kommunia's *formidlings projekt* and the Greenland Visitor Centre (GVC) has involved a comprehensive visitor dissemination plan for the island. The working group has based its study on the planned route (see **Figure 9**, next page) provided by the GVC in the document *Qeqqata Kommunia, turistanlaeg ved nationale sevaerdigheder* (2021). This plan includes a total of seven interpretation points and four viewpoints dispersed across the southern part of the island.

Based on this new route proposed by the GVC, a total of twenty-seven ( $n=27$ ) cultural features will fall within 100-meters of the new path. Some of these features are included as part of the interpretation strategy, however many other features—such as the Inuit grave field and children's "playground"—are not included because they are considered too vulnerable for visitation at this time. Many of other features along the path, such as the ruins of the colonial warehouse may become more vulnerable if mitigation actions are not taken.





**Figure 9.** Map showing the current visitor path on Nipisat (pink) and the new path proposed by the GVC (blue). The new GVC path includes seven interpretation points and four viewpoints.

## 3.2 Vulnerability Assessment for Vegetation

Nipisat is a mosaic landscape (**Figure 10**) comprised of several different vegetation types common to this part of West Greenland, such as willow and dwarf birch heath, crowberry, and bog bilberry. Vegetation is sparse along the tops of ridges with rocky, exposed areas covered by lichens and sedges. In between are small or larger wetlands, some of them very saturated and inaccessible by foot, while other being spongy and wet, but still possible to access by foot. The wetlands are dominated by bryophytes, sedges and grasses.

A complete floristic inventory was never performed, but no rare or redlisted plant species were observed during the fieldwork.

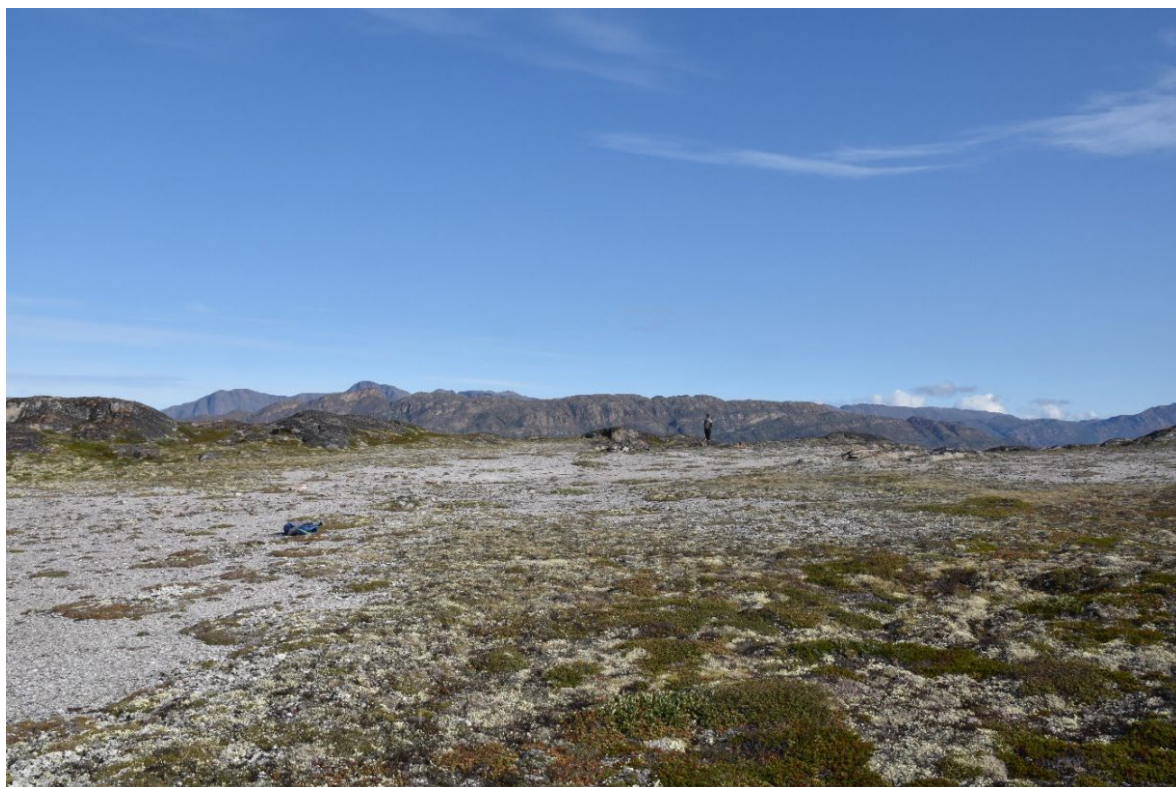


**Figure 10.** Mosaic vegetation in Nipisat with heathlands, rocky areas, and small wetlands. Photo: D. Hagen, Norwegian Institute for Nature Research, August 2021.

The sensitivity assessment at Nipisat included two parts: (1) the suggested hiking route, and (2) the core cultural dissemination points and other archaeological remains found on the island. These two assessments are treated separately below (see **Figure 12** and **Figure 13**).

The major parts of the suggested hiking route pass through robust vegetation and terrain. The channelling of visitors along the wooden poles limits the area of the impact, and along most the route a visible path has already been developed. Along the same path a small number of sensitive units are recorded; four exposed ridges/sparse vegetation with fine grained soil (**Figure 11**), three steep hills (**Figure 11b**), and one wet area, that give a location score of 4. The total vulnerability for the hiking trail along the eastern and central part of the island calculates an overall sum of 24 (**Table 8**).





**Figure 11.** An exposed ridge with sparse vegetation (#1009) on fine grained soil. Photo: D. Hagen, Norwegian Institute for Nature Research, August 2021.



**Figure 11b.** Steep hill with unstable soil/ substrate (#1010). Photo: D. Hagen, Norwegian Institute for Nature Research, August 2021.

**Table 8.** Vulnerability assessment for vegetation and terrain in Nipisat, the suggested hiking route in eastern and central part of the island. Alternatives of mitigation are described in the test below and account for the new scores.

Nipisat (east)					Mitigation		
Map ID	Sensitive unit	Area	Location	Area × location	Area	Location	Area × location
1002 1004 1009 1012	Exposed ridge (area) / Sparse vegetation on fine-grained soil	3	4	12	3	4	12
1007 1010 1013	Steep hill with unstable soil/ substrate	2	4	8	2	2	4
1015	Wet vegetated area	1	4	4	1	1	1
	SUM for the site			24			17
	Redlisted species	None recorded					

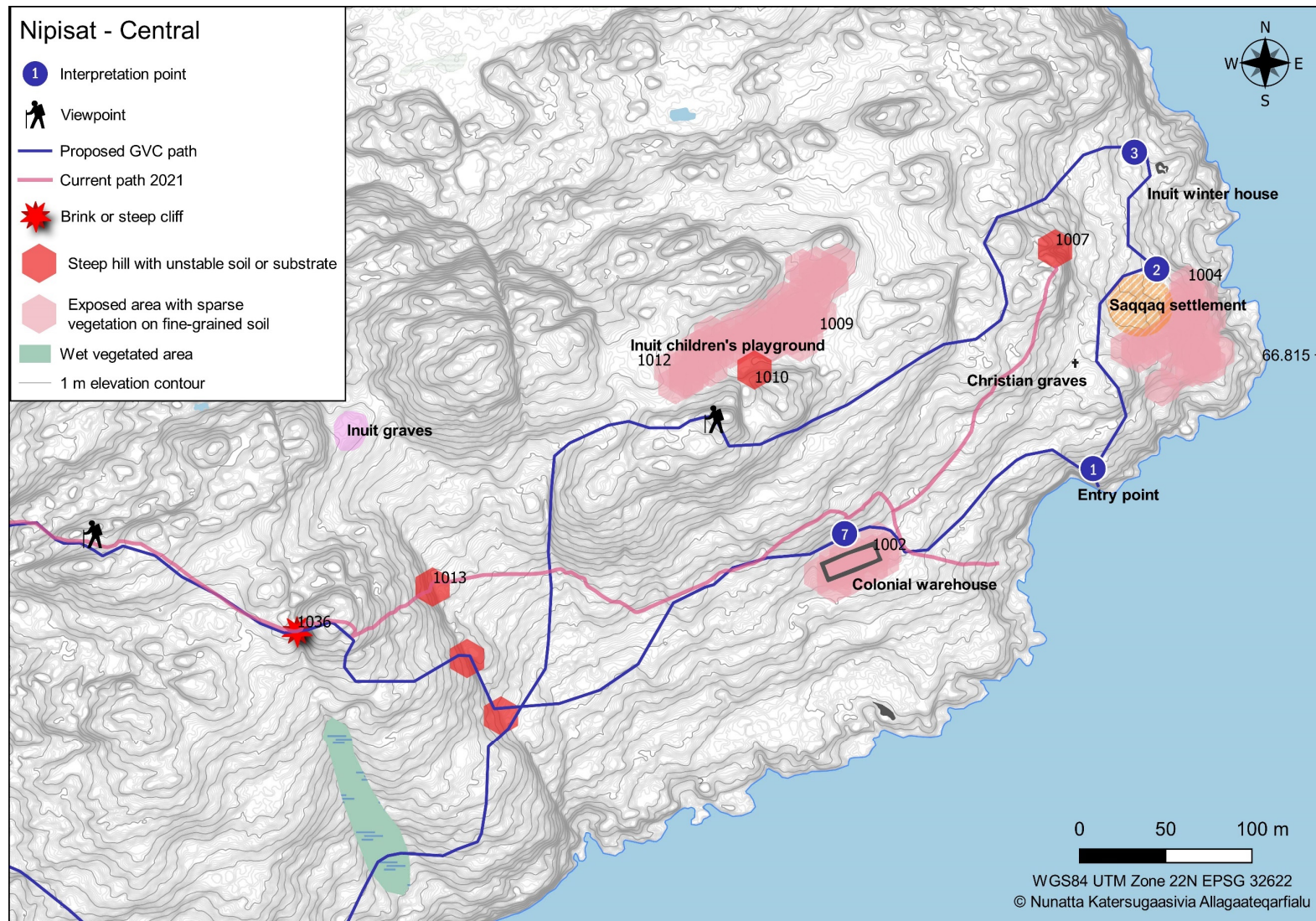
**Table 9.** Vulnerability assessment for vegetation and terrain in Nipisat, west part of the island. Alternatives of mitigation are described in the test below and explain for the new scores.

Nipisat (central)					Mitigation		
Map ID	Sensitive unit	Area	Location	Area × location	Area	Location	Area × location
1023 1024 1034 1035	Steep hill with unstable soil/ substrate	2	1	2	2	1	2
1033 1036	Brink/steep cliff	2	1	2	2	1	2
1027 1028 1029 1030	Wet vegetated area	2	4	8	2	2	4
	SUM for the site			12			8
	Redlisted species	None recorded					

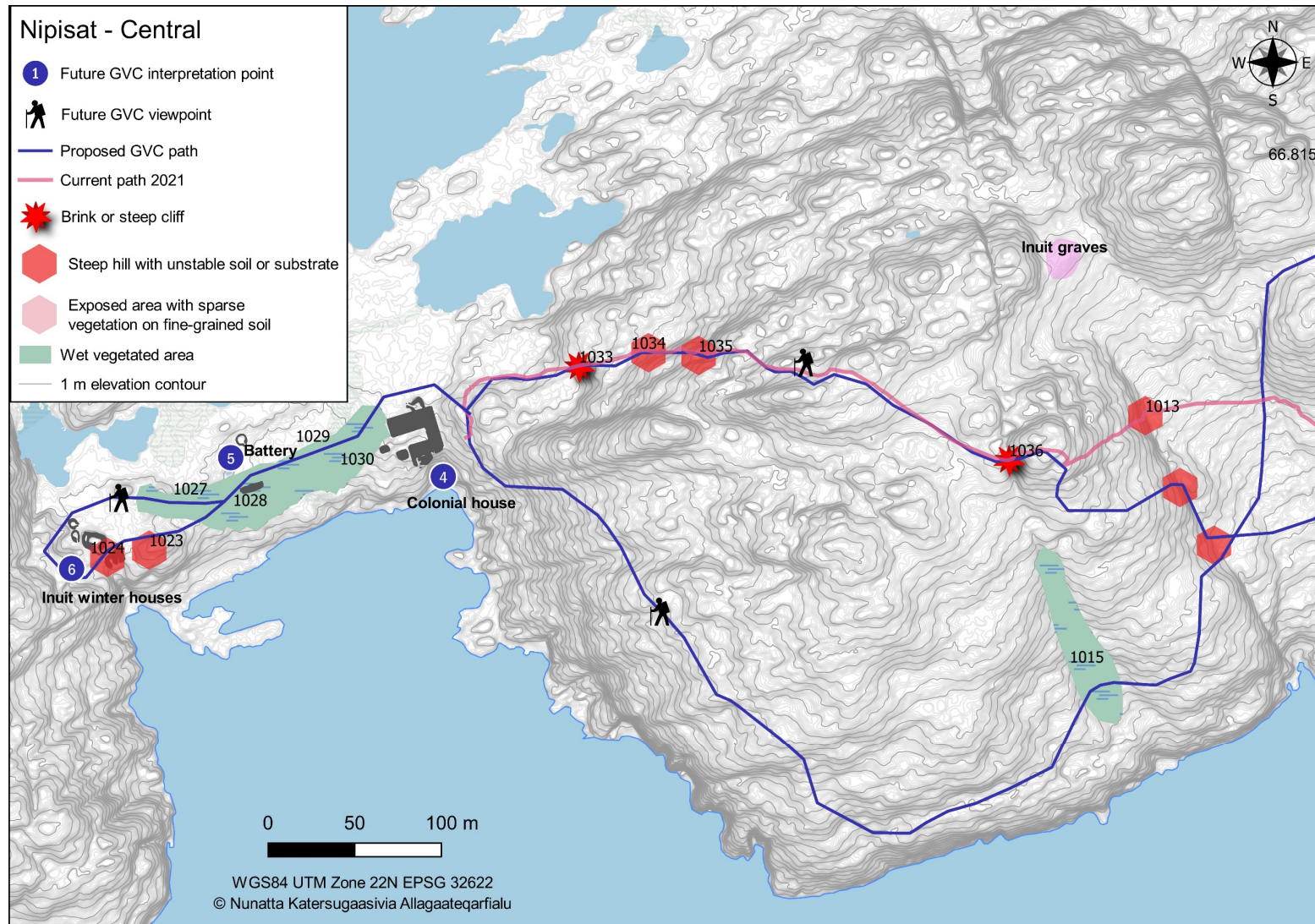
The areas around the Inuit and colonial houses on the western portion of the island (**Figure 13**; GVC points of interest #4-6) will be attractive for visitors due to easy access to readable remnants, and are also included in the proposed route in the dissemination plan. The route crosses wet areas which will be muddy and complicated to enter if the number of visitors increase in the future.

Further hiking on the western side of the island is not a part of the proposed hiking route, but it does possess significant natural qualities and would be easy for hikers to access. The terrain and vegetation here is similar to the eastern side of the island, with some exposed ridges and areas with sparse vegetation on fine-grained soil (**Figure 14**). The vegetation is generally robust, and considering a low number of visitors that walk off marked path this will probably not cause any tearing or erosion. However, if the number of visitors increases, the management authorities should consider establishment of a marked path. The total vulnerability for this part of the island is however low, with a sum of 3 (**Table 10**).





**Figure 12.** Nipisat east, vulnerable areas identified adjacent and along the proposed GVC path.



**Figure 13.** Nipisat central, vulnerable areas identified adjacent and along the proposed GVC path.





**Figure 14.** Exposed ridge with unstable substrate in the western part of Nipisat (#1116).

**Table 10.** Vulnerability assessment for vegetation and terrain in Nipisat, far western part of the island (not shown on map). At present, alternatives of mitigation are not relevant for this part of the island.

Nipisat (west)					Mitigation		
GPS ID	Sensitive unit	Area	Location	Area × location	Area	Location	Area × location
1116 1119 1120 1121	Exposed ridge (area) / Sparse vegetation on fine-grained soil	3	1	3	-	-	-
	SUM for the site			3			
	Redlisted species	None recorded					

### Mitigation

The proposed hiking trail is situated in an area with robust terrain and vegetation. The most vulnerable section of the path to discuss is the large wet area found between the colonial house ruins and Inuit turf houses to the west. This area has a low tolerance for trampling and can easily be torn resulting in a visual and ecological negative impact. Adding stepping stones or boards across the wetland will reduce the vulnerability, as the visitors then will use the developed path.

The need for mitigation on vegetation outside this wetland is limited, but some minor measures can contribute to reduce vulnerability. The terrain has lots of small hills and depressions that must be passed. At some points along the present path (e.g., #1010), the route could be adjusted to avoid a steep hill. These steep slopes have a soil and vegetation cover on top of rocks, and these will likely be destabilized when vegetation and soil is torn off down to the bedrock. In this way the risk of increasing erosion is limited as long as the hikers stay on the path and avoid creating parallel routes. This adjustment can reduce the vulnerability significantly, to a sum score of 17 (see **Table 8**).

### 3.3 Vulnerability Assessment for Wildlife

Nipisat wildlife vulnerability assessment considers only species known to occupy the western half of Aasivissuit-Nipisat at various times of the year (**Table 11**). This allows for the exclusion of mammals and birds primarily occupying the inland areas and focuses rather on the species using the islands south of Sisimiut and those marine mammals moving in and out of the fjord. One exception is the addition of the Greenland white-fronted goose (EN) which may use this site as a stopover on the way to their breeding grounds further inland.

**Table 11.** Species of interest that are present in, or in the vicinity of, the Nipisat site for at least some portion of the year. This is not an exhaustive list of all species present and additional redlisted species may have yet to be identified.

Species – English	Species –Greenlandic	Species – Latin	Status	Criteria
Arctic tern	Imeqqutaalaq	<i>Sterna paradisaea</i>	NT	A2a
Black-legged kittiwake	Taateraag	<i>Rissa tridactyla</i>	VU	A2a
Harbor seal	Qasigiaq	<i>Phoca vitulina</i>	CR	C2ai
Hooded seal	Natsersuaq	<i>Cystophora cristata</i>	VU	A3ac
Walrus – West Greenland	Aaveq	<i>Odobenus rosmarus</i>	VU	A2ad
Beluga	Qilalugaq qaortaq	<i>Delphinapterus leucas</i>	VU	A2ad
Bowhead whale	Arfiviit	<i>Balaena mysticetus</i>	VU	D
Polar bear	Nanoq	<i>Ursus maritimus</i>	VU	A3c
Black guillemot	Serfaq	<i>Cephus grylle</i>	LC	
Common eider	Miteq siorartooq	<i>Somateria mollissima</i>	LC	
Razorbill	Apparluk	<i>Alca torda</i>	LC	
Rock ptarmigan	Aqisseq	<i>Lagopus mutus</i>	LC	
Canada goose	Nerlernaarsuk	<i>Branta canadensis</i>	LC	
Arctic hare	Ukaleq	<i>Lepus arcticus</i>	LC	
Arctic fox	Terianniaq	<i>Alopex lagopus</i>	LC	
Bearded seal	Ussuk	<i>Erignathus barbatus barbatus</i>	LC	
Harp Seal	Aataaq	<i>Pagophilus groenlandicus</i>	LC	
Ringed Seal	Natseq	<i>Phoca hispida</i>	LC	
Harbour porpoise	Niisa	<i>Phocoena phocoena</i>	LC	
Humpback whale	Qipoqqaq	<i>Megaptera novaeangliae</i>	LC	
Fin whale	Tikaagulliusaaq	<i>Balaenoptera physalus</i>	LC	
Minke whale	Tikaagullik	<i>Balaenoptera acutorostrata</i>	LC	

#### Wildlife Presence – Nipisat

The primary and immediate wildlife concerns on Nipisat pertain to birds. Nipisat's central pond just north of the current landing site is a productive moulting grounds for waterfowl in the early summer months as well as a favourable location for migrating songbirds. White-fronted geese are known to have frequented Nipisat in the past, but do not appear to have recovered this area in recent years. White-fronted geese (EN) pass through this area on their way to their breeding grounds in the Ramsar site overlapping the Aasivissuit-Nipisat area boundaries further inland to the east. However, Canada geese (LC) do arrive in large numbers to moult at this central pond in the early summer. White-fronted geese (EN) are included in the Nipisat site despite their officially recognized breeding grounds in the Ramsar site on the eastern side of Aasivissuit-Nipisat. This subspecies of bird is particularly vulnerable as it breeds only in West Greenland, and no other place in the world.



Field observations showed indications of additional wildlife presence, including Arctic foxes and hares, ravens, and birds of prey, none of which are species of concern in this region. One species of note, seals, were not observed during the field survey, but several locations around the island could be choice haulouts. Seal presence is a concern only if those appearing are the Redlisted species of harbor seal (CR) or hooded seal (VU). Additionally, the other Redlisted marine mammals including walrus (VU), beluga (VU), bowhead (VU) and polar bears (VU) are very rarely found so close to land except those whales that move in and out of the fjord.

### **Local Community Use of Wild Living Resources**

Both the communities of Sisimiut and Sarfannguit actively harvest, hunt, and fish in the Aasivissuit-Nipisat area. Nipisat is commonly visited by locals who moor small boats all along the island's coastline and whose cabins dot the surrounding islands and mainland, some of which are visible from Nipisat. Likely little harvesting, hunting, or fishing occurs on Nipisat itself.

However, not captured in previous reports and assessments is a small seabird colony on the southwestern side of Nipisat that is in current use by both an unidentified species (as the colony was not occupied during the site visit) and by a local harvester (who had left small remains of egg collecting equipment near the colony). Additional egg collecting activities for ducks and gulls occur on the surrounding islands in the months of May and June.

### **Mitigation**

Unintended adverse impacts to wildlife due to anthropogenic disturbance may be mitigated through the development of site-specific guidelines and protocols for species and particular seasons. These guidelines may consider implementing 'emergency stops' such as those suggested for cultural heritage that will always protect Redlisted species, other species during their critical life cycle stages, and the seasonal harvesting, hunting, and fishing activities of local citizens. Examples of such protocols may include strong guidelines for proper behaviour around breeding, nesting, moulting, and feeding birds such as refraining from landing on small islands with nesting waterfowl and seabirds and keeping adequate distance from seabird colonies. This includes strong protocols for proper behaviour around marine mammals and haulouts. Site landings while redlisted marine mammals are present should always be avoided.

### 3.4 Vulnerability Assessment for Cultural Heritage

Nipisat's status as a Key Site in the Aasivissuit – Nipisat World Heritage property is well-known, and the island is a frequent day-trip destination for local citizens and tour operators from Sisimiut. Annual visitor numbers to the island are generally on the low side, however in 2018, the island was visited by expedition cruise ships and may have had upwards of 750+ cruise visitors that summer (**Figure 15**). Investment in new infrastructure and interpretation points will inevitably increase the attractiveness for cruise ships to land passengers at Nipisat and therefore a thorough understanding of potential sensitive points and vulnerabilities of the island's cultural heritage assets should be considered to ensure the site's values are maintained.



**Figure 15.** The ship, *Seabourn Quest*, landing passengers at Nipisat in 2018. Photo: Jan Bannemann.

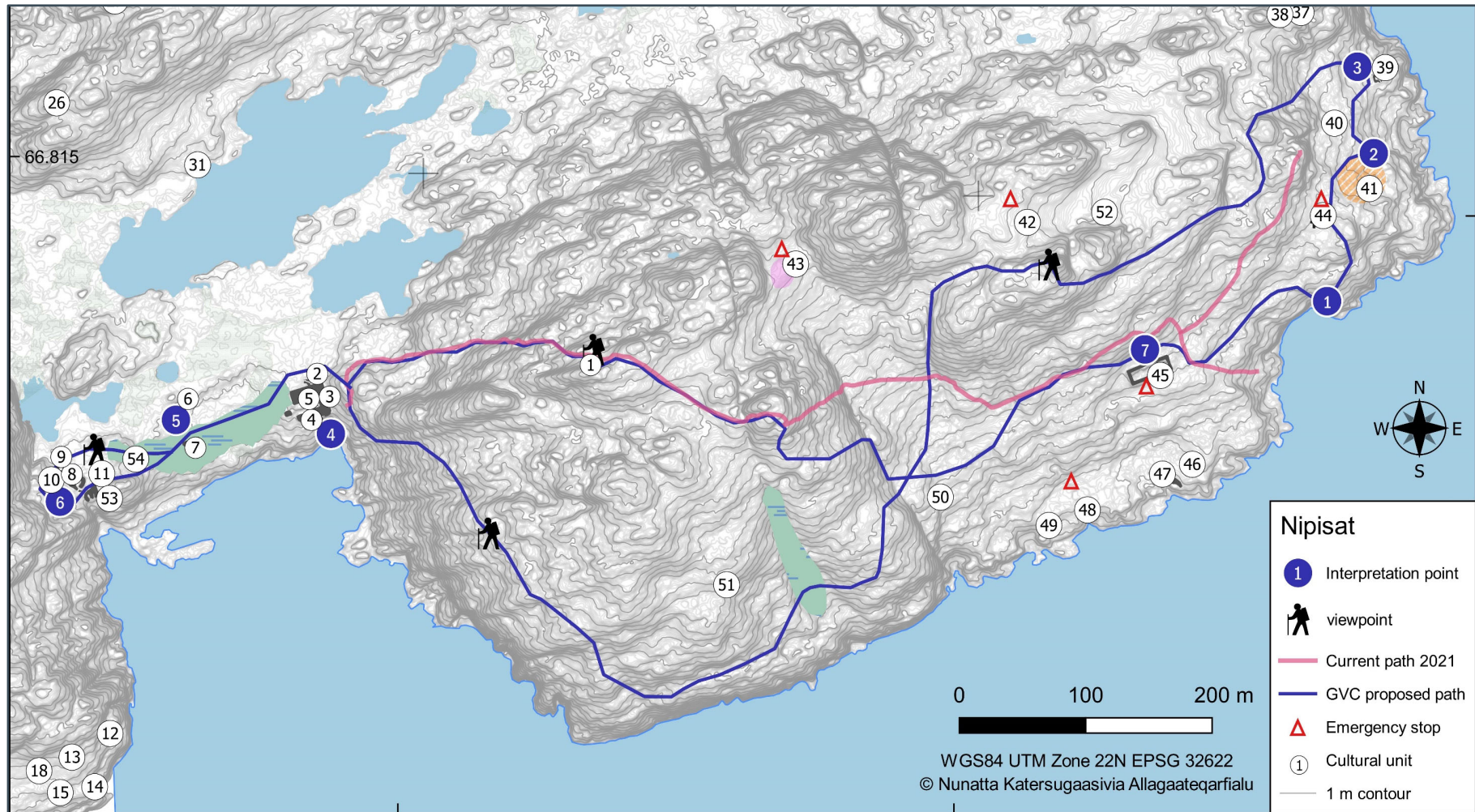
Ancient monuments, archaeological features, and historic elements on the landscape can have a variety of different vulnerabilities that can be influenced by both natural and human pressures, and therefore vulnerability can vary widely between units of the same type depending on their placement in the terrain and the prevailing conditions of the natural/historic environment. Consequently, even when units may appear to be so heavily disturbed that there appears to be little left in terms of value—it is precisely this poor state of preservation that makes them even more vulnerable to future degradation. A good example of this can be seen at the Saqqaq settlement (**Figure 16**) on the eastern side of the island. The excavations conducted in the early 1990s left very little in terms of physical remains, but the site is still subject to the conditions and protections detailed under the 2010 Heritage Act .

Archaeological feature types on Nipisat can be broadly grouped into three broad cultural historical phases that include Paleo-Inuit (Saqqaq), Thule culture/Historic Inuit, and European colonial. Colonial remains represent one of the most well-documented historical components of the island's history, with visible remains that include the warehouse, cannon battery and the old colonial house. In 2019, the precise location of 65+ cultural features (i.e., units) were photographed and mapped by precision dGPS on Nipisat. Simultaneously, field evaluations at this time included scoring of the seven criteria comprising each unit's overall VIV (see **Figure 17**).



**Figure 16.** Saqqaq settlement on the eastern shore of Nipisat. Although little remains of the settlement and no visible Paleo-Inuit elements are still visible, the location is still protected under the 2010 Heritage Act. Photo: J. Fog Jensen, National Museum of Denmark, 2016.





**Figure 17.** Map showing the location of Nipisat's cultural units located <100m in distance to the current and future proposed path.

Nipisat		Vulnerability Assessment								Mitigation				
Unit no.	Feature type	Remoteness factor	Path	Access	Readability	State of preservation	Objects	Pull-factor	Vulnerability score	path improvement	limited access	new signage	Old score	New score
1	Undetermined feature	5	4	1	3	4	4	4	6	0.1	1	1	6	4
2	Inuit winter house	5	4	3	2	2	1	4	7	0.1	1	1	7	3
3	Inuit winter house	5	4	3	2	2	0	4	6	0.1	1	1	6	2
4	Inuit winter house	5	4	3	2	2	1	4	7	0.1	1	1	7	3
5	Colonial house	5	4	3	2	2	0	4	6	0.1	1	1	6	2
6	Inuit winter house	5	4	2	2	1	0	4	5	0.1	1	1	5	2
7	Battery	5	4	2	2	1	0	4	5	0.1	1	1	5	2
8	Inuit winter house	5	4	2	3	2	0	4	5	0.1	1	1	5	2
9	Inuit winter house	5	4	2	3	2	0	4	5	0.1	1	1	5	2
10	Inuit winter house	5	4	2	3	2	0	4	5	0.1	1	1	5	2
11	Inuit tent ring	5	4	2	3	2	2	4	6	0.1	1	1	6	3
39	Inuit winter house	5	4	2	1	2	1	4	5	0.1	1	1	5	3
40	Fox trap	5	4	2	2	4	4	4	7	0.1	1	1	7	4
41	Saqqaq settlement	5	4	4	3	4	0	4	9	0.1	1	1	9	3
42	Inuit children's playground	5	4	3	4	1	4	4	8	0.1	1	1	8	3
43	Inuit grave field	5	4	4	2	4	4	4	10	0.1	1	1	10	4
44	Christian graves	5	4	4	2	1	4	4	9	0.1	1	1	9	3
45	Colonial warehouse	5	4	3	1	4	1	4	7	0.1	1	1	7	3
46	Undetermined feature	5	4	4	3	1	1	1	7	0.1	1	1	7	1
47	Inuit house remains	5	4	4	3	3	4	1	9	0.1	1	1	9	3
48	Grave (heavily disturbed)	5	4	4	3	4	4	1	9	0.1	1	1	9	3
49	Inuit house remains	5	4	4	3	1	1	1	7	0.1	1	1	7	1
50	Inuit grave	5	4	3	3	4	4	1	8	0.1	1	1	8	3
51	Inuit children's playground	3	4	2	3	1	2	1	5	0.1	1	1	5	2
52	Undetermined feature	5	4	3	1	1	4	1	6	0.1	1	1	6	2
53	Inuit winter house	5	4	4	3	1	1	4	8	0.1	1	1	8	2
54	Tent ring	5	4	2	3	2	2	4	6	0.1	1	1	6	3
Vulnerability Index Value (VIV) =									9	New VIV after mitigation =				3

**Table 12.** The Vulnerability Assessment calculation for Nipisat. A total of 27 of the 65 cultural units found on the island are currently identified within <100 m to the proposed GVC path.



## Mitigation

A total of twenty-seven ( $n=27$ ) of the sixty-five ( $N=65$ ) cultural units found on the island are located within <100 m to the proposed GVC path (Figure 17). These units are listed by diagnostic type in Table 12 with the accompanying VIV scores recorded in 2019. Overall, the new path proposed by the GVC in its current state ranks the area with an overall VIV of 9 (no infrastructure). However, if mitigation strategies are employed, this number could be significantly reduced through the installation of formal pathways, limiting access through visual barriers, and the addition of interpretive signage. **By employing these measures, the aggregate VIV for the features found <100 m to GVC's proposed path can be reduced from an overall score of 9 to a score of 3.**

### Emergency stops

Based on the high degree of sensitivity, several locations on Nipisat have been determined to be extremely vulnerable to human disturbance and should be avoided and/or strategies implemented to ensure that these cultural units and their components remain undisturbed. These include:



**#42. Inuit children's playground (-53.49925518, 66.81478131).** The playground comprises the remains of 4-5 miniature play 'houses' and 'kayaks', all constructed of small cobbles resting on loose gravel with sparse vegetation cover on fine-grained soil. The nature of the features makes them difficult to discern to the untrained eye and no current path exists to direct visitors. At present there is a strong potential for visitors to inadvertently walk over, kick, or nudge the surface remains. Visitors should not approach this area under any circumstances.



**#43. Inuit grave field (-53.50339169, 66.81442234).** This collection of graves is found on the upper slope of a moraine valley found in the center of the island. The grave field covers an area approximately 60 m<sup>2</sup>. At least 22 graves are identified inside the field with many containing human remains. In the recent past, some of the graves have been disturbed with skulls removed and lying outside of the graves. The GVC and NKA have agreed to not to include it as an interpretation point for visitors to the island.



**#44. Christian graves (-53.4939388, 66.8149038).** Four ( $n=4$ ) Christian burials believed to date to the colonial period on Nipisat are found approximately 50 m to the southwest of the Saqqaq settlement on the eastern side of island. The GVC and NKA have agreed to not to include it in as an interpretation point.



**#45. Colonial warehouse (-53.4967635, 66.8138218).** The colonial warehouse represents an important interpretation point and a major component of the colonial history of Nipisat. However, recent burrowing activity by foxes into the walls of the structure have resulted in a large degree of displaced subsoil and buried crushed shell deposited inside the structure. Human foot traffic within the interior of the feature would further displace soil leading to a loss of value. The proposed GVC path should guide visitors away around the feature to a viewpoint that is within a safe distance (minimum of 2 m from the wall of the structure) with clear signage that prohibits entry by visitors inside the feature.



**Other Inuit graves (both identified and unidentified).** Several individual graves are found throughout Nipisat with at least one (**#48, -53.497973, 66.812759**) within a short distance from the proposed GVC path. A decision has been made by the GVC and NKA to not attract attention to the graves and therefore all isolated Inuit graves should be avoided. Due to the ability of the graves to blend into the landscape, there is a high probability that more graves will be identified in the future. Extreme caution should be made to ensure that the proposed future path does not compromise any undiscovered graves on Nipisat.



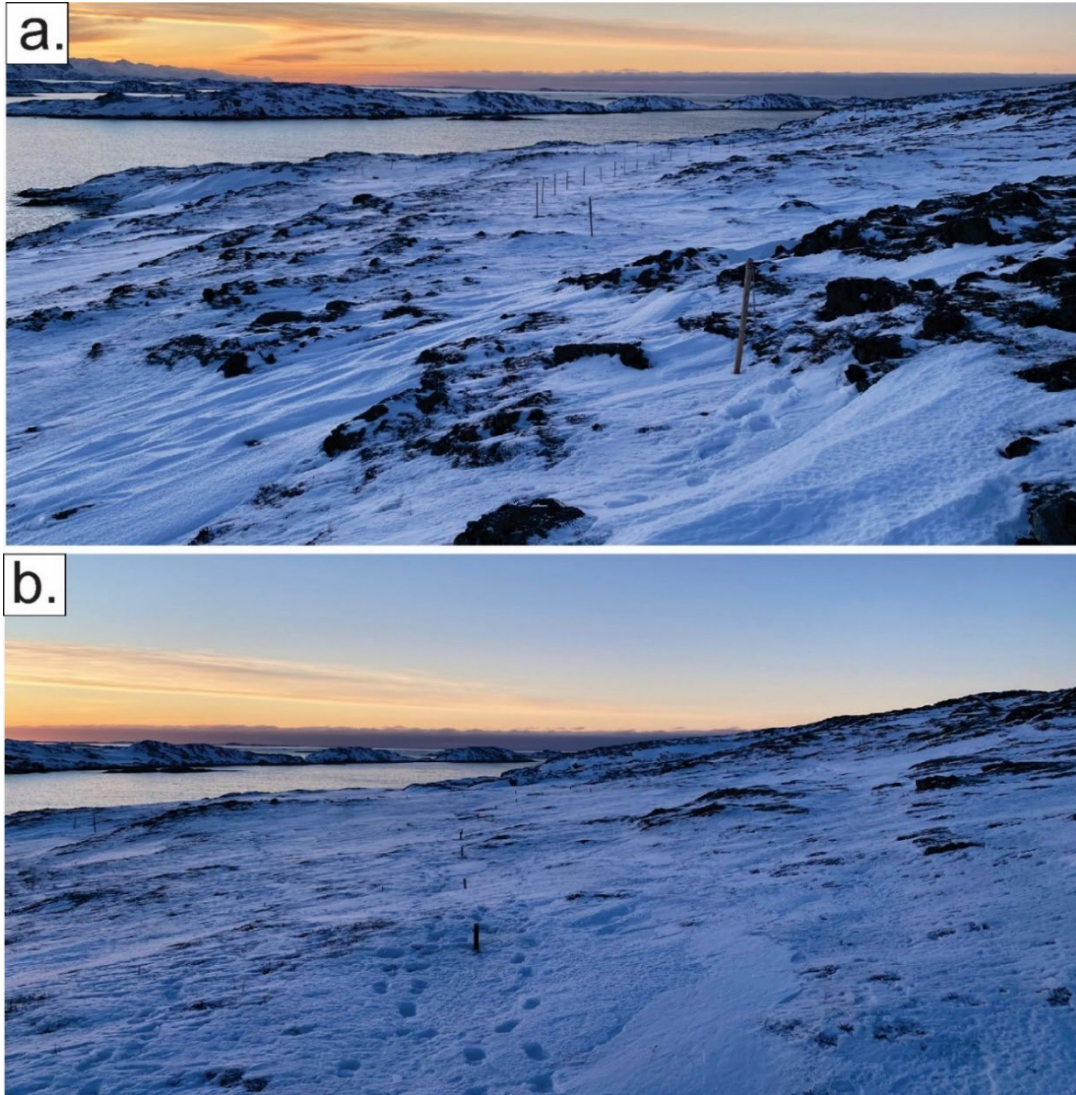
### 3.5 Recommendations

Based on the evaluation of the Vulnerability Assessment team in August 2021, the following recommendations are provided for minimizing negative impacts to Nipisat's natural and cultural values:

- A. With regard to the new GVC path proposal, the path must adhere to the rules and regulations outlined in *Inatsisartutlov nr. 11 af 19. maj 2010 om fredning og anden kulturarvsbeskyttelse af kulturminder*. The new path should remain at a **minimum distance of 2 meters** from all listed cultural units listed in Table 12. This includes any artificial boardwalks, raised metal walkways and/or viewing platforms, as well as signage or interpretive boards. **Additionally, the path must make considerations for avoidance and/or protection of those features listed as 'emergency stops'.**
- B. The vegetation at Nipisat is in general robust and tolerant for hiking and other typical tourist behaviour on along the shore. However, some small sensitive units were identified in the study and minor mitigation efforts suggested in section 3.2. The most challenging part of the site—with respect to the vegetation and visitors—are the wetlands located between the colonial house ruins and the Inuit winter houses, as this area has a very low tolerance for trampling and foot traffic. **If visitor numbers increase, an elevated boardwalk or path will be required to prevent degradation to the area and to make this section safe and pleasant for visitors.**
- C. The small, unrecorded seabird colony on the southwestern side of Nipisat is in steep, rocky terrain that drops to a sheer, overhanging cliff, and is far from the recommended path. **It is likely beneficial for the colony's fecundity, the tourists' safety, and the local harvest-ing effort to keep the colony's location from appearing on public maps.**
- D. Anthropogenic disturbance of nesting seabirds puts eggs and chicks at risk, so the recommendation is to keep a safe distance from all active breeding colonies between the months of March and September when the majority of breeding, nesting, hatching, and rearing activities occur. A minimum distance of 100 m is recommended to avoid flushing birds from their nests or causing them to dive at tourists. Operators should be able to identify what species of seabird it is and whether it is redlisted. For redlisted species, a **minimum distance of 300 m** is recommended. Cruise ships produce more noise pollution and should anchor at least **500 m away** and only approach the island by zodiac.
- E. Cruise ships should **refrain from navigating the small channels** between the barrier islands in the western half of Aasivissuit-Nipisat to minimize noise pollution where Redlisted species of marine mammals may be resting and feeding.
- F. Directing visitors along a clear path is recommended to ensure that tourism continues to have a minimal impact on the island's cultural and natural values. The wooden poles installed in 2019 have thus far fulfilled the purpose of channelling visitors along a route, and after two summer seasons most of the path is now easy to observe and follow. However, the GVC has proposed an alternative path on the eastern side of the island that would make this section of the old path with wooden posts obsolete.

For the section of the path that overlaps the GVC proposed path, the poles themselves can be considered as foreign elements, and could be replaced with smaller more visually unobtrusive markers. As of December 2021, the UNESCO Park Ranger has begun cutting the wooden posts (Figure 18) down to a height between 20-30 cm above the ground surface. A decision should be made in regard to the cut posts on the eastern side of the island—whether they should remain, and the path kept as it is, or if the posts should be removed in favour of the new proposed GVC path.

- G. Close communication between management authorities and tourist operators is strongly recommended for the future development of the site for visitors.** Exchange of knowledge about vulnerability, nature- and cultural values, access, expectations from operators, need for regulations, etc. will be essential for the successful future development to support a variety of needs and will help to avoid conflict and future loss of natural and cultural values on the island.

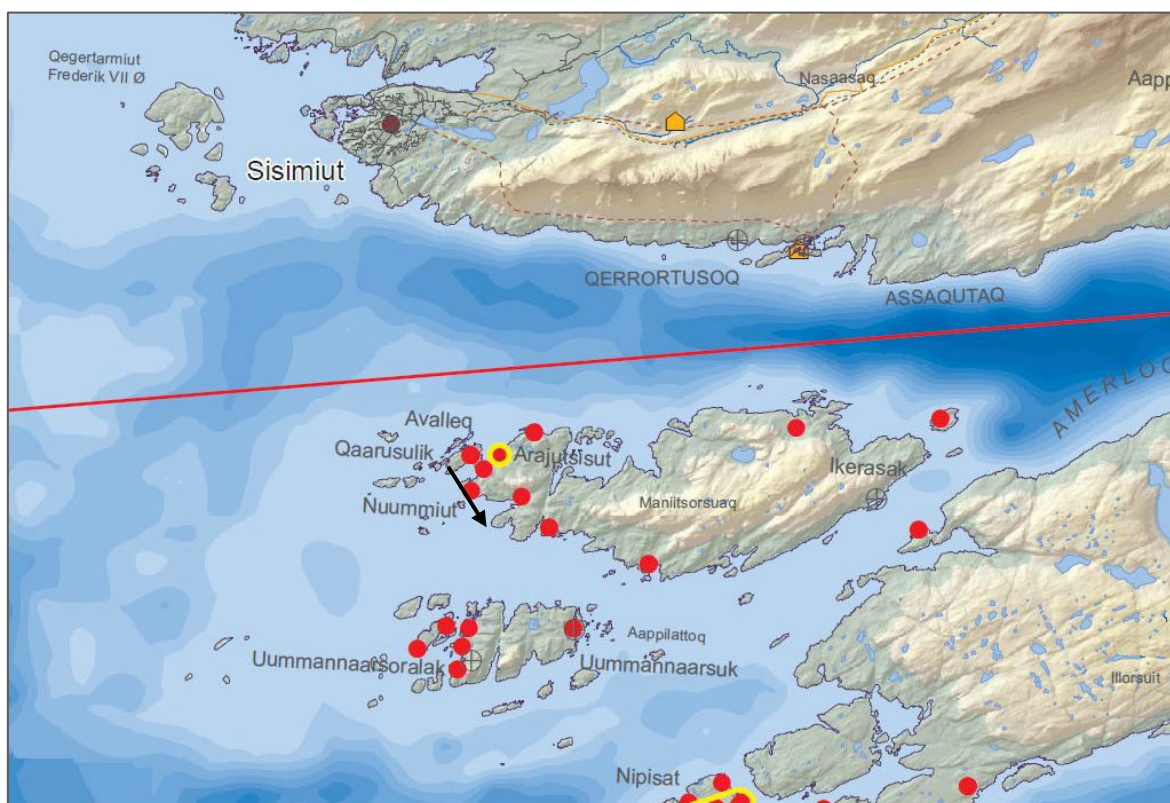


**Figure 18.** Before (a.) and after (b.) modification of the standing posts on Nipisat. In December of 2021, the UNESCO Park Ranger began cutting down the 2 m tall posts that marked the visitor path due to their visual intrusiveness on the natural landscape. The posts now measure 20-30 cm above the ground surface.



## 4 Vulnerability Assessment for Arajutsisut (NKAH 0285)

The UNESCO Key Site of Arajutsisut is a large, multicomponent Thule winter settlement located at the mouth of the Amerloq fjord, approximately 8 km south of Sisimiut on the western side of the island of Maniitsorsuaq (**Figure 19**). The site contains at least seven communal house ruins, three rectangular houses and one round winter house from the Early Thule Culture period. The small cove and valley are well-protected against northern and southern winds and sea swells, making it an optimal location for protection against inclement weather, as well as providing an optimal viewshed for spotting whales in the mouth of the fjord and in the open waters of the Davis Strait.



**Figure 19.** The Key Site of Arajutsisut denoted by the arrow at the mouth of the Amerloq fjord. The site is about 8 km south of Sisimiut. Red dots on the map show the locations of nearby listed heritage sites in the WH property (Aasivissuit – Nipisat Annex Map, 2017).

### 4.1 Present and Expected Use – Demarcation of the Site

Due to its proximity to Sisimiut, Arajutsisut has been frequently visited by local operators who offer the visit as a short excursion to visitors. Landings are a challenge at both low- and high-tide; at low tide visitors must disembark on the bare rock outcroppings on the north side of the cove (**Figure 20**). This terrain possesses almost no stable vegetation and is comprised of bare rock and weathered sandy, loose gravel prone to disturbance by foot. It is possible to land on the sandy beach with a small rubber dinghy or zodiac, however earlier management initiatives tried to discourage visitors from landing on beach and walking directly up into the core area of the site due to the fragility of the exposed midden above the beach.

In 2019, A line of 1.5 m poles with rope were installed at Arajutsisut to demarcate a path that ran to the north of the core area that led visitors up to a viewpoint overlooking the Inuit house ruins. In 2021 only a few of the poles were still standing and the temporary dissemination sign was removed. Currently we have no data on the frequency or volume of visitors landing at Arajutsisut, however, weather monitoring station and excavations performed in 2019 and 2021 by the Activating Arctic Heritage project have left evidence of modern human activity on the surface of the site.





**Figure 20.** The Key site of Arajutsisut from above, facing east. Landings are challenging at both low- and high tide requiring visitors to step-off the boat onto the rocky ledges seen on the left shore of the cove. Photo: M. Myrup 2019.

## 4.2 Vulnerability Assessment for Vegetation

Arajutsisut is generally dominated by crowberry heathland. The exposed ridges in the higher elevation areas have less vegetation (mostly lichens) and patches of exposed weathered rock and gravel. A dominant feature on the island is the robust grass vegetation that grows within and adjacent to the house ruins (**Figure 21**). This is a well-known hallmark of earlier anthropogenic activity where household waste was deposited outside the house entrance resulting in increased levels of nitrogen and phosphorus in the soil. Plant species that are strong competitors for these nutrients will out-compete other species in these areas. At Arajutsisut, lyme grass (*Leymus mollis*) and common horsetail (*Equisetum arvense*; **Figure 22**) were frequently observed. The core area of the site also possessed some wetland areas with different types of vegetation.

A complete floristic inventory was not performed at the time of the visit in 2021, however no rare or redlisted species were observed during the fieldwork.



**Figure 21.** Nutrient rich areas have encouraged robust vegetation growth due to earlier human activities. Strong competitive species, such as lyme grass (*Leymus mollis*) and common horsetail (*Equisetum arvense*), dominate around and inside the house ruins at Arajutsisut.



**Figure 22.** The two dominating vegetation types at Arajutsisut; crowberry heathland in the higher elevation areas and the grass-dominated vegetation close to the Inuit house ruins. Photo: D. Hagen 2021.



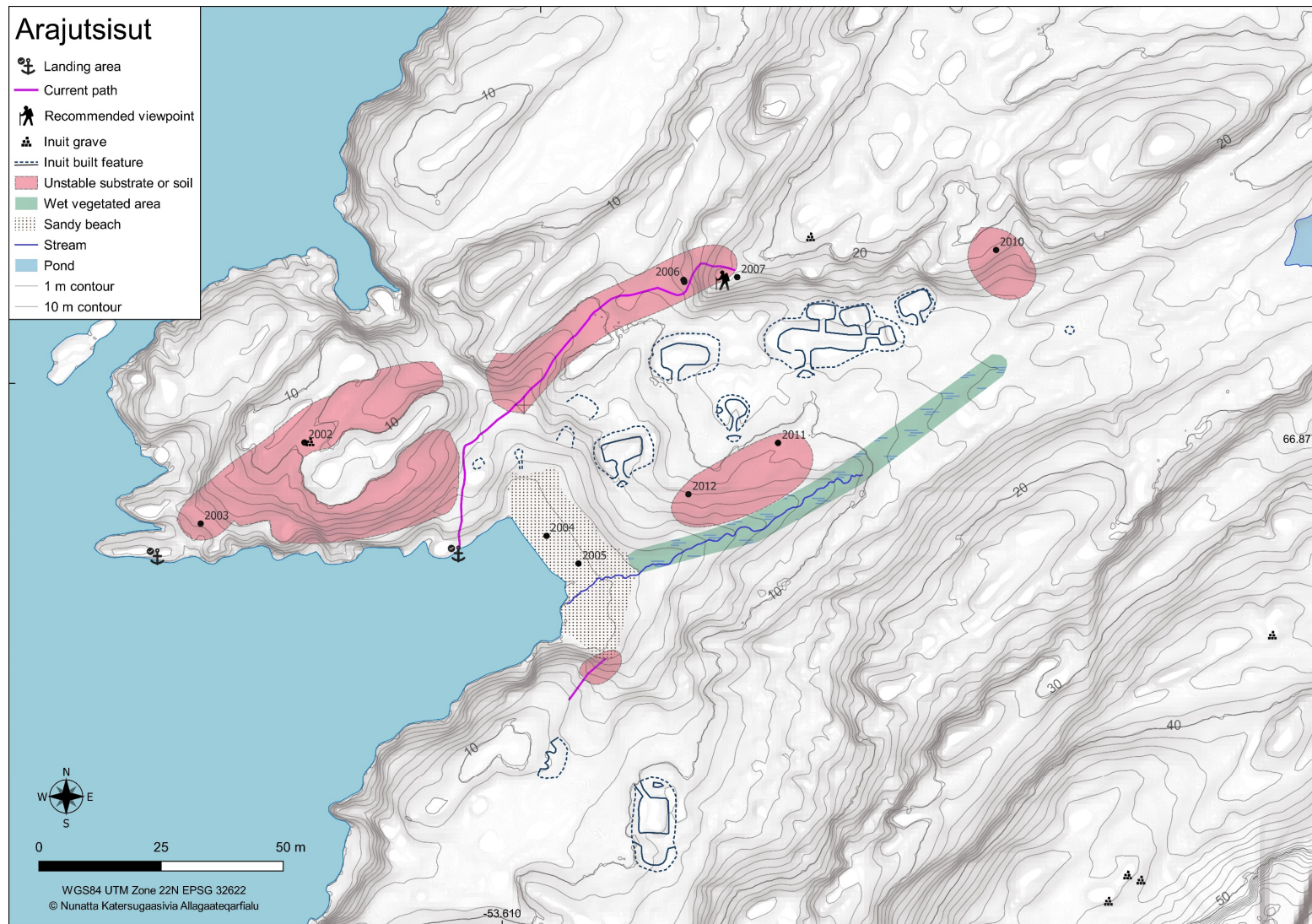
The most obvious landing site for visitors to Arajutsisut is either on the beach (from rubber dinghy or zodiac) or onto the rocky cliffs next to the beach (i.e., a 'step off' from a targa). We assessed both landing points. The Vulnerability Assessment of vegetation at Arajutsisut first followed the current suggested route for visitors, beginning from the northern 'step-off' along the exposed rocks and proceeding up the hill to the east overlooking the core settlement area. Guide poles were installed by the UNESCO Site Manager on Arajutsisut in 2019 but several of the poles had fallen by the time of our visit (**Figure 23**). The team followed the path marked by the poles to the viewpoint (**Figure 24**).



**Figure 23.** Poles installed in 2019 by the UNESCO Site Manager along the suggested path. The vegetation cover in the areas is thin and prone to erosion by foot traffic. Photo: D. Hagen 2021.

The most dominant vegetation type in the higher elevated areas at Arajutsisut is crowberry heath. Along this route a number of sensitive areas (four steep hills of different lengths; **Table 13**) were recorded, where the soil is fine-grained and easily erodes from foot traffic (**Figure 25**).

Along the beachfront the soil is almost pure sand. This is a dynamic littoral ecosystem where winds and wave action constantly influence and shape the border between land and sea. The vegetation cover next to the beach is dominated by lyme grass overlaying a thick sand layer (**Figure 26**). The root system of the lyme grass binds the sand and helps to reduce the natural aeolian erosion. This ecosystem is partly man-made (as mentioned above); however, the lyme grass is a native species and a natural modifier to the beach dynamic. As wind and waves will continue to erode the beach, the area is vulnerable to trampling and other types of human activity (indicated as a sensitive unit in **Table 13**).



**Figure 24.** Site map of Arajutsisut showing the current paths and sensitive vegetation areas in relation to the cultural features.





**Figure 25.** The vegetation cover in the hills at Arajut-sisut is thin and the soil is fine-grained. Increased human foot-traffic could greatly accelerate the natural erosion already taking place in these areas.  
Photo: D. Hagen 2021.



**Figure 26.** Harmsen and Buschman examining a slope near the beach with evidence of earlier house remains. The lime grass on this slope possesses a strong root system that has reduced the natural erosion of the underlying sand layer.  
Photo: D. Hagen 2021.



**Table 13.** Vulnerability assessment for vegetation and terrain in site Arajutsisut. Alternatives of mitigation are described in the test below and explain for the new scores.

Nipisat					Mititation		
Map ID	Sensitive unit	Area	Location	Area × location	Area	Location	Area × location
2002 2003 2006 2007 2010 2011 2012	Steep hill with unstable soil/ substrate	3	4	12	3	0,1	0,3
2004 2005	Sandy beach with sparse vegetation	2	4	8	2	0	0
	<b>SUM for the site</b>			<b>20</b>			<b>0,3</b>
	<b>Redlisted species</b>	<b>Non-recorded</b>					

### Mitigation

This sandy beach is the most obvious landing point for Arajutsisut, however the presence of several vulnerable cultural elements on the beach (embedded whale bones, house ruins on the nearby north slope and a midden with an exposed erosion front) makes it a highly sensitive cultural zone. The alternative landing site would be the aforementioned 'step off' points from a boat onto the rocky, exposed cliffs along the north side of the cove. However, this route should be carefully discussed with the UNESCO manager and the tourist operators, taking safety and accessibility issues into consideration. This route along the cliffs will not conflict with any sensitive units for vegetation, but the loose sandy soil and large cobbles can become easily displaced by foot traffic. As one draws closer to the recommended viewpoint, several steep embankments present the opportunity for erosion and damage to low growth vegetation in the sparsely covered and exposed areas above the site.

It is possible to reduce the sensitivity of this site considerably, however it would require several costly interventions. One mitigation would be to construct a boardwalk from the landing site that avoids the sandy beach, directing visitors along a walkway up the hill towards the viewpoint. This will reduce the sensitivity for vegetation considerably reducing the vulnerability of the site from score 20 to 0,3. The trade-off would be that it would be a highly obtrusive construction with a strong visual impact on the landscape and potentially compromise the OUV on Arajutsisut. The alternative is to moderate these actions and accept a higher level of impact on the vegetation (for example, implement only one of the suggested measures or construct a more modest boardwalk or foot path).

## 4.3 Vulnerability Assessment for Wildlife

### Wildlife Presence – Arajutsisut

Wildlife presence at the Arajutsisut site is relatively negligible. There was no immediate evidence of large marine or terrestrial mammal use of this site, and despite large cliffs, seabird presence was also largely undetected. The large island the site belongs to supports several common species such as ptarmigan, hares, and foxes that may live here year-round. As for birds, the site supports ptarmigan and is at least partially used by ravens and gulls, though not for breeding. The beach is well protected and may be ideal for harbouring seals, though the populations of seal species are known to be low in the area (**Table 14**).

**Table 14.** Species of interest that are present at the Arajutsisut site for at least some portion of the year. This is not an exhaustive list of all species present and additional species of interest may have yet to be identified.

Species – English	Species – Greenlandic	Species – Latin	Status	Criteria
Greenland white-fronted goose	Nerleq	<i>Anser albifrons flavirostris</i>	EN	A4ab; C1
Rock ptarmigan	Aqisseq	<i>Lagopus mutus</i>	LC	
Arctic hare	Ukaleq	<i>Lepus arcticus</i>	LC	
Arctic fox	Terianniaq	<i>Alopex lagopus</i>	LC	

### Local Community Use of Wild Living Resources

Arajutsisut is likely not a popular spot for hunting or harvesting activities due to its small size and geography, despite its close location to Sisimiut. There are few berry patches, no gull or waterfowl nests, and no presence of caribou or muskox. Ptarmigan may be hunted here in the winter months and would pose no conflict with tourism activities. However, locals from Sisimiut are known to visit Arajutsisut on occasion for leisure and to visit the cultural remains. These arrivals are not nearly as frequent as at the Nipisat site.

### Mitigation

No mitigation measures are currently recommended for this site as it poses a low threat to wildlife sensitivities.

## 4.4 Vulnerability Assessment for Cultural Heritage

Arajutsisut possesses sixteen ( $N=16$ ) registered ancient features of significance. From 2016 to 2022, the precise locations of each feature were collected and documented by photograph and mapped by precision dGPS (**Figure 29**). The scoring of the seven criteria comprising each unit's overall VIV was conducted in 2019 and 2022 (**Table 15**). Features are diagnostically representative of traditional Thule culture/Historic Inuit features local to West Greenland (for example, large rectangular communal houses are typical architectural styles for the 17th and 18th century), however the site and surrounding areas may possess evidence of settlement and activity that pre-dates Inuit occupation but has yet to be identified.

Arajutsisut was first registered as an archaeological site in 1989 during a coastal survey by Sisimiut Museum (Kramer 1989). The core area of the site comprises a cluster of house ruins situated on top of an up to 5-6 m high slope dominated by lyme grass (Jensen, et al. 2017:52-53). A large and well-defined rectangular house ruin is found on an upper terrace to the southwest, overlooking the core area (**Figure 27**). Travelling about 100 m to the west, a secondary settlement location was identified in 2019 with at least three house remains—however these features are poorly defined and difficult to discern when compared to the much more strikingly visible house remains of the site's core area. Several Inuit graves are also found in the rocky, higher elevated terrain surrounding the site.



**Figure 27.** Arajutsisut, facing northwest. The arrow denotes the large communal house found on the upper terrace to the southwest of the core area.



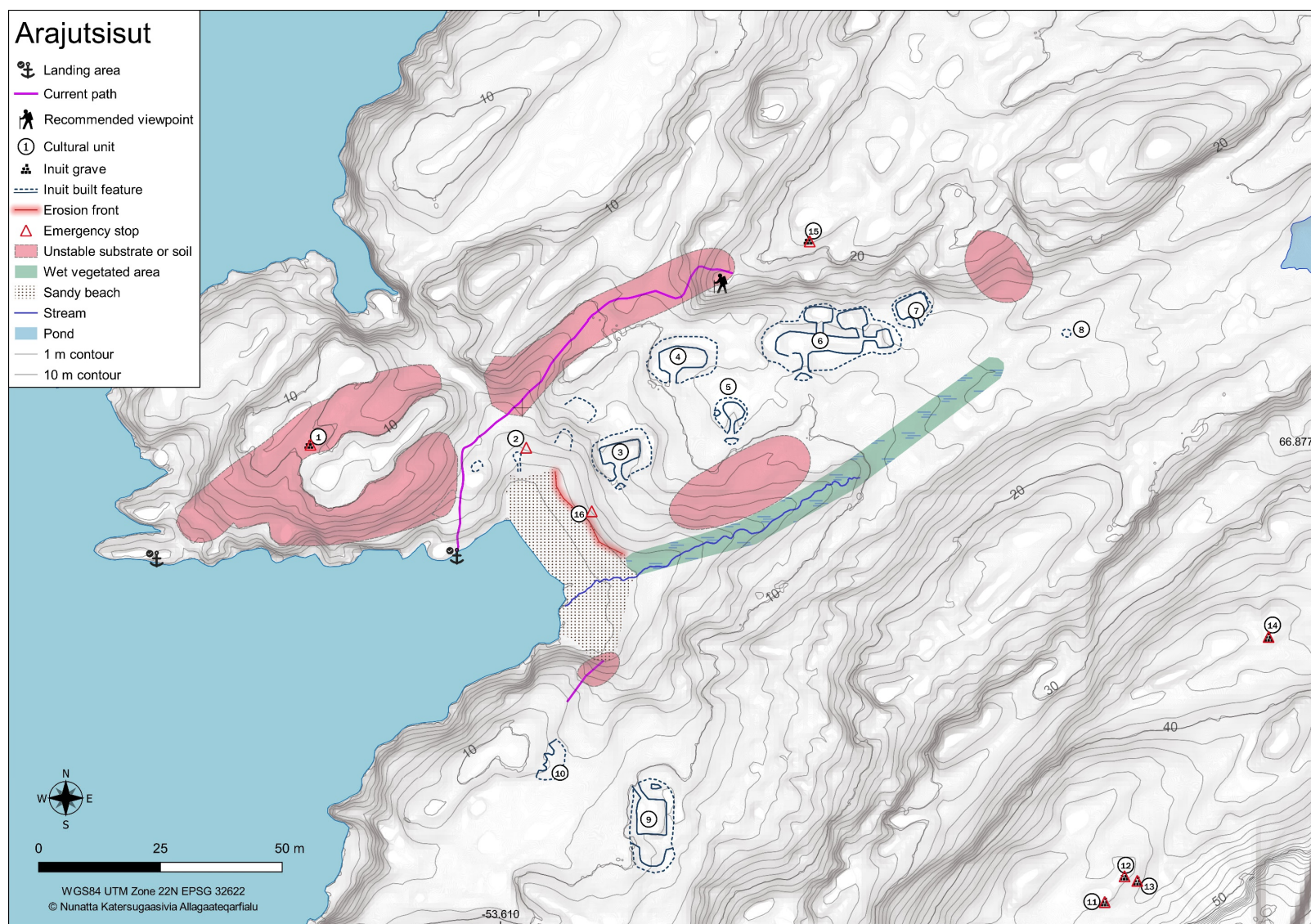
The main house features found on-site are clustered above the slope overlooking the beach, extending into the valley and demonstrate several iterations of rebuilding over time. A smaller built earthen feature (#10) may be a storage depot and one recently identified small depression (#8) may be characteristic of a children's 'playhouse' feature (personal communication, Martin Appelt 2021).

Six Inuit graves are found in the immediate vicinity of the site; two graves on the northern side of the site and four graves in the higher elevated terrain to the south, some still containing human skeletal remains. Several more graves have been documented in areas further to the east (not included in this assessment). These four graves along the southern periphery were observed to be less disturbed since it is more difficult for visitors to make their way up into the higher elevated areas.

The sandy beach and adjacent slope to the north represent one of the most sensitive areas for cultural heritage on Nipisat. In addition to large whale vertebrae that become exposed at low tide, the partially exposed midden (unit #16) of house #3 is found tucked beneath the grassy embankment to the east (**Figure 28**). Years of wave action have exposed ancient remains and animal bones. This exposed midden feature could be a potential problem in the future for curious visitors who may land on the beach and be tempted to touch or pluck in situ remains out of the exposed profile. Additionally, following the grassy slope to the north of the beach lies what appears to be the overlapping remains of at least three Inuit house features, but could include several more below the surface (see **Figure 26**). The slope has made for a convenient short-cut up to the path in recent years but continued use of the passage could lead to degradation of the ancient features in the future.



**Figure 28.** The exposed midden found on the beach at Arajutsisut. The arrow denotes the general vicinity where exposure is most prominent and could catch the attention of visitors. Photo: Harmsen 2016.



**Figure 29.** Map showing the location of Arajutsisut's registered cultural units and sensitivity zones in relation to the current path used by visitors to the site.



Arajutsisut		Vulnerability Assessment								Mitigation				
Unit no.	Feature type	Remoteness factor	Path	Access	Readability	State of preservation	Objects	Pull-factor	Vulnerability score	path improvement	limited access	new signage	Old score	New score
1	Grave	3	4	4	2	2	4	4	9	0.1	1	1	9	4
2	Undefined house features	3	4	4	3	4	0	1	8	0.1	1	1	8	2
3	Inuit winter house	3	4	4	2	2	0	4	8	0.1	1	1	8	2
4	Inuit winter house	3	4	4	2	2	0	4	8	0.1	1	1	8	2
5	Inuit winter house	3	4	4	2	2	0	4	8	0.1	1	1	8	2
6	Inuit winter house	3	4	4	2	2	0	4	8	0.1	1	1	8	2
7	Inuit winter house	3	4	4	2	2	0	4	8	0.1	1	1	8	2
8	Children's play house?	3	4	4	2	2	0	4	8	0.1	1	1	8	2
9	Inuit winter house	3	4	4	2	2	0	4	8	0.1	1	1	8	2
10	Undetermined, cache?	3	4	4	2	2	0	4	8	0.1	1	1	8	2
11	Grave	3	4	2	2	2	4	1	5	0.1	1	1	5	3
12	Grave	3	4	2	2	2	4	1	5	0.1	1	1	5	3
13	Grave	3	4	2	2	2	4	1	5	0.1	1	1	5	3
14	Grave	3	4	2	2	2	4	1	5	0.1	1	1	5	3
15	Grave	3	4	4	2	2	4	4	9	0.1	1	1	9	4
16	Midden	3	4	4	2	2	4	4	9	0.1	1	1	9	4
Vulnerability Index Value (VIV) =									7	New VIV after mitigation =				2

**Table 15.** Vulnerability assessment of cultural heritage for Arajutsisut.



## Mitigation

The overall VIV of Arajutsisut was calculated as a score of 7. Several individual ancient features on Arajutsisut are recognized as being highly vulnerable, but for the most part the main house features are stable and readable as archaeological remains, skewing the score toward an 'upper middle' vulnerability ranking. However, with proper interventions (e.g., safe landing spot, established foots paths, and signage) the site's VIV could be reduced to a score 2. The trade-off however would be that these interventions could potentially detract from the natural authenticity of the site and therefore any intervention or infrastructure improvement will require careful consideration by the Site Manager before implementation.

## ▲ Emergency stops

Based on the high degree of sensitivity, several units on Arajutsisut have been determined to be moderately vulnerable to future human disturbance. Strategies should be implemented that ensure that these cultural units and their components remain undisturbed. These include:



### #2, Undefined house features.

The slope found to the immediate north of the sandy beach (**#2, -53.6100227, 66.8769428**) contains the faint remains of 3-4 house features. The slope is frequently used as a shortcut from the beach to the higher elevation terrain where the current path lies, however these features could be further degraded over time with increased foot traffic. We suggest an alternative route should be established to bypass this sensitive area.



### #1, #11-15 Graves.

Several graves are found at Arajutsisut with the majority located in the higher elevation terrain to the south. However, two graves (**#1, -53.6109722, 66.8769117**) and (**#15, -53.6086984, 66.8773207**) are located in areas more easily accessible to visitors exploring the area.



#### #16 Sandy beach and exposed midden.

The sandy beach and adjacent midden feature collectively represent one of the most sensitive zones for cultural heritage on Nipisat. In addition to large whale vertebrae that become exposed at low tide, the partially exposed midden (#16, -53.6096988, 66.8768110) of house #3 is found tucked beneath the grassy embankment to the east. This exposed midden feature could be a potential problem in the future for curious visitors that may be tempted to touch or pluck in situ remains out of the exposed profile.



## 4.5 Recommendations

Based on the evaluation of the Vulnerability Assessment team in August 2021, the following recommendations are provided for minimizing negative impacts to Arajutsisut's natural and cultural values:

- A. At present, landings at Arajutsisut present a major challenge as both the sandy beach and the 'step-off' points can result in damage to the site. **We recommend that at present no more than 10-12 people (the max. passenger capacity for a commercial Targa) land on the site at a time, and that these groups should be accompanied by a knowledgeable local guide that can help safely navigate the group away from the more sensitive areas of the site.**
- B. Any new path created on Arajutsisut must adhere to the rules and regulations outlined in Inatsisartutlov nr. 11 af 19. maj 2010 om fredning og anden kulturarvsbeskyttelse af kulturminder. **The new path should remain at a minimum distance of 2 meters from all listed cultural units listed in Table 15.** This includes any artificial boardwalks, raised metal walkways and/or viewing platforms, as well as signage or

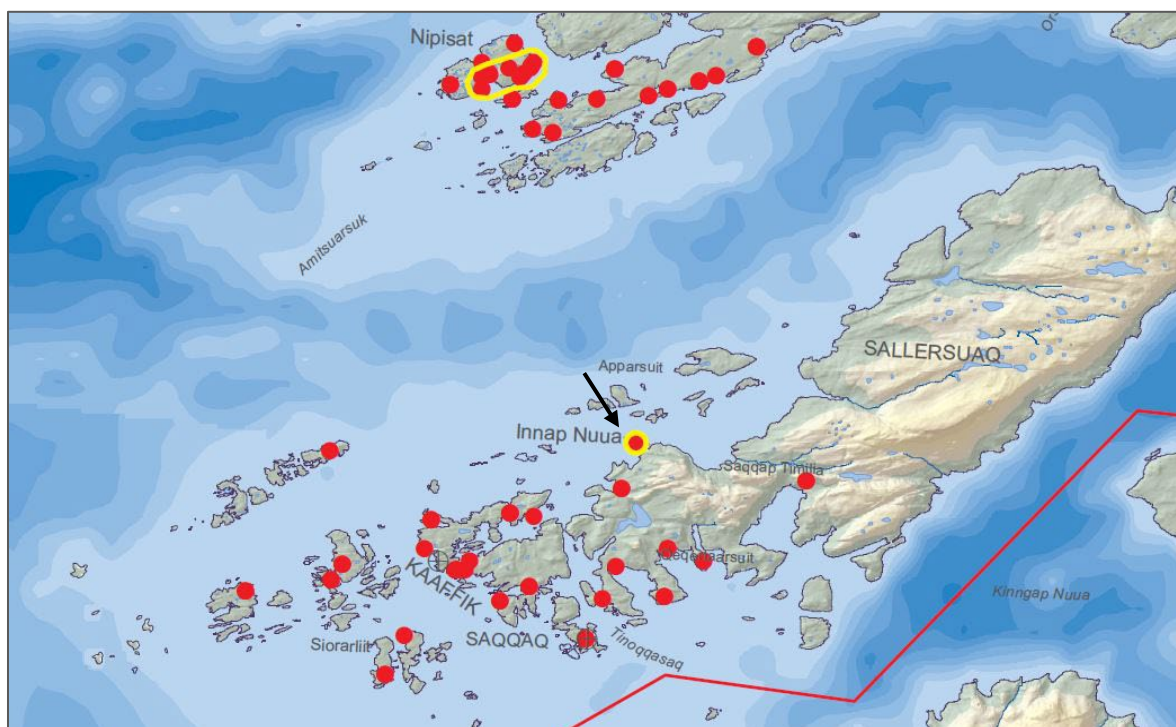
interpretive boards. Additionally, the path must make considerations for avoidance and/or protection of all units demarcated as 'emergency stops.'

- C. Inuit graves are highly sensitive and due to their character often present a higher risk of disturbance due to the presence of visible human remains. Additionally, because graves tend to blend into the landscape there is a high probability that more graves will be identified in the area in the future. Extreme caution should be made to ensure that any future path will not compromise the graves on Arajutsisut. **At the present time we do not recommend that visitors should enter and/or walk into the core area of the site. Rather, visitors should observe the site from the recommended viewpoint.**
- D. Greenland white-fronted geese (EN) may occasionally be present at Arajutsisut as brief stopovers on their way to their inland breeding grounds. **These birds should be given significant distance and left alone so as not to disturb their resting and feeding activities.**
- E. If seals are present at the landing sites for zodiacs and Targa, the operators are recommended **to keep distance and find another landing site in order not to disturb vulnerable species** while they are hauled out.
- F. The current route along the cliffs will not conflict with any sensitive units for vegetation, but the loose soil and large cobbles can become easily displaced by foot traffic. As one draws closer to the recommended viewpoint, several steep embankments present the opportunity for erosion and damage to the low growth vegetation exposed areas above the site. **A clearly demarcated path or an elevated boardwalk could significantly reduce the potential for erosion of these sensitive areas in the future.**
- G. Cruise ships should **refrain from navigating the small channels** between the barrier islands in the western half of Aasivissuit-Nipisat to reduce noise pollution where Redlisted species of marine mammals may be resting and feeding.



## 5 Vulnerability Assessment for Innap nuua (NKAH 2703)

Innap nuua is a multicomponent Thule culture Inuit settlement situated on a peninsula on the north side of the island of Sallersuaq to the south of Ikertooq fjord (**Figure 30**). This peninsula is characterized by undulating terrain of rocky hills with areas of more even terrain of sediments in between where the ruins are situated. The locality consists of three ruin groups as well as several individual Inuit graves and a burial field situated in the valley to the east of the site. Several smaller built features (e.g., caches and graves) are found in the surrounding terrain and there is some preliminary evidence (J.F. Jensen, personal communication) to suggest that the gravel terrace to the northeast of the core settlement area may have been occupied by Paleo-Inuit peoples in the distant past.



**Figure 30.** The Key Site of Innap nuua (denoted by the arrow) is located on a small peninsula on the north side of the island of Sallersuaq to the south of Ikertooq fjord. Red dots on the map show the locations of other nearby registered heritage sites in the WH property (Aasivissuit – Nipisat Annex Map, 2017).

### 5.1 Present and Expected Use – Demarcation of the Site

Prior to 2019, there are no known operators with products related to Innap nuua. This is most likely due to the extreme difficulty in landing at the site. Approaches are more frequently done along the rocky banks of the southern cove; however, this can be somewhat dangerous for individuals with limited mobility as it requires scaling a steep incline of bare rock. The north side of the peninsula possess an equally challenging landing along the rocks, but the adjacent sandy beach could be used for access with a rubber boat or zodiac at high tide. There is currently no paths or signage on Innap nuua, which lends to its authenticity as a highly undisturbed example of a late Thule Culture settlement in West Greenland.

## 5.2 Vulnerability Assessment for Vegetation

The vulnerability assessment for vegetation is complicated for Innap nuua as there are no proposals for the development of this site as a local tourist attraction or destination for visitors. Cultural history is likely the main draw for this site, as ancient remains are observed over a large area. The assessment performed for vegetation only covers part of the site—focusing broadly on the main sensitivity points and potential conflicts that could occur if number of visitors increase in the future.

The core settlement areas of Innap nuua is covered with robust vegetation. However, in the upper terrain to the north and southeast are found large patches of exposed rock and thin ground soil with sparse grass cover. Other areas include ancient gravel beach terraces that are almost completely devoid of vegetation. In these areas lichens proliferate on ridges and exposed rock (**Figure 31**). These exposed ridges have fine soil with a risk of erosion if the vegetation is disturbed by foot traffic. These ridges are an attractive viewpoint for hiking and demonstrate a high vulnerability (Table 16), despite that they only cover very small part in the total area. In more protected locations the vegetation cover is denser with gray willow observed in natural depressions and inside house features (**Figure 32**).



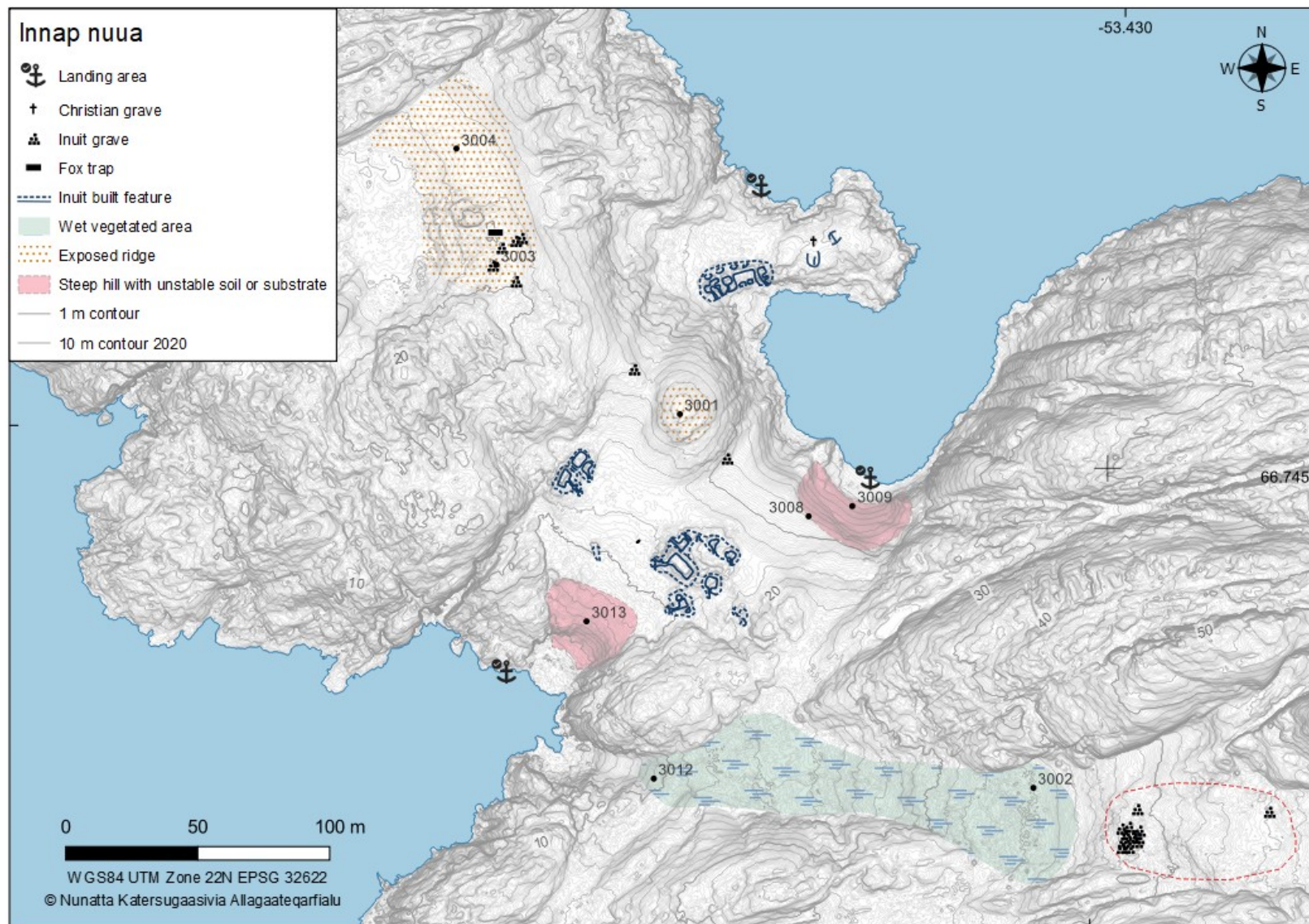
**Figure 31.** The lower areas of Innap nuua possess a more robust vegetation that thins in the higher elevated areas with exposed rock and thin soil. Photo: D. Hagen 2021.



**Figure 32.** In the more protected areas of Innap nuua the vegetation cover is thick with gray willow found growing in moist natural depressions and inside house features. Photo: D. Hagen 2021.

The more challenging situation for Innap nuua is the landing points (**Figure 33**). ‘Step-offs’ from a boat onto the exposed rock are precarious both along the northern and southern shore. However, at high tide, a beach landing could be made in the northern cove. Here the shoreline is narrow at the foot of a steep slope of sandy and unstable soil (**Figure 34**). Visitors arriving the site would need to traverse the slope to enter the core area of the settlement. The ‘step-off’ landing points present no conflict with vulnerable vegetation.





**Figure 33.** Site map of Innap nuua showing wet vegetation and unstable soil areas in relation to the cultural features.





**Figure 34.** The hills up from the north cove is steep with patches of exposed sand and a thin vegetation cover making it very vulnerable to human foot traffic.



**Figure 35.** Some wet areas in the site are sensitive to trampling, however as they are very wet it is likely that hikers will walk around them, consequently they are not very vulnerable.

The major parts of the core area comprise robust terrain and vegetation. Some sensitive wet areas occur in the area (**Figure 35**), however these areas were given a low score (**Table 16**), because hikers would avoid these very wet areas.

The most sensitive unit observed is the unstable hill slope on the northern cove shore, consisting of highly erodible sand (**Figure 36**). A thin vegetation cover has stabilized the upper portion of the hill, but the lower section is in a dynamic state of erosion. The vegetation here is vulnerable to any kind of human disturbance as well as wind and other natural processes, such as wave action. Calculation of the vulnerability is skewed downward, because the hills are so steep that other routes would be more attractive for visitors—even if these alternative routes entail longer distances.

### Mitigation

The vegetation in Innap nuua is in general robust, except for the steep slopes along the beaches in the north and south coves. Due to the location and the complicated landing conditions, this site will likely never get many visitors. The site might attract visitors with special interest and travelling in small groups or individual visitors, which requires some physical skills to enter the site at the “step-off” landings. Given the potential of low number of visitors to the site, the risk of impact to the vegetation is limited. We see no need for mitigation, except from redirecting all hiking away from the steep, sandy slopes by the beach.



**Figure 36.** The steep and sandy slope next to the beach is a dynamic with visible evidence of active erosion. Trampling and other human activities will accelerate these processes.

**Table 16.** Vulnerability assessment for vegetation and terrain at Innap nuua.

Innap nuua					Mititation		
Map ID	Sensitive unit	Area	Location	Area × location	Area	Location	Area × location
3001 3003 3004	Exposed ridge	2	4	8			
3008 3009 3013	Steep hill with unstable soil/ substrate	3	1	3			
3002 3012	Wet vegetated area	2	1	2			
	<b>SUM for the site</b>			<b>13</b>			-
	<b>Redlisted species</b>	<b>Not recorded</b>					

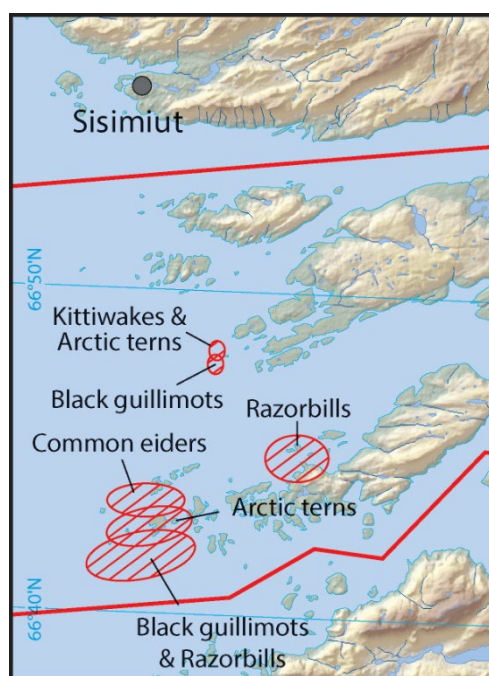


### 5.3 Vulnerability Assessment for Wildlife

Innap nuua likely supports common Arctic wildlife such as foxes, hare, and ptarmigan. Presence of scat suggests that the site supports at least a large population of Arctic hares and Arctic foxes. Several species of gulls are present, but there are no indications that they are nesting near the Key Sites, though they might nest on cliffs on other parts of the island.

**Table 17.** Species of interest that are present at Innap nuua for at least some portion of the year. This is not an exhaustive list of all species present and additional species of interest may have yet to be identified.

Species – English	Species –Greenlandic	Species – Latin	Status	Criteria
Razorbill	Apparluk	<i>Alca torda</i>	LC	
Rock ptarmigan	Aqisseq	<i>Lagopus mutus</i>	LC	
Arctic hare	Ukaleq	<i>Lepus arcticus</i>	LC	
Arctic fox	Terianniaq	<i>Alopex lagopus</i>	LC	



**Figure 37.** Presence of Razorbills (LC) in the vicinity of Innap Nuua.

#### Local Community Use of Wild Living Resources

Innap nuua is likely not a popular spot for hunting or harvesting activities, though it may be visited by locals for leisure or to visit the cultural remains. As it is some distance from Sisimiut, its anticipated traffic by locals is likely quite small. However, the graves here may attract some people with historical attachments to the area.

#### Mitigation

No mitigation measures are currently recommended for this site as it poses low threat to wildlife sensitivities.





**Figure 38.** Ruin group C. consists of one enormous, 25 m long and 5.5 m wide communal house that has been partitioned into five sections by a series of internal walls, measuring approximately 1-1.2 m high. Photo: Harmsen 2021.

## 5.4 Vulnerability Assessment for Cultural Heritage

Innap nuua was first archaeologically documented by Jørgen Meldgaard in 1956. In 2016 and 2019, archaeologists from the Greenland National Museum and National Museum of Denmark performed a thorough survey (Appelt, et al. 2019:73-79). Three very well-preserved communal houses comprise ruin groups (A., B. and C.) at Innap nuua, with Ruin Group C. measuring over 25 m in length and divided into several individual dwelling spaces by transverse internal walls (Figure 38). Another well-preserved communal house (A.) is observed as being built within a concentration of earlier round houses, together with some ancillary smaller later constructed rectangular houses.

**Ruin group A.** consists of a well-preserved communal house built into older ruins, one of which is a round house.

**Ruin group B.** has eight well-preserved dwellings: four Early Thule round houses, two rectangular winter dwellings and two communal houses. The best preserved of the communal houses is a 11 x 5 m dwelling with walls standing 1.6 m tall. This house was built into an existing house group, whereby earlier ruins or possibly midden deposits have been disturbed.

**Ruin group C.** consists of one enormous, 25 m long and 5.5 m wide communal house that has been divided into five sections by a series of four internal walls. The walls are 1-1.2 m high throughout the ruin.

The site possesses several individual graves, with at least one Christian grave and a grave field with a few associated grave goods lying in the open, making it especially vulnerable to looting or disturbance. The higher elevation areas with individual graves are generally formed of loose cobbles with graves blending into the terrain also making them particularly vulnerable to disturbance. In the middle of the site a large whale bone (**Figure 39**) is observed partially embedded in the



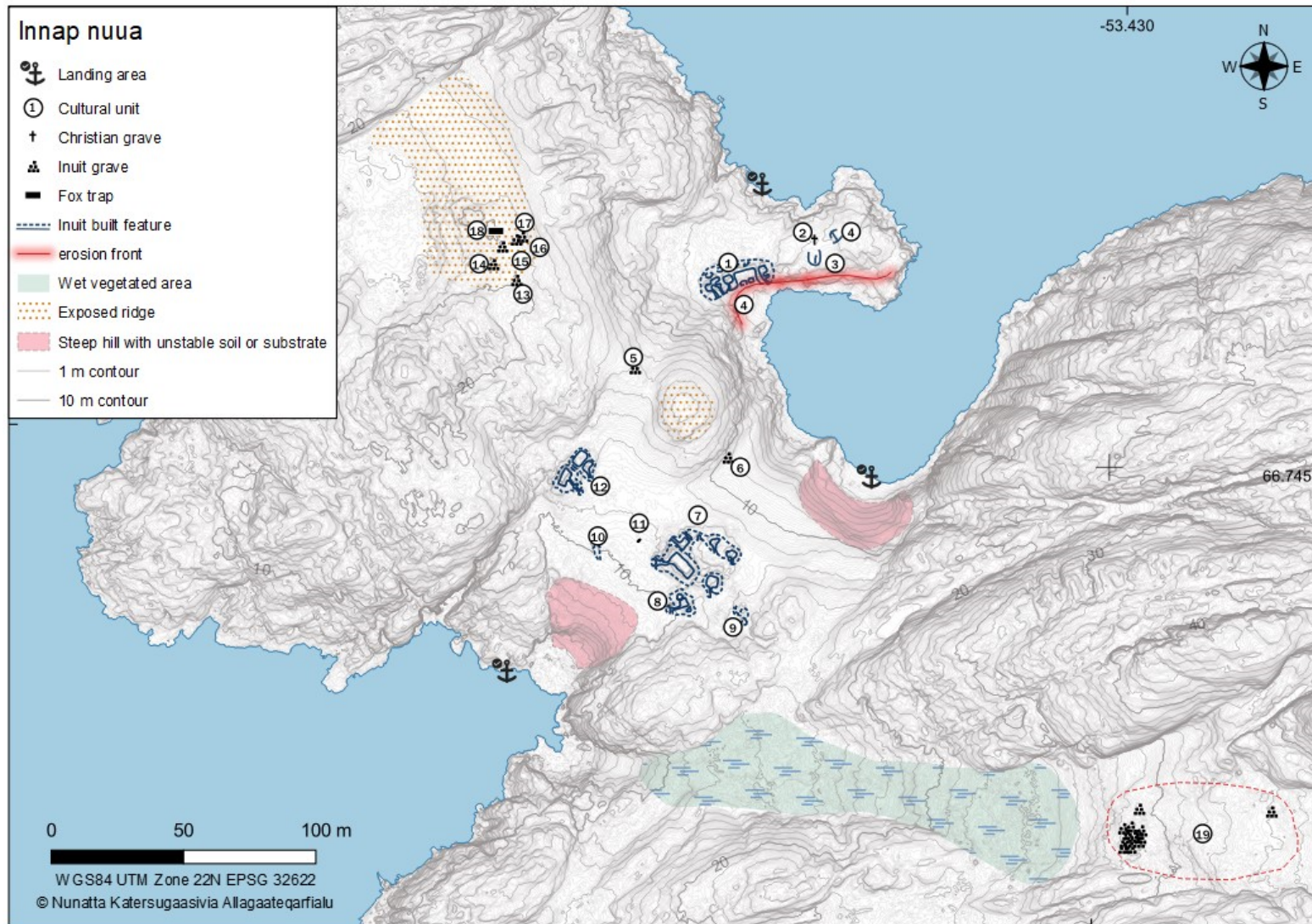
ground. The bone which could be moved or removed with little effort making it a highly vulnerable unit.



**Figure 39.** Large whale bone artifact lying on the surface at Innap nuua next to Ruin Group A. The bone could be easily removed from the site, making it a highly vulnerable unit (Photo: J. F. Jensen 2016).

An exposed ancient beach ridge is found approximately 15-16 m asl to the north of the core settlement area which may have been a settlement for Paleo Inuit peoples in the remote past. A few isolated quartz microflakes were identified on the surface by J.F. Jensen in 2019.

Lastly, running 70 m along the edge of the shore below Ruin group C. is a midden feature (#19) that is under pressure from coastal erosion and other climate warming. Several exposed animal bones and wood are found protruding from the profile below the house and along the shoreline running north. A few scattered cultural remains were observed on the pebble beach in 2021. Only twenty ( $N=20$ ) of the most relevant listed cultural units were included in the vulnerability assessment performed in 2021 (**Figure 40** and **Table 18**).



**Figure 40.** Map showing the location of Innap nuua's registered cultural units in relation to the site's sensitive areas.



Innap nuua		Vulnerability Assessment								Mitigation				
Unit no.	Feature type	Remoteness factor	Path	Access	Readability	State of preservation	Objects	Pull-factor	Vulnerability score	path improvement	limited access	new signage	Old score	New score
1	Communal house	3	4	3	1	2	0	2	5	0.1	1	1	5	2
2	Christian grave	3	4	3	3	2	4	1	7	0.1	1	1	5	3
3	tent feature	3	4	3	3	3	4	1	7	0.1	1	1	5	3
4	tent feature	3	4	3	3	3	4	1	7	0.1	1	1	5	3
5	Inuit grave	3	4	3	2	2	4	1	7	0.1	1	1	5	3
6	Inuit grave	3	4	3	2	2	4	1	7	0.1	1	1	5	3
7	Winter house complex	3	4	3	1	1	0	2	5	0.1	1	1	5	1
8	Winter house	3	4	3	1	1	0	2	5	0.1	1	1	5	1
9	winter house	3	4	3	1	1	0	2	5	0.1	1	1	5	1
10	winter house	3	4	3	1	1	0	2	5	0.1	1	1	5	1
11	Whale bone	3	4	3	1	1	1	2	5	0.1	1	1	5	2
12	Winter house complex	3	4	3	1	1	0	2	5	0.1	1	1	5	1
13	Inuit grave	3	4	3	3	2	4	1	7	0.1	1	1	5	3
14	Inuit grave	3	4	3	3	2	4	1	7	0.1	1	1	5	3
15	Inuit grave	3	4	3	3	2	4	1	7	0.1	1	1	5	3
16	Inuit grave	3	4	3	3	2	4	1	7	0.1	1	1	5	3
17	Inuit grave	3	4	3	3	2	4	1	7	0.1	1	1	5	3
18	Fox trap	3	4	3	1	3	4	1	7	0.1	1	1	5	3
19	Exposed midden	3	4	3	2	4	4	1	7	0.1	1	1	5	3
20	Grave field	3	4	3	1	2	4	1	6	0.1	1	1	5	3
Vulnerability Index Value (VIV) =									5	New VIV after mitigation =				2

**Table 18.** Vulnerability assessment of cultural heritage for Innap nuua.

## Mitigation

Due to its remoteness, the overall VIV of Innap nuua was calculated as a score of 5. Several individual ancient features on Innap nuua are recognized as being highly vulnerable but for the most part the main house remains are in excellent condition and there has been very little previous disturbance from visitors to the site. However, with proper interventions (e.g., safe landing spot, established foot paths, and signage) the site's VIV could be reduced to a score of 2. The trade-off however would be that these interventions would detract from the natural authenticity of the site and therefore any intervention or infrastructure improvement will require careful consideration by the Site Manager before implementation.

## ▲ Emergency stops

Based on the high degree of sensitivity, several units on Arajutsisut have been determined to be moderately vulnerable to increasing visitation. Strategies should be implemented that ensure that these cultural features and their components remain undisturbed. These include:



### Grave field and Individual Graves

Due to the ability of the graves to blend into the landscape, there is a high probability that more graves will be identified at Innap nuua and the surrounding higher elevation areas in the future. Additionally, a large concentration of ancient graves (**#19, -53.4296577, 66.7437521**) is also found in the small valley within a boulder field to the southeast of the core settlement area. The grave field covers an area measuring approximately 200 m<sup>2</sup>. At least 11 graves are identified inside the field with many still containing human remains. Additionally, material items (e.g. soapstone, kayak wood) appear to have once been in association with graves but now reside on the surface making them extremely vulnerable to collection.



### 11. Whale bone (-53.43401170, 66.74468663)

A large whale bone partially embedded in the ground is located a few meters to the west of Ruin group A. The bone which could be potentially removed with little effort, making it a highly vulnerable unit.



#### 19. Eroding midden (- 53.43317514,66.74555136)

The eroding midden found below Ruin group C on the shoreline that runs a length of approximately 70 m is currently being affected by both a warming climate and wave action. This exposed midden feature could be a potential problem in the future for curious visitors that may be tempted to touch or pluck in situ remains out of the exposed profile or collect objects on the beach.

## 5.5 Recommendations

Based on the evaluation of the Vulnerability Assessment team in August 2021, the following recommendations are provided for minimizing negative impacts to Innap nuua's natural and cultural values:

- A. Landings at Innap nuua present a major challenge. Both the sandy beach (inaccessible at low tide) and the 'step-off' points on the north and south shores are not safe and therefore we do not recommend these access points for visitors with limited mobility. **Additionally, we recommend no more than 10-12 people (the max. passenger capacity for a commercial Targa) land on Innap nuua at a time, and that these groups should be accompanied by a knowledgeable local guide that can help safely navigate the group away from the more sensitive areas of the site.**
- B. Based on the terrain and problems with accessibility once on the site, construction of a path at Innap nuua may be both unrealistic and unnecessary. However, any new path that is constructed must adhere to the rules and regulations outlined in Inatsisartutlov nr. 11 af 19. maj 2010 om fredning og anden kulturarvsbeskyttelse af kulturminder. The new path should remain at a minimum distance of 2 meters from all listed cultural units listed in Table 18. This includes any artificial boardwalks, raised metal walkways and/or viewing platforms, as well as signage or interpretive boards. **Additionally, the path must make considerations for avoidance and/or protection of all units demarcated as 'emergency stops.'**
- C. Ancient graves are highly sensitive and due to their character often present a higher risk of disturbance due to the presence of visible human remains. Additionally, due to the highly sensitive nature of the grave field and presence of funerary objects on the surface, the grave field should be completely avoided by visitors.
- D. Cruise ships should **refrain from navigating the small channels** between the barrier islands in the western half of Aasivissuit-Nipisat to reduce noise pollution where redlisted species of marine mammals may be resting and feeding.
- E. Greenland white-fronted geese (EN) may occasionally be present at these sites as brief stopovers on their way to their inland breeding grounds. These birds should be given significant distance **and left alone so as not to disturb their resting and feeding activities.**
- F. Anthropogenic disturbance of nesting seabirds puts eggs and chicks at risk, so the recommendation is to keep distance from all active breeding colonies between the months of March and September when most of the breeding, nesting, hatching, and rearing activities occur. Operators should keep distance to avoid flushing birds from their nests or causing them to dive at tourists – **a minimum distance of 100 m** is recommended. Operators

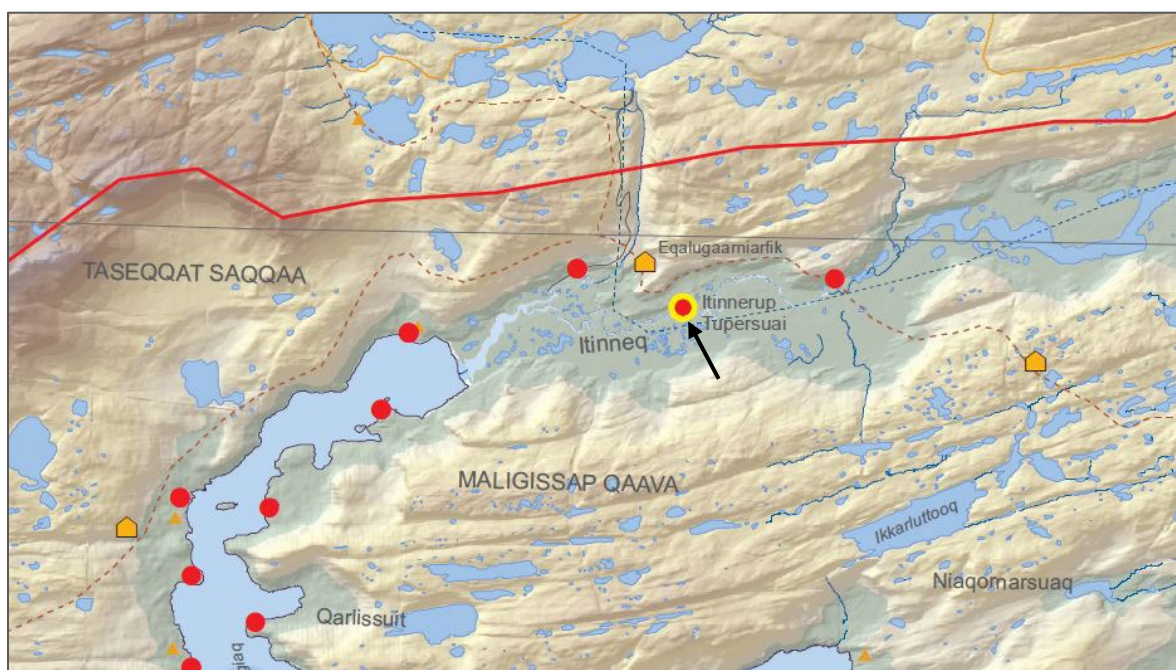


should be able to identify what species of seabird it is and whether it is redlisted – for redlisted species, **a minimum distance of 300 m** is recommended. Cruise ships produce more noise pollution and should anchor at **least 500 m away** and approach by zodiac.

- G. If seals are present at the landing sites for zodiacs and Targa, the operators are recommended to **keep distance and find another landing site in order not to disturb vulnerable species while they are hauled out.**

## 6 Vulnerability Assessment for Itinnerup Tapersuai (NKAH 2618)

Itinnerup Tapersuai (**Figure 41**) was chosen as a Key Site in the WH property because it was a frequent stopover by ancient peoples during seasonal migrations from the coast to the interior. The site is located on the Itinneq marine clay plain that forms a flat gateway between the head of Maligiaq fjord and the Tasersuaq lake. The Arctic Circle Trail (ACT) passes through Itinnerup Tapersuai and can be accessed by hikers arriving from either the east or west. When arriving from the east the Arctic Circle Trail crosses the river over a wooden bridge approximately 70 m to the south-east of the ancient campsite. The Arctic Circle Trail exits the campsite to the north and follows an east-west oriented winter transport corridor roughly 100 meters north of the site. In this direction, the trail takes a few different directions with another less trodden path following a more westerly route to the cliffs towards north.



**Figure 41.** The Key Site of Itinnerup Tapersuai (denoted by the arrow) is in the Itinneq valley near the head of the Miligiaq fjord. The Arctic Circle Trail (ACT) is represented by the yellow dashed line. A winter transport route is shown as the blue dashed line. Red dots on the map show the locations of other registered heritage sites in the WH property (Aasivissuit – Nipisat Annex Map, 2017).

The current appearance of these sites, and most of the visible ruins, results from their use in the 19th and 20<sup>th</sup> centuries, but nearby Inuit graves provide evidence earlier occupation. Itinnerup Tapersuai was visited by Dagmar Hagen, Victoria Qutuuq Buschman and Jens Fog Jensen from 22.-23. August 2021. During the visit the team surveyed the ancient camp area and the surrounding terrain with special attention given to the eastern section of the ACT, and west up to the public cabin (Ekalugaamiarfik) situated near to the northwest of the site.



**Figure 42.** The main landscape types in Itinnerup Tapersuui are the flat valley, meandering river and mountain on both sides. Photo D. Hagen 2021.

## 6.1 Present and Expected Use – Demarcation of Site

Entry to Itinnerup Tapersuui is possible either by boat or by hiking overland. Most local hunters arrive to Itinnerup Tapersuui by boat, and travel further inland by sailing and transporting smaller boats upriver into lake Tasersuaq. At Itinnerup Tapersuui the larger boats are left in the fjord and traffic from the mooring area to the campsites further inland occurs along hiking paths stretching eastward. The principal season of use of Itinnerup Tapersuui is by local hunters in August and September. The area is expected to become a prominent destination due to both its proximity to the new Sisimiut-Kangerlussuaq Nature Road to the north and increasing numbers of hikers on the ACT. Except for one sign denoting the ACT, the area currently has no informational or interpretive signage.

## 6.2 Vulnerability Assessment for Vegetation

Itinnerup Tapersuui covers a large area and possesses a diverse topography and terrain resulting in a variety of different vegetation types. The vulnerability assessment for vegetation only addresses the direct influences from observed human activity at and near to the main site. Our goal was to characterize the major issues related to site use and potential conflicts that could occur as visitors increase in the future.

Itinnerup Tapersuui is found inside a wide and flat, plain valley along the edge of a river that feeds the Maligiaq fjord. The site is surrounded by mountains and a view of the fjord to the west (**Figure 42**). This area's climate is generally very dry in the summer months. The valley is characterized by sandy river deposits and grass-dominated patches of vegetation, with sporadic growths of heath and willow in the wetter areas (**Figure 43**). We evaluated part of the area overlapping the ACT (**Figure 44**) that traverses the valley up to the public cabin in the mountain, which includes the heathland and passage that cross through wet, vegetated areas.



The overall impression of this site is that it is *very sensitive*, as the sandy soil is unstable with thin vegetation cover. However, this is a natural consequence of the terrain and the traditional use of the area that has shaped the present-day ecosystem. Consequently, the vulnerability to human trampling and hiking is moderate to small.



**Figure 43.** The lower valley Itinneq plain has some steppe-characteristics such as dry and sandy soil and low precipitation. Photo: D. Hagen 2021.



**Figure 44.** The ACT passes through the Itinnerup Tupersuai. A single sign identifying the path is found on one of the higher ridge lines to the north of the ancient camp area.

The most striking attribute related to sensitivity for terrain and vegetation is the dry and fine-grained soil. This is the main reason for most of the recorded sensitive units, including both steep hills (**Figure 45**) and flat areas with sparse vegetation (**Figure 46**). This ecosystem is dynamic and was shaped by natural processes over the last several millennia. Strong wind and dry weather have resulted in sand-flow and natural erosion and it is not always possible to separate these natural processes from the long- and short-term human influences on the system. A main challenge for the local environment is that natural recovery is almost absent due to the fragile nature of the vegetation that requires a long period of time to re-establish itself after a disturbance (e.g. human traffic).

A few short stretches along the ACT cross wet, vegetated areas (**Figure 47**). Most of these are only moderately wet, and easy to cross during the drier summer months. In wet periods they become muddy and increases the natural tendency of visitors avoid the wet areas, in effect widening the path.





**Figure 45.** Steep hill with fine-grained and unstable soil. Photo D. Hagen 2021.



**Figure 46.** Flat area with fine-grained soil and sparse vegetation sensitive to trampling. Photo: D. Hagen 2021.



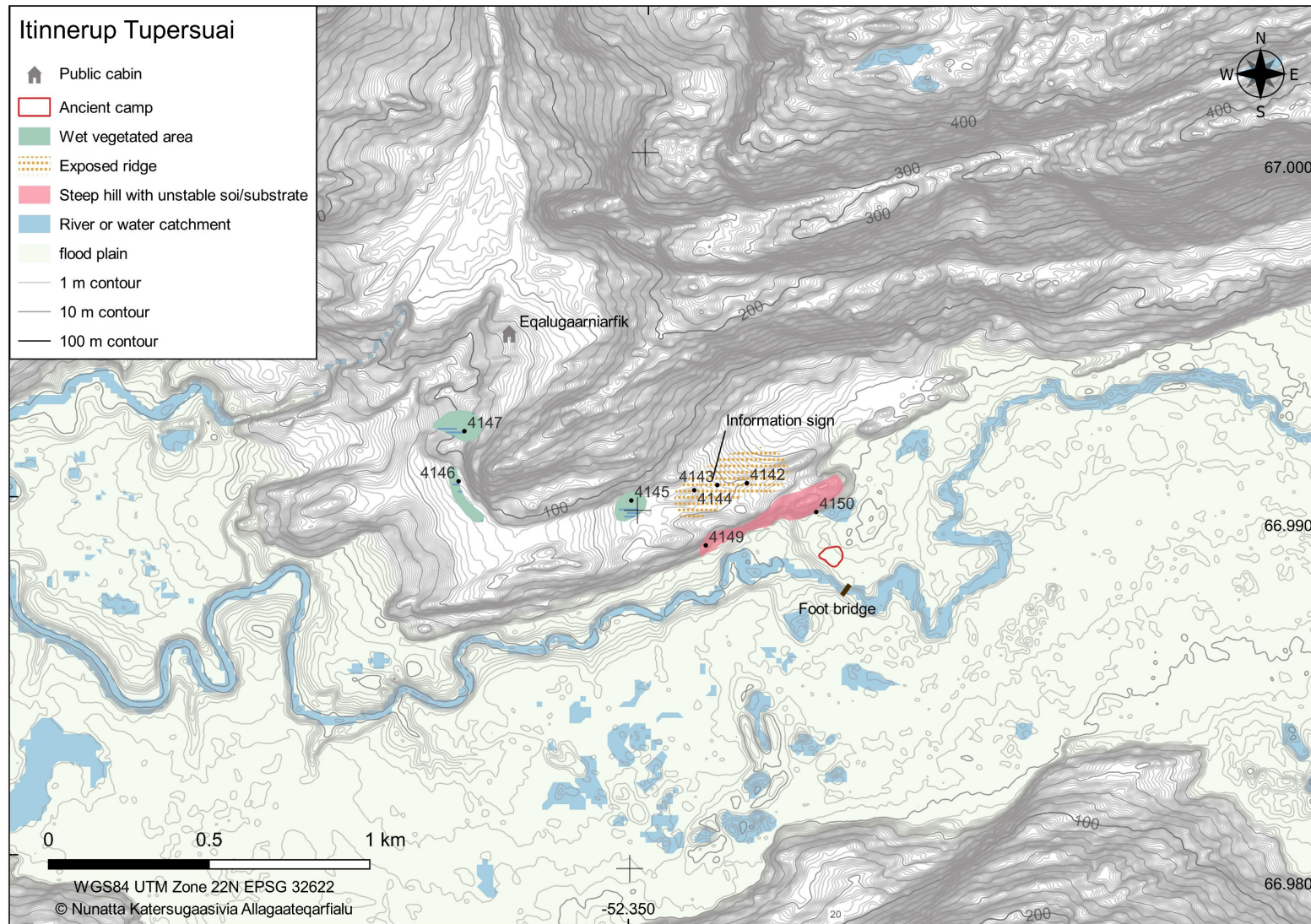


**Figure 47.** Part of the ACT crosses wet areas and there is a risk for widening or parallel paths created by visitors wishing to avoid stepping into the mud.

**Table 19.** Vulnerability assessment for vegetation and terrain in site Itinnerup Tupersuai.

	Nipisat				Mititation		
Map nr.	Sensitive unit	Area	Location	Area × location	Area	Location	Area × location
4149 4150	Steep hill with unstable soil/ substrate	2	4	8	2	4	8
4145 4146 4147	Wet vegetated area	1	4	4	2	0,1	0,2
4142 4143 4144	Sparse vegetation on fine- grained soil	2	4	8	2	4	8
	<b>SUM for the site</b>			<b>20</b>			<b>16,2</b>
	<b>Redlisted species</b>	<b>None recorded</b>					





**Figure 48.** Site map of Itinnerup Tupsuui showing wet vegetation and unstable soil areas in relation to the ancient camp.





**Figure 49.** *Steep hills are vulnerable to trampling and to mitigate further erosion people should stay on established paths.*

### Mitigation

Ittinerup Tupersuai has a long history of human use, and both old and more recent traces of human activity are observed on the landscape (for example, the camp site and the network of paths found on the valley floor). Some paths are made by animals, others by humans, and most likely used by both. The ACT follows some of these old paths as well some old vehicle tracks along the lower slopes of the valley's northern edge.

If the number of visitors increases at Ittinerup Tupersuai it will be important to inform people to stay on the established paths and warn against venturing into the steep terrain which will accelerate erosion (**Figure 49**). To avoid creating parallel paths around sensitive areas we suggest providing some flat step-stones or walking boards. This mitigation could reduce the vulnerability of the site from the score of 20 to 16,2.

## 6.3 Vulnerability Assessment for Wildlife

### Wildlife Presence – Ittinerup Tupersuai

As Ittinerup Tupersuai is situated a wide, low valley flanked by mountains and is either by hiking or by boat up the small river at high tide, this site primarily concerns terrestrial and freshwater species. Both caribou and muskox may congregate in the valley during the summer months, usually in small groups. The known caribou calving grounds are located further inland and quite far from the site to the north of Kangerlussuaq.

The small lakes and river also support species of waterfowl and songbirds, and higher up in the valley within the adjacent Ramsar site is the only known breeding location in the world of the Greenland white-fronted goose (EN). Several seabird species do feed, nest, and breed around cliffs near the entrance to the river, including Glaucous Gulls (LC), Razorbills (LC), and Black Guillemots (LC). The river that provides access to the site is also home to Arctic char.

**Table 20.** Species of interest that are present at the Itinnerup Tupersuai site for at least some portion of the year. This is not an exhaustive list of all species present and additional species of interest or redlisted species may have yet to be identified.

Species – English	Species – Greenlandic	Species – Latin	Status	Criteria
Greenland white-fronted goose	Nerleq	<i>Anser albifrons flavirostris</i>	EN	A4ab; C1
Black guillemot	Serfaq	<i>Cephus grylle</i>	LC	
Glaucous Gull	Naajarujussuaq	<i>Larus hyperboreus</i>	LC	
Razorbill	Apparluk	<i>Alca torda</i>	LC	
Arctic hare	Ukaleq	<i>Lepus arcticus</i>	LC	
Arctic fox	Terianniaq	<i>Alopex lagopus</i>	LC	
Caribou	Tuttu	<i>Rangifer tarandus</i>	LC	
Muskox	Umimmak	<i>Ovibos moschatus</i>	LC	
Arctic Char	Egaluk	<i>Salvelinus alpinus</i>	LC	

### Local Community Use of Wild Living Resources

Both the communities of Sisimiut and Sarfannguit actively harvest, hunt, and fish in the Aasivissuit-Nipisat area, including the inland site of Itinnerup Tupersuai. This site is a popular destination for local families in the summer months for both camping and hunting of caribou and muskox.

Locals are also known to use the cabins along the adjacent portion of the ACT as both overnight resting points and as emergency shelters.

Local reports and stories acknowledge that on occasion tourists using the ACT unknowingly endanger themselves and interfere in hunting activities at this site in various ways:

- Straying from the marked trail
- Unknowingly positioning themselves between hunters and their targets
- Being unaware of how their close presence effects grazing caribou and muskox
- Being unaware of the risk of animal attack
- Being unaware of safety hazards related to hunting, i.e. camouflage
- Straying from marked paths

### Mitigation

Proper awareness for the impacts of human presence on wildlife, especially the impacts on breeding and rearing species, should help mitigate behaviours that effects wildlife sensitivities. Knowledge and understanding of ongoing hunting activities will also lessen the risks to tourists.





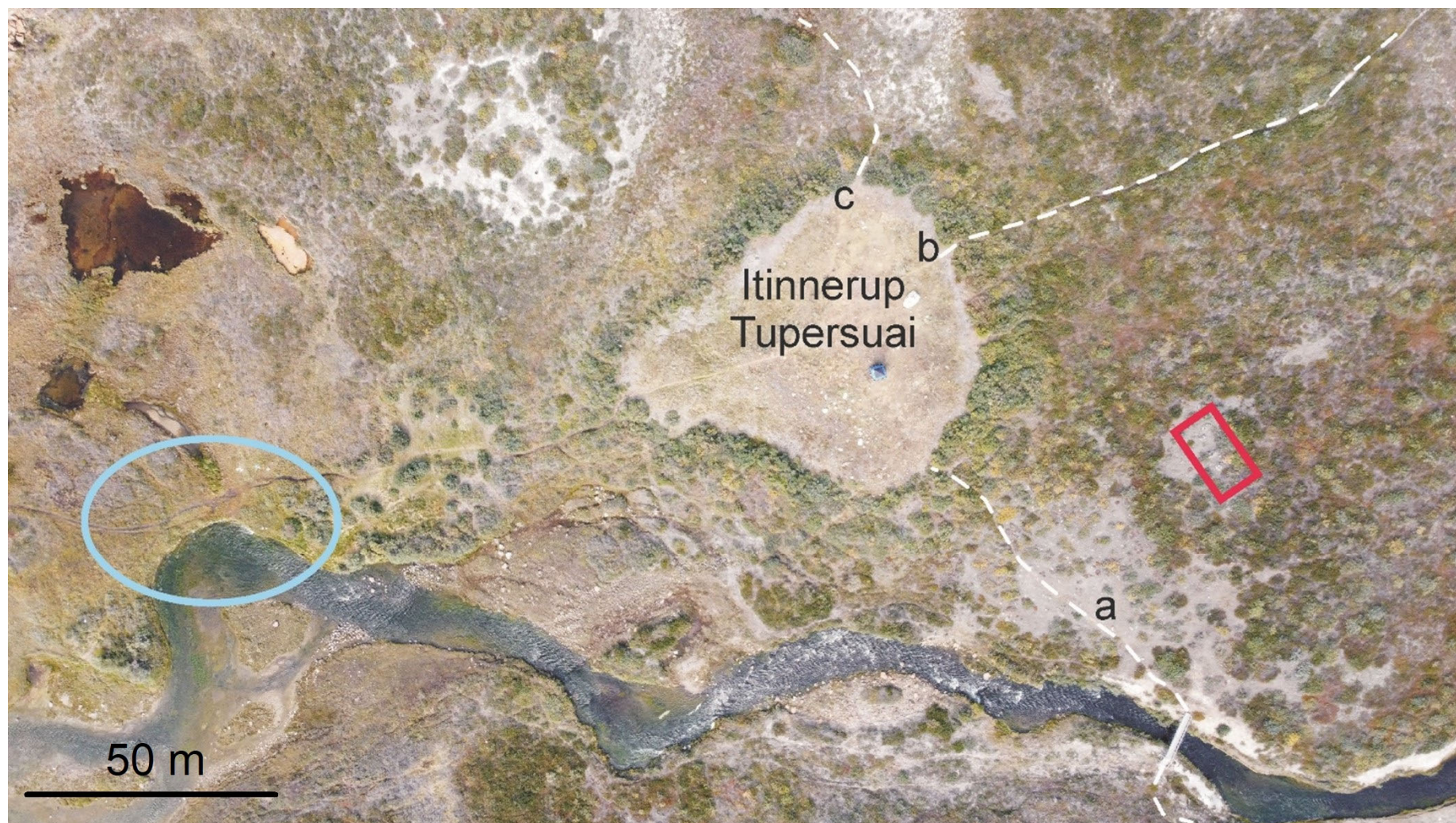
**Figure 50.** *Itinnerup Tupersuai seen from the cliffs north of the site. ACT is seen leading from lower left corner of image to the Itinnerup Tupersuai site where two tents are seen. The ACT continues towards east across the wooden bridge (denoted by the arrow) behind the campground. Photo: J. F. Jensen 2021.*

## 6.4 Vulnerability Assessment for Cultural Heritage

Itinnerup Tupersuai's ancient camp consists of a large, grassy pear-shaped 70 x 60 m<sup>2</sup> flat area surrounded by willow scrub (**Figure 50** and **Figure 51**). The site is still used today for camping by local people with the only principal visible features being tent rings comprised of head-sized cobbles. These stones have been re-used and arranged according to needs of people during the seasonal occupations from past to present. There are no ruins of any other dwelling types (such as tent houses) or other 'domestic' features (e.g. smoking ovens or caches) observed at Itinnerup Tupersuai. There are a few pits and remains of older depressions which could be the remnant of older tent house constructions—however, none are preserved in such a state that their original intended function is evident. Midden deposits of any significance have not been located at Itinnerup Tupersuai, although tests have only been done on the south 'front' facing slope of the ancient camping area. Midden deposits could be present in other nearby locations that have not been thoroughly surveyed.

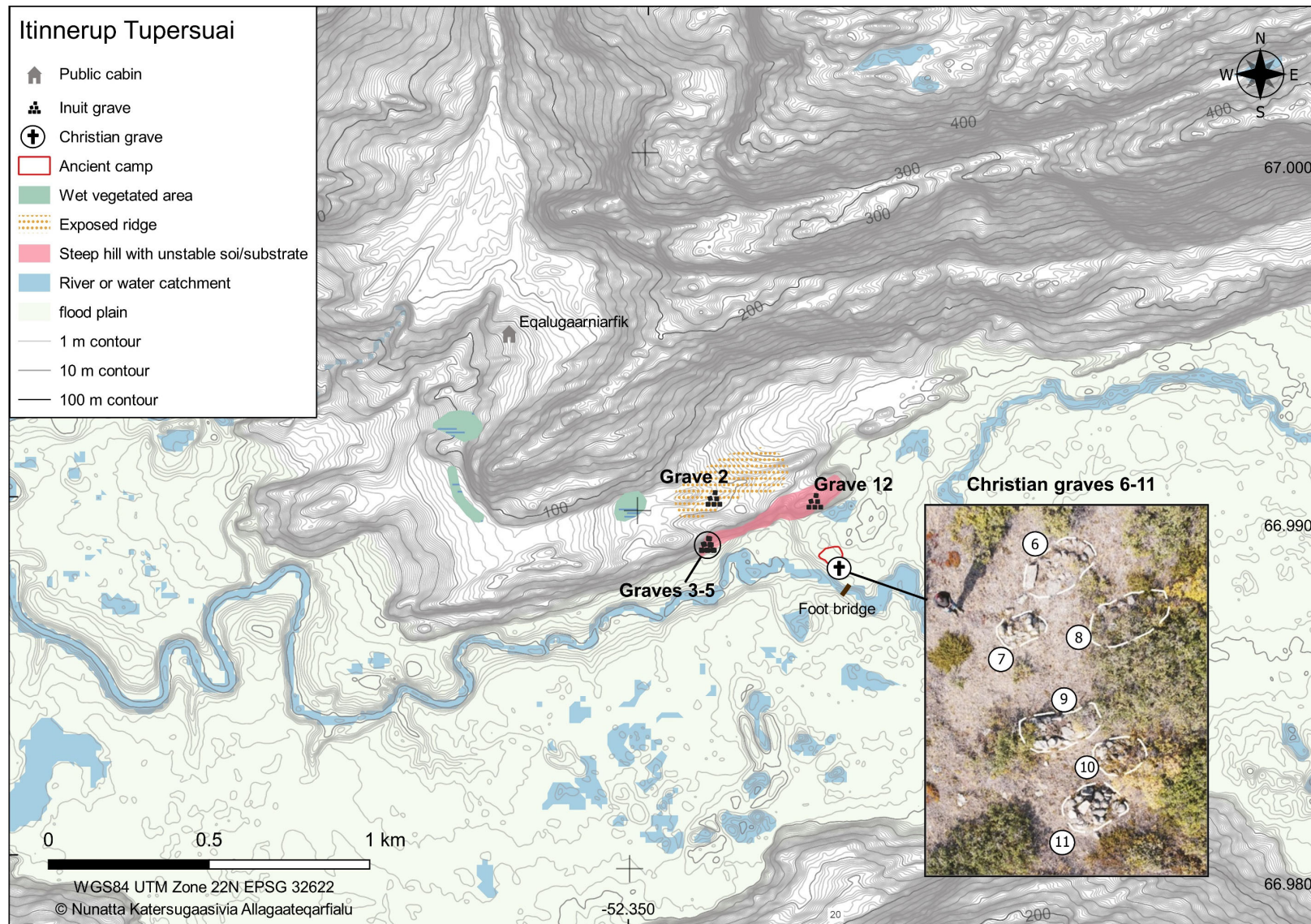
A total of thirteen ( $N=13$ ) graves are identified at and adjacent to Itinnerup Tupersuai including a concentration of six graves that are believed to be Christian burials due to their characteristic east-west orientation (see red rectangle in **Figure 51** and **Figure 52**). These Christian graves (#6-11) are confined to a small cluster grouping approximately 25 m to the east of the ancient campsite, whereas the older chamber graves are scattered in the terrain to the south (#13) and on the cliffs to the north of the site (#2-5). Graves #4. and #5 appear to have been recently disturbed with their capstones removed (**Figure 53** and **Figure 54**). This disturbance is believed to have occurred after 2016.





**Figure 51.** The site of Itinnerup Tupersuai is situated at the point where the river inhibits further sailing towards east (right side of image). The area where boats are generally moored is marked with a blue oval on the left side of the picture, and a Christian burial ground with six graves is marked with red rectangle approximately 25 m to the east of the ancient camp area. The ACT is denoted by a dashed white line (a, b and c).





**Figure 52.** Map showing the location of Itinnerup Tupsuui's registered cultural units in relation to sensitive areas.



Itinnerup Tupersuai		Vulnerability Assessment								Mitigation				
Unit no.	Feature type	Remoteness factor	Path	Access	Readability	State of preservation	Objects	Pull-factor	Vulnerability score	path improvement	limited access	new signage	Old score	New score
1	Camp site	2	2	2	1	1	1	2	3	0.1	1	1	3	2
2	Inuit grave	2	4	4	2	2	4	1	8	0.1	1	1	8	3
3	Inuit grave	2	2	4	1	1	4	1	5	0.1	1	1	5	2
4	Inuit grave	2	2	2	1	1	4	1	4	0.1	1	1	4	2
5	Inuit grave	2	2	2	1	1	4	1	4	0.1	1	1	4	2
6	Christian grave	2	4	2	1	1	4	1	5	0.1	1	1	5	2
7	Christian grave	2	4	3	1	1	4	1	6	0.1	1	1	6	2
8	Christian grave	2	4	3	2	2	4	1	7	0.1	1	1	7	3
9	Christian grave	2	4	3	2	2	4	1	7	0.1	1	1	7	3
10	Christian grave	2	4	3	1	1	4	1	6	0.1	1	1	6	2
11	Christian grave	2	4	3	2	2	4	1	7	0.1	1	1	7	3
12	Inuit grave	2	2	3	1	1	4	1	4	0.1	1	1	4	2
13	Inuit grave	2	4	4	1	1	4	1	7	0.1	1	1	7	2
Vulnerability Index Value (VIV) =									5	New VIV after mitigation =				2

**Table 21.** Vulnerability assessment of cultural heritage for Itinnerup Tupersuai.



**Figure 53.** Grave #4. (-52.34494, 66.98909), facing east. The grave is comprised of three separate chambers that are almost joined. Note the lack of lichen on many stones showing that the grave has recently been disturbed and that the capstone removed from its original position. Photo: J. F. Jensen 2021.



**Figure 54.** Grave #5 (-52.34488, 66.98910), facing east. This grave is the easternmost of three burials that are joined (Graves 3 and 4). Like Grave 4, the capstones have been removed and the chamber left open. The newly exposed surfaces are absent of lichen showing that the disturbance is recent. During a brief survey of the site in 2016, none of these graves were observed as opened. Photo: J. F. Jensen 2021.

## Mitigation

The overall VIV of Itinnerup Tupersuai was calculated as a score of 5. Apart from the above-mentioned vandalism and opening of Graves #4 and #5, there appears to be few major vulnerability concerns for the cultural remains at Itinnerup Tupersuai. With proper interventions (e.g., clearly demarcated foot paths and camping areas, dissemination materials and signage) the site's VIV could be reduced to a score of 2. The trade-off, however, would be that these interventions could potentially detract from the natural character of the area and therefore any new infrastructure will require careful consideration by the Site Manager before implementation.

It is also worth noting that natural erosion along the riverbanks and climate change effects in the form of thawing permafrost appear to be minimal at Itinnerup Tupersuai. Disturbances resulting from site use and visitors also appears to be minimal. One long term change that may be relevant to observe is the decadal changes in vegetation and the proliferation of willow scrub observed in several parts of Greenland that can result in negative consequences for heritage features in the landscape (Fenger-Nielsen, et al. 2019). Willow scrub obscures ruins and sites, as can now be seen at Graves 8 and 10. In case of the graves it might be considered advantageous that they are partially hidden—however, overgrowth of this species may have also result in unwanted long-term effects on the feature’s construction and disturbance to any organic remains.

### ▲ Emergency stops

All graves found at Itinnerup Tupersuai are vulnerable to future human disturbance. Strategies should be implemented that ensure that these graves their components remain undisturbed. These include:



**All graves (#2-13)**

Due to the ability of the graves to blend into the landscape, there is a high probability that more graves will be identified at Itinnerup Tupersuai and the surrounding higher elevation areas in the future. Extreme caution should be exercised to ensure that any future path improvement or signage does not compromise any of the presently known or undiscovered graves on in the general area.

## 6.5 Recommendations

Based on the evaluation of the Vulnerability Assessment team in August 2021, the following recommendations are provided for minimizing negative impacts to Itinnerup Tupersuai’s natural and cultural values:

- A.** Any new path created at Itinnerup Tupersuai must adhere to the rules and regulations outlined in Inatsisartutlov nr. 11 af 19. maj 2010 om fredning og anden kulturarvsbeskyttelse af kulturminder. The new path should remain at a minimum distance of 2 meters from all listed cultural units listed in Table 21. This includes any artificial boardwalks, raised metal walkways and/or viewing platforms, as well as signage or interpretive boards. **Additionally, the path must make considerations for avoidance and/or protection of all units demarcated as ‘emergency stops.’**
- B. Mapping.** Higher resolution maps (1:10000) of the central camp area are needed for any future development and planning of Itinnerup Tupersuai. Continued mapping of the area on an annual basis would provide much needed information on **vegetation growth, erosion** and the **widening of paths in wet, vegetated areas**.
- C. Traditional land use.** During the summer and autumn hunting seasons, visitors to Itinnerup Tupersuai should be made aware that they are visiting an **active hunting zone**. Direction from the operator may be necessary to ensure that tourists do not unintentionally place themselves in harm’s way.



- D. Greenland white-fronted geese (EN) may occasionally be present at Itinnerup Tapersuai at certain times of the year as part of their migration to inland breeding grounds. **These birds should be given significant distance and left alone so as not to disturb their resting and feeding activities.**
- E. **Rubbish.** In some areas, rubbish is scattered on the site and patches of willow scrub surrounding the ancient camp area were observed as toilet areas. Efforts should be made to inform visitors on proper waste disposal while in the area.
- F. **Signposts and information boards.** The best place for installation of signposts would be by the public cabin to the west of Itinnerup Tapersuai or along specific vantage points on the cliffs to the north of the ancient camp site. These cliffs offer magnificent overviews of the plain where geological history, wildlife topics and the cultural importance of Itinnerup Tapersuai as a gateway to the interior can be easily visualized.

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