Investigating Portages in The Norse Maritime Landscape of Scotland and the Isles

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Thesis Submitted for the Degree of Doctor of Philosophy

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March 2000

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Throughout history, the practice of carrying boats and supplies overland between navigable rivers, lakes and stretches of sea has been a concern of all maritime cultures. The Vikings are notorious for their use of portages during their expeditions of exploration and settlement. Portages are an intrinsic aspect of navigation within a maritime landscape, opening up new territories and expanding nautical routes. Portaging provides economic, logistic and strategic advantages over the alternatives of navigating dangerous waters or having access denied by land. As portaging is an activity performed by a maritime culture the evidence used in investigating portages must be multi-disciplinary, involving archaeological evidence, place-name studies, historical sources, ethnological studies and experimental archaeology.

This thesis explores all aspects of the portage scenario, as they would have been manifest in the Norse maritime landscape. A survey of the history of portaging from antiquity to the modern era is performed, concentrating on the activities of the Vikings in Scandinavia and Eastern Europe. The place of portages in the navigation of the maritime cultural landscape is applied to the many different situations in which they would have provided an advantageous or necessary alternative. Essential to the study of maritime activities is the vessels involved. An exploration of the maritime technology available during the Viking Age is presented, grouping the vessels into types based upon size, capabilities and purpose. To help understand some of the methods and techniques involved in the portage activity, experimental Viking ship archaeology is reviewed with special attention paid to experiments in portaging. All of these data combine to provide a criterion that is used to identify possible portage sites in the Norse maritime landscape of Scotland and the Isles. The last chapter and a video appendix present the navigation and portaging of a replica Viking Age cargo vessel based upon information provided by this thesis.

Declaration

No work in this thesis has previously been submitted for a degree in this or any other university. The thesis is based entirely upon the author's own research and not upon any joint work.

Copyright

Acknowledgements

I would like to thank the following people for their assistance and encouragement during the course of my research into portages in the Norse maritime landscape of Scotland in the Isles. Without their advice, support and friendship the completion of this thesis would not have been possible.

United Kingdom

Jennifer R. Birks • British Broadcasting Corporation: Channel 2 Science and Research
Barbara Crawford • Sir Robin Knox-Johnston • Mary Macleod • Christopher D. Morris
Lindsey L. Murray

Scandinavia

Margareth Buer • Terje Planke • Per Weddegjerde • Christer Westerdahl
The Crew of *Havørn* • The Crew of *Borgundknarren*

Elsewhere

Elizabeth and Christopher Amato • Patricia D. McCullough • Alexander McCullough
Paolo Toniolo

Foreword

This thesis is the culmination of 5 years of study into an aspect of the maritime cultural landscape that has, for the most part, been neglected by the study of Viking/Norse archaeology and maritime studies in general. Therefore, assimilating as many avenues of inquiry as possible into this investigation of portages in the Norse maritime landscape of Scotland and the Isles was overdue. In order to fully understand this practice, an in depth review of portage activities throughout time and space was necessary. The many reasons and methods of portaging from ancient Greece to 19th century North America is addressed in Chapter 2: *Who, What, Where, When and WHY Portage?* The aim of this review is to familiarise the reader with the history of portaging, setting the scene for an intensive investigation to portage possibilities in Scotland and the Isles during the Viking Age.

Once this has been established, Chapter 3*: Portages in the Maritime Cultural Landscape* addresses the concept of the maritime cultural landscape in specific relation to the portaging activity. Aspects of the maritime cultural landscape are defined and new terms are introduced which apply specifically to the navigation practices involving portages. This allows the reader to become aware of the landscape in which the portaging activity would occur on its different levels. The Norse being a culture operating almost exclusively in the maritime zone, an understanding of these concepts is necessary when investigating any activity exclusive to this environment.

A study of the vessels that would have been operating in these areas is also necessary to fully understand the possibilities available to the Viking Age navigator. This involves not only understanding the basics of how these vessels were constructed, but what the capabilities of the different types of vessels were. Many different boat/ship finds from the Viking Age are reviewed, and then grouped based upon their size, potential usage and capabilities. This is the focus of Chapter 4*: Maritime Technology during the Viking Age*. Even though these are but a scant representation of the numerous vessels that would have been plying the waters of the Viking Age, a varied cross section is represented.

Portaging is a human activity that is based in the maritime cultural landscape and therefore a complete understanding of the techniques and methods involved is something which is not present in the archaeological record or in the landscape itself. Experimental archaeology is able to provide some possible answers where none existed previously. It is for this reason that this discipline was chosen to try and find some of the answers unobtainable by other means. As there are many different levels of experimentation, answering varied research inquiries, a review of archaeological experiments based on numerous vessel designs and activities is presented in Chapter 5: *Experimental Archaeology*. Particular attention is paid to the *Havorn* expedition in this chapter and the *Borgundknarren* expedition in Chapter 7: *The Borgundknarren Expedition*, as the author was present on both of these and the information has not been presented in an analytical method before. The *Havørn* expedition directly addresses many of the difficulties involved in portaging and river travel, whereas the *Borgundknarren* journey investigates Viking Age navigational practices, as well as the portage scenario. The latter expedition involves the site of Mavis Grind in the Shetland Islands as a portage point, based upon information provided by this investigation into portages in Scotland and the Isles. Appendix C of this thesis is the video documentary based upon the *Borgundknarren* expedition. This allows the reader to visualise the portage activity and the difficulties encountered, as well as some possible methods of Viking Age navigation.

With all of the information gathered on portages using the previously mentioned avenues of inquiry, a comprehensive analysis of possible portage sites utilised in Scotland and the Isles during the Viking Age is presented in Chapter 6: *Portages in the Norse Maritime Landscape of Scotland and the Isles.* The sites analysed in this thesis are a representative sample based upon landscape studies (both terrestrial and underwater), archaeological data, historical resources, place-name studies and ethnological data. From this data it was possible to formulate a *portage criterion* upon which further investigations into portages in the Norse maritime landscape, as well as any other cultural affinity, can be investigated.

In dealing with the portage activity in this comprehensive manner, all aspects are investigated and a greater understanding of portaging in Scotland and the Isles during the Viking Age is presented. This thesis provides a basis for further research not only into Viking Age maritime practices, but also for any investigation into portages and their application in navigational practices of any maritime culture.

This thesis is the product of research conducted between 1994 and 2000 in the Department of Archaeology at the University of Glasgow, with the *Havørn* expedition (occurring in the summer of 1992), providing my initial interest in the subject of portages during the Viking Age. Fieldwork was undertaken primarily during 1995 and 1996 with numerous site-specific investigations occurring thereafter. This involved both coastal and underwater survey of many of the sites in order to form a more complete understanding of the maritime landscape. The video presented as Appendix C: *The Viking Voyage*, was the result of consultations with BBC 2 Science and Research, who also produced and directed the film.

During the course of this work interim papers were presented at several places: Scottish Archaeological Forum 1995: Marine and Coastal Environments, Glasgow; Scottish Society for Northern Studies Conference and AGM 1996, Edinburgh; 13th Viking Congress (poster), Nottingham; Departmental Postgraduate Seminars, University of Glasgow.

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1. Introduction

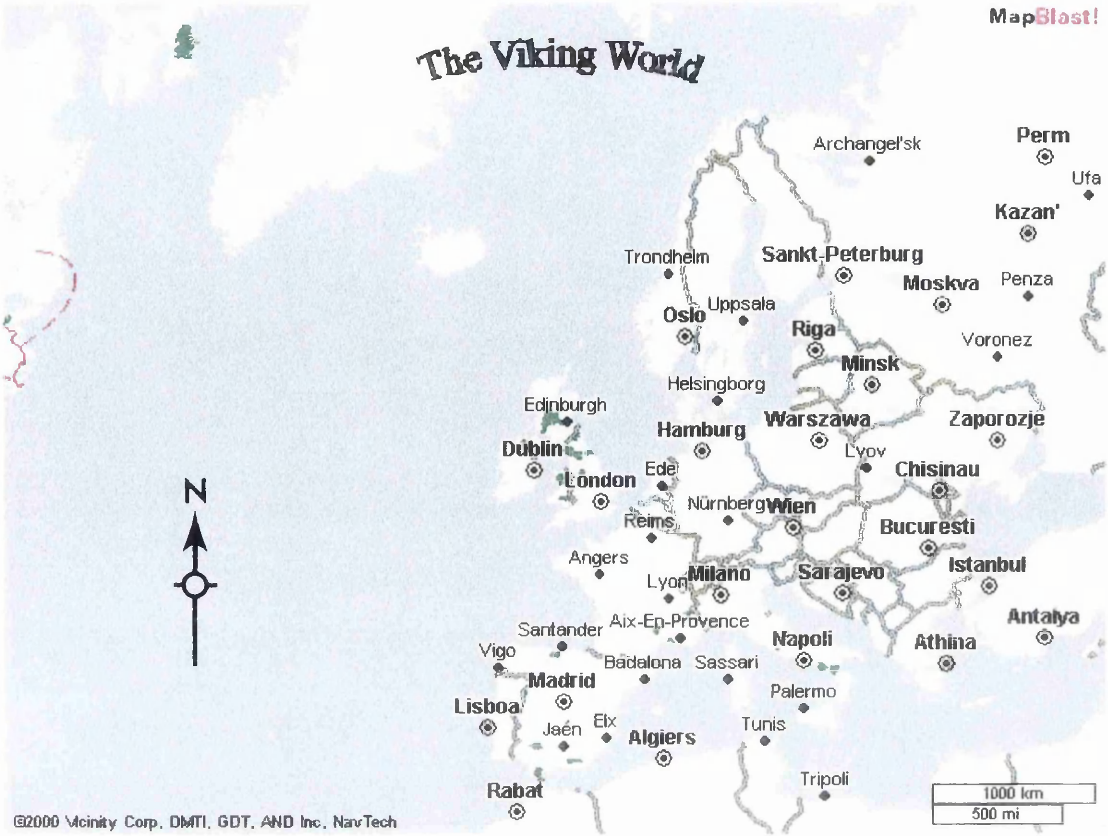


Figure 1.1: Map showing the navigable realm of the Vikings. (Adapted from www.mapblast.com 2000)

"The Vikings' ability to use narrow necks of land over which they dragged their boats in order to circumvent long sea routes is not to be underestimated."

Barbara E. Crawford in *Scandinavian Scotland* (1987:24)

This statement is obvious when mapping the infiltration of the Norse into foreign lands, yet, how do we know the extent that the Vikings utilised portages as a regular component of the Norse Maritime Landscape? Wherever one looks in the Viking World, portages seem to have been used as a basic method of navigation. Therefore, it is probably safe to assume that it was not just a one-time adaptation to local conditions, but a regular feature of the Norse Maritime Landscape.

The objective of this thesis is to formulate and utilise a *portage criterion* to locate and identify possible portage sites in the Norse maritime cultural landscape as evident in Scotland and the Isles. This *portage criterion* will establish an *archaeological definition* of portaging that will be applicable in future investigations into the maritime cultural landscape of not only the Vikings, but for all maritime cultures. The practice of dragging boats over isthmuses of land is only one component of a larger system of transport zones making up the *micro-topographical* and *macro-topographical* maritime landscape. These two terms will be introduced and defined so that they can be used in conjunction with the *portage criterion* to identify and describe the routes utilised by *maritime cultures* to travel within their environment. Westerdahl (1998:1) reminds us that a *maritime culture* is one that is utilising the maritime environment, a culture which lives on the shore but does not exploit the maritime opportunities available to them does not possess a maritime culture. In the case of any maritime culture, all aspects of their existence must be included in any investigation into their way of life, even if it includes the utilisation of the terrestrial landscape by dragging a boat across it. The results of this investigation will allow for the portage phenomenon to be analysed in a manner that places it within the context of a cultural existence, thus providing a better understanding of the maritime environment and the navigational routes which allowed for exploration, settlement, trade and communication.

As established by this research, the standard definition of portaging only begins to describe a complex scenario involving complicated logistical, strategic and navigational circumstances. As the evidence for portages and portaging is reviewed, this definition will constantly be added to and amended, until its culmination in a *portage criterion*. Using archaeological data, an analysis of contemporary maritime technology, accounts in primary sources, place-name studies, topographical and geographical information, and ethnographic material, evidence for portages during the Viking Age in Scandinavia, Continental Europe, and the British Isles will be reviewed. Evidence for portaging throughout the ages, the world over, is also included in this survey, as some of the modus operandi is universally applicable. This thesis is not intended to be a catalogue of all the portage sites utilised in the navigation of Scotland and the Isles during the Viking Age, but a review of what we know about portages and the implementation of a methodology on how to identify and interpret them.

Because the portage scenario involves many variables, a multi-disciplinary approach must be adopted. A combined study involving many fields allows for a lack of information in one area to be compensated for by another. This is not to imply that the notion of *possible therefore correct* can be implied, but that if a site meets the criterion it was *probable* that a portage would have taken place at the location. Using this procedure, a reassessment of the navigable environment in the maritime cultural landscape of Scotland and the Isles during the Viking Age must be made. Areas that were once considered inaccessible or on the fringe, may now occupy a transport zone offering regular traffic and thus communication and contact extending beyond the immediate locality.

Because of the many problems associated with assigning the culture of the Vikings or Norse with a hard and fast chronology based upon settlement dates, this thesis will use the terms Viking *and* Norse to refer to the period of *c.* AD 800 – 1250. This is roughly based upon Bigelow's assignation of the dates between *c.* AD 800 - 1500 for the Norse in Shetland (Bigelow 1992: 9), taking into account the evolution of maritime technology at this time. Therefore, any references made to this maritime culture as the Vikings or the Norse are one and the same for the purpose of this investigation into the utilisation of the maritime landscape.

In order to understand how portages were part of the maritime landscape of the Norse, it is necessary to understand the practice of portaging in general. It is for this reason that the next chapter will provide an in depth review of portaging from antiquity to the modern period. Using these as a basis for comparison, portages from throughout the world of the Vikings will be presented. Portages were used for many different reasons over the ages, but the *primary* concerns of these cultures were the same: economic and military. As each realm of the Viking world is examined, the practice of portaging is evident in their navigational practices. Therefore, this standard procedure would have been easily adapted to the maritime landscape of Scotland and the Isles as the coastline is very similar to that of much of Scandinavia.

The next chapter will examine the different reasons for and methods of portaging, setting the groundwork for this investigation into portaging in the Norse maritime landscape of Scotland and the Isles.

2. Who, What, Where, When and WHY Portage?

The Concise Oxford Dictionary (1991:928) defines **portage** as:

> *n. & v. – n.* **1**. the carrying of boats or goods between two navigable waters. **2**. a place at which this is necessary. **3**. **a** the act or instance of carrying or transporting. **b** the cost of this. – *v.tr.* convey (a boat or goods) between navigable waters.

As this thesis shall reveal, this definition only describes the minimum requirements of a portage scenario as evident in the maritime cultural landscape. The portage scenario involves complicated logistical, strategic and navigational circumstances. When investigating portages in the Norse maritime landscape of Scotland and the Isles one has to first ask the question 'Why portage?' In order to gain a basic understanding of the concept of portaging it is necessary to review the various reasons and methods for portaging throughout the history of the utilisation of the maritime cultural landscape. The evidence of portaging is minimal, mainly appearing in historical sources, when the activity is related to either a unique scenario possibly involving a major undertaking with large vessels or where a decisive battle was entered into by way of a portage. Portages also gain mention when they have a major political significance, as in the case of Magnus Barelegs as recorded in the *Orkneyinga Saga* (ch.41). Physical features related to possible portage sites are also a rare occurrence in the landscape, mostly because of the ephemeral nature of the portage scenario. Only when a well-established and maintained portage point is discovered is there a possibility of locating associated features. Examples of this are the Diolkos on the Isthmus of Corinth, Draget off Lake Malaren in Sweden, An Tairbeart in Kintyre, and possibly the Kanhave Canal in Denmark. It is difficult to discern the regularity with which many portages were traversed and thus relied upon as a prime component of the maritime cultural landscape. Therefore, this investigation into the portage scenario is heavily reliant upon landscape studies, maritime routes and the continuing practices of contemporary mariners, as well as data collected during archaeological experiments.

2.1 The Ancient World: Mythology and Methodology

As long as mariners have been plying the waterways of the world the necessity of carrying boats and supplies overland between navigable rivers, lakes and stretches of ocean has been a concern of all maritime cultures.

In ancient mythology we find numerous references to portaging, a prime example being in *The Argonautica* of Appollonius of Rhodes. A gruelling 12 day portage is told of, where instead of fighting their way back through the Sea of Azov and the facing the challenge of the "clashing rocks" (*Sympleglades*), they opted to portage over the Crimean peninsula back into the Black Sea (Casson 1991:60) (Burn 1968:194). Burn also supports the idea that this legend is based upon the distorted memory of a real voyage (1968:192). He proceeds to explain some of the circumstances which would enable one to relate *The Argonautica* to past situations and places which could well have been the same as encountered by Jason. In reference to the previously mentioned portage scenario, he is able to forward an explanation for the 'clashing rocks' and the subsequent portage. The 'clashing rocks' are recognised as icebergs or ice floes that occur during severe winters on the Black Sea. In 1920 AD, a corner of the Sea of Azov froze solidly enough to allow the Red Army to outflank the defenders of the Crimea by marching troops across (Burn 1968:193). An ice floe of this thickness would be considered a serious threat to any wooden vessel in antiquity, thus perpetuating a legendary tale that would equal the 'clashing rocks'. From his examples Burn (1968:194) finds it conceivable that the legend of Jason and the Argonauts could quite reasonably be the record of a treasure hunting expedition. The aforementioned type of ice floe would not allow for a safe return into the Black Sea, and thus trap the vessel within the Sea of Azov. By sending sailors on limited reconnaissance missions, they would have been able to find that to the west of the Isthmus of Perekop there was open water. This portage from sea to sea would provide a much less hazardous option to navigating their way through the treacherous ice fields.

Casson (1971:89) writes that during the period of 500–323 BC, not only triremes, but even the larger vessels were not only light enough to be drawn up on the beach at night but also could be portaged quite a distance on rollers. (As the exact description of rollers is lacking from the primary sources and the archaeological record one can only assume that this refers to cut and prepared logs which may or may not have actually rolled.) Polyaenus in his *Strategems of War* (5.2.6) records that Dionysius I had his men haul 80 triremes a distance of 20 stades (2 1/3 miles) in a day. The actual procedure of this portage is not related in this history, but one can assume that this was a planned naval strategy that was not unknown at the time. Before this massive undertaking he advised both the soldiers and sailors to take courage and exert themselves. This particular scenario involved an assault on the city of Naxos, therefore the amount of soldiers and crew would be sufficient for the entirety of the operation. The actual portage activity would be greatly simplified by the presence of substantial manpower, thus allowing for an expedient crossing.

If necessary, most vessels could be dismantled and transported long distances to be quickly reassembled at a new location. There are numerous examples of vessels of all types being built in a kit form which would allow for them to be transported to a chosen launch site and then reassembled. This practice was to include such vessels as quinqueremes, quadriremes, triremes, and triaconters as reported by Arrian (*Anab.* 7.19.3) to have been cut up for just such this purpose. This report relates specifically to the fleet Alexander collected at Babylon that had been transported from Pheonicia to Thapsacus on the Euphrates. This story is retold with some variations by Strabo (16.741) and by Quintus Curtius (10.1.19). Arrian (*Anab.* 5.8.5) also notes that a fleet of small craft and triaconters that Alexander had on the Indus were also transported overland after being cut into sections. This portage was executed after Alexander received news whilst in Taxila that Porus (King of the Pauravus) was waiting on the other side of the Hydaspes with all the troops he could muster to prevent Alexander crossing the river and to attack if he does. Hearing this, Alexander sent orders to his fleet on the Indus to be disassembled in the following manner for transportation overland; the smaller vessels were bisected, and the thirty-oared galleys were cut into three sections. These were then loaded onto carts and transported to the Hydaspes where they were reassembled and launched, thus allowing Alexander to have the entire flotilla at his disposal. According to Arrian (*Anab.* 5.13) the re-assembly and launching of these vessels was accomplished during a torrential downpour, thus drowning out the din of the preparations. Once completed the vessels were hidden amongst the trees along the riverbank until the forces were fully prepared for their attack. This example of a strategic portage provides an excellent example of utilising not only the element of surprise in having the unexpected ability to transport large numbers of troops, but also possessing the ability to attack deep inland with a formidable naval presence. Casson (1971:136) attributes this practice as being long known in the East.

In the 12th century B.C., Ramses III had ships moved from Coptos to the Red Sea (Arrian: *Anab.* 7.19). According to Diodorus Siculus (II.16.6), Semiramis had collapsible river craft purpose built to be transported on camels. She summoned shipwrights from Phoenicia, Syria, Cyprus and the rest of the maritime oriented lands to construct these vessels so she could begin her war against the Indians. The reason for this being that the Indus River, the largest in this region and the boundary of her kingdom, required numerous boats for the purpose of transport and defence. Because of a lack of construction materials near the river, it was necessary to bring the vessels, in kit form, from Bactriana by land. The transportation of these incomplete vessels makes sense on numerous levels. Firstly, it allows the transport costs to be kept at a minimum due to the conveyance of only finished components, thus eliminating the carriage of unnecessary raw materials. This method also allows for a quick assembly of the vessels for an expedient launching. This operation has some affinity with the theory that the vessels used during the Viking Age to navigate the rivers of Eastern Europe began their journey as incomplete vessels. They would then be fully fitted once the most difficult parts of the journey had been overcome.

To establish a shipyard on a common border, albeit a riverine one, is to open oneself up to attack during the production phases. Semiramis took two years to prepare for this invasion, for not only was the construction of boats necessary, but she also ordered the construction of dummy elephants. The reasoning behind the construction of these dummy elephants was to allow for the cavalry horses to get accustomed to these savage beasts (Diodorus Siculus II.17.3). Upon completion of both these tasks, she summoned her forces to Bactriana. Diodorus Siculus (II.17.2) reports that two thousand of these 'kit' boats had been constructed, and along with the dummies of the elephants, were loaded onto camels in preparation for this manoeuvre.

The Greek tyrant Periander even went so far as to build a maritime railway over 3 miles long - the *diolklos*, as it was called, for his navies to have easy access to either side of the Isthmus of Corinth (see Fig. 2.1). This limestone-paved track could also provide a portage for smaller merchant craft, or allow for the carriage of cargoes from larger vessels to others waiting on the other side of the traverse (Casson 1991: 73).

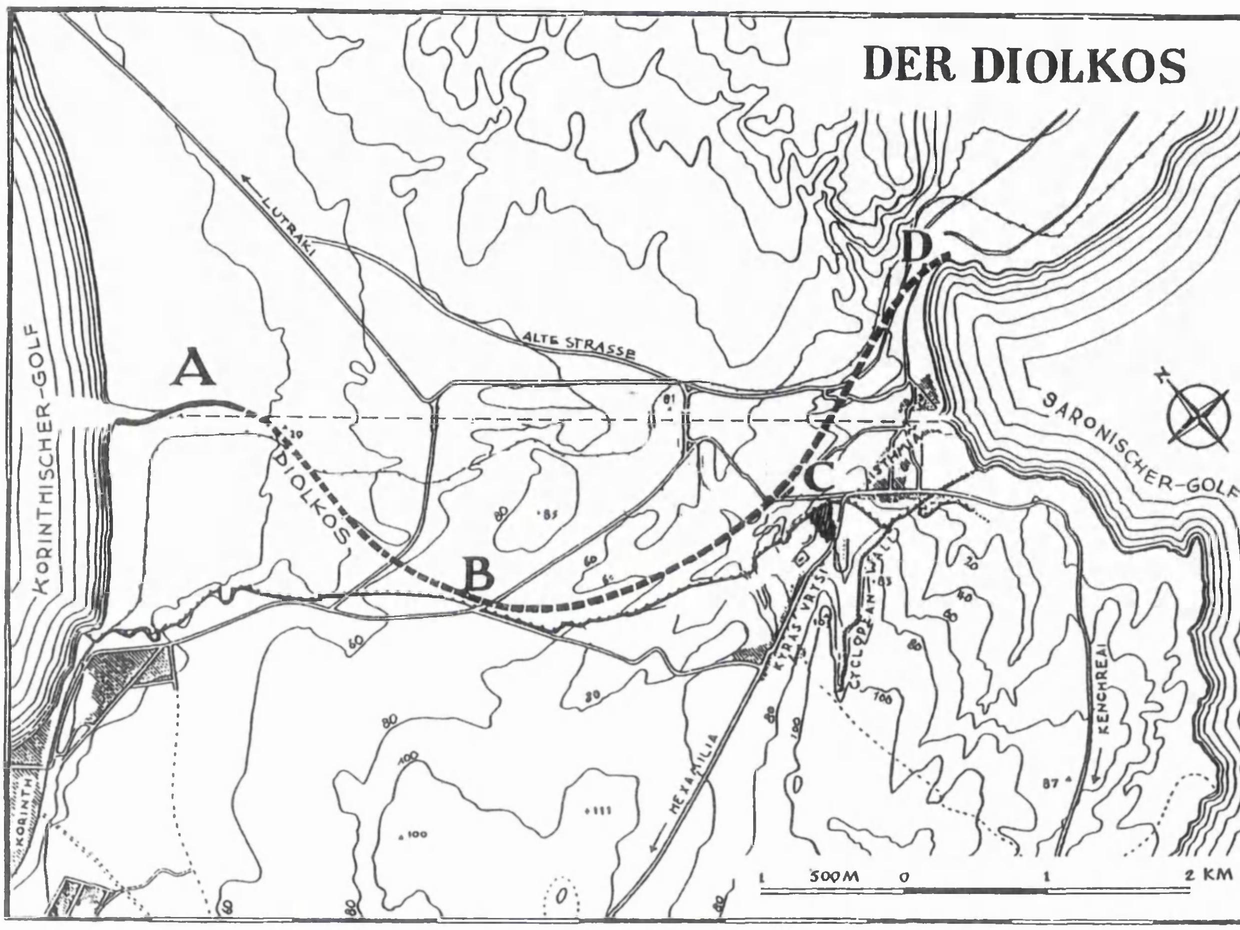


Figure 2.1: The assumed course of the Diolkos. The findspot near Poseidonia is marked with an **A**. The known course at Schoenus is situated at **D**. (After Werner 1997: Fig. 16)

This, the largest ship trackway from ancient times runs a similar path to the modern Corinthian canal. The exact date of the construction of the Diolkos is unknown. Although the surviving stonework appears to be from the reign of Periander, there may have been a smaller construction serving the same purpose beforehand. In all likelihood this is the case, as the continuing utilisation of these areas tends to be an inherent aspect of the maritime landscape. During the time of the Greek historian Thucydides, the Diolkos was already ancient. Thucydides *History of the Peloponnesian War* (3.15.1) tells that in order for the Spartans to undertake the invasion of Attica, they instructed their allies to go to the Isthmus [of Corinth]. Being the first to arrive, they began preparing the slipways for the ships, so that they could transport them from Corinth to the sea [Aegean] on the Athenian side and make a simultaneous attack with ships and soldiers. In addition to the strategic advantages of this construction, it served an economic function as well. A fee could be charged for use of the *Diolkos* for the transference of ships and cargo (Wiseman 1978:13). This shortcut across the isthmus would not only bring income in terms of the direct imposition of fees, but in bringing a large quantity of foreigners and foreign goods into the territory. This would give an obvious boost to the economy of the Corinthian territory.

The ancient mariner, as many others throughout history, preferred coastal navigation. But when sailing within sight of land they would have to make passages that were as hazardous, if not more so than the offshore routes, for different reasons. Between Cape Malea on the southern tip of the Peloponnesus and the island of Cythera is one such treacherous passage. Wiseman (1978:45) reports that the Corinthians would have been foolish people not to take advantage of the narrow Isthmus (40 stades or 7.1km) to offer an alternative route to the dangerous channel. We can assume that they saw the economic potential of this venture early on. Even though mention of the actual paved trackway is rarely noted in the sources, the act of portaging across this Isthmus is mentioned more frequently. The Diolkos was probably first identified by the German archaeologist Dr. Habbo Gerhard Lolling in 1883, when he noted the remains of what appeared to be a small trackway upon which small ships were dragged from one sea to another. Subsequent discoveries in the area slowly extended the limits of the known Diolkos until a fairly complete picture of its course was able to be produced. Some of the carefully set stones were accidentally discovered during a military exercise in the area, with further excavation being undertaken with the help of a military school (Werner 1997:98-99). There is now about 1100 m of the Diolkos which has been unearthed, and it is upon this that it is possible to trace its route and make interpretations as to the methodologies used to transport vessels from one sea to another.

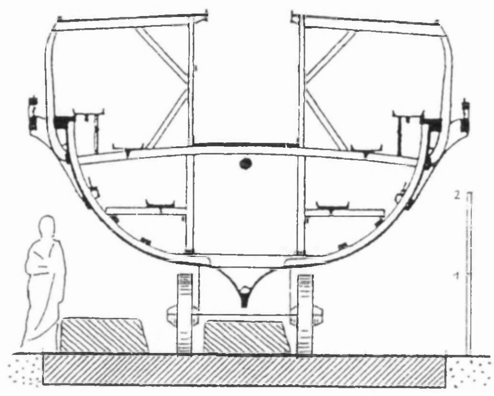


Figure 2.2: A section through a reconstructed trieres showing the difficulty of transporting vessels on a narrow gauge railway. (After Werner 1997:Fig.17)

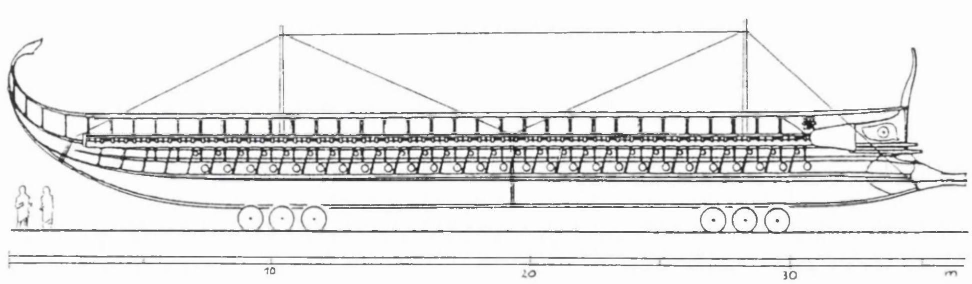


Figure 2.3: A Greek trieres shown on trolleys utilising guylines to prevent sagging. Reconstruction drawing by J.S. Morrison & J.F. Coates. (After Werner 1997:Fig. 19)

As to how vessels were transported along the Diolkos, a few methods have been forwarded. The current two theories are 1. The use of sledges of some type with wet sand in the tracks to reduce friction, and 2. The use of wheeled vehicles. The common opinion, backed by technical arguments, supports the latter of these two theories (Werner 1997:111). Morrison and Coates (1986:211, 1989:68) estimate the weight of a Greek oared warship (triere) between 15 and 21 tonnes without, and about 25 to 27 tonnes with equipment (outriggers, seats, etc…). Channels cut into the paving slabs have led to the interpretation that a movable wooden platform (the holkos) was utilised for the movement of ships and cargo (Wiseman 1978:45). As these channels are 1.5m distant from each other, it is supposed that only small vessels could be hauled across the isthmus, whereas larger vessels would offload their cargo for portage (see Figs. 2.2, 2.3). As common sense dictates, the route of the Diolkos is sinuous, lessening the grade as it ascends to the centre of the isthmus. There are numerous dates for the use, rebuilding and repair of the Diolkos, the earliest being from the period of Periander (*c.* 625-585 BC). The last recorded portage being from 868 AD when Nicetas Oriphas took his fleet of 100 Byzantine warships of the dromon type across to engage the Saracens (Wiseman 1978:46, Werner 1997:114). But, as previously mentioned, the route across the isthmus had probably been used as a portage well before its formalisation into a 'marine railway'. The natural evolution of the more frequently used portages has been towards canalisation, and such was the case of the Diolkos. Again, it was the tyrant Periander who conceived of the idea to cut a canal through the Isthmus to make this journey even simpler. There is only one ancient mention of this plan by Diogenes Laertius (i.99) noting that "he [Periander] wanted to dig a canal through the Isthmus." Throughout antiquity the idea of digging a canal through the Isthmus was a recurring idea to the likes of Demetrios Poliorketes (336-283 BC), Julius Ceasar (100-44 BC), Caligula (Emperor AD 37-410) and Nero (Emperor AD 54-68), all of whom could see the economic and strategic value of this traverse. It wasn't until AD 1893 that this dream of the ancients was realised with the construction of the Corinthian Canal (Werner 1997:114-115).

Isserlin et al. (1991:83-92) also relate the possibility of a ship canal across the Mount Athos peninsula constructed by Xerxes of Persia. Again, the reasoning behind this construction would be to avoid the dangerous currents and winds encountered during the journey. Additionally, the undertaking of such a construction could prove advantageous as a form of psychological warfare (Isserlin et al. 1991:83). Further investigations into this site were unable to conclusively locate the precise route of the canal or to confirm if it was a contiguous canal or one that involved a portage (Isserlin et al. 1991:90-91, 1992:284, 1996:339). The investigations of 1991-92 showed that the slope gradient was suitable for the dragging of vessels. The results of these investigations have been inconclusive in identifying either the route or the exact methods which were used to transport vessels across this peninsula, but the knowledge that this was done serves to further the idea that canalisation and portages served a major role in the ancient world. The idea of portage sites becoming canals not only occurs in the ancient world but throughout the ages the world over. A possible example of this from the Viking Age is the construction of the Kanhave Canal in Denmark (see below).

From the preceding information it is easy to see that portages played a significant part in the maritime cultural landscape of antiquity. The primary sources of this period provide an abundance of information relating to who, what, where and why to portage. But, being that these accounts are only recorded due to their significance in history, one must assume that these activities occurred on a much more widespread scale then the documents reveal. Unfortunately the archaeological information on portages is very scarce, and only when as large an undertaking as the Diolkos is attempted are we able to locate the remains of such a structure. This realisation makes it almost inconceivable that there would be an archaeological representation of the smaller, ephemeral portage sites that would provide a crossing between smaller bodies of water such as lakes and rivers. This is especially true given the constant changes in the riverine environment that would necessitate the use of different portage sites not only over the ages, but also in different seasons.

2.2 Charlemagne and the use of portages in the Frankish Empire

As can be expected, the practice of portaging both vessels and cargo continued to be used on a regular basis. Once again, the recording of these activities is associated with a key historical figure. That they are mentioned at all is a testament to the fact that they were a continuing key component in the utilisation of the maritime landscape.

In AD 797, the Saxons were the target of the Frankish fleet in Hadeln, a low, marshy coastal region between Weser and the Elbe (Haywood 1991: 98). These ships were dragged overland where sailing was impossible, this traverse thus serving as a way to transport necessary supplies, albeit with difficulty. Described by the Wolfenbüttel annalist as 'navnes magna', these may have been large vessels. Haywood (1991: 98) goes on to relate the annals as describing Charlemagne's use of these vessels as 'castellum' – a fortress. His interpretation of this is that possibly the ships were arranged as a wagon laager around the camp (not unlike a rounded up wagon train of the pioneer days in the United States). As these vessels are described as 'large', the arranging of the vessels into this protective barrier would have been a significant undertaking. Yet, since this was a large-scale military operation, an abundance of available manpower and possibly draught animals would have made the operation more plausible. A detailed review of the vessels that may have been involved in this operation is necessary to evaluate this strategy properly, which is not within the scope of this investigation.

Lebecq (1983:212, 216-17) argues the case for the Fulda annals which give another example of Charlemagne's use of a portage which was based upon the route used by the Frisian fleet which sailed up the Rhine to Regenburg via the Main and the Regnitz (Rezat). This involved a short portage overland into the Altmühl, a tributary of the Danube (Haywood 1991:100). Haywood (1991:104) discusses this attempted construction of a canal by Charlemagne following the same route of the Regnitz – Altmühl portage. As in the case of all portages where excavations have been attempted to construct canals, this must have been a very important route at this time. This would have connected the Rezat (a tributary of the Main) to the Altmühl with an easily navigable channel that could be controlled for both economic and military aims. Charlemagne expended vast resources in numerous attempts to excavate this canal (Haywood 1991:106-9), which reinforces the importance of this crossing. Nonetheless, it was never completed due to impossible geological circumstances (Haywood 1991:108, Hofmann 1967:444). When this project failed, he had two of his own ships carried across, thus proving the viability of this portage site (Haywood 1991:100). Haywood argues that Lebecq has overestimated the importance of the Frisian naval forces (1991: 100), but the portage account still remains as an example of a strategic portage scenario.

Unger (1980:78) proposes that the Frisians moved goods in cogs along the coast, taking advantage of their ties up to the Rhine, England and to Scandinavia. "And in cogs east along the coast to the town of Hollingstedt where the goods and perhaps the entire ship were carried overland to Hedeby on the Baltic coast. So the Frisians portaged their cogs into the Baltic. The need to move them overland kept them small as did the typically shallow harbours of the Baltic. Moreover, those harbours were often hard to reach, being on rivers". His failure to provide references for this proposition leads one to believe that it may be based more on opinion than on archaeological or historical resources. Yet, this theory is supported by more than just Unger (see Lebecq above).

From the reign of Charlemagne we are able to assess the value of portages in a landscape quite removed from both Viking Age Scandinavia and Ancient Greece, yet the practice of portaging remains a mainstay in the utilisation of the maritime landscape. In order to fully understand the methods employed when dragging vessels, further research needs to commence into the maritime technology of the time. This applies not only to the military vessels, but also to the boats used by merchants and the common people. They may not have had the immense manpower available to the military, but it is more than likely that in navigating these same waterways they too had to drag their boats or transport cargo from one navigable waterway to another.

2.3 Portages in the Norse Maritime Landscape

2.3.1 Scandinavia: Norway

Scandinavia, being the origin of Norse exploration and expansion, will be the starting point in my investigation into portages in the maritime landscape during the Viking Age. The place-name evidence in Scandinavia provides a means of identifying possible portage points throughout the landscape. The Old Norse [*eið*] has become the modern Norwegian [*eid*], which is defined as an isthmus, neck of land (Kirkeby 1987:76). Yet, this place-name does not inherently refer to portages, it is only a geographical description of areas ideal for portage sites. The place-name [*drag*], and variations thereof, can also indicate possible portage sites. This place-name occurs in numerous places on the West Coast of Norway, as well as on inland locations. This tradition of hauling boats may have also contributed to alterations in ship construction, especially when it comes to lashing the planking to the ribs (Brøgger & Shetelig 1951:118) to keep the vessel light and supple. It is also proposed that material evidence exists for boat hauling at Drageidet in northern Norway (Nymoen 1997:4). To say that portages occurred at all of these places may not be correct. But, these place-names provide an excellent foundation for an investigation into portages in the Norse Maritime Landscape in Norway.

Some of the place names that lend themselves to the identification of possible portage points along the western coast of Norway are: *Sandeid*, *Nordeid*, *Oldeide*, *Nordfjordeid*, *Eidsvag*, *Namdalseid*, *Finneidfjord*, to name a few (Buer 1995: pers. comm.). On the east coast we find *Eydehavn* and *Eidsfoss* (Buer 1995: pers. comm.)

and *Spangereid*, where a small ca. 400m wide tongue of land provides a safer passage than sailing around (Hernaes 1995: pers. comm.). Archaeologically, this area contains large graveyards and boat burials from the Viking period. Per Hernaes (1995: pers. comm.) also mentions *Listeid* and *Sandeid* as portage possibilities both containing graves and evidence of Viking material culture. I am neither implying that all of these were definite portage sites, nor am I implying that these are the only possibilities for portages, but their place-names and locations justify recognition in the search for portages.

In *Sverrissaga* (Sephton trans. 1899:20-22,), a reference is made to a portage that not only gives the location of the episode, but also provides us with a graphic description of the activity involved in a portage. In this account, the recently crowned King Sverri has sailed to Orkadale (Orkanger) and dragged his ships ashore and burnt them. He then marched his troops over Dofrafell (Dovrefjell) into Gudbrandsdalen and onward to Miors (Mjosa). Upon arrival, he became aware that he would be encountering a gathering of three barons with 18 ships. The barons contingent consisted of 1200 troops, while Sverri's only 200. After consulting his troops, they decided it would be best to march onward for two days. He then sent 40 of his contingent to a lake called Rond (Randsfjorden), to seize all the ships that were there. When King Sverri arrived he was able to subdue the three host forces, giving most of the defeated forces quarter. As expected, the conquered forces maintained a somewhat deceitful disposition, thus sending word of King Sverri's activities and location to Orm Kings-brother, King Sverri's rival. Orm Kings-brother was at sea when he received the information and ventured up the Vik against King Sverri. Orm gathered together his forces and had large ships dragged from a lake called Tyrfi (Tyrifjorden) to Rond in order to launch an attack against King Sverri. The saga writer mentions this portage as if it were not out of the ordinary. Special consideration is given neither to this tactic nor this portage. When a topographical map of Norway is consulted, the local geography lends itself to portaging as a standard practice. Therefore, I feel that this may have been an established portage site/route in the Norse Maritime Landscape.

In the meantime, King Sverri and his retinue, having caught wind of Orm's actions and the presence of 14 hostile ships on Miors, care of his newly subjected barons, began to devise a strategy. King Sverri sent all his scouts towards Orm's position, then gathered together forty men and went to the forest to fell trees. When the next morning arrived, he gathered his force and revealed his plan. He had them drag the ships that he had seized at Rond on a 5 mile non-stop portage to Miors, using the freshly hewn timber as rollers. It is stressed in the source that such a portage had never been accomplished at this location. The boats were immediately launched in a surprise attack on the barons' retinue. The use of this portage as a military tactic served King Sverri well. The element of surprise was maintained, a victory was achieved, and King Sverri sailed onward to hold an Assembly at Hamar-Kaupang (Hamar). From this account we get several valuable pieces of information. First, the importance placed on King Sverri's devising a new portage over such a great distance is significant when attempting to formulate a portage feasibility study. In comparison to other portages in Norway, it seems quite long. Yet, when viewed in light of the portages in Continental Europe (Porphyrogenitus ch.9, see below), it doesn't seem such a remarkable occurrence. The fact that newly felled timber was used as rollers, and the implication that the crew were unaware of why they were felling the timber, could be used to examine the various technologies involved in portaging. It is hard to believe that they were unaware of the tactic that was to be employed, but it does add some mystery to a tale written to entertain, as well as to educate. The use of log rollers is only one of the numerous methods of portaging that has been proposed (Nylén 1983, 1986:104-113; Ambrosiani 1991:102; Porphyrogenitus ch.9.). As in almost all of the portage accounts, this one is also associated with a key historical figure and a significant strategic operation. As mentioned previously, detailed description was only provided about the long drag, in an area where this had not been attempted beforehand, yet another drag was dismissed as commonplace. Thus reinforcing the practice of portaging as a common occurrence within the maritime landscape of the Vikings.

Pål Aage Nymoen is undertaking research into the various portage scenarios in Norway. This research is heavily reliant upon the place-name "eid", which also occurs profusely in the northern isles of Scotland, and to a limited extent in the Western Isles and Scottish mainland. His main geographical area of research is the area of Sogn og Fjordane to and including Nordland, as this area also has the highest occurrence of the place-name "eid". He mentions just a few of the place-names that are used to identify portage possibilities (Nymoen 1997:1) such as *Eidsvag*, *Eidsvik*, *Hamneid* and *Drageid*. In this same paper he proposes that small strips of land over which ships could be dragged are not only navigable, but are considered an actual part of the sea. This is an opinion that I wholeheartedly agree with and feel is a key component when investigating the maritime cultural landscape. This notion is one that applies not only during the Viking Age, but throughout all ages. The portage scenario in the maritime cultural landscape is one that needs to be examined from a multi-disciplinary point-of-view as it involves many different methods of inquiry to locate and identify portages and place them into the proper perspective. This study should incorporate landscape studies, saga references, place-name information and archaeological information.

As *Sverrissaga* demonstrates, the geography of Norway is one full of navigable seaways and lakes. This alone opens many possibilities for portages from one body of water to another, as shortcuts on a long journey, as military stratagem, or just to get to a better fishing hole. Archaeologically, not a great deal of research has been directed towards the identification and use of portages in Scandinavia. But, one site that has yielded some data on established portages is Birka, Sweden.

2.3.2 Scandinavia: Sweden

Birka/Bjorko, an island site on Lake Malaren in central Sweden, lies on the strategic east-west water route, the Fyrisleden. During the early medieval period, access to Birka could be attained through the use of portages. Place-name studies have identified the element "*ed*" (ON *eið*) and the place-name "*Draget*" as indicative of a well-developed system of waterways (Ambrosiani 1991:99). Two portages have been identified in association with the settlement of Birka and the waterborne activity on Lake Malaren, *Södertälje* (ca. 100m long) to the south and *Draget* (500-1000m long and lined with timber) to the north (Clarke and Ambrosiani 1991:131, Ambrosiani 1991:101).

Ambrosiani also tells us, unfortunately, that the portage at *Södertälje* has been completely destroyed through modern development. But he is able to tell us some of the geographical and geological information that may aid in identifying other portage possibilities in the Viking World. Below the Viking Age sea level, but 5m above the present sea level, a dense layer of clay was deposited, possibly when it was a channel up to Stora Torget (Ambrosiani 1991:102). To the north 400-500m, the land once more descends to the 5m level, thus providing an outlet for the traversing traffic. In total, the topographical variation couldn't have been more than a couple of metres (Ambrosiani 1991:102). Although the physical representation of the portage was unable to survive the ages, the information provided by the topography of this portage can help identify possible portage sites elsewhere.

The portage at *Draget*, providing passage to Uppsala ca. 25km to the north of Birka, is in a somewhat better state of preservation, yet the topography has been destroyed. Ambrosiani (1991:102) reports the following circumstances for the portage at *Draget*:

> -in the southernmost end of the pass there is a small lake below the 5m contour.
> -once a gravel plateau is crossed, another small lake(now dry) is encountered.
> -the northern end of the portage has a threshold which must be crossed before it is possible to descend to Ullvifjarden.

The description of this portage suggests that it consisted of two small terrestrial traverses. During the 1920's, the northern end of one of these traverses was exposed during the excavation of a motorway. And, surprisingly, one of the construction workers remembers the ditch being lined with a herringbone pattern of timbers (Ambrosiani 1991:102), and a sketch was made in 1974 from his recollection of this feature (see fig. 2.4).

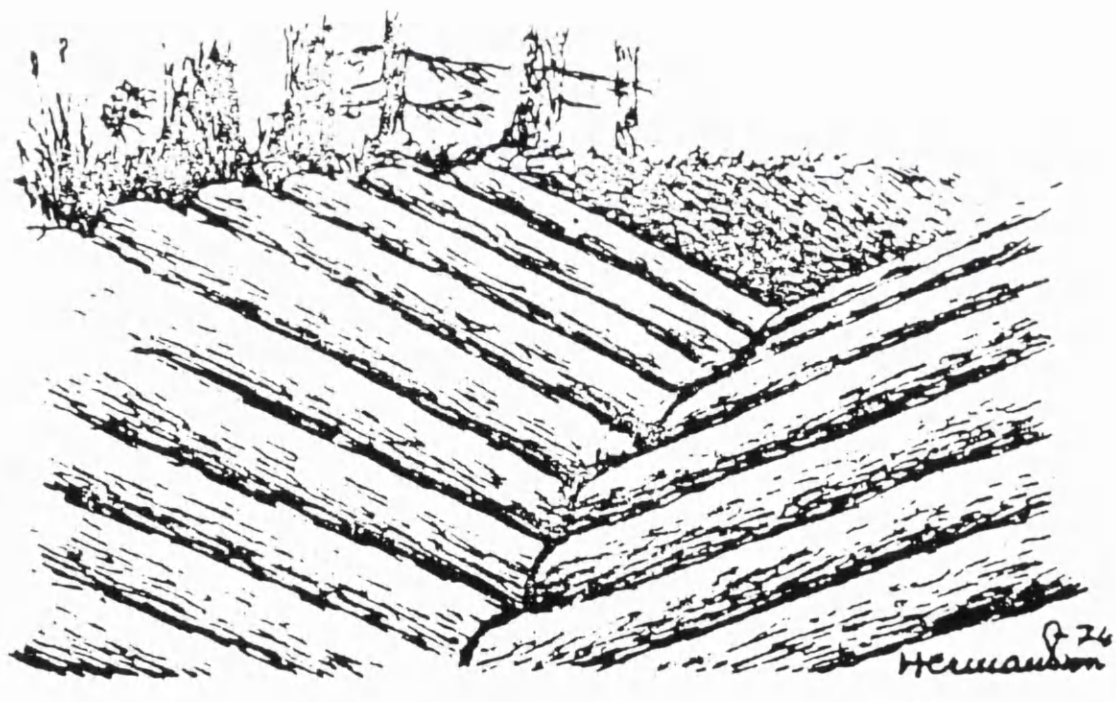


Figure 2.4: A sketch of the timbers located in the 1920's at the drag site located near Birka. Sketched in 1974 by Erik Hermansson. (After Ambrosiani 1991:Fig.4)

It is this last bit which proves to be exciting in the search for portage criteria. If this indeed was a standard practice (allowing for some architectural variation) for a frequently used portage, it could explain the ease of certain portages (see Orm Kings-brother above), it could also be an archaeological determinant in the quest to locate and vindicate portages.

2.3.3 Scandinavia: Denmark

In Denmark, as in the rest of Scandinavia, place-names can be employed to help locate possible portage/dragging sites. Max Vinner (1997:100) discusses the place-name "Drag", and the many forms in which it can be used to locate and identify possible portage sites. He also writes that there are many sites within Denmark that contain this place-name element that would be ideal portage sites. Some of the forms recognised as being indicative of portage sites are drag-, draugh-, drå-, dræ, or drej. Bente Holmberg analyses Danish place-names (1989:125) and mentions some of the drag place-name locations that have been identified as portage/dragging sites. One is Dræby in Munkebo, between the Kerteminde Fjord and the Odense Fjord. The 'drej' origin of this place-name is interpreted as; a place where man can push or drag ships (vessels) over land. Over the ages this has become a typical way of defining a small tongue of land or isthmus (Holmberg 1989:125). The interpretation of this place-name to associate it with a dragging site is reinforced by the fact that this drag provides an easier crossing than braving the dangerous and long journey around Fyns Head.

The Kanhave Canal, on the island of Samsø, may also have served as a dragging site before its canalisation (see Fig 2.5). This construction runs across Samsø from Sælvig Bay in the west to Stavns Fjord in the east. The canal is approximately 500m long and 11m wide. The walls of the canal have been reinforced in some places with a bulwark of horizontal wooden planks, 2-4 planks high (Jørgenssen 1997:1). Although local tradition held that the canal was from the Swedish Wars of the 17th century, dendrochronological dates provided by some of the wood samples taken during excavations in 1977 and 1979 have provided a construction date of 726 AD with repairs occurring in the 740-750s AD (Jørgensen 1997:2).

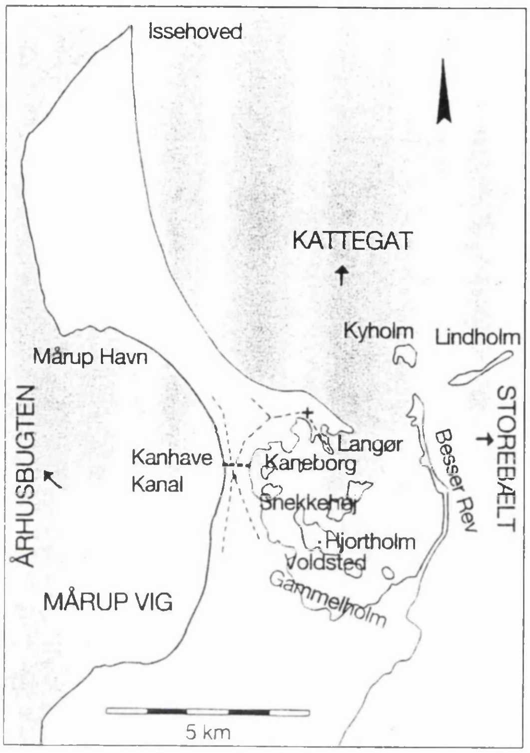


Figure 2.5: The location of the Kanhave Canal on the island of Samso. (After Vinner 1997:94)

An interesting aspect of this construction is that it is not possible to prove that this feature had water from the sea flowing through it at any time during its use! Jørgensen (1997:4) proposes that ships that wished passage would have to be dragged over the beach ridge at the West End. Later deposits indicate that there were times that seawater would flow from the bay in the west to the fjord in the east. An enigma of the Kanhave canal is its closing. Within the canal trench a large amount of timber has been recovered from the small-scale excavation that was performed. Also present in the deepest sections of the canal were quantities of shaped branches and large stones (Jørgensen 1997:5). As this debris is not identified as rubbish and it occurs in the upper part of the earliest mud-layer, it can only be interpreted as the conscious effort to fill the canal (Jørgensen 1997:5). The reasons for this are unknown, and a date is still pending on the closing of the canal.

Because of the strategic location of this feature and the physical make-up of the landscape, it is likely that this site was a dragging/portage location previous to the construction of the canal. The evolution of a portage site into a canal can, in some cases, be seen as a natural trend. Numerous reasons for the construction of this canal have been forwarded. These reasons could just as easily be applied to a portage/dragging site in a similar context. Whether it served as a military base with easy access to either side of the island or as an economic control point is unknown. It could be both of these reasons at the same time, as in the case of the Diolkos over the Isthmus of Corinth. Wilson (1978:9) believes that this canal was constructed under a central authority; such as a king who would want to easily move his fleet of warships between the east and west, during the periods when the Norwegians may have threatened Denmark. A personal communication from Ole Crumlin-Pedersen to Wilson (mentioned in Wilson 1978:9), suggests that this feature was possibly constructed by a pirate chief who may have controlled Samsø. In cases like this it is best not to apply a singular purpose to the structure, but to consider that all of the possibilities *could* be true, especially over time. This statement is especially true when investigating facets of the maritime cultural landscape, as it is in a constant state of flux. This applies to the vessels that plied the waterways as much as to the utilisation of the physical features in the maritime landscape.

In 'Med Vikingen som Lods ved den Danske Kyst", Max Vinner (1997) provides numerous possible portage scenarios. These sites are a valuable resource to review when compiling information about portage sites as they add to the growing inventory of portage site attributes. The topography of Denmark is primarily composed of low-lying land, thus making portages a common feature in its maritime landscape. One such possible dragging/portage site is on the isthmus of Helnæs on the southwest corner of Fyn. This isthmus was used to form a controlled harbour by the construction of a blockade in between the tip of Helnæs and the island of Illum. This blockade served to allow safe anchorage (Vinner 1997:70). At the stem of this narrow isthmus there is a narrow section that would have been an ideal dragging site. Although the 'drag' place-name is not present at this location, Vinner (1997:71) puts this place-name onto a map showing where this could have taken place.

Another location, which is discussed in more detail (see the chapter on Experimental Archaeology), is the site of Draget/ Dragsmuren on the isthmus of Helgenæs (Vinner 1997:100). This site is an ideal portage site as it is a low-lying strip of land which allows for a vessel to be easily hauled across, cutting both the time and distance of a journey around. As this is not an inventory of Danish portage sites, I feel that it is only worth mentioning a few of the many possibilities available. The maritime landscape of Denmark facilitates itself to the practice of portaging/dragging as it is comprised mostly of low-lying topography which in places juts into the surrounding bodies of water forming obstacles which need to be overcome. The practice of dragging a vessel over these areas seems the most logical solution to the problem, therefore incorporating portages as a regular aspect of navigational practice. This being the case in most of the Scandinavian countries, it seems only natural that this practice would be adapted elsewhere, especially if the local tradition also held this activity as the norm.

As this collection of data grows it is possible to begin to identify possible portage sites based not only upon place-name information, but also on the physical characteristics of the sites. This method of locating possible portage sites in the Norse maritime landscape is especially relevant when tracing the navigational routes in Scotland and the Isles, as some of these place-names which may have existed during the Viking Age may have been subsequently altered, replaced or lost. The homeland of the Vikings has provided some valuable information on portages. But the use of portages was a necessary navigational tool on Continental Europe, especially in Eastern Europe. This is the next area to be examined for clues on portaging in the Norse Maritime Landscape.

2.3.4 Continental Europe: The Eastward Expansion

Some of the most remarkable portages of the Viking Age occurred during the journeys eastward, via the river systems of the continent. Their penetration deep into the interior regions not only enabled them to establish colonies with which they could maintain regular contact, but they were able to use these colonies as a staging ground for complete circumnavigation of the continent. In order for the Vikings to make these journeys, an intimate knowledge of the river systems and local topography was essential. Our main sources of information on the portages of the eastward expansion are the Norse sagas and the primary documents of Russia. The place-name evidence does not readily lend itself to the identification of portages, as in many of the examples from elsewhere in the Viking World, yet they offer some alternative place-name possibilities which may be applicable elsewhere (see examples below). The archaeological data for the movement eastward is limited: the majority of research being directed at the settlement patterns and not the actual navigational routes. Some trials involving experimental archaeology and its application to portages and navigation of the river systems in Eastern Europe has been carried out (see Nylén 1983, 1986:104-113 and authors personal experience, see below). These experiments attempted to recreate some of the scenarios that may have been encountered on these journeys and the methods in which they could be overcome. These investigations into some of the routes and portaging techniques may not follow the exact routes that were undertaken during the Viking Age, but they are able to provide us with some notion as to how this activity would be performed under somewhat similar circumstances. But this does not provide a complete picture by any means, in addition to the lack of direct archaeological evidence and technical methodologies, the existence of modern obstacles does not allow for circumstances that existed during the Viking incursions eastward to be existing. Additionally, the natural tendencies of rivers to constantly change their course makes the exact routes of the Viking journeys impossible to follow in any experiment. As the preceding discussion is centred upon river travel, it is important to note that it is upon rivers and between them that the portaging of the eastward expansion is based, a situation not as common in contemporary Scandinavia or Scotland and the Isles for the most part. Therefore, some of the techniques used in the homeland may have been altered when applied to these different circumstances. All of these issues will need to be dealt with when formulating a general portage criterion. This may also justify the formulation of a portage criterion requiring geographically dependent methods and technologies reliant upon the variables and constraints for each area of the Viking World. This concept has led to numerous discussions on how the transport systems in Eastern and Northern Europe during the Viking Age were employed and how these systems were maintained (Westerdahl 1996; Nylén 1983, 1986).

The sagas provide us with many accounts of bravery and heroism along the eastern trade routes. These range from encounters with unknown peoples as in the description of the natives use of 'Greek fire' in *Yngvars Saga* (Palsson and Edwards trans. 1989:55), to the exotic tales of King Haralds exploits through Russia into Constantinople and onward into the Mediterranean (Sturluson: *King Haralds Saga* ch.2-4). In addition to the numerous saga references, there are a number of references to portages in the primary documents of Russia, such as the *Russian Primary Chronicle* and Constantine Porphyrogenitus' *De Administrando Imperio*. From these primary documents, it is possible to identify some of the routes followed and some of the technology and methodology used on these expeditions. Combining the saga stories with the information provided in the primary sources, one is able to begin to get an idea of some of the various methods of portaging as seen through the eyes of a recorder. This information, when coupled with place-name studies and experimental archaeology begins to give us a picture of how portages were accomplished in the Viking Age, and what would necessitate them.

A primary element in the Norse sagas is excitement and adventure in foreign lands. An expedition eastward to Constantinople provided just such action. It not only served to help build characters, but also to entertain with stories of exotic lands. Of the numerous saga accounts pertaining to the eastern endeavours, only a few are worth mentioning when investigating the portage scenario. In *King Harald's Saga*, Harald's journey east is mentioned in chap.2, yet it only relates that he wintered with King Jaroslav and stayed in Russia for several years, travelling widely throughout the east. But, from his subsequent appearance in Constantinople (Sturluson: *King Harald's Saga* ch.3), we can only assume that he had followed the river systems and portaged accordingly.

The best saga account of a portage scenario in the east comes from *Yngvar's Saga*, contained in the *Vikings in Russia* (Palsson and Edwards trans. 1989). Chapter 5 of *Yngvar's Saga* relates to us the tale of Yngvar's preparation for the journey eastward. Once his reconnaissance revealed which river was mostly navigable, he planned an expedition to locate its source. As they penetrated deeper into the new territory, they noticed a change in the colour and habits of the animals. This statement exemplifies the vast distances that could be covered by travelling on the river systems. What is important to us in this saga, is the reference to circumnavigating a great waterfall in a narrow gorge with high cliffs. They hauled the ships up with cables and after the portage re-floated their ships (*Yngvar's Saga* ch.5). This chapter also relates a story of some natives they meet carrying ships on their backs. In order for the Vikings to have to haul their ships with cables, whilst the natives were able to carry theirs on their backs, indicates that the ships of the Vikings were probably larger than the local vessels. But this also provides data that the Vikings were merely conforming to the accepted navigational practices of the local areas, in any case practising a common navigational technique used the world over.

In chapter 6 of the same saga, they encountered another great waterfall with cliffs so high that it was impossible to haul their ships up by cables, thus resorting to the construction of a canal to avoid the massive waterfall. The construction of this canal took months according to the saga. This seems an extreme adaptation to local circumstances when taken at face value, especially when considering that the local inhabitants more than likely dragged or carried their boats around the falls, or there would have been some sort of feature already constructed to circumnavigate the obstacle. This also seems as though it would be an odd solution to this problem as the slope gradient was too steep to haul a vessel up, yet it was possible to construct a feature requiring a constant water level. Could it be that this was an area that was to see frequent passage, thus necessitating the construction of such a feature with all the engineering problems it would involve? A canal of this type would obviously need some sort of lock system, therefore making it a very complex undertaking. This aside, the presence of Viking Age material in Constantinople is evidence that these falls were indeed conquered.

Although the reasoning behind this journey may have been from the mind of the author, the references to portaging techniques is, once again, enlightening. This also brings into question the types of vessels which would have been used for the journeys eastward. There are numerous theories relating to which type of vessel would have been preferable and experiments have taken place with a range of different configurations (see Experimental Archaeology).

A look into the *Russian Primary Chronicle* reveals various aspects of the maritime landscape utilised by the Rus (Scandinavians). One of the more interesting accounts occurred in the years AD 904-907. This has Oleg, with a large combined force of ships and horses, launching an attack on the Greeks at Tsar'grad, who had fortified the strait and closed up the city. After much death and destruction around the walls of the city, Oleg ordered his warriors to fix wheels to his ships and wait for a favourable wind. When the conditions turned for the better, they sailed off across the open country in a siege on the city. The Greeks, terrified of this sight, sent messengers pleading for the safety of the city and offering to pay tribute. This method of bringing boats overland may seem a bit out of sorts, yet it remains something to be further investigated. The concept of land yachts and the use of wind power to propel vessels on land are not unknown, but in the case of a Viking Age vessel, but would most likely damage the hull structure. Portaging requires an extreme amount of control over the vessel so as not to damage it. Utilisation of the wind as a source of power would probably do more damage to the vessel than good to the expedition. The limited use of the sail to aid in portaging may have been helpful, if the conditions permitted, but to sail across the landscape is above and beyond the potential of most vessels!

The *Russian Primary Chronicle* (AD 945), relates the story of Queen Olga making a deal with the Derevlians. Part of the deal involved each party being carried to Olga's land in their respective boats by Olga's people. When she proposed this, the people lamented that slavery is to be their lot. Needless to say, this was a ploy on her behalf to avenge a blood debt. The significance of this reference is in the attitude of the people when they were required to carry the boat. Were slaves employed in the mechanics of portaging? The Vikings were well known for their slave trading activities, so it seems likely that they would have utilised the available labour. Granted, this may seem an obvious, if not insignificant point, but it still figures into the logistical analysis of portaging. Especially when, in most circumstances, they relied upon their own manpower for these manoeuvres.

The most referred to portages of the eastern movement occurred at the cataracts of the Dneiper (*Russian Primary Chronicle* AD 972). It was here that Prince Svyatoslav of the Rus decided, against advice, to traverse the cataracts of the Dneiper by boat. The Pechenegs, hearing of the booty the prince had with him and the small size of his retinue, descended upon the cataracts, causing the prince to stay the winter in Beloberg. When spring came, Prince Svyatoslav again attempted the cataracts, but this time the Pechenegs fell upon him and slew him. They then took his skull and fashioned a drinking cup out of it. This episode reinforces the vulnerability of the Vikings while they were in the act of portaging. Portaging may have been a successful way of surprising the opposition, as mentioned above in the account of King Sverri, but it also gave the enemy a chance to strike at an extremely vulnerable moment. This has far reaching implications when investigating the location of portages in relation to settlements and when portaging in strange or hostile territory.

In Constantine Porphyrogenitus' *De Administrando Imperio* (ch.9), we also have accounts of portaging the cataracts of the Dneiper. It is worth noting that the type of boat used during these expeditions is described here. These 'monoxyla' were fashioned from trees cut by the indigenous population during the winter and transported into neighbouring lakes, which feed the Dneiper, at the beginning of the spring thaw. These log boats are then drawn along the river to Kiev, where the

Russians fit them with side planks, then rowlocks and oars recycled from their old 'monoxyla' were added. The boats of the Rus traders had to be light enough to portage, yet able to withstand the sudden squalls of the Black Sea (Shepard 1974:13). Vernadsky (1943:266) describes the boats used by the Varangians as an early type of rowboat in which a sail could be set. A more detailed description equates these vessels with the common description of a Viking Age vessel i.e. high in the stem and stern with posts at both ends, possibly with elaborate carving in the case of a prominent chieftain. In *Kievan Russia* (1948:29) he recounts the tradition that vessels would start their journeys in an incomplete form, only to be finished once they had circumnavigated the cataracts of the Dneiper. Once equipped with sails, they were able to navigate the Black Sea, where the journey would end and the goods from upriver could be traded. As the amount of goods returning would be less, according to Vernadsky (1948:29), some of the vessels would be either sold off or scuttled. He also refers to these vessels as 'monoxyla', yet his description of these vessels in their early stages of production does not make them out to be as simplistic as Shepard (1974:13) does. If any cargo were to come down the river systems, a simple dug-out does not seem to be an economically viable alternative, due to the sheer lack of cargo space. It is for this reason that the idea of these vessels starting out as large rowing boats, before their fitting out as sailing vessels later on, is a more attractive option.

These types of vessel need to be further investigated. As in the case of most maritime studies, an in depth analysis of the vessels employed must be carried out. For this reason, another section of this thesis will address aspects of contemporary maritime technology and the transport systems involved in both the macro-topographical and micro-topographical facets of the portage scenario.

After these vessels are fitted out, they move down to the city of Vitichev, where they gather into a large group. En masse they come down the river to the cataracts. First encountered are the *Essoupi* (Do not sleep!), these are narrow rapids with many rocks strewn throughout. The Russians put into the bank and some travel on land whilst others strip down and position themselves around the boat in such a way that they can feel for rocks and control the vessels along the banks of the rapids. Once through, the men are reloaded and they sail onward. The second cataract is called in Russian *Oulvorsi* (Island of the Barrage). They must treat this one the same as the first. The third cataract, in Slavonic *Gelandri* (Noise of the Barrage), must also be dealt with in this manner. The fourth barrage, the biggest, is referred to in Russian as *Aeifor*. Two translations have been forwarded for this word. The first being 'ever violent, ever rapid', the second being 'the portage rapid', neither of which have been vindicated, yet seem appropriate enough. An investigation into the place-names of this barrage is presented in the commentary of the MS (Jenkins 1962:46-7). This barrage was the only one that necessitated a portage. Caution was taken to set a watch for the Pechenegs, and the rest of the crew were employed in leading slaves and transporting the goods and 'monoxyla'. Again raising the issue of slave labour, Shepard (1974:12) tells us that during the return journey, captives would have been a liability while trying to navigate rapids. The method used for the transport of the 'monoxyla', was a combination of dragging and carrying them on their shoulders. Once the <u>six mile</u> traverse was accomplished, they again embarked on their sailing journey. The fifth and sixth cataracts were dealt with in the same way as the first three. The data on the methodology of navigating vessels through this dangerous set of cataracts relays information regarding the transport of goods and the mechanics of portaging. These are all issues that will need to be considered when formulating a portage criterion. Once all of the cataracts have been cleared, the vessels are re-fitted with sails, masts and rudders that they have brought with them. Of course, a degree of caution should be maintained when using primary sources due to the bias and beliefs of the recorder, yet valuable information is to be obtainable from them. Especially on such a subject as portaging, of which little information is available elsewhere.

2.4 The Tradition Continues

The mention of portages, especially in relation to significant historical figures, bears witness that this method of navigation was an important aspect of the maritime cultural landscape throughout the ages. The idea of using portages, as a logistical or strategic manoeuvre did not go out of fashion as time passed. During the American Civil War (AD 1861-1865), many battles were fought amongst the tributaries and marshes of the Chesapeake Bay, providing the perfect opportunity for using portages to easily traverse from waterway to waterway. A good example of this is provided in Shomette (1982:151), where the following account is given:

> July 24, 1863; a report that 500 men had been spotted at Old Church in Virginia with 6 boats on wagons with the intention of surprising a Yankee gunboat on the Rappahannock.

Once again, this example mentions the vast amount of manpower utilised to make this operation viable. It is not to say that all portages required this number of men, but during a strategic operation, speed and power are of the essence, albeit at the cost of stealth.

One could write volumes on the portage possibilities available from prehistory to the present, but that is not the objective of this thesis. The above examples have shown the importance portages held in the practical navigation of mariners throughout the ages and some of the reasons behind this activity. Other possible methods of portaging are further addressed in the chapter on Experimental Archaeology, where some of the scenarios mentioned above are tested for their viability and practicality.

This review of portages throughout the ages, narrowing down to the Viking Age leads us into the next chapter: *Portages in the Maritime Cultural Landscape*. This chapter explains the concept of the maritime cultural landscape and how the portage scenario fits into the navigational practices exercised therein. This sets the groundwork for investigating potential portage sites based upon the reasoning behind portaging and its applicability.

3. Portages in the Maritime Cultural Landscape

3.1 Introduction

This investigation into portages in the Norse maritime landscape of Scotland and the Isles is an in-depth study of one aspect of a much larger system. In order to understand how portages fit into this system, it is necessary to understand the concept as a whole. For this reason, the *maritime cultural landscape,* defined by Westerdahl (1992) as the whole network of sailing routes, with all the coastal ports and harbours and any associated remains of human activity, both on land and in the water must be considered. This includes any area in which waterborne activities can be carried out ie. lakes, rivers and ponds. Further elements of the maritime cultural landscape are also proposed by Westerdahl (1986, 1987-89, 1998). This concept extends well beyond the simple nautical aspects of a society to define the way of life of a culture. Since the portage scenario is just one facet of this assemblage of activities, a brief discussion of the transport zones utilised in the maritime landscape is necessary to understand the role of portages in this system.

3.2 Transport Zones in the Maritime Cultural Landscape

Westerdahl (1998) proposes a theory on the traditional transport zones employed in the navigation of the maritime landscape. His theory breaks this concept into a 'long perspective' and the 'means of transport' (Westerdahl 1998:1-2). The 'long perspective' identifies the transport zones as zones or corridors, where the movement along the routes flows in both directions. These zones of transport are identified by different techniques of transport, the degree of land based transport systems and the variations in seasonal and climate based factors. The 'means of transport' refers to the different vessels and their relationship with the environment in which they operate. This includes the natural geography of the areas in question, and any hydrographic factors that may influence the utilisation of these areas (Westerdahl 1998). These factors influence the design and construction of vessels suited to operation within the maritime landscape on various levels (see Maritime Technology). Zones of transition are also presented which involve the reloading of cargo by the change in a means of transport to water or land carriage in a different zone (Westerdahl 1998). The study of portages as a component of the maritime landscape can see a singular portage site in two ways. Where larger cargo vessels may have to unload their cargo for further distribution and transport, a coastal trading vessel or local boat may utilise the same site for dragging as a routine course in the navigation of the area. For this reason, I choose to view all regularly used portage sites as being a corridor of transportation in a singular zone, albeit consigning them to either a micro-topographical or macro-topographical maritime landscape.

These two components of the maritime landscape can be broken down into smaller groups addressing all the aspects involved in the transport in maritime cultural landscape. Westerdahl (1998:3-4) lists these 7 zones as: trans-isthmian land transport zones (also Sherrat 1996), "ferry" corridors, river valley zones or other far reaching navigable watercourses, coastal transport zones, estuary lagoon zones, lake zones and zones of the open sea. Obviously, the first of these zones is the core of the portage scenario, yet all of the others play a part in the use of these portage sites. It is for this reason that each of these zones of transport will be discussed in their relation to the portage scenario in Scotland and the Isles during the Viking Age.

Ferry Corridors

This transport zone involves the crossing of any body of water in order to connect terrestrial transport networks. This includes, but is in no way limited to, ferries across lochs, rivers and small bays. This transport zone does not figure into the portage scenario as it serves as an extension of the terrestrial transport system. However, the same vessels plying these routes may be employed in further navigation involving some of the other zones in the maritime landscape.

River Valley Zones

The transport corridors in operation along river valley zones, when utilised in conjunction with portage sites provide an almost endless amount of opportunities for navigation within the micro and macro-topographical maritime landscape. The perfect example of this transport zone as a part of a macro-topographical landscape is on the Viking voyages eastward through the continent. A journey originating in the Baltic was able to follow the river systems to a portage point where they could traverse to another river which would deposit them in the Black Sea. This allowed for the complete circumnavigation of Europe, enabling trade routes to be secured and settlements to be established. To view this system as the utilisation of numerous different transport zones detracts from the activity as a whole, whereas to view this as a singular voyage by means of the macro-topographical navigation of these zones puts it into a new perspective.

Instead of viewing a river as a corridor for transport that will terminate at the next zone, it can be viewed as a small section of a route that may involve a sea-loch, a landlocked body of water and a river. Combined, they make up a specific route that needs to be seen as such. An example of this is the possible route from Loch Moidart, Ardnamurchan to Loch Shiel via the River Sheil, then onwards to Loch Eil traversing the portage site originating near Glenfinnan (see chapter 6).

Portages can also aid in navigation within the river transport zones by providing a means of surmounting obstacles such as waterfalls, rapids and shallows. This is evident from the accounts in the *Russian Primary Chronicle* and the *De Administrando Imperio*, where the cataracts of the Dneiper had to be avoided by numerous methods of portaging. For the Rus, this was a portage in the macro-topographical navigation of the area as they moved southwards.

Coastal Transport

The coastal transport zone is defined by the use of coastal navigation, or "hugging the coast" during journeys. In the Norse maritime landscape, most navigation was either coastal navigation, island hopping or an extension thereof. Coastal navigation was the preferred method throughout the ages for numerous reasons. It was ideal because it allowed for your location to be known at all times, or at least to know land was nearby if problems arose or supplies were needed. It also allowed specific sailing directions to be passed on to others by navigating by known landmarks. It is still wise to stay a fair distance offshore as tidal currents and submerged obstacles are more frequent as land is neared. In staying off land, it is possible to see further out into the horizon and see islands upon which to land. From this small step it is possible to see how the evolution of planned passage making occurred (Christensen 1999:pers. comm.).

This aside, the coastal zone provides a vast expanse of navigable territory and with it opportunities to explore river mouths, sea lochs and isthmuses that if traversed would shorten a coastal journey or eliminate dangerous sections of the route. This is especially relevant in the coastal navigation off Scotland and the Isles. The coastline is riddled with deeply intrusive sea lochs allowing access to the innermost reaches of the mainland and nearly bisecting many of the islands. The use of portages in these circumstances is seen as an extension of coastal navigation. The Vikings, familiar with a coastline not unlike this where the practice of portaging was a regular feature of the maritime landscape surely utilised this method of navigation wherever possible. This not only increased access to areas suitable for settlement, but also allowed for extensive communication networks to be employed.

The coastal trading vessels designed to operate in this environment (see chapter on maritime technology) were ideally suited for portaging due to their light build and reasonably small size. The coastal transport zone combined with any of the adjoining transport zones provides for numerous navigational opportunities to become available in both the micro and macro-topographical maritime landscape. Many of these options are discussed in the detailed analysis in the chapter on portages in the Norse maritime landscape of Scotland and the Isles.

Estuary Lagoons

Westerdahl (1998:4) defines these zones as the lagoons closed to continual traffic by sand dunes, beach ridges or any other obstacle that would often require the unloading and loading of cargo between vessels to overcome. This would normally occur between vessels that were designed specifically for river transport and seagoing vessels. In the case of the Vikings, one type of vessel could often serve in both of these environments. Thus a portage over the obstacle would allow for a singular vessel to complete the navigational route. On the other hand, situations like this could also see a large cargo vessel unloading its cargo into either smaller cargo vessels or local boats. Either way, the carriage of cargo over the obstacle to continue its journey constitutes a portage. However, if the transference of cargo is necessitated by shallow water depth upon entering the lagoon, the activity cannot be considered a portage in the true sense of the word.

Lake Zones

As landlocked bodies of water, these would normally be viewed as isolated zones of transport. As such they constitute a component of the *maritime landscape* on their own, albeit a localised one. When the portage scenario is introduced into this equation, a once isolated landscape becomes accessible from the outside world and may just become an extension of another zone or a corridor in a much larger transport scenario. The resulting increase in trade and communication can aid in the cohesion of widespread communities, or may allow foreigners to have access to areas and resources that were previously unreachable.

In the Viking Age report of the Norwegian Ottar to King Alfred of Wessex, it is told how the Cwenas were able to make raids on the Norwegians across the mountains, and how the Norwegians would retaliate (trans. Lund 1984:21). This was done via the large freshwater lakes that are interspersed throughout these mountain ranges. The Cwenas, with their very small, lightweight boats were able to carry these overland to make their raids on the lacustrine communities (trans. Lund 1983, 1984). This tactic is echoed by the Vikings in Scotland when they raided around Loch Lomond by portaging from what is now Arrochar, on Loch Long to Tarbet on Loch Lomond (see below). In this case, the entirety of Loch Lomond became an extension of the sea. This point of view differs from the proposed delineation of transport zones by allowing them to be constantly altered when the utilisation of the maritime landscape changes with new ideas and technology.

The inclusion of lakes into a larger navigational sphere blurs the lines between the transport zones proposed by Westerdahl (1998). It is upon this basis that I propose two new categories be added to the study of the maritime cultural landscape, augmenting the numerous offered by Westerdahl (1986, 1987-89, 1992, 1998). These new categories (discussed in detail below) are the *micro-topographical maritime landscape* and the *macro-topographical maritime landscape*. They are not in disagreement with the established transport zones, but a way of combining different zones into a singular area of maritime activity.

This extension of the lacustrine environment puts it into both the micro and macro-topographical maritime landscape by increasing the territory accessible and allowing for increased exposure to outside influences. This may be a traverse connecting two small lochs for increased fishing and communication or the establishment of a transport corridor, as is the case of Loch Shiel (see chapter 6).

The Open Sea

This transport zone can only be considered in the realm of the macro-topographical navigation of the maritime landscape. It involves ocean passages that inherently include long distance movement of cargo or personnel. It cannot be stressed enough that many different zones of transport are utilised in the maritime landscape, so this element can also be conjoined with others for the analysis of routes. For the longer, more dangerous sea passages, larger vessels with a deeper keel, heavier weight and more freeboard were more commonly used than the light built vessels designed for the coastal environment. The maritime technology (vessels) of the Viking Age can be grouped by their design attributes and the roles they performed in the maritime landscape, providing a basis for the analysis of their place portage scenario (see chapter 4).

Trans-isthmian Transport

In its simplest form, this involves the crossing of isthmuses by vessels or cargo whilst in transit. In the investigation into the portage scenario and how it was used in the micro and macro-topographical navigation of maritime landscape, this is a key to linking the various transport zones. The main focus of this thesis is to analyse the sites, vessels and scenarios that would have constituted the portage activity in Scotland and the Isles during the Viking Age.

The above information can be used to aid in the formulation of a portage criterion by identifying the various environments and routes which would necessitate a portage. If a traversable section of land is located in an area which meets the criterion, then from a logistic, economic and/or strategic point of view it would have been sensible to utilise this area as a crossing point. There will be anomalous cases involved in this scenario which would not fit the normal parameters of the criterion, but that does not necessarily rule these sites out as portage possibilities. Quarff in Shetland and Tarbert in Kintyre could well fall into this category. But extreme examples aside, it is entirely within reason to assume that if a piece of land is encountered which fits into the criterion, it would be utilised as an extension of the maritime landscape and thus be included in the navigational practices of the Norse.

3.3 Navigation in the Micro and Macro-topographical Maritime Landscape

In the course of this research into the navigation of the maritime landscape, two distinct spheres of navigation became evident. Both of these methods of navigation use one or more of the seven zones of transport as defined by Westerdahl (1998). But where the zones of transport are viewed as singular environments in the maritime landscape, the *micro and macro-topographical maritime landscape* connect these zones into practical navigational routes. This method of investigating a maritime landscape allows for complete systems of transport and communication to be studied in relation to the maritime culture and the way in which it utilised its environment. This concept also enables the routes of transport to be analysed in relation to settlements and other sites. As a complete system, transport zones involved in a singular route of the micro or macro-topographical maritime landscape can also provide data on the types of vessels that may have been employed in their navigation, especially in relation to the portage scenario.

The *micro-topographical maritime landscape*, defined here for the first time, involves the navigation of a local area mainly for the purposes of subsistence, communication, and small scale trading. These routes would normally involve the use of a minimal amount of transport zones, and would never involve the utilisation of the open sea transport zone. Whereas portage sites (trans-isthmian transport zones) always involve at least two other transport zones, because in order to be correctly defined as a portage in the maritime landscape, there must be a landing, traverse and re-launching. Therefore, it would be correct to assume that this activity in the micro-topographical maritime landscape would also include the use of at least three transport zones. There are extenuating circumstances that may necessitate the use of a portage to avoid obstacles that may be present in a single zone. An example of a portage in the navigation of a singular zone on the micro-topographical scale would be the dragging of a vessel around a set of rapids, as was the case in the portaging of the waterfalls on the Dneiper (*Yngvars Saga* ch.6).

The navigation of the micro-topographical landscape is primarily the routes used on a regular basis to maintain contact with neighbouring settlements, participate in small-scale local trading and perform subsistence activities such as fishing. This does not exclude inter-island communication, if this can be accomplished without making a significant passage. The rough parameters delineating an area to be considered within the micro-topographical maritime landscape, in the maritime cultural landscape of a sail/rowing based method of waterborne transport, would be the distance covered in ideal conditions if the outward journey takes a maximum of 1 day, or in the case of a return journey, 2 days in total. An excellent example of this can be found in an account given by Barbara Johnson of Shetland (Shetland Archives 1941: D.9/113b/38) who tells of a journey from Papa Stour to Otterswick, on the island of Yell with two Shetland sixerns. This journey took from a little before sun-up to around 11pm. In the course of this journey, three transport zones were traversed, including the trans-isthmian portage at Mavis Grind (details of this account can be found in chapter 6).

The preceding explanation for the micro-topographical maritime landscape is used to describe many of the portage scenarios discussed in this thesis. As this concept is applicable to many maritime cultures, I propose that this term be adopted to describe the navigational routes to which it is relevant during future investigations involving the utilisation of the maritime landscape.

Navigation in the *macro-topographical maritime landscape* describes the routes and distance covered in a journey that terminates at a destination far removed from its origination. This is the case for most extensive trading expeditions, cargo distribution routes and exploration journeys. As opposed to the area covered in the micro-topographical maritime landscape, navigation in the macro-topographical maritime landscape can be of any temporal duration. The trials of the "Borgundknarren" involved the sailing of a replica Skuldelev 1 deep sea trading vessel (knarr) from Norway to Shetland. If the place of origin is considered Bergen, the outward section of this journey took more than 4 days and involved utilisation of the open sea transport zone, trans-isthmian zone and the coastal transport zone. Many of the portage scenarios in Scotland and the Isles are within the parameters of the macro-topographical navigation of the maritime landscape. Any extensive journeys from the mainland to outlying islands and vice versa, or between different groups of islands are considered within this realm. Extensive inland navigation though the use of portage sites to connect transport zones is also within the confines of the macro-topographical maritime landscape. An example of this is the sailing through the Western Isles by Magnus Barelegs around the year 1098 (Orkneyinga Saga: ch. 41). This journey involved the use of the open sea transport zone, the coastal zone and the trans-isthmian zone at Tarbert in Kintyre (see chapter 6).

The navigational of the macro-topographical maritime landscape includes all journeys involving large-scale trade, transport, communication, and exploration. For these reasons it is not only applicable in the investigation of portages in the Norse maritime landscape, but in any investigation into the activities of all maritime cultures.

Any culture operating in a maritime cultural landscape will utilise both aspects of navigation in their travels through the seven transport zones. The activities performed in the two navigational ranges will differ in reasoning, but will often utilise the same zones of transport en route. Where possible, this thesis will indicate the rationale for a portage being performed.

3.4 Investigating Portages in the Maritime Landscape

In order to locate and identify possible portage sites in the maritime landscape, there are a number of variables that must be taken into account. One of the objectives of this thesis is to isolate these factors so that they can be employed in the investigation into portages in the Norse maritime landscape of Scotland and the Isles. It is a combination of these factors that allow possible portage sites to be identified in the maritime landscape and placed into the context of navigational routes in the micro and/or macro-topographical maritime landscape as described above.

That the Vikings were a maritime culture in Scotland is a given, but exactly how they operated in the maritime environment is a topic about which not much is known. That they were able to establish and maintain complex transport and communication routes that allowed them to successfully settle and operate in this area is also a historical fact, but the locating the exact routes they plied is a more elusive study.

As the coastline of Scotland and the Isles is not very different from that found in Scandinavia, it is reasonable to assume that the navigational practices employed there would be equally applicable here. It is upon this basis that many of the lines of inquiry into the portage scenario are based. In areas such as the Northern Isles of Shetland and Orkney, where the maritime traditions strongly parallel those in Scandinavia, the evidence for this is great. Not only in the maritime practices and technology, but in the place-names as well. On mainland Scotland, there are more distinct differences in the maritime traditions, yet the Scandinavian origin is present as are other forms of place-names indicative of the portage scenario.

The Portage Criterion

The identification of the portage sites discussed in this thesis is based upon a system of archaeological landscape studies (both terrestrial and underwater), archaeological remains (though rare), place-name identification, ethnological and historical research, experimental archaeology and studies in practical navigation. The combination of these factors compose the *portage criterion*, which can be used to locate and identify possible portage sites not only for Viking Age Scotland, but for any study of societies utilising the maritime cultural landscape. Some of the variables (such as place-names and ethnology) may differ, but the basic concepts remain the same. The application of this criterion could be for a variety of reasons, be it for the research into a specific maritime landscape, plotting possible trade and communication routes, or investigating settlement patterns. In this case, the reason is for the identification of portage locations that could alter the current view on the navigation of the Vikings in Scotland and the Isles. The sites discussed in chapter 6 were chosen for their individual attributes and analysed on their own merits as portage sites. As is the case with all theories, there are always exceptions, and these are duly noted. It is with this in mind that I propose the criterion to which possible portage sites should be compared when investigating navigational aspects of the maritime cultural landscape. These attributes are in no particular order as all of them are not usually present and different combinations can provide the same conclusions of whether the proposed site would have possibly been used as a portage site.

Archaeological investigations: This method of investigation is by far the most complex and varied. On the simplest level, the location of possible features involved in the portage scenario i.e. timbers set into the ground for use as a dragging surface as is assumed about the timber finds at Tarbert in Kintyre (Crone 1994, 1995) or the stone trackway over the isthmus of Corinth (Wiseman 1978, Werner 1997). Unfortunately, the portage activity is quite often ephemeral, leaving no trace of its occurrence. Only at the larger, more commonly used sites would concrete archaeological data be discovered. In the case of the Northern Isles of Scotland, timber was at a premium and could serve any one of a number of uses after its employment as a 'roller'. The location and identification of portage sites strictly by archaeological excavation is not the only archaeological method valuable in this inquiry.

When applied in conjunction with the other attributes of the portage criterion, archaeological landscape survey provides information to help determine the viability of a portage scenario at the chosen site. This study is not limited to the terrestrial landscape, due to changing sea levels and coastal geomorphology it is often necessary to investigate the submerged landscape in the vicinity of proposed portage sites. The terrestrial survey should focus on the topographical variation over the distance of the traverse and on the presence of any obstacles that would have made passage difficult or impossible. As a general rule (note that there are exceptions to this), if the gradient of the slope is greater than 3:1, the hauling of anything larger than a small boat used in local navigation would provide great difficulty. The composition the entire length of the traverse, landing to landing, is also valuable in assessing whether or not the traverse may have been used as a portage site. Also the presence of any watercourses or lochs which would aid in the traverse should be considered. The local geology and coastal geomorphology of the landings must also be considered.

On many of the sites, the submerged maritime landscape can provide data relevant to site use or alteration. In the case of Lunna, Shetland, a submerged slipway leads to a possible landing for a portage over the isthmus. This feature needs to be further investigated to determine its date and exact purpose (see chapter 6). Underwater survey can also provide valuable information on the composition of seabed at the landing and provide information on the stability of the area. The different types of bottom encountered by divers can indicate whether or not the site is as it was during the period being investigated. Not all are static, as vegetation and sand bottoms have a tendency to change. Rocky bottoms provide the best indicators of older seabed configurations, as they are an underwater extension of the local geological formations that form the coastal relief above the surface (Nesterhoff 1972:175). The survey on the Sullom Voe landing at Mavis Grind exhibited a landing of mostly bedrock composition, remaining fairly unchanged over time. The only alterations to this landing were on the immediate shore during the construction of the modern road (see chapter 6&7). It is also possible to identify obstacles that may have provided difficulties in accessing the landing by larger vessels.

For this investigation into portages in the Norse maritime landscape of Scotland and the Isles, many of the sites were investigated with both terrestrial and underwater archaeological survey. It was not possible to perform these investigations on all sites, as some the sites did not stand up to the criterion well enough to warrant further investigation.

Place-name Studies: This shows the truly multi-disciplinary approach that must be adopted when investigating portages in the maritime landscape. As this is a very specialised field, the obvious course of action is to consult the relevant sources and researchers in this field. After doing both of these, the basic place-names '*eið*' - Old Norse for '*isthmus*', and '*tarbert*' Gaelic for '*carrying or bringing over*' are the main place-name indicators of the portage scenario as exhibited in Scotland and the Isles. The Old Norse '*eið*' occurs in modern Scandinavia as variations of the place-name '*eid*', whereas in the Northern Isles it appears as '*aith*' and in some locations in the Western

Isles it can occur as variations of '*eid*'. As this is a complicated study, the best option is to consult the experts, which was what was done for this investigation when suggestions for portage place-names were required. In the individual site analyses contained in chapter 6, many variations of both the Old Norse and Gaelic place-names can be found, and in some cases there is no relevant place-name. Yet, this avenue of inquiry is a key component of the portage criterion, as it can provide locations for further inquest.

Maritime technology: This aspect of the portage criterion is critical when analysing the portage scenario in relation to the dragging of vessels. It also can provide valuable data on the navigational routes that may have been followed during the relevant time period. In the case of this investigation into portages in the Norse maritime landscape, their reputation as master mariners employing a variety of vessels for specific tasks allows for this aspect of the portage criterion to provide a great deal of information on the micro and macro-topographical navigation of Scotland and the Isles. Chapter 4 of this research provides a systematic grouping of various examples of Viking Age vessels in relation to their duties in the maritime landscape. This allows for certain vessel types to be eliminated in consideration of the navigation of specific areas, simply by their design attributes. This is an extremely important aspect of any investigation into the maritime cultural landscape, as vessel designs tend to reflect the environment in which they will be used. An excellent example of this is the development and use of the Ness Yoles of Shetland (see chapter 4). Albeit, these are a modern example following in the Scandinavian tradition of boatbuilding, but the design and construction of these vessels has become firmly fixed as it is considered the ideal form for use in the locality. On a more generalised scale, the ships of the Vikings were designed, for the most part, with specific tasks in mind. If this is possible, it is also possible to form hypotheses as to possible reasons for the use of the portage site in the navigation of the micro and macro-topographical maritime landscape.

Historical Data: Historical data contained in chronicles, sagas, and other related sources can provide valuable information in relation not only to the locations of portages, but also about how and why they were done. This can prove valuable, but only when used in conjunction with the other elements of the portage criterion, as historical sources *can* be unreliable. Saga literature remains important as a resource for the identification of possible portage sites and their significance to contemporary society, yet the only portages recorded are ones which were either of an extreme distance or if they influenced the political surroundings of the time (see chapter 6). Even though the saga literature is regarded as a bit suspect on the grounds of historical accuracy, the data on maritime tradition and navigational routes can be very helpful in determining the personality of the maritime landscape. If a portage is considered significant enough to be included in the saga's and in local tradition, it probably did occur (possibly a regular occurrence), and sometimes associated place-names are able to support this.

Ethnological Information: These accounts are valuable in that they provide a record of events similar to historical sources. They can also provide data from which analogies can be drawn in relation to similar activities in similar situation in the past. An example of this being the portages at Mavis Grind in Shetland. This site meets the criterion in almost all aspects. Accounts of this site being used as a portage site can be found in the local tales and traditions, as well as in documents in the Shetland archives. Numerous sites have ethnological data supporting their use as a portage, and in some cases it is these sites which would have been considered unlikely to be used as portage sites. The ethnological element of the portage criterion can also be valuable when investigating the methods that were used in the portage scenario.

Practical Navigation: In order to portage over an isthmus with a vessel or cargo, successful navigation to the landing is necessary, as is having chosen the best routes for the task at hand. This element of the portage criterion is closely related to the *maritime technology* element. This aspect of the portage scenario is especially relevant to the portage sites which provide the only access to landlocked bodies of water, as is the case of the portage from Arrochar on Loch Long to Tarbet on Loch Lomond (see chapter 6). Without using the trans-isthmian transport zone, access to these areas with a vessel or fleet of vessels would not occur. It is for these reasons, that the decision to use portages in the navigation of the micro and macro-topographical maritime landscape determines the viability the various transport zones utilised in the chosen routes. Studies of the submarine topography, coastal features, tide streams, and overall hydrologic movement within the maritime landscape aid in the determination of whether a portage was a preferable alternative to sailing/rowing around the landmass, if that was even possible. When combined with other elements of the *portage criterion*, a study of practical navigation can not only aid in the location of possible portage sites, but can reveal how important the role was of the portage scenario in the navigation of the maritime landscape.

These six elements comprising the *portage criterion* are a valuable resource for investigations of any type into the utilisation of the maritime landscape (see Table 3.1). Throughout this thesis references will be made to this method of investigation and the *micro and macro-topographical maritime landscape*, all of which are concepts developed as result of this investigation.

Criterion Factor	Basic Elements		
Archaeological Investigations	Location of any possible related features such as timbers, trackways or slipways	The physical and cultural aspects of the terrestrial and submarine landscape	Any man-made alterations to the site or traverse
Place-name Studies	Descriptive of the location such as aith-'isthmus'	Descriptive of an activity such as tarbert-'bringing over'	Reliant upon specialists in the field of place-name studies
Maritime Technology	Vessel design	Specific purpose of the vessel	Adaptation of vessel design to the environments in which they operate
Historical Data	Chronicles and Sagas	Show the political and strategic importance of the portage activity	Aid in the recognition of navigational practices of the time
Ethnological Information	Found in recorded accounts, folklore and local tradition	Personal accounts providing a large amount of detail regarding the portage activity as a whole	Provide data on the different methods used to portage vessels
Practical Navigation	Allows for the identification of different possible routes or the only route to a destination	Provides the necessary hydrological data for the assessment of different routes	Helps to identify the capabilities of the vessels along the proposed routes

Table 3.1: Basic elements of the 'Portage Criterion'.

Once a portage site has been identified, another avenue of research that can greatly aid in the understanding of the portage scenario is experimental archaeology. This allows for a site to be tested, along with a vessel design, for its viability as a portage site and the advantages that it would offer. Numerous experiments have been performed along these lines, one of which was a direct result of this research (see chapter 5, 7 and the appendix "Viking Voyage").

3.5 Practical Aspects of Portages in the Maritime Landscape

The establishment of the *portage criterion* and the recognition of navigational practices within the *micro and macro-topographical maritime landscape* allow for the practical aspects of portaging to now be addressed from the point of view of the mariner. When plying the various transport zones in the geography of the maritime landscape, the choice must be made on which course to take, and even more importantly to be able to successfully follow the chosen course. Basically, the utilisation of the maritime landscape was for specific reasons: economic, strategic, logistical, political or any combination of these motives. The successful completion of the journey in the minimal amount of time with the maximum amount of cargo or personnel was paramount. Therefore, the chosen course had to minimise risk and cost, without sacrificing the speed of the journey.

In the Scotland and the Isles during the Viking Age, transport was primarily via waterborne methods. This utilisation of the maritime environment continues to some extent to this day, and assuredly played a significant role before the arrival of the Vikings. With most settlements being located in the coastal zone or within one of the other zones of maritime transport, all aspects of trade and communication relied heavily upon travel in the marine environment. In regards to the relative costs of transporting cargo and personnel within the maritime environment, a significant advantage is held over land transport. The most cost-effective method of transporting goods is with deep-sea cargo vessels able to carry a maximum of cargo with a minimum of crew (Peacock 1978:49). At face value, this method is ideal, but in regards to the micro-topographical navigation of the maritime landscape, the efficiency of these vessels declines and the cost of transport increase. There is also a significant risk factor that must be considered when sending a large amount of cargo in a single vessel. This may account for the use of large cargo vessels primarily for the shipment of large, bulky less valuable cargo items. Duncan-Jones (1974: 368) provides a comparison between road based wagon transport and maritime transport methods based upon Diocletian's price edict. A comparison is also drawn between these modes of transport during the Roman Empire and their counterparts of the first half of eighteenth century England. The Diocletianic figures for the cost ratios of transport are sea 1, inland waterway 4.9, and road travel 28-56 (depending on the interpretation of the mode of travel). The transport cost ratios of the first half of the eighteenth century in England are sea (transatlantic) 1, inland waterway (river) 4.7 and road 22.6 (Duncan-Jones 1974: 368). Although these figures are not geared towards the relative costs of transport during the Viking Age, it is obvious that waterborne transportation holds a distinct advantage, especially when you consider the lack of roads and the island locations of most Viking Age settlements. Based upon these observations, the assumption can be made that 1km of land transport has the same cost as 28-56km of sea travel during the Age of the Roman Empire. If this also applies during the Viking Age, the cost of portaging cargo, and/or vessels easily proves less than that of a long, treacherous sea journey. It is necessary to mention that the cost of dragging a large vessel would obviously be more than simple land transport, yet for smaller, lighter vessels the theory holds true.

This rationalisation for choosing portages as an element in the navigation of the maritime landscape is especially applicable in the micro-topographical landscape. The light vessels operating in this environment are easily portaged over the narrow, low-lying isthmuses that constitute most of the possible portage sites in Scotland and the Isles. McGrail (1997: 310-311) provides data on where landing places are most likely to be found. On inland waterways (rivers and lakes) this is normally at the confluence of a fast river with a slow one, where a river leaves or enters a lake, near the lowest fordable point of a river or at the head of a deep-water inlet. In the coastal zone, McGrail gives credence to numerous types of landing areas; many of these are obvious such as in sheltered havens near rivers and estuaries (but not in the delta). Other possibilities are sheltered areas near a headland or near an out-flowing river where a vessel can wait for a favourable wind to either round the headland or to offset the current. Many of these favourable landing places were also ideal locations for establishing control points for imposing tolls on vessels and cargo. These include promontory sites, near narrow channels and portage sites; this is one of the theories on the reasoning behind the construction of the Kanhave Canal in Denmark (see chapter 2).

3.6 Conclusion

In this chapter numerous concepts relative to the practical utilisation of the maritime cultural landscape have been introduced. The seven transport zones in the geography of the maritime landscape have been put into a system of micro and macro-topographical navigation and the practical aspects of the portage scenario have been discussed. These ideas play a crucial role in this thesis, as they are the basis for this investigation into portages in the Norse maritime landscape of Scotland and the Isles.

With these ideas in place, it is now necessary to investigate the different types of vessels that would have operated in the maritime landscape of Scotland and the Isles during the Viking Age. As the primary mode of travel during this period, boats and ships provided the only links between many Viking Age communities. Therefore it is important to analyse the different vessel types and their various roles within the maritime cultural landscape. The next chapter places the vessels into different groupings based upon size, purpose and capabilities. This allows them to be evaluated against the portage criterion and aids in the identification of the navigational routes in the macro and micro-topographical maritime landscape.

4. Maritime Technology during the Viking Age

4.1 Introduction

An unrivalled use of maritime technology and exploitation of the maritime landscape symbolises the Age of the Vikings. This mastery of seamanship and ship construction techniques allowed them to successfully explore vast areas and establish and maintain navigational routes throughout Europe and beyond. In this investigation into the portage scenario, what is important about these vessels is not the actual discovery and excavation, but the geographical location, evidence of use and the plan drawings which could be used to get an idea of what the vessel would have looked like during its use, and how it was used. Westerdahl (1998:7) supports this line of inquiry by stressing the importance of not looking at ships as a mere archaeological type, but by defining them by their function and use. From these reconstructed drawings it is also possible to construct a replica vessel for sea trials. This aspect of ship archaeology is covered in detail in the chapter on Experimental Archaeology (below chapter 5), as are the specific details on the vessels from which these replicas were based. The primary focus of this chapter is to introduce an array of Viking Age ship finds in order to see what transport options were available to the mariner, and how they could best utilise the maritime landscape with these vessels. Specifically, which vessels were most likely portaged and the ways in which this might have been accomplished.

Numerous reports and books have been published on the various Viking Age vessels, yet in the mind of most only a few stand out. These being the Oseberg Ship (Brøgger et al. 1917), Gokstad Ship (Nicolaysen 1882), and the 5 vessels from the

Roskilde Fjord near the town of Skuldelev (Olsen and Crumlin-Pedersen 1967). As discussed in the chapter on Experimental Archaeology, these vessels have spawned numerous replicas with the accompanying sea trials. This has led many to question what actually is the typical "Viking Ship". Alan Binns (1981: 287-294) presented a paper for the *Eighth Viking Congress* entitled 'The Ships of the Vikings were they "Viking Ships"? This paper addresses some of the ideas and misconceptions that are often associated with the general concept of a Viking ship being typified by vessels such as the Gokstad find. This observation should be taken much further, especially in light of the numerous Viking Age ship finds in recent years. This basic survey of Viking Age vessels will focus on the ones most likely involved in the portage scenario, whilst also ruling out certain vessels from the portage scenario. Again, this is not to say that these vessels would never have been portaged, but only that they were not the vessels of the typical portage scenario. Many of the vessels of the Viking Age were designed to carry out specific tasks; such as the transport of large cargo loads with a minimal crew, whereas other were purpose built to carry a large crew and very little in the way of cargo. The vessels that would most likely take part in the typical portage scenario would be the smaller warships and the smaller coastal trading vessels. In addition to these, the boats engaged in the everyday chores of the individual or settlement would also be commonly used in the portage scenario, especially in the micro-topographical navigation of the locality.

4.2 Roots of Boatbuilding

In order to understand the advanced technology of the Viking ships, the various roots of boatbuilding must be reviewed. Basil Greenhill (1976:91, Greenhill and

Morrison 1995:74-75) is able to categorise all boats into four types, based upon the four principal origins of boatbuilding. These main types being the raft boat, the skin boat, the bark boat, and the dugout. The raft boat, with its partial immersion while floating and its lack of protection from the elements, is not deemed to contribute at all to the evolution of boatbuilding in Northern Europe, especially the Viking ship (Greenhill 1976:97, Greenhill and Morrison 1995:78). The skin boat is constructed by stretching a hide over a pre-erected framework of a determining shape (Greenhill 1976:116, Greenhill and Morrison 1995:91), a construction sequence which does not seem apply to Viking era clinker-built vessels. Greenhill (1976:116) also makes the observations that a skin boat would be unable to cope with the stresses of seafaring and thus experimental research should be carried out to explore this supposition.

Such a venture, the Brendan Project, has taken place involving the reconstruction of a skin boat believed to be the kind available to a sixth century Irish monk (Mudie 1986:42-46). This project was undertaken in order to prove the seaworthiness of such a vessel on an Trans-Atlantic journey (Mudie 1986:42). An account of this journey can be found in the Tim Severin's adventure travel book *The Brendan Voyage* (1978).

The third root of boatbuilding is the bark boat. The bark boat is constructed shell first, then an interior frame is added for support (Greenhill 1976:124, Greenhill and Morrison 1995:97). Although this construction sequence more closely parallels that of the clinker-built Viking ship, it is unable to endure the stresses inherent to the Viking maritime culture. Therefore it is the fourth method of boatbuilding forwarded by Greenhill, the dugout, is the one to which most boats owe their development (Greenhill 1976:129, Greenhill and Morrison 1995:101). These are boats constructed with the primary hull structure being composed of a hollowed out log. This evolution is not an easy one to trace, and seems to wind unevenly through the millennia. Yet, once the evidence unfolds, it is clear that this is the most logical course of development.

For this investigation, it is worth taking a *brief* look at the evolution of the dug-out into the clinker-built/lapstrake constructed hull. This discussion is based on Greenhill's explanation (1976:129-152, Greenhill and Morrison 1995:101-116) for the dug-out developing into the plank boat. The basic design of the dug-out boat is a simple one. By hollowing out a log by means of an adze, ax, chisel or fire (or any combination of the above methods), you can create a simple boat. But, in order to use this simple design in conditions more severe than that of a sheltered cove or lake, you must improve upon it. This can be accomplished by attaching a plank or 'strake' to the upper wall of the hull. This makes the hazard of water coming in over the sides less likely to occur. Thus, if you would also like to increase your capability for carrying cargo, you can attach another strake to the first one by means of iron rivets or 'clinkers', wooden pegs or 'tree nails', or by sewing the planks together.

As the hull height increases, so does the instability of the design. This increase in hull height and the subsequent increase in the draught of the vessel facilitated the need for the joints to be made watertight with caulking, allowing for the submersion of the shell. This is when a frame had to be added to the hull, in order to support the strakes and maintain the integrity of the hull. The premise being that the lap-strake construction of the Viking ship was a product of this evolutionary sequence. The original dugout portion evolving into a keel, and the additional planks becoming the main body of the hull. Thus, we have the foundation for the evolution of the Viking ship.

This theory on the evolution of the lap-strake vessels fits conveniently with the ideas surrounding the construction of vessels as they travelled down the river systems of Europe. Shepard (1974:13) supports the idea that many of these vessels [monoxyla] were advanced dug-outs which would be fitted with an extra strake before entering the open water conditions of the Black Sea. For ease of portaging this type of vessel would seem ideal, yet the primary keel member of a vessels such as this could be extremely heavy. A vessels constructed entirely in the lap-strake clinker built tradition would be much lighter and more sea worthy. The size of the vessels employed during the eastward expansion is still an issue of many debates as the question of lightness and strength is still countered with the problem of cargo and personnel carrying capacity.

From the basic hollowing of a log to the marvellously engineered craft of the Viking Age is a large step. These latter vessels are a wonder of hydrodynamics emulated to this day. That they were able to make long sea passages safely and efficiently is no surprise to anyone who has ever had the good fortune to sail a replica of a Viking Age vessel. In addition to this, these vessels were designed in such a way that they were not only effective in the crossing of the open seas, but were fashioned in a way that their mere presence exemplified power and instilled awe and fear into those whom observed these approaching serpents of the seas.

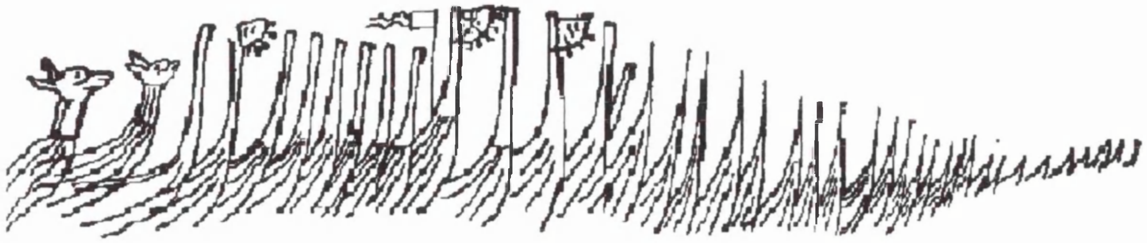


Figure 4.1: A fleet carved on a piece of wood found at Bryggen (Bergen), Norway. Bryggens Museum, Bergen, Norway.

4.3 The Ships

There are many names and descriptions which have been used to define the different types of vessels of the Viking Age: *bátr* (open rowing boat), *skipsbátr* (ship's boat), *byrdingr* (transport boats), *skúta* (coastal rowing and sailing boat), *knörr* (cargo vessel), *langskip* (warship) to name a few. For the purposes of this investigation, the different sizes and functions of vessels will divide them into different classes. There may be some specialists that disagree with the groupings into which these vessels are being classified, however this system allows for like vessels to be considered in the portage scenario based upon their similarities. One of the key factors influencing the ability of a vessel to operate in a maritime landscape which necessitates the beaching of vessels for loading, unloading, storage and portaging is a "rockered" or sprung keel. This greatly simplified beach operations by allowing the vessel to be more easily floated on the rising tide or pivoted on the lowest point if necessary, as well as making it easier to bail out any water taken in on route (McGrail 1987:194). This type of construction was common in most Viking Age vessels.

The vessels included in this survey will span the time period between approximately 800 AD and 1250 AD (which I have established as my temporal boundaries for the Viking and Norse period in the Introduction), with the concession that slightly earlier or later vessels should be considered members of the appropriate group. Some of these vessels fall into more than one group or may not fall into any grouping at all. In this event, they have been placed with the vessels in which they have the most similarities.

4.3.1 Group 1 Vessels (local transport boats)

This group includes vessels which may be rightly called boats, meaning that they are small open craft without decking and usually propelled by oars or a small sail (Kemp 1976:92). As such, they are ideal for the daily chores necessary to maintain a maritime oriented existence. Small, light built, yet able to carry a small cargo of staples or livestock as well as provide a means of communication with neighbouring settlements, these vessels were the Volvo's of the Viking Age. Vessels in this group could be portaged easily with minimal manpower, yet their viability on the open seas is questionable. For this reason, these vessels operated mainly within the micro-topographical maritime landscape. As there are always exceptions to the rule, it is possible that journeys could be made further afield but that would be highly dependent upon the wind and weather and it is safe to say that these vessels were not employed in making ocean passages. Below is a list of some of the boats that fall into this category, including a modern example of a vessel for which there is a large resource of ethnographic material recounting portages.

4.3.1.1 Gokstad Boats

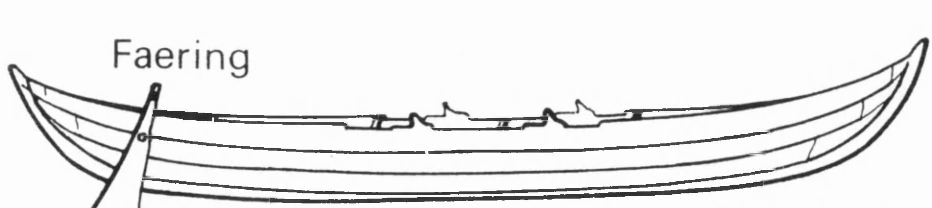


Figure 4.2: Drawing of one of the small boats (færing) from the Gokstad Ship burial. (After Morrison in Hendersen 1978: Fig. 6.2)

Three small boats were found interred with the Gokstad Ship (see below) during the excavations at the Gokstad farm at Sandefjord in Norway (Nicolaysen 1882:38). These small boats were ideal for everyday tasks or as tenders to larger vessels. Of the three, two have been reconstructed with lengths of 6.5m (four oared) and 10m (Christensen 1959). The vessel of interest at this time is the four oared boat or *færing* (see Figure 4.2). The complete measurements provided for this boat are a length of just over 6.5m a beam of 1.38m and a hull depth of 0.49m. This makes the length to beam ratio around 5:1. This vessel would have most likely been used for local or minor inter-island transport and communication. It is fairly obvious that these vessels could have been easily portaged with a minimum of manpower. For the purposes of this investigation, it is not necessary to go into details on these vessels as their place in the maritime landscape limits them to the navigation of the micro-topographical maritime landscape. An experiment in Viking Age boat construction was undertaken at the National Maritime Museum in Greenwich, whereas upon completion of the boat trials were performed on the rowing capabilities and performance aspects of these vessels (McGrail 1974, McGrail & McKee 1974).

Not suprisingly, the boatbuilding traditions of Scandinavia were exported along with the maritime culture of the Vikings to Scotland, and some of these vessels will be reviewed in more detail here.

4.3.1.2 Scar

This boat was excavated on the island of Sanday in December 1991. All that remained of this vessel was an impression in the earth and the iron rivets from which all the following data has been extrapolated. From the over 300 rivets excavated it was possible to determine that this vessel was clinker built in the Scandinavian tradition of lapstrake construction. The measurements obtained from this shadow of a boat are that she was 6.3m long, 1.6m in beam and had a 0.6m hull depth. This would give it a length to beam ratio of around 4:1.

This boat was propelled by means of six oars, but there is also evidence forward of amidships of a mast fitting onto the keel where a small sail could be erected. As in the case of the Gokstad boat, this vessel is assumed to have been steered by means of a side rudder mounted on the starboard aft quarter. This vessel is similar to Norwegian sexæring, and also the modern Shetland Sixern discussed below. The cargo capacity of the Scar boat, as in the case of the Gokstad boats and the modern Shetland examples, is highly dependent on whether the vessel was propelled by oar or by sail and on the size of the crew. This vessel was probably used for the same tasks as all the boats included in this group, but may have also been able to make slightly longer crossings and had a cargo carrying capacity slightly greater than the Westness boats discussed below. The data regarding the Scar boat was found in the unpublished Ph.D. thesis by Anne Allen (1994: ch. 6.4) who kindly granted me access to this information.

4.3.1.3 Westness 1

Both of the Westness vessels were excavated from the Southwest of Rousay in Orkney with the assistance of the National Maritime Museum. The first of these vessels was discovered in 1979 and excavated in 1980. The remains of this vessel were only a shadow, thus she had to be reconstructed from the outline of the rivets. This boat was clinker built in the Scandinavian tradition of lapstrake construction. This vessel measures approximately 5.25m in length with a beam of 1.35m and a hull depth of about 0.6m. This gives her a length to beam ratio of approximately 4:1. For a local transport vessel, this is a bit beamy, but would be suitable for local trade and communication. This vessel seems to be made of oak, judging from the small amounts of wood remaining in the corrosion of the rivets. Evidence of a chafing piece made of antler found during the excavation seems to indicate that this vessel was used as a fishing boat.

This vessel is assumed to rely on oars as a primary means of propulsion. This assumption is based on the light draught and the small keel, which would provide very little resistance to leeway during sailing. These same factors would make this boat easily manoeuvrable, yet unable to transport large light cargo, normally. Again, it must be said that what appears to be the archaeological ideal as extrapolated from formulas and models is not often the truth. This is often the case in the cargo carrying practices of ships, where they have in cases almost doubled their capacity for the sake of making a journey more cost effective.

From the above information it is easy to see that a boat of this size would be able to carry cargo, be used for subsistence activities and localised travel and communication. Its light build would allow for this vessel to successfully navigate the micro-topographical maritime landscape utilising any portage opportunities it might find to its advantage.

4.3.1.4 Westness 2

This, the second vessel excavated at Westness on Rousay, was approximately 5.5m in length, 1.4m in beam and had a hull depth of about 0.45m; giving it a length to beam ratio of about 4:1. With a full stem and stern, this vessel does not appear to belong to any known boatbuilding tradition, but the shape of the strakes resembles that of southern Norway. A vessel like this would be ideal for the localised navigation of the maritime landscape, again being able to freely use portage points when advantageous.

4.3.1.5 Traditional Shetland Boats (modern examples)

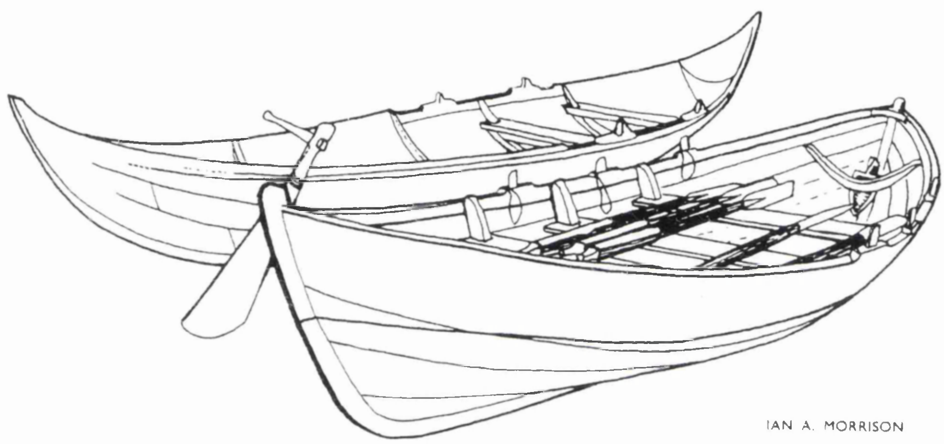


Figure 4.3: Gokstad færing in the background and a Shetland Ness Yole in the foreground. (After Morrison in Hendersen 1978: Fig.6.3)

Direct descendants of the small boats of the Viking Age, the traditional Shetland boats allow for investigations into the utilisation of the maritime landscape to be conducted using ethnographical information (see Figures 4.3, 4.4). When viewing these vessels first hand, it is easy to see their lineage, and when compared to the finds from the Gokstad burial housed in the Viking Ship Museum in Oslo the differences are very subtle. Besides the excellent information available on the construction techniques and history of these vessels, there also exists numerous accounts of portaging these boats regularly whilst navigating the maritime landscape of Shetland.

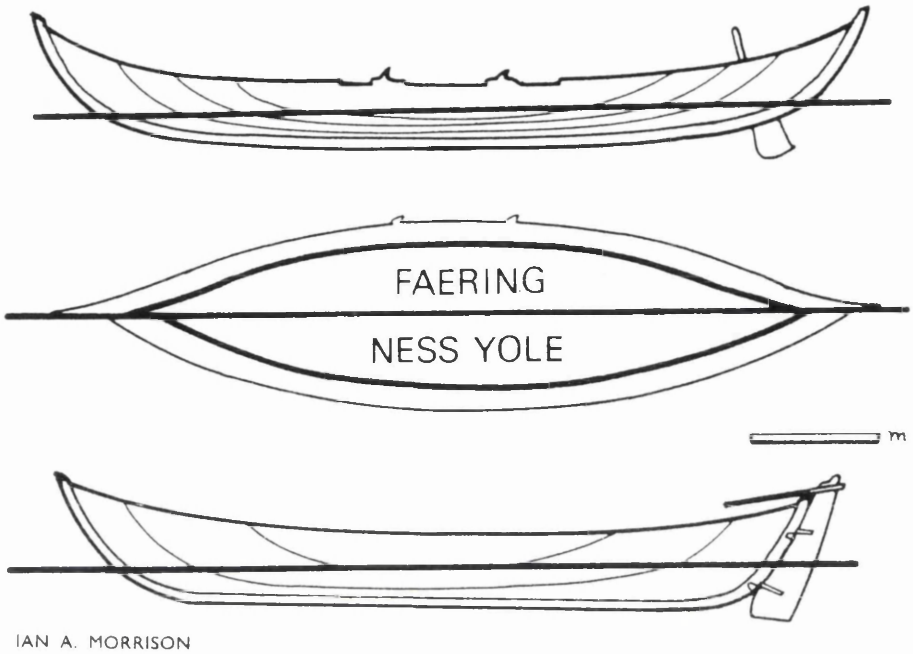


Figure 4.4: Profile and plan views of the Shetland Ness Yole and the Gokstad færing showing the similarities in their design. (After Morrison 1978: Fig 7.1)

An account of the traditions and use of the Shetland Sixern is provided by the Rev. John Spence in *The Days of the Old Shetland Sixern* (1910:39), which provides some interesting insights. The sixern or *haf-boat* in which the Rev. Spence spent his time on the *haf* (deep sea) was about 18 feet (5.5m) of keel and was divided into six compartments. Traditionally, six men made up the crew with each man having a specific seat in the boat, and they were responsible for the associated equipment: kabe, raemik and humle-band. The aforementioned gear is extremely similar in name (except for the raemik) and design to its Viking Age forebears. This equipment is comprised of a thole pin, an oar, and an oar loop (flexible grommet) made of a strap fastened to the thole pin thus eliminating the need for a crutch. This facilitates easy backing, allows them to hang overboard without loss and easily taking the oars inboard if necessary (Morrison 1992:127).

Hendersen (1978) provides a more detailed recording of the history and evolution of traditional Shetland boat types, relating them to the small boats found during the Gokstad excavation. These being the direct ancestors of the Shetland boats, the main difference being the high stem and stern with the planking carried up almost to the peaks on these ancient vessels, the basic construction remains the same. This design, which served so well in the fjords of Norway, was easily adaptable to the navigation of the sea off Shetland. The uncommonly aft placement of the oarlocks allows for the bow of the vessel to ride high in the seas, making it ideal for rowing into head sea as is commonly the case in Shetland (Morrison 1978:66).

Another Shetland boat that harks back to the Viking Age is the *Ness Yole* (see Figure 4.4). These vessels are specifically designed to brave the extreme tidal conditions and broken water encountered while fishing on the inshore areas of Shetland. Over the years, the measurements of these boats have become hard and fast, any variation in these and the vessel is not considered a *Ness Yole*. These measurements are a keel length of 15 feet (4.572m) with an overall length of 22.5 feet (6.858m) a beam of 5.5 feet (1.676m) and a depth of hold (inside) of 21 inches (0.534m). The only reasoning behind the strict adherence to this design would be that over the generations this was proven to be the best design and therefore one that should not change. Hendersen (1978:53) relates that for many centuries these boats were constructed in Norway with temporary fastenings that would be removed before shipment to Shetland. Vessels such as this were ideal for fishing within ten miles of the coast, the inshore zone and thus ideal for local transport trade and communication. For plying the deeper waters further offshore a change had to come about in vessel design. Hence, the Shetland *Sixern* was developed to fish the *far haf*.

Figure 4.5: Design and layout of the Shetland sixern/sixareen developed for deep-sea fishing. (After Morrison in Hendersen 1978:Fig.6.4)

Charles Sandison of Unst, Shetland provides an excellent analysis of the sixern in *The Sixareen and her racing Descendants* (1954). His discussion provides detail on the experimentation which was being undertaken with the development of the sixareens and how often these boats would be altered in the off season to try to work out some of the problems encountered during the previous season (see Figure 4.5). Many of these changes were the result of comparisons made with the vessels of neighbours. It is easy to see how over the ages the ideal vessel for a particular area could be attained, and as in the case of the *Ness Yole*, provided strict guidelines for the building of a purpose and location specific vessel. One of the characteristics of all the traditional Shetland boats is lightness. Not only did this allow them to ride high in the seas, but also to be easily dragged up to their *noosts* (storage berths) or portaged over isthmuses. It is not unknown for skippers to have their boats built from light larch in order to be able to out pull the others of the fleet (Morrison 1978:59), a racing tradition which carries on to this day. An example of how light built these vessels are evident by the gross tonnage between a fully fitted vessel and a stripped hull, 3tons vs. 0.8 tons (Morrison 1978:61).

Another Shetland vessel reminiscent of the Viking Age boats are the *fourerns* (Shetland four oared boats) which were ideally suited for almost all tasks within the realm of inshore navigation. Unlike the Ness Yoles, the design plans were flexible. They could have a length of keel between 8 and 12 feet (2.43 and 3.65m) with a narrow or stout beam and a variety of hull shapes: broad and flat to narrow and sharp (Hendersen 1978:55). Another interesting characteristic of the traditional Shetland boats is the *tilfer*, or removable mast step. This removable floorboard works in association with the sail *taft* (thwart) which is also removable. Therefore, when these boats are stripped to the gunwales it is impossible to tell if they are sailing or rowing boats. This raises some interesting questions when examining the archaeological remains of Viking Age boats and the subsequent interpretation of them as either sailing or rowing vessels. Morrison (1978:70) makes an excellent point by stressing that when evaluating material remains they should not remain in isolation from the activities for which they were designed. The boats of the Viking Age and their Shetland descendants were designed for a multitude of uses, therefore all possibilities should be considered when placing them into operational groups, if there is indeed any way to definitively do so.

	Vessel	Location	Date	Preservation	Purpose	Propulsion	Length	Beam	Draught	Length to beam ratio	Publication
Group 1 (local transport boats)	Gokstad Faering	Sandefjord, Norway	885-895 AD	partial	tenders or daily use boats	4 oars	>6.5m	1.38m	0.49m	5:1	Nicolaysen 1882
	Scar	Sanday, Orkney	unknown	300 rivets	tenders or daily use boats	six oars or small sail	6.3m	1.6m	0.6m	4:1	Allen 1994
	Westness 1	Rousay, Orkney	unknown	rivets	tenders or daily use boats/fishing	oars	5.25m	1.35m	0.6m	4:1	Allen 1994
	Westness 2	Rousay, Orkney	unknown	rivets	tenders or daily use boats	oars	5.5m	1.4m	0.45m	4:1	Allen 1994
Group 1 (local transport boats) modern	Sixern	Shetland	modern	surviving examples	deep sea fishing	oars/sail	ca. 5.5m	variable	variable	variable	Ethnology
	Ness Yole	Shetland	modern	surviving examples	inshore fishing	oars/sail	6.858m	1.676m	0.534m	4:1	Ethnology
	Fourem	Shetland	modern	surviving examples	inshore fishing	oars/sail	2.43m-3.65m keel length	variable	variable	variable	Ethnology

Table 4.1: Characteristics of Group 1 Vessels (local transport vessels).

4.3.2 Group 2 Vessels (coastal traders)

These vessels spanned the gap between the small local transport vessels of Group 1 and the large ocean going traders of Group 4. Ideally suited to long distance coastal navigation, these vessels could carry larger amounts of cargo or personnel to locations within a larger area than the local transport boats. This was perfect for shipping cargo to a trading centre from a farm or small settlement. These vessels were also able to make short sea passages. Because of this greater range, yet still being small enough to be manhandled with a small crew, these vessels were ideal for navigation within the micro and macro-topographical maritime landscape. Because of their reasonably small and light construction, they could be portaged with relative ease without undue risk to primary members, a problem that is inherent in many of the longships. Others do not consider some of the vessels mentioned below coastal traders, an example being the Fotevik vessel, which is usually classed with warships/longships (Crumlin-Pedersen 1991b:74). Another vessel included in this group for lack of a better alternative is the Oseberg Ship, which is assumed to be a 'royal barge' of the early ninth century, reasons for this are discussed below.

4.3.2.1 Skuldelev 3

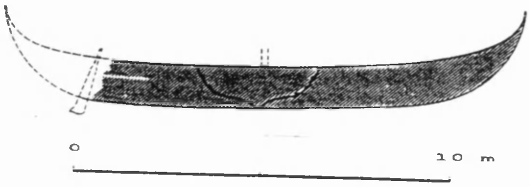


Figure 4.6: Outline of the hull design of the Skuldelev 3 find. The shaded area indicates the preserved section of the hull. (After Crumlin-Pedersen 1991b: Fig.7)

Skuldelev 3 is a perfect example of a small coastal trading vessel (see Figure 4.6). Dated to around 1000AD this vessel was preserved to approximately 75% of its original design, with most of the damage occurring in the stern section, this small cargo carrying vessel would have measured approximately 14m in length with a beam of 3.8m and a hull height of 1.28m (Olsen and Crumlin-Pedersen 1967:118-132, Crumlin-Pedersen 1991b:75). This makes the length to beam ratio 4:1, the same as the deep ocean trader Skuldelev 1 (see below). The excavation of this vessel also recovered the uppermost (eighth) strake, which had oarports for 7 oars with the crossbeams serving as the supports for these. This would enable this vessel to be easily manoeuvred whilst navigating close inshore. The mast of this vessel was stepped into a deep hole in the keel, as opposed to a proper mastfish. The option of oared propulsion also gave vessels of this design the option of travelling narrow waterways or upriver. This capability made them the ideal vessels for operating in an environment where portages could be used on a regular basis to circumvent dangerous sea routes or provide access to areas that were not connected with the sea.

This vessel has prompted numerous archaeological experiments in relation to its construction methods and sailing capabilities, performed at the Viking Ship Museum in

Roskilde. These experiments have concluded that this vessel could have carried a 4.6 tons of cargo at a draught of 0.84m with a corresponding freeboard of 40% amidships. In comparison to the 2.3m longer Skuldelev 1 ocean going cargo vessel, a Group 4 classification discussed below and in the chapter on experimental archaeology, which could carry approximately 24 tons of cargo at a 40% freeboard amidships with a draught of 1.28m. It is clear that these vessels were designed to serve different roles in the transportation of cargo. Both of these vessels are assumed to have needed a crew of five for efficiently sailing, which results in a man to cargo ratio of 1 man per 4-5 tons of cargo for the Skuldelev 1 vessel and 1 man per 1 tonne of cargo for Skuldelev 3. The assumption from these figures is that the Skuldelev 3 would be used for the transportation of lighter, more valuable cargo or as a multi-purpose transport vessel (Olsen and Crumlin-Pedersen 1967:132, Crumlin-Pedersen 1991b:75).

In relation to the portage scenario, the Skuldelev 3 vessel is the ideal candidate for portaging in both the micro and macro-topographical navigation of the maritime landscape. Its light build allowed it to be dragged with minimum of effort, yet its overall design enabled it to successfully sail on minor passages. The only drawback to the use of this boat for regular portaging would be the small crew that may have manned her. If draught animals were employed, or the crew numbers were slightly increased, the dragging of this type of vessel would have been a simple operation. For local transportation and small-scale trading, this sea-worthy shallow draught vessel was perfectly suited for the manipulation of all aspects of the maritime landscape in all but the most extreme conditions.

4.3.2.2 Oseberg

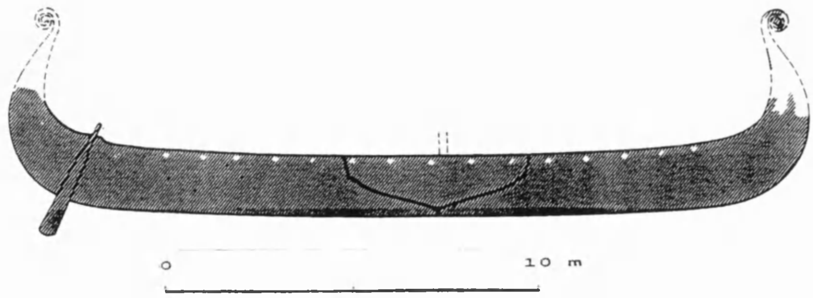


Figure 4.7: Outline of the hull design of the Oseberg Ship. The shaded area indicates the preserved section of the hull. (After Crumlin-Pedersen 1991b:Fig.5)

This vessel, along with the Gokstad Ship, is the typical Viking Ship for many people. A ninth-century female inhumation burial, this vessel was excavated at the Oseberg farm in Vestfold, south Norway. Along with the bodies of two females, at least twelve horses, four dogs and two oxen were interred. Excavated in 1904 by Gabriel Gustafson of the University of Oslo, this grave had been previously plundered of all jewellery, some skeletal remains and many of the grave goods. (Brøgger et al. 1917)

Dated at around 850 AD, this is the oldest excavated vessel from the Viking Age in Scandinavia, and also the oldest example of a Viking Age vessel with evidence of a mast and sail (see Figure 4.7). With an overall length of 21.6m, a maximum beam of 5.1m and hull depth of 1.6m this vessel is difficult to place into a grouping by utilisation. The 19.8m keel is scarved from two pieces of oak and the majority of the vessel is also built of this hardwood. The decking and oars are of pine, with the carved ends of the upper strake being of beech. This ship was decorated with intricate carvings of intertwined animals. Some of the rigging was also excavated from this burial, allowing for a clearer picture of the maritime practices of the age to be interpreted. (Christensen *et al*:1992, Christensen 1997:173)

A replica was constructed of this vessel for sea trials in 1987. She originally carried 100sq. m of sail which had to be reduced to 90sq. m. Rigged in the same manner as the traditional vessels of the West Coast of Norway she sailed fairly well, yet the bow wave flooded the hull at 10knots with a 10-degree heel. Additional washstrakes were added to combat this problem. It is unknown whether this was a situation encountered by the Oseberg Ship, but if it were it would limit the ocean sailing capacity of the vessel. Limited to areas of reasonably calm seas and subject to possible swamping due to limited freeboard, this vessel falls into Group 2. Although it is longer, beamier and heavier than the other vessels, this vessel was most likely employed in the coastal navigation of the local area and possibly served as a private barge for the wealthy owner of the vessel. This vessel was obviously dragged out of the water to its site of interment, as to it being portaged, as part of its regular employment in the maritime landscape is doubtful.

4.3.2.3 Roskilde 2

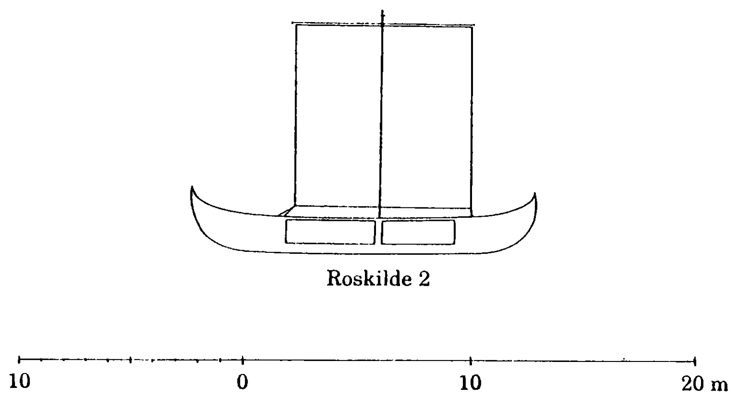


Figure 4.8: Profile of the Roskilde 2 vessel. (After Morten Gøthche in Croome 1999: Fig.2)

This vessel was discovered in the proximity of the Viking Ship Museum in Roskilde along with the 8 other vessels ranging from the Viking Age to the Late Middle Ages (Croome 1999: 382) discovered in 1997. The timbers for this vessel were felled in

1168 AD. Examination of this vessel has shown it to be the product of the highest standard of craftsmanship. As a perfect example of Scandinavian boatbuilding tradition, this vessel also had lower crossbeam knees decorated with profiles. The keel is fashioned from an oak timber on which the evidence of the scarving is still present. Unfortunately, all that remains of the stem and stern are the iron nails. Clinker-built, this vessel is estimated to have been approximately 15m long and 4.5m wide with a hull depth of about 1.65m. (Myrhøj & Gøthche 1997:2) (see Figure 4.8). A hypothetical scenario has been proposed attributing this vessels demise the result of the swamping and eventual sinking during a storm. This vessel is thought to be from the 12th or 13th century, as it is built with all the characteristics of a Viking Age vessel.

For a coastal trading vessel this is an unusually large and seaworthy example. Its construction of oak would make the vessel extremely strong, but at the cost of weight and therefore manoeuvrability on land. This design could easily have made shorter passages, but could also have served well in the local navigation of an area. Almost a Group 4 design, this vessel would have proven difficult to manhandle across all but the narrowest isthmuses. Until further analysis on the vessel helps place this vessel into its proper place in the maritime traditions of the Viking Age, it serves as an extreme example of a coastal trading vessel.

4.3.2.4 Roskilde 5

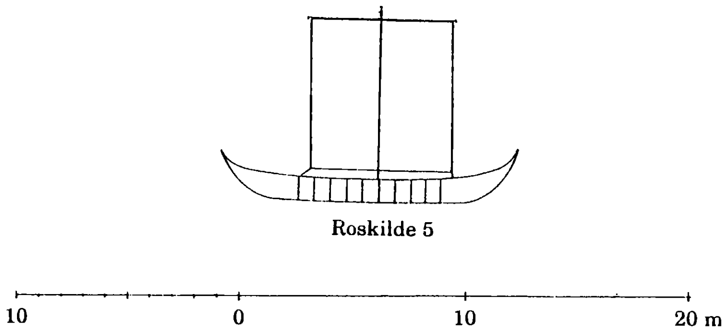


Figure 4.9: Profile of the Roskilde 5 vessel. (After Morten Gøthche in Croome 1999: Fig.2)

Roskilde 5 another one of the nine vessels that were discovered during the excavation for the extension of the Viking Ship Museum in Roskilde during 1997 (see Figure 4.9). This is a reasonably small cargo vessel with about a 10m-oak keel. Constructed mostly of pine, this vessel must have been approximately 12-14m long with the bow and stern intact. The width of this vessel has been calculated at approximately 3.6m with a height above the keel of about 0.95m (Myrhøj & Gøthche 1997:4), giving this vessel a length to beam ratio of approximately 4:1. This little ship had 7-8 rooms between the ribs. The investigators of these discoveries think that this vessel was not likely to have been built in Denmark, but in Norway.

In the portage scenario, this vessel would have been ideal. Its construction of mostly pine would have made it light and easy to drag across land. Its reasonably small design would have made manoeuvring the vessel, once on land, possible with a minimum of crew. The low freeboard would have made this design more suited to localised navigation than to making passages, yet it could have freely sailed reasonably sheltered waterways during most conditions.

	Vessel	Location	Date	Preservation	Purpose	Propulsion	Length	Beam	Draught	Length to beam ratio	Publication
Group 2 (coastal traders)	Skuldelev 3	Roskilde Fjord, Denmark	ca. 1000 AD	75%	Small cargo vessel	oars/ sail	14m	3.8m	1.28m	4:1	Olsen and Crumlin-Pedersen 1967
	Oseberg	Vestfold, Norway	ca. 850 AD	>75%	Royal barge?	oars/ sail	21.6m	5.1m	1.6m	4:1	Brøgger et al. 1917
	Roskilde 2	Roskilde, Denmark	Timbers felled 1168 AD	partial (stem and stem are only rivets)	Very large coastal trading vessel	oars/ sail	15m	4.5m	1.65m	4:1	Croome 1999
	Roskilde 5	Roskilde, Denmark	unknown	partial	Small cargo vessel	oars/ sail	12m-14m	3.6m	0.95m	4:1	Myrhøj & Gøthche 1997

Table 4.2: Characteristics of Group 2 Vessels (coastal traders).

4.3.3 Group 3 Vessels (warships)

These are the vessels that typify the Viking Age for many. Long and slender, these serpents of the seas were the devil incarnate for all those whom they besieged. The vision of a large fleet of longships could only mean one thing, death and destruction at the hands of the Vikings. On the lighter side, these vessels were ideally suited for the transport of large crews quickly and efficiently to their destination. These vessels were, generally, light built and able to make ocean passages during favourable weather conditions, yet if the larger ones were to be dragged across land they risked structural damage. Crumlin-Pedersen (1991:74) recognises that many of the ideas about Viking Age longships are heavily biased by the large archaeological resource of Denmark. It is possible that the longships employed by on the West Coast of Norway or other areas may have been more akin to the Gokstad type of vessel. This presumption is obvious when given the different sea conditions to be encountered in the many different areas of the Viking World. As time progressed, Viking Age vessels became extremely specialised in purpose, so without a doubt they were suited to local conditions. As such, there evolved many different forms designed to accomplish similar tasks. Selections of these are discussed below. As for their role in the maritime landscape, each different type served a similar purpose in a different way, to be able to transport large crews so that they could quickly attack in various conditions. This activity sometimes involved portages of varying distances. The beautiful thing about portaging a warship was that there was sufficient man-power to move most vessels. The only drawback in this scenario was the maintaining the structural integrity of the vessel. The smaller warships would have had no difficulty in traversing great distances, yet the longer vessels would run the risk of breaking their back. It is for this reason that these vessels capabilities must be evaluated on the merits of each vessel. Generally, these vessels could be used for portages in the navigation of both the micro and macro-topographical maritime landscape.

4.3.3.1 Skuldelev 5

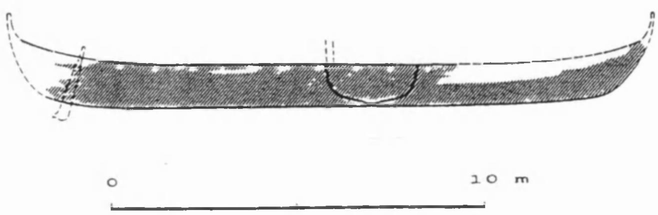


Figure 4.10: Outline of the hull shape of the Skuldelev 5 vessel. The shaded area indicates the section of the hull which was preserved. (After Crumlin-Pedersen 1991b:Fig.6)

Built from timbers felled 1030-1040 AD, only about 50% of this warship was preserved with the stern and most of the starboard side missing. The reconstructed dimensions of this ship have her measurements at length 17.2m, beam 2.6m and a depth of hold of 1.1m (Olsen and Crumlin-Pedersen 1967:132-145, Crumlin-Pedersen 1991:74, Bill 1997:389). This gives it a length to breadth ratio of 7:1. For propulsion this vessel relied on 12 or 13 pairs of oars or power from a sail of which the mast was stepped into the keelson. The stepping of the mast into a position such as this facilitates easy raising and lowering if the need to do so arises. The shrouds supporting a rig such as this were designed to be easily released (see appendix C "Viking Voyage") for either repairs or to 'loosen up' the vessels for increased sailing performance. The vessel is an excellent example of a fast troop carrier with a compliment of approximately 26 men (Olsen and Crumlin-Pedersen 1967:145, Crumlin-Pedersen 1991:74). As most warships, the design of this vessel leaves little or no room for the carriage of cargo. This specific example of this design is thought to be a *leidangr* vessel, or one that was built and kept by royal command for the defence of the local area at the expense of the local inhabitants (Bill 1997:389). Numerous features on this vessel show signs of repair (or disrepair as the case may be), such as the evidence for the repair of the oarholes and its long span of use.

This is another vessel of which a replica was made and numerous experiments have been performed (for details on these trials see the section on Experimental Archaeology). One of these involved the portaging of the replica by both manpower and the use of draught animals. Because of its light build and low hull height this vessel was easily portaged and could use this as a tactic in the strategic aspect of warfare in the Viking Age or as a basic navigational practice. This allows this vessel to be considered ideal as an amphibious craft for warfare in reasonably calm waters.

4.3.3.2 Skuldelev 2-4

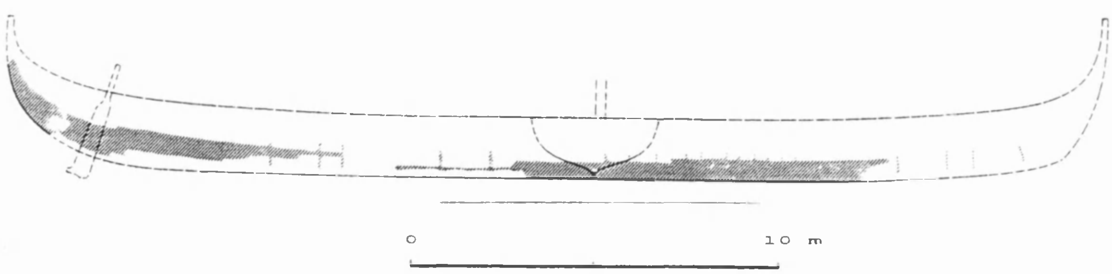


Figure 4.11: Outline of the hull design of the Skuldelev 2-4 vessel. The shaded area indicates the preservation of the hull. (After Crumlin-Pedersen 1991b:Fig.6)

One of the largest examples of a Viking Age warship, this vessel is a longship in the true sense of the word. The recent discovery of an approximately 35m long vessel (Roskilde 6) on the grounds of the Viking Ship Museum in Roskilde, from around 1025 AD has served to reinforce the references in the sagas to the immense dragons (longships) that were so often scoffed at by modern critics (Croome 1999:382). Therefore, vessels of this length were not unique. The Skuldelev 2-4 find had only about 25% of its structure present with only parts of the bottom and stern (see Figure 4.11). The measurements of this vessel are a length of 30m, beam of 3.7m and the depth of hold 1.6m (Olsen and Crumlin-Pedersen 1967:111-118, Crumlin-Pedersen 1991:74, Bill 1997:388). This would give the vessel a length to breadth ratio of 8:1. This vessel probably had about 30 pairs of oars that could be used for propulsion or it could use wind power by setting a mast into a 13.3m keelson constructed of two timbers. It is likely that a mast partner enabled the rig to be raised and lowered whilst at sea (Bill 1997:388). A vessel this large would have carried a crew of about 60 men as a minimum, but it could have probably have easily transported upwards of 70 or more men.

With its reasonably low freeboard, this vessel does not seem to be as seaworthy as many of the other Viking Age vessels (Skuldelev 1 etc...). Yet the timbers used to construct this vessel are of oak felled in eastern Ireland and she was most probably built in Dublin (Crumlin-Pedersen & Bonde 1990:3-6). As for its use in the portage scenario, it is reasonably safe to say that a vessel of this length and weight is unlikely to have been dragged any great distance. Not only due to the awkwardness of such an operation, but because of the strain it would put on the keel and other primary structural members. There are references to warships being dragged over vast distances in order to engage the enemy (Sverri's Saga), but the likelihood of these being made about a leviathan such as this or any of the other super longships is slim, despite the immense amount of manpower making up the crew. It is for these reasons that when considering a portage scenario which would have been a regular feature in the maritime landscape, the dragging of vessels such as these are not included in the equation.

4.3.3.3 Gokstad

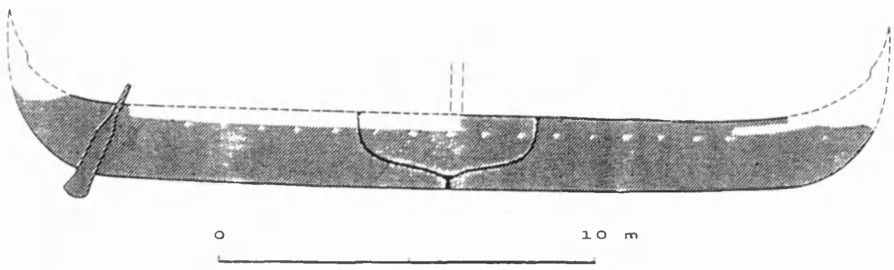


Figure 4.12: Outline of the hull design of the Gokstad Ship. The shaded area indicates the amount of the hull that was recovered during excavation. (after Crumlin-Pedersen 1991b:Fig.5)

The discovery and excavation of this inhumation ship burial from a mound at the Gokstad farm in Vestfold, Southern Norway in 1880 and subsequent publication by the main excavator Nicolay Nicolaysen in 1882 (*Longskibet fra Gokstad ved Sandefjord*); set in the minds of many what a Viking Ship was and should look like (see Figure 4.12). This mindset was furthered by the construction and sailing of a Gokstad replica to North America in 1893 by Magnus Andersen (Christensen 1986:68-77). With this vessel considered 'the Viking Ship' by so many, it is interesting to see how it compares to the Viking Age vessels that have been discovered since. This vessel has also been the subject of numerous publications, discussions and debates, for the purpose of this investigation it is necessary to examine the Gokstad in its most basic form; as a warship designed to maximise it effectiveness in the maritime landscape.

Dendrochronologically dated to 885-895 AD, this vessels last voyage was as the burial chamber for a wealthy male with the associated grave goods and sacrifices. In addition to the numerous practical implements, games and animals there were three small boats. These are discussed in the section on Group 1 vessels (above) as they most likely served as local transport vessels or tenders. This burial shows evidence of grave robbing, but this probably occurred soon after the interment. The Gokstad Ship is possibly what was referred to in the Old Norse sagas as a *karve* or *karfi*, which were the personal transportation of royalty or nobility. These vessels served a multitude of purposes for their owners; from trade and travel to fitting out as a vessel of war, they could be adapted to most situations.

This vessel measures 24.2m in length, 5.1m in beam and has a depth of hold of 2.1m (Christensen 1997:173, Nicolaysen 1882: plate 1). This gives this vessel a length to beam ratio of approximately 5:1. It has been estimated that this vessel carried a crew of around 40, but it could have most likely held upwards of 70 on certain voyages. With a slightly curved keel, so that the deepest section is amidships, this vessel has a 4m keelson into which a mast would be stepped. The design of this keelson with its accompanying mast partner allowed the mast to be raised and lowered with a minimum of effort. The exact configuration of the rigging is unknown, therefore it is impossible to assert any conclusive argument on the handling of this vessel. Replicas fitted with a square sail similar to that used on the traditional fishing boats (*fembøring*) of the West Coast of Norway have proven to be fast, tack well and be seaworthy enough to sail on the North Atlantic during the summer months. A much higher freeboard and oarhole covers contribute greatly to the seaworthiness of this vessel, and give it a distinct advantage over the rest of the vessels in this group.

Oak is the primary material used in the construction of this vessel, adding strength and durability as well as weight. A detailed analysis of the construction of this vessel is not necessary here and can be found in numerous sources, what is important is the size, weight and sailing capabilities. As mentioned above, with the *fembøring* rigging, these vessels would have had no difficulty in making the long passages necessary for raiding and exploring the maritime landscape of Scotland and the Isles.

The design of this vessel makes it a prime candidate for portaging during the navigation of the macro-topographical maritime landscape. It was able to carry a large crew, sail the open seas, and most likely could be dragged over small isthmuses of land if required. This type of warship/transport vessel would have been able to utilise the maritime landscape to a much better extent than the more specialised cargo vessels, with their immense bulk, or the super longships with their immense length. Many of the possible portage sites in the maritime landscape of Scotland and the Isles would have provided an preferable alternative to the sometimes long and dangerous journeys involved in the navigation from point A to point B.

Some trials in portaging have been performed on a 2/3 scale version of this vessel ("Havørn") with success (see chapter 5). For details on these experiments refer to the chapter on Experimental Archaeology, below. Overall, this typical Viking Ship, has proven not to be typical, but a combination of many features associated with many of the other Viking Age ship finds. As such, it is uniquely suited to coastal and offshore navigation whilst performing a variety of functions.

	Vessel	Location	Date	Preservation	Purpose	Propulsion	Length	Beam	Draught	Length to beam ratio	Publication
Group 3 (warships)	Skuldelev 5	Roskilde Fjord, Denmark	1030 - 1040 AD	50%	Longship (raiding)	oars/ sail	17.2m	2.6m	1.1m	7:1	Olsen and Crumlin-Pedersen 1967
	Skuldelev 2-4	Roskilde Fjord, Denmark	1025 AD	25%	Longship (raiding)	oars/ sail	30m	3.7	1.6m	8:1	Olsen and Crumlin-Pedersen
	Gokstad	Sandefjord, Norway	885 - 895 AD	well preserved but looted	General purpose longship	oars/ sail	24.2m	5.1m	2.1m	5:1	Nicolaysen 1882

Table 4.3: Characteristics of Group 3 Vessels (warships).

4.3.4 Group 4 Vessels (large cargo vessels)

The large cargo vessels were very unlikely to have been portaged great distances, or even short distances for that matter, unless the traverse could be deemed an economically viable alternative. As empty hulls, it is possible to drag these vessels from point A to point B, yet once in ballast and the mast fixed, this operation becomes more complex with each added variable. The archaeological experiment involving the "Borgundknarren" (a copy of Skuldelev 1, see chapter 7) showed that it is possible to manhandle a vessel in this group in extreme circumstances, yet again the notion of *possible therefore correct* must not be implied!

The inclusion of these vessels in an analysis of possible portage sites is necessary due to the varying roles that they may have played in the portage scenario. The unloading of cargo from a large cargo vessel to be carried across an isthmus, only to be reloaded onto Group 1 or Group 2 or another Group 4 vessel, gives these ships a unique role in the portage scenario. As all vessels during the Viking Age, these were shallow draught vessels that could be manoeuvred close to shore to facilitate the easy transference of cargo. When reviewing the various cargo vessels it is important to remember that they were not easily rowed, therefore their inshore manoeuvrability was limited.

Due to their use as ocean going trading vessels, they are strictly for use in the navigation of the macro-topographical maritime landscape. It does not seem likely that vessels such as these would be employed for a minor shifting of cargo or personnel from one farmstead to another. It is for this reason that only a couple of vessels in this group are discussed in any detail. The Skuldelev 1 vessel serves as an interesting study as it is a small cargo vessel upon which experiments in portaging have been performed, whilst the

Roskilde 4 vessel as it represents a larger beamier vessel which would be a very unlikely vessel to be dragged.

4.3.4.1 Skuldelev 1

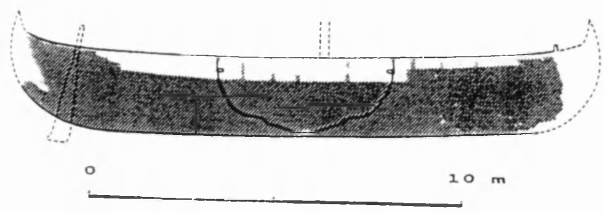


Figure 4.13: Outline of the Skuldelev 1 ocean going trader (knarr). The shaded area indicates the preserved area of the hull. (After Crumlin-Pedersen 1991b:Fig.8)

The find of approximately 60% of this deep ocean trading vessel, or *knarr*, in the Skuldelev Fjord (Olsen and Crumlin-Pedersen 1967:96-109), Denmark has spawned numerous replica ships for sea trials and experiments. The chapters on experimental archaeology (chapters 5 and 7) provide detailed accounts of some of these experiments, as does appendix C "Viking Voyage".

The reconstructed dimensions of this vessel are a length of 16.3m, a beam of 4.5m and the depth of hold 2.1m. The estimated cargo capacity of this vessel is around 24 tons (Crumlin-Pedersen 1991:75, Bill 1997:388) with a length to beam ratio of roughly 4:1. The twelve strakes of the hull are of pine, whilst the floor timbers, keel, most of the stem and stern timbers and some bites are of oak. Some of the other bites and framing are of lime, with a small amount of the framing being of pine (Olsen & Crumlin-Pedersen 1967:109, Bill 1997:388). There is evidence of fore and aft decks for manoeuvring whilst heavy wooden clamps serve as a seats for a beiteäss (tacking spar). This vessel was constructed in Norway and is considered a small knarr (see Figure 4.13). For more detail on the construction and uses of this vessel refer to the "Borgundknarren" section in chapter 7.

Vessels of this size were probably not portaged on a regular basis, but evidence from the areas of construction on Norway show that they would need to be dragged down to the sea for launching. Experience has shown that the task of dragging a replica of this vessel is a difficult task, yet if the vessel were to be stripped to the gunwales it would not be impossible. There are circumstances that could warrant the dragging of a vessel such as this, but its primary role in the portage scenario was most likely the distribution of goods for carriage to other vessels. As such, its only function was in the macro-topographical navigation of the maritime landscape. This is the case of all members of this group. Extenuating circumstances aside, the possibility of them being regularly hauled across land is minimal.

4.3.4.2 Roskilde 4

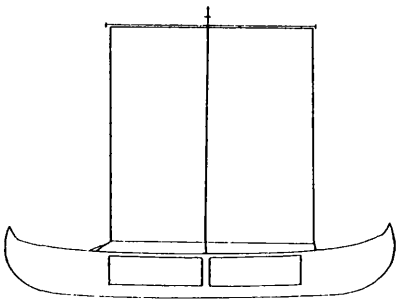


Figure 4.14: Profile of the Roskilde 4 vessel. (After Morten Gøthche in Croome 1999: Fig.2)

This is another ship that was unearthed during the excavation for the extension of the Viking Ship Museum in Roskilde in 1997. The starboard side of this vessel exhibits preservation up to the 11th strake. Based upon a stout T-shaped keel the starboard midship section of this vessel was the best preserved. The keel timber was preserved in a length of about 6.1m long, with the addition of keel extensions and the bow and stern this vessel is approximated to be almost 20m in length (see Figure 4.14). The width of the vessel has been reconstructed to be about 6.2m with the depth of hold being 1.9m (Myrhøj & Gøthche 1997:4). This would make the ratio of length to beam to be about 3:1, making it a very stout vessel. Primarily built of oak, with closely spaced ribs, this vessel was ideally suited for the carriage of large, heavy cargo. This vessel is thought to be from the 12th or 13th century, being built in the Scandinavian tradition of clinker built vessels.

Due to the heavy materials used in its construction and its size, the regular portaging of this vessel was probably not common. As mentioned in the discussion on the Skuldelev 1 vessel, the cargo vessel usually played a limited role in the portage scenario, and even that was primarily in the macro-topographical aspect of transporting cargo large distances for portage to other vessels for further distribution.

	Vessel	Location	Date	Preservation	Purpose	Propulsion	Length	Beam	Draught	Length to beam ratio	Publication
Group 4 (large cargo vessels)	Skuldelev 1	Roskilde Fjord, Denmark	ca. 1000 AD	60%	trading vessel	sail	16.3m	4.5m	2.1m	4:1	Olsen and Crumlin-Pedersen 1967
	Roskilde 4	Roskilde, Denmark	12th or 13th century	partial	cargo vessel	sail	approx. 20m	6.2m	1.9m	3:1	Myrhøj & Gøthche 1997

Table 4.4: Characteristics of Group 4 Vessels (large cargo vessels).

4.4 Conclusion

This brief discussion of a few of the Viking Age ship finds and some of their modern counterparts resulted in groupings into which these vessels can be placed. Albeit, this is a small sampling of the Viking Age ship finds, but it makes the point that there are distinct differences in the various types of vessels that allows them to be classified by their role in the maritime landscape. In doing so, it is possible to gauge the participation these vessels may have had in portaging in both the micro and macro-topographical navigation of the maritime landscape.

These deductions, when combined with the data provided in the other chapters of this thesis should allow for the portage possibilities to be examined in light of the types of vessel designs that would have been utilised in the Norse maritime cultural landscape of Scotland and the Isles.

As portaging is an activity representing behaviour with its own special methods and techniques, it is now valuable to review the various archaeological experiments which have tried to replicate the sailing, navigation and portaging of some of these designs. This will help to place the individual vessel designs into their niche in the maritime cultural landscape and also allow for a critical assessment of the capabilities of the different Viking Age vessels. The obvious difficulty in this is that as there are no Viking mariners to perform these trials, they must therefore be analysed in light of a learning curve.

5. Experimental Archaeology

5.1 Introduction

For many, the Viking Age is defined by images of longships emerging from the mist, spewing forth axe-wielding barbarians. The longships, with their upward curving prows and graceful lines, have been the topic of considerable research and experimentation in trying to interpret the maritime aspect of the Viking Age. The importance of the ship to the culture to the Vikings is represented not only by numerous ship burials and historical references, but also by the wide geographical distribution of Viking artefacts and settlements, from Istanbul to North America. There has also been numerous ship finds in Denmark which were the result of intentional scuttling for defensive purposes. The body of evidence relating to the ships of the Viking Age has provided numerous opportunities to study these vessels from an archaeological context and then enable one to place them within a historical, cultural and technological context. In addition to the evidence provided by excavation, much of the current state of knowledge on Viking maritime culture and technology has been reached through using the archaeological data to reconstruct vessels for use in archaeological experiments. These projects have allowed us to replicate the various designs of the ships and apply specific research questions to them. This method of investigation is one that I feel can be of great value to the archaeologist when interpreting not only Viking Age ship finds, but also the maritime culture of the Vikings. There have been numerous experiments conducted, using a wide range of Viking Age vessels, to better understand the portage/ dragging activities of the Vikings.

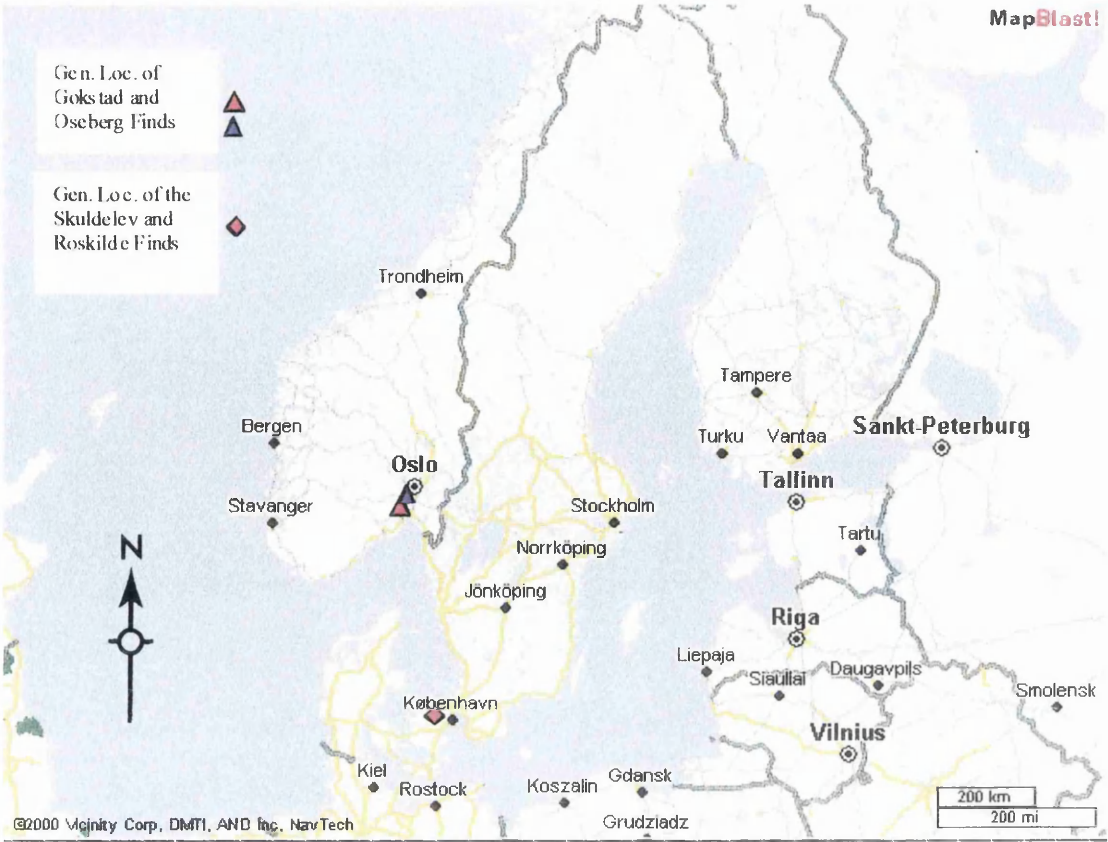


Figure 5.1: The locations of some of the more famous Viking Ship finds in Scandinavia. (Adapted from www.mapblast.com by the Author)

5.2 Viking Age Ship Finds

During the late 19th century, a Viking Age ship burial was to be unearthed in Norway that would define the Viking maritime culture to many. In 1880, the Gokstad Ship (dated at ca. AD 850) was found at the Gokstad Farm in Sandefjord, south of Oslo (see Fig. 5.1). The Gokstad ship is constructed in such a manner to allow for offshore sailing, shallow water rowing or sailing, and beach landings. This combination of attributes makes the ship unique from other, specialised purpose, Viking Age ship finds. In addition to providing an excellently preserved example of a Viking ship, it also provided a catalyst for the beginning of experimentation with Viking ship replicas, the "Viking" journey undertaken by Magnus Andersen in 1893 (Christensen 1986:68-77). In the excavation report, Nicolaysen (1882:17-23) attempts to explain many aspects of Viking maritime culture and shipboard life, from the methods of bailing unwanted bilge water, to the assignation of the cook by lottery. Discussions on the shipboard activities of the Vikings can occur from a theoretical point of view, but the only way to test their viability is an actual replication of the Viking experience. Many of these experiments have been performed over the years, for the purposes of this thesis only a small sampling of them will be reviewed unless they are directly relevant to the portage activity.

Another important Viking Age ship find from Norway is the Oseberg Ship (see Fig. 5.1 for location of find). This ship, like the Gokstad Ship, served as a burial chamber (Brøgger et al. 1917). This elaborately decorated vessel, from ca. AD 800, was intended for relatively sheltered inland waterways (Greenhill 1976:209, Greenhill and Morrison 1995:196). Seen as the personal vessel of a chieftain or chieftainess (Greenhill 1976:210, Greenhill and Morrison 1995:197), it not only contributes to our knowledge of Viking ship technology, but it also helps us to understand the cultural lifeways of the Vikings. The Oseberg burial yielded a vast amount of elaborate grave goods that can be used to help interpret the lifestyles of the "upper" class (Sjøvald 1985:12). A replica of the Oseberg was launched in 1988, which proceeded to sink straight to the bottom of the sea. In order to make her seaworthy an additional two strakes had to be added (Ragnar Thorseth as recorded in Schuster 1991:7).

Arguably, the most significant Viking Age ship finds is the group of vessels called the Skuldelev Ships from the Roskilde Fjord in Denmark (see Fig. 5.1 for location). This discovery is so important in that it yielded various examples of specialised, working vessels. Fragments of five vessels were recovered from the Roskilde Fjord, where the interpretation is that they had been intentionally scuttled to block a channel leading to the cathedral town of Roskilde. These fragments represented a fishing boat or ferry, two longships, and two cargo ships. All of the vessels recovered are considered working boats, and all of the finds date from about AD 1000 (Olsen and Crumlin-Pedersen 1967:73-174). The finding of contemporary, working boats allows us the unique opportunity of constructing replicas of each of these vessels for a comparative analysis of Viking ship technology. Their state of preservation also allows for an analysis of the methods and techniques used in their construction, notably the lack of sawmarks and the implications of this (Crumlin-Pedersen 1970:7). Numerous experiments have been performed in relation to the Skuldelev Ships (see this chapter below). These range from sailing trials of both the longships and cargo ships to experiments with the construction methods, tools, and materials.

Ole Crumlin-Pedersen (1970:10) maintains that Scandinavian Viking Age ships have basic features that allow the distinctly specialised ships to be grouped together. They are all clinker built. The keel, stem and stern form an even curve fore and aft, and are almost identical. The framing of the vessels is symmetrical across the keel and each frame section has a cross-beam above it. The upper part of the ships hull is reinforced by a system of knees, side frames and stringers. These ship finds have all provided valuable information in relation to the study of Viking maritime culture. They have provided us with physical representations of the infamous ships used in the raids on Lindisfarne and other foreign shores, the vessels used in the colonization of the British Isles, Iceland, Greenland and the exploration of North America, and the vessels used to penetrate deep into the heart of Eastern Europe and south to Byzantium. But certain questions still remain, such as how long did these journeys take? How did they navigate the river systems? How practical is portaging versus sailing around? What kind of sail did the Vikings use? How efficient is rowing an 18m longship? These are issues that can only be dealt with through practical experimentation and replication of the Viking maritime activities.

5.3 Experimental Ship Archaeology

The field of experimental archaeology has much to offer the discipline of archaeology, but certain guidelines and restrictions must be followed in order to maintain the integrity of the experiments. Experimental archaeology can be useful in exploring some of the observations proposed by the initial investigator, as well as for providing an arena for the testing of new theories and ideas. It can also play a role in interpreting artefacts that are of unknown purpose.

There are numerous levels upon which these experiments can be based (Coles 1979, McGrail 1986: 8-17, Coates et. al 1995: 293-301). The level of experimentation performed by historians, archaeologists and scientists with a specific research question to answer usually provides a scientific atmosphere in which critical observations can be made and specific tests can be conducted and repeated. Coles (1979:39) gives us three levels of experimental archaeology. The first level is represented by a simulation or copy. Here, attention to detail is only relevant in how it affects the visual appearance of the experiment. The materials used in the construction vary from the materials used in the original. Modern technology is also applied to the construction of the copy. The main premise of a simulation or copy being that it is not tested for function or purpose. These experiments are used primarily for museum displays and exhibitions. Coles (1979:39) makes the point that these are not reconstructions, recreations, reproductions or replications.

The second level defined by Coles involves the testing for past processes and reproduction methods. These experiments not only look like the original, but are manufactured with the same techniques and materials as the original. The use of ethnographic information can provide much of the data for this level of experimentation. The third level of experimentation involves taking the product of the second level through practical applications. This is the trial stage of experimentation. In order to prove or disprove any theories, more than one trial is needed. This involves a highly critical and scientific process of data collection. All aspects of the experiment must be noted and analysed, including any biases on the part of the investigator and the participants.

Coles (1979:46-48) lays down some fundamental rules which should be considered when attempting any experimental project. In addition to the preceding criteria for the levels of experimentation, he states that the scale of the replication should be assessed and that any problems encountered en route should be examined. The use of improvisation is also extremely valuable in interpreting possible solutions to the problems encountered by the original actions. The notion that *possible therefore correct* cannot be used as a method of analysis, but can be used to identify and eliminate both positive and negative data. This issue sometimes falls into the background during the excitement surrounding the project. Any variation in materials and methods of construction should be noted, as should any mistakes that occur during the construction phases. The recording of data during the construction phase, trials and conclusion phases of the experiment should include all possible factors which may have had an influence upon the project, such as personal opinions, idiosyncrasies, preconceived notions, short cuts, laziness, tiredness, boredom and over enthusiasm (Coles 1979:48).

Seán McGrail (1986: 8-17) provides a detailed discussion on experimental boat archaeology and the various levels he feels apply to this type of research. His discussion of this avenue of inquiry provides some guidelines to use when performing an experiment on many different levels. The three main areas where we are able to make deductions using experimental archaeology to extend our knowledge are: a. building techniques, b. the uses to which a boat might have been put, and c. the likely performance she may have attained (McGrail 1986: 8). There are numerous ways to go about testing hypotheses and theories, ranging from hand calculations to trials of full-scale replicas. The latter method provides the best observations of how a vessel performs in an uncertain world. It also allows the experiment to include observations of variables which would be left out of small scale tank trials or computer modelling such as the feeling of safety provided by a rig or how minor adjustments and repairs affected the outcome of the trials. For these reasons, the experiments which re-enact possible journeys using reconstructions of Viking Age vessels are the focus of this chapter and chapter 7. Obviously, trials involving the dragging of vessels are of specific importance, but navigation and sailing trials can also provide some insight into the capabilities of different rigs and help to better understand many aspects of Viking Age navigation and seamanship. The value of model building and testing by means of calculations based upon the physical laws of nature and possibly tank and wind-tunnel tests is stressed by McGrail (1986:9). When applied to the specific performance characteristics of vessel design this observation holds true. Yet, when testing the viability of a scenario that relies not only on the characteristics of the vessel but also variations in the maritime landscape and the performance of the crew, it is necessary to undertake a full-scale reconstruction of not only the vessel but also the activity itself. The resulting trial cannot be based strictly upon testing the physical properties of an object; it is heavily influenced by the human factor; constantly changing as opinions and attitudes change. McGrail (1986: 10) provides a breakdown of what he considers the different levels of experimentation and how they are performed based upon the construction aspects and aims of the experiment. As each experiment has its own objectives and budget to operate within, the guidelines will be dictated by these factors.

The experimental archaeologist has numerous sources from which replication information can be compiled for a project. Archaeological data, historical documents, and iconography can all be of value when attempting to reconstruct a historical situation. Archaeology provides a physical example to be replicated and can give valuable information involving the methods of construction. A reconstruction based on archaeological material is likely to be more accurate than one that is based upon strictly historical data (Coles 1979:54). The Viking ship finds provide a vast amount data upon which experiments can be based. The drawings made during the excavations can serve as blueprints for the reconstruction, and the artefact catalogue can sometimes serve as an equipment inventory for the journey.

The documentary evidence that is valuable to us, as experimental archaeologists, can be collected from a variety of sources. The first sources that come to mind are the saga literature. While these are based on historical data, they are subject to the creative freedom of the author. After all, these stories provided entertainment as well as historical information. Recorded accounts of Viking activity by the ecclesiastical community help contribute to our knowledge of raiding activities. While these sources provide only glimpses into the material culture of the Viking age, they can help us interpret the behaviour associated with this material culture. Another source of information that can utilised to enhance the models or replicas used in experimental archaeology is the interpretation of iconographic material. Monuments like the Gotland Stones depict Viking Ships with a full crew and rigging

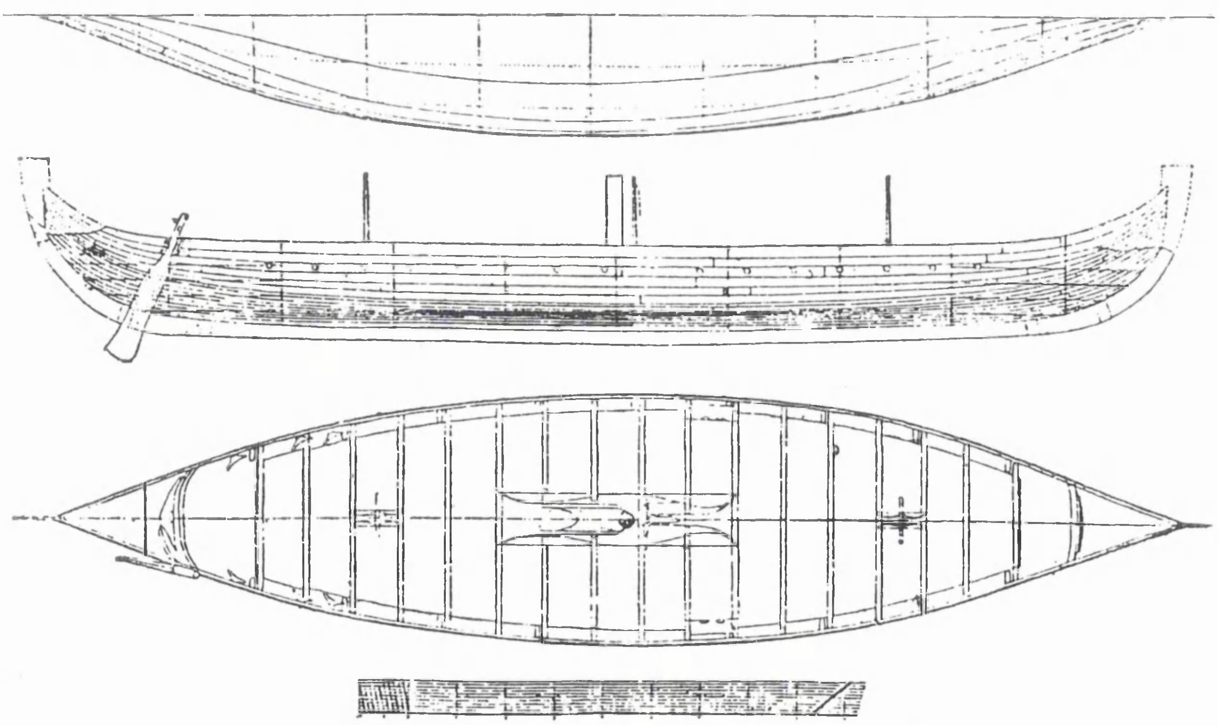
(Nylén 1986:104). This is one of the only sources of evidence relating to the methods of rigging a Viking Ship. The Bayeaux Tapestry is also a valuable source of information relating to the construction and utilisation of medieval vessels. It was from the Bayeaux Tapestry that a tool was identified for a specific construction phase of the ship, a tool that was later excavated at Hedeby (Crumlin-Pedersen 1986a:222, Crumlin-Pedersen 1997:187). It is the combination of this data that enables us to make serious inquiries into the practical aspects of the Viking Age maritime culture.

5.4 Experimental Archaeology Based on Viking Age Ship Finds

The previously mentioned Viking Age ship finds have all done their part in contributing to experimental archaeology. The following experiments have been the culmination of research projects that have sought to answer specific questions or prove the viability of certain historical accounts. This section will look at some of the Viking ship experiments and the reasons they are considered to have aided in the interpretation of Viking Age ship finds and the maritime culture of the Vikings. The experiments presented here serve as a general introduction to the experimentation that has been performed with the various Viking Ship designs with a specific concentration on the experiments involving portaging. Besides these, there have been other experiments based upon the Gokstad design (Lomax 1992) and many based upon the Skuldelev Ships (Vadstrup 1986:84-93).

5.4.1 "Viking"

The first reconstruction of a Viking ship took place not long after the excavation of the Gokstad Ship. This experiment was not so much for the progression of science as it was in the name of national pride. Magnus Anderson, a Norwegian sailor, came up with the idea of sailing a replica of the recently excavated Gokstad Ship to the Chicago World's Fair in 1893 to reinforce the premise that the Vikings were indeed familiar with North America before Columbus (Christensen 1986:68-69). A board was set up to establish the feasibility of the endeavour, and thus we have the origins of the first Viking ship replica, "Viking".



Linjeplan. — Sideplan seet udvendig fra. — Dæksplan

Figure 5.2: The Gokstad Ship plans as drawn up by the Drafting Office of the Norwegian Navy in 1880. (After Christensen 1986:Fig.1)

Using Nicolaysen's design as a blueprint (see Figure 5.2), it was built with modern methods to produce an exact replica (Christensen 1986:71). Much of the rigging they used was probably not what the Viking would have used and they took along with them tents to set-up amidships and canvas bags full of reindeer hair as floats for safety precautions (Christensen 1986:73). The aim of this experiment was to test the sailing capabilities of a Viking Age vessel and reinforce the fact that the Vikings had sailed to North America. Although this experiment deviates from the guidelines lay down by Coles (1979) and McGrail (1986) there was much to be learned from this endeavour. The technical aspects of this journey were very poorly recorded (Christensen 1986:76), but a note of praise was made regarding the ease in which the side mounted rudder could handle even the roughest seas (Christensen 1986:76). All told, Anderson proved that a Viking ship of this design could in fact sail the 5000 km to North America in an impressive 27 days (Coles 1979:89).

5.4.2 "Saga Siglar"

For ship specifications see Figure 7.1.

The discovery and excavation of the Skuldelev Ships from the Roskilde Fjord in Denmark, has encouraged the building of numerous. Two that stand out are "Saga Siglar" and "Roar Ege". The aim of these two experiments was to determine the importance of the original documentation provided by the ship find, and to test the accuracy of the artefact/site observations in relation to the analysis of the production methods and material usage (Crumlin-Pedersen 1986a: 210). Another important aspect of these projects relates to the actual sea trials to be performed; all of the details regarding the rigging and data collection should be agreed upon beforehand in order to maintain the integrity of the experiment (Crumlin-Pedersen 1986a: 210-211).

The lines for "Saga Siglar" were based upon the Skuldelev 1 find, a deep-sea trading vessel (knarr). The goal of this project was to build an exact replica of Skuldelev 1 and sail it around the world (Thorseth 1986:78-83, Schuster 1991: 22-30). He proposed that "Saga Siglar" be built exactly as the original: using the tools, materials, techniques, craftsmanship and labour that would have been used in the Viking period (Thorseth 1986:79-81). Ole Crumlin-Pedersen (1986a: 209) maintains that up to 1986 the "Roar Ege" (a copy of Skuldelev 3) was the only reconstruction of a Skuldelev Viking ship find to be constructed as an archaeological experiment, but does concede that the Saga Siglar is of interest because the design of the hull, rig and sail were all worked out at the Roskilde Viking Ship Museum. A replica called "Skuldelev" is now under construction at the Viking Ship Museum that is being built to the highest standard of any Viking ship replica to date (see Fig. 7.3). Of the 20th century Viking ship replicas, Ragnar Thorseth's Saga Siglar is probably the best known. What his experiments lack in archaeological data collecting, they compensate for in gaining the attention of the public. After his success in the "Gaia" journey from Norway to America (Lomax 1992), the 'Saga Siglar' was to be sailed around the world whilst recording the sailing characteristics of this vessel design and in navigation (Thorseth 1986:81). Unfortunately, this vessel sunk at its moorings in the Mediterranean in 1992 due to a storm. Because of this, it was not possible to bring this experiment to its conclusion, yet the results achieved during the legs of the journey it did complete proved the vessel to be extremely efficient and seaworthy.

5.4.3 "Roar Ege"

Ole Crumlin-Pedersen's goals in his construction of the "Roar Ege" were: to provide archaeological and technological data on Viking seamanship and shipbuilding, provide a floating full-scale replica of Skuldelev 3 (Olsen and Crumlin-Pedersen 1967:118-132), provide an opportunity to train people in maritime culture the of the Vikings, and provide a visual recording of the entire process for presentation to the public (Crumlin-Pedersen 1986a:213, Crumlin-Pedersen 1986b:94). In order to record all aspects of the processes involved in this project he laid down very stringent guidelines for the recording of data. He also relied on iconographic data, specifically the Bayeaux Tapestry, to study the medieval shipbuilding techniques (Crumlin-Pedersen 1986a:222). It was during the construction of "Roar Ege" that the realisation was made that they needed a more specialised adze/axe. From the Bayeaux Tapestry they could discern a specialised tool being used, but were unable to replicate it because of its absence from the archaeological record. During the construction, this very type of tool was recovered from the excavations at Hedeby (Crumlin-Pedersen 1997:187-189), thus allowing Crumlin-Pedersen's archaeological experimentation to add to the data set of both groups (Crumlin-Pedersen 1986a:224).

Once built this vessel set out upon the waters of Zealand for sea trials, where she proved herself a technically superb vessel able to easily sail the waters off Denmark and likely could have made the journey to Norway and westwards to Scotland (Neersø 1986:34). The main purpose of this experiment was accuracy in construction, without the use of modern tools, which this undertaking has provided a large amount of valuable information. The principal aims of the sea trials were to assess the speed in relation to sea conditions, test the windward sailing ability in relation to the its rigging and conditions, test the overall seaworthiness and strength of the hull. These trials are recorded in Vinner (1986:220-225). The "Roar Ege" experiment in Viking Ship construction and Viking Age sailing techniques provides an excellent example of an archaeological experiment based upon maritime technology.

5.4.4 "Krampmacken"

"Krampmacken" Specifications

length overall: 8m
mast height: 6m
beam: 2m
weight of vessel excluding crew: 1000+Kg
sail area: 18m²
year of construction: 1979-80

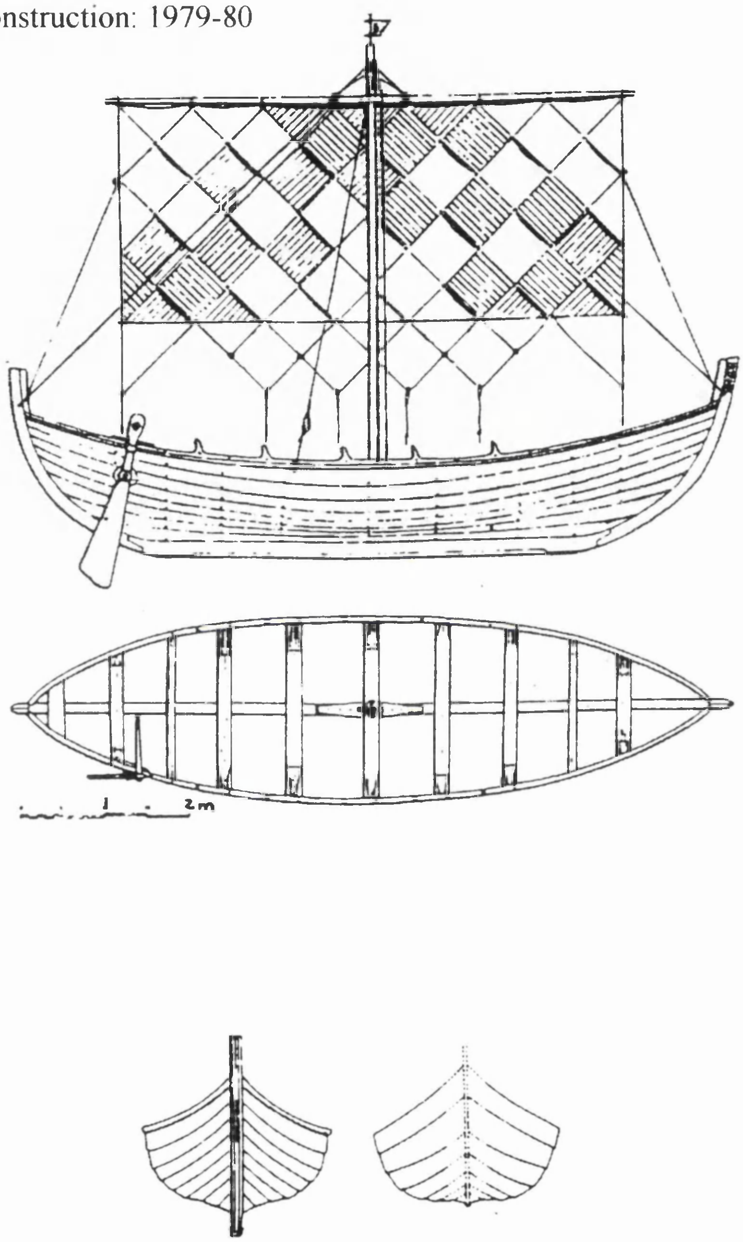


Figure 5.3: The "Krampmacken" measurement drawing. (After Nylén 1986:Fig. 1)

The "Krampmacken" project was similar to the "Havørn" (see below) expedition in that both vessels sought to reach Istanbul via the river systems of Eastern Europe (Nylén 1986; 1983; 1997), but they differed in both vessel design and methodology. Nylén's (1986:105) initial justification being; "Which kind of vessels were on the European Rivers - upstream and downstream from the Baltic to the Black Sea - and how were they used?" (See figure 5.3).

Figure 5.4: The first dragging of "Krampmacken". (After Nylén 1986:Fig.7) Photo: Torsten Wigström

Whereas "Havørn" was strictly concerned with the methods of navigating on the river systems of Eastern Europe, Nylén was more concerned with the journey in its entirety. His principle theories were: only documented facts from the appropriate period and locale must be used; it is wrong to assume all Scandinavian boatbuilding techniques were similar; needs are created by marine technology and vice versa; and that only through practical experiments can one fully understand the surviving archaeological material (Nylén 1986:104). Ignoring his own suppositions, he constructed "Krampmacken" more along the lines of a post-Viking vessel (Crumlin-Pedersen in Nylén 1986:112). The main criticism being that the rigging is adopted from the Gotland picture stones which date to approximately the 8th century, yet the hull design is based on the Bulverket boat which has been dated to the 12th century (Crumlin-Pedersen in Nylén 1986:112). This said, there is still a great deal of data to be had from the sailing and dragging of this vessel on its way south.

Nylén used as much information obtained from local finds as possible, especially the iconographic data gleaned from the Gotland stones regarding rigging and crew size. His rigging consisted of plaited, unsewn basket woven sails with net-like sheeting which each of the crew members manipulated (Nylén 1986:106). He also made the observation that the mast and the yard must be able to stow in the ship in order to maximise the rowing capability of the vessel (Nylén 1986:106). Experiments were also conducted onboard "Krampmacken" regarding cooking within the vessel whilst underway, further exploring how the Viking Age mariners could have performed their daily tasks whilst enroute.

The biggest experiment for "Krampmacken" was the expedition eastward via the southernmost route used by the Vikings (the choice of this route was due primarily to the political situation in Eastern Europe during the early eighties). During the years 1980-83, the crew of Krampmacken experimented with various methods of rowing, sailing and portaging, finally deciding to use a simple wheel set-up for overland travel (see Figure 5.4) and the basket wove sail for sailing (Nylén 1986:106). In 1983, the ship travelled upstream 581 km in 34 days (see Figure 5.5). It had to be rowed 259.9 km and sailed 251.5 km. She also had to be hauled from the riverbank 21.5 km and dragged on land on a purpose-built wheeled construction for 48.1km (Nylén 1997: 2).

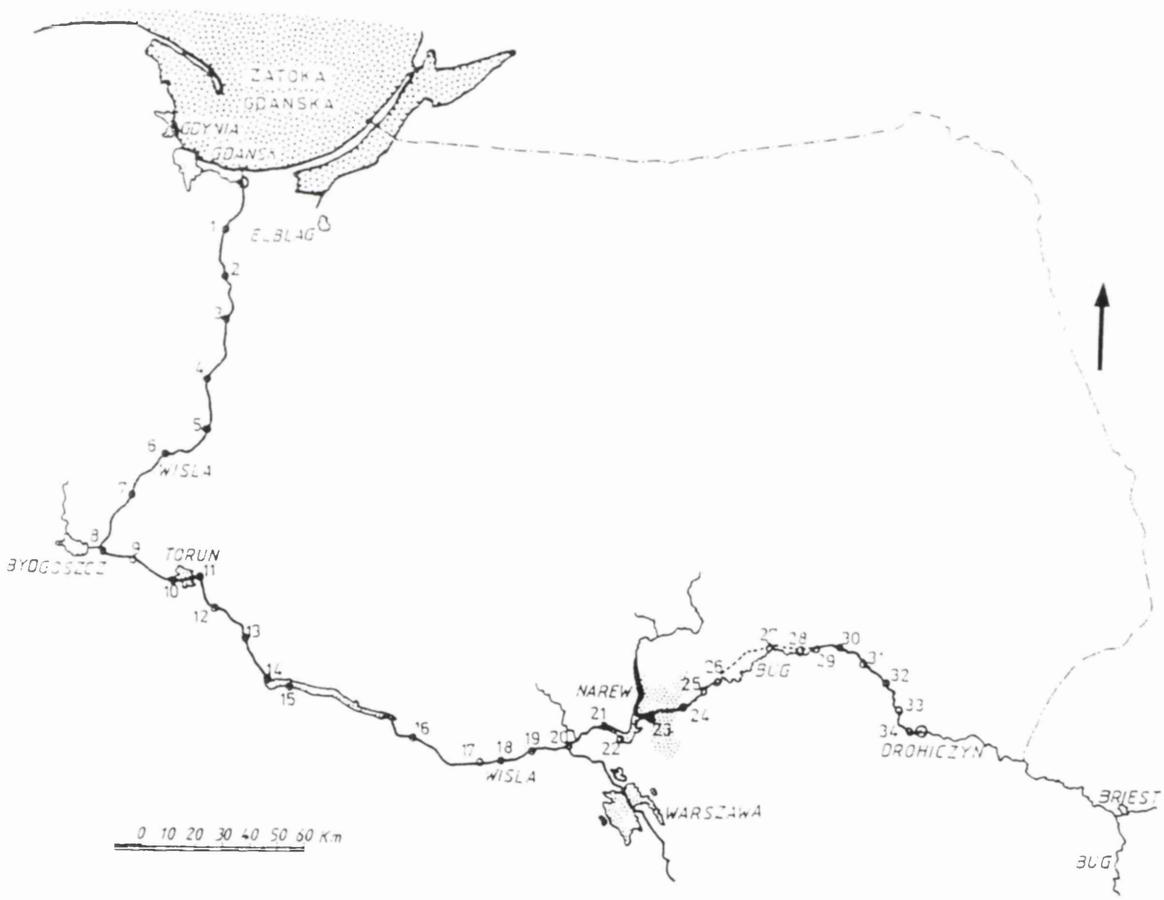


Figure 5.5: Map showing the "Krampmacken's" performed and planned trip to Mikligarthr. (After Nylén 1986:Fig.4)

Again in 1985, experiments were performed recreating the eastward movements of the Vikings. On this expedition the ship travelled 2726.5 km upstream and downstream, mostly downstream, in 131 days. She was rowed 1508.5 km, sailed 560 km and hauled from the riverbank 217 km and carried on land 441 km using this same wheeled construction (Nylén 1997:2). When using the basket woven sail at sea, it was impossible to hold on in a brisk wind and tacking was out of the question (see Figure 5.6) (Tøfta 1992: pers. comm.).

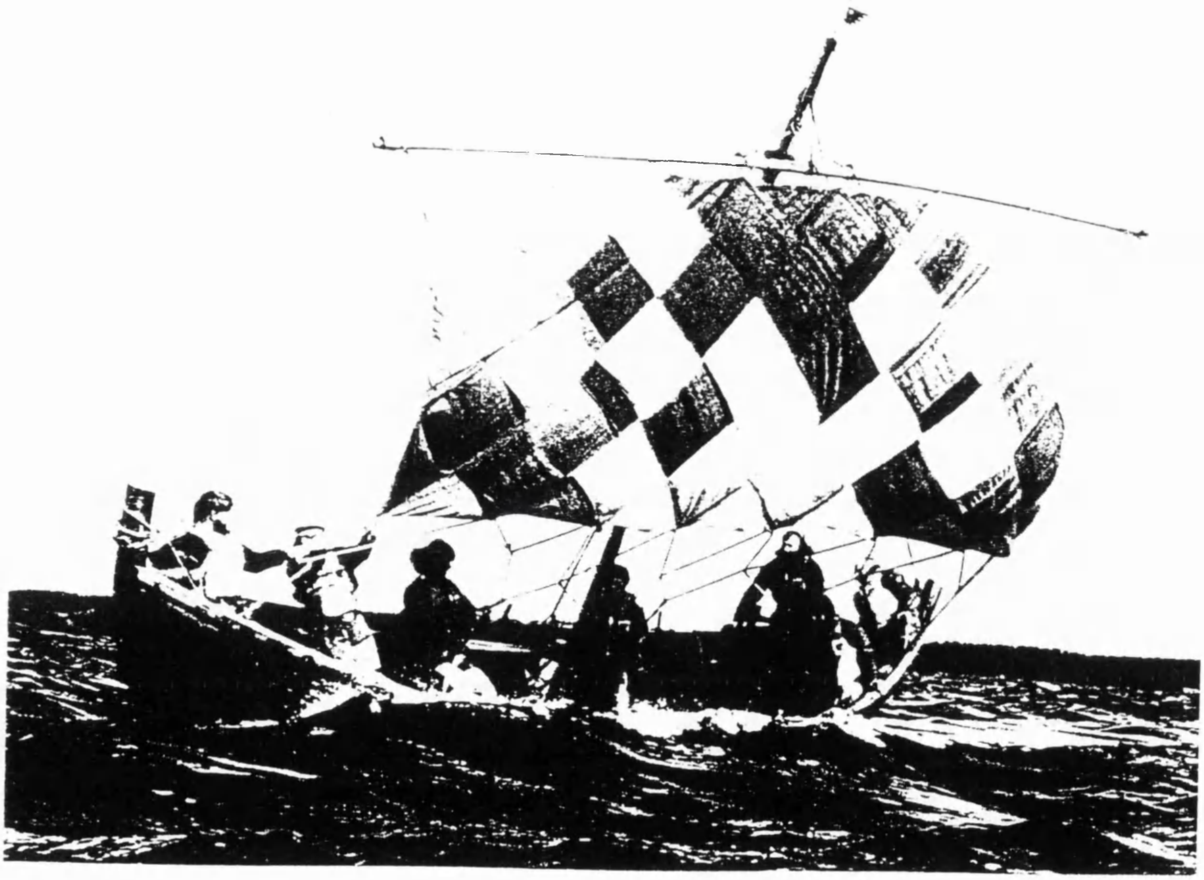


Figure 5.6: The "Krampmacken" using the woven sail. (After Nylén 1986:Fig.3)) Photo: Sören Hallgren

Nylén's experiment provided him with data upon which he was able to make the following conclusions: the Vikings probably travelled in convoys, because there was safety in numbers and it provided additional hands. For ballast, it was possible they carried iron trade items that could be traded down river (Nylén 1986:111). Even though many of the suppositions forwarded by Nylén can be called plausible at best, his research contributed to the state of knowledge regarding the Viking expansion eastward and provided information on portages which should prove valuable to future research.

5.4.5 "Helge Ask"

"Helge Ask" Specifications

length overall: 17.24m - length at waterline: 15.57m
width overall: 2.62m – width at waterline: 2.18m
mast height: 8.7m
beam: 1.8m
draught: 0.51m
freeboard: 0.62m
sail area: 46.5 m^2
construction material: planking in ash; oak and pine
weight: 1700Kg hull
ballast: 750Kg (stones)
year of construction: 1991 (by the Roskilde Wharf using replica Viking tools).

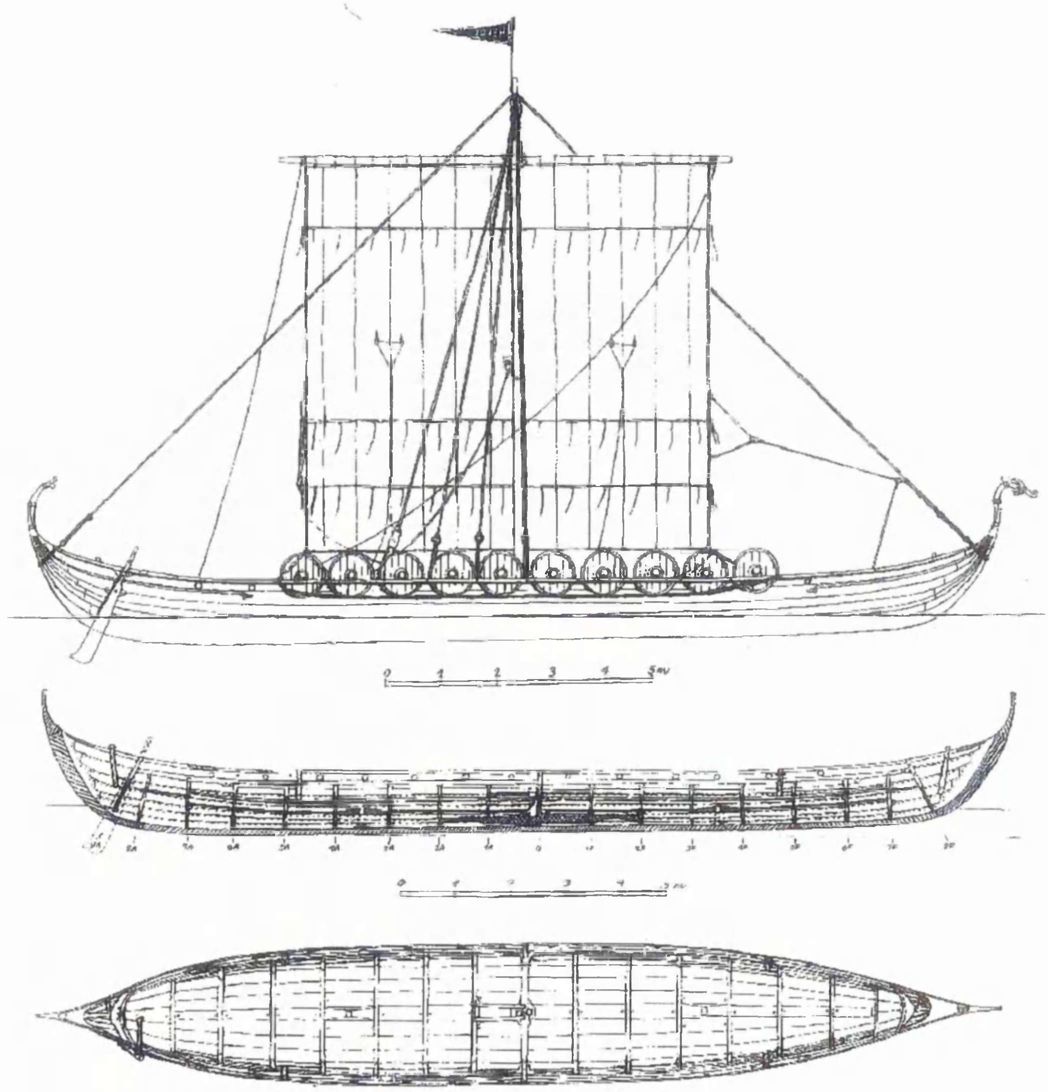


Figure 5.7: The "Helge Ask" measurement drawing. (After Hendricksen 1997:link from text)

"Helge Ask" a copy of Skuldelev 5 (see Figure 5.7) was involved in an archaeological experiment involving dragging this vessel over the narrow neck of land at Helgenæs in 1996. In Denmark, there is also the tradition of dragging boats across narrow strips of land to save distance, avoid difficult wind, avoid enemies or avoid dangerous currents (Vinner 1997:54,62,71,94,100; 1999: pers. comm.). As in other areas of the Viking World there are place-names that help locate places where this activity would have been performed. These sites are usually identified by the presence of the place-name 'drag' or some form thereof: Drag-, Draugh-, Drå-, Dræ-, Drej-, -dråt etc..., these place-names always occurring where two waterways are only separated by a narrow strip of land (Vinner 1997: 100).

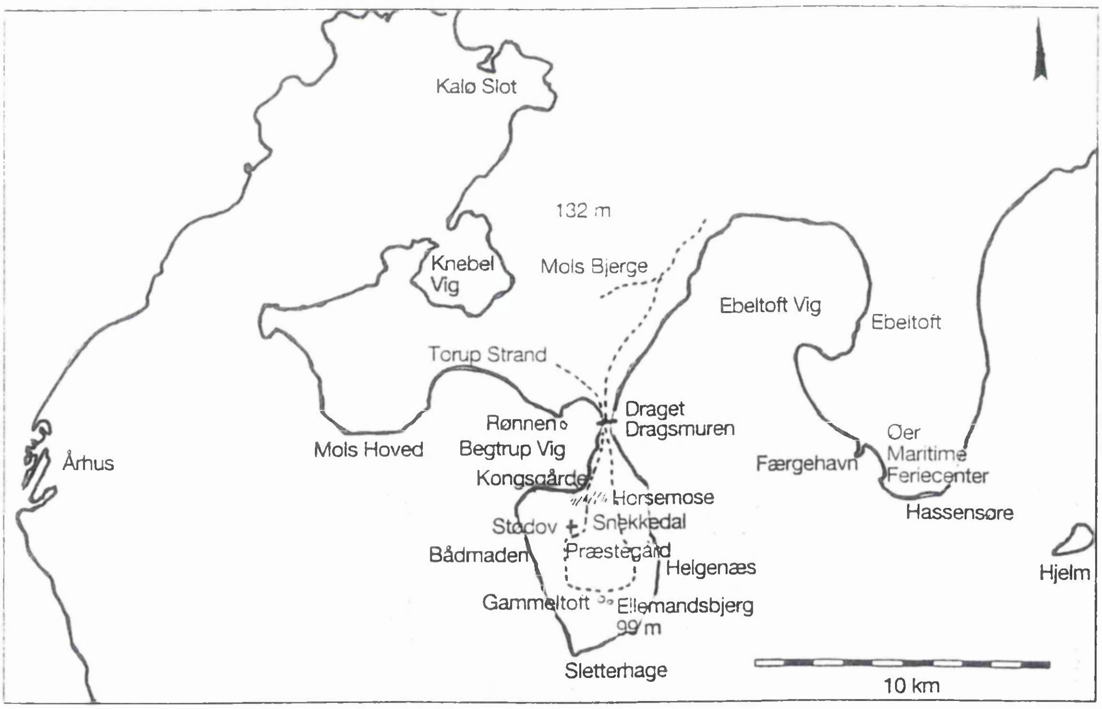


Figure 5.8: The strategic position of the portage site "Draget". (After Vinner 1997: 100)

The most interesting aspect of this experiment was the duality of its objectives, the first one being to see how long it would take for men to drag the vessel the 300m between waterways. The second part of the experiment involves the use of draught animals to drag the vessel back across the isthmus along the same track. Given the lightness of this vessel and the manpower generated by the 33-man crew, there was never any doubt that they would be able to perform the portage. In modern times this neck of land is 300m wide, during the Viking Age it is likely that it was 100m narrower (Vinner 1997: 100). The topographical variation bordering this neck isthmus is 132m high to the north and 99m to the south. According to Vinner (1997: 100), these hills and the 2.5m elevation of the Draget form a triangle that allows the portage site to be identified from a distance (see Figure 5.8).

The unofficial web page of the "Helge Ask" (Hendricksen 1997) provides a brief account of the experiment as does Max Vinner in "Med Vikingen som lods ved den danske kyst" (1997: 100-105). Upon landing at the narrowest section of the island of Helgenæs, which holds the place-name 'Draget' and 'Dragsmuren', all of the baggage, ballast and rigging were removed from the hull. This reduced her weight to less than 2000Kg. As a dragging surface, greased 'lunder', what I refer to as 'rollers' (even though they do not roll), of split wood were placed in a track-way for the ship to be dragged on. There were also wooden sided tracks constructed that would act as a guide to the keel. These were employed to set the vessel on track when the dragging commenced, but these seemed more of a hindrance than help when having to quickly shift the surface from aft to fore of the vessels. All of the 'rollers' and tracks were greased with sheep fat and then doused with water to make them as slippery as possible.

For this experiment a direct pulling method was used with a rope attached to the stem and a harness encircling the hull, without the aid of a block and tackle rigging. The low height of the gunwales of this vessel and the numerous oarholes allowed for the oars to be slotted through the vessel and used as handles. This technique allows for the crew lifting and pushing not only to get a significant amount of lift, but to also apply a good deal of force forward. With 33 men involved in the operation, 6 moving the rollers from the back to the front, they were able to drag "Helge Ask" the entire 300m over a maximum elevation of 2.5m in approximately 15-16 minutes, not including rest periods. A drag occurring on a site like this has proven to be an extremely efficient operation. The drag back across the site utilised the power of 4 Icelandic horses, as the local Jutland breed are quite large and were not available to the Vikings. This time 18 men were stationed around the vessel to lift and pull whilst 12 hands were required to move the 'rollers'. A difficulty encountered in this method is that having to hop the 'rollers' worries the horses. Therefore, the 'rollers' had to be quickly placed under the keel behind the horses as they passed. This operation was uncomplicated and it took only 12 minutes to complete the drag. A few days before this experiment, the "Helge Ask" sailed around the headland between the two waterways against the wind. This journey took 9 hours. The entirety of the portage experiment took under 3.5 hours. (See Figure 5.9)

This experiment was filmed by Danish Television (Provins 1996) and provides a good account of the activities involved in dragging a vessel. There are numerous aspects of this experiment that provide valuable information relating to the portage scenario. This experiment employed the use of a warship of shallow draught and light-weight. Their success demonstrates the ease in which one of these vessels could be manhandled across narrow strips of land. If travelling in a fleet of many vessels, the manpower available could make short work of hauling the entire fleet across. During this experiment the mast was lowered. In all likelihood, it would be possible to perform this experiment with the mast and rigging standing to lessen the already short time used to drag this boat across the isthmus. This possibility was experimented with using a much heavier, deeper draught vessel with success (see chapter 7: "Borgundknarren").

Figure 5.9: "Helge Ask" being dragged across the isthmus at Draget by Icelandic horses. (After Vinner 1997:102)

5.4.6 Havørn: The Eastward Expansion

"Havørn" Specifications:

length overall: 28 boat ells/ 15.6 m
mast height: 23 1/2 boat ells/ 13m
width (at the widest): 6 2/3 boat ells/ 3.7m
depth: 34 1/2 (old Norwegian)inch/ .95m
height (keel-stem): 6 1/3 boat ells/ 3.5m
sail area: 57 m^2
construction material: oak
year of construction: 1985

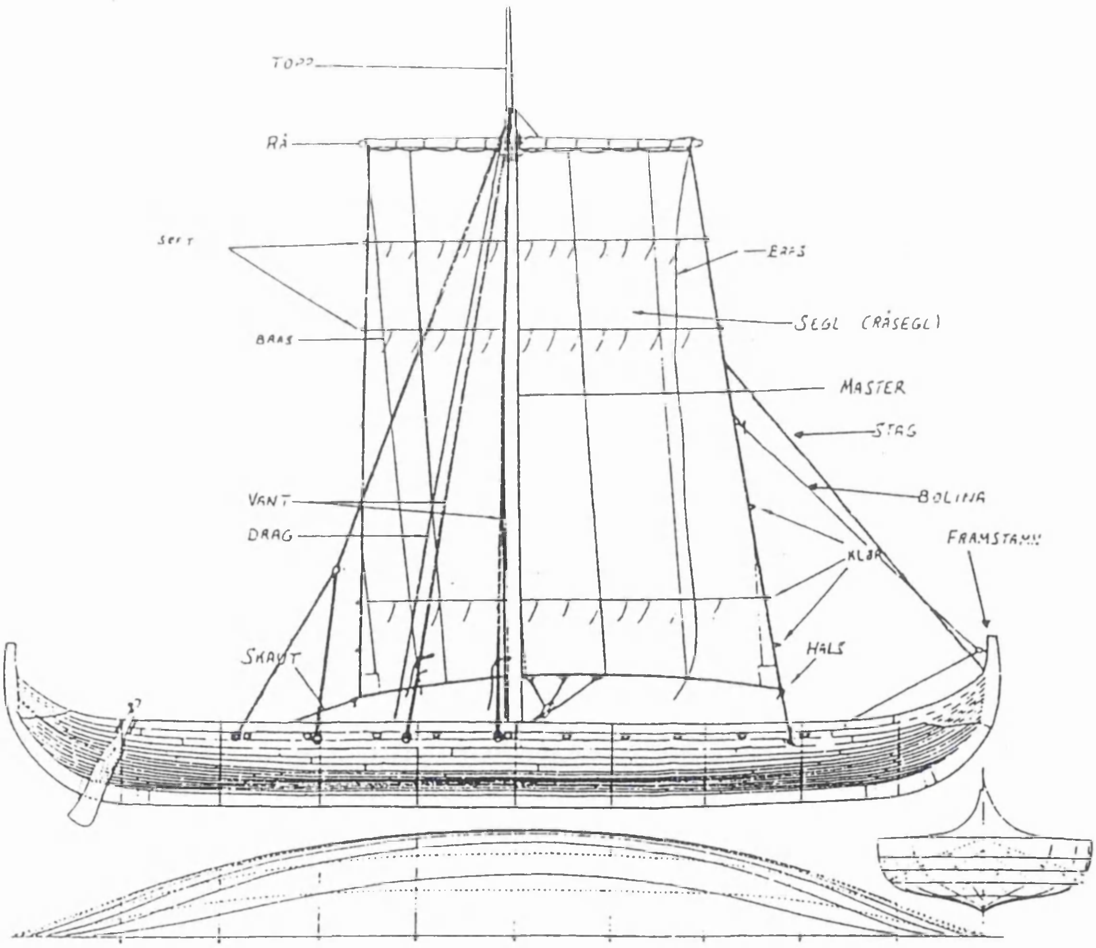


Figure 5.10: "Havorn" measurement drawing. (After Engoy 1992: 13)

Another experimental project based on the design of the Gokstad Ship was the Havørn expedition during the summer of 1992, re-enacting the Viking movement eastward. As I was a crewmember during this journey, it was possible to keep a detailed log of the expeditions progress and the different methods of propelling a large vessel upstream on shallow rivers, against rapids, and dragging the ship up the riverbanks. Because of the greater amount of detail and the first-hand observations that were made, this experiment serves to conclude this chapter on experimental archaeology.

As this journey was carried out with the interests of numerous parties such as "Natur og Ungdom" (the youth wing of the Norwegian Society for the Protection of the Environment), "Kystlaget Viken" (the coastal association Viken) and the owners of Havørn, strict adherence to the guidelines of an archaeological experiment was not possible. The goals of this expedition were to further knowledge about the contact between the Scandinavians, the Arabs and the Slavic people during the Viking Age. The specific aim of this experiment was to try different methods of conquering the river systems of Eastern Europe with a replica Viking Age vessel of this design (see Figure 5.10).

The Viking ship "Havørn" (Osprey) is constructed on the basis of drawings of the Gokstad ship. "Havørn" is scaled down to 2/3 length of the Gokstad ship and its height and beam adapted accordingly. The main reason for this was the practicalities in building and sailing this vessel with a minimal crew and limited funds. For the purposes of this experiment, this variation does not detract from the experience of navigating rivers and dragging a vessel of Viking Age design. "Havørn", is constructed in the manner of other Viking Age ship finds, clinker built with iron nails. As on the original ship, the planks are fastened in a different manner below the waterline than they are above it. Above the waterline the planks are fastened to the framing and beams with trenails (wooden nails); below the waterline they are lashed, presumably to make the hull more supple. The deck consists of loose floorboards resting on transverse beams. The space between the beams is called a 'rom' (room), and is just under a meter wide, according to the normal space between rowers. Due to its scaled down size "Havørn" has nine rooms and hence nine pairs of oars. "Havørn" was ballasted with 6 tonnes of round stone ballast brought from Norway the previous season. The placement of ballast must be carefully executed by an experienced member of the crew for numerous reasons, the foremost being that the proper draught and trim must be established for the vessel to sail safely and efficiently. It is also imperative that the ballast must be placed in a manner which does not allow it to shift whilst under sail in any conditions; yet it must be able to break free if the vessel should capsize. Modern methods were used in the construction of "Havørn", but this aspect should not affect the outcome of this experiment as it pertains more to the techniques used in dragging the completed hull across land and navigating upstream.

This phase of the trials originated in Helsinki, from where "Havørn" sailed across the Baltic to Tallinn, Estonia and then on to Riga, Latvia via the island of Muhu (see Figure 5.11). When under sail, the 'Gokstad' type vessels ride the waves in a manner much smoother than modern rigid vessels. This is mostly due to the clinker built construction that allows for the main structure to possess a small amount of flexibility. When riding the waves this looseness in the vessel has a tendency to twist and flex slightly providing a smoother sail by absorbing some of the wave action. In addition to providing a more comfortable journey, this action more than likely prolongs the life of the vessels.

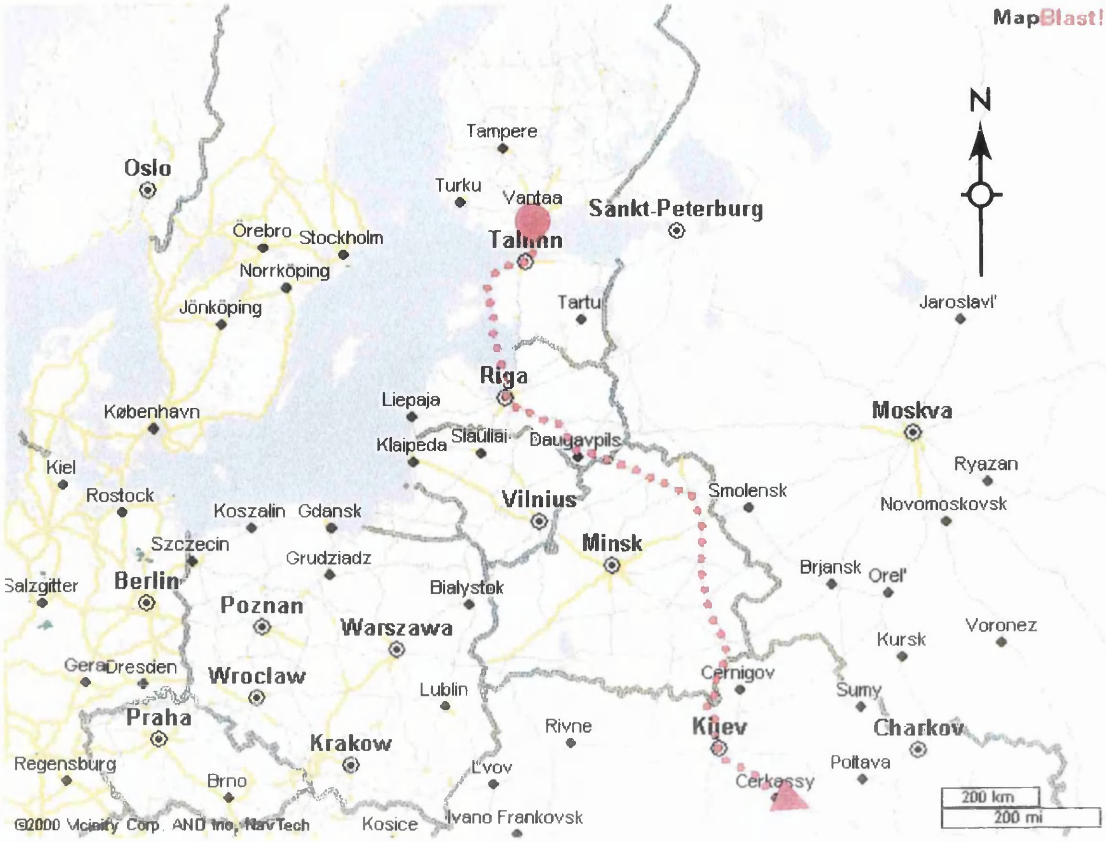


Figure 5.11: Map showing "Havørn's" route from Helsinki to Kiev, indicated by the red line. (Adapted from www.mabblast.com 2000)

The real experimentation began when the transition was made from open water of the Gulf of Riga to fighting against the current of a narrow, shallow river, the Western Dvina. Numerous obstacles presented themselves to our expedition which would not have existed during the Viking Age, such as high voltage cables, dams, cable ferries, and other products of an industrialised age. These are not issues to be examined in this thesis, as what is important is the understanding of the portage scenario and the methodologies involved in this activity.

5.4.6.1 Crossing the Baltic Sea

For this expedition we opted to use a standard centre-mounted compass for navigation to the chosen destinations. After numerous hours at the helm of "Havørn", one quickly learns that the plotted course and the actual course had to differ in order to allow the vessel to react to the sea in the way she was meant to. As in the Viking Age, the wind and swell provided not only the quickest course, but by far the most comfortable. As coastal navigation was widely practised throughout history, we allowed for the variations that navigating in this manner would produce. This extension of coastal navigation to apply to offshore crossings is a common theory when observing the evolution of seamanship and thus a natural progression during the movements during the Viking Age (Christensen: 1999: pers. comm.).

5.4.6.2 Navigating the Western Dvina

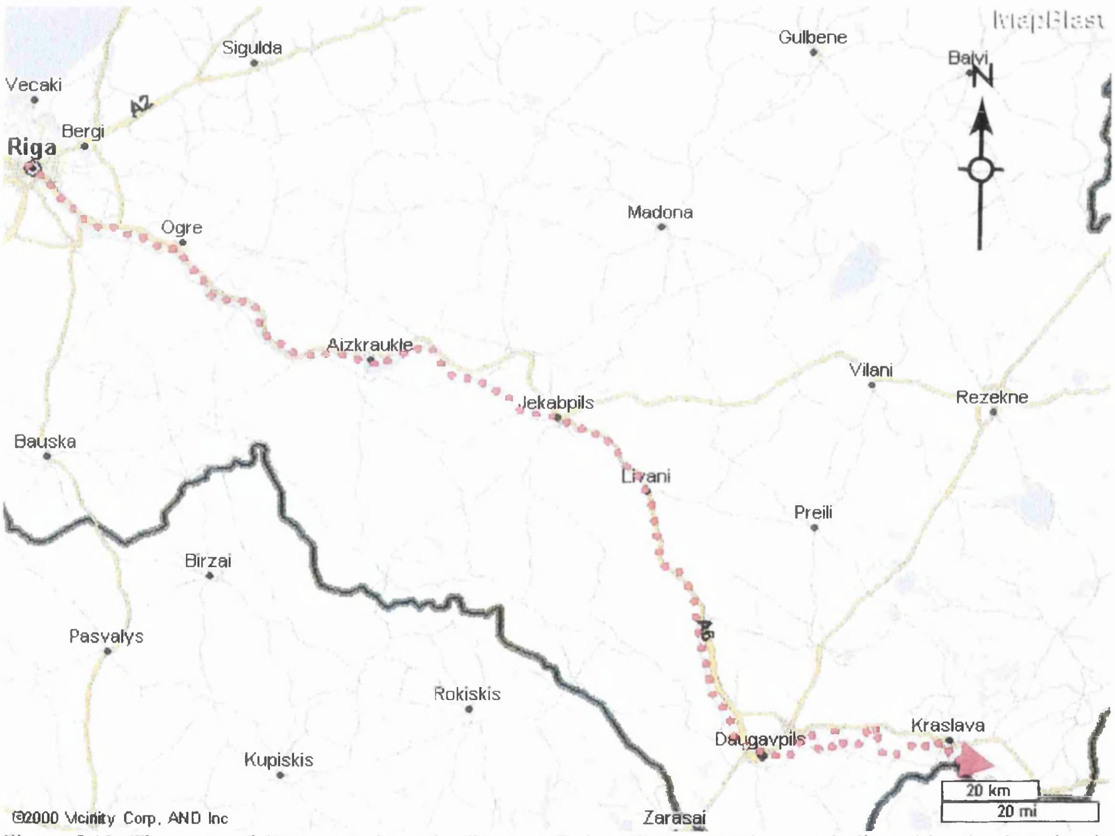


Figure 5.12: The route of "Havørn" along the Western Dvina (Daugava) River, as indicated by the dotted red line. (Adapted from www.mapblast.com 2000)

Upon arrival in Riga, the first dilemma to present itself was whether or not to retain the round stone ballast, or jettison it in order to raise our draught and lighten the load for rowing. After much deliberation the decision was made to off load the ballast.

This decision was based upon the amount of rowing which lay ahead and the extra weight it would eliminate from the portage scenario. For navigating a complex river system this seems to be the most likely option (see Figure 5.12). Albeit this limits your sailing capabilities by increasing the vessels freeboard and reducing the draught, thus making her more likely to heel over in a slight wind. But the advantages gained by reducing weight and increasing rowing performance more than outweighs the 6 tonnes of round stone ballast left behind. A procedure which the Vikings would have had to been able to execute efficiently would be the raising and lowering of the mast. This can be an important issue when dragginga vessel of considerable size, as it raises the centre of gravity and necessitates additional manpower to stabilise it as well as being a hazard. Having dragged vessels of different sizes and weights, with masts (see chapter 7) and without, the extra effort needed to balance a vessel while on a thin keel can be easily avoided by unstepping the mast. The evidence that we have from the mastfish from the Gokstad ship, thus replicated in Havørn, allows for the mast to be raised and lowered with considerable ease when the crew have trained for the task.

Archaeological research still has yet to discover the proper mast height and rigging configuration for the various types of ships in use at the time. With this in mind, the rigging configuration was adapted from the traditional fishing boats of the West Coast of Norway, the fembøring (Godal 1986:194-207). This vessel is held to be the product of Viking ship evolution as the vessels became more geographically and task specialised. The crew of "Havørn" could efficiently raise and lower the mast at will, but the mast she was equipped with could not be stored entirely inside the hull; this made rowing difficult at times. This observation has implications towards possible rigging configurations for ships attempting journeys involving primarily rowing. Once the mast had been lowered, it was possible to erect a "Krampmacken" type sail using oars and a small piece of sailcloth. This improvisation proved valuable when rowing with a light wind by enabling the crew to maximise their efforts and rest often (see Figure 5.13).

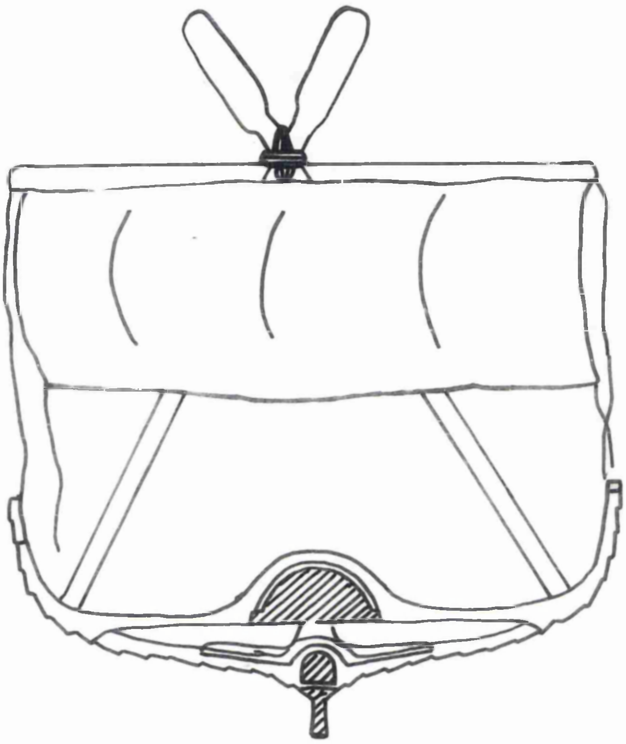


Figure 5.13: Rough drawing of the improvised "Krampmacken" type sail used on Havorn. Drawing: J.R. Birks

Another serendipitous discovery enabled the helmsman to steer whether using the "Krampmacken" type sail or under oar power or both. This improvisation was necessitated within the first 10 miles of river travel, when the rudder (which draws over 1.5m) met an immovable object whilst under the power of the small sail. The force produced by this simple rigging was enough to split the main shaft of the steering oar. This incident caused "Havørn" to become fast on the riverbed. It took a great deal of poling, rowing, backing and shifting of live ballast (the crew) to dislodge her and head for the relative safety of deeper water. From this it was surmised that in order to navigate the shallow waters of rivers it would be necessary to modify the steering mechanism. Our solution to this problem was to remove the thick tiller from the main rudder, making it possible to pivot the rudder on the axis (boss) where it is attached to the hull and improvise a tiller which would allow for control when both rowing and sailing, with a draught of half the original configuration. This modification proved more and more advantageous as we continued upriver (see Figure 5.14).

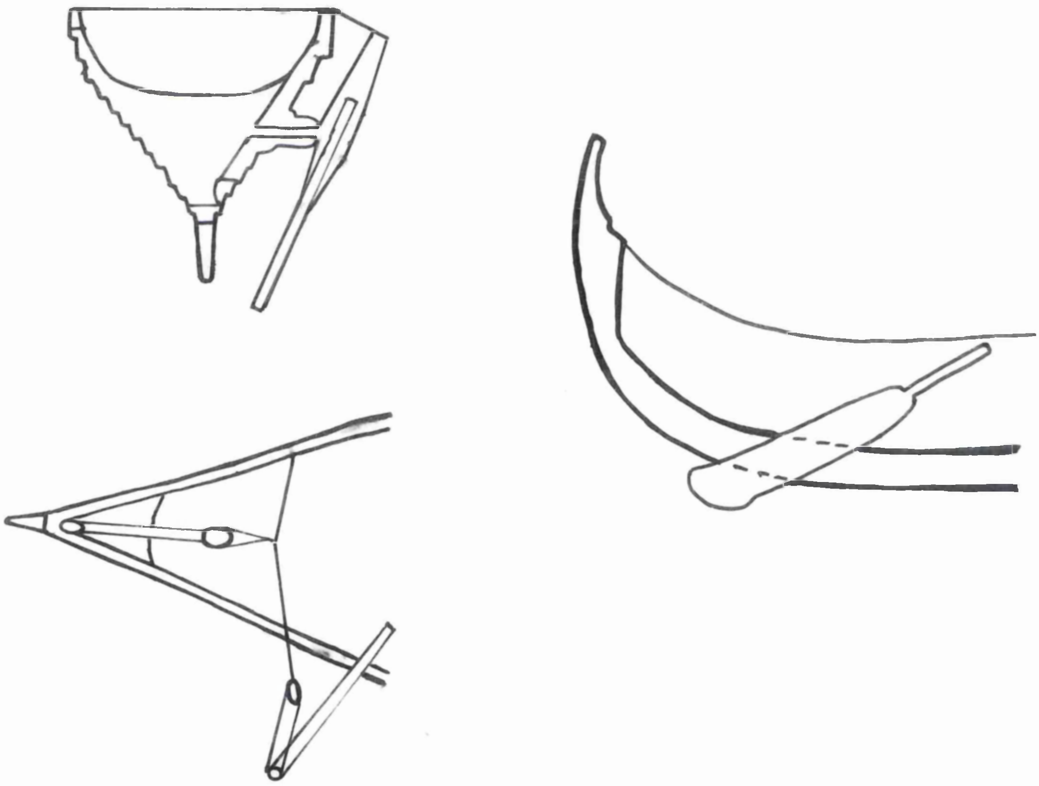


Figure 5.14: These drawings show the different views of the modifications made to "Havorn's" steering oar for river (shallow water) navigation. Drawing: J.R. Birks

With the amount of rowing involved in such an expedition, the possibility existed to try many different alternatives and find which proved most efficient and comfortable. Instead of static benches, each crew member had their own personal chest in which they would not only store their gear, but also utilise as a rowing seat as this vessel design lacked thwarts upon which to sit. The flexibility of rowing from an unfixed seat proved invaluable when rowing for extended periods. They could be positioned as one would assume, benchlike; or could be positioned lengthways, parallel to the gunwales, and mounted in the same manner as a horse. Both of these positions could be used simultaneously by different oarsmen thus providing the most comfortable option for the individual. The flexibility of this option allowed for many different onboard activities to be carried out quickly and efficiently. While sailing, this allowed for the deck to be cleared so that the crew could easily manoeuvre the rigging. While rowing, it allowed for each individual to place them in the position that was most productive and comfortable. It also enabled the crew to quickly reverse themselves in order to make a hasty departure from a landing. This could be very advantageous, if a quick getaway was necessary. It is also important to have the ability to clear areas of the deck to access the rooms for taking on or offloading cargo, getting supplies, room for sleeping or food preparation and to prepare for battle.

The most important aspects of this experiment were related to travelling against a strong current and dragginga vessel. A major hindrance to our trials was the presence of three large dams that not only completely blocked the river, but also limited to flow of the river below them to a depth that would prove impassable. It was in these circumstances where the integrity of the experiment as a complete journey was compromised. In order to facilitate passage and maintain our schedule, these obstacles were circumvented by lifting the vessel by means of a crane with a harness onto a lorry to be taken to where we could pass. On the large scale this can be seen as a failure; but on a small scale, trials of river navigation and dragging our activities would still provide a valuable testing ground. The positive aspect of this necessity was the practice gained in quickly loading and unloading the entire contents of the vessel. In the shallows, continuously running aground made necessary the construction of a depth sounding device. As we are travelling at a fairly slow rate in shallow water the best option for this task proved to be an oar handle with depth marks carved into it. As the keel of "Havørn" now only drew about 70cm with the steering oar drawing approx. 90cm at its maximum extension in its modified mounting; it was possible for a crew member to stand in the stem and take soundings at regular intervals, and when necessary use the modified oar to push us away from hazards.

The first real opportunity to experiment with navigating against a strong current amidst numerous rocks and rapids occurred just below Jekabpils, Latvia (see Figure 5.12). Once this section of the river was reached forward movement by oar propulsion became nigh impossible (at least for extended periods of time). The current ran a steady 5+ knots forcing us to devise a different method of propelling "Havørn" upstream. With the equipment available to us onboard, a system had to be devised to manoeuvre the vessel up these sections of the river as efficiently as possible. The practice of hauling the ship from the riverbank similar to the way in which a canal barge is driven seemed most logical. The highest priority in these circumstances was the location of a clear channel. This could be determined by a combination of experience in navigating on rivers (watching eddies) and the crewmember at the bow directing according to his soundings and observations. When the river was shallow enough (less than 1m) it was necessary to send a crewmember wading ahead of the vessel with a rope to guide her through the dangerous sections.

Yet, if the current was too strong this could prove dangerous to both the crew and the vessel. Additionally, if a deep channel was located, whoever identified it risked the chance of being swept away.

It is worth mentioning here that there are numerous ways to get a 15.6m long Viking Ship stuck in a shallow river. Each of these different forms of getting stuck spawned a procedure which could be quickly (usually) instigated and allow passage or at least freedom from the obstruction. Sandbars proved a common feature in the riverbeds of both the Western Dvina and the Dneiper. If the depth of the sandbar was sounded at more than ca. 60 cm, it was possible to position a half crew of oarsmen aft and have the remainder of the crew waiting amongst them. Once the sandbar was contacted, the oarsmen would row at full pace while the crew ran to the bow, thus forcing the vessel to pivot on the keel and rock over the obstacle. This technique had to be employed carefully as not to break the ships back. In cases where the sandbar was shallower than 60 cm, it would be necessary for the majority of the crew to go overboard and position themselves around the vessel and lift with a forward momentum. This method also had to be adjusted to the strength of the current. If the current ran strong a greater number of crewmembers were required to remain onboard to control the vessel once she was free. The reduction in draught due to decreased ballast would allow for enough clearance and when coupled with the ease of lifting a vessel with the natural buoyancy provided by the water, the obstacle could be overcome. When encountering rocky terrain it was of utmost importance to keep the keel parallel with the current. If the vessel were to impact an obstacle broadside the pressure of the current could easily cause a catastrophic failure of the hull, therefore this was to be avoided at all costs. After much experimentation, it was decided that the best way to battle the current was to carry an anchor upstream (on land) and place it in the river in a straight line to where you want to go. This manoeuvre has to be carried out using two anchors, one to secure the vessel whilst the other is brought to the next anchorage. In doing so it is possible to alternate the anchors so that a fairly regular procedure can be followed. Point to point navigation was required during this exercise to minimise the swinging of the vessel with the current into obstacles. To reduce the swinging effect guidelines are manned on at least one of the riverbanks, preferably both, to brace the vessel. In order to make the forward progress a few of the strongest crewmembers would stay onboard and pull the boat to the anchor. It is important to note that during this procedure the framing timber in the bow of the vessel, to which the anchor line was secured, cracked and needed to be replaced.

For our purposes, this solution to the problem of navigating against a strong current in rocky waters proved to be the best, although this is not to say that another more efficient method does not exist or was not practised in the Viking Age. As in the case of all archaeological experiments: *possible therefore correct* cannot be applied. The further upriver the vessel travelled the quicker and stronger the current became, thus forcing the decision to be made to drag the vessel out. If indeed it is possible to make headway in an efficient manner against a current such as this, we were unable to realise it. This may be because of the relatively small size of our crew (about 15 at this time), or it may just be due to lack of experience and knowledge in this circumstance.

It was in this location that the decision was made to drag "Havørn" out of the river and to a point where we could meet a lorry to transport the vessel to a location above the next dam. Using the aforementioned procedures, the ship was pulled to a suitable location for dragging her out, as identified by a short reconnaissance mission. Dragging also provided its share of difficulties. Once a location was chosen based on topography and the availability of trees suitable for use as 'rollers', the ship had to be prepared for portaging. Ideally, the gradient should be no steeper than 5:1; the slope of the riverbank chosen for our drag could is estimated to be less than 8:1. It is also important in this experiment to have access to a fair amount of 'rollers' with a maximum diameter of 20cm, preferably a bit thinner.

Figure 5.15: Clearing the landing area and preparing 'rollers' for the first dragging of "Havorn".
Photo: Author

The area chosen for the dragging not only had a very gradual slope, but the clearing which needed to be done provided us with the necessary timber for the 'rollers' (see Figure 5.15). Contrary to popular belief, we found that these 'rollers' did not in fact roll. The main reason for the ease of effort in dragging was the reduction of surface area afforded by the 'rollers' and a reduction in friction made possible by the removal of the bark thus exposing the bare wood saturated with sap. This effect can also be produced by smearing the 'rollers' with some sort of grease such as sheep fat (see "Helge Ask" above) or fish oil (see "Borgundknarren", chapter 7). In order to support the keel sufficiently and still provide as frictionless a surface as possible, spacing the 'rollers' at the roughly same distance apart as the internal framing (1 room) is the optimal position, a distance easily judged by noting the distance between the oar holes. This spacing is dependent on numerous factors. The length and weight of the vessel being the primary consideration with the slope gradient and composition also being important influences on this spacing. In the case of "Havørn" this worked out to be just under a metre. This may seem a bit much to the outside observer, but one has to remember that these vessels are constructed to have a bit of flexibility when supported by water, therefore when on land any precautions which can be taken to support the vessel is necessary. These same logs can also be used to provide shoring for the vessel during the preparations for the drag.

Figure 5.16: Aligning "Havorn" for the drag and ensuring that the rigging is correct. Photo: Author

While the timber was being prepared, the remainder of the crew cleared the riverbank of all brush and did their best to flatten any rough spots. It was also necessary to move some of the stones from the riverbed extending to the landing place. This allowed for as smooth a transition as possible from water to land (see Figure 5.16).

Figure 5.17: Trying to drag the empty hull before the lifters were in position. Photo: Author

With all the equipment and rigging removed, all that remained of "Havørn" was an empty hull. The removed rigging had to be reconfigured into a system for attaching lines to the vessel which would provide the most efficient means of dragging her up and out (see Figure 5.17). This was accomplished by attaching a line fastened to a small (ca. 4cm diameter) hole in the fore section of the keel. This line was attached to a double block and tackle that would increase the dragging force of the small crew. In an environment such as this numerous sturdy trees were available for use as anchor points for the rigging. The procedure involved in the initial approach to the dragging site is crucial to the success of the operation. It is necessary to position the majority of the crew at regular intervals around the hull so lift and stabilise her while the remainder of the crew manned the dragging lines. Depending on the landing, it may be necessary to have some oarsmen remain onboard to provide propulsion by manning the aft oars, these individuals would soon enough come to the aid of the rest of the crew. For this gradient (approx. 8:1) it was possible to have fewer crewmembers on the dragging lines for the initial landing.

Figure 5.18: Dragging "Havorn" out of the rapids towards the portage site. Photo: Author

The crewmembers supporting and lifting the vessel had to do so in a specific manner to avoid injury and maintain forward momentum. The prescribed method of doing this is to squat with one's back to the hull so that the back remains straight and all of the lifting power is in the thighs. This not only provides the most power, but helps to avoid injuries to the back. In order to get this system to work timing is of the utmost importance (see Figure 5.18). One of the crew members who regularly sails on the traditional working craft of Western Norway used a shanty very similar to one that would be used when manning a windlass. This steady rhythm allows for both the dragging and the lifting to occur simultaneously. When lifting, a minor forward lean would get the vessel moving. The crew are in no way trying to actually pick up the vessel. Their main purpose is to reduce the friction and stabilise the hull so she does not heel over. It is also very important to have some crewmembers shifting the 'rollers' from behind the vessel to under the bow fast enough that the forward momentum of the ship is not compromised. In this experiment with "Havørn" an oar was positioned in an oarhole and could be used as a lever to stabilise the vessel. It is important to note that some 'rollers' were positioned under the vessel as she approached the bank of the river so that the keel never had the chance to make contact with the riverbed. Had this happened, the resulting friction would have made the dragging significantly more difficult. This was a lesson which had to be relearned during the dragging experiment using the knarr replica "Borgundknarren", for when the tide went out the aft portion of her keel held fast in the gravel bottom (see chapter 7). During the actual dragging of "Havørn" many locals came along to watch and manned the dragging line once she was out of the river. This aspect of the experiment is one that seems to be very common and in certain scenarios is necessary in the dragging operation. More than likely, Viking Age mariners would travel in fleets or convoys thus providing a considerable supply of manpower. Having this manpower available allows for numerous scenarios to be examined. As in the case of the "Borgundknarren" (see below), local manpower was necessary to make the experiment possible. The first dragging experiment was only to test different methods of moving the ship out of the water and up slope. After about 200 metres had been traversed the experiment was concluded upon arrival at the road where an articulated lorry which would transport the vessel upriver past the dam was waiting. The duration of this first dragging is not important in its analysis, as much of the time was spent contemplating methods and then instructing crewmembers on their assigned tasks.

The distance covered by this portage was quite notable, as there were three dams that needed to be passed. This was necessary if the schedule was to be maintained. A reconnaissance mission was made to scout out locations for the re-launching. The area chosen was a grassy field with a grade of 8:1 gradually increasing to approx. 5:1 at the riverbank. When "Havørn" first began to descend the slope it was slow going, but as the grade increased so did her speed. Before the relaunching began, 'rollers' were positioned along the entire route that "Havørn" was to pass. When dragging the ship down the slope, maintaining balance on the keel was of utmost importance as an accident here could possibly end this expedition for the time being. As she increased her speed down the gradient she began to heel over and a crewmember had to jump onto the gunwale to bring her back into check. In doing this he was dragged into the river with the boat, but had accomplished the goal of keeping her upright. A valuable lesson was learned here involving controlling the speed of the vessel both when dragging up or down a gradient. This episode showed the necessity of having a line attached to the stern that could either be manhandled as a brake, or attached to a static object such as a rock or tree that could be used as a belay point.

This technique proved necessary when dragging the "Borgundknarren" over Mavis Grind in Shetland.

Once "Havørn" was given a secure mooring she had to be loaded and rigged for the next stage of the journey. For ballast, stones from the riverbed were laid in the hull. These were flat, sharp stones from the Western Dvina riverbed; wholly different from the round stone ballast loaded at the start of the journey more than a month earlier. It did not take long to load all of the equipment and provisions back into the vessel as the crew were becoming well practised at this. The decision was also made to step the mast into place so the option of using the full sail was immediately available. This differed from the earlier section of the river as the full mast lay on deck and the improvised "Krampmacken" type rig was erected when needed. The crew had to constantly sound the depths, as well as guide the vessel through a few deeper channels to allow passage. The opportunity arose to hoist sail with a following wind, but along with the wind came a torrential rain. Normally this would be a welcome break from rowing, but as she rounded a bend, a cable ferry was observed not too far in the distance. As the sail was lowered and "Havørn" closed the gap, low power cables were spotted. This brought on a emergency situation, as the mast was quite a bit higher than these cables. Granted, this was a modern hazard which dictated that the full mast was probably not a favourable option when navigating a river which at times was quite narrow and shallow, and had not been considered navigable from the sea within the recent memory. It is more than likely that natural hazards would have also prevented the Viking Age mariner from having a mast of great height constantly rigged during river travel. It is also possible that a vessel plying the waterways of Eastern Europe during the Viking Age would have been of smaller dimensions and possibly purpose built, as supposed with the "Krampmacken" experiment and supported by Westerdahl (1997: pers.comm.) (Shepard 1974:13).

The journey continued with the vessel encountering conditions similar to those mentioned above until a section of the river was encountered that was characterised by an extremely fast current which 14 oarsmen could not overcome. As it would be nigh impossible to send someone out into the current to set an anchor as performed earlier, a new solution to this dilemma had to be devised. This section of the river had a few bends in it, so one idea to be tested involved taking a line upriver to a point on the bank of the river that lay directly in front of the chosen course. This line would then be fastened to a static object such as a rock or a tree, as was the case here. Again, the line would be hauled in by crew onboard the ship. This was done for numerous reasons, the first being that the crew onboard could still steer the ship to some extent using the oars and the steering oar. Secondly, this allowed the vessel to be quickly and easily secured to stop any possible slipping back with the current when the crew need a rest. Lastly, if an emergency situation arose the crew would be in the right place to deal with it. This method of dragging the ship upriver proved effective in an area that was impossible to row against. As luck would have it, an emergency situation did develop when the current caused "Havørn" to drift onto a large boulder. The only way to get her off the rock was to have another line on shore as close to the ship as possible and try and pull her off. This worked initially, but caused her to get lodged on another boulder as she came closer to the riverbank. Eventually the ship came into the shallows where the crew was able to use the squat-lifting technique to manoeuvre "Havørn" to a safe mooring. After a good rest it was decided that the best way, if not the only way, to make reasonable progress against rapids was the method described earlier of setting an anchor in the river and hauling on this line whilst a line to the shore controlled lateral movement. After 2 hours of hauling lines the 200m of rapids were conquered. Navigating a vessel against a strong current, requires roughly the same effort as dragging the vessel on land. Therefore, the idea of portaging around certain sets of rapids becomes a viable alternative to hauling against the current. Especially if the current is quite extreme and contains numerous obstacles and hazards and the course for dragging the boat on land has a minimal rise and fairly clear pathway.

Figure 5.19: Dragging "Havorn" out of the Western Dvina to be portaged to the Dneiper. Photo: Author

After dragging "Havørn" up a track, the portage over to the Dneiper was again accomplished with a crane and lorry (see Figure 5.19). Once "Havørn" was launched into the Dneiper the trip downstream was fairly routine. Procedures for navigating over sandbars had been developed on the Western Dvina and proved the most efficient method of overcoming these obstacles. The most difficult aspect of travelling down the Dneiper was the constant meandering of the river as it snaked its way across the countryside. The banks of the river were approximately 3m high where the river had cut its current path. This limited the visibility to only the river. If one went aloft the seemingly endless curves of the river could be seen for miles.

The "Havørn" expedition provided practical experience in river navigation and the dragging of a vessel not far removed from those crewed by the Vikings. It is important to note that the practical experience in dragging a vessel provides one with the knowledge to be able to better assess a possible portage/dragging site when it is encountered almost anywhere in the world. Familiarity with the construction of the vessels and their sailing and rowing characteristics are vital to any investigation into aspects of navigating within the Norse maritime landscape where practical applications of maritime technology are necessary for the interpretation of the site. The preceding information on the portage/dragging scenario may or may not be how the Vikings did it; but since the exact procedures are unknown, the experimentation with many methods to find the one most likely can provide *possible* answers.

5.5 Conclusion

The above accounts of experiments involving Viking Age vessels have provided researchers in the field of nautical and maritime archaeology with an abundance of data that could not be extrapolated from the archaeological material alone. This is particularly true in relation to the study of portaging/dragging. The information obtained from these experiments has provided a working basis upon which to assess the viability of different portage scenarios and the ways in which the various types of Viking Age vessels could be dragged. This allows possible portage sites to be evaluated on their feasibility for use as a portage or dragging site in relation to different vessel types and their use in the navigation of the micro and macro-topographical maritime landscape. Also, as portaging can take form as unloading cargo and crew for carriage overland to another vessel the scenarios involved in this activity should also be further investigated. Experimental archaeology is not an exact study, but by experimenting with all types of vessels and the methodologies which would be required to shift them over various topographical profiles, it also allows for some possibilities to be either eliminated or re-evaluated, and others to be accepted as possibilities, maybe not as definite, but as possible!

This information, when examined in conjunction with archaeological data, place-names, and an analysis of maritime routes can help one to better understand the navigation of the Vikings and others. As exemplified in the "Helge Ask" experiment (see above), even a short sailing distance can take significantly longer than the entire dragging process. In addition to shortening routes in relation to both time and distance, some portages provide the only way to access and navigate certain areas, as demonstrated in both the "Havørn" and "Krampmacken" expeditions through Eastern Europe. All of the portage experiments reviewed concentrated on portages on a macro-topographical scale. There is also the possibility of portages being executed on a micro-topographical scale by much smaller vessels being transported between lochs and rivers. Both types of situations combine to formulate the portage scenario in the maritime cultural landscape of the Viking Age. Further investigations into this activity need to be performed with the appropriate vessels i.e.; Group 1 and 2 vessels as defined in chapter 4. From these experiments it may be possible to reveal new navigational routes or assess the economic cost and benefit of traversing in the micro-topographical landscape. Chapter 7 of this thesis uses the information presented in the next chapter to carry out another archaeological experiment in the macro-topographical navigation of the maritime landscape. The basis of the next chapter is to take all of the information discussed so far and apply it to the maritime landscape of Scotland and the Isles during the Viking Age. This allows for many sites that fit the criterion to be evaluated on their individual merits and how they fit into the navigational routes of the Vikings in Scotland.

6. Portages in the Norse Maritime Landscape of Scotland and the Isles

6.1 Introduction

As a maritime culture that used portages as a basic navigational practice in their homeland, it would be unbelievable that the Vikings didn't practice it to a great extent on a coastline not unlike their own. This theory is evident throughout continental Europe where it allowed for inroads to be made that would have been impossible otherwise. The coastal regions of Western Scotland and the Northern Isles are similar to that of western Norway, providing circumstances in which portaging would be the most advantageous method of navigating certain regions. In *Scandinavian Scotland* (1987:24-25), Barbara Crawford discusses some of the evidence for the portages in Scotland and the Isles, presenting a few examples of possible portage sites and some of the reasons that they might have been used. After an in-depth analysis of all the components which make up the portage scenario, it is hard to believe that the Viking mariners would have done otherwise. This previously little researched aspect of navigation is an extremely important aspect of the maritime cultural landscape in Scotland and the Isles, if not the world over. It seems odd that such an intrinsic aspect of navigation could be neglected when analysing the routes that the Vikings, and most likely their predecessors and descendants in Scotland and the Isles, followed. With this in mind, a critical review of known portages and possible portage sites would allow a criterion based upon these data to aid in the identification of other areas where portaging activities may have taken place. This information could aid in a reassessment of the navigational practices and routes the Vikings followed not only during their initial inroads into Scotland and the Isles, but also the routes followed as they became familiar with the maritime landscape, and shortcuts that may have developed. The identification of portages by the Vikings could have occurred by various methods. The most likely method would be through local knowledge that would be passed on after an area had been explored and navigated successfully by other Viking Age mariners. From the sea, portages can be identified by their profile in the landscape. They can be identified as an inverted triangle of sky or may appear as separate islands from a distance. Thus reinforcing the notion that some of the portages were seen merely as continuations of a navigational route and not as a deviation from a course. Many of these portages were probably in use before the Viking Age. Identifying the sites that fall into this category would prove difficult because the impression that the Vikings left in Scotland in the Isles tends to override any of this data. Once the Viking Age was over (1250 AD for the purposes of this thesis) the local cultures continued with both the maritime traditions and technologies imported from Scandinavia. Therefore it would only seem natural for them to continue using the navigational routes and practices as well. Cheape (1984:210) reinforces the importance of portaging as a primary aspect of the navigation of Scotland and the Isles by writing: "The idea of carrying boats or drawing ships across dry land and between lochs or arms of the sea may now seem a remote and unlikely expedient, even a preposterous one. In past generations it was a vital one, when a dangerous sea passage could be avoided and an enemy surprised". As this thesis reveals, this is one of the most basic activities involved in the portage scenario.

As expected, place-name studies and primary documents are valuable resources for locating and identifying possible portage scenarios in Scotland and the Isles. Like Norway, the Old Norse place-name [*eið* - isthmus] provides a starting point for the initial identification of a potential portage site. This place-name is predominantly located in Shetland and Orkney, yet does occasionally appear in one form or another in the Western Isles or Mainland Scotland. The primary linguistic term used to locate possible portage sites in the Western Isles and on the mainland are variations of the Gaelic term [*tairm-bert*]; meaning literally 'over-bringing' (Watson 1926:505, Cheape 1984:210-211). Gillies (1906:20) states in his *Place-Names of Argyll* that "An isthmus need not be a Tarbert, but it is not likely that it would become a Tarbert were it not an isthmus". As in most circumstances surrounding the locating and identification of portage sites by their place-names, it is possible that there may be other names that are not readily recognised as portage site indicators or have not been understood as such. Granted, reliance solely upon place-names to identify portage sites, without any physical features upon which to base the interpretation may seem a bit controversial. However, place-names, when analysed in conjunction with historical or ethnographic sources and/or the appropriate geographical and geological criterion, can be of great value when compiling a data about a possible portage site. This method of locating possible portage sites has been found to be accurate in locating portage possibilities when probable navigational routes are analysed within the maritime cultural landscape. It is also important to note that this method of portage site identification is universally applicable throughout cultures, time and space.

In this chapter, I will review some of the place-names and how they can be used to help identify some of the portages used in the formulation of the portage criterion. As each individual portage possibility is discussed their specific place-name will be discussed in the context in which it applies to the site. In some cases there is no place-name indicative of a drag or portage, but the topography and location facilitates a portage for one reason or another.

Watson (1904) recorded some place-names from Ross and Cromarty that provide examples of both containing both the Gaelic and Norse referents. Locheye [Gaelic *Loch na h-uide*], is an example of an [*eið*] place-name (even though it is contained within the Gaelic) describing a portage possibility, but Watson goes on to describe the presence of some slow running water between two lochs which could also attribute to this place-name (Watson 1904:42). Even so, a traverse between two lochs might be easier accomplished if it was possible to use the assistance of this water. This brings into question whether or not this type of situation could be considered a portage in the true sense. As discussed earlier, if a traverse between *two* bodies of water involves either the unloading of cargo or the intentional dragging of the vessel; it should be considered a portage scenario. Circumstances such as this can also be used to help identify possible portage sites. For smaller vessels, the possibility of expanding the range of travel to a nearby loch or the sea is inestimable in terms of communication, economics, logistics and military strategies.

All of the areas investigated during the research for this thesis relied heavily, if not entirely, upon water borne travel for transport, contact with neighbouring settlements and seats of power as well as resource procurement. Therefore, it is likely that any opportunity to expand their sphere of contact, or increase the safety and reliability of journeys, would be utilised. It is upon that basis that the following sites were chosen for an investigation into their role in the maritime cultural landscape of Scotland and the Isles during the age of the Vikings. The intention of this thesis is not to provide a catalogue of the known portage sites of Scotland and the Isles, but to provide an archaeological definition of portages in the Norse maritime landscape. In tandem with the formulation of this definition a portage criterion is being formulated based upon the findings from this research. Together, these will enable any site that may have served as a portage to be analysed against models of the many different types of portage scenarios to assess their viability as portage sites. Ideally, this criterion will apply not only to portage sites from the Norse period or geographical realm, but also (with slight adaptations in relation to vessel types and maritime practices) will apply to a much greater cultural, temporal and geographical milieu.

6.2 The Northern Isles: Shetland and Orkney

6.2.1 Portage Possibilities in Shetland

Since the Viking Age, Shetland has maintained strong ties with Norway, both culturally and technologically. In addition to retaining many place-names and linguistic similarities, it has also carried on the maritime traditions of the Vikings in both boat building and in practical utilisation of these vessels (Morrison 1978, Sandison 1954). These continuing traditions provide not only ethnographic information that can aid in the identification of portage sites and the methods practised, but also data relevant to the various routes used in the local navigation of Shetland. In Shetland, portages would have been of considerable help not only in shortening journeys around the long archipelago (Crawford 1987:24), but also in avoiding dangerous conditions such as the Sumburgh Roost off the southern tip of Shetland (Morrison 1973:136). These conditions are made more forbidding by the extreme weather that is encountered on and off Shetland. On average, Shetland receives approximately 240 hours of full gales per year, with gusts over 175-mph occurring. Throughout a 10-month period the average windspeed can be 14 mph, for three of these months it can average over 20 mph (Morrison 1978:61). These conditions, combined with the heavy seas on all cardinal points and the strong tidal streams to the north and south make for some of the most hazardous conditions one can encounter. The mainland of Shetland forms a barrier approximately 90km in length between the North Atlantic and the North Sea, and the entirety of the archipelago extends approximately 113km from Muckle Flugga in the north to Sumburgh Head in the south. As thus, it provides an ideal target when practising navigation by island hopping, but once land has been raised Shetland becomes a large obstacle in which skill and care are needed to successfully navigate to the chosen destination. This task is complicated by the exposed and formidable presence of the majority of the coastline involving strong eddies, tidal streams, submerged hazards and imposing cliffs. The practice of coastal navigation holds many dangers in an area such as this, therefore any measures which can be taken to minimise these risks is welcome. The geography of Shetland provides many low-lying, narrow sections of land that can be traversed to eliminate the long and dangerous journeys around the archipelago. Many of the sites included in this investigation have been utilised as portages in one way or another until recent times, a tradition which can only be assumed to have been started by the Vikings given their propensity to portage throughout their extensive sphere of navigation.

Exposed Coastlines of Shetland

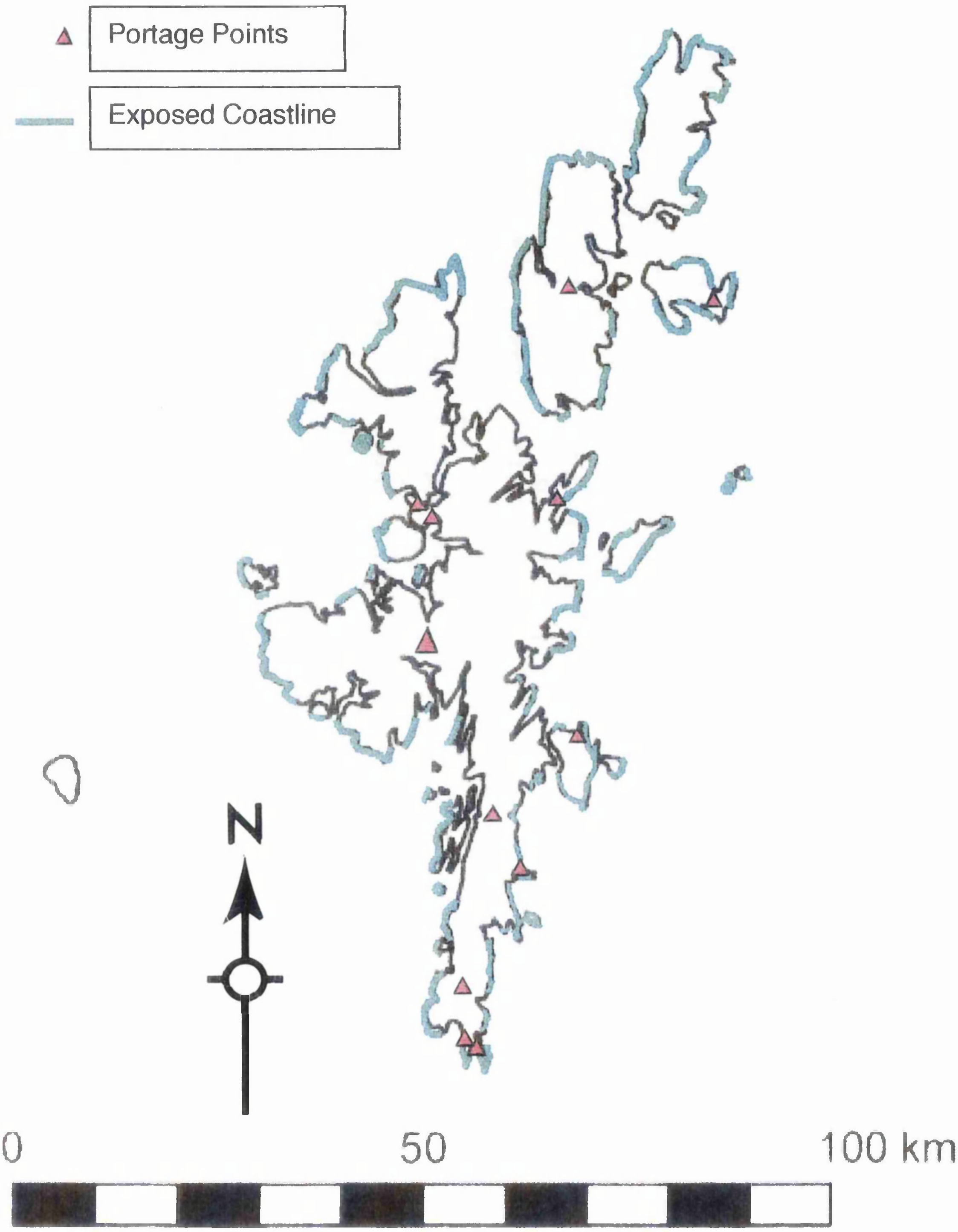


Figure 6.1: This illustration shows the exposed coastlines of Shetland. (After Flinn 1964:Fig.1)

Portage Sites in Shetland

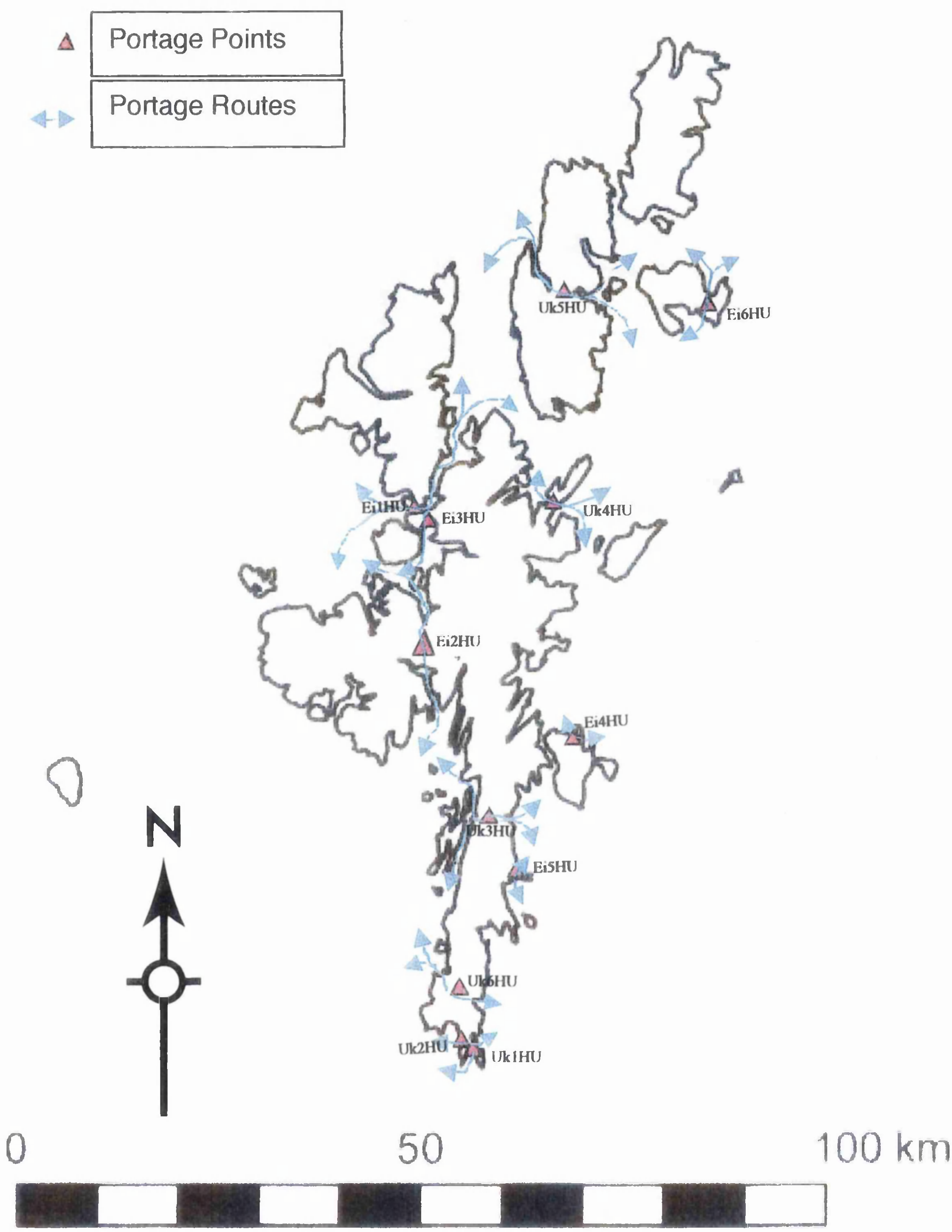


Figure 6.2: This illustration shows the portage points and their traverses on Shetland. (Illustration:Author)

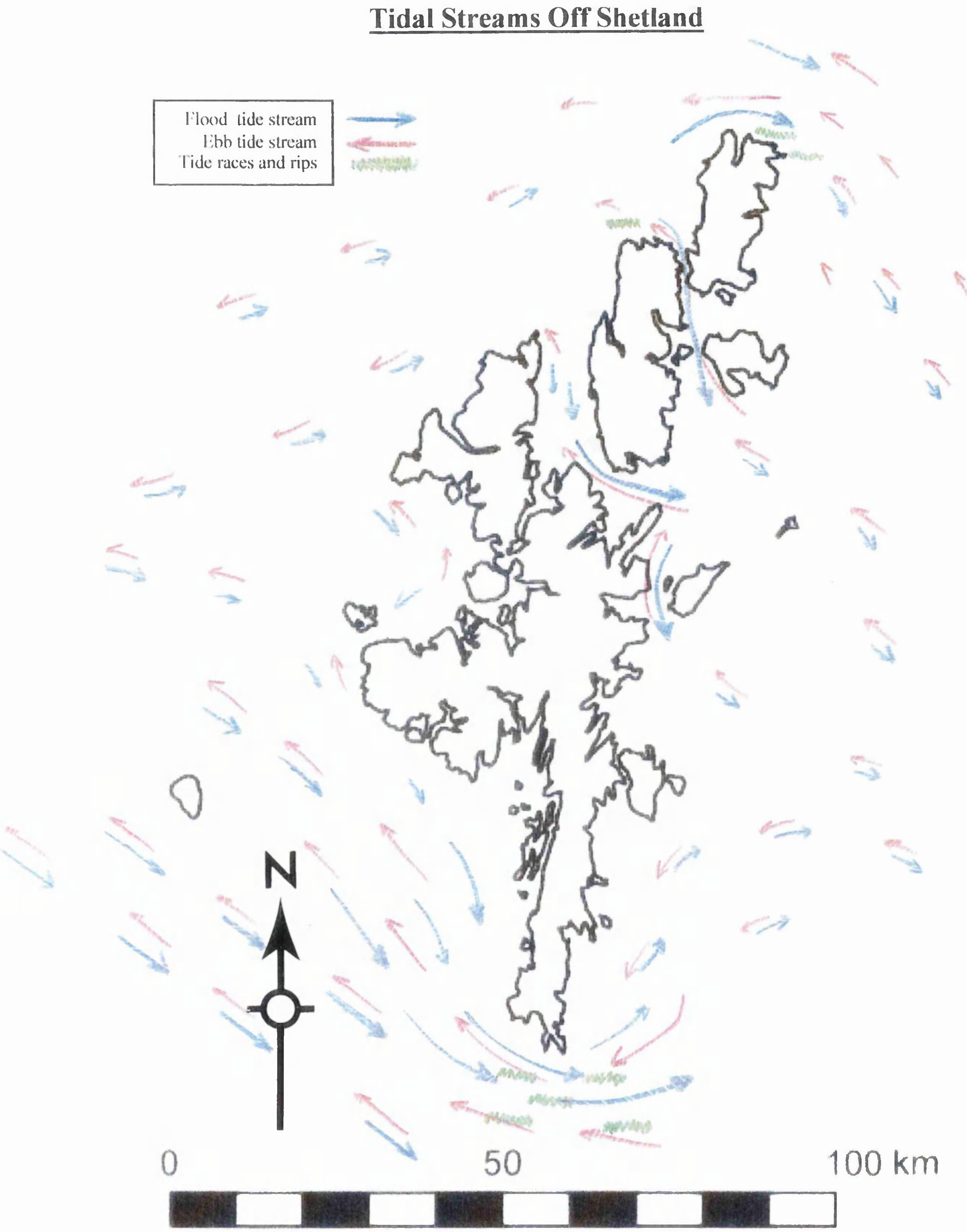


Figure 6.3: General flow of tidal streams off Shetland. Data derived from the Tidal Stream Atlas for the Orkney and Shetland Islands.

6.2.1.1 Sumburgh Head (south)

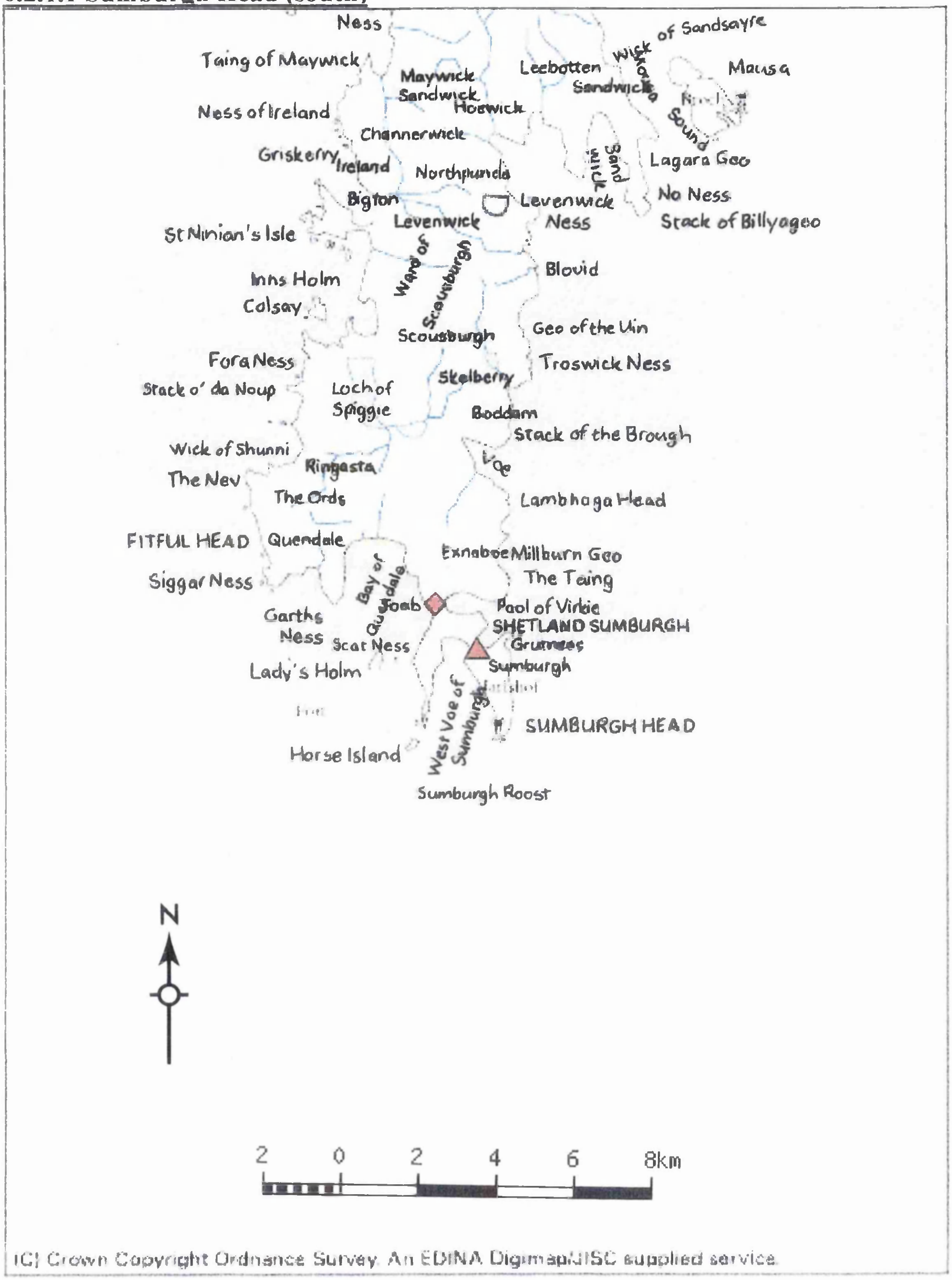


Figure 6.4: The red triangle indicates the location of the portage site at Sumburgh Head (south). The red diamond shows the location of the other portage site at Sumburgh Head (north).(After www.digimap.com 2000).

Site Name: Sumburgh Head (south)
Site Code: Uk1HU
OS Grid Reference: HU 420 351
Accessed by: West Voe of Sumburgh – Grutness Voe
Maximum Elevation above Sea Level: <10m
Minimum Distance Across: 250m

The admiralty data recorded here is based upon recent information, yet similar circumstances would have existed in these same seas during the Viking Age. The detail provided here is to serve as an example of the extreme conditions that would be encountered when navigating in this area. In the vicinity of Sumburgh Head there are tidal streams which run with great force, forming eddies both inshore and out. Off the tip of Sumburgh Head is the Sumburgh Roost, a heavy tidal race located further out. It forms south of Sumburgh Head (1 1/4 miles W) during both the SE-going and NW-going tidal streams. If the wind is against the tidal streams at the springs, the race can be a full 3 miles wide. There appears to be no period of no race between the end of the W-going and the start of the E-going, but during the vice-versa there is a break of 30 minutes referred to as The Still. In rough weather it is said to be dangerous for any vessel to attempt to brave the race. It is considered most dangerous during a W-NW gale with the W-going stream, and it is also considered violent with strong wind between WSW and NNW. The E-going stream is violent with winds between SSW and ENE. During strong NE weather, it is advisable for low powered vessels (obviously that would include all vessels from antiquity), to wait out the weather by anchoring in the Bay of Quendale. The pattern of the Sumburgh Roost is as follows: E-going race begins –0405 HW Lerwick (-410 HW Dover) and ends at +0025 HW Lerwick (+0020 HW Dover). This is when The Still occurs. The W-going race begins at +0055 HW Lerwick (+0050 Dover), ending –0405 HW Lerwick (-0410 HW Dover)(*North Coast of Scotland Pilot* 1994:176).

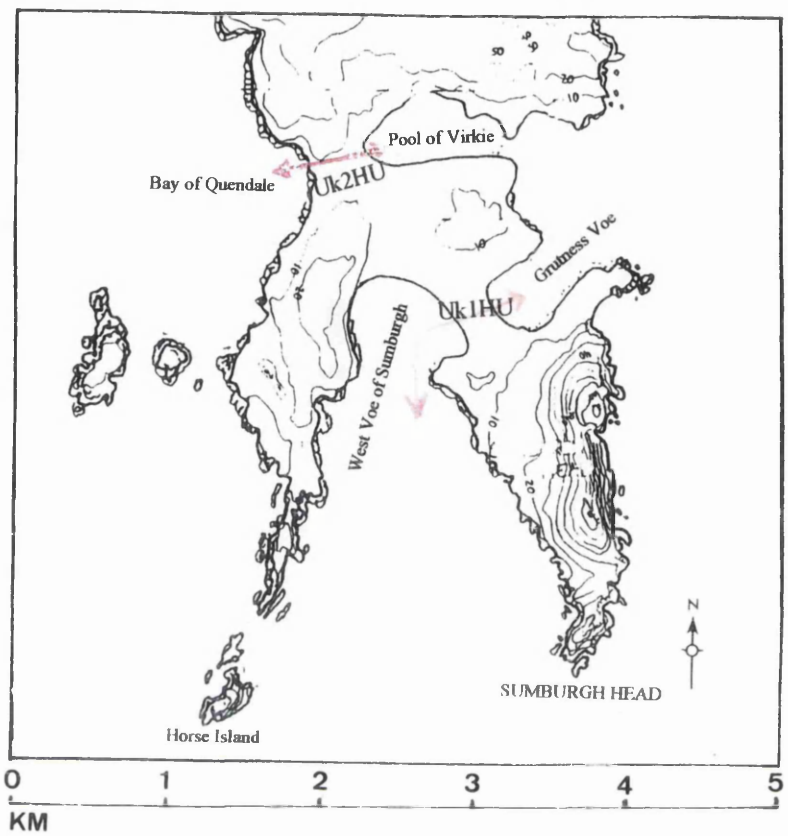


Figure 6.5: Drawing showing a possible portage route in relation to the topographical contours. (Illustration: Author)

The West Voe of Sumburgh lies between Sumburgh Head and Horse Island and is separated from the Bay of Quendale by the peninsula of Scat Ness (see Figures 6.4, 6.5). The Sumburgh Roost lies at the entrance to the voe and it is exposed to South winds. The voe can be used to avoid the Roost by navigating a channel between Horse Island and Hog of Ness (*North Coast of Scotland Pilot* 1994:178).

On the east side of this site is Grutness Voe. It is the southernmost of two branches of this inlet, the other being the Pool of Virkie. A rocky spit obstructs the entrance to this voe with the depth over the seaward terminus being 2.7m (*North Coast of Scotland Pilot* 1994:199).

Figure 6.6: View from the south showing the isthmus at Sumburgh Head (south). (Photo:Author)

This traverse at this site consists of a low-lying isthmus of land, which readily facilitates itself to the portaging of vessels in order to avoid the Sumburgh Roost (see Figure 6.6). A sandy spit of land defines the landscape, with dunes on either side providing the topographical variation. An airport now occupies the central portion of this site. The shoreline of both sides is composed of white sand. An underwater survey of this area revealed that the white sand continues out into the sea at a gradual decline. During low tide, some rocks were exposed in the Southeast corner of Grutness Voe.

One of the most intriguing portage possibilities on the Shetland Islands lies at Sumburgh on the southern tip of the archipelago. At Sumburgh, a Pre-Viking settlement, there are beaching places and roadsteads that provide an alternative to braving the roost (Morrison 1973:132-33). It was upon this supposition that research was carried out by the Shetland Viking Expedition, in the summer of 1972, into the bedrock topography and the physical geography of a possible portage site. Although the original goal of this expedition was to try and locate the landing site and/or remains of the vessels of Earl's Rognvald and Harald, after their emergency landing on the shore of Shetland (Henderson 1985:177-178). The topography of the maritime landscape was a significant factor in the research design, thus lending itself to an examination of some portage possibilities. In *The North Sea Earls* (Morrison 1973:128-136), the following details of a topographical survey from which valuable data concerning the submarine surface and its relation to the portage scenario are presented. The seafloor is an ever-changing entity, yet the basic plan of the bays at Sumburgh is determined by the bedrock topography, which hasn't been altered much since the last glaciation. The same cannot be said for the sea-level, which has risen significantly. His research was unable to provide a definite record of the sea-level during the Viking period, but a change in the sea-level significant enough to alter the overall coastline of Sumburgh over the past 1000 years would be difficult to quantify (Morrison 1973:136). Another constantly changing aspect of the Sumburgh coastline is the deposition of sand to form beaches. Morrison believes in the likelihood that the Vikings would have had the same beaches available to them as we have to us (Morrison 1973:136). The conclusion from his study being that not only was Sumburgh a good place to weather out storms in a safe harbour, such as Grutness Voe; but that the isthmus between Grutness Voe and the West Voe of Sumburgh was narrow, low, flat and sandy enough to provide no difficulty for a routine portage with the light-built, shallow draught vessels of the Viking period (Morrison 1973:136). On both sides of the promontory there are two options: wait in the sheltered bay until one could have clear sailing around; or portage over to the other side to avoid any danger entirely. This site is easily located from the North Sea by locating from a distance what looks like an island off the tip of the mainland. As it looms closer it is possible to see the Roost to the south and the low-lying land of the isthmus dead ahead. The construction of the airport has altered the landscape by the levelling of the centre of the isthmus and the construction of large dunes on both sides. This site still stands as an excellent example of a portage site for not only the shifting of cargo but for the dragging of vessels of varying sizes. Due to the low topographical variation and minimal distance to be traversed, it is likely that this site was utilised by all but the largest vessels of the time (see section on maritime technology). That is mainly because of the extreme effort that would be needed to shift such vessels, not that it was impossible. The possibility does exist that, in times of extreme weather, this option may have been exercised.

On the micro-topographical scale, this portage site offered a relatively quick and easy traverse to different fishing grounds or access to the other coast (see Figure 6.7). At this site though, a portage would not clear all of the obstacles that could be avoided by dragging a little to the north at Uk2HU (see below). On a macro-topographical scale, the option of portaging at Uk2HU would be a better option than braving The Roost or, depending upon the size of the vessel there exists other possibilities of traversing the archipelago at numerous junctures even further north (see below).

It is in areas with these same characteristics that further landscape studies should be directed; the topographically obvious locations, if not suggested by the place-name evidence alone (see Figure 6.7). In recent times fishermen have been known to drag their small vessels across the runway at Sumburgh Airport to access the fishing on the other side of the isthmus. To brave the roost is not worth the danger and effort, yet to traverse the land makes for a profitable expedition.

Figure 6.7: View of the eastern landing at Sumburgh Head from the sea. (Photo: Author)

6.2.1.2 Sumburgh Head (north)

Site Name: Sumburgh Head (north)
Site Code: Uk2HU
OS Grid Reference: HU 392 110
Accessed by: Bay of Quendale – Pool of Virkie
Maximum Elevation above Sea Level: <10m
Minimum Distance Across: 400m

The nautical data for the approach to this possible portage site is much the same as the above site. This traverse is another section of the low-lying isthmus of Sumburgh Head, immediately north of Uk1HU. Portaging at this site would also enable a mariner to avoid the perils of the Sumburgh Roost, in addition to allowing one to avoid skirting the rocky cliff and shoals which run along the SW part of the peninsula. Due to modifications of the isthmus during the construction of Sumburgh Airports E-W runway, the western portion of this site has been severely altered with the addition of a seawall and breakwater construction (see Figure 6.4). Even with these modifications, the potentiality of this site for providing an ideal location for crossing the isthmus in order to use to avoid the Sumburgh Roost is evident. The landing in the Pool of Virkie is dependent upon the tides, as this area dries at low tides. As mentioned earlier the majority of this area has been modified by the construction of the runway for Sumburgh Airport (see Figure 6.8).

Figure 6.8: View from the north of the traverse at Sumburgh Head (north). (Photo: Author)

6.2.1.3 Quarff

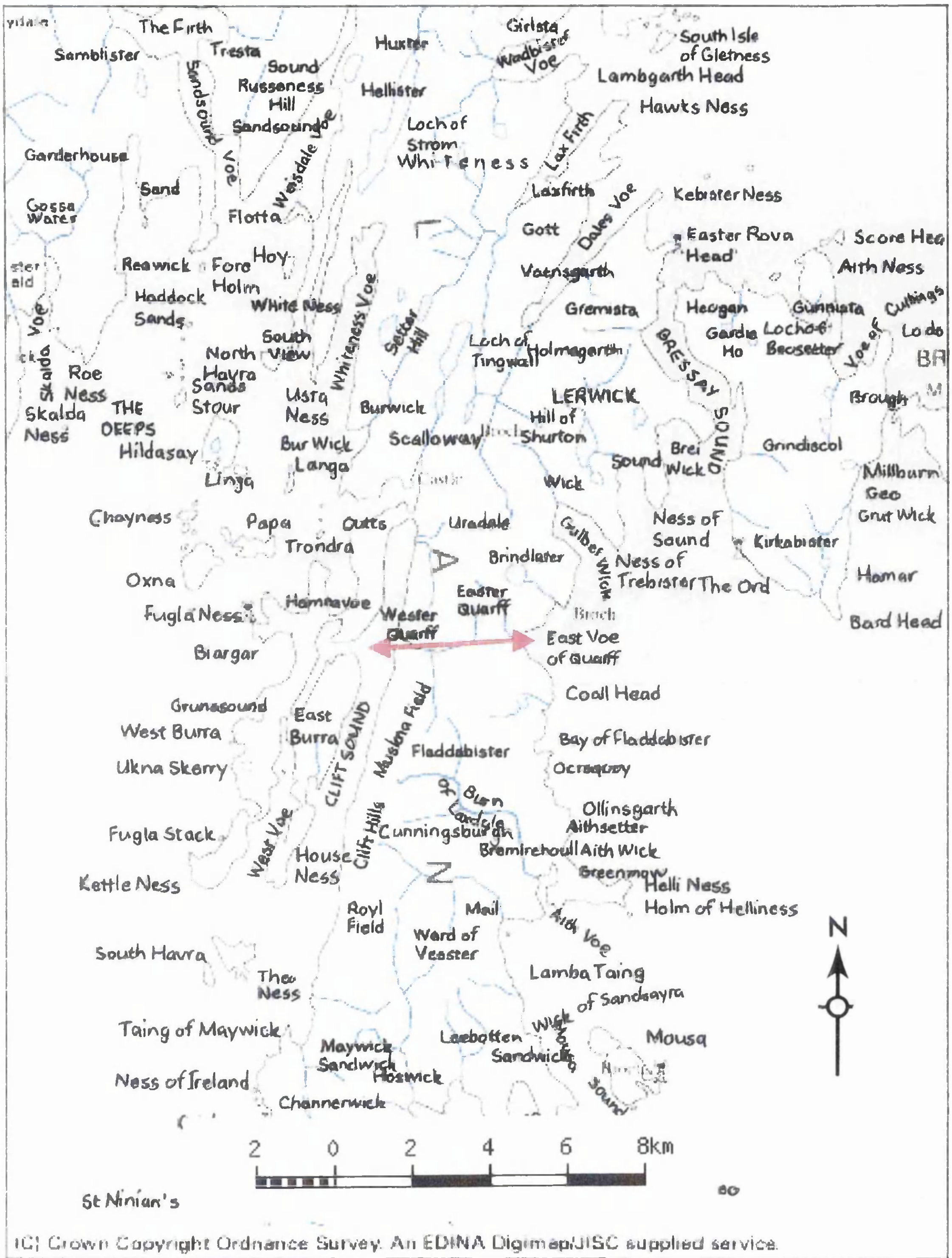


Figure 6.9: The red arrow indicates the route of the traverse at Quarff. (After www.digimap.com 2000)

Site Name: Quarff, mainland Shetland
Site Code: Uk3HU
OS Grid Reference: HU 420 351
Accessed by: West Voe of Quarff (Clift Sound) – East Voe of Quarff
Maximum Elevation above Sea Level: ≤40m
Minimum Distance: 2650m

The *North Coast of Scotland Pilot* (1994:178) reports that the West Voe of Quarff is a small inlet to the mainland. This inlet becomes quite shallow as one approaches the landing. The same source (1994:200) reports that the area surrounding the East Voe of Quarff is skirted by cliffs of varying heights, many of which have caves at their bases. Only the Valley of Quarff breaks the steep terrain of this section of mainland Shetland. This valley is easily recognised from the sea. As is the case with many portage sites, they can be easily identified from the sea as they often appear as either a "V" in the landscape or as a passage between two islands. This may explain how some of these sites were initially located (see Figure 6.9).

The site of the traverse at Quarff is primarily a valley that cuts across the whole of the southern Shetland peninsula, named the Valley of Quarff. When at sea to the E, this valley is seen as a notch in the mainland. The topographical variation throughout this valley is quite diverse. On the W side, the angle of the slope is quite steep before it flattens out for a short bit. Then it follows a more gradual slope down to the East Voe of Quarff. The landscape at this site is quite varied and consists of drainage gullies, rocky outcrops and hillocks. The landing at the West Voe of Quarff is composed of a rocky beach of mostly small-medium cobbles; the shoreline is skirted with boulders. The landing at the East Voe of Quarff is composed of a pebble beach on a gradual slope. The East Voe of Quarff contains many obstacles to the mariner, including exposed rocks and submerged boulders and reefs. These hazards could possibly pose some difficulty to larger vessels, but to the smaller vessels that would have been landing at this site to be portaged, they seem to hold no great threat (see Figure 6.10).

This site has been used as a dragging site for smaller vessels throughout the history of Shetland (Isbister 1996: pers. comm). Tommy Isbister, a local builder of traditional Shetland boats (Ness yoles), related the tradition of the boats being built on the west coast of Shetland and then dragged over Quarff for delivery on the east coast. This site seems, on first examination to be one of the least likely places where boats would be dragged, but it is one of the few places from which there exists a place-name as well as ethnological data. The place-name Quarff is a variation of the place-name 'hvarf', which in Shetland dialect means 'to drag' (Schei and Moberg 1988:96). This name strongly reflects the similar place-names used in Scandinavia to indicate a place where boats were dragged across narrow strips of land.

Figure 6.10: A view looking down the Valley of Quarff from the west. (Photo: Author)

A walking survey of this area revealed that a dragging at this site would be a substantial undertaking that would require an organised operation involving a fair amount of manpower. The landings at either side are made in sheltered bays, but once out of the water the coast rises steeply, a drag here might be more easily accomplished with draught animals (see figure 6.11). Again, this site would eliminate the treacherous journey around Sumburgh Head by providing a direct route that would shorten the journey by approximately 70km. On a macro-topographical scale this could cut the voyage around the mainland significantly. Having said this, the evidence for the use of this site indicates its primary function as a portage in the micro-topographical sense. Mariners employing small-scale coastal navigation could use this opportunity to greatly expand their sphere of contact. The East Coast, which was previously accessible only by braving The Roost or via land routes, could be widely travelled by the same vessels in which the journey originated. Thus not only increasing their access to exploitable subsistence resources; but also increasing their contact and trading with other settlements.

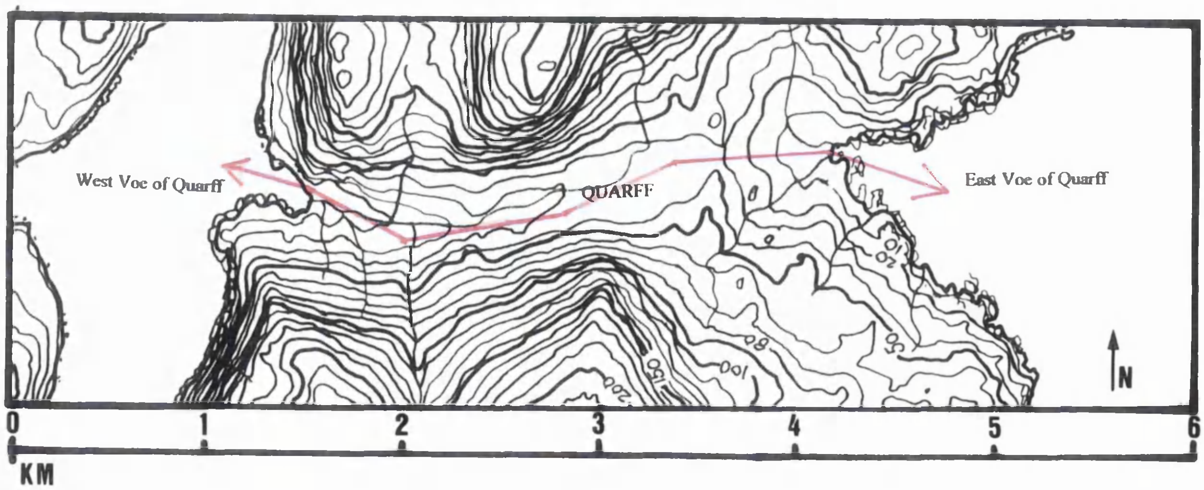


Figure 6.11: Drawing showing the topographical variation and possible traverse route at Quarff. (Illustration: Author)

6.2.1.4 Lunna

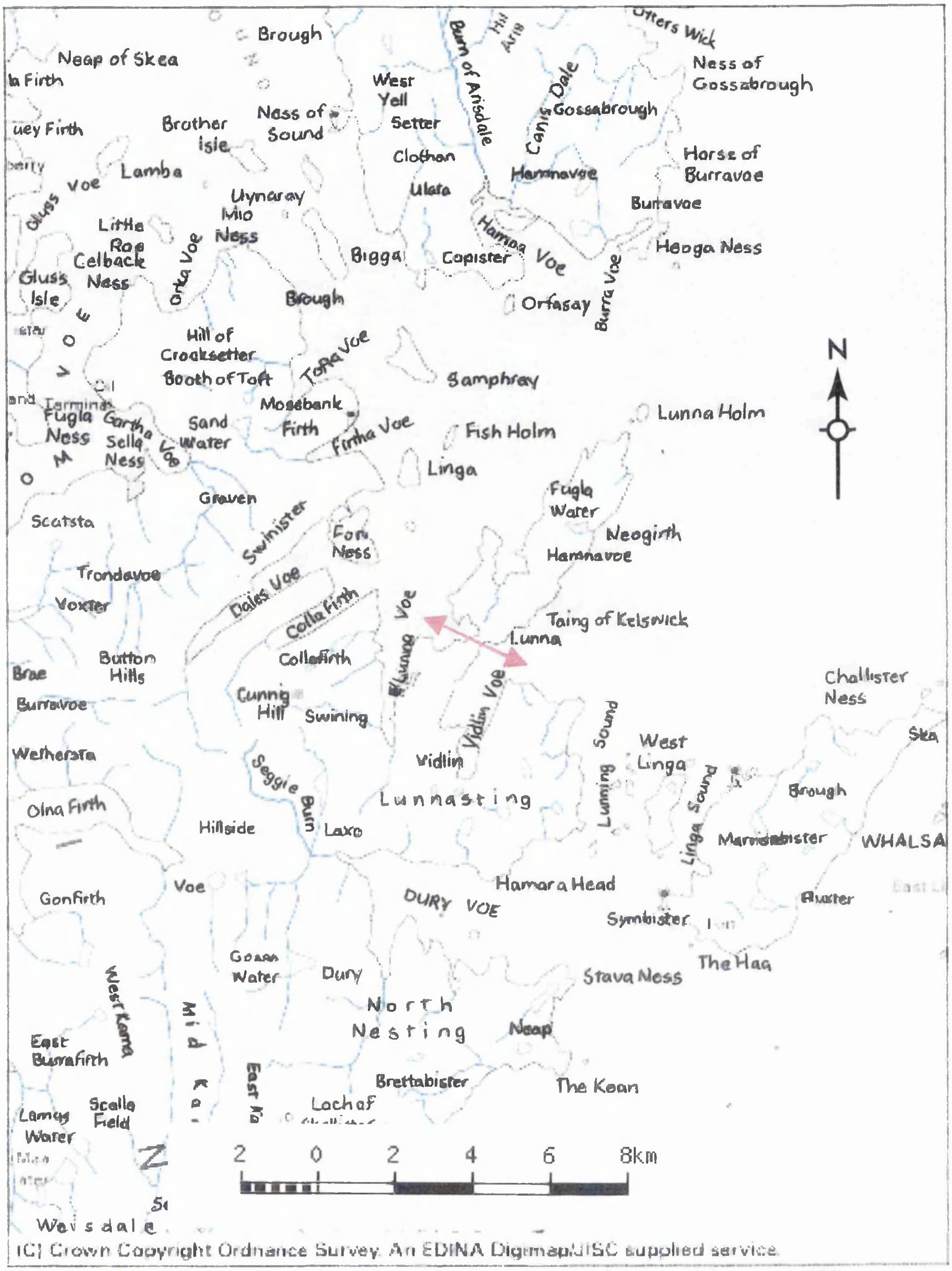


Figure 6.12: The red arrow indicates the traverse at the site of Lunna. (After www.digimap.com 2000)

Site Name: Lunna, Lunnasting, north mainland Shetland
Site Code: Uk4HU
OS Grid Reference: HU 485 691
Accessed by: West Lunna Voe – East Lunna Voe
Maximum Elevation above Sea Level: <10m
Minimum Distance Across: 220m

The *North Coast of Scotland Pilot* (1994:223) reports that the entrance to the small bay at West Lunna Voe is obstructed by a dangerous rock that is also reported below in the portage account made by Willie Nicolson (1965/66:SA 3/2/31/2). To gain entrance between the small peninsulas that project from the N and S, local knowledge is required. Anchorage is available in the outer bay by Grames Ness. *The North Coast of Scotland Pilot* (1994) does not relate any specific information on East Lunna Voe, but underwater survey revealed that the voe is quite shallow and has a gently sloping, rocky bottom with many possible hazards to larger vessels. Shallow draught vessels should have no difficulty in navigating to any of the proposed landings if they have local knowledge of the area or exercise caution (see Figure 6.12).

The site at Lunna consists of a low-lying isthmus of land separating West Lunna Voe from East Lunna Voe (see Figure 6.13). Initially, the place-name Lunna does not hold a familiar portage indicator such as the ON 'eið', but this site was initially suggested as a possible portage site by Val Turner of the Shetland Amenity Trust (1995:pers. comm.). When sailing on the "Borgundknarren" from Norway to Shetland, many of the crew referred to the 'rollers' (logs) upon which we would be dragging the vessel as 'lunna'. Upon further investigation this term [*lunne*] was found to refer to timber or a pile of logs (Kirkeby 1987:671). As place-name studies is a highly specialised discipline, it is beyond this work to confirm that this is the origin of this place-name, although it does seem indicative of a landing/launching activity at this site.

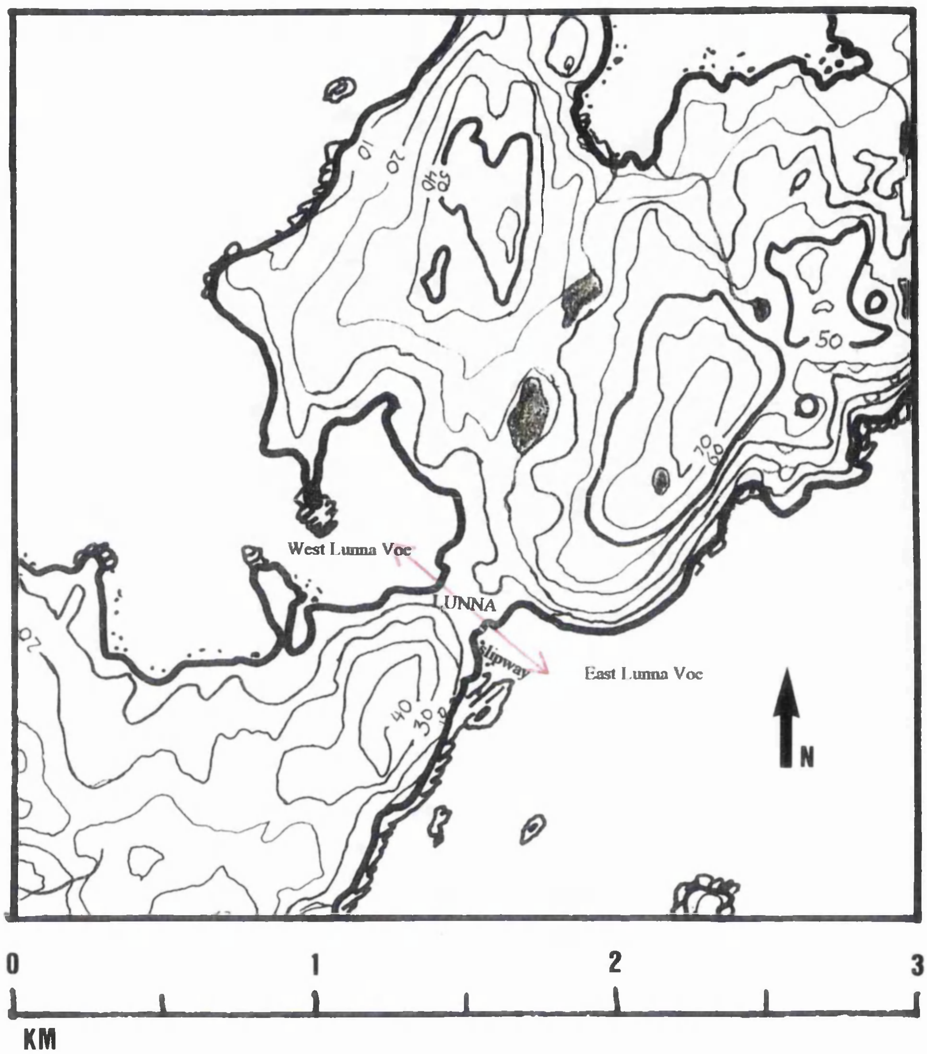


Figure 6.13: Drawing showing the topography of the portage site at Lunna, and the possible traverse. (Illustration: Author)

The west landing of this site is formed by a gradually sloping beach, which is heavily eroded. The immediate shore is formed by a step bank, leading down onto a shingle beach composed of mostly small – medium cobbles. All along the shoreline this landing has been fortified with concrete pylons as anti-landing defences during the Second World War. It should be noted that Lunna was the base of a support operation for the Norwegian Resistance Movement during this war. This site has been subjected to heavy erosion, primarily on the landing from West Lunna Voe. Some of this is probably related to the construction of the road that crosses in the middle of this isthmus. The pressure of traffic and the weight of the road so close to the shoreline can be a key factor in the erosion of coastal areas (McGlashan 1998:pers. comm.) Other forces that may be contributing to the degradation of this site are the use of this land as a grazing for sheep and more than likely the activity in this area by the occupants of the base during the Second World War had its impact on the environment.

Once a landing has been made on either side of the strip of land, the topographical variation of the isthmus is minimal. Located about halfway across the isthmus, there is an exposed piece of bedrock with a hole drilled into it. This hole is approximately 3.5cm in diameter and greater than 10cm deep. The exact purpose of this hole is unknown. When crossing from the west a slight deviation to the S is required to reach the optimal landing in East Lunna Voe. This leads down a slight slope to a landing composed of large, medium and small cobbles bordered by bedrock outcroppings. At this landing area there is a slipway of an unknown date. This slipway juts out from the landing at an angle of 110° for a distance of ca. 35m; at an average width of 6m. Now completely obscured by kelp growth, this landing is constructed with large stones aligning both sides and small cobbles paving the centre.

The journey around this isthmus is approximately 15 km. Due to its location and the minor distance avoided by portaging at this point, the site would lie primarily within the realm of a micro-topographical portage site. This site offers no great advantage in the large-scale navigation of Shetland, but does provide a handy landing for a catch or for the transport of smaller vessels from one side to the other for greater local mobility. The main advantage being the avoidance of entering into Yell Sound, which can run quite strong in both directions possibly causing difficulty for smaller vessels. This holds especially true in reference to vessels reliant upon a square rig or oars. As coastal navigation was the norm during the Viking Age, this passage would allow for the navigator to have easy access to the eastern seaboard of the North Mainland without entering into Yell Sound proper.

Brian Smith, the Shetland Archivist, provided a copy of an interview with Willie Nicolson of Lerwick, late of Firth, Delting as he was interviewed by John Johnson, John Graham, and Tom Anderson in c. 1965/66 (Shetland Archives: SA 3/2/31/2). This interview related the story of dragging a vessel across the isthmus at Lunna during a storm sometime before 1900. This interview was recorded in Shetland dialect, this is the tale in Willies own words:

> "Oh, yes, yes. Oh, we lay in da back o Lunna Ness two times wi a night o blind moorie fae da nor'west. Dirs a gio yundrew da tidder side o, yundrew atween Lunna Holm an da Taing, dere, dats whit dey caa da Land Taing. Dir a gio in dere at dey caa da Gio o Gungsta, an hits a great big gio. An dis sam Nicolson men didna hae dis boat at dey wir lost in, dey hed a boat built by Tommy Arcus an sho wis a fifteen fit boat an dem at wis got in at da back o da ness, dere, we got da land. Man, we couldna do nothing at all, so we just gud in at da back o da ness dere an we pat oot da rope an we made her fast ta da clett an we lay dere, man, da moorie wis fit ta shock wis all night an da first at cam abune da banks wis a man ida mornin dan hit wis me midder's uncle Robbie Sinclair, dey caad him, an he bed in Lunna. An he cam doon upo da clett an spak ta wis, he says; "Now, whit you'll hae ta do is try an git da sails reefed as close as you can an see if you can git in ... ta da east banks o Lunna." Dats whaur da kirk is du knows an da kirk yard an dat. So we gud, we got in dere, surely aboot eleven o'clock o day. An Peter Manson, dere, he too sae mony o wis an me Uncle Robbie Sinclair took sae mony o wis. An dey wir an Umphray man at bed ida Grind, he took sae mony o wis, du sees dey wir eleven men, six ida boat an five o wis. An we wir aa night dere. An dan da idder day he wisna mujch easier bit he wis still broken a lock an Peter Manson took both his Clydesdale horses doon an he took a great hawser o a rope an he pat aroond da boats and we took everything oot o dem, every mortal thing. An he bent on both da horses an he took dem right across da neck, du knows, right across till we cam ta da wast banks o Lunna, an dan he took da carts doon an he took all da fish an all da lines an ballast an every mortal thing. So we ballast dem dere an got in all ida stuff. Man, I mind, you know, aboot dat, we wir gotten a fine little turbot maybe aboot dis size, faidder grippit him by da gills an hoved him ashore, he says; "I tink you're weel wirt

dis Peter." He didna want ta tak him, no, no. Faidder says; "I tink you're well wirt it."

Willie Nicolson 1965/66: SA 3/2/31/2

This account of a portage at Lunna is valuable for numerous reasons. Even though this dragging took place north of the slipway located during the field survey, this does not mean that this was the only area in which to perform a drag. It does demonstrate that this practise was utilised in order to overcome circumstances which otherwise were insurmountable. After their attempt to weather the storm, the option to portage was made by a local who may have had to do this previously, or had at least heard of it being done and been familiar with the procedure. It is unfortunate that although the length of the vessel is recorded (15 feet) the type of vessel is not recounted in this history, as it would help to determine the tonnage involved in the dragging. Most likely this was a Shetland yole, which is very similar to the smaller coastal vessels of the Viking Age. The use of draught animals for this procedure is interesting, as they would have only been able to provide pulling power. The actual methodology and technique employed would have been derived from a tradition of hauling boats out of the water and into their noosts, well clear of the tideline as to prevent them being swept out to sea or blowing away during storms. Another interesting aspect of this account is the use of a great hawser that was put around the vessels. This technique is necessary when dragging larger vessels, but must also be the most efficient method to drag any vessel. As these vessels were small, the added support and stability the harness system would add during the dragging process must also make an undertaking such as this a much lighter task. In the case of the archaeological experiment dragging a cargo vessel, the Borgundknarren, this was the only method possible due to the sheer weight and bulk of the hull.

Another interesting aspect of this portage is the volunteering of numerous members of the community to help drag the boat during a storm. This is the case whenever an archaeological experiment is undertaken; it is probable that it would have also occurred among the maritime communities of the Viking Age. From this account it is obvious that the boats were not just attempting to safely land their catch, as they reloaded everything on the far side and continued their voyage after weathering the storm. It is ethnological accounts such as this, which provide us with data on the circumstances under which a portage would occur. In experimental archaeology, we may attempt to drag a boat at a chosen point as the prime objective of the expedition, whereas ancient mariners had no choice but to drag their vessels, as it was the only option that would allow them to complete their journey. This was as true to Willie Nicolson and his crew, as it was during the Viking Age. This record of this portage helps to support the probability that the site at Lunna is an example of a portage site used throughout the ages.

South of where this drag occurred, there is a feature that would greatly aid in the landing and dragging of vessels across this isthmus: a submerged slipway (see Figure 6.14). This construction located in East Lunna Voe is of an unknown date and numerous inquiries provided no data relating to its construction or use. Briefly described above, this feature is the result of a clearing of all the major boulders that would obstruct access to this landing. Due to its relatively narrow construction throughout the entire length, it is likely that it is a feature relating to vessels of a fairly narrow beam and light construction. This assumption is based upon the fact that in order to land a vessel on a slipway such as this and haul it well above the tide line, as is Shetland tradition, it would require the presence of numerous hands on either side to support and haul the vessel. A comprehensive underwater survey of this feature was unable to be performed due to time and equipment constraints; in addition to poor visibility caused by a heavy growth of kelp. Further research at this site should include the complete mapping of this area with a total station and a plan should be made of the feature and its surroundings, as well as a more intensive survey of the seabed in this area.

Figure 6.14: A view from the west of the exposed section of a submerged slipway extending into East Lunna Voe. (Photo: Author)

6.2.1.5 Mid Yell

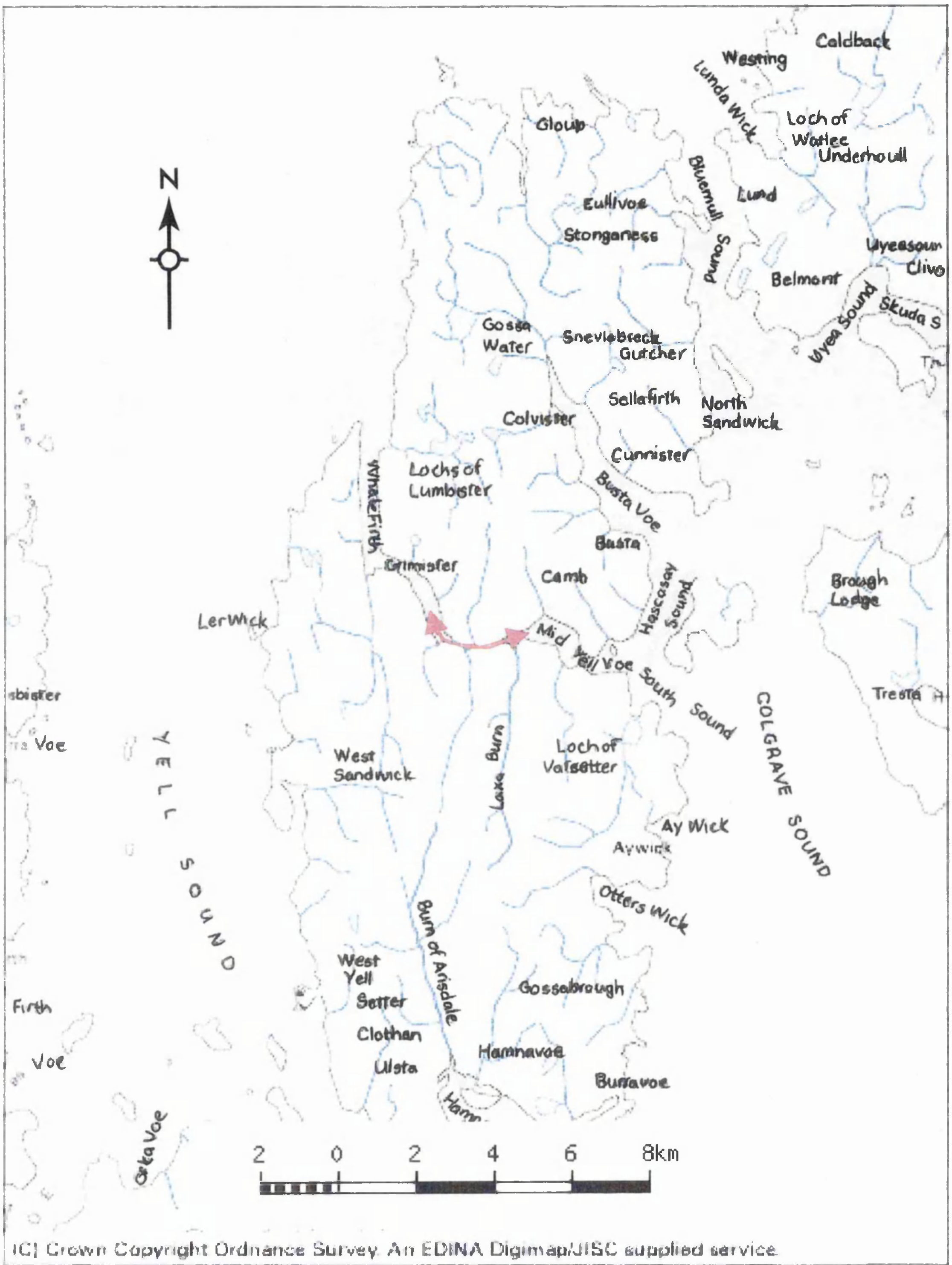


Figure 6.15: The red arrow indicates the site of the traverse at Mid yell. (After www.digimap.com 2000)

Site Name: Mid Yell, Setter, Shetland
Site Code: Uk5HU
OS Grid Reference: HU 493 915
Accessed by: Whalfirth – Mid Yell Voe
Maximum Elevation above Sea Level: <10m
Minimum Distance Across: 1150m

The *North Coast of Scotland Pilot* (1994:222) reports that Whalfirth has not yet been completely surveyed, but a 1978 survey found a depth of at least 5m in mid-channel. Haswell-Smith (1996:389) reports that Whalfirth provides a quiet secluded anchorage, but that some submerged obstacles must be avoided. For Mid Yell Voe, the Pilot (1994:228) states that the voe is surrounded by land formations, which cause gusts and eddies within the voe, during strong winds. Although these conditions may occur at various times during inclement weather, the possibility of navigating either of these waterways is highly favourable to braving the journeys around the entirety of Yell. Haswell-Smith (1996:389) reports that Mid Yell Voe is relatively clear mid-channel with a bottom of mud and sand.

Yell measures approximately 25km in length N-S, and the sea journey from the mouth of Whalfirth to the mouth of Mid Yell Voe measures approximately 32km on the northern route and approximately 43km along the southern route. Both of these passages involve navigating in areas of extreme tide races and strong winds are not uncommon.

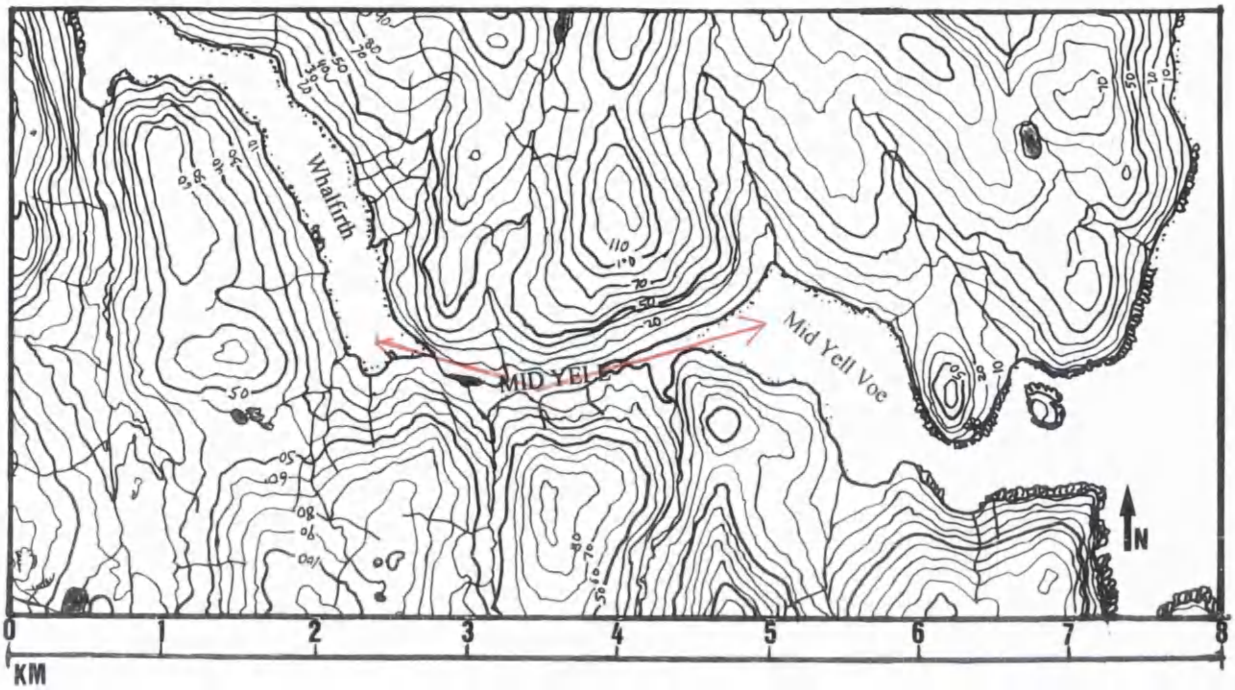


Figure 6.16: Map showing the topography and possible traverse at Mid Yell. (Illustration: Author)

This site is a narrow, low-lying isthmus that bisects the island of Yell. The W landing of this site is accessed via Whalfirth, which snakes it's way through the W coast of Yell. The landing at Mid Yell is composed of a rocky bottom that gradually slopes up to where it meets a stream. The stream runs across Mid Yell serving as a drainage system for run-off from the surrounding hills. The bed of the stream is composed of clay and cobbles. The lowest and flattest part of this site follows a gentle curve to the N across pastureland to where it lands in Mid Yell Voe. A stream picks up again on the descent into Mid Yell carrying run-off. The landing into Mid Yell Voe is a gradual slope leading into a gently sloping shore composed of a rocky bottom (see Figures 6.15, 6.16).

This traverse may have been best suited to the portage of small vessels and cargo only, as dragging larger vessels would prove quite difficult. This is probably a common procedure at the majority of the portage sites that are lengthy or traverse over relatively high elevations. Not only would a portage here allow small vessels and cargo access to the North Atlantic and the west coast of Shetland, but would also avoid taking the vessel and its payload through the potentially dangerous passages to the north and south. Another possibility is that these portages could make possible the use of small vessels for transportation during the harsh winter months when the weather is at its most extreme. This type of portage could also provide transportation and communication networks during seasons when ocean sailing could not be undertaken safely or at all. This traverse and others like it allow for the use of smaller vessels staying close to land to make fairly long journeys within reasonably sheltered confines.

6.2.1.6 Loch of Spiggie

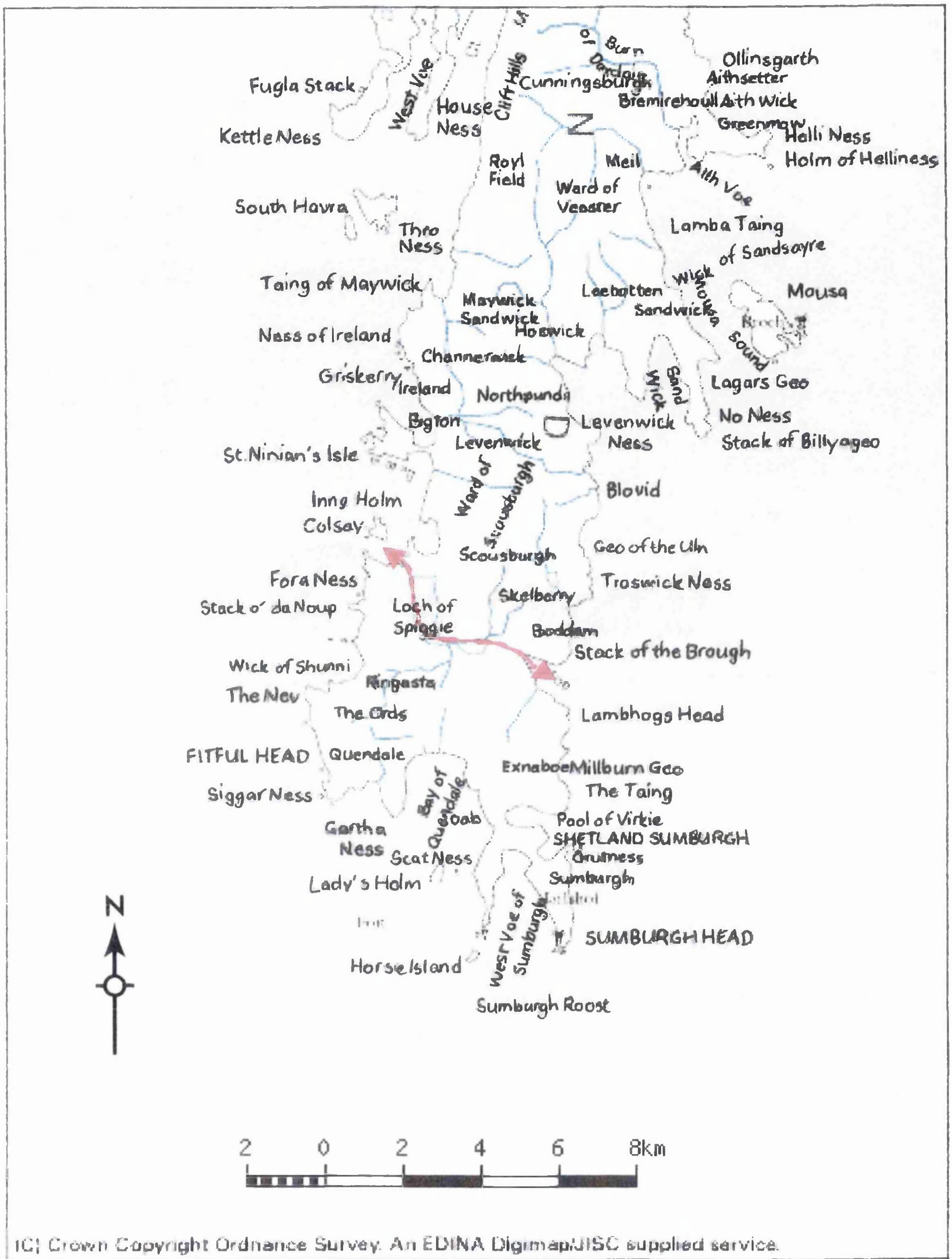


Figure 6.17: The red arrow indicates the traverse across the site at Loch of Spiggie. (After www.digimap.com 2000)

Site Name: Loch of Spiggie
Site Code: Uk6HU
OS Grid Reference: HU 378 158
Accessed by: Muckle Sound – Voe
Maximum Elevation above Sea Level: ≤20m
Minimum Distance Across: 1100m

The Muckle Sound area provides a haven from crossing around Fitful Head to the south thus braving the Sumburgh Roost during a circumnavigation of the mainland. When approaching Shetland from the S-SE, Fitful Head is the first land to be sighted and can thus be used as a navigational point from which to guide passage. On the easterly side, Voe provides a sheltered bay in which gales from the NNW can be avoided (*North Coast of Scotland Pilot* 1994:200).

This is another site that allows for a traverse of mainland Shetland (see Figure 6.17), providing yet another option for the mariner to navigate from the east coast to the west coast without having to sail/row the whole way around the mainland. When all the possible portage sites traversing mainland Shetland are considered, the long barrier of Shetland no longer seems as imposing as before. Located on the south mainland where Muckle Sound comes in below Colsay, this traverse is begun with a short overland crossing to the Loch of Spiggie and the Loch of Brow. From here a traverse over land, with a maximum rise of 20m leads to Voe in the North Sea. The Loch of Spiggie may have once been connected to Muckle Sound and Loch of Brow (J. Moncrieff 1996: pers. comm.), thus facilitating a portage of a much-reduced distance.

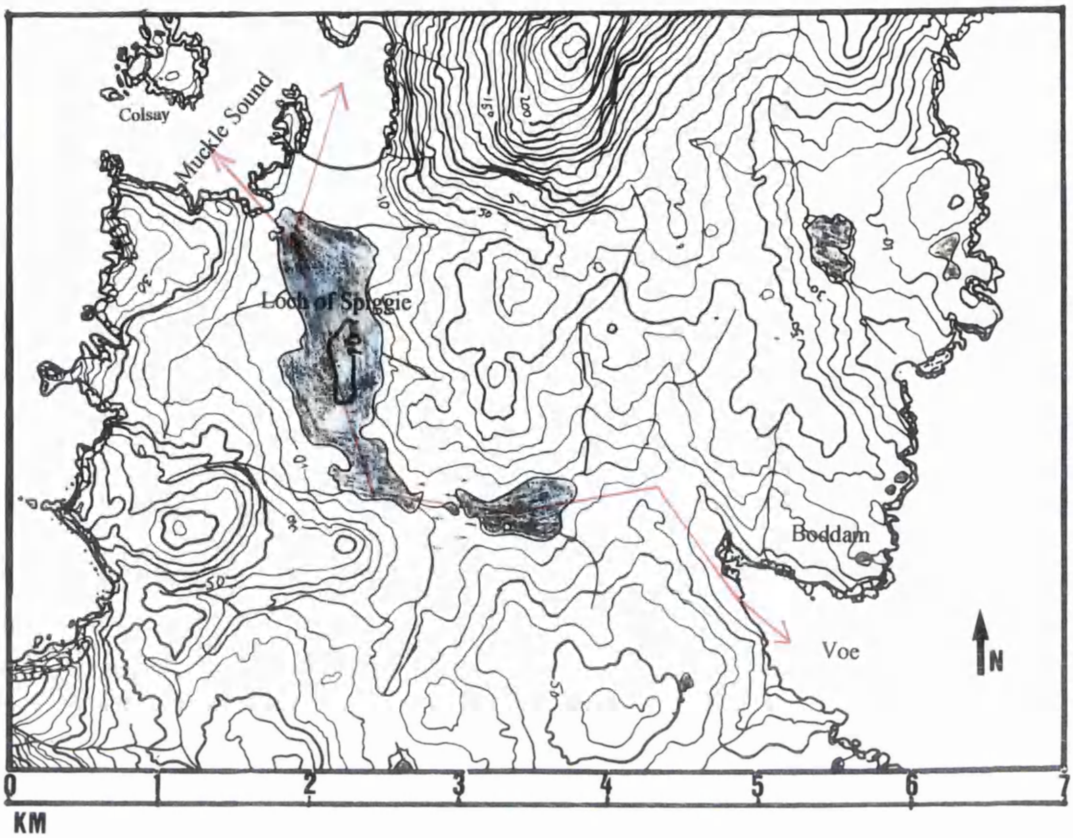


Figure 6.18: Topographical map showing the traverse across the Loch of Spiggie. (Illustration: Author)

This possible portage site is unique as it includes two freshwater lochs in its traverse (see Figure 6.18). Even if these never formed a continuous waterway to Muckle Sound on the West Coast, they would still facilitate a portage scenario of considerable ease. As well as providing a sheltered haven from the tides and abuses of the marine environment, rowing or sailing on a loch is a much easier task than hauling a vessel or its cargo. In the site profile, the minimum distance across is the distance that would be covered on the land sections of the traverse. This could have been less or more in the past, but this figure can give an approximation of the distance a vessel or cargo would need to be portaged. The landscape in this area is primarily marshy areas and fields with no large obstructions. As it is not known whether these lochs were one loch or an extended sea loch in the past, I would assume that if they did form a sea loch extending into the mainland they would have provided one of the best areas at which to traverse the south mainland. As they are now, they still form a unique portage possibility, especially for smaller vessels.

6.2.1.7 Mavis Grind

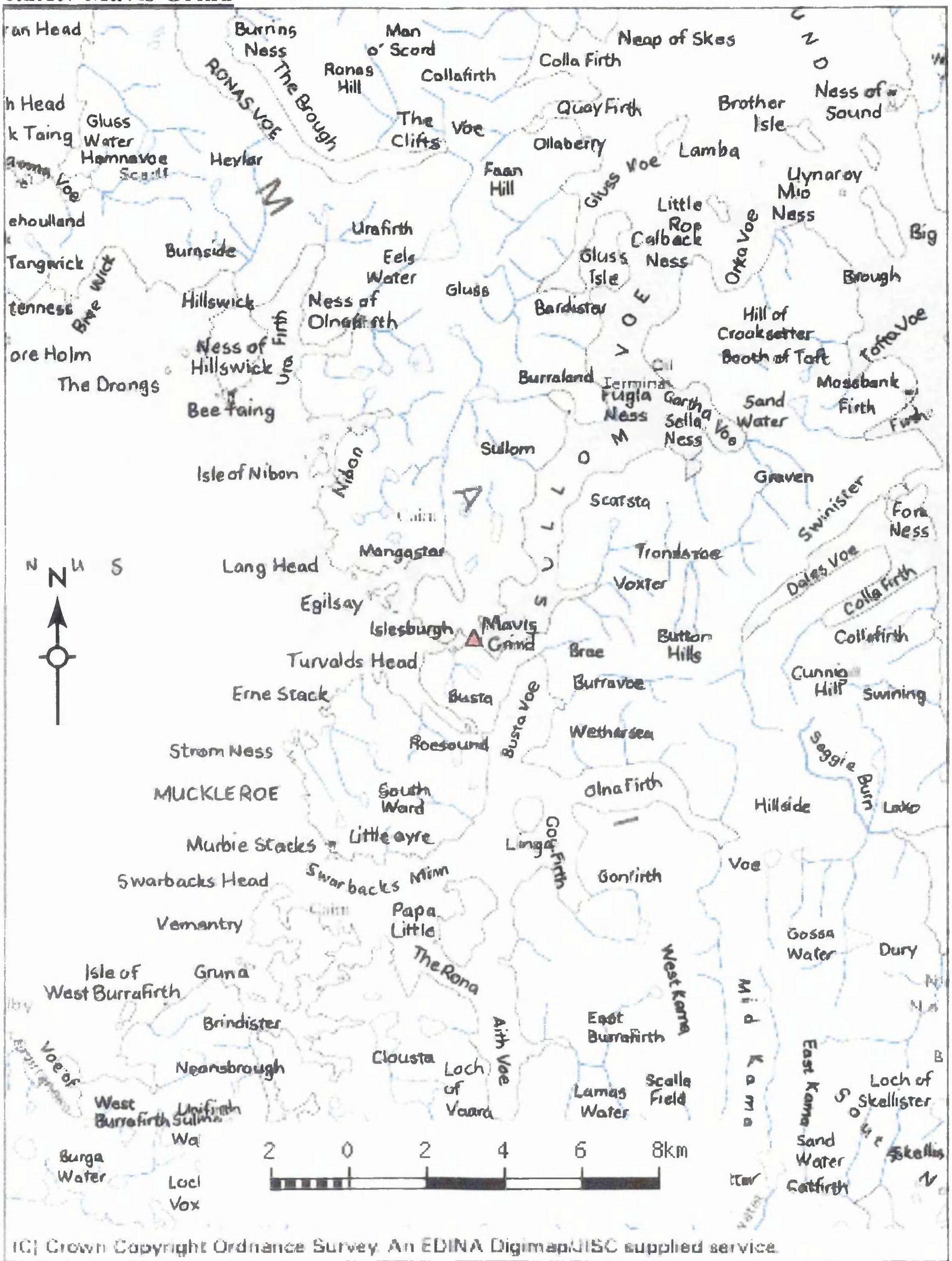


Figure 6.19: The red triangle indicates the traverse at the site of Mavis Grind. (After www.digimap.com 2000)

Site Name: Mavis Grind
Site Code: Ei1HU
OS Grid Reference: HU 340 684
Accessed by: St. Magnus Bay – Sullom Voe
Maximum Elevation above Sea Level: <10m
Minimum Distance Across: 100m

According to the *North Coast of Scotland Pilot* (1994:188), St. Magnus Bay is a large inlet between Matta Taing (60°17'N, 1°42'W) and Esha Ness, 12 miles N. This inlet is approximately 12 miles wide. Within this inlet are many smaller bays and inlets, one is the sheltered bay that leads to Mavis Grind. The entrance to this bay is extremely narrow (<12m) and can only be attempted by larger, beamier vessels, such as cargo vessels, during high tide. Because of this controlling aspect, this bay is one of the most sheltered available in Shetland. With the raging North Atlantic to the west, the option to wait for favourable wind and weather conditions in this haven is ideal (see Figure 6.19). Couple this with the opportunity to easily drag a smaller vessel, or even a larger one to an arm of the North Sea for access to the northernmost isles and eastern seaboard of Shetland and the ideal portage scenario develops.

The approach from Sullom Voe to Mavis Grind provides no real difficulty until the actual landing is reached and underwater obstacles are present which may cause some problems, especially in foul weather or spring low tides. It is noted that following the east shore, especially between The Narrows and the Ness of Haggrister will find the deepest water (*North Coast of Scotland Pilot* 1994:221). The shallow draught vessels of the Viking Age should have had no difficulty in navigating this watercourse to the landing at Mavis Grind.

According to the Faroese philologist Jakob Jakobsen (1936:36) and a personal communication from Doreen Waugh (1995), the portage point of Mavis Grind seems to serve as the best example of a portage site in Shetland. In addition to meeting all the normal requirements for a possible portage site; the short distance traversed, low topographical profile and place-name indicator, there is a good deal of ethnographic data supporting the importance of this site as a portage. This traverse would have saved a great deal of time and been less hazardous than sailing around the mainland.

The distance of the northern sea passage from within the mouth of Sullom Voe to Muckle Roe is approximately 70km, a journey which skirts many hazardous stretches of water and dangerous coastal areas with no havens from the weather if needed. The distance around the island along a southern route is so great as to not be considered a viable alternative. The approximately 100m portage is not only a shorter option, but can be accomplished without exposing the vessel or its cargo to the open ocean.

The chapter on experimental archaeology addresses the subject of traversing this site with a large cargo vessel, a difficult task, but the smaller vessels that would have been more commonly plying the coastal regions of Shetland would have no difficulty in making this traverse. The evidence supporting the use of this site as a dragging site is substantial. A letter (Shetland Archives: D.9/113b/38) was located in the Shetland Archives by archivist Brian Smith that provides an ethnological example for the use of this site for the dragging of traditional Shetland sixerns. This letter was from Barbara Johnson, Otterswick, East Yell dated the 25th of January 1941, to Peter Jamieson. Below are the relevant passages of this letter in the original text:

> "Weel, I am able to tell you the year and the month my father in law moved to Yell. It was in February, 1864. He told me the story or so much of it. He said they left Papa Stour before daylight with two sixerns. One had two cows and so much fodder (corn and hay) as was supposed to feed them till grass came, and the other sixern had him and his and two bairns, the oldest a gild 3 1/2 years, and a boy (my husband) 13 months. They reached Mavisgrind and had to disload everything and heave the sixerns across, then load again, and reached the beach of Otterswick [Yell] about 11 pm."
>
> *(Johnson 1941: D.9/113b/38)*

A journey such as the one related above exemplifies the distance by which a journey can be shortened by using the portage site at Mavis Grind. It can be assumed the two cows were employed as draught animals to facilitate an easy drag. Ms. Johnson also mentions another family (the Jamiesons) using the same route two years later.

Jakobsen suggests that the place-name 'Mavis' was formerly *Meved = *maef-eið* 'the narrow neck of land' (1936:36). 'Grind' being the Shetland dialect for 'gate' (Crawford 1995:pers. comm.). Jakobsen (1928, Pt.I, 264) also interprets 'Grind' as a framework with parallel sides with some sort of lattice or hurdle infill. This last explanation is not generally accepted. Thus, this site is known specifically as 'the gate of the narrow isthmus' (Cheape 1984:212, Jakobsen: 1926:90, 1897:85). Upon this site is located the boundary between Northmavine and the mainland. The name of the parish 'Northmavine,' is a corruption of 'Northmavid,' the ancient form of which is 'norðan mæv-eið'; 'north of the narrow isthmus.' It is in this form that it occurs in a deed of 26 August 1403(Jakobsen 1897:85). Cheape (1984:212) suggests that a narrow crossing such as this would provide an ideal control point for either economic or military reasons. This was the case of the Diolkos in ancient Greece and possibly the case of the Kanhave Canal in Denmark (for more detail on these sites see chapter 2). The likelihood of any of these portage sites being used as a control point of some sort is quite high as they provide an area that could provide an advantage to those who wish to cross in both shortening a journey and reducing the danger. Portage sites, such as this, could easily be exploited in their ability to act as a form of toll system, much in the way canals serve today. They provide an advantage to the mariner, and the controller of the area reaps some sort of benefit. It is also possible that the occupants of sites which were not as frequently traversed to procure some sort of personal compensation by assisting vessels in portaging. They could assist in the carriage of goods and vessels for the reward of trade goods or possibly labour in kind. The possible economic scenario that may have developed out of the portage scenario is discussed in greater detail in the section on portages in the maritime cultural landscape.

Mavis Grind is now a narrow isthmus, but the sea level off Whalsay *may* have risen at least 9m over the last 5000 years. If a similar rise had occurred at Mavis Grind, it could have *possibly* been as wide as 1 km [at one time], but would have still provided a logistically advantageous crossing point (Cracknell and Smith 1985:83). During the Viking Age, this location would have been an excellent area for regrouping and organising expeditions along the Shetland coastline. Both sides of this site offer not only sufficient depths for navigation and harbours sheltered from the elements, but they are also hidden from many direct lines of sight.

This isthmus of land is the narrowest point on the mainland of Shetland, bringing the North Sea and the North Atlantic into extremely close proximity. Mavis Grind is composed primarily of bedrock outcrops. The western landing from St. Magnus Bay has a very gradual sloping shore comprised mostly of medium pebbles. During WWII, concrete anti-landing bollards were placed in the inter-tidal zone. The crossing itself has a steeper incline to where it has been modified by the construction of the current road (A970) during the 1970's. The Sullom Voe landing slopes at approximately a 15° angle down a beach of medium pebbles and bedrock. This entire area has been affected by the construction of the modern road, which not only raised the elevation across the traverse, but also widened the isthmus, by a few meters. The shore was also altered by the addition of a breakwater upon which to lay the roadbed on the Sullom Voe side. Further details on the alterations performed to this site by the construction of the road can be found in chapter 7 on the "Borgundknarren" Expedition.

An underwater survey of the possible landing at Sullom Voe revealed a sharply sloping bottom composed primarily of large boulders and bedrock covered with a layer of silt. The small inlet which best facilitated itself to the landing and dragging of boats, contains a submerged ridge rising near the surface at low tide, as well as a submerged pinnacle which could also be a hazard. These both would have to have been considered by early mariners navigating into Mavis Grind with deep draught vessels.

The place-name, local tradition and history, geographical and topographical characteristics of this site make it an ideal site for dragging vessels or shifting cargo. That we were able to drag a cargo vessel across this site during the "Borgundknarren" expedition does not prove that the dragging of cargo vessels was a regular occurrence here, but serves as an example showing that even large vessels could be manhandled across this narrow isthmus. The likelihood that this site has been used as a portage as long as there have been maritime cultures in Shetland does not seem improbable.

6.2.1.8 Aith, mainland Shetland

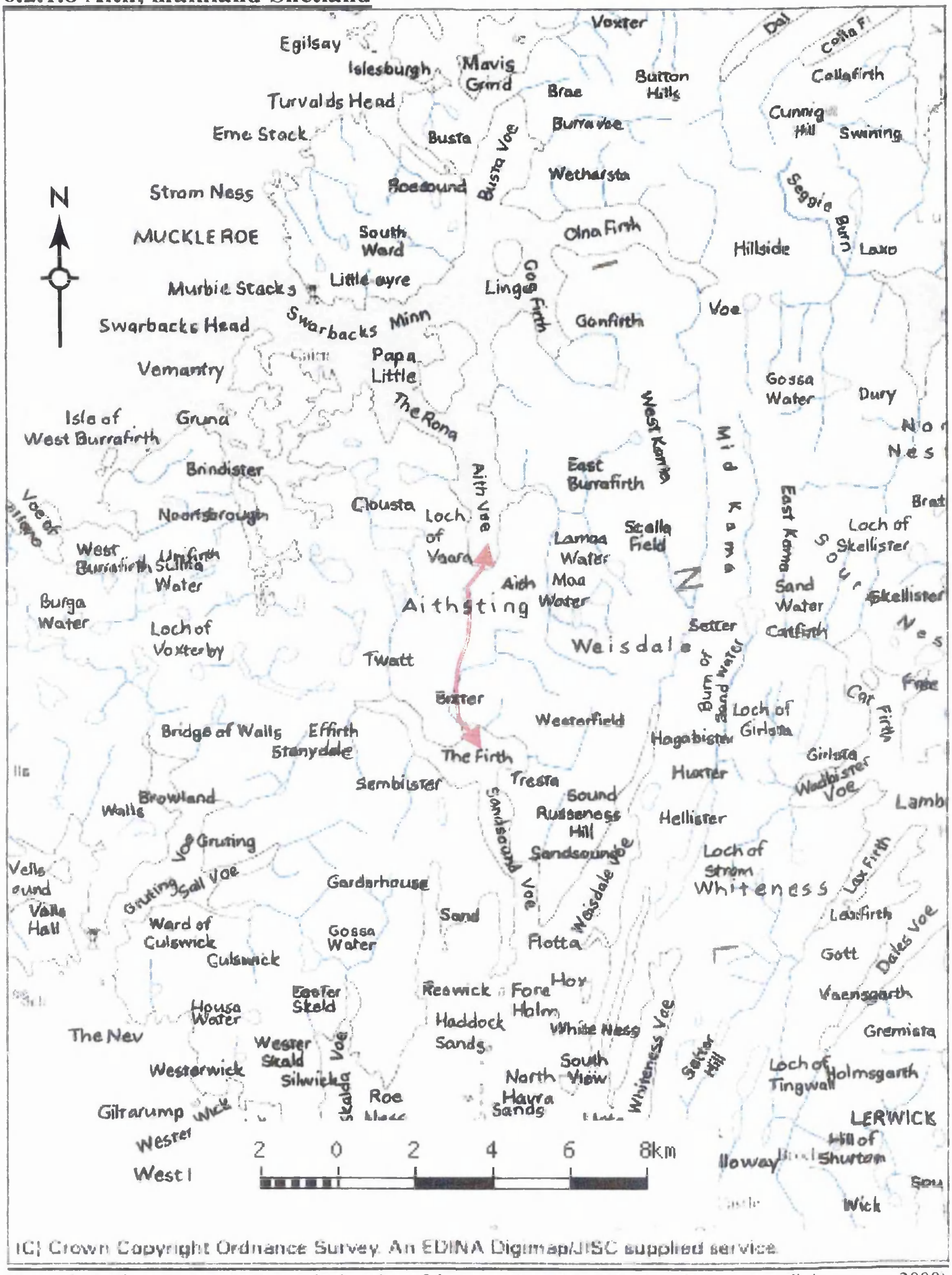


Figure 6.20: The red arrow indicates the location of the portage at Aith, Aithsting. (After www.digimap.com 2000)

Site Name: Aith, Aithsting, mainland Shetland
Site Code: Ei2HU
OS Grid Reference: HU 340 540
Accessed by: Effirth Voe (Bixter Voe) – Aith Voe
Maximum Elevation above Sea Level: <50m
Minimum Distance Across: 3920m

The *North Coast of Scotland Pilot* (1994:184) states that at the innermost part of the voe, a deep channel about 1 cable wide leading into The Firth, this having a sheltered basin with a wide portion with Tresta Voe to the E and Bixter Voe to the W. The head of Bixter Voe is called Effirth Voe and is only suitable for small craft. The tidal streams in this area are insubstantial.

The same source (1994:191) reports that the E side of Aith Voe is fouled by an above-water rock near the outer end of a spit extending 1 cable NNW from the shore. Smaller craft are able to find a good anchorage at the head of the voe.

This isthmus of land crosses the mainland of Shetland between Aithsting and Weisdale. A valley crosses this isthmus keeping the topographical variation to below 50m. The landscape of this traverse is now composed primarily of grazing land with some peat deposits. Along the line of least resistance in the main traverse from the south to the north, a small loch (Loch of Houster), is located (see Figure 6.20). On a portage of this magnitude, the presence of a small body of water could serve as either welcome assistance or as a nuisance. How it is viewed depends on many different factors; the main two being the size of the vessel and the size of the loch. For smaller vessels, the opportunity to quickly launch and row is a welcome rest, yet for larger vessels the logistics of launching and landing could pose more difficulty than benefit for a short traverse across a small loch. However, in the case of the traverse at the Loch of Spiggie, a large portion of the crossing can be accomplished whilst navigating inland lochs. The numerous variables involved in portaging at each individual site combine to provide a profile for each site and its potential use as a portage by the different types of vessels of the Viking Age.

The landing near Bixter is composed of a rocky shoreline with a gradual slope. The slope from the Voe to the turf is very gradual and steady. Throughout the valley there are small drainage gullies carrying the run-off from the surrounding hills. The landing in Aith Voe is of a similar composition; a rocky shoreline with a gradual slope. The village of Aith is located at the head of the voe and therefore some alteration to the coastline has occurred.

Crawford (1987:24) has also mentioned this site as a possible portage site even though it is quite long and the topographical variation is high. When compared to some of the longer drags in Norway, the potential of this site as a portage becomes more realistic. The use of this isthmus as a portage involving the dragging of vessels is an issue of contention. Dragging a vessel this distance, over a topographical variation of this degree would require a vast amount of effort. If it were to occur here, It is possible that the use of draught animals would be necessary. An alternative to dragging a vessel across would be to unload the cargo and transport it across the isthmus, to be reloaded onto other vessels at the other side would be an advantageous manoeuvre. Even hauling smaller vessels, such as a færing would be a minor operation. Sailing around the western extremity of the mainland proves a hazardous and long journey to these smaller vessels, therefore a drag at this site may have occurred. Both sides of this portage afford a sheltered harbour that would be ideal for the loading and offloading of cargo. The traverse across this site is fairly flat and featureless in comparison to risking the sea journey around the coast (see Figure 6.21). For these reasons alone it is possible that this site was used a portage, either for the dragging of smaller vessels or for the movement of cargo to other vessels.

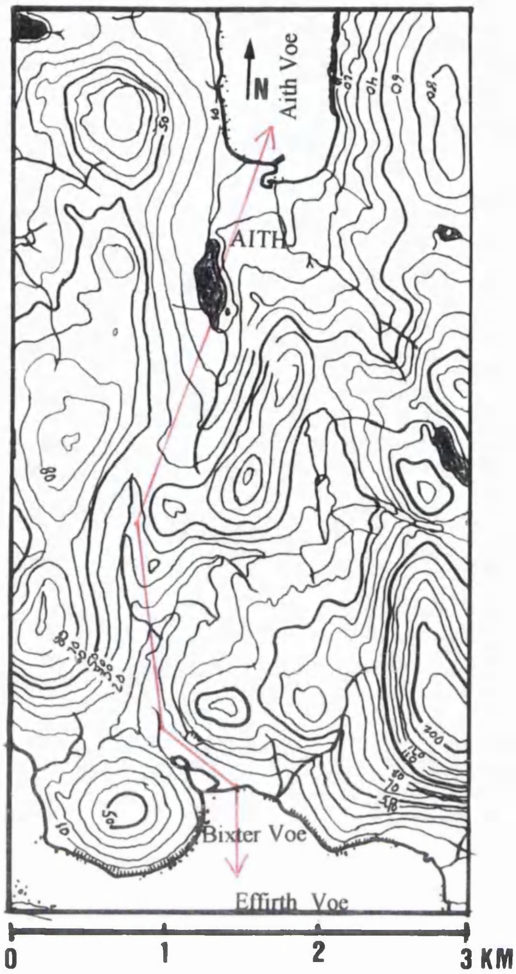


Figure 6.21: Topographical map showing the route of the traverse at Aith and the surrounding topography. (Illustration: Author)

To the west of the village of Bixter is another portage possibility. This traverse is from Gruting Voe to Bixter Voe across the site of Effirth. The possibility of this being a portage site is recognised by the place-name Effirth [Aid-firth], as mentioned by Jakobsen (1897: 113). This site is similar to the possible portage site at Loch of Spiggie in the South Mainland, as it includes numerous lochs in the traverse. The high occurrence of "Aith" place-names is Shetland has required a restriction on the amount of sites with this name to be included in this investigation. There are many other sites which do not contain that place-name which are just as likely to have served as portages in the Norse maritime landscape.

6.2.1.9 Brae

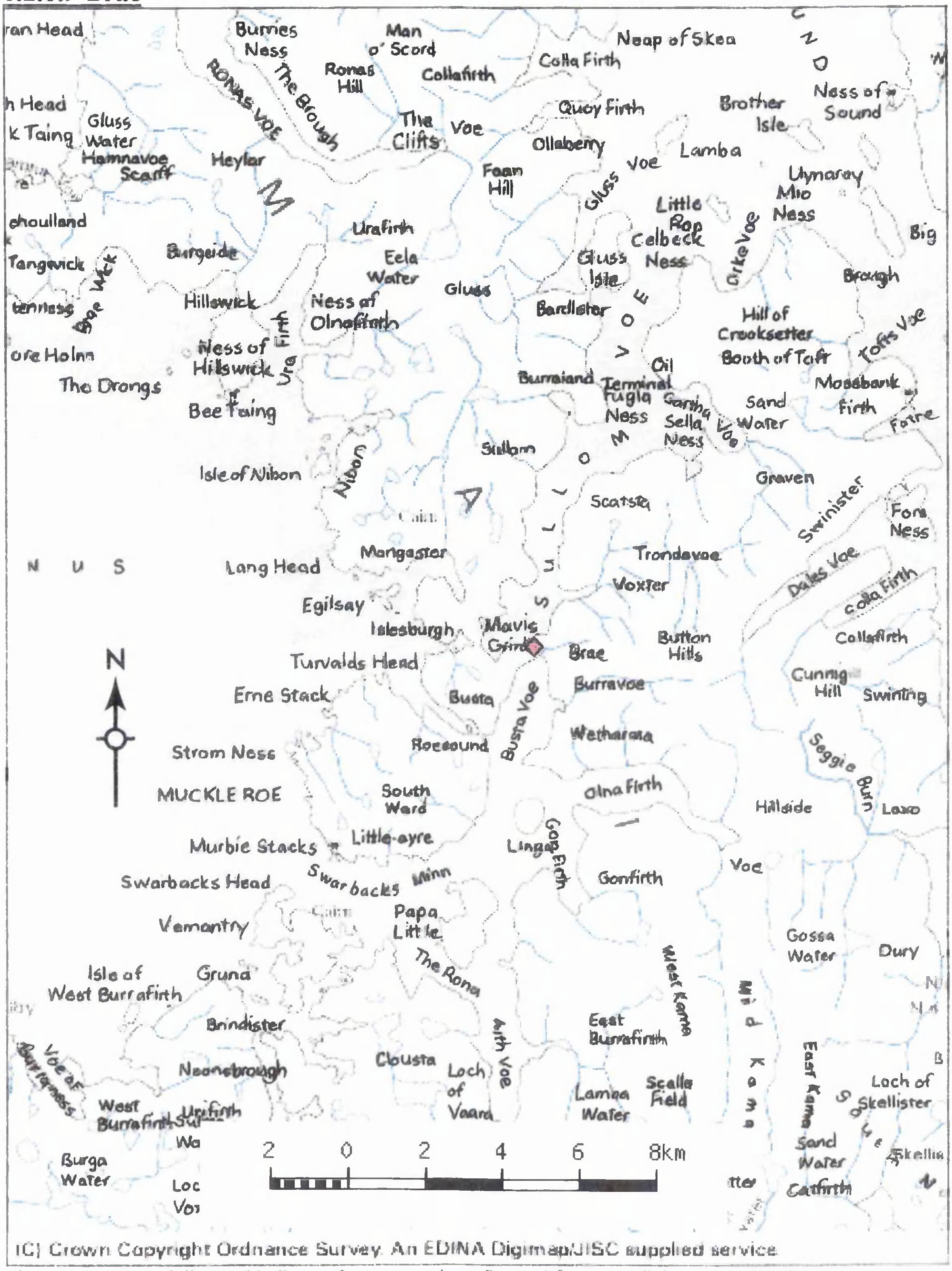


Figure 6.22: The red diamond indicates the portage site at Brae. (After www.digimap.com 2000)

Site Name: Brae, mainland Shetland
Site Code: Ei3HU
OS Grid Reference: HU 357 683
Accessed by: Busta Voe – Sullom Voe
Maximum Elevation above Sea Level: <10m
Minimum Distance Across: 580m

Busta Voe is a straightforward anchorage offering deep water towards the centre and providing fine shelter. No substantial navigational difficulties are noted.

The approach from Sullom Voe to Brae provides no real difficulty. It is noted that following the Eastern Shore, especially between The Narrows and the Ness of Haggrister will find the deepest water. All of this data is from the *North Coast of Scotland Pilot* (1994:221). For more information on the conditions in Sullom Voe, see the section on Mavis Grind (above).

The navigation of both of these bodies of water is without difficulty as long as the fairway is maintained, and care is taken when landing. Both landings at his site are composed of gradually sloping beaches would provide no difficulties to the experienced mariner in a shallow draught vessel.

This site is a low-lying isthmus that, in addition to Mavis Grind, forms a dividing point between Northmavine and mainland Shetland. The landing at Busta Voe is composed of a gently sloping sand and pebble beach, leading up to flat pastureland with minimal topographical variation across the whole of the isthmus (see Figure 6.22).

The landing at Sullom Voe is composed of a very gently sloping beach of small – medium pebbles. The entirety of this site is very low and flat. This site, like Mavis Grind, affords an opportunity to cross from the North Sea to the North Atlantic. When evaluating the crossings at both of these sites, the obvious choice would be Mavis Grind. The only advantage to crossing at Brae is that the peninsula of Muckle Roe can be avoided and a sheltered harbour can be had in Busta Voe. From here easy access can be had to numerous areas of the Northeast Mainland, while maintaining reasonably sheltered conditions.

Brae also contains the [eið] place-name designating an isthmus or narrow neck of land joining two bigger places together (Jakobsen 1897:85). In this case it is considered a contracted form of "Brai-ai"; during the time of Jakobsens writing some of the older generation still pronounced it in this way (1897:85). The Old Norse version of this place-name is [breið-eið], meaning literally the broad isthmus, which is to distinguish it from the narrow isthmus at Mavis Grind to the North (Jakobsen 1897:85, 1928:139). Because of the close proximity of these two traverses, it is easy to see the importance of sheltered Sullom Voe to the navigation in and around Shetland. It is for these reasons that Brae remains an ideal site for inclusion in the formulation of a portage criterion. It provides yet another alternative to sailing around a large section of mainland Shetland when transporting men and cargo via the sea roads.

6.2.1.10 Aith, Bressay

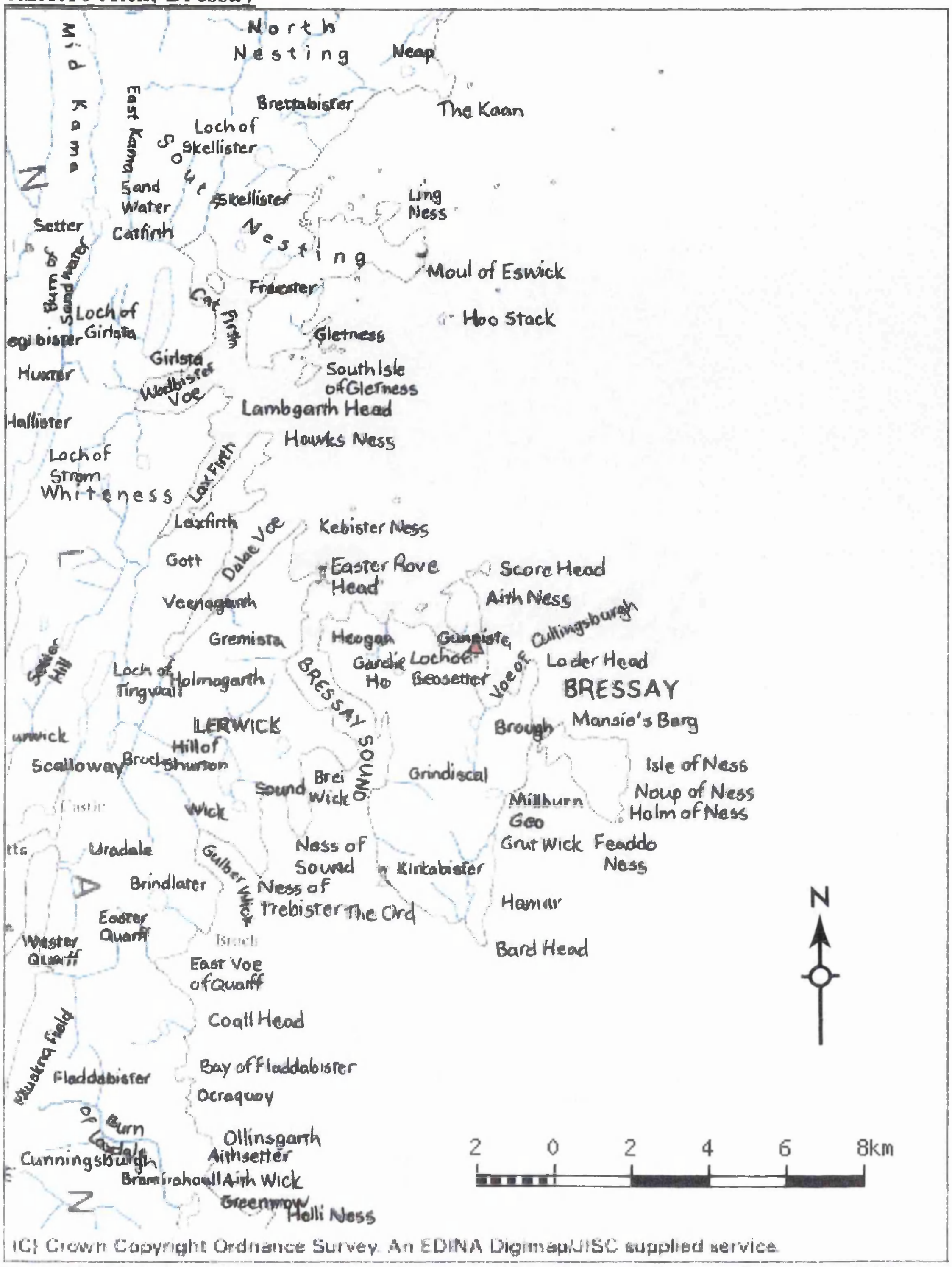


Figure 6.23: The red triangle shows the portage location at Aith on Bressay. (After www.digimap.com 2000)

Site Name: Aith, Bressay, Shetland
Site Code: Ei4HU
OS Grid Reference: HU 513 438
Accessed by: Aith Voe – Voe of Culbingsburgh
Maximum Elevation above Sea Level: <10m
Minimum Distance Across: 125m

The *North Coast of Scotland Pilot* (1994) does not make any mention of Aith Voe or the Voe of Culbingsburgh. But it does give some general information about Bressay (*North Coast of Scotland Pilot* 1994:200). Haswell-Smith (1996:354) relates that in Aith Voe there is secure anchorage and sheltered conditions in all weather. The south and east coasts of Bressay are generally recognised by the presence of high, precipitous and steep-to cliffs with the north and west sides generally being lower and rocky (*North Coast of Scotland Pilot* 1994:200). The tidal stream in this area runs north to south and can be fairly strong off Moul of Eswick and other salient points, but once open ocean is reached they are probably weak (*North Coast of Scotland Pilot* 1994:201). Being directly exposed to the North Sea would lead one to believe that during the winter months it is likely that this island experiences its fair share of extreme weather. It is on this basis that it may be worthwhile to drag a vessel or carry cargo across the island at this point (see Figure 6.23).

This site occupies a narrow isthmus on the island of Bressay, Shetland. It is a low-lying stretch of land that essentially connects Aith Ness to the main part of Bressay. This traverse could possibly shorten the approximately 7.5km journey into the North Sea, from one side to the other. This crossing falls within the realm of a micro-topographical portage scenario. If this site were ever used to drag vessels over, it is probably due to extreme weather or the carriage of small coastal vessels. This may be a site where the place-name was given to the landform as a description of it being an isthmus or head of land, and it may not refer to any dragging activity occurring at this point. Even so, that the possibility exists that vessels were dragged over this isthmus at some point in time, therefore this site should be included in the assessment of portages on micro-topographical scale (see Figure 6.24).

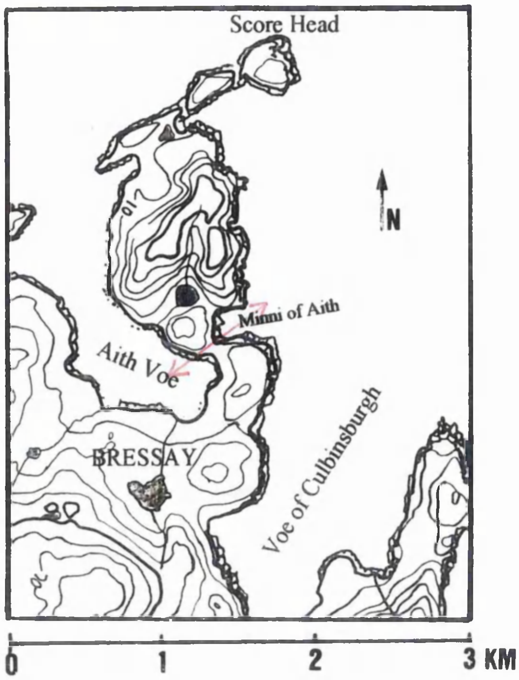


Figure 6.24: Topographical map showing the location of the traverse at Aith on Bressay. (Illustration: Author)

6.2.1.11 Aith, Fetlar

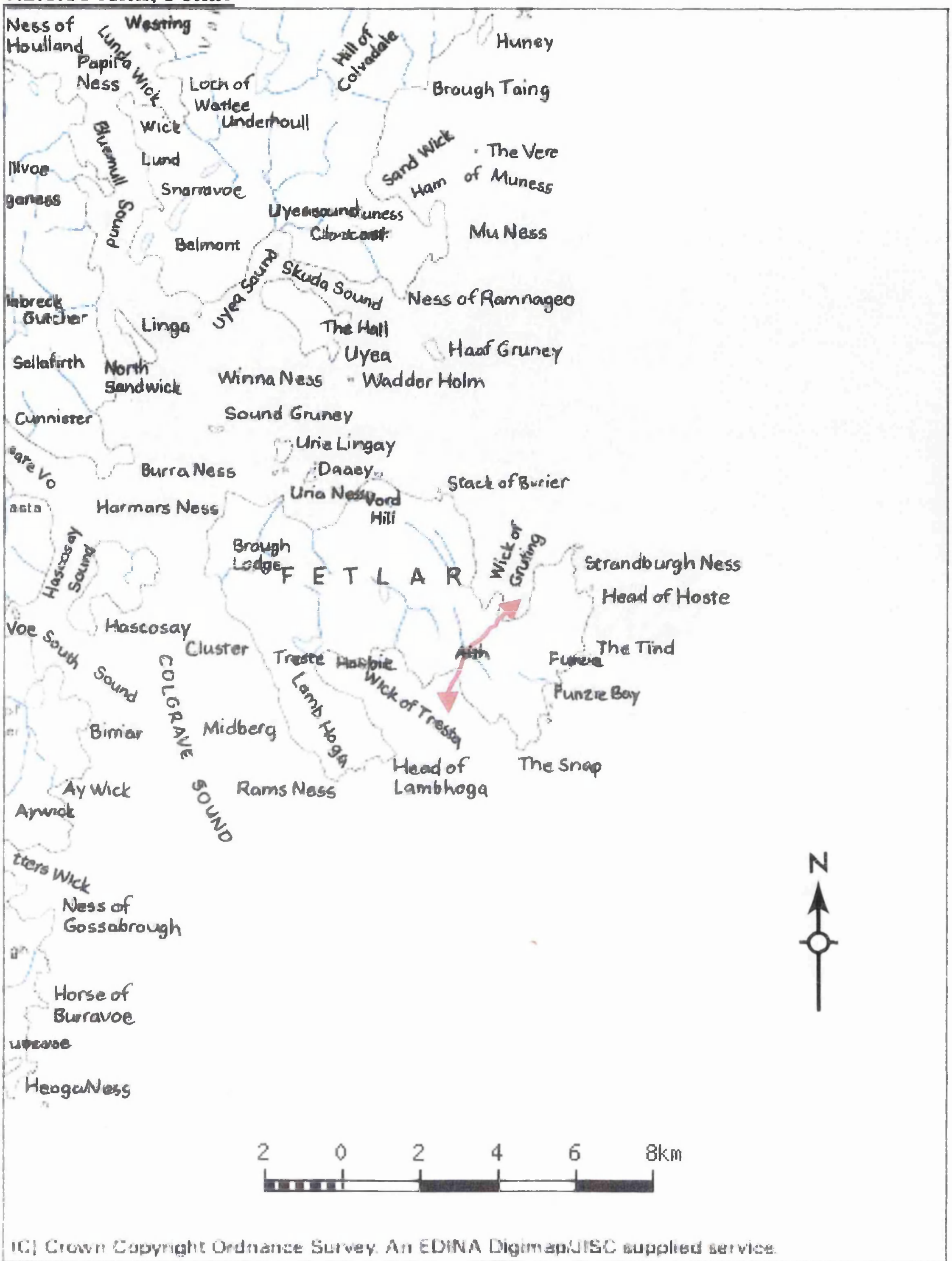


Figure 6.25: The red arrow indicates the traverse across Fetlar at Aith. (After www.digimap.com 2000)

Site Name: Aith, Fetlar, Shetland
Site Code: Ei6HU
OS Grid Reference: HU 645 906
Accessed by: Wick of Tresta – Wick of Gruting
Maximum Elevation above Sea Level: <20m
Maximum Distance Across: 1670m

The *North Coast of Scotland Pilot* (1994:227) gives the following information about the Wick of Tresta. The shores of the Wick of Tresta are bold and clear of any dangers beyond offshore. The bay is exposed to the SE and W gales can raise a considerable swell. When entering the bay caution should be exercised to avoid a submerged rock. Once in the bay, all points should be given a berth of at least 1 cable. This bay provides a good anchorage and the bottom composition is of stiff grey sand.

The Wick of Gruting is an inlet on the N coast of Fetlar providing access to the landing on site Ei6HU. The *North Coast of Scotland Pilot* (1994:227) reports that both sides of the bay are clear of dangers more than 1 cable offshore. The Ness of Gruting, a small cliff promontory sticks out at the head of the bay. This bay provides a good fair weather anchorage with good holding sand (see Figure 6.25). Both of these Wicks provide good shelter and anchorage (Haswell-Smith 1996:392).

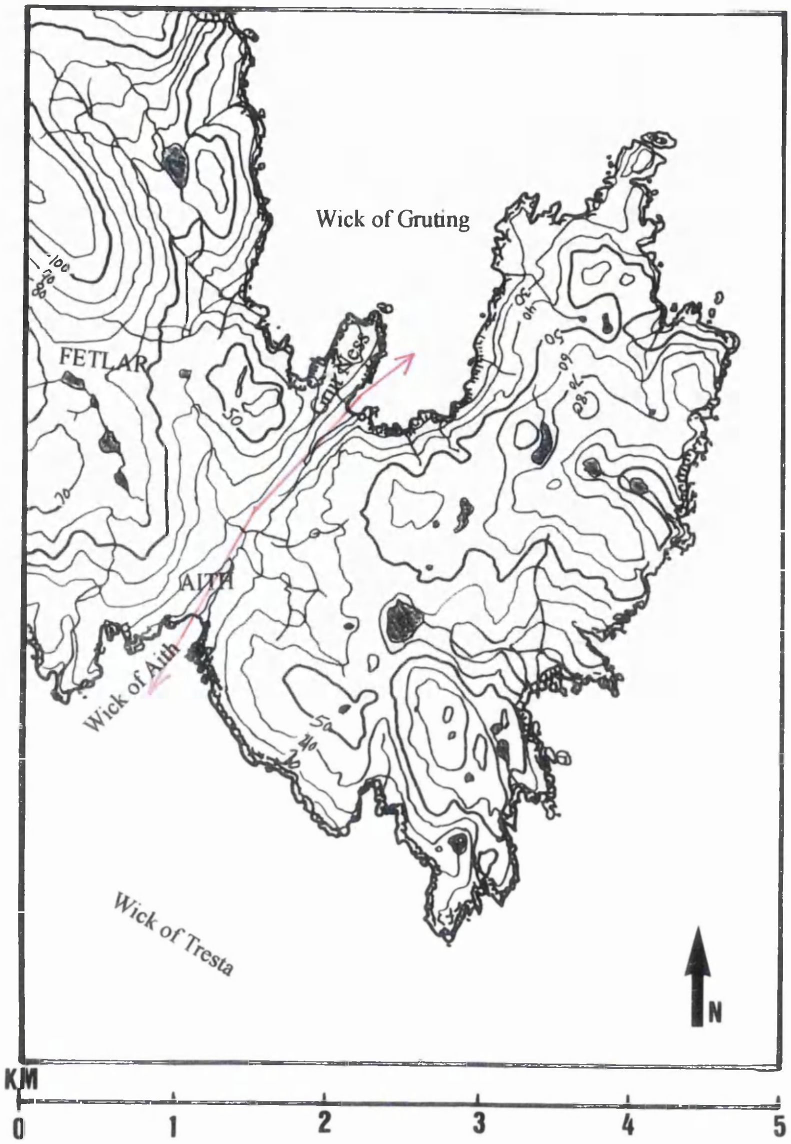


Figure 6.26: Topographical map showing the possible traverse at Aith, Fetlar. (Illustration: Author)

This is another site that falls into the micro-topographical portage scenario. This site is a low-lying isthmus that traverses the E end of Fetlar. The valley located here keeps the topographical variation to a minimum (see Figure 6.26). This valley contains a number of drainage's providing a run-off system for the neighbouring hills.

A crossing at this point would only be advantageous during either extreme weather or unusually strong tidal stream activity. For a small vessel or cargo this could possibly provide an alternative to venturing into the North Sea or taking the journey around the island. Again, this site is possibly using the "Aith" place-name to describe the physical attributes of a geographical feature. The shortest (eastern) sea route around this isthmus is approximately 11km, so this traverse would save considerable time when shifting cargo, but when putting the island into its maritime perspective, both sides are easily accessible from either Unst or Yell. The southern route does, however involve navigating the Colgrave Sound around Rams Ness in order to enter the haven of the Wick of Tresta.

As this reasonably narrow neck of land has, on both sides, reasonable anchorage, it can serve as an example of a portage in the micro-topographical maritime landscape as it could be used as a portage, but not as part of a regularly travelled navigational route.

6.2.1.12 Aith, Cunningsburgh

Figure 6.27: The red arrow indicates the location of the possible portage site at Aith, Cunningsburgh. (After www.digimap.com 2000)

Site Name: Aith, Cunningsburgh, mainland Shetland
Site Code: Ei5HU
OS Grid Reference: HU 443 296
Accessed by: Aiths Voe – Aiths Wick
Maximum Elevation above Sea Level: <20m
Minimum Distance Across: 290m

The *North Coast of Scotland Pilot* (1994:199) reports that Aith Voe is narrow and shallow but provides a useful boat haven (see Figure 6.27). Both of the shores are foul and the entrance must be carefully navigated due to obstruction by rocks. Aiths Wick is a small bay that also requires careful navigation to obtain clear passage.

This site is a low-lying isthmus that lies between Cunningsburgh on the mainland and the Point of Pundsta and Helli Ness. There is a slight rise in the direct route from Aiths Voe to Aiths Wick, but a minor deviation keeps the topographical variation to a minimum. Even so, for the short distance of this site the topographical variation could provide some difficulty for larger vessels or cargoes. The route around the eastern point of the peninsula would provide a preferable passage for all but the smallest of vessels. For this reason, this possible portage site is also deemed to fall within the realm of the micro-topographical portage scenario. It could prove quite valuable for small-scale localised fishing activity or coastal transportation of goods, as it would provide a shortcut in the close coastal navigation of this area. Jakobsen (1897:85) mentions this site as having the "Aith" place-name, as do so many in Shetland and Orkney.

The next geographical area to be addressed in this thesis is the Orkney Islands. Like Shetland, this group of islands has had a past closely linked with Scandinavia, and the maritime traditions of Orkney have continued to reflect this (Allen 1994).

6.2.2 The Orkney Islands

In Orkney, as in Shetland, circumstances also exist which would favour the use of portages over long and harrowing journeys around the islands. Two of the places which are believed to have been portage sites, as indicated by their place-names, are Scapa [ON *Skalp eið*; isthmus of the divide/ship] and Eday [ON *Eiðey*; isthmus isle] (Marwick 1952:100,174). The possibility for numerous other portage place-names also exists in Orkney (Crawford 1987:24), not to mention the possibility of portages occurring in geographically and logistically advantageous areas that may or may not have a place-name that designates a portage. MacBain (1922:90) provides numerous examples of the ways in which the [eið] place-name can be corrupted from its recognised form as 'Aith'. These include the less conspicuous 'Haugs-eid' that has become Hoxa; and as mentioned earlier 'Eidh-ey', which has become Eday; and 'Skalp-eidh' which is now Scapa. Using the accepted interpretations of the Old Norse place-names it is possible to use these to help in the identification of possible portage sites in Orkney. Many of these sites are obvious choices based upon the great advantage offered by a minor traverse. The following sites were chosen to try and provide a representative sample of the portage possibilities available in the Norse Maritime Landscape of Orkney.

Orkney, like Shetland has a coastline not entirely unlike that of Norway. Granted, there are more gently sloping beaches than are observed on the West Coast of Norway, but the possibility of an easy landing and re-launching is a welcome sight. There has also been a great deal of change to the coastal regions of Orkney by the addition of the Churchill Barriers and numerous harbour constructions affecting the natural processes of coastal geomorphology. All of these factors have combined to make for a difficult assessment of the portage scenario in Orkney in its current state. Yet, the place-names, topographical relief, and admiralty aspects of navigating in these waters can point to areas that would have most likely served as portages for either vessels or cargo or both. As stated earlier, this investigation is not meant to be a catalogue of known or possible portage sites. It is intended as a presentation of the most likely scenarios in the various geographical areas of Scotland to formulate a criterion for the portaging of vessels and cargo in the maritime cultural landscape of Norse Scotland. Even then, it is most likely that these sites were used as portages before the arrival of the Vikings and continued long after. The sites in Orkney fall into both the micro- and macro- topographical scenarios and will be discussed on their individual merits.

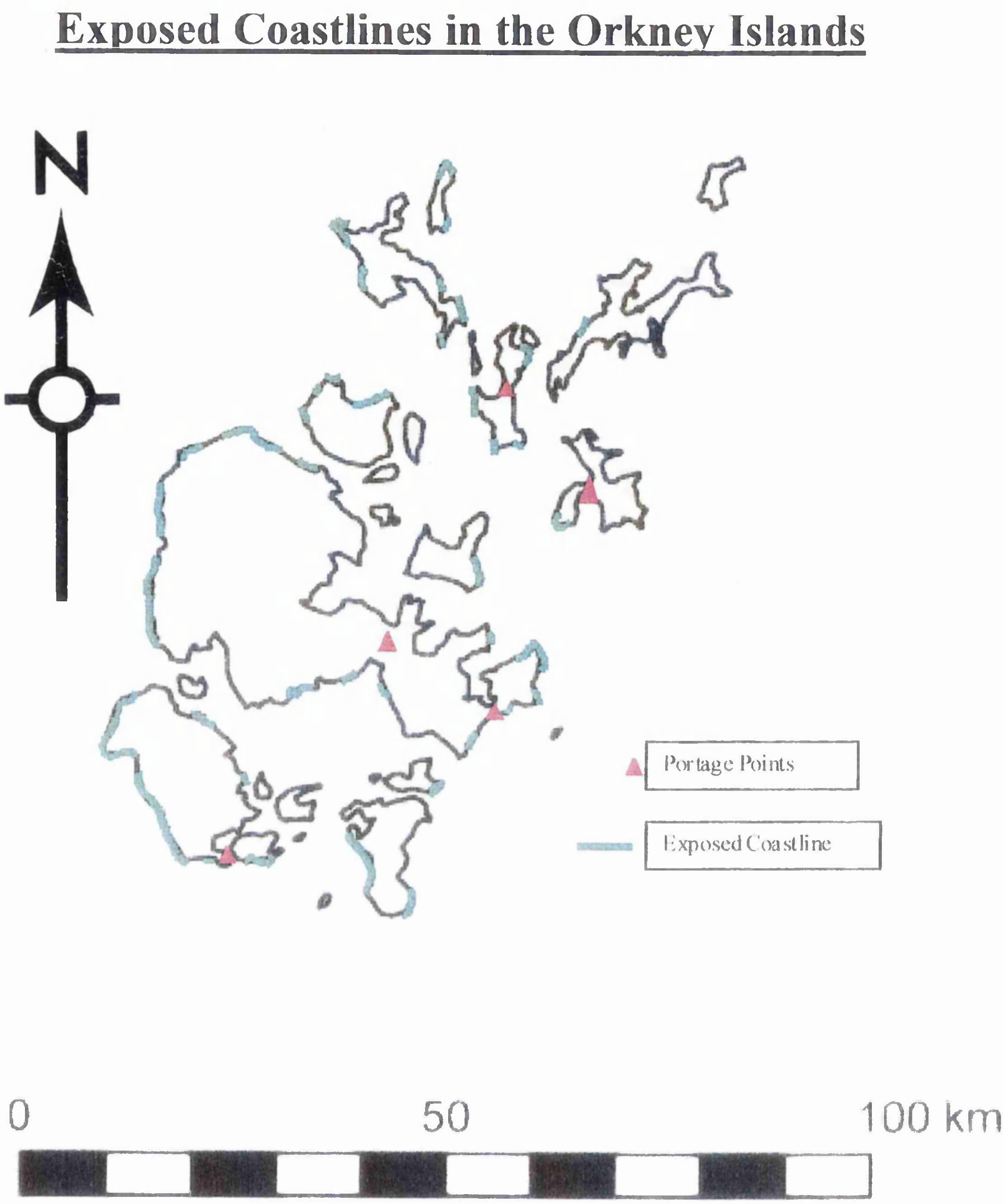


Figure 6.28: The exposed coastline of Orkney. (Compiled with data from Admiralty Nautical Charts and Ordnance Survey Maps)

Portage Sites in the Orkney Islands

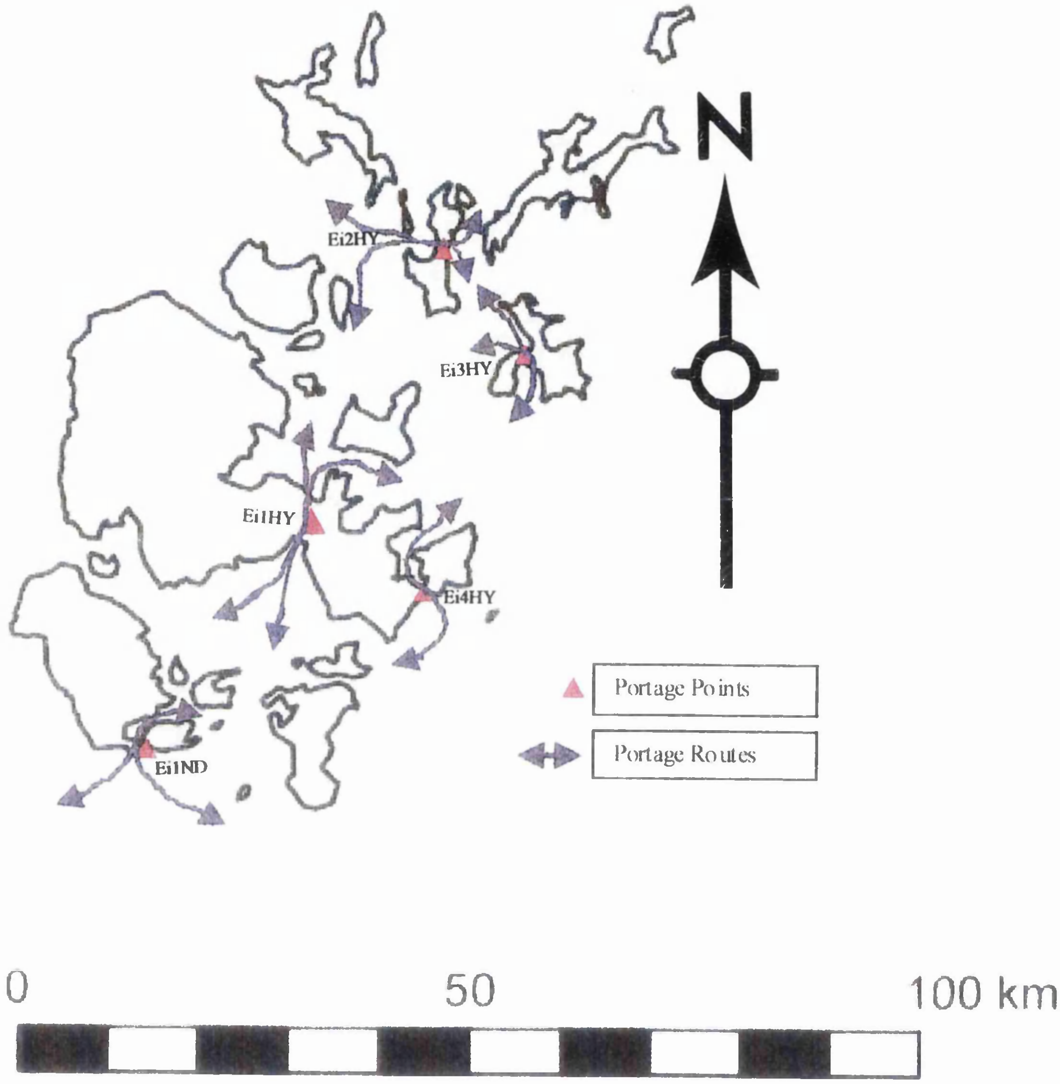


Figure 6.29: General location of portage points and routes in Orkney. (Illustration:Author)

Tidal Streams Around Orkney

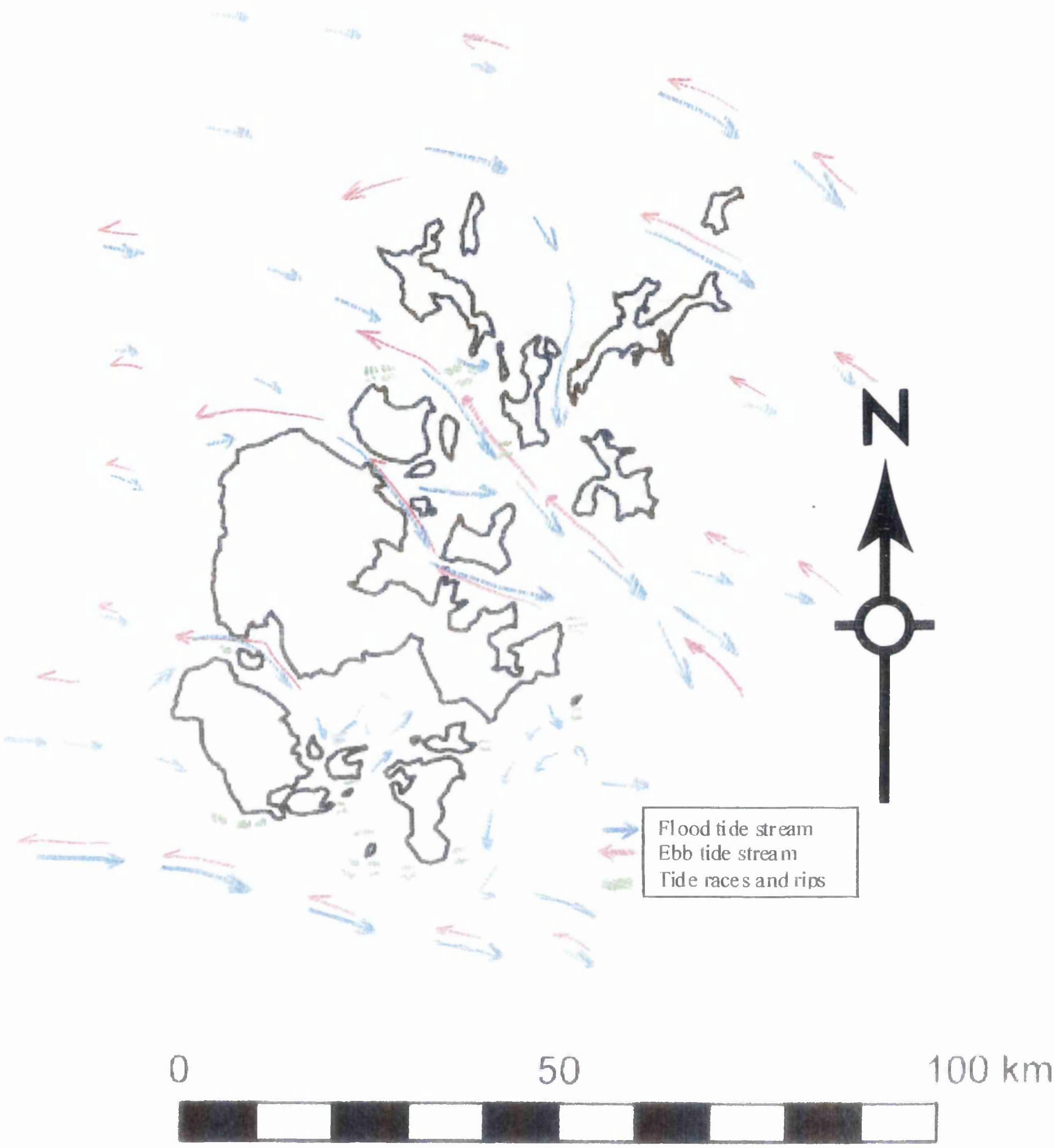


Figure 6.30: General flow of the tidal streams around Orkney. Data derived from the Atlas of Tidal Streams for Orkney and Shetland and the Admiralty Charts.

6.2.2.1 Scapa

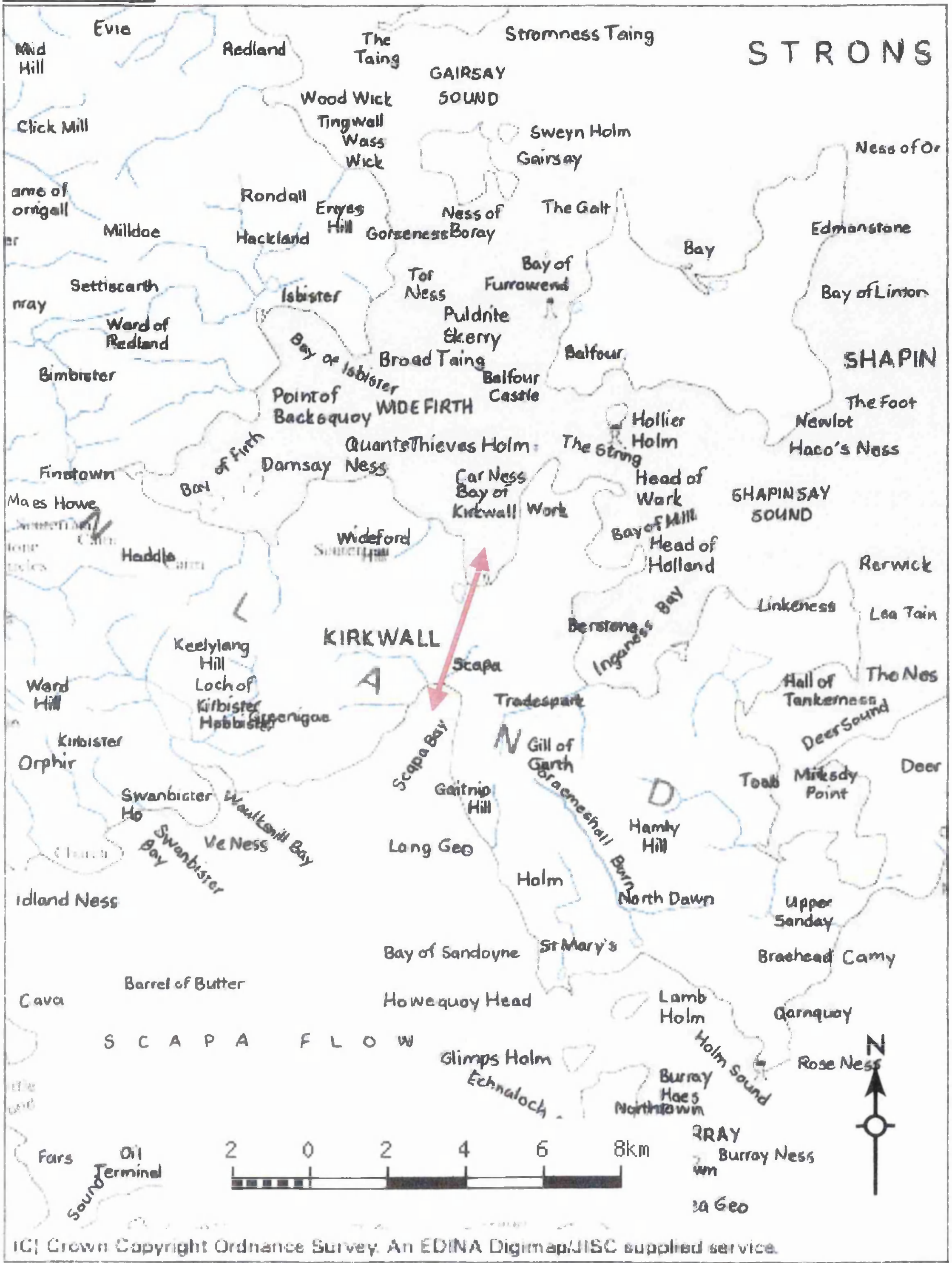


Figure 6.31: The red arrow indicates the route of a possible traverse from Scapa to Kirkwall, Orkney. (After www.digimap.com 2000)

Site Name: Scapa, mainland Orkney
Site Code: Ei1HY
OS Grid Reference: HY 447 100
Accessed by: Scapa Bay – Bay of Kirkwall
Maximum Elevation above Sea Level: <10m
Minimum Distance Across: 2575m

The *North Coast of Scotland Pilot* (1994:137) describes Scapa Bay as having shallow banks on the East– West, with the West bank occupying nearly half the bay. To enter the bay one must avoid the shallow banks and Scapa Skerry, where a group of dangerous rocks lay on the Southeast of the west bank. In any other weather besides a Southwest wind the bay provides a good shelter. The head of the bay nearly dries and is the main run-off point for the isthmus.

The Bay of Kirkwall is exposed to the North winds, but these do not cause any significant problems. The waterfront in this area has been significantly modified throughout the ages in such a manner that is becomes difficult to access the original landing or shoreline. Yet it is possible to visualise that this area provided a secure anchorage, sheltered harbour and attractive landing. This is normally a prerequisite to the establishment of a major settlement, in this case Kirkwall; and the harbour location and maritime landscape of bay area reinforces this conclusion (see Figure 6.31).

This site where the traverse would have taken place is a wide, low-lying isthmus of land dividing mainland Orkney from Kirkwall to Scapa. This area is now primarily dedicated to the grazing of cattle and industrial development. The landing at Kirkwall has been highly modified in recent times to accommodate the harbour.

The Scapa landing has also been modified with the addition of a seawall and Coast Guard station. Across the isthmus the land has been cleared, but the basic topography still remains. The shore is gently sloping and is comprised of a sandy bottom with some small cobbles throughout. This makes an ideal landing for the shallow draft vessels of the Viking Age.

As previously mentioned, this site contains a corruption of the Old Norse [eið], in the place-name ON [skalp-eið] or the *skip isthmus* (MacBain 1922:90,57; Marwick 1952:100; Crawford 1987:24). This portage would allow one to avoid venturing out into the open waters of the North Sea or the North Atlantic by crossing the isthmus in a North-South direction eliminating approximately an 80km sea journey around the western extremity and approximately a 45km journey around Mull Head to the east. Of course this distance can be different depending on your departure point and destination, but for the most part this approximately 2.5km portage would provide a viable alternative to a long journey which may involve the open sea.

6.2.2.2 Aith, South Walls

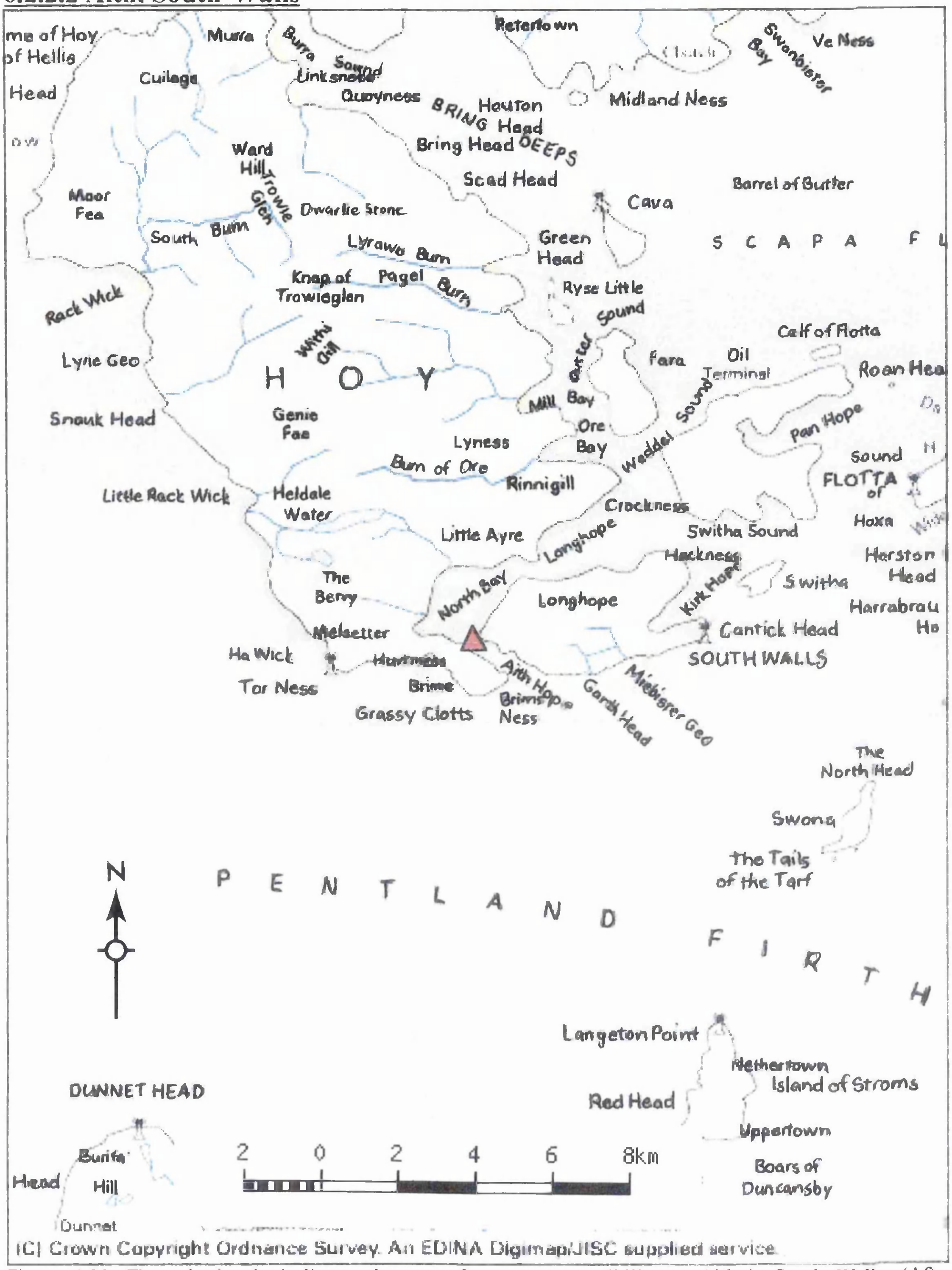


Figure 6.32: The red triangle indicates the area of a portage possibility at Aith in South Walls. (After www.digimap.com 2000)

Site Name: Aith, South Walls, Orkney
Site Code: Ei1ND
OS Grid Reference: ND 288 892
Accessed by: North Bay (Long Hope) – Aith Hope
Maximum Elevation above Sea Level: <5m
Minimum Distance Across: <25m

According to the *North Coast of Scotland Pilot* (1994:122), Aith Hope does not provide for a secure anchorage, but it can be used to provide shelter from the North winds in depths of 6-11m, which in the case of any Viking Age vessels is more than sufficient. North Bay is the innermost part of Long Hope that extends more than 3 miles WSW between South Walls and Hoy. The main channel leading through Long Hope lies in the centre and attention must be paid to obstacles that may or may not be visible, depending on the tide. This area requires careful navigation and local knowledge is advantageous.

The possible portage site located at Aith in South Walls, Orkney is an extremely narrow isthmus connecting South Walls to Hoy. On both landings, the shoreline was made up of primarily small – medium pebbles leading into a gradually sloping sandy bottom. On the western section of the Aith Hope side, a spit of cobbles juts out into the Hope providing an ideal habitat for heavy kelp cover. In sections of this site bedrock outcrops can be observed, but the site is primarily composed of shifting sand (see Figure 6.32). Randomly scattered upon the remainder of the gently sloping bottom were a few small-medium cobbles. The stability of this isthmus seems in part to the modern road constructed upon it, although this would be a contradiction to the normal interpretation of coastal geomorphologic processes.

Figure 6.33: A view from the east of the isthmus of Aith in South Walls. (Photo:Author)

This narrow strip which connects South Walls to Hoy seems as though it may have been an extremely unstable stretch of land throughout its history. A severe storm could easily wash over this strip of land causing severe erosion. On the other hand, the easy traverse over this strip of land would make it possible for a vessel to easily reach the sheltered harbour of the North Bay of Long Hope. A traverse at this point would enable one to cross from the Pentland Firth to this sheltered bay in an extremely short distance (see Figure 6.33), as opposed to the approximately 13km sea journey around South Walls; plotted from the mouth of Aith Hope to a secure anchorage in the North Bay. Due to the short advantage gained by a portage at this location, this crossing would fall in to the realm of a portage in the micro-topographical landscape. This type of portage most likely did not have a great effect on the large-scale navigation of Scotland and the Isles. It does open the possibility for transport to take place in and around a localised region during extreme weather or out of the generally accepted parameters of a summer sailing season by allowing passages in the open sea to be avoided. For this reason, the micro-topographical navigation within groups of islands, and even the navigation of a single island, is as important as the longer routes used by mariners when travelling from groups of islands onwards.

6.2.2.3 Mid Eday

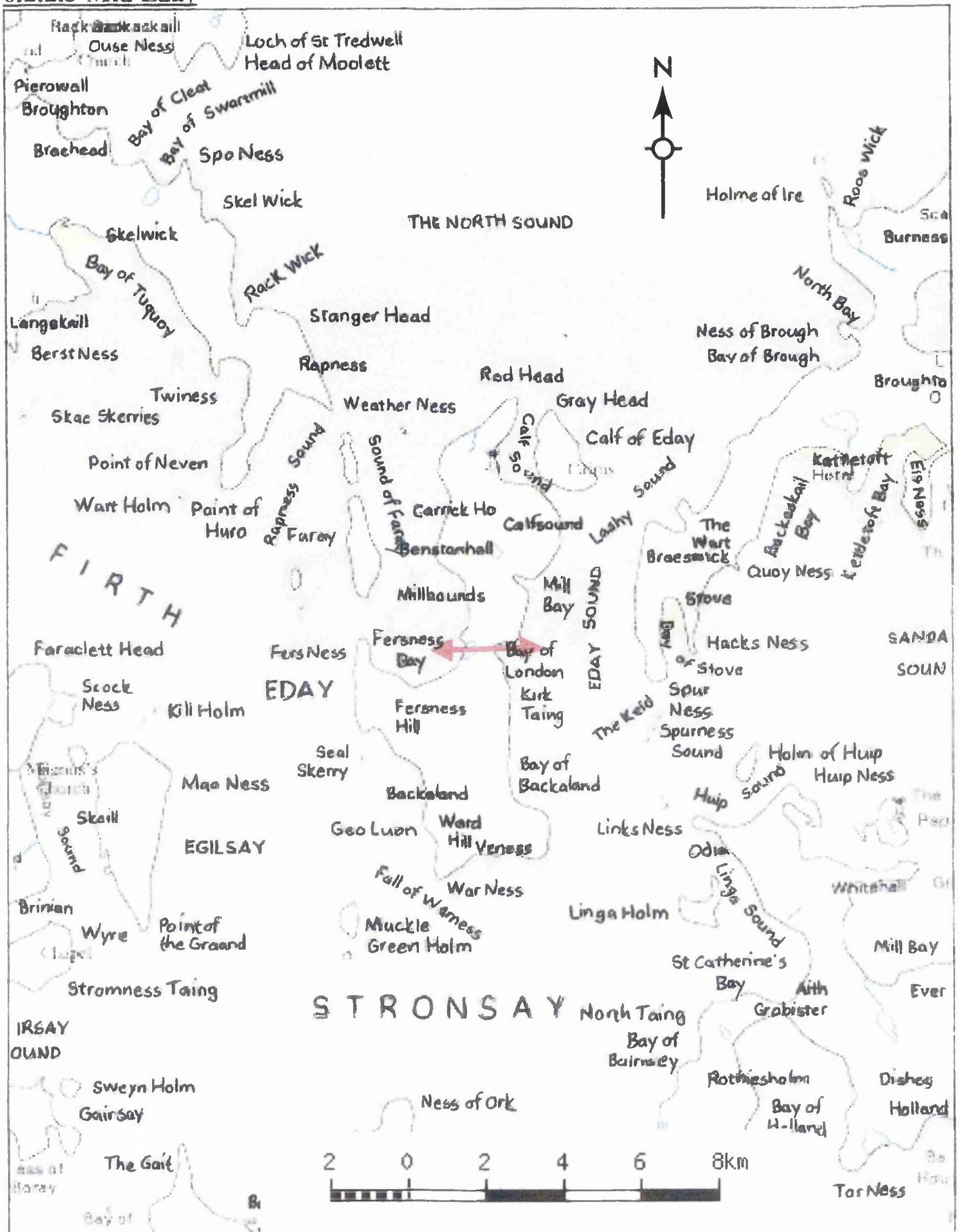


Figure 6.34: The red arrow indicates a possible traverse over the centre of Eday. (After www.digimap.com 2000)

Site Name: Mid Eday, Eday, Orkney
Site Code: Ei2HY
OS Grid Reference: HY 561 343
Accessed by: Fersness Bay (Sound of Faray) – Bay of London (Eday Sound)
Maximum elevation above Sea Level: <10m
Minimum Distance Across: 650m

The *North Coast of Scotland Pilot* (1994:159) reports that the tidal streams running through Eday Sound increase in strength both north-going and south-going, but that the south-going tidal stream is appreciably stronger. Spurness Sound affects the tidal action in Eday Sound so that the south-going stream may vary between 145° and 160° and the North-going between 280° and 360°. A north-going tidal stream tends to form a south-going eddy along the East Side of Eday.

The western landing for this site is reached through the Sound of Farray into Fersness Bay. The *North Coast of Scotland Pilot* (1994:163-4) provides the following information on Sound of Faray between Faray and Fers Ness, where the landing lay at the Northeast part of Fersness Bay. The tidal streams in this area run strongly in both directions with a spring rate of about 4 knots in the south but less in the north. The passage into the Sound from the south requires care to avoid a sandy shoal 1 mile Northeast of Fers Ness. In order to access the area of the landing, this must be successfully navigated. It is noted however, that the best anchorage is in Fersness Bay; which would thus provide a sound staging area for any landing activity.

This site is located at the mid-section of the island of Eday, Orkney (see Figure 6.34). As in the case of Sumburgh, Shetland the even grade of this landscape makes this site the ideal location for an airstrip. Although this isthmus is quite broad, the topographical variation remains quite low throughout. The landings on both sides are composed of gently sloping sandy beaches. The eastern landing dries at the head of the Bay of London transforming into a landscape of low dunes. The sandy head in the Bay of London shows some heavy signs of erosion as the old N-S road is now crossing into the tidal area and is almost completely obscured, continuing on the other side of the tidal zone. The remains of a small seawall/breakwater can also be observed running across this sandy flat.

The W landing from Ferness Bay is a bit steeper, but also leads into some low dunes. The centre portion of this isthmus is low and very level, probably to some degree the result of the construction of an airstrip. The composition of the entire landscape seems to be dominated by sandy soil.

The entirety of this site seems to be the victim of extreme erosion, especially the eastern landing. The narrowest section of this island would provide an ideal portage site on the micro-topographical scale and could possibly have been used on the macro-topographical scale during navigation through the Orkney Islands, yet it is more characteristic of former category. This traverse seems ideal for smaller boats, which would have been used for regular inter-island transportation, or small fishing boats (see Figure 6.35). The landing on either side of the isthmus could be easily accomplished, as could the re-launching, the main difficulty would be to overcome the deposited dunes after a landing has been made. With a smaller vessel (less than 20ft, depending on its build) this should pose no significant difficulty. But with a larger warship or cargo vessel, this would have posed significant difficulty not only in the amount of force needed to overcome the obstacle, but also in the dangers that it would impose upon the structure of the vessels. In water, these vessels are quite resilient to stress, but when subjected to unnatural stress upon primary members (the keel, in particular) this could result in the catastrophic failure of a primary structure, thus breaking the back of the ship. This type of damage is most often irreparable, especially on site.

The traverse across Eday is less than 650m, with the approximate sailing distances around being 16km on the northern route and 20km on the southern passage. These sailing distances are approximate because they can involve many different passages between smaller islands, or may involve staying off the immediate coastline to keep clear of danger. For these estimates, the routes plotted follow the clearest direct path around the island.

Figure 6.35: A view from the south of the east landing at Mid Eday. Note the extreme erosion as evident by the remains of a track and wall across the sand. (Photo:Author)

6.2.2.4 Aith, Stronsay

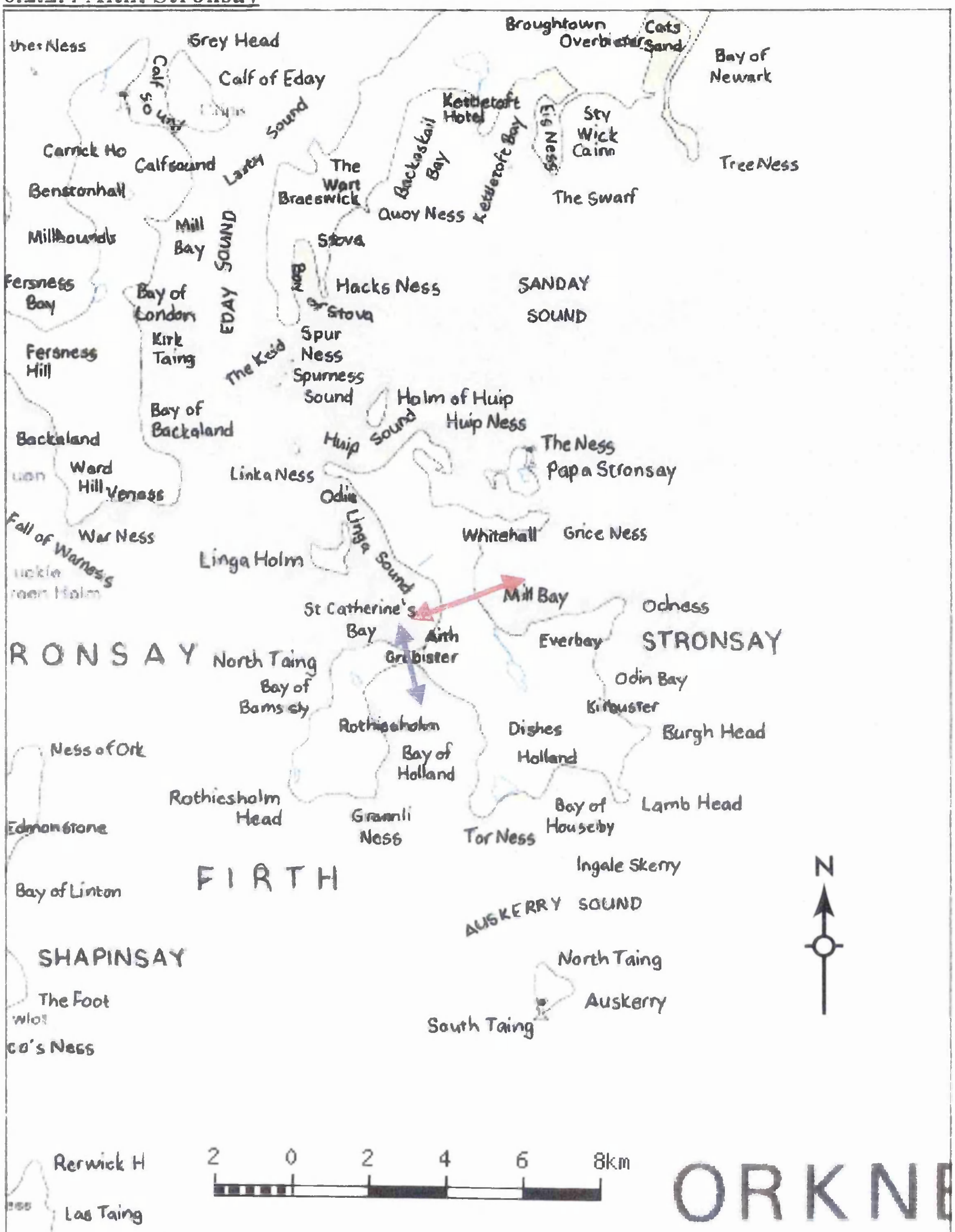


Figure 6.36: The red arrow indicates the traverse at Aith on Stronsay. The blue arrow represents another site that may have been traversed. (After www.digimap.com 2000)

Site Name: Aith, Stronsay, Orkney
Site Code: Ei3HY
OS Grid Reference: HY 638 248
Accessed by: St. Catherine's Bay – Mill Bay
Maximum elevation above Sea Level: <10m
Maximum Distance: 250m

According to the *North Coast of Scotland Pilot* (1994:161) the entrance to St. Catherine's Bay, between Links Ness and a rocky point fringed by North Taing, is obstructed by a drying reef. Entrance is gained by a narrow channel between Linga Holm and Stronsay. This should not be attempted without local knowledge. For shallow draught vessels, numerous anchorages' can be had in St. Catherine's Bay, depending on the wind direction. This possibility makes for an ideal location for either weathering storms or for preparing for the traverse across the isthmus (see Figure 6.36).

Mill Bay, on the East Coast of Stronsay, is located on the southern side of Sanday Sound. Within this bay the effects of the tidal streams are negligible. There are some drying rocks located within the entrance to this bay which mark a reasonably clear channel. This bay is not considered to be a good anchorage due to much fouling within the bay (*North Coast of Scotland Pilot* 1994: 151). But, the shallow draught vessels of the Viking Age should have no problem navigating in this area, as long as proper precautions are taken.

Aith in Stronsay is a low-lying isthmus that is composed mostly of marshland with a sandy beach to the south. The west-east traverse across Stronsay is again at the location of an Aith place-name. On the Island of Stronsay there are a few possible traverses which could have been utilised as portages during the Viking Age, as well as at other times. This area could have served as an initial landfall when navigating from the southern coast of Norway, albeit a more southern route towards Kirkwall would be preferable. Weather conditions that would force one to seek shelter or a landing could possibly make this landing difficult, but not impossible if necessary. During favourable conditions, this site presents an easy crossing that would allow for access to the comparably sheltered waters of Stronsay Firth or the North Sea. Stronsay is characterised by low-lying land that is very irregular in shape with many indentations and arms extending into the sea. It is because of this that portaging could be considered a viable alternative to the tedious navigation of the coastal fringes in order arrive at a destination which may only be a short traverse and sail away. Traverses of this type are on the micro-topographical scale, yet the likelihood of this same traverse being utilised by a vessel(s) and crew after the journey across the North Sea is also quite high. This said, a portage here after a long sea journey is most likely to be based upon seeking shelter from inclement conditions than a specific navigational decision to cross here.

Another option for traversing Stronsay would be at the narrow isthmus between the Bay of Holland and St. Catherine's Bay. This traverse would provide an excellent micro-topographical portage for the inshore coastal navigation of Stronsay by smaller vessels. A portage here could eliminate a journey of about 6km around Rothiesholm Head.

The *North Coast of Scotland Pilot* (1994:158) reports the following conditions for the Bay of Holland: The shore of this bay is rocky except at the Northwest head where there is a sandy beach nearly 1 mile long. Even with its southern exposure this bay can be a useful anchorage in fine weather. The tidal streams in this area are negligible, but may be encountered off the entrance.

6.2.2.5 Upper Sanday

Figure 6.37: The red arrow indicates the route of a traverse across the isthmus at Upper Sanday. (After www.digimap.com 2000)

Site Name: Upper Sanday, Deerness, Orkney
Site Code: Ei4HY
OS Grid Reference: HY 549 034
Accessed by: St. Peter's Pool – Dingieshowe Bay
Maximum Elevation above Sea Level: <10m
Minimum Distance Across: 100m

The *North Coast of Scotland Pilot* (1994:146) gives the following information about the approach from the SE of this site:

> The Coast is indented by several shallow bays which are of no interest to the mariner. Between Rose Ness and Sandisbrae, the S extremity of Deerness, the coast is lined by cliffs except close NE of Dingieshowe where, at the head of a shallow bay, a narrow and low isthmus connects the SW end of Deerness with the main part of the Mainland. In bad weather the sea breaks over this isthmus which is then not readily seen; in these conditions care is required to avoid mistaking the apparent opening between cliffs on either side of the isthmus for the entrance to Holm Sound, SW of Rose Ness.

The tidal streams in this area are not very strong and are changeable. When approaching Dingieshowe Bay, a conspicuous landmark is the green mound of Dingieshowe.

For St. Peter's Pool, the S most part of Deer Sound, the Pilot (1994:155-6) reports that the sound is irregular in shape and in its inner part (St. Peter's Pool) it is shallow, rocky and does dry out. From this side it is again quite easy to sight the green mound of Dingieshowe. Any navigation into the inner part of the sound requires local knowledge. A narrow channel makes the entrance to St. Peter's Pool between the Point of Od and Braebuster Ness. This area provides a good anchorage as its irregular shape lends itself to being free from squalls. Although it may be a bit tight and the depth and swinging room are limited.

The site of the traverse at Upper Sandy is comprised of a narrow isthmus of land mostly made of sand (see Figure 6.37). The whole length of the isthmus is covered with dunes. These dunes are currently protected by fencing which should protect them from extreme erosion, leading to the conclusion that the coastal geomorphology in this area is quite active and has been in the past. In the S, at Dingieshowe Bay, there is a wide sandy beach that is unsheltered and receives direct action from the North Sea. This sandy beach has a spit of small – large cobbles jutting out into the sea at the W. Because of the direct exposure to the North Sea a landing here would take considerable skill and local knowledge in all but the calmest conditions. Once the traverse is completed, the sheltered harbour of St. Peter's Pool would serve as a welcome haven to the rough conditions on the south side of the isthmus.

The Northern part of this Isthmus is fairly sheltered at St. Peter's Pool. The coastline itself is composed of white sand with medium - small cobbles, turning to a primarily rocky bottom with some sandy patches. The slope of this shore is very gradual. A large portion of the inner bay dries or becomes shallower than .5m, thus requiring a high tide to access this area completely. The smaller, shallow draught vessels of the Viking Age would easily be able to find navigable depths in the fairway of this body of water, although the larger warships and cargo vessels may not have been able to utilise this portage. It is for this reason that this site is relegated to the realm of the micro-topographical portage scenario. This also seems to be a logical use of this site as the area of Dingieshowe was the location of a 'Thing' or law-meeting during the Viking Age, therefore the arrival of many smaller vessels utilising the sheltered harbour at St. Peter's Pool would be expected. It is also more than likely that this would also make available sufficient manpower for the dragging of smaller vessels over from the North Sea side to the sheltered bay.

6.3 The Western Isles

For the purposes of this investigation the Western Isles of Scotland encompasses *all* bodies of land not connected to the mainland during the Viking Age, from the Mull of Oa on Islay in the south to the Butt of Lewis in the North. The maritime landscape of this area is not unlike that of Norway. As was the case in Norway, most communication and transport was conducted via waterborne travel, and in the case of the smaller, more remote islands, this would be their only option for trade and communication with other settlements. It is also the case that the Outer Hebrides has a coastline littered with deeply intrusive sea lochs, bays and favourable landing places. For safe and efficient navigation of the treacherous coastline between these havens, portages offered a preferable alternative to these dangerous and sometimes very long sea journeys.

As on the mainland, many of the place-names indicative of possible portage sites contain the Gaelic place-name '*tarbert*'. According to Cheape (1984:211), many of the Gaelic place-names are post Norse, especially in Lewis and the Outer Hebrides where they may be 13th century and translate to the Norse forms. Some of these translations may serve to fix the '*tarbert*' place-names, though scholars have noted the Pre-Norse Gaelic names in these areas. The Old Norse place-name [eið] also occurs in a few place-names on the mainland and in the Western Isles. MacBain (1922:90) recalls that this place-name has many strange forms in the Hebrides such as: Ie, Ey, Ay, Eie, Huy, Ui, Vye, Uiy, Uie, Eye; and that written in Gaelic it is Uidh. This is also the interpretation given by the Ordnance Survey, *Place-Names on Maps of Scotland and Wales* (1981:11), Uidh, [ON eið] - isthmus, ford. Other possibilities offered by MacBain (1922:90) are; Uie-head which occurs at Vattersay, Barra and the peninsula of Eye near Stornoway. There are doubtless many other areas where variations of either '*tarbert*' or '*eið*' occur to aid in the identification of possible portage sites, but for the purpose of this investigation only a few of these sites will be researched for the formulation of the portage criterion. Type-sites were chosen from as varied areas as possible to provide a broader picture, and hopefully a more complete picture of the types of portages that occurred in the Western Isles during the Viking Age.

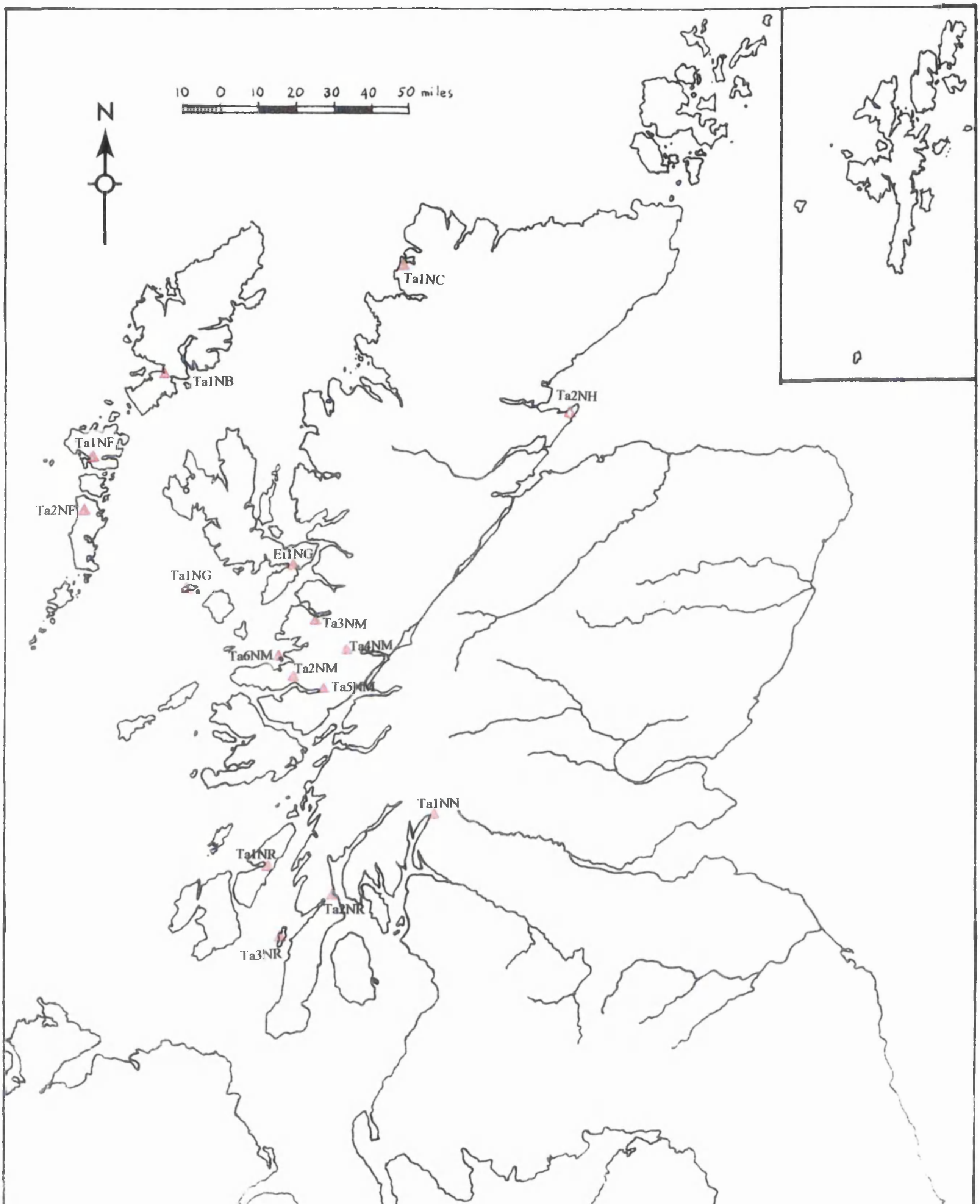


Figure 6.38: Map showing the general location of portage sites in the Western Isles and Mainland Scotland. (Illustration Author)

6.3.1 Loch Tarruin an Eithir

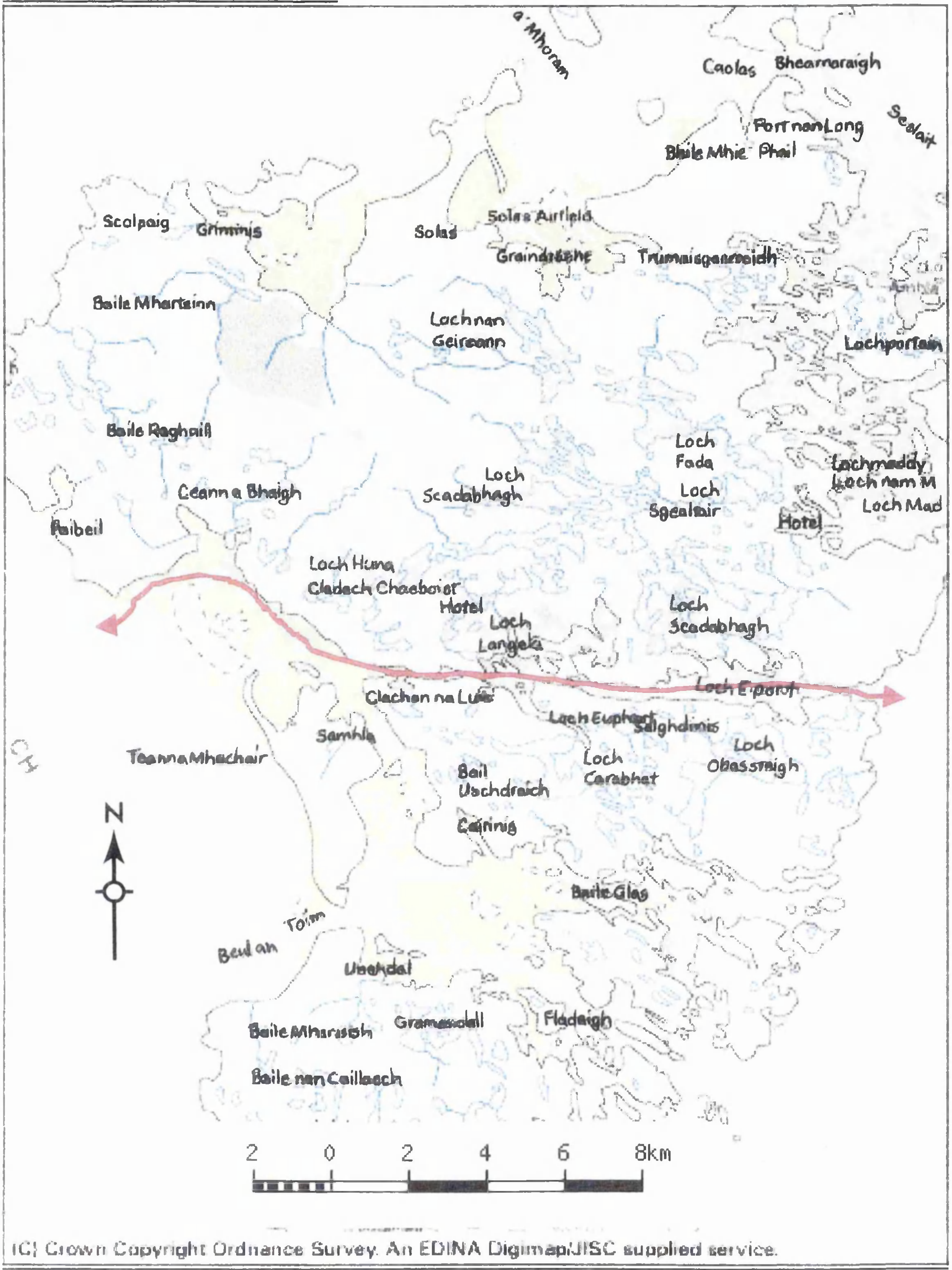


Figure 6.39: The red arrow indicates the traverse across North Uist at Loch Tarruin an Eithir. (After www.digimap.com 2000)

Site Name: Loch Tarruin an Eithir, North Uist
Site Code: Ta1NF
OS Grid Reference: NF 877 647
Accessed by: Sound of Monach - Loch Eport
Maximum Elevation above Sea Level: <20m
Minimum Distance Across: 1800m

The Sound of Monach is the stretch of ocean that lies between the Heisker Islands and North Uist. Off the East coast of these islands lies the small island of Stockay. It is 1 1/2 miles north of this island that the narrowest and shallowest section of this sound appears. There also exists a shoal and a shallow reef that has a depth of only 1.5m; therefore any vessel requires careful navigation. Foul ground also extends from North Uist to the SW (*West Coast of Scotland Pilot* 1995:136). The coastal area of North Uist is mostly sand and this is what the landing at the portage site is mainly comprised of. These sands dry at low tides and expose many areas that cause hazards to navigation. Due to the above conditions, local knowledge is required to navigate this area (see Figure 6.39).

The access to this site from the east is attained by navigation westward on Loch Eport. The *West Coast of Scotland Pilot* (1995:388) reports long, steep shores and sometimes cliffs surround this loch on the North shore. The south side of the loch is composed of a deep black bog. As long as the fairway is maintained, hidden shoals and other hazards can be avoided. From a distance, the entrance to this loch can be identified by several remarkable hills. The tidal stream at the entrance to the loch run at 3 knots in both directions with eddies forming on both shores of the entrance. Once within the narrows, the tidal streams are weak. Careful navigation is required to avoid the numerous obstacles within the narrows. As the head of the loch is approached the depth decreases to approximately 5.5m, 1 1/2 miles from shore. From this point on the depth decreases, but holes of this depth can be found within a short distance of its head (*West Coast of Scotland Pilot* 1995:388). This loch provides a sheltered haven once to the tidal streams at the entrance have been navigated.

This site is an excellent example of a dragging site not only because of its location at the head of a sea loch far into North Uist, but it also has a place-name which is one of the most concrete for a portage site. Loch Tarruin an Eithir literally translates to 'the loch of the boat haul' (Cheape 1984:211). This alone sets this site up as a portage, but when the elevation and distance are included in this equation, this becomes an interesting scenario. Loch Eport cuts quite far into North Uist and provides numerous opportunities for shelter and anchorage. The actual traverse involves navigating during advantageous tidal conditions and dragging vessels across sandy terrain. With a larger vessel this could pose some difficulty, but with the smaller coastal trading vessels which would have been used for everyday travel on this loch, this traverse would not have been too difficult. This ability to navigate within the sheltered confines of Loch Eport, with the added advantage of having extended access the western seaboard provided numerous economic and strategic advantages to having access to a singular coast.

This portage site falls into both the realm of a micro-topographical and macro-topographical portage scenario. For the locals, this traverse could provide relatively easy access to the sea from the innermost reaches of the loch. This would allow for procurement of resources from the sea that could be transported to the areas within the island. This also opens up the opportunity for vessels plying the sea to trade their cargoes across the isthmus to smaller vessels within the loch for further trading. On a large scale this portage site could cut the distance travelled on the open sea significantly (eliminating a distance of approximately 55km if one were to sail around to the North) and thus reduces the exposure to the hazards present there.

The entirety of North and South Uist is inundated with deeply intrusive sea lochs, most almost cut the whole way through the islands. In some cases the only physical boundary between The Little Minch and the North Atlantic is low-lying sandy terrain, but some of the distances that these cover make the idea of dragging a vessel across sand unfeasible. This site provides navigable depths for almost the entirety of the crossing. The actual traverse across land is minimal when compared to the actual distance covered in total, and for the transport of small vessels or cargo this distance is insubstantial. As in the case of most portage sites, the exposure to the ravages of the open sea can be quite extreme on these journeys and if the opportunity to avoid it exists it can be the most advantageous, both economically and logistically.

6.3.2 Tarbert, Harris

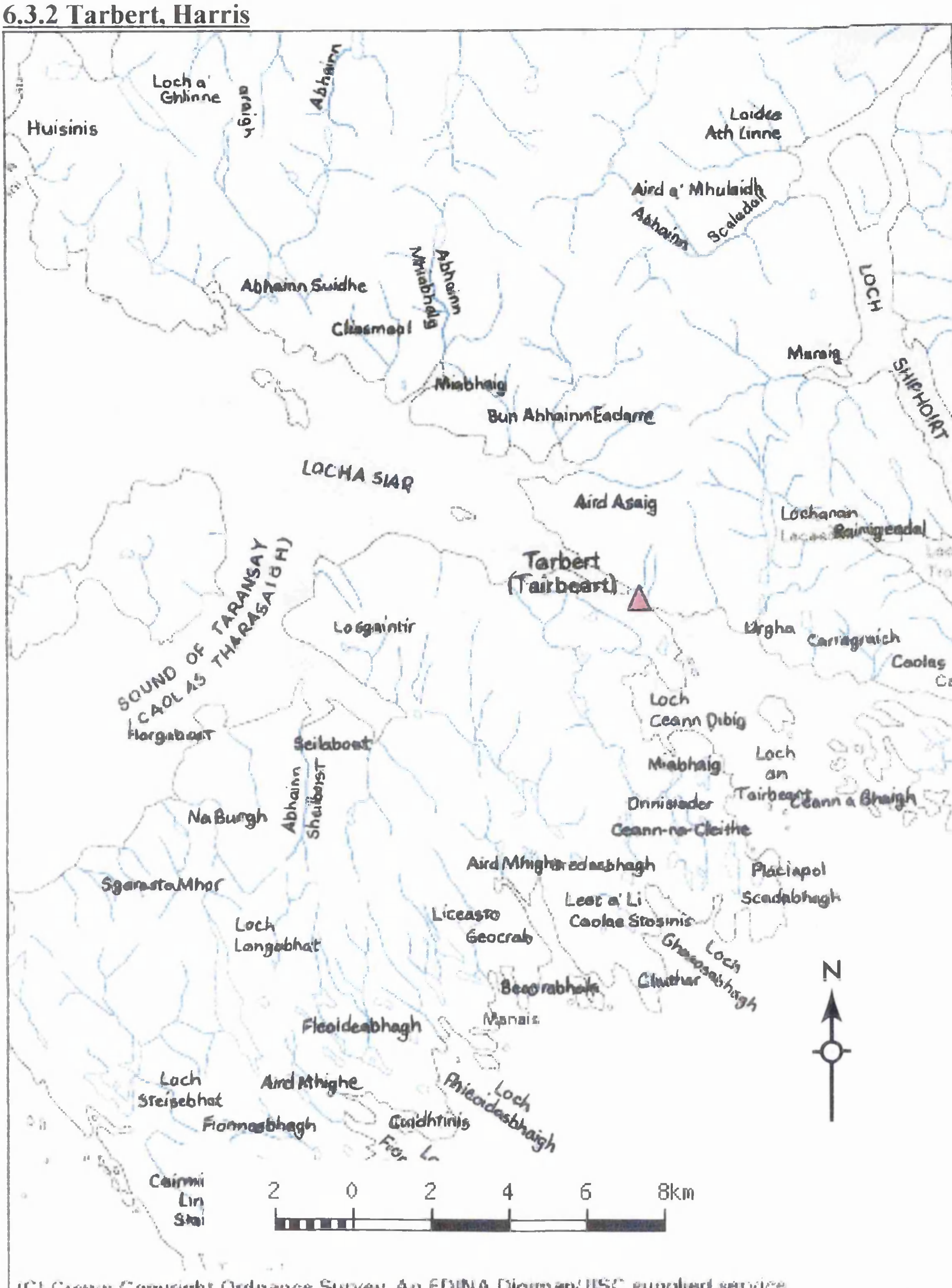


Figure 6.40: The red triangle shows the location of the traverse across Tarbert in Harris. (After www.digimap.com 2000)

Site Name: Tarbert, Harris
Site Code: Ta1NB
OS Grid Reference: NB 153 002
Accessed by: West Loch Tarbert – East Loch Tarbert
Maximum Elevation above Sea Level: <20m
Minimum Distance Across: 625m

The western approach to this site is on West Loch Tarbert. The *West Coast of Scotland Pilot* (1995:150) describes this entrance between the islands of Horsanish and Taransay as containing many islets and shoals mid-channel and to the North, whilst the south side is comparatively clear. If a course is maintained in the centre of the fairway, obstacles can be avoided and the head of the loch can be reached. The tidal streams are barely perceptible in this area, except in the Sound of Taransay. This sea loch can be identified not only by the island hopping method of coastal navigation that leads to its mouth, but also by the presence of the highest peaks in the Hebrides that lay on the north coast. The landing near the village of Tarbert has been altered over the ages by harbour constructions and modern land development, therefore the grade and composition of the landing is difficult to determine (see Figure 6.40).

East Loch Tarbert provides access from the east. This is a broad loch containing many bays. Access to landing can easily be gained by maintaining a course in the middle of the fairway in either of the channels passing the island of Scalpay. This island makes the loch easily identifiable from seaward. The tidal streams set around Scalpay running at 1 1/4 to 2 knots in both directions. The tidal streams are barely perceptible within East Loch Tarbert. This is a well-sheltered loch proving a haven from The Minch. If crossing The Little Minch from north of Skye, this is one of the shorter, less difficult routes. Although the fairway remains relatively clear, there are some harbours within that require careful navigation (*West Coast of Scotland Pilot* 1995:406) to avoid submerged obstacles. The head of the loch has been severely altered with modern constructions to now make this one of the busiest harbours in the Hebrides (see Figure 6.41).

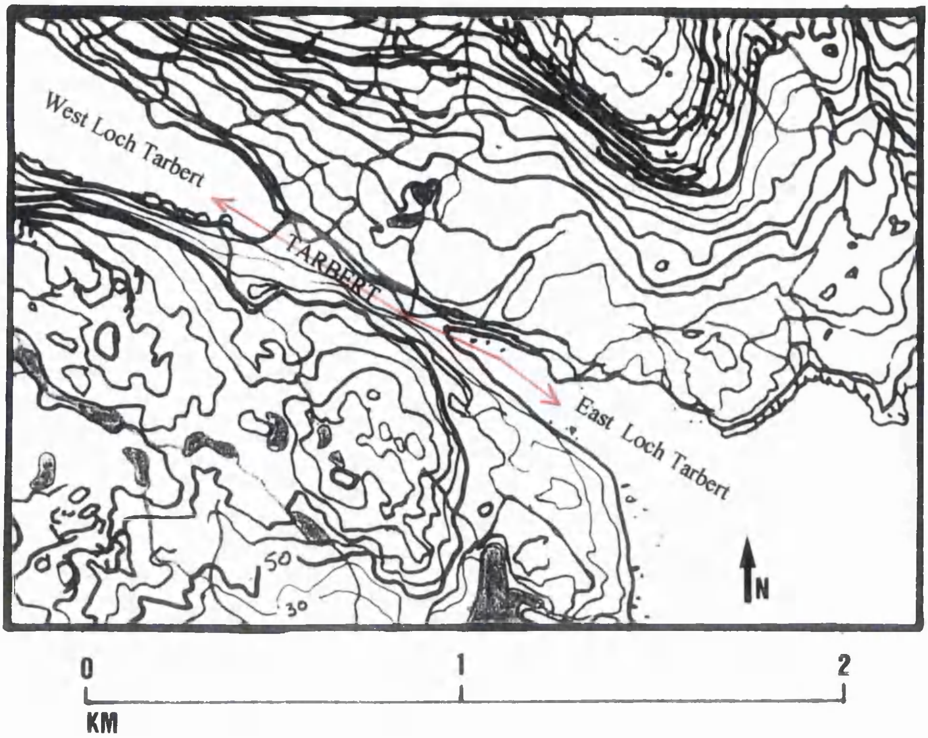


Figure 6.41: Map showing the topographical variation across the route of the traverse at Tarbert in Harris. (Illustration: Author)

Figure 6.42: View of the landing at West Loch Tarbert from the east. (Photo: Author)

Figure 6.43: View of the landing at East Loch Tarbert taken from the west. (Photo: Author)

This '*tarbert*' site is recognised in studies of the Western Isles (Watson 1926: 505-6, Cheape 1984: 211) as representative of a possible portage site. A crossing at this point would allow for a sea journey of approximately 55km (around to the South) to be reduced to a portage of approximately 625m on fairly even ground (see Figures 6.42, 6.43). The harbours on either side of this isthmus provide good shelter and fairly easy sailing or rowing. This is especially true when the fairly calm conditions within these sheltered areas are weighed against those which could be encountered whilst sailing around the entirety of the Isle of Harris, especially during periods of inclement weather.

This is another example of a portage possibility in both the micro-topographical and macro-topographical portage scenarios. For smaller vessels, this site enables them to have access to either side of the isthmus without exposing themselves to the open sea. It also allows for further access to be gained into the sea lochs on either side of the landmass, in particular Loch Seaforth that allows access to a fair amount of the interior of the Isle of Lewis. In the case of the smaller vessels, the only option was to practice coastal navigation when travelling around the islands, therefore any interior routes that could be utilised to expand their sphere of contact were valued. It is also likely that this site could have served as an invaluable transfer point of goods and people from either side to the other. Thus the practice of portaging could greatly extend the range of the mariner and any cargo he may be transporting. It goes without saying that the use of portages could also allow for journeys that were not possible during extreme weather to be undertaken safely during almost any time of the year or inclement weather conditions.

On a macro-topographical scale, a portage at this site could reduce the length and exposure of a journey, while also allowing an opportunity to trade whilst in transit. Although, a portage of this magnitude would probably not have been an option for a cargo vessel, any smaller vessel should have had no difficulty in traversing this distance. The feasibility of dragging a larger vessel at this point can only be gauged by the circumstances at the time, yet the possibility of doing so can be examined on a more relaxed basis. This means that it was possible to drag a larger vessel, but was it ever practical or necessary? In extreme cases these vessels may have been dragged across the isthmus, but the likelihood of this having occurred is minimal.

6.3.3 Beinn an Tairbeart

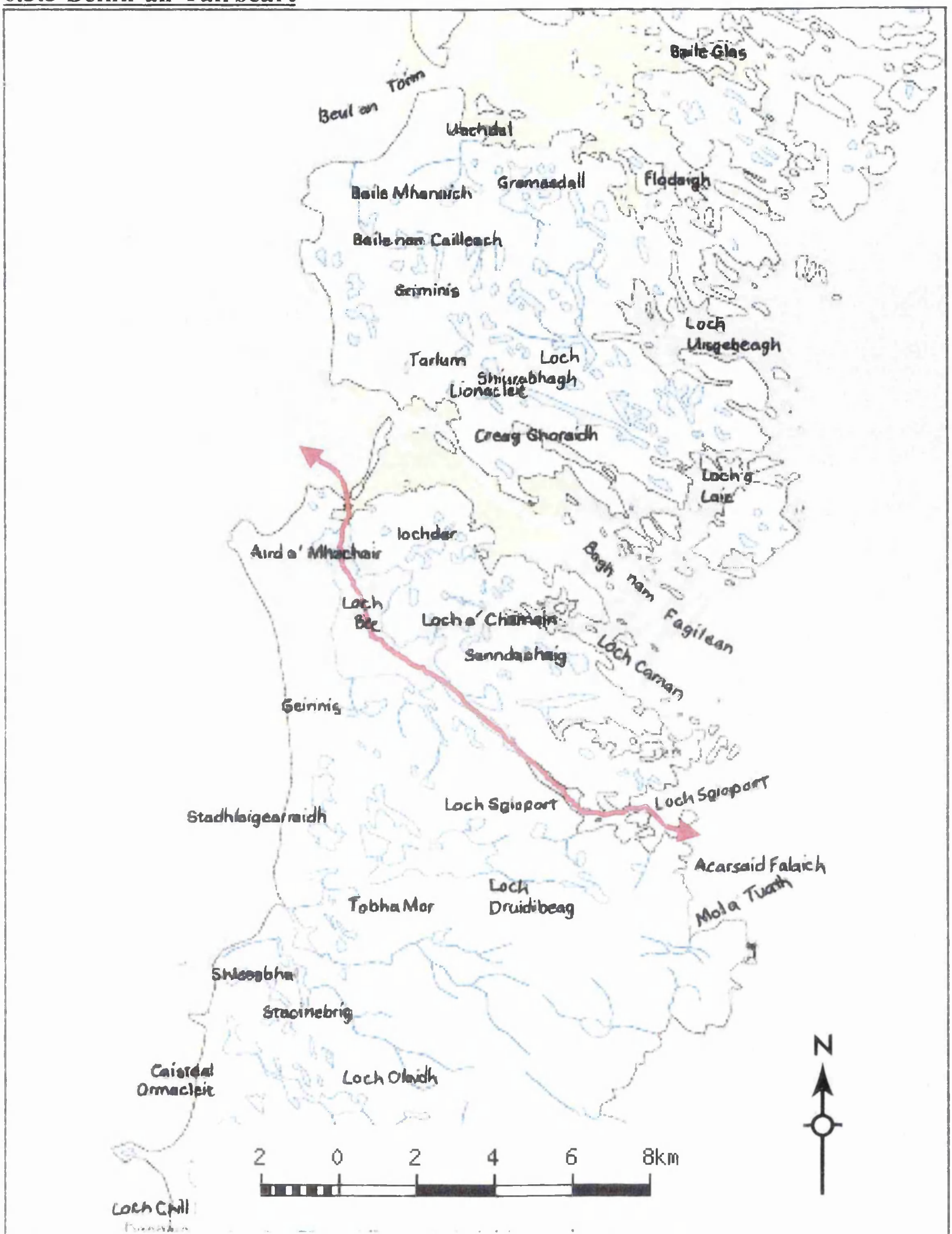


Figure 6.44: The red arrow indicates the route of the traverse at Beinn an Tairbeart in South Uist. (After www.digimap.com 2000)

Site Name: Beinn an Tairbeart, South Uist
Site Code: Ta2NF
OS Grid Reference: NF
Accessed by: North Atlantic Ocean – Loch Bee and Loch Skipport
Maximum Elevation above Sea Level: <10m
Minimum Distance Across: 750m

The easiest way to describe the course of this traverse is to start from the eastern approach. This site is accessed via Loch Skipport and Loch Bee. The *West Coast of Scotland Pilot* (1995:386) describes Loch Skipport as a loch that is entered between Rubha Grimman and the northern extremity of Ornish, a promontory. Loch Skipport extends 2 3/4 miles WSW then WNW to Loch Bee. The outer part of the loch contains several small islands and within the loch both shores are scattered with small bays and inlets. As long as the fairway is maintained, shoals and obstacles can be avoided. The tidal stream is barely perceptible within Loch Skipport, except within the narrows. During Southwest gales, heavy squalls can arise. Numerous areas of good anchorage can be found within this loch, especially in the lee of many of the islets. Once this loch has been traversed, a narrow section leads westward to Loch Bee (see Figure 6.44).

Hydrographic data pertaining to Loch Bee is not recorded in the way that the oceans are, as it is not considered a waterway within the realm of the admiralty. A review of the surrounding topography and the loch itself reveals that this watercourse would be navigable by a shallow draught vessel, such as many of the types used during the Viking Age.

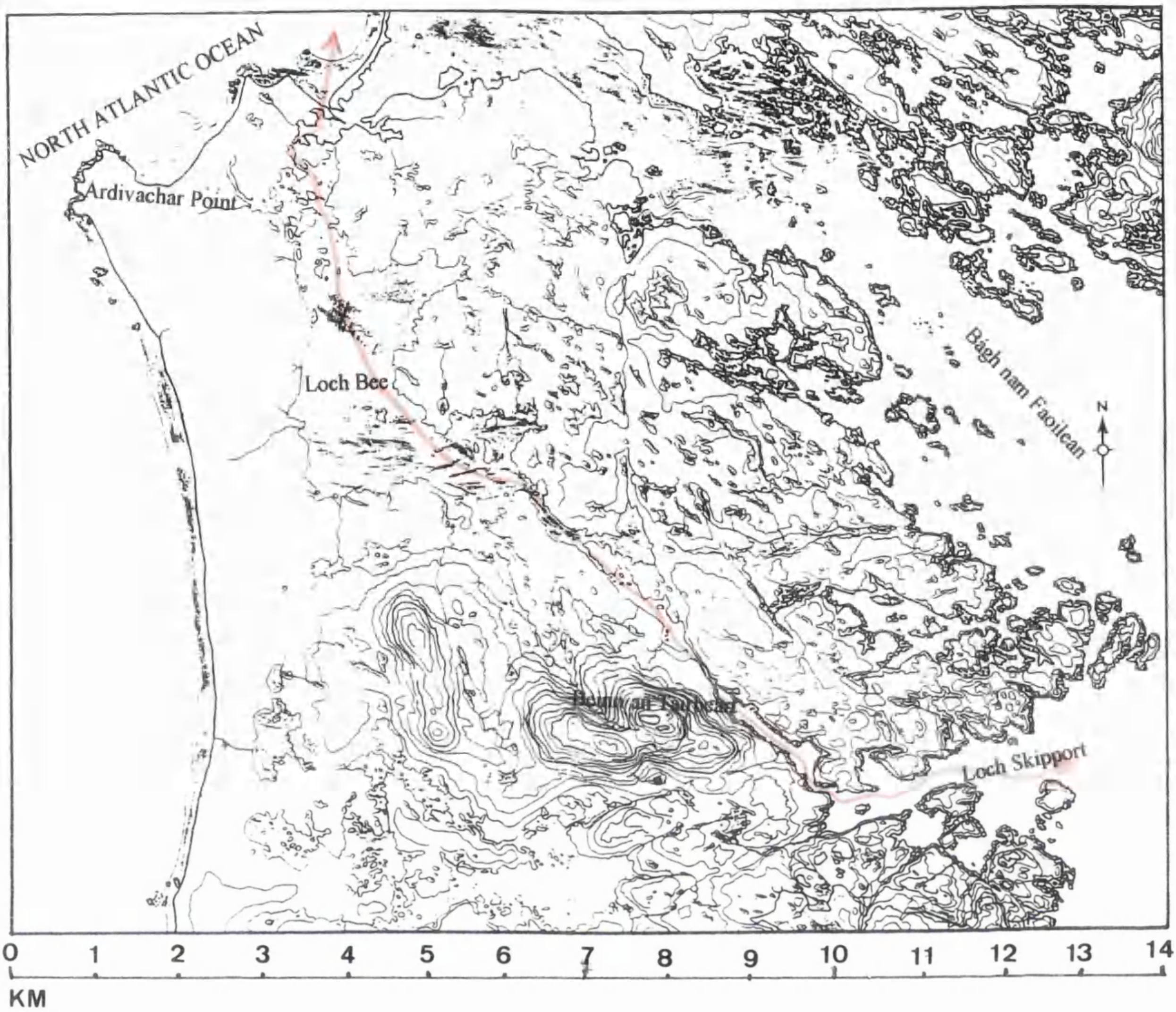


Figure 6.45: Topographical map showing the route across South Uist via the portage site near Beinn an Tairbeart. (Illustration: Author)

The '*tarbert*' place-name for this portage site is located on a hill to the south of Loch Bee. According to MacBain (1922:93) the place-name 'Skiport' means ship-firth. It is easy to assume that this would refer to the use of this loch by vessels of various typologies.

When the geographical circumstances of this possible portage site are assessed in the context of incorporating this large, land locked body of water the advantages of this portage opportunity are obvious. Not only does this offer the mariner the possibility of navigating throughout the interior of South Uist, but it also allows for easy access to either the Sea of the Hebrides (the Minch) or the North Atlantic Ocean, both of which have advantages in their own right. Couple this with the benefit of a safe haven on an inland body of water and it is easy to see how this traverse could have economic, logistic and strategic advantages (see Figure 6.45).

This portage falls into the realm of both the micro-topographical and macro-topographical portage scenarios. A portage at this point allows a sea voyage of approximately 75km (around the southern end of South Uist) to be avoided. The northern route could follow any of a number of possible routes. One is a crossing between Benbecula and South Uist at Bagh nam Faoileann, composed of sand flats that dry at low water; this could prove difficult for heavily laden or deeper draught vessels. Another is a route around the entirety of Benbecula and North Uist which would entail a sea journey up to the Sound of Harris or the use of a portage somewhere else in the Uists. It is upon these observations that the use of this site as a portage on a macro-topographical scale is based. This traverse would allow for the elimination of a long, and possibly dangerous sea journey.

On the micro-topographical scale, this traverse involving large bodies of inland water would afford the mariner or local inhabitant access to a large inland area of South Uist. This would allow for smaller vessels to have access to a greater area and maintain trade and communication more easily. This would also allow for larger vessels, such as cargo vessels, that were unable to make this traverse to have their cargo transferred to the smaller vessels for further distribution.

6.3.4 Tarbert, Canna

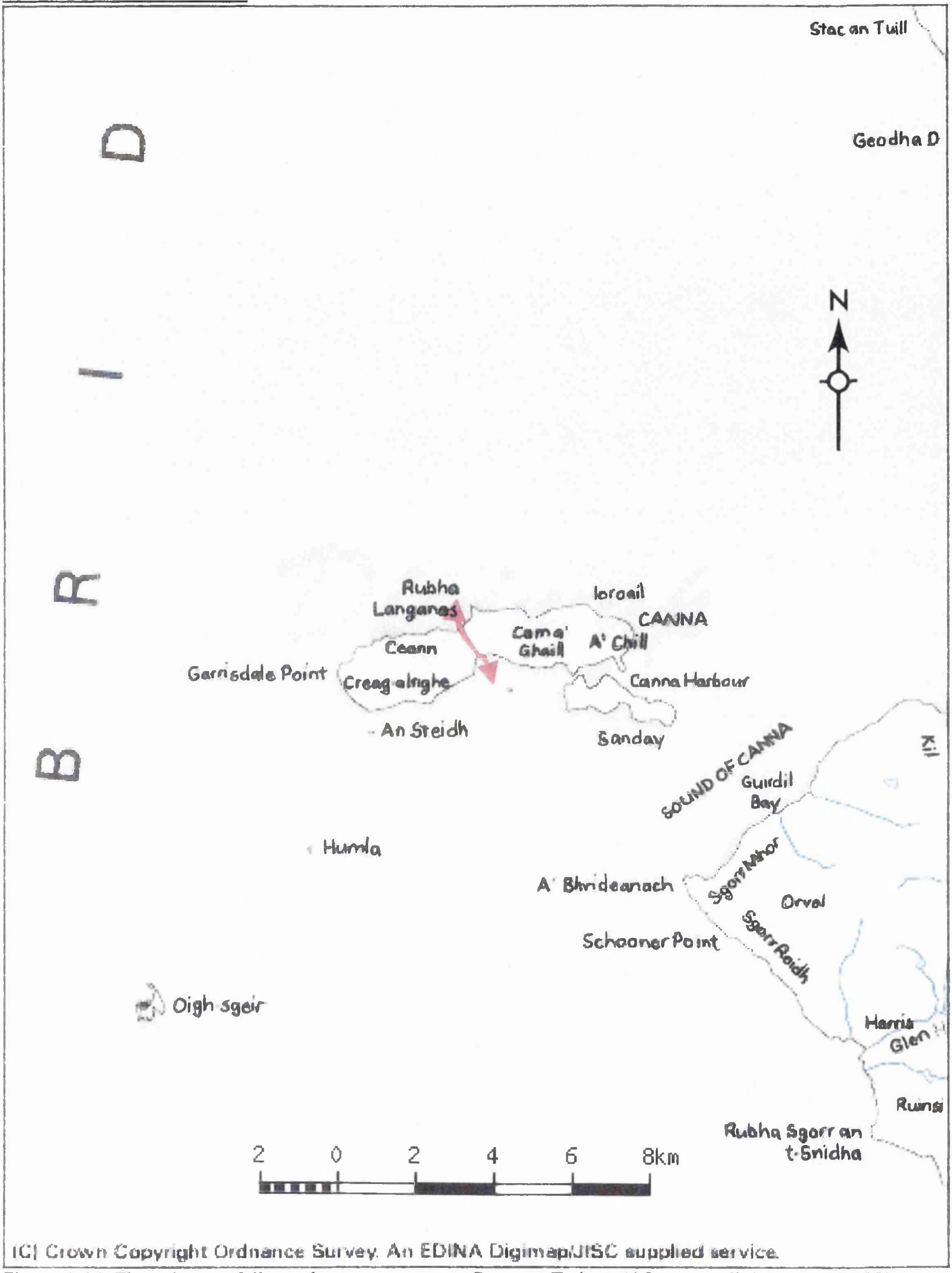


Figure 6.46: The red arrow follows the traverse across Canna at Tarbert. (After www.digimap.com 2000)

Site Name: Tarbert/Tarbert Bay, Canna
Site Code: Ta1NG
OS Grid Reference: NG 238 055
Accessed by: Tarbert Bay – The Sea of the Hebrides
Maximum Elevation above Sea Level: <30m
Minimum Distance Across: 700m

Canna is a small isle that is pinched in the centre in such a way to form a narrow isthmus. This isle is low in the middle and rises in elevation at the two ends making the traverse easily identifiable from a distance. The route that provides access to the portage site on the south side of the isle is Tarbert Bay (see Figure 6.46). This area affords a possible anchorage in calm weather as long as the isle called Háslam is avoided (Haswell-Smith 1996:118). As the coastline in this area is composed of sandy beaches, it is well suited for the hauling of boats out of the water.

Access from the north side of the island is from The Sea of the Hebrides. This area is subject to extreme tidal streams. Some shelter can be had within the lee of the isle, but caution must be used when landing (see figure 6.47). Again, this area is described as having sandy beaches that would be suitable for landing a small boat (*West Coast of Scotland Pilot* 1995: 283). This applies to the vessels that were in use during the Viking Age (see chapter 4).

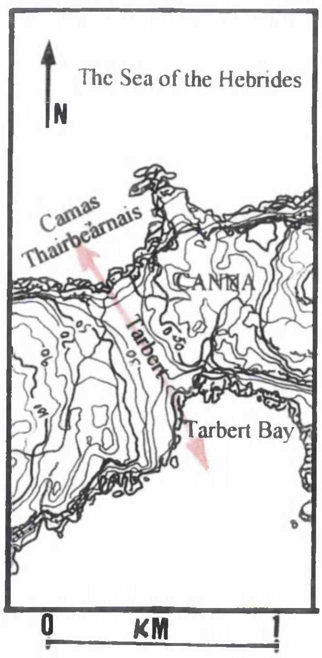


Figure 6.47: Topographical map showing the route of the traverse across Tarbert on Canna. (Illustration: Author)

This site is another example of a portage in the micro-topographical maritime landscape. The place-names that identify this site with portaging are located on the isthmus itself in the form of 'Tarbert' and on the southern landing, which occurs in Tarbert Bay. A traverse across an island this small would not provide any great benefit to a mariner navigating the Sea of the Hebrides and for any larger vessel it could be more trouble than benefit. However, for the small-scale navigation around the island, this traverse could provide an option that allows for an open ocean passage to be minimised. The benefit of this could be in the reduced exposure to the elements and increased security of cargo and personnel. A dragging or cargo transfer across this isthmus eliminates the sea journey of approximately 10km around the western extremity and approximately 15km around Sanday and the eastern extremity. For smaller coastal vessels this may provide a preferable option to risking the Sea of the Hebrides and any extreme conditions which may occur in the open sea that would risk the completion of the journey. Many of the decisions on when and where to portage were dictated by the wind, weather and water conditions, this is just as much the case in the micro-topographical portages as it is for the macro-topographical portages. It is for these reasons that many of the smaller portages may not have been necessary all the time, but would serve their purpose when needed. This may also be a key factor when considering the physical features that would be associated with a portage site or the lack thereof. A portage site, which would only provide any advantages during the winter or extreme inclement weather, may have only been used a few times a season and therefore would most likely *not* contain any evidence of portaging activity. Yet, it's place-name, geographical location and topographical profile can provide clues as to the likelihood of a site being used as a portage and if it could provide a benefit to navigational practices as such.

6.3.5 Tarbert, Jura

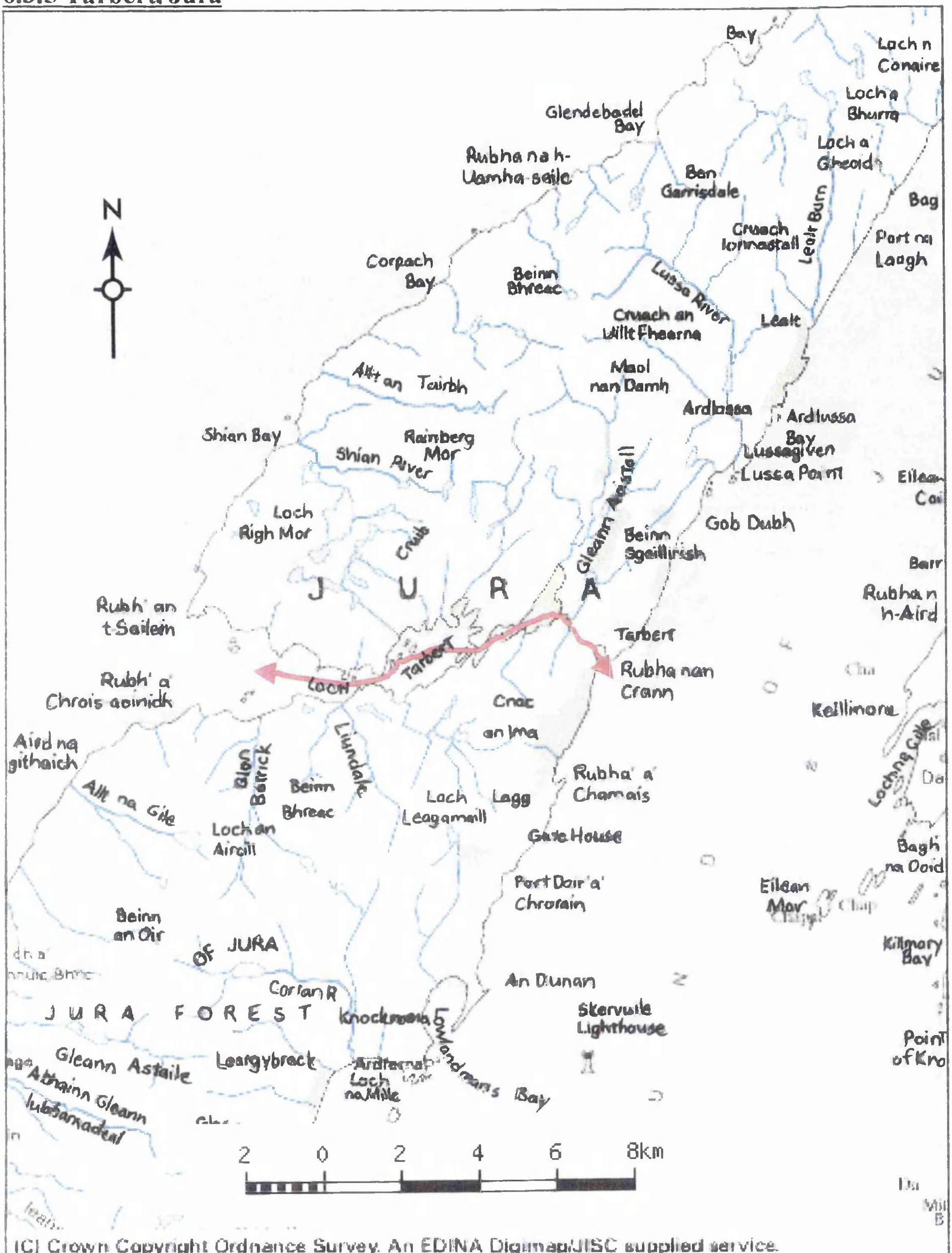


Figure 6.48: The red arrow indicates the route of the traverse across Jura at Tarbert. (After www.digimap.com 2000)

Site Name: Tarbert, Jura
Site Code: Ta1NR
OS Grid Reference: NR 825 603
Accessed by: Loch Tarbert – Tarbert Bay
Maximum Elevation above Sea Level: <20m
Minimum Distance Across: 1200m

Loch Tarbert provides access to this site from the west. This is a long sea loch penetrating deep into the interior of the island of Jura. The landing at the head of this loch is composed primarily of sand. The entrance to Loch Tarbert heads eastward with narrows about 2 1/2 miles from the entrance, where the loch is only 1 cable wide with shoals in the fairway. Above this point the loch widens and continues ENE for approximately 1 1/2 miles (*West Coast of Scotland Pilot* 1995:215). The area near the head of the loch is suitable for small craft or shallow draft vessels only. The tidal streams in the outer part Loch Tarbert usually set NW with spring rates of 1kn, other times being weak and irregular or slack (*West Coast of Scotland Pilot* 1995: 215). The remainder of the outer part of the loch experiences no regular discernible tidal streams. The tidal streams in the inner part of the loch are imperceptible. This loch provides an excellent sheltered harbour for the anchoring and landing of vessels as long as care is taken to the weather (see Figure 6.48).

The landing on the East Coast of Jura is accessed through Tarbert Bay. The *West Coast of Scotland Pilot* (1995:192) describes this landing as a small inlet with a sandy beach at its head. Most of the bay is clear of obstacles and an anchorage can be had at a clear patch of sand to the North of a small islet located at the Southwest entrance. This bay is considered to be shallow and filled with dense seaweed, but it is possible to land on the beach. The entrance to the bay from the Sound of Jura contains rocky shoals that are awash; therefore local knowledge is essential for navigation.

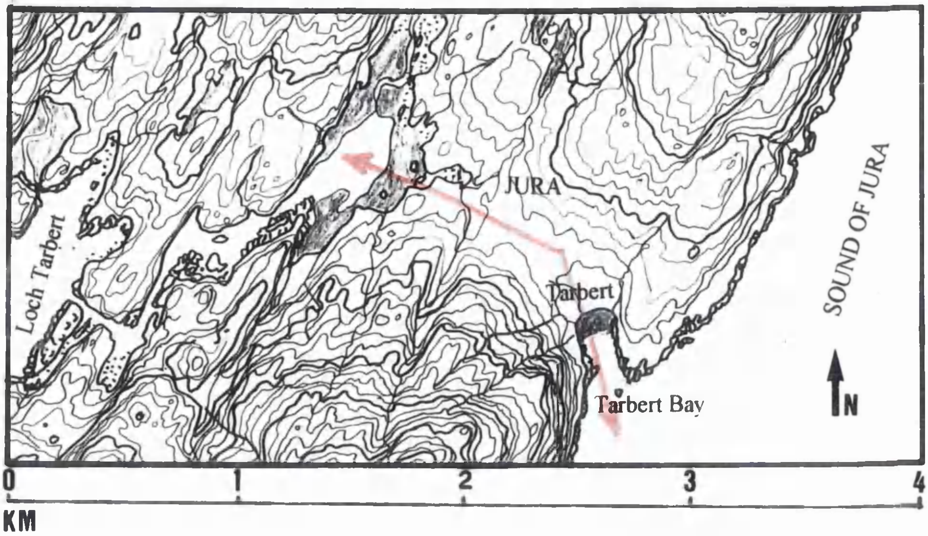


Figure 6.49: Topographical map showing the variation across the traverse at Tarbert on Jura. (Illustration: Author)

The traverse across Jura is also identified by the presence of numerous '*tarbert*' place-names in additional to its topographical features. The bays on both sides of this site contain this place-name, as does the isthmus itself. A crossing at this point could be useful in both the macro-topographical and micro-topographical navigation of this area. The 1200m traverse eliminates a sea journey of approximately 45km around the southern route through the Sound of Islay and an approximately 55km-sea journey around the northern point (see Figure 6.49). The most likely use of this site as a portage point would be in the micro-topographical navigation of the Western Isles because of the north – south orientation of this island along the routes that would have been used during this period. With Islay being located at the southern extremity of Jura and the main navigational routes running north from here to Mull, Ardnamurchan, Skye, and beyond, this site would not provide any great advantage in a large-scale north – south navigation of the Western Isles and Mainland Scotland.

On the micro-topographical scale, this site provides an ideal location for smaller vessels to cut their sailing distances when trading or maintaining communication with the rest of the island. It also provides an ideal opportunity for mariners from the Mainland to have easier access to a greater geographical area by simply crossing the Sound of Jura; landing in what is now Tarbert and traversing into the sheltered Loch Tarbert. This route provides a short and sheltered route to the northeastern tip of Islay as well as the easiest access to the West Coast of Jura and a short crossing to Colonsay. It is these many reasons that make this site an attractive portage possibility for either cargo or vessels, for trading or communication in the micro-topographical navigation of this area.

6.3.6 Tarbert, Gigha

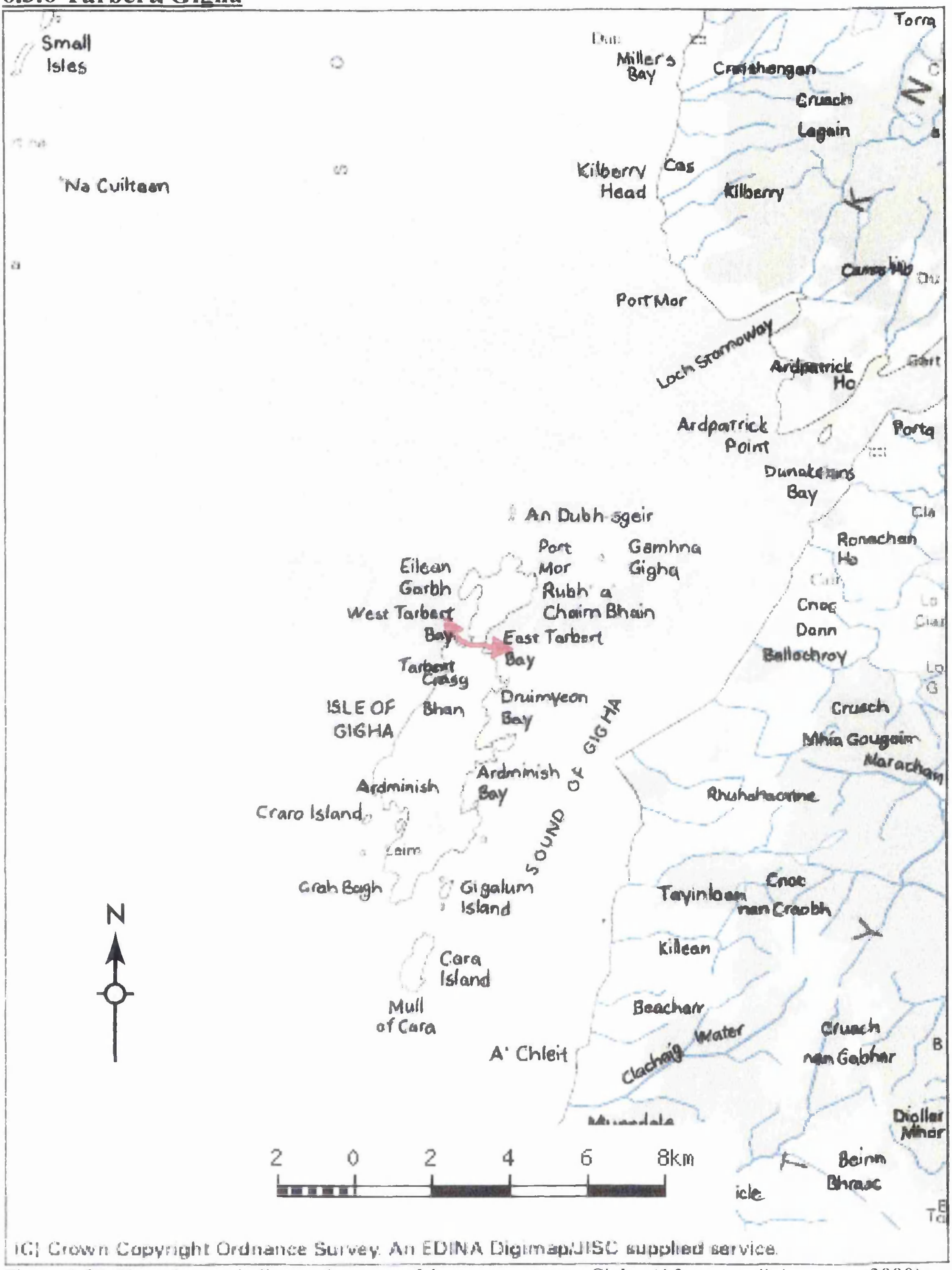


Figure 6.50: The red arrow indicates the route of the traverse across Gigha. (After www.digimap.com 2000)

Site Name: Tarbert, Gigha
Site Code: Ta3NR
OS Grid Reference: NR 655 525
Accessed by: West Tarbert Bay – East Tarbert Bay
Maximum Elevation above Sea Level: <20m
Minimum Distance Across: 300m

Access to this landing from the west is gained through West Tarbert Bay. This bay is entered S of Eilean Garbh, and affords anchorage for small vessels in the Southeast corner of the bay where there is shelter in the south and Southwest (*West Coast of Scotland Pilot* 1995:183). In calm weather nearly the whole of the bay provides a good anchorage (see Figure 6.50).

East Tarbert Bay provides access from the Sound of Gigha in the east. This bay is sheltered from westerly winds and provides a good anchorage in a sand bottom. The nearest dangers are Tarbert Rocks, which lie near the middle of the bay (Haswell-Smith 1996:35).

This is another portage site that is located at a narrow isthmus on a small island amongst the Western Isles. Again, it contains numerous occurrences of the place-name '*tarbert*'; the bays on either side of the isthmus are called West Tarbert Bay and East Tarbert Bay respectively. This is also the place-name located on the isthmus itself. When these factors are combined with the low topographical variation and short distance to be crossed, this becomes the ideal location for a portage in the micro-topographical navigation of this area. It's small size, location and North-South orientation do not allow for it to be considered for any portaging activity which may have taken place during the extended navigation of the Western Isles by larger vessels. As in the case of many of the possible portage sites with similar geographical circumstances, an attempt at portaging here would be a waste of time and effort during long distance navigation. There are always exceptions to the rules, but the most common usage is what remains most important in this investigation.

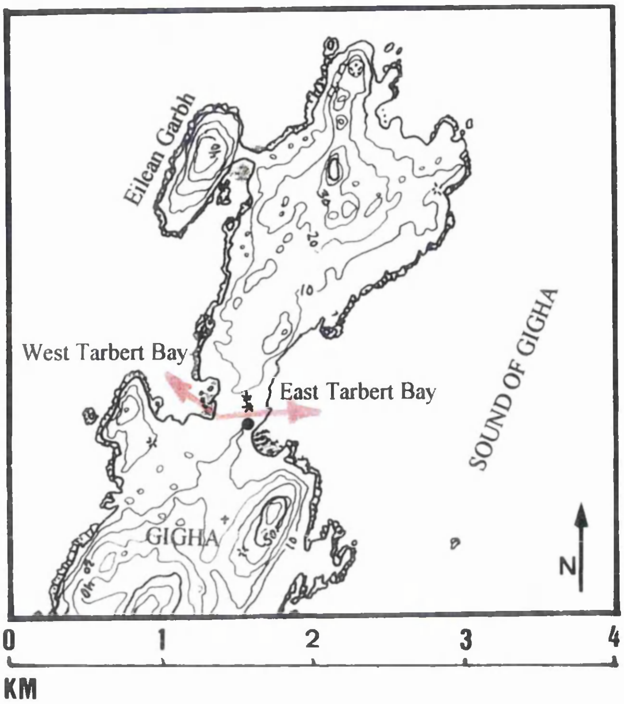


Figure 6.51: Topographical map showing the variation in the traverse across Tarbert on Gigha. (Illustration: Author)

The only portaging activity, which would have been feasible involving large vessels, would have centred on the off-loading of cargo and personnel at one side only to embark from the other in vessels heading for a final destination. Even then, this type of activity may have been more representative of simple trading as opposed to proper portaging. This portage serves, as do others of its type, as a prime example of a small island having a means of accessing landings on either side without the need for partial circumnavigation (see Figure 6.51). This aspect of portages in the micro-topographical maritime landscape is especially important for local communication on these isolated bodies of land.

6.3.7 Loch Eishort

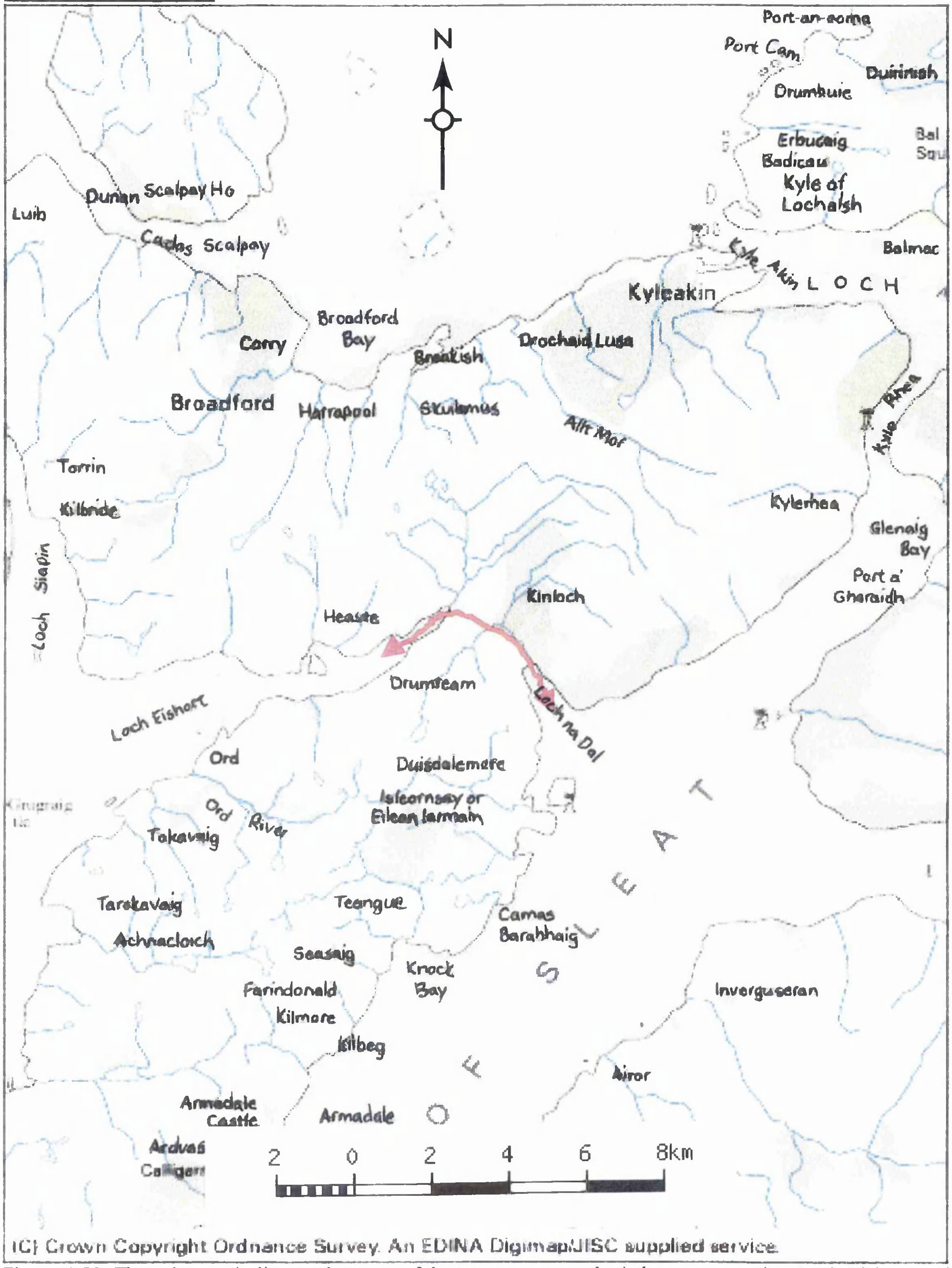


Figure 6.52: The red arrow indicates the route of the traverse across the isthmus connecting Loch Eishort and Loch na Dal. (After www.digimap.com 2000)

Site Name: Loch Eishort, Isle of Skye
Site Code: Ei1NG
OS Grid Reference: NG 687 162
Accessed by: Loch Eishort – Loch na Dal
Maximum Elevation above Sea Level: <30m
Minimum Distance Across: 2750m

Western access to this site is gained by the navigation of Loch Eishort (see Figure 6.52). This loch is entered between Eilean Ruairidh and Rubha Suisnish. It extends ENE for about 5 miles, but narrows to about 2 1/2 cables, 2 miles from the entrance. Above the narrows this loch is only navigable by small and/or shallow draught vessels. Care must be taken when navigating within the fairway as rocks are present, both exposed and submerged (*West Coast of Scotland Pilot* 1995:298).

Loch na Dal provides passage to the eastern landing of the site. The *West Coast of Scotland Pilot* (1995:312) reports that the entrance to this loch provides anchorage with a good depth (24m) and good holding ground. The loch shoals quickly within the entrance, but passage can be made to the head with careful navigation of a shallow draught vessel.

The site of this portage, located on the Isle of Skye, is interesting because it retains a form of the Old Norse place-name '*eið*' to this day. MacBain (1922:37) supports this interpretation by translating the place-name [Loch] Eishort as Eiths-fjord or Isthmus fjord. The topographical variation across this isthmus is quite high (ca. 30m) and the distance to be traversed is substantial at 2750m, therefore this site seems to fall into the category of a portage in both the micro-topographical and macro-topographical navigation of the maritime landscape. A larger vessel (cargo ship or warship) would prove extremely difficult to drag across this traverse and was most likely not economically or logistically viable. Yet, the transport of smaller vessels or carriage of cargo across this isthmus could easily be accomplished. This would allow for a sea journey in the Sea of the Hebrides and the Sound of Skye of approximately 40km to be avoided.

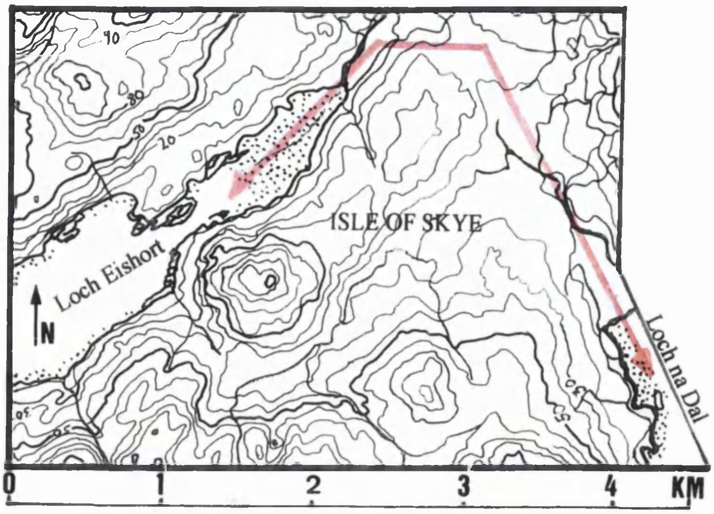


Figure 6.53: Map showing the topographical variation of the traverse from Loch Eishort to Loch na Dal. (Illustration: Author)

Both landings are extremely tidal and beaching a vessel on either side would be tidally dependent (see Figure 6.53). This is the case at the head of most sea lochs; therefore we must assume that the mariners of the Viking Age would have had good information relating to the tidal activities in the various areas in which they were navigating. To bring a larger vessel with a deep draught into these areas would require the landing to be cleared of obstructions that may cause damage to the vessel, as exemplified by the landing at Lunna in Shetland. Other sites have landings that are naturally able to facilitate the landing of a heavy, large vessel as is present at Sumburgh in Shetland. The landings at this portage site across the Isle of Skye do not show evidence of extensive clearance, this is not to say that the coastal geomorphology of the area has not altered the appearance of the coast since the Viking Age. Another problem that may have been encountered at this site; as well as others, is the presence of marshy land that would need to be traversed. The careful placing of '*rollers*' would be able to curtail this problem for the vessels, but the personnel whom were involved in the hauling would have had to slog their way for a bit. On the positive side, this wetland could provide a constant source of lubricant for the '*rollers*'. The portaging of smaller vessels through marshy lands between navigable bodies of water by the native Americans was a regular occurrence, and is still widely practised by canoeists. As is the case with the landing places located off sea lochs and even more so off the open ocean, geomorphology is a continuing process that takes in-depth environmental investigation to reveal past circumstances and continuing trends. It is possible that these marshy lands had not yet developed or may have been part of the body of water to which they are adjacent.

It is for the above reasons that this site provides an interesting example of a portage site in the micro-topographical and macro-topographical maritime landscape of the Isle of Skye. It provides a convenient traverse for small vessels and cargo in the local navigation of the island and can offer a relatively sheltered row/sail when navigating in this area of the Western Isles and further.

6.4 Mainland Scotland

For the purposes of this investigation, the area referred to as Mainland Scotland runs along the West Coast of Scotland from Cape Wrath south to the Mull of Kintyre. In addition to the numerous previously mentioned portages, many other portage possibilities exist in Scotland and the Islands. As mentioned previously, the most common portage place-names in the Western Isles and on the Scottish Mainland are rooted in the Gaelic place-name '*tarbert*', meaning literally to carry across (Gillies 1906:20) or '*tairm-bert*', an over-bringing (Watson 1926:505-6). There are many derivations of this term occurring throughout the Scottish landscape, varying in the way they reference possible portage sites. The most common forms being *tairbeart*, *tarbert*, *tarbet*, and *tarbat* (Cheape 1984, Gillies 1906, MacBain 1922, Watson 1926). On the Scottish mainland and in the Western Isles the *tarbert* place-name occurs in abundance. To list all of the *tarbert* place-names is not necessary as they would all fall under the scrutiny of the portage criterion if an investigation were to occur into their use as a portage site. These sites range into long traverses across isthmuses that jut out into the sea to small crossings between landlocked bodies of water sometimes connected by a burn. The Old Norse place-name [eið] is also found in Gaelic as *uidh*, still occurring in the Western Isles, as previously mentioned, this place-name is rarely found on the mainland (Gillies 1906:227). It is also worth noting that there are also some place-names, primarily based upon the Old Norse [eið], in the Faroe Islands that warrant future research based on the portage criterion proposed by this thesis.

The possible portage sites on the western mainland were chosen by their widespread locations and unique scenarios, from the well-documented portage at Tarbert in Kintyre to the Point of Tarbert in Sutherland, which may or may not have served as a portage point. It is the variation in these sites that enable them all to contribute data to this comprehensive study of the portage scenario as observed in the maritime landscape of Scotland and the Isles during the Viking Age and beyond.

6.4.1 Tarbert, Sutherland

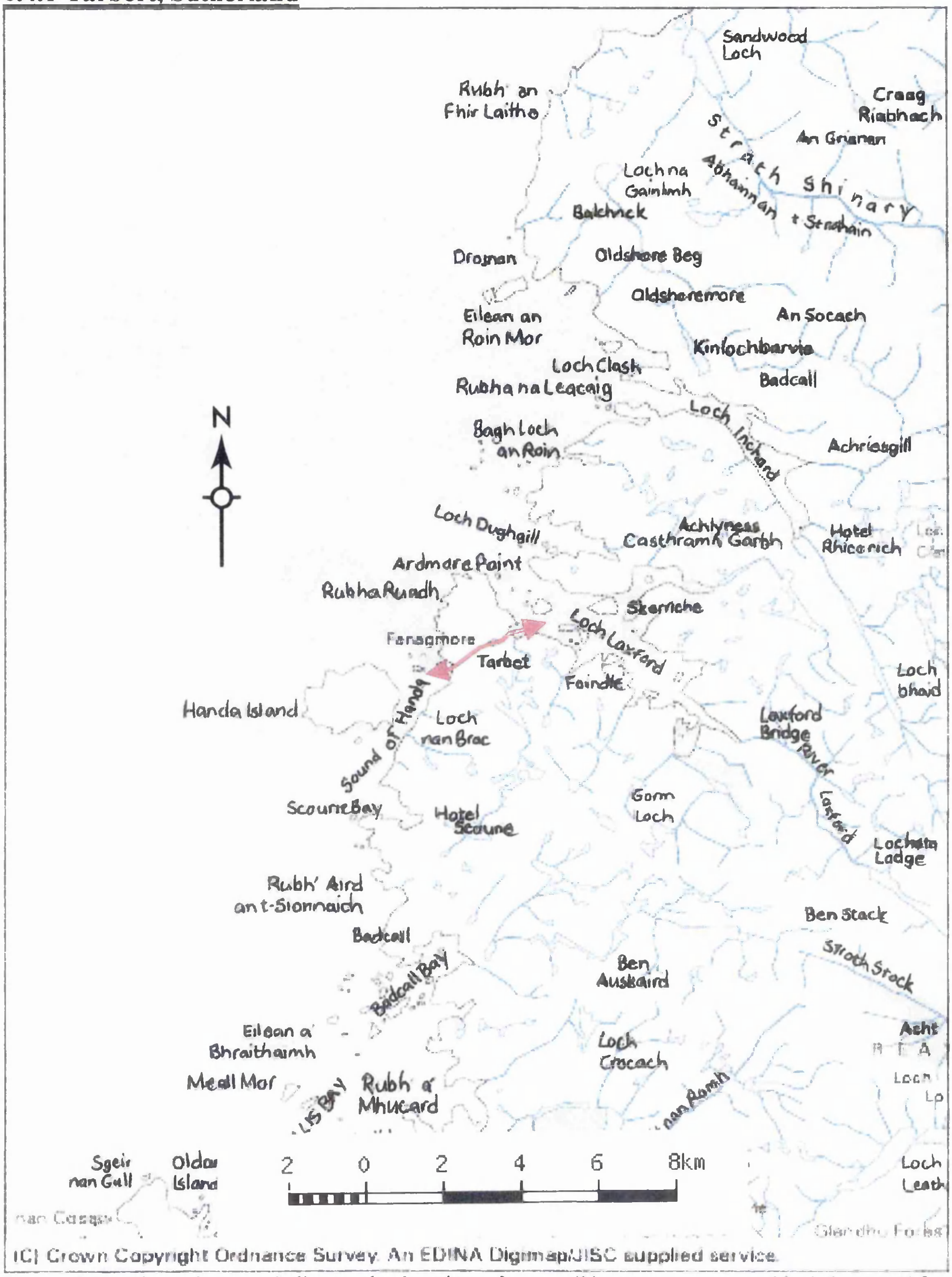


Figure 6.54: The red arrow indicates the location of a possible traverse across this isthmus. (After www.digimap.com 2000)

Site Name: Tarbert and Point of Tarbert
Site Code: Ta1NC
OS Grid Reference: NC 164 489
Accessed by: Sound of Handa – Loch Laxford
Maximum Elevation above Sea Level: <10m
Minimum Distance Across: 1750m

The *West Coast of Scotland Pilot* (1995:448) gives the following information on Loch Laxford and its approaches: Loch Laxford provides good anchorage amongst its several islets and highly indented shores. In clear weather it is possible to locate the loch relative to three mountains, Ceann Garb, Ben Arkle and Ben Stack. As charts and pilots as we know them did not exist during the Viking Age, landmark recognition from memory must have served as an intrinsic part of their navigational practices. The presence of easily recognisable mountains, cliffs and valleys could easily confirm a course. Having related this, the *West Coast of Scotland Pilot* goes on to warn that care must be taken when approaching to avoid mistaking Loch Dúghaill, which lay 1 1/4 miles ENE of Rubha Ruadh, for Loch Laxford. Once in Loch Laxford it is apparent that caution must be exercised to successfully navigate amongst the islets and several drying reefs. The landing that would have been utilised on the north side of the peninsula lay in Fangamore Bay. The *West Coast of Scotland Pilot* (1995:449) reports that this area contains secure anchorage in depths of 11 to13m, depths easily navigable by any vessel during the Viking Age.

The Sound of Handa, which provides access to the southern landing of the Point of Tarbert, has a navigable width of 3/4 cable and is charted to be at least 11·2m in the fairway. It is also noted that local knowledge is required to navigate here. The spring rate of the tides in this area is between 2–3 knots and there are heavy overfalls in the vicinity of and caused by the Bodha Morair, a group of sometimes exposed rocks in the middle of the sound, which break even when submerged (*West Coast of Scotland Pilot* 1995:448).

This possible traverse is located on a peninsula that juts out into The Minch on West Coast of Sutherland (see Figure 6.54). The Tarbert site lay at the foot of the peninsula, cutting across its entirety. Its low topographical profile suggests that hauling a vessel across this isthmus would not be a difficult manoeuvre, but the feasibility of performing an operation such as this at this point seems like it would not be a worthwhile venture. It is possible however, that the transference of cargo and/or people from Loch Laxford over to the Sound of Handa might have been an option preferable to entering The Minch and rounding the isthmus. This would eliminate any exposure to the open sea and the dangers a mariner could possibly face in those circumstances. It may also have provided a safe route to different fishing grounds for a small vessel. It is for these reasons that this site would fall into the category of a micro-topographical portage site for localised use and not a major traverse used in long distance navigation.

6.4.2 Tarbat Ness

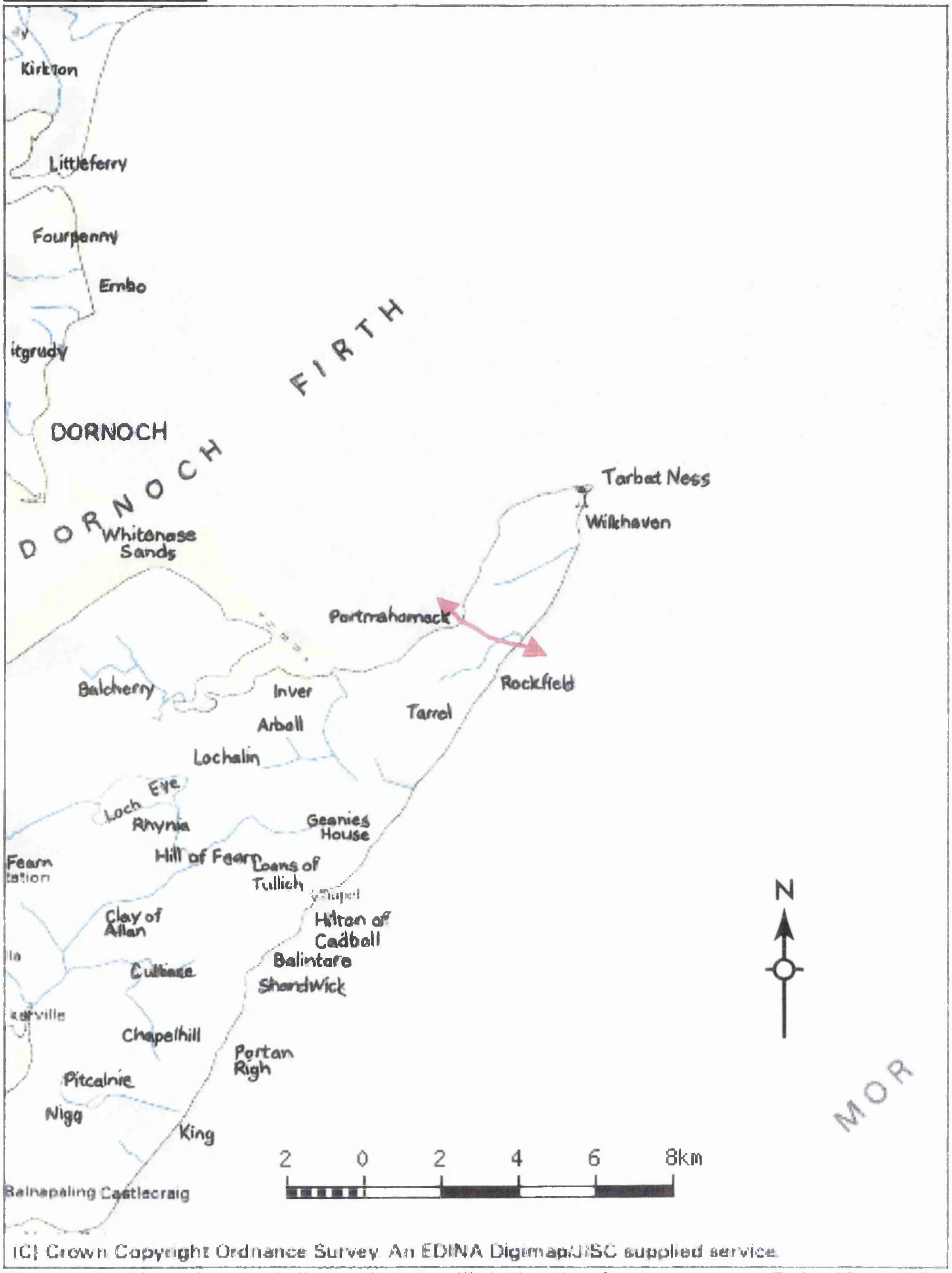


Figure 6.55: The red arrow indicates the most likely location for a traverse on Tarbat Ness. (After www.digimap.com 2000)

Site Name: Tarbat Ness
Site Code: Ta2NH
OS Grid Reference: NH 920 880 (approximate location)
Accessed by: Dornoch Firth – Moray Firth
Maximum Elevation above Sea Level: not available
Minimum Distance Across: 1800m (approx.)

This site is included in this investigation due to its uniqueness in occurring on the East Coast of Scotland, an area otherwise containing little evidence of portage activity. The *North Coast of Scotland Pilot* (1994:95) describes the topography from Tarbat Ness to the Cromarty Firth, in the distant aspect, as a line of sheer and bare red sandstone cliffs that gradually increase in height to the SSW. Tarbat Ness is the low-lying extremity of this point. The eastern coastline is lined by cliffs increasing in height to the SSW and in places is distanced from the sea by a narrow strip of low flat land.

This place-name is located at the point of a low-lying isthmus-extending northeast into the Moray Firth (see Figure 6.55). Tarbat Ness is defined as deriving from the Gaelic [*rudha Thairbeart*] meaning a promontory isthmus/crossing/portage (Watson 1904:45). This site is problematic in that the place-name 'Tarbat Ness' applies to the outer extremity of the isthmus. The minimum distance across this isthmus was measured at the traverse from Portmahomack to Rockfield. It is unlikely that a crossing of either cargo or vessels occurred at this point, as there are no circumstances present which would warrant this. Cheape (1984:210) mentions that Earl Einar of Orkney, who was called Torf Einar because he was supposedly the first man to cut peat in Scotland, established a proprietary occupation at Tarbat Ness, near the southern extremity of the Norse presence in this area of Scotland. This allowed the strategically and economically important area near the Dornoch Firth to be controlled.

The approximate sailing distance around this point is 14 km, not a large distance when compared with the traverse of 1800m over the isthmus. It is for these reasons that this site is not considered a viable portage site and that the place-name probably serves to describe the presence of an isthmus. As the exact location of a '*tarbert*' or '*carrying/bringing over*' point cannot be located at this site, its inclusion in the formulation of a portage criterion would not be helpful. This is not meant as an exclusion of negative data, as much as it is a weeding out process for sites that clearly would not aid in the identification of potential portage sites.

6.4.3 Tarbert, Loch Sunart

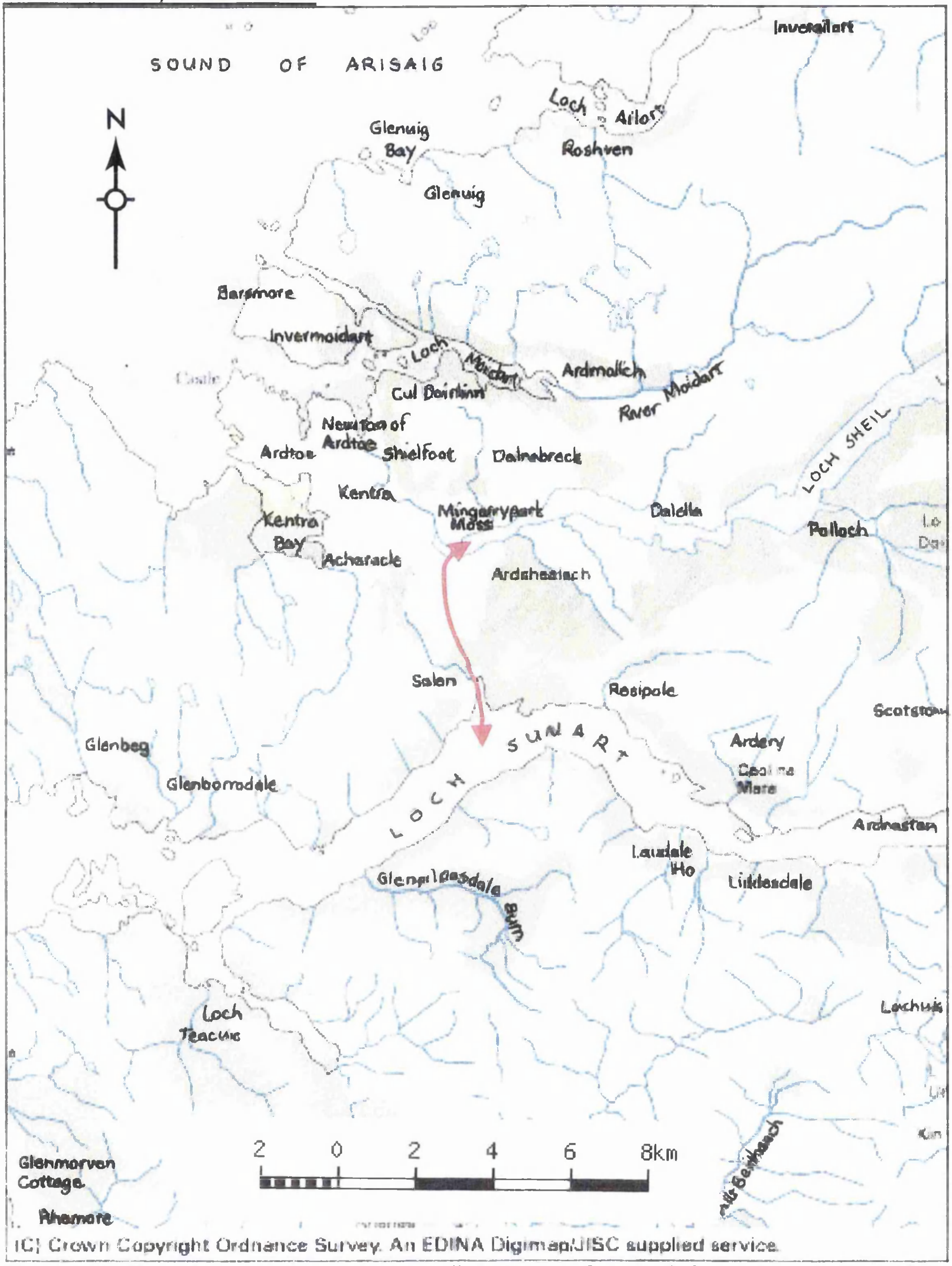


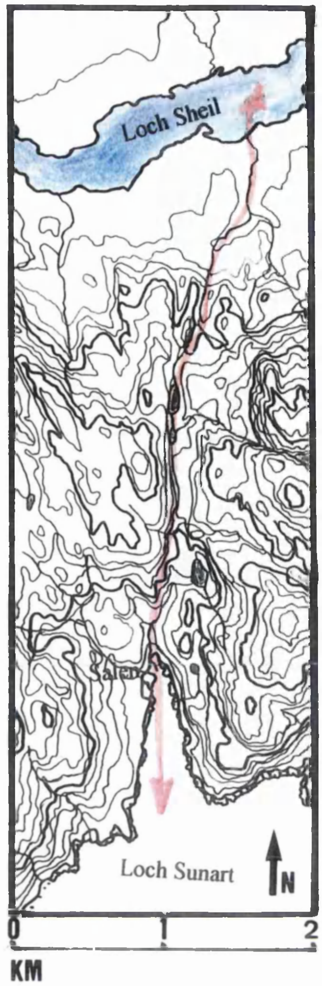
Figure 6.56: The red arrow indicates the most likely traverse from Loch Sunart to Loch Sheil. (After www.digimap.com 2000)

Site Name: Tarbert
Site Code: Ta2NM
OS Grid Reference: NM 687 638
Accessed by: Loch Sunart – Loch Sheil
Maximum Elevation above Sea Level: <70m
Minimum Distance Across: 3650m

The *West Coast of Scotland Pilot* (1995:241) reports that Loch Sunart is a 16 mile long sea loch which dries at the head. The course of this loch is tortuous for the first 2 miles with many unmarked dangers and then clears for approximately 6 miles before narrowing significantly. In general, this loch is quite deep, only getting shallow in the narrows and at the head. The traverse from Loch Sunart to Loch Sheil takes place at Salen. The *West Coast of Scotland Pilot* (1995:243) provides the following data on Salen Bay. The tidal stream in this area is weak in the area immediately south of the bay. Foul ground extends from both sides of the bay with a drying rock on the west side of the bay.

It is interesting to note that [Loch] Sunart is a purely Norse name (Gillies 1906:83). The original form being Sweyn's fjord or *frith*. Throughout the ages this loch has held many versions of this place-name such as: Swynwort (1392), Swynfiurd (1499), Soynfort (1505), Swnorthe (1517), Swynfurd (1543), with the area of Sunart being referred to as "Isle of Shunard" (1667) and Swenard (1723) – all of these place-names relating back to the original Norse form (Gillies 1906:83). The "Isle of Shunard" relates to the portage site on the Tarbert from Loch Linnhe to Loch Sunart (see Figure 6.56), where the Morvern area was able to be circumnavigated, and thus an 'island' in the same sense that Kintyre would be an island if it could be circumnavigated. This concept is further reinforced by the idea that if it could be navigated around in a vessel or dragging one, these routes were considered passages in the maritime landscape, with the same considerations of any other sea passage.

Figure 6.57: Topographical map showing the likely course of the traverse as dictated by the contours. (Illustration: Author)



Once the landing at Loch Sheil is entered upon, a fairly calm scenario is to be encountered. As it is a freshwater loch, the difficulties with tides, drying obstacles and seasonal variation are not applicable. As in the case of most lochs, caution is to be exercised when approaching the coastal fringes, yet a clear, navigable route exists in the centre of the loch. Access to Loch Shiel can also be attained by navigation from Loch Moidart to the River Shiel (see Figure 6.57). This route adds to the many navigable waterways located throughout mainland Scotland. When all of these possible routes are examined in the context of a maritime culture, a whole system of transport and communication appears that provides access to areas once thought unreachable by inroads from the sea. It is because of these varied methods of navigating through inland waterways that the Vikings were able to make their penetrations deep into Scotland and the Isles, as well as the rest of Europe.

This possible portage site falls into the category of sites that allow for a terrestrial traverse from a sea loch to a freshwater loch. This scenario allows for a journey to be taken of which there would be no other way for it to be completed without a portage of either cargo or vessels. This could be done for numerous reasons, yet the large distance and high topographical variation of this site make it likely that this was a transference point for cargo, personnel and possibly smaller vessels which could be transported with a cart or similar device. This site was chosen due to its association with a '*tarbert*' place-name located just south of Salen on the North Shore of Loch Sunart.

This is just one of the traverses which would allow for the almost complete circumnavigation of Ardgour, Morvern, Ardnamurchan and the district of Sunart, thus establishing a maritime transport and communication route throughout the entire area. The ability to do this allows for a reassessment of the entire concept of the Western Isles during the Viking Age. If these traverses were indeed considered part of the maritime landscape and no different than other difficult passages, then the infamous crossing of Magnus Barelegs at Satiris-eið, (Tarbert in Kintyre) in 1098 AD (Orkneyinga Saga: chap. 41) was just a reinforcement of the concept that if it could be circumnavigated *it is an island*!

The history of this area is one that has been dominated by the presence of maritime cultures; the use of routes such as these would be an essential component to the maintenance of communication and control in this area. Most the traverses involved in this route are quite long and exhibit a high topographical profile, yet to move personnel, cargo and small vessels would have been worthwhile for the advantages it would provide. These would enable a maritime presence to be had in the entire area that would allow for quick movements along the lochs to reach almost any location. This opens a new aspect to the practical navigation employed around the Scottish Mainland. Not only would this allow for people from distant areas to maintain contact and trade with others, but it would also provide a means for chieftains to make inroads from the sea and travel far and wide throughout the mainland. This site falls into both the micro and macro topographical aspects of the maritime landscape because of the great variation in the applications to which this site could be employed. On the micro-topographical scale, this site could be used for local communication and economic ventures, yet this same traverse provides access to a great inland area or the open sea. It is in the latter sense that this site could be utilised on the macro-topographical scale.

6.4.4 Tarbert, Loch Morar

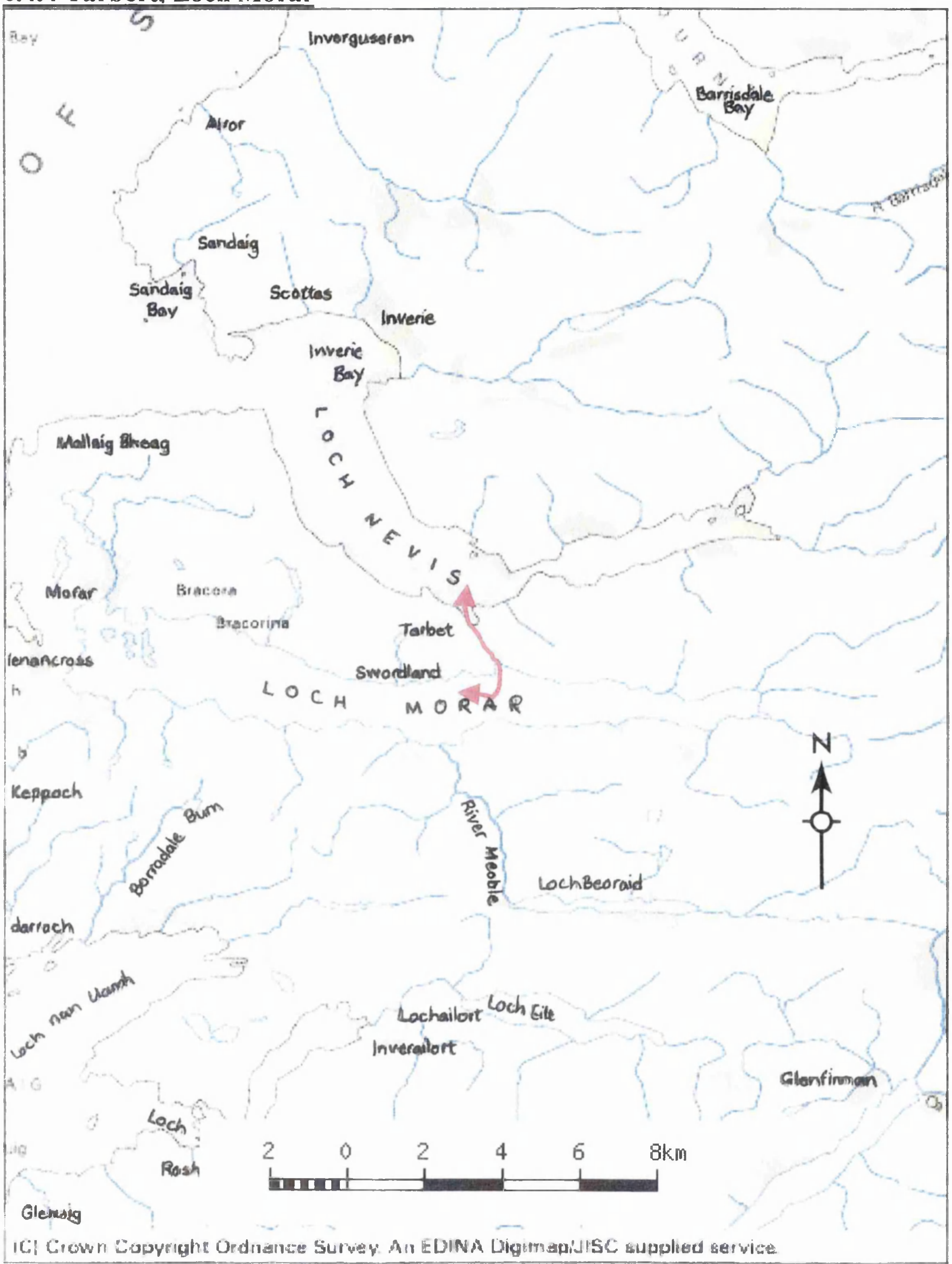


Figure 6.58: The red arrow indicates the line of the traverse at Tarbert. (After www.digimap.com 2000)

Site Name: Tarbert
Site Code: Ta3NM
OS Grid Reference: NM 794 920
Accessed by: Loch Nevis – Loch Morar
Maximum Elevation above Sea Level: <80m
Minimum Distance Across: 1050m

The *West Coast of Scotland Pilot* (1995:307) reports that Loch Nevis is navigable to smaller vessels, but to be wary of submerged shoals which may not be easily recognisable. This is especially true in the coastal areas. The tidal streams in this area are very weak in the wide entrance, but quicken as the narrows are approached. Once in the inner loch, the tidal streams are imperceptible. The winds on Loch Nevis are confusing, even in the fairest weather. When the wind is blowing gales or even freshening, violent squalls of an unpredictable direction occur. The *West Coast of Scotland Pilot* (1995:307) reports that any strong wind on this loch can make it a dangerous place for any vessel.

Tarbet Bay is a sheltered bay on the south side of the west entrance of the narrows in Loch Nevis. This bay provides a good anchorage with depths between 7 and 11 metres, with primarily a mud bottom. Local knowledge is required for easy entry and during south-westerly winds squalls are frequent (*West Coast of Scotland Pilot* 1995:308). The landing at this site is easily obtained and would pose no difficulty to the shallow draught vessels of the Viking Age.

Loch Morar, laying to the south of Tarbet on Loch Nevis is an inland loch that requires care only when navigating near the coast as there are submerged boulders and craggy shores in some areas (see Figure 6.58). This loch is reported to be the deepest in Europe, charted at over 300 metres in areas. The landing near the portage point is quite steep and does contain some boulders.

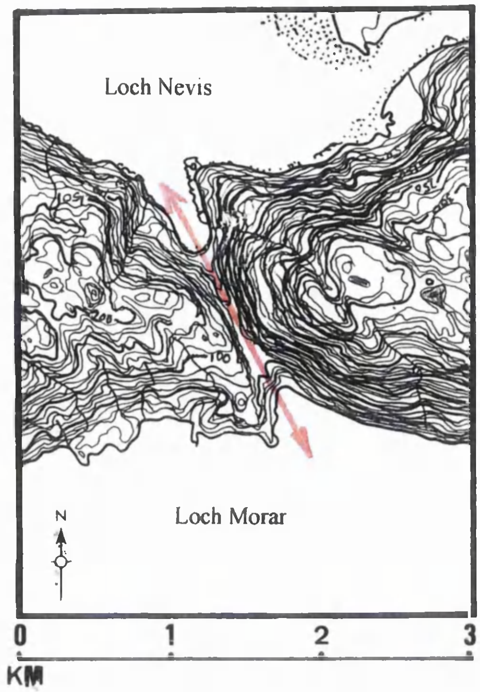


Figure 6.59: This topographical map of Tarbert on Loch Morar shows the high contours through which this traverse snakes. (Illustration: Author)

This is another site with a '*tarbert*' place-name, this time appearing as Tarbet. The geographical circumstances at this site lead one to believe that this site would fall into the category of a micro-topographical portage site (see Figure 6.59). The distance covered it is not great, but the elevations reached are high for this short distance. Also, once Loch Morar is accessed, the only available destinations lie on the shore of the loch. Small vessels may be able to ply some of the waterways that feed the loch, such as the River Meoble to the south, but even these are limited in their possibilities. This limited maritime environment, once the traverse is accomplished, is the main reason that the use of this site as a portage is to be considered a localised phenomenon. This site was more than likely used for offloading cargo at Tarbet to be carried over to the Loch Morar side for further distribution.

6.4.5 Glen Tarbert

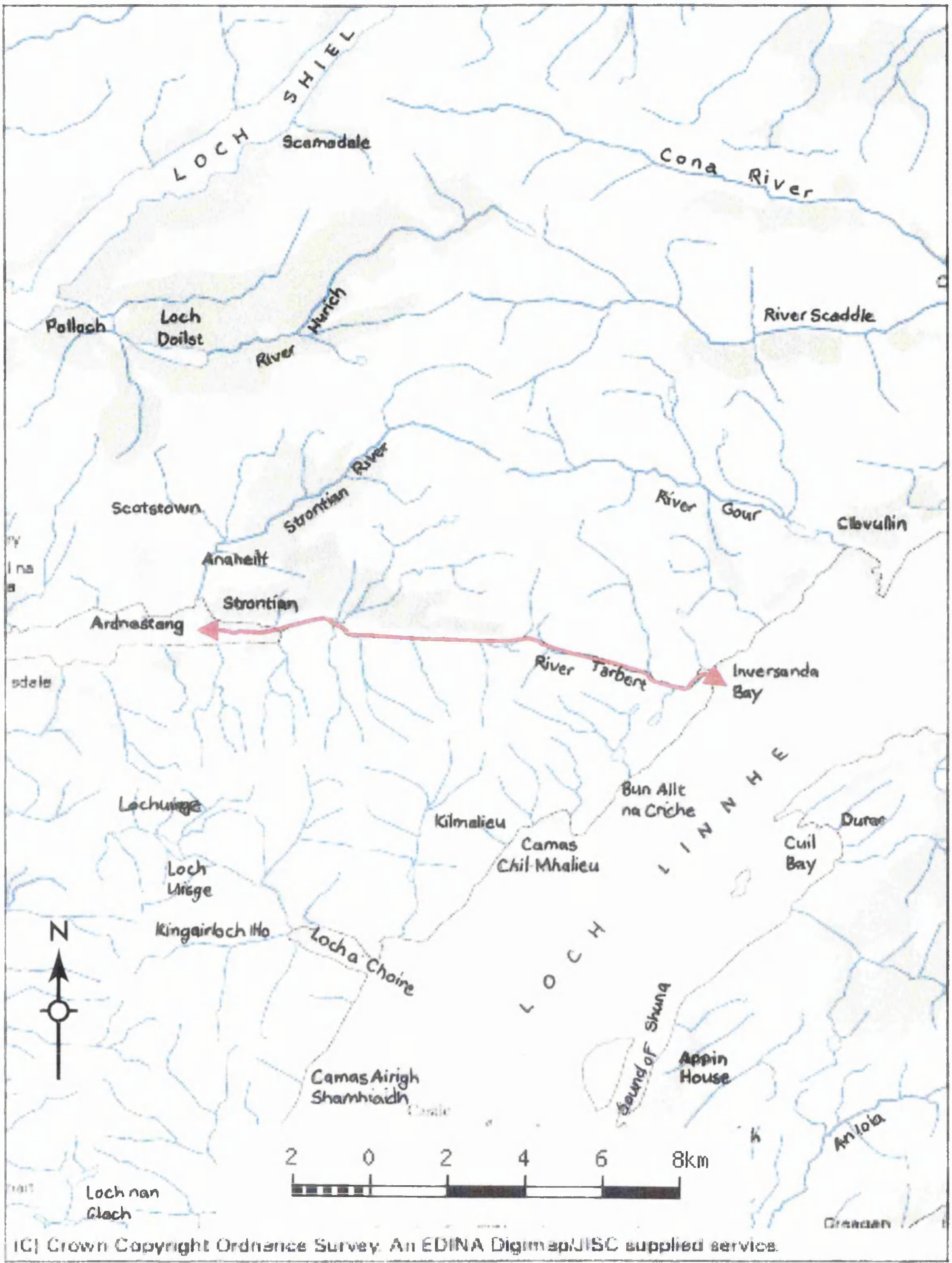


Figure 6.60: The red arrow shows the location of the traverse across Glen Tarbert. (After www.digimap.com 2000)

Site Name: Glen Tarbert
Site Code: Ta4NM
OS Grid Reference: NM 888 604
Accessed by: Loch Sunart – Loch Linnhe
Maximum Elevation above Sea Level: <100m
Minimum Distance Across: 10350m

This site is fairly unique for portages in Scotland and the Isles as it follows the course of the River Tarbert and the Carnoch River. The admiralty information for Loch Sunart is much the same as Ta2NM, but this traverse involves complete navigation of the loch to its head. The *West Coast of Scotland Pilot* (1995:243) reports that the coastal regions of this narrow loch is comprised of foul ground on the shores and local knowledge is required. As long as the fairway is followed, sufficient depths can be found for navigation to the river. The bed of this loch is primarily composed of mud and clay, with drying rocks on the shorelines.

The Loch Linnhe landing of this portage site is accessed at Inversanda Bay. Loch Linnhe is a continuation to the Northeast of the Firth of Lorn. This loch and the surrounding lochs provide navigable channels penetrating deep into this mountainous region, much in the way the fjords of Norway do. The main fairway of this loch remains deep and easily navigable, but as one sails north many of the adjoining lochs are entered through narrows which may have bars which are quite shallow (*West Coast of Scotland Pilot* 1995:244). Access to the central part of Loch Linnhe can be obtained from a variety of options. These include entrances from the sea by way of either the Sound of Mull or the Firth of Lorn. Access from other sea lochs can be obtained via Loch Creran, Loch Leven, Loch Etive or Loch Eil to the North (see Ta5NM below). For this site, only the main channel of Loch Linnhe need be described, as it is the main route to this site. Both shores of this section rise to mountain ranges penetrated with deep valleys. The tidal streams in this area run at a maximum of 1/2 to 3/4 knots, gaining in strength as the narrows at Corran are approached. The Sanda Shoal, an obstacle navigable by shallow draught vessels, borders the entrance to Inversanda Bay.

This '*tarbert*' site is one of the other sites involved in the maritime route that allows for the near complete circumnavigation of Ardgour and Sunart. The distance covered by this traverse is quite long, but with the assistance of the Carnoch River and the River Tarbert, it makes this possibility more realistic (see Figure 6.60). The topographical profile of this possible portage site is also quite high, but it is very gradual and spread over the distance. The actual dragging of a larger vessel for the entirety of this portage is not likely. But, to row/sail as far as possible up the river and then unload a cargo for carriage to the landing in Loch Linnhe or another vessel waiting in the River Tarbert is more likely. The carriage of very small vessels is also a possibility, as they could navigate in all but the shallowest depths and were built light enough to facilitate easy handling out of the water.

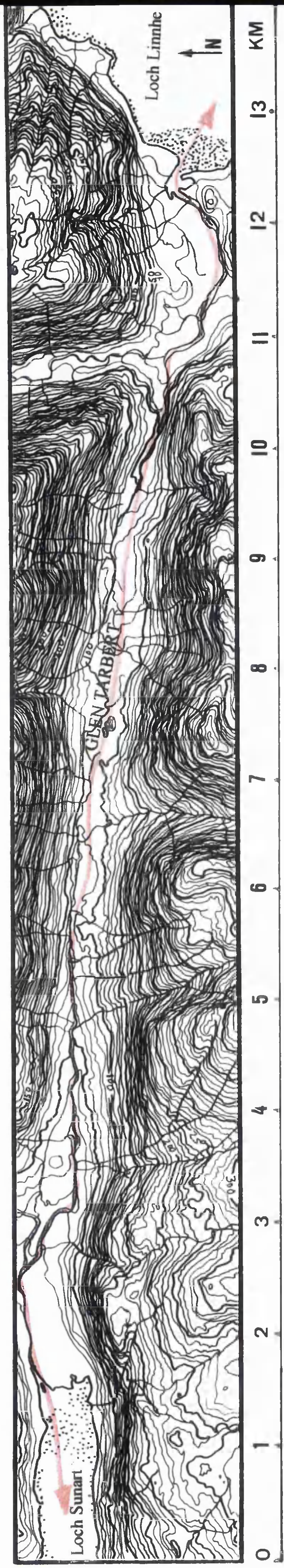


Figure 6.61: Topographical map showing the course of the traverse across Glen Tarbert in relation to the surface contours. (Illustration: Author)

For the largest vessels, the sea journey of approximately 60km around, from the mouth of Loch Sunart, down through the Sound of Mull would be a much better alternative, if not the only one. Even though this possible portage site may have provided a useful traverse for the small-scale transport of goods and allowed communication to be maintained within the area, it is unique in that it falls into the category of micro-topographical portages because of its great length and difficulty (see Figure 6.61). Yet, if the complete circumnavigation of this area were utilising this portage site as part of the route, it would have a role in the macro-topographical navigation of the Western Mainland. Multi-use sites such as this, bring into question the definition of '*portage*' as it applies to maritime cultures and practical navigation, a subject that is addressed in this thesis.

6.4.6 Lochan Dubh Torr an Tairbert

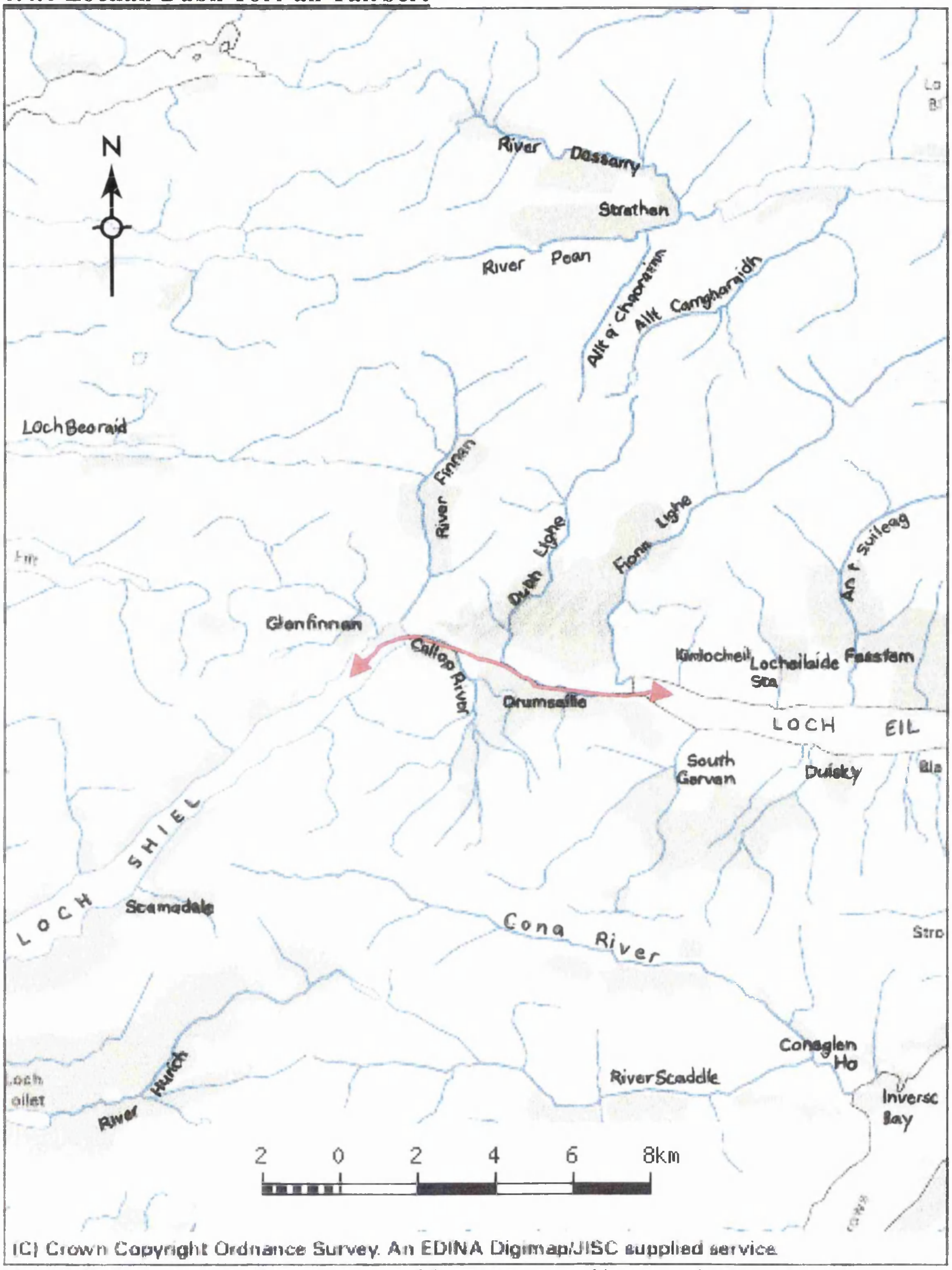


Figure 6.62: The red arrow indicates the course of the traverse across this portage site. (After www.digimap.com 2000)

Site Name: Lochan Dubh Torr an Tairbert
Site Code: Ta5NM
OS Grid Reference: NM 934 787
Accessed by: Loch Sheil – Loch Eil
Maximum Elevation above Sea Level: <20m
Minimum Distance Across: 12000m

The Loch Sheil landing of this site is comprised of a gently sloping bottom composed primarily of sand and cobbles. As a freshwater loch, this body of water is not subject to the variations of the marine environment. The proposed landing for the traverse is at the site of Glenfinnan, where a low-lying valley to the southwest provides a passage to Loch Eil (see Figure 6.62).

The navigation of Loch Eil to the landing at the western extremity is described in the *West Coast of Scotland Pilot* (1995:262) as unusually featureless. As long as the fairway is maintained, no obstacles will be encountered within 2 cables of the shore. The landing on the western extremity of Loch Eil is a gently sloping shore composed of mud, sand and small cobbles.

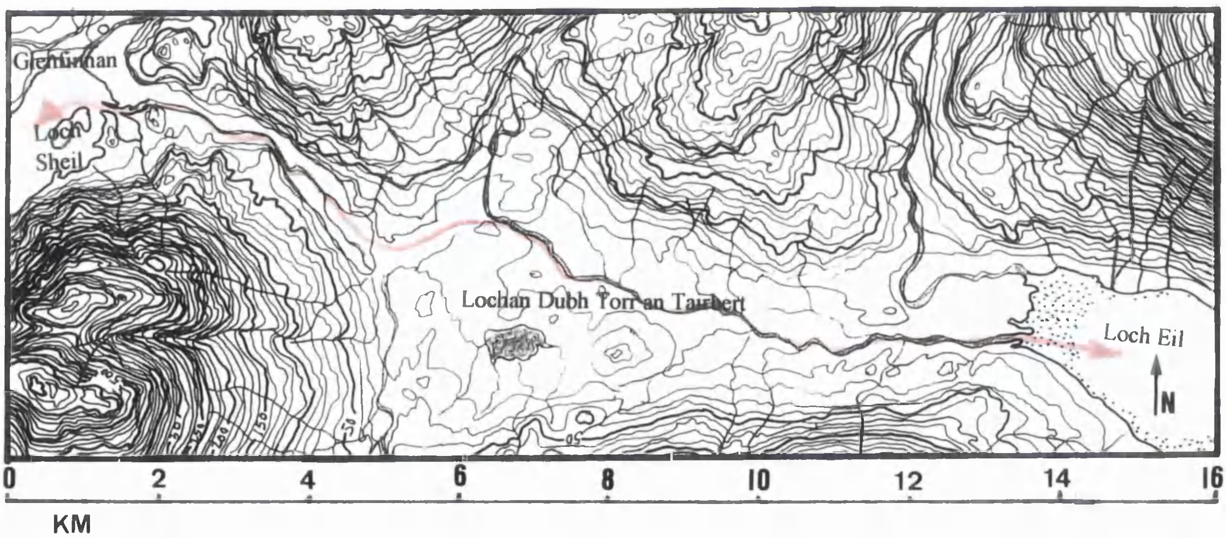


Figure 6.63: Topographical map showing the route of this traverse across Lochan Dubh Torr an Tairbert. (Illustration: Author)

This is another site that holds the '*tarbert*' place-name. This is also a site that incorporates river systems in the traverse between the two bodies of water. This is also a traverse that involves a supposed landlocked body of water; therefore there is no alternative option in accessing it, except by the possible portage from Loch Sunart into Loch Sheil discussed above or along the River Sheil from Loch Moidart. As is common on the routes involving portages on the West Coast of Scotland, this crossing also involves rivers that could be navigated by smaller vessels to cut the distance between the two lochs significantly (see Figure 6.63). In this case, the 12km traverse can be reduced to less than a kilometre by using the Callop River on the Glenfinnan side (West) and the Dubh Lighe on the Loch Eil side (East). Some of the watercourses that run between the two lochs are very shallow, yet during wet periods could hold enough water to allow a smaller vessel to pass. As the third leg in the route around Ardgour and Sunart, this would have served as an important aspect of the communication and transport system of the area, not only during the Viking Age, but also before and after as well. Because the traverse at this site opens into large bodies of water on either side, this site is part of the macro-topographical maritime landscape. Once this crossing is made routes become easily available that enable the mariner to continue onwards for vast distances.

6.4.7 Tarbert, Loch Moidart

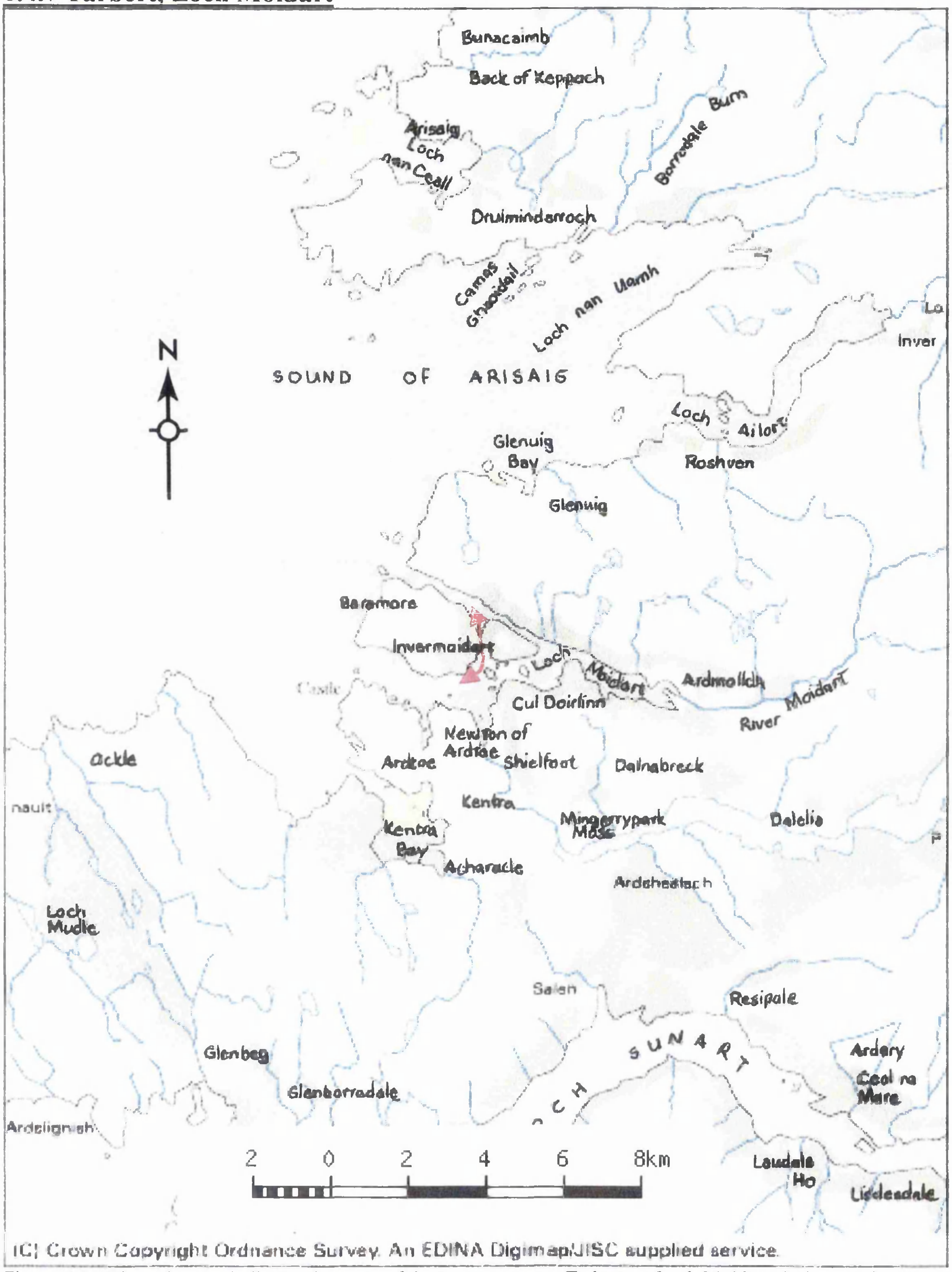


Figure 6.64: The red arrow indicates the route of the traverse across Tarbert on Loch Moidart, Ardnamurchan. (After www.digimap.com 2000)

Site Name: Tarbert
Site Code: Ta6NM
OS Grid Reference: NM 660 736
Accessed by: North Channel of Loch Moidart – South Channel of Loch Moidart
Maximum Elevation above Sea Level: <10m
Minimum Distance Across: 200m

The following local description is from the *West Coast of Scotland Pilot* (1995:287). Loch Moidart which lies in an opening of the coast between Farquhar's Point and Rubha nan Clach Dearga, 1 3/4 miles Northeast, is a picturesque loch with sandy beaches between rocky headlands, which dries out over most of its area. The entrance is obstructed by Eilean Shona leaving narrow channels to the North and South of the island which are available for small craft only. Anchorage can be obtained in the South Channel. The South Channel of Loch Moidart provides the main entrance and affords the best anchorage facilities for small craft in a basin 7 cables within the entrance, 1 1/2 miles west of Castle Tioram (see Figure 6.64).

However, both channels are tortuous with drying rocks close on both sides and less depths than charted, due to silting, which have been reported in South Channel. In view of this and the strong tidal streams, local knowledge is essential. In Loch Moidart, tidal streams set fairly strongly in both North Channel and South Channel. A steep sea is created in the entrance when the out-going stream sets against a West wind has maximum effect during departure from the Loch.

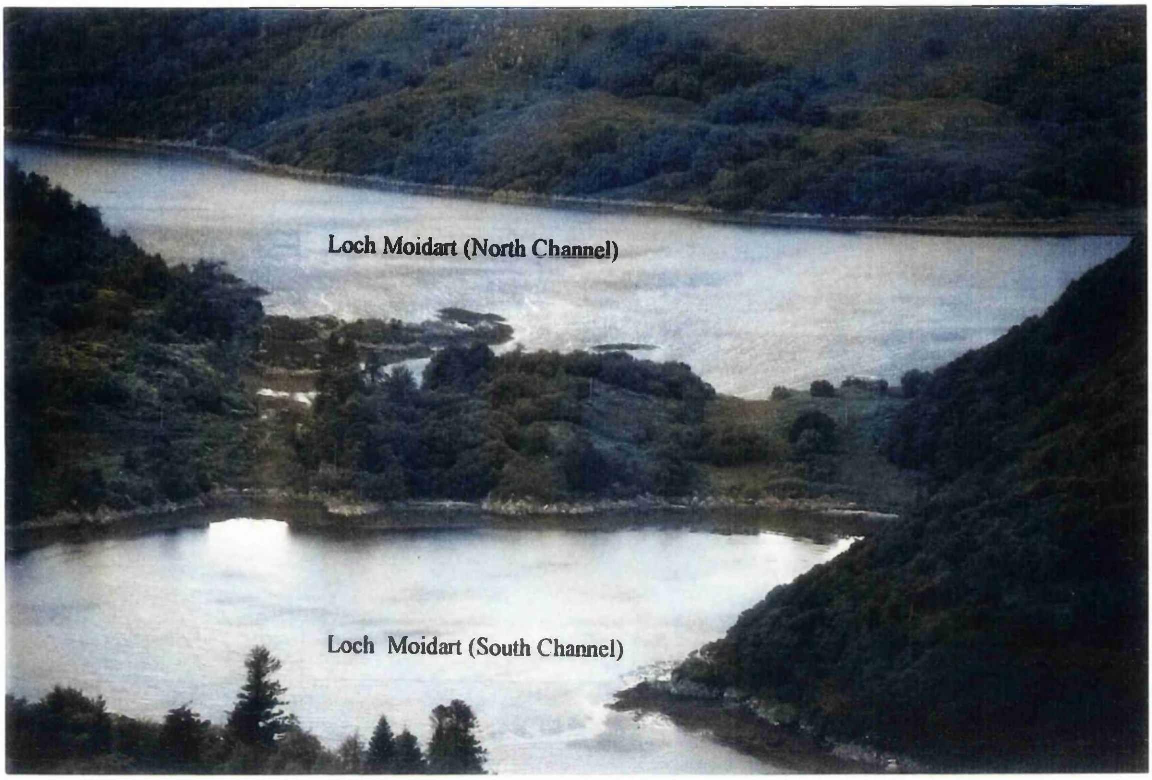


Figure 6.65: Photo of Tarbert on Loch Moidart, taken from the southeast, showing the entirety of the isthmus. (Photo: Author)

The North Channel of Loch Moidart is suitable only for smaller vessels and dries at the head in a marshy area. It is because of these strong tides that it may have been easier to access the inner loch of the South Channel via a portage from the North Channel than to fight the tidal streams. Obviously, this reason would only apply to circumstances with a sense of immediacy whereas it was not possible to wait for the tide to turn.

This is another site that contains the '*tarbert*' place-name, this one also falls into the category of a portage used in the micro-topographical navigation of the West Coast of Scotland. This traverse can be used to move smaller vessels from the North Channel of Loch Moidart to the South Channel of Loch Moidart on the narrow isthmus between Eilean Shona and Shona Beag. Even though the distance and topographical profile of this traverse would easily facilitate the dragging of larger vessels, such as warships (see Figure 6.65). The likelihood of this is minimal gauged upon the reasonably short journey these more seaworthy vessels could utilise. The distance from the termination of navigable water in the North Channel to the Island of Riska in the South Channel is approximately 9km via the circumnavigation of Eilean Shona and exposes the mariner to the open sea of the Sea of the Hebrides. In a smaller vessel this journey could prove dangerous and time consuming, the option of dragging a smaller vessel over the 200m isthmus to access either body of water can provide many advantages to this journey. This includes the simple dragging of a small row/sail boat over the isthmus for increased fishing territory to simply increased ease of communication with other areas. As is the case with all possible portage sites, a cost factor has to be considered when deciding the ways that each portage site may have been employed. For this site, the portaging of large vessels would have been more trouble than benefit. This is often the case of portages in the micro-topographical scenario; that they only suit small-scale movement of vessels and cargo.

In the South Channel is located Eilean Tioram, the location of the ruins of a 13th century castle and most likely the location of earlier occupation which has been built upon over time. This is an ideal location for a stronghold in the maritime landscape due to the sheltered harbour available and the easy access to the Sea of the Hebrides, which provides access to the entirety of the Western Isles. The importance of this site is reinforced by access to the River Sheil that enters the western end of Loch Shiel allowing access to the whole of the loch. This also allows for the portages off Loch Shiel to be performed allowing access to an even greater area. Albeit, the navigation of most of these waterways would only be possible with a smaller, shallow draught vessel. Yet, these same vessels would be present in all regions of the maritime landscape during the Viking Age.

6.4.8 Tarbet, Loch Lomond

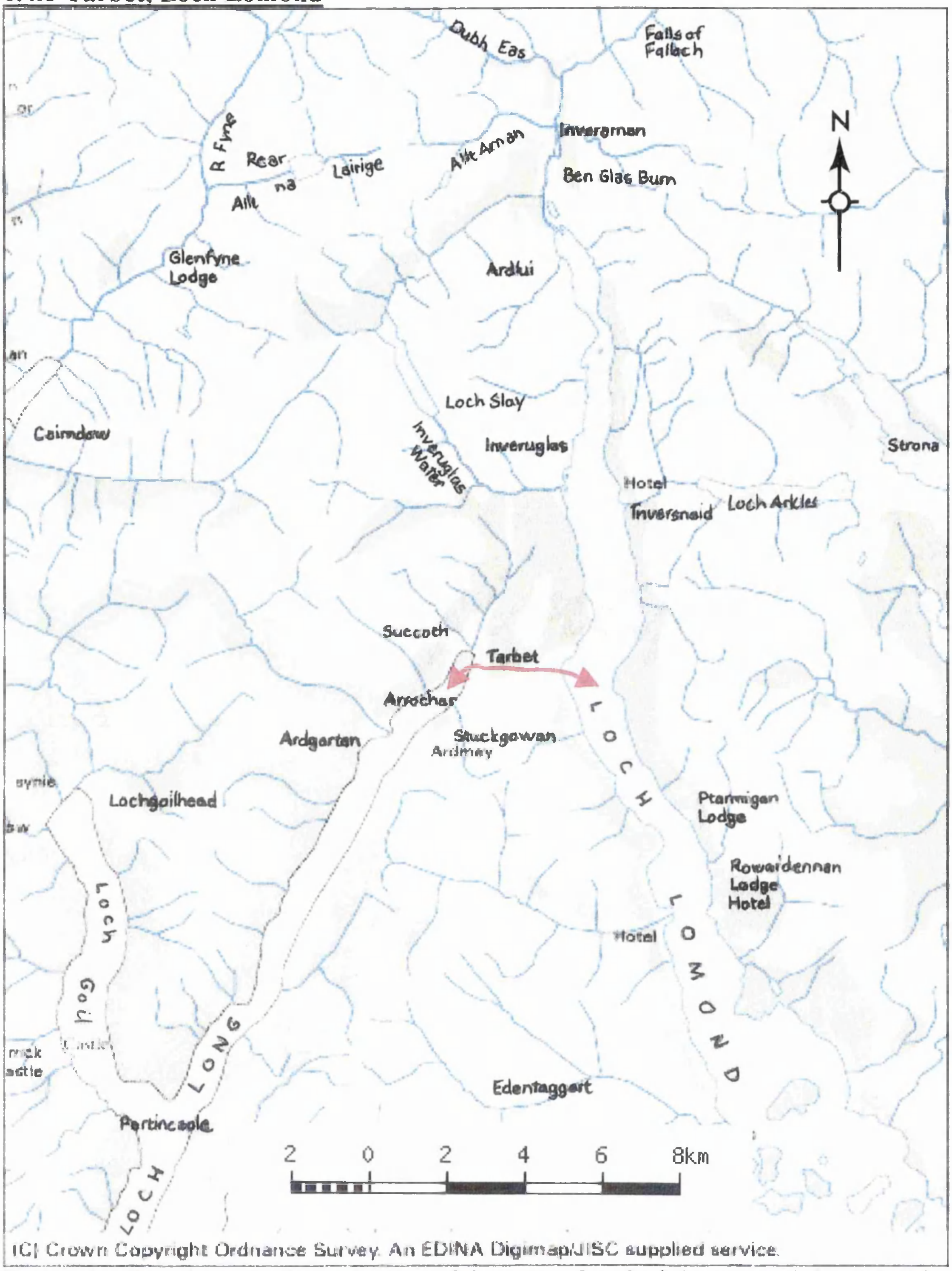


Figure 6.66: The red arrow indicates the route of the portage from Loch Long to Loch Lomond. (After www.digimap.com 2000)

Site Name: Tarbet
Site Code: Ta1NN
OS Grid Reference: NN 312 048
Accessed by: Loch Long – Loch Lomond
Maximum Elevation above Sea Level: <20m
Minimum Distance Across: 2750m

Loch Long, entered between Strone Point and Barons Point, is a narrow sea loch which extends approximately 14 miles north and NNE to its head where it dries out for about 3 cables (*West Coast of Scotland Pilot* 1995:82). It is approached from the Firth of Clyde using the Loch Long Channel. Loch Long is surrounded by high mountains and hills (see Figure 6.66). Again, this is a situation not unlike the maritime landscape of Norway. The tidal streams in lower Loch Long run at approximately 3/4 knots in both directions at the entrance and are barely perceptible at the head (*West Coast of Scotland Pilot* 1995:82). Navigating a sailing vessel on Loch Long can be dangerous as the surrounding landscape provides squalls, calms and unpredictable winds. If the fairway is maintained, a shallow draught vessel can navigate a clear course to the head of the loch.

Loch Lomond has a length of 18 1/2 miles and a width of 4 1/2 miles at its south end and a width of 2 cables at its north end. The south end of the loch is shallow and contains many islands while the north end is deep (192m) and free from obstructions in the fairway (*West Coast of Scotland Pilot* 1995:101). The shallow draught vessels of the Viking Age would have had no difficulties in navigating the length and breadth of the loch as long as care was taken.

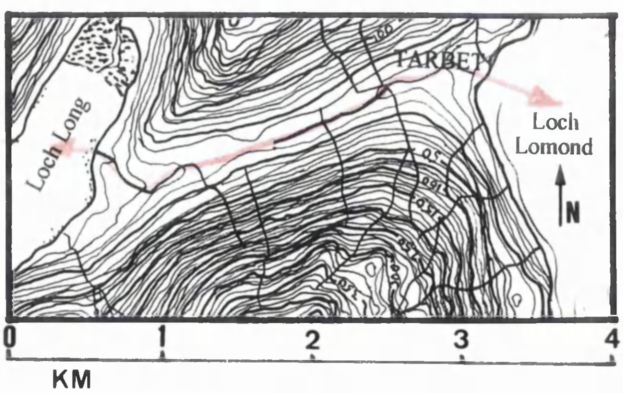


Figure 6.67: Topographical map showing the contours of the traverse between Loch Long and Loch Lomond. (Illustration: Author)

This is another possible portage site having a '*tarbert*' place-name; recorded by Cheape as "Tarbert" (1984: 211) and on the latest OS map as "Tarbet". This traverse from "Tarbet" on Loch Lomondside to Arrochar on Loch Long is another site which connects a frequented sea road to a land locked body of water, albeit an extensive one (see Figure 6.67). Loch Lomond is a significant body of water to have access to as it enables waterborne transport to have access to an extremely large and important area of mainland Scotland. This site is the scene of a portage involving 60 ships as recorded in *Hacon's Saga* (Dasent 1894: 354 [chap. 322]). Hakon had sent these vessels up Loch Long (Skipfirth) in order to draw Alexander III into negotiations. Once they reached the narrow isthmus at the head of Loch Long they proceeded in dragging these vessels across this strip of land into Loch Lomond. Once afloat on the loch, they destroyed the crops on the islands and raided right around the loch into Lennox. Of the many uses of portages, one which has gained mention in the sagas is the element of surprise that can be attained by appearing with a large fleet in an area where it does not seem likely a fleet could be. This was a similar tactic to that which Sverri had executed in Norway as mentioned above and recorded in *Sverrisaga*. That these portages only gain mention when they serve to influence the course of politics reinforces the concept that this practice was a standard navigational practice of the Viking Age.

This site probably served a function in both the macro-topographical (as described above) and micro-topographical navigation of the Vikings. The latter being that it would provide quick and easy access from anywhere on Loch Lomond to Loch Long and the open sea beyond. This option could be essential to communication with other areas and could also provide an inroad for cargoes of foreign or valuable trade goods. Economically it would be invaluable for the communities on Loch Lomond to have access to not only trade items, but also to the subsistence options available from the sea. Portages of this type may have only involved the offloading of cargo at Arrochar to be transported across the isthmus for reloading onto vessels on Loch Lomond to be distributed further. All of these possibilities make this site an excellent example of a portage site for use in the formulation of a portage criterion.

6.4.9 An Tairbeart, Kintyre

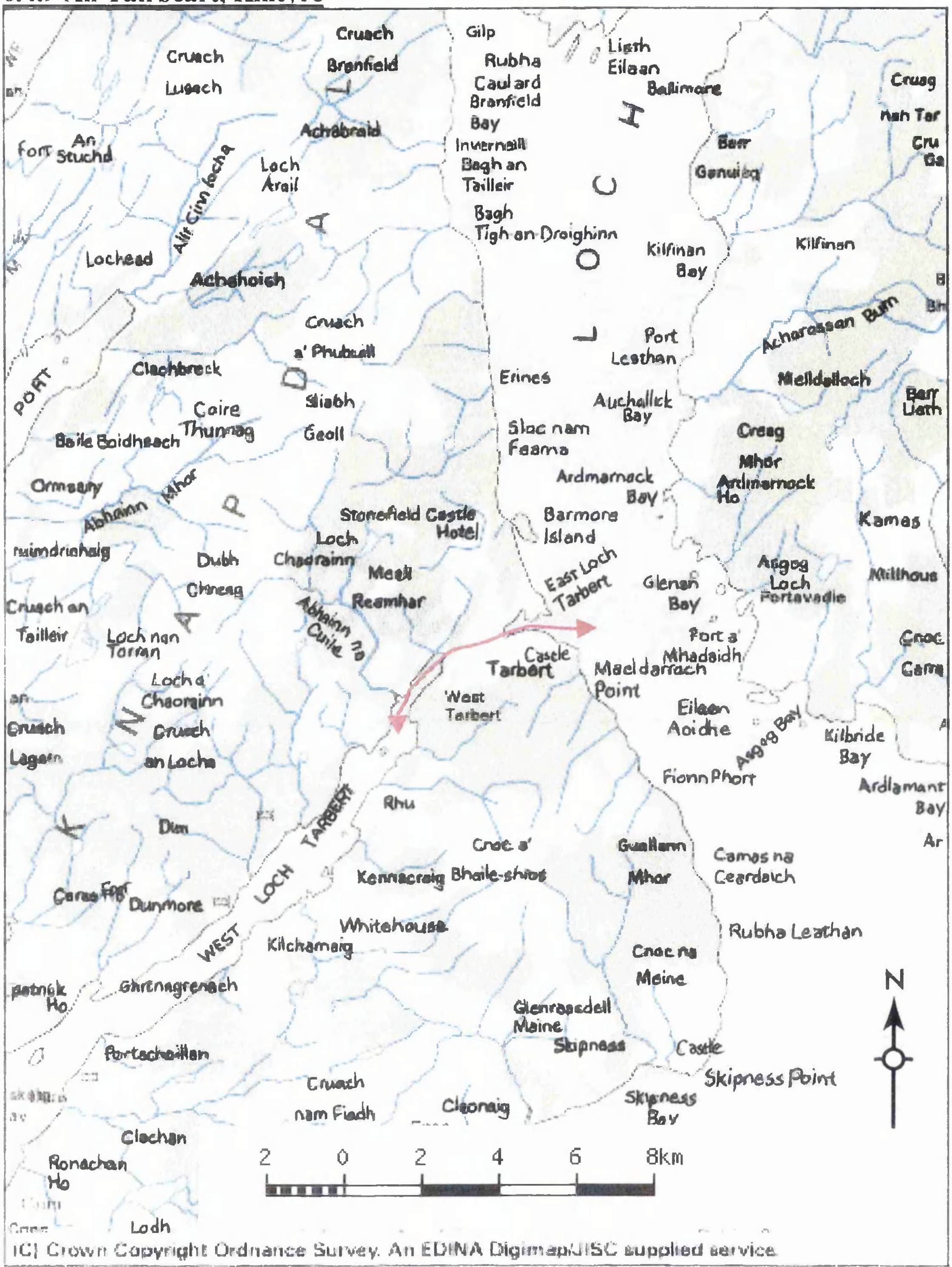


Figure 6.68: The red arrow indicates the line of the traverse across An Tairbeart in Kintyre. (After www.digimap.com 2000)

Site Name: An Tairbeart
Site Code: Ta2NR
OS Grid Reference: NR 853 682
Accessed by: West Loch Tarbert – East Loch Tarbert
Maximum Elevation above Sea Level: 15m
Minimum Distance Across: 1480m

East Loch Tarbert is described in the *West Coast of Scotland Pilot* (1995:115) as having an outer shore which is surrounded by foul ground extending up to 1/2 cable offshore in some places. This necessitates care when entering the loch from Loch Fyne. The depths afforded in this loch are suitable for the navigation of a shallow draught vessel. There are two main channels that provide passage in the loch, the south channel providing the greatest depths. In order to access the inner harbour from the outer harbour, narrows which contain small islets and fouling must be navigated. The tidal streams within this area are barely perceptible. The inner loch is well sheltered from the weather, but squalls can arise from the wind funnelled across the gap from West Loch Tarbert (see Figure 6.68).

West Loch Tarbert is as a narrow loch that extends 8 1/2 miles to the northeast where it ends in a low isthmus. The narrows at the entrance to this loch have a depth easily cleared by shallow draught vessels. As the head of the loch is approached the depth gradually decreases to 2.4m at a distance of 6 1/2 cables from the shore. The fairway of this loch is free from dangers and is navigable by small vessels. The tidal streams at the entrance of the loch are irregular in both directions, within the loch the tidal streams are barely perceptible (*West Coast of Scotland Pilot* 1995: 168). The bottom composition in West Loch Tarbert is composed primarily of mud. The landing at the head of the loch is a gradual slope also composed primarily of mud, turning to marshy ground (see Figures 6.69, 6.70).

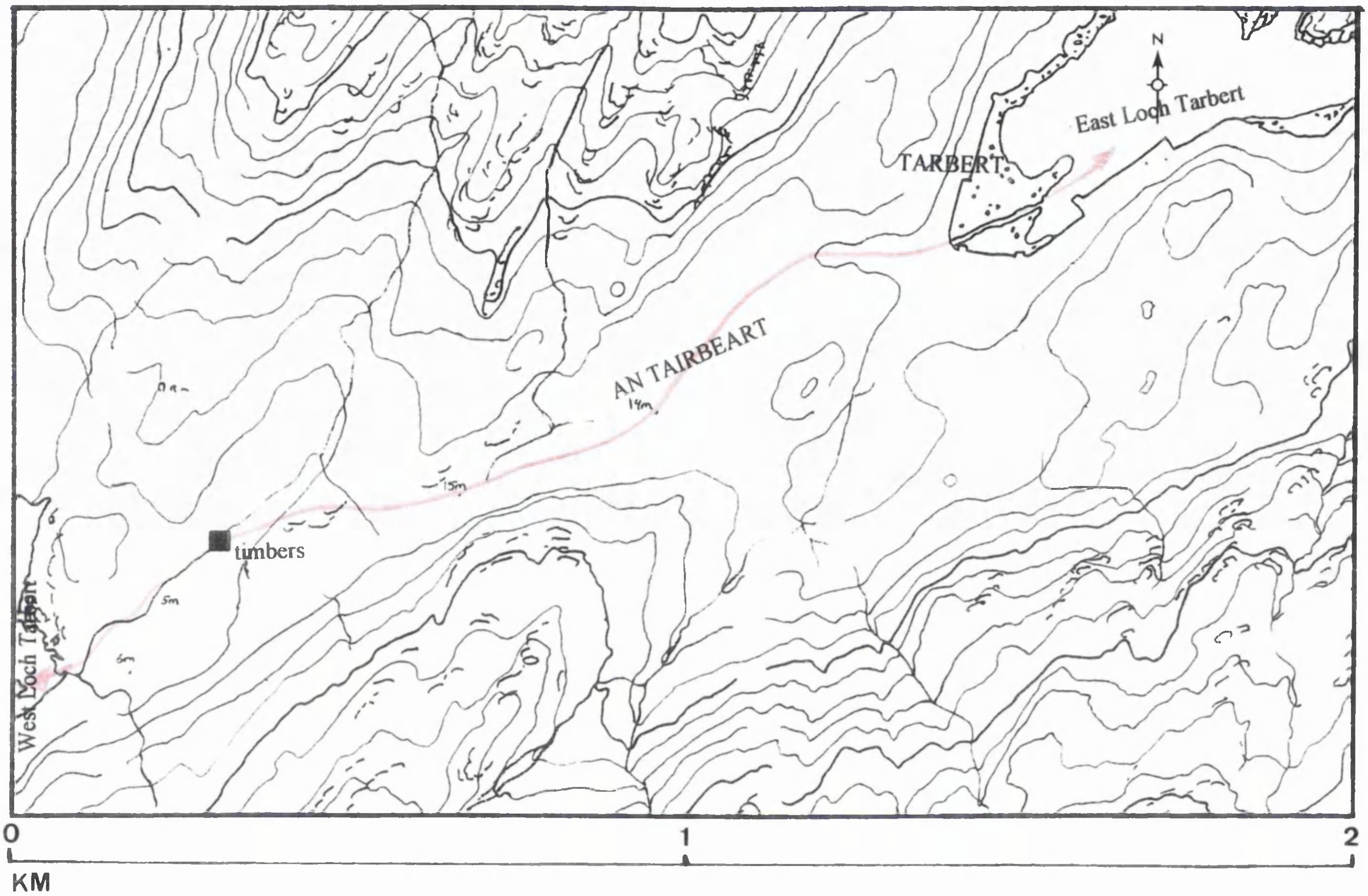


Figure 6.69: Topographical representation of the traverse across An Tairbeart in Kintyre. The ■ indicates the location of the timbers during the excavations by AOC Scotland. (Illustration: Author)

Figure 6.70: Photograph of the landing on West Loch Tarbert, taken from the southeast. (Photo: Author)

Tarbert [Gaelic *An Tairbeart*; the portage, ON *Satiris-eið* (Gillies 1906: 227)] on the Mull of Kintyre is the site of probably the most famous Norse portage in Scotland. This is where, in ca. AD 1098, King Magnus Barelegs had himself drawn across the isthmus in a skiff with the rudder set, thus claiming Kintyre for Norway (*Orkneyinga Saga* ch.41, Cheape 1984:198, Crawford 1987:25). This portage has had quite a bit of information recorded about it over the ages that can be used to help confirm the use of this site as a dragging. Not only does the place-name designate a portage, but there is also the saga reference and some possible archaeological material which has been recently unearthed that may relate to portaging activities at this location.

The *Orkneyinga Saga* tells us that messengers from King Malcolm of Scotland came to offer King Magnus a settlement that included all of the islands of the West Coast which could be circumnavigated with a rudder set. When they arrived at the narrow neck of Tarbert on Kintyre, he had his skiff drawn across with himself at the helm, thus claiming this choice piece of real estate for Norway. What is interesting to note here, is that it is mentioned in the saga that the isthmus connecting Kintyre to the mainland is 'so narrow that ships are regularly hauled across' (*Orkneyinga Saga*: ch. 41; *Heimskringla*, Saga of Magnus Barelegs: ch.10). Cheape (1984:198) also tells us of the use of this portage in or around 1315 by Robert Bruce. Thus implying both a pre-Norse and post-Norse use of this portage point.

This area is a peninsula in Southwest Scotland that is almost separated from the mainland of Scotland by West and East Loch Tarbert, thus accounting for the occasional reference to this landmass being an island (Cheape 1984: 208), further reinforcing the concept of islands being any landmass which can be circumnavigated. This concept of referring to an isthmus as an island makes perfect sense when utilising the image of a maritime landscape as held by a culture that was primarily water based. As discussed earlier, these strips of land were considered an actual part of the sea and therefore if they functioned to form islands, so it was. Once again it is stressed that this portage could be used to avoid long and treacherous journeys, as well as to surprise an enemy (Cheape 1984:207-208). The sea journey around the Mull of Kintyre is approximately 140km from the mouth of East Loch Tarbert to the mouth of West Loch Tarbert. This portage would cut that distance by a distance of at least 130km.

Recently, the possible site of this portage has been investigated archaeologically by B.A. Crone (1994) of AOC (Scotland) Ltd. Dr. Crone's initial report contained the following information:

Site Name: *An Tairbeart* (Kilcalmonell Parish)

Name of contributor: B.A. Crone (AOC [Scotland] Ltd)

Type of site or find: Stray timbers

NGR: NR 853 682

Report

> The owner of the land, Mr. Neil Duncan, reported the location of six large oak timbers in a boggy field in the low-lying land traditionally thought to be the route of the Viking portage between East and West Loch Tarbert. These timbers were associated with a discrete area of large stones and boulders revealed in the face of a drainage ditch. Dendro-chronological analysis was employed to date the timbers but with no success. The face of the drainage ditch was recorded and showed that the mound of stones lay directly on the subsoil while the timbers lay in the peats and clays which had developed to the East of the mound.

Sponsor: Mr. Neil Duncan

Crone (1994)

Further details on the work executed at the site of *An Tairbeart* are presented in the article *An Tairbeart; the portage* by B.A. Crone (1995:31-33). It states there that when these timbers were originally brought up three to four years previously, it was believed that they were a part of the original portage. This may have been part of the portage that was crossing a boggy surface as suggested by Crone (1994), or maybe it was the physical manifestation of one of the 'herringbone/corduroy' patterns described elsewhere in the literature (Ambrosiani 1991:103). This site yielded only one in situ timber, and a discrete area of large boulders and stones were observed

(Crone 1994). Sadly, the dendrochronological specimens were unable to be dated. Crone concludes that it is possible that this was an attempt to construct a stable surface running approximately North-South over boggy ground. Due to the limited amount of funding available to this project, a complete excavation was not possible, but with further research this site should continue to contribute to the knowledge of portages.

This site is well documented throughout history as a portage site, and its location in the maritime landscape further supports this claim. As a key portage in the macro-topographical portage scenario this site provides important information on the physical characteristics of portage sites, and when combined with the information obtained from other areas of Scotland and the Viking World, greatly aids in the formulation of a portage criterion.

The three previous sections have discussed sites that have been included in the formulation of the *portage criterion*. The next section will introduce some other portage possibilities that warrant further research to fully understand their role in the maritime landscape.

6.5 Other Portage Possibilities in the Maritime Landscape of Scotland and the Isles

The portage possibilities and scenarios discussed in the sections above are just a sampling from the vast array of options available along the routes utilised during the Viking Age. As this is not a catalogue of portage sites, but an investigation into the reasoning behind them and the methods by which they were performed, many possibilities were omitted from the type sites by choice or by chance. It is here that some of the other possible portage sites will be briefly discussed. Most of these sites remain on the fringe of what would be considered a true portage site or scenario. This may be because of a lack of a recognised place-name or because their function in the maritime landscape does not allow them to be considered a *true* portage by the archaeological and navigational definition.

Two sites that hold the place-name '*tarbert*', but do not contribute to the formulation of a portage criterion or to the study of portages as they occur in the maritime cultural landscape of the Viking Age are; Tarbet on the Isle of Fidra (NT 512 870) and Tarbet on the Isle of May (NT 680 990). Both of these are located on small isles off the East Coast of Scotland. Any discernible advantage in the navigation of the eastern seaboard by use of these sites as portages is not obvious. However, the mere presence of the '*tarbert*' place-name does lead one to believe that these sites were the location of a '*carrying or bringing over*' at some point in time, and if so, both of these sites would fall well within the confines of a portage in the micro-topographical scenario.

Another group of sites that warrant mention are the numerous '*tarbert*' sites that occur throughout the Outer Hebrides. The majority of these place-names are located on small, low-lying strips of land, which separate two freshwater lochs. The purpose of these traverses is fairly obvious. They serve to facilitate the transference of vessels and goods from one loch to another for access to larger geographical area, and also add to the subsistence options available. An example of this are the two Lochs an Tairbeart (NB 256326 & NB 249276) behind Garrynahine, Lewis. There is also a Loch Ben Tarbert (NB 526458) located behind the township of North Tolsta in Lewis. All of these sites need to be evaluated on an individual basis with the aid of a portage criterion in order to test their feasibility. For each individual portage site a number of variables exist that will help determine the viability of the traverse as a portage. By studying the unique variables for each site under the guidelines of the portage criterion, it is possible to determine if a portage would have been likely at the chosen site and why. This process, as utilised in this investigation to Viking Age Scotland, can as effectively be applied to similar circumstances in the maritime cultural landscape the world over.

Another set of place-names which have led to the identification of areas where vessels may have been dragged are those describing tidally dependent strips of land connecting islands to the mainland or other islands. Because these areas are usually covered at high water, and likely navigable, they cannot be considered portages in the true sense of the word. The Gaelic term for this feature is '*dóirlinn*' – an isthmus likely covered at high water (Gillies 1906:199, Ordnance Survey 1981:8, Watson 1926:505). Gillies breaks down this term to a variation of the old verb '*lingum*' – to jump, possibly because the tide flowed in quick enough as to jump or spring over the isthmus (1906:15). This word can take many forms, and occurs throughout the Western Isles and Scottish Mainland. An excellent example of this is the Dóirlinn (NM 662712) located between Eilean Tioram and the mainland, which serves to separate the isle (upon which the remains of Castle Tioram are located) and Ardnamurchan (Watson 1926:505). Some other examples of '*dóirlinn*' sites are; Dóirlinn in Gigha, which is located near to Tarbert on the same isle (Watson 1926:506); Dóirlinn in West Loch Tarbert, Kintyre; and the unique occurrence of a Dóirlin in Loch Avich, Argyll (Gillies 1906:56,59). This last site is peculiar as it is located in a freshwater loch, where there is no tidal action. Of course, some freshwater lochs have seasonal rising and falling, so it may be an analogy to similar circumstances in the marine environment that brought about the name.

The Old Norse referent to a similar situation as the Gaelic '*dóirlinn*' is '*örfiris-ey*' – ebb isle. This is equivalent to the Gaelic term '*eilean tioram*' or dry island (Watson 1926:505). An '*örfiris-ey*' derived place-name can occur in tandem with a '*dóirlinn*' place-name, as in the case of Oransay in Loch Sunart (Watson 1926:505) or on its own, as Oransa, off Bracadale (MacBain 1922:36). The place-name '*örfiris-ey*' is present in one form or another at on at least four islands in the Outer Hebrides and two in Skye (MacBain 1922:89). This situation is one that may or may not involved the dragging of vessels at one time or another, but is important to acknowledge these sites when studying the portage scenario. Most of these scenarios are on the fine line between portaging and the landing of vessels. The question also remains that if water covers the isthmus at high tide does a dragging that took place at low tide count as a portage? For the purposes of this investigation, and when examined under the scrutiny of the archaeological definition and criterion of the portage scenario, it does not!

Another set of place-names which may be indicative of a portage scenario, albeit an elusive one to locate, are the three '*díg*' place-names which occur near Loch Sunart in Argyll. This is a grouping of three place-names; Díg na crìche, Díg na bhoga and Díg na sgúlain, translated by Gillies (1906: 85, 86) as; the march ditch, the bow ditch and the ditch of the wicker basket. These place-names seem to be similar to some of the ones encountered when investigating the portages of the Viking expansion eastward, in that instead of defining geological features as is usually the case in Scotland, they are descriptive names. Further investigation into these sites would be necessary to find if they are indeed related to the portage scenario.

On a much larger scale, the suggestion has been made that the current route of the Caledonian Canal may have been a portage route during the Viking Age. The idea of this being a possible portage route was discussed with Barbara Crawford (1995) during a conversation about possible portage sites in Scotland and the Isles. This crossing along the Great Glen would involve traversing over approximately 30km of land during the approximately 90km distance. Along the route there are numerous lochs which could be sailed or rowed across. This portage from Loch Linnhe to the Moray Firth could eliminate the approximately 540km sailing distance from the Firth of Lorn to the mouth of the Moray Firth were one to sail around the mainland of Scotland. A traverse at this point would eliminate many kilometres of treacherous sailing in some of the roughest conditions to be encountered off the British mainland. Further research is required into this site to determine the likelihood of such a venture.

The Irish historian Alfred P. Smyth takes the distances portaged in Britain one step further with his proposition of a 'sea road' from Dublin to York across the British mainland. This theory involves the use of portages by the Dublin Vikings in their effort to maintain communication and trade with the Viking town of York (Smyth:1975 and 1979), and vice versa. He forwards that it was possible to 'sail' from Dublin Bay to the walls of York using the Clyde and the Forth, thus eliminating the 600 treacherous miles (960km) of sailing and adding a 20 mile (36km) portage (Smyth 1975:22). Albeit, 20 miles is a formidable distance to portage, it would have been strategic and logistical genius to be able to maintain and utilise such a direct route of trade and communication. This is a portage possibility that needs to be further examined with the aid of a portage criterion, as is the case with many more of the possible portage sites in Scotland and the Isles. As the case in most archaeological models, the guidelines of this will not be hard and fast, and there are always exceptions to the rules, but it can help to isolate possibilities and aid in the interpretation of site specific transportation routes.

Smyth (1979:32) also brings to our attention a number of portage possibilities from Ireland, which I will include some here. The idea that the Vikings were traversing from lough to lough in Ireland, just as everywhere else is supported by the account of the Limerick Norsemen leader Olafr "Scabby-Head" Cenncairech transporting his fleet from the Shannon to the Eine. According to Smyth (1979:32), the easiest route for this journey would have been from the Shannon to the River Black, then overland to Lough Gowna or Lough Oughter. His insinuation being that this was not a difficult manoeuvre to bring the longships back and forth between Erne and Lough Ree. In order to substantiate these claims and fully apply them to the impact of the Norse in the Hiberno-Scottish area, the Norse and contemporary Irish maritime landscape need to be further examined in accordance with all other available information.

The information contained in this chapter has provided a clear picture of the navigational routes, landscape and conditions encountered on many potential portage sites in Scotland and the Isles. If used to their full potential, these routes drastically change the maritime landscape of Viking Age Scotland. Areas that were once thought to be isolated from or to have limited access to the sea are now within the realm of the maritime landscape. Portages would have also served to shorten the long and treacherous sea journeys that are inherent in the navigation off Scotland and the Isles. Most importantly, the methods used in the identification of these sites will help other possible portages to be located and identified so that the utilisation of the maritime landscape can be fully understood when executing an archaeological investigation into any maritime culture.

The next chapter is an archaeological experiment based on the research conducted in this thesis. The choice of Mavis Grind in Shetland to perform the experiment was based upon the evidence provided by the extensive analysis of this site and its high probability of serving as a commonly used traverse throughout history. It was also chosen because its location would allow for the experiment to investigate the portage scenario, and the navigational aspect of locating and utilising a portage. The vessel chosen was a Group 4 vessel (see chapter 4), a replica of the Skuldelev 1 cargo vessel. For its role in the portage scenario, this vessel is one that was unlikely to have portaged on a regular basis, but the experiment focused on methods and techniques, therefore this trial served as an extreme example of portaging. Appendix C: The Viking Voyage provides a video documentary on this experiment, allowing the reader to see the successes and failures that an archaeological experiment involves.

Based on the information used in the identification of portages in the micro- and macro-topographical navigation of the maritime landscape, other experiments at other chosen sites using vessels from all of the different groups could be used to help complete the understanding of not only the roles of the different portage sites, but also the roles of the vessels in the maritime landscape of the Viking Age.

7. The "Borgundknarren" Experiment in Navigation and Portaging

The Science Department of the British Broadcasting Corporations Channel 2 produces a series entitled 'Secrets of Ancients' which presents and discusses issues dealing with the fairly unknown practices of ancient societies. Viking navigation and the portage scenario are issues that caught their attention for presentation as one of the last in the series. After their preliminary investigations into the available resources on this topic they were referred to this research on the subject. The further development of this experiment was its culmination as a trial of Viking Age navigational techniques leading to a portage over the isthmus at Mavis Grind in Shetland. This experiment was the direct result of testing the information on portages in the Norse maritime landscape of Scotland and the Isles proposed by this thesis. The primary reason behind the choice of Shetland as a location for this experiment was that it allowed for trials in Viking Age navigation using a bearing-dial (Sølver 1953:294-296, Taylor et al. 1954:78-84, Thirsland and Væbek 1990, Thirslund 1995) whilst navigating to a site where there exists a substantial amount of data regarding portaging activity over the ages. The choice of a westward journey was also significant in that the previous experiments involving portaging had concentrated on the eastward movement of the Vikings.

As the primary consultant on the portage section of the project, it was possible to propose numerous sites that would meet the requirements of relying on a fair amount of data and ease of filming, the most likely sites being at Lunna (see chapter 6) and Mavis Grind (see below and chapter 6). Both of these possess place-names that could identify them as places where dragging activities occurred and both sites are narrow enough to facilitate a fairly quick portage. Albeit, the site at Lunna would be much easier traversed using a replica of a small, light warship such as Skuldelev 5. The underwater and terrestrial survey at Mavis Grind provided enough data to make it the logical choice, as it met all of the criteria as well as holding a firm place in local tradition for the dragging of boats. This site also was narrow enough to allow for a larger vessel to be portaged with sufficient manpower.

7.1 The Ship

"Borgundknarren" Specifications:
length overall: 16.5m
mast height: 14m (pine)
width (at the widest): 4.6m
depth: 2.1m
height (keel-stem): approx. 4m
sail area: $87m^2$
sail material: Duradon
construction material: oak keel, pine planking
year of construction: 1993-94
ballast: 15 tonnes (round stone)

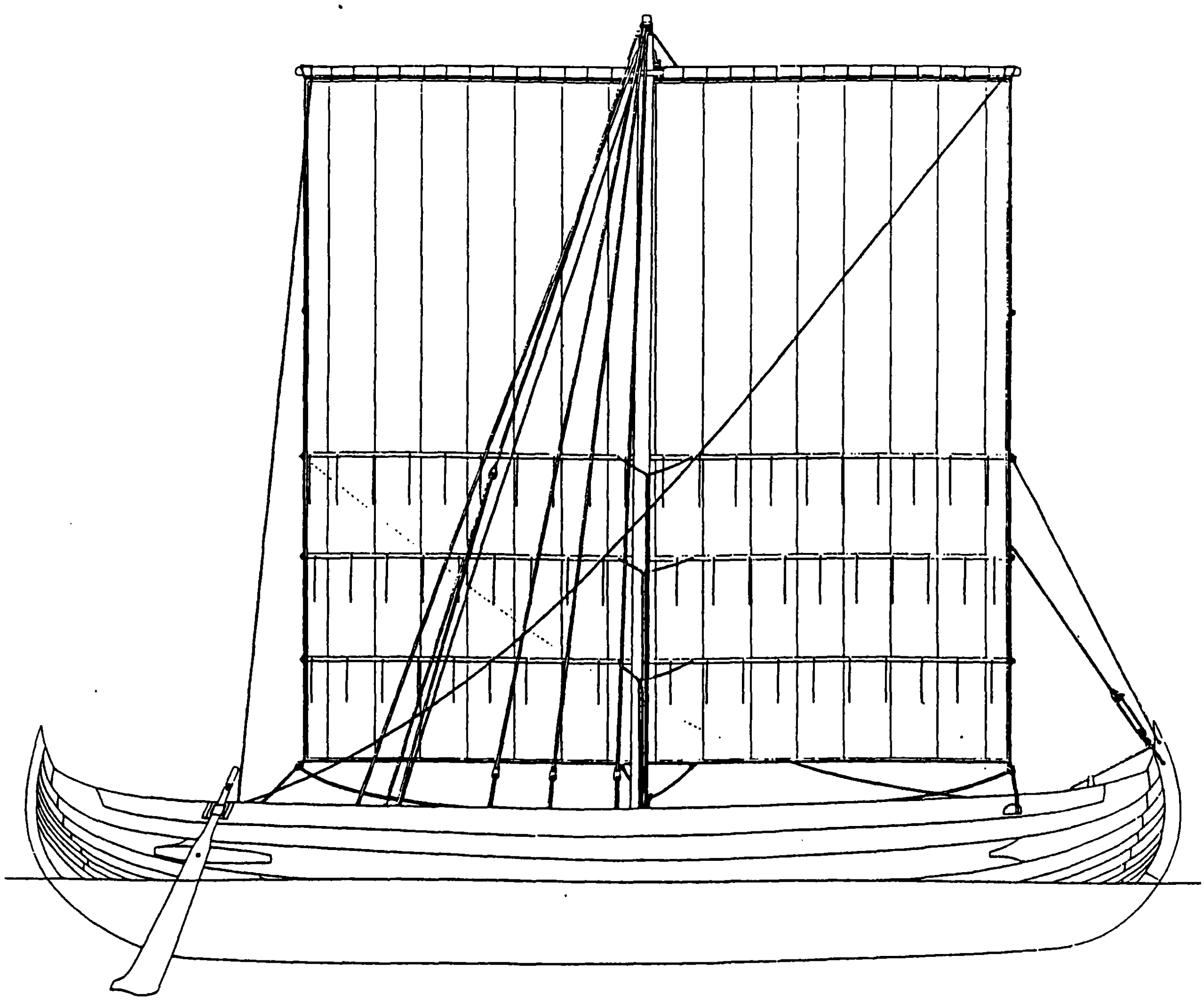


Figure 7.1: Preliminary measurement drawing of the hull and rig of Skuldelev 1. (Drawing after Thorseth 1986:70)

From the outset it was obvious that this project would involve intense logistical planning in order for all aspects of the journey to be properly executed. This not only included the organisation of the vessel and resources needed to sail and portage a large vessel, but locating the vessel itself. Once this was accomplished, assembling a crew suitable to the task with the required knowledge for each aspect was of the utmost importance.

Figure 7.2: The Skuldelev 1 vessel on display at the Viking Ship Museum in Roskilde, Denmark. Photo: Author

The type of vessel chosen for these trials was a replica of Skuldelev 1 (see Figure 7.2), a *knarr* or cargo ship recovered from the Roskilde Fjord in Denmark. It is worth noting that this size of vessel is not what one would normally associate with dragging. That is not to say that these vessels were not portaged; only that this will serve as an extreme example. Nonetheless, these cargo vessels would also have to be hauled out of the sea for repairs and storage so the concept of dragging such a vessel across a narrow strip of land was a regular occurrence.

Many of the key boatbuilding areas of Norway are located away from the sea, therefore these vessels would be launched on lakes and make their way toward the ocean via portages between numerous lakes. This is also true of the "Borgundknarren" which was built by Jakob Bjorkedal at his shipyard in Bjorkedal, where he has made numerous replicas including "Saga Siglar". There are *now* tracks established to transfer the vessels from the workshop to the sea, but the final launching of these vessels is still accomplished by men hauling her down to the sea without the aid of machines. These portages between lakes are a prime example of portages on a micro-topographical scale (see chapter 3).

For the first stage of the journey this vessel served as an excellent subject for observations relating to the time it would take to reach Shetland and how to navigate when sailing a deep draught trading/cargo vessel without the aid of modern navigational devices. The construction of this vessel is unique in relation to the other ship finds from the Viking Age in that it has a particularly hydrodynamic hull. At the fifth strake (*meginhufr*), which is 5cm thick, the hull curves outward at a higher angle that forms a channel along the hull (see Figure 7.3). This channel allows air from the bow to be passed under the entire length of the hull thus reducing friction and creating lift; observable from the stern as a corkscrew of air emanating from beneath the waterline whilst under sail. One can only deduce that this is produced by the propulsion energy coming from a centrally located point when the vessel is in trim, thus showing the advantage of this design for ocean sailing. For the journey across the North Sea this vessel is ideally suited to the task. This exaggerated curve to the hull also extends the workable keel form that would serve to help stabilise the vessel when crossing the wind. This provides additional data supporting the concept that these Viking Age vessels were able to come across the wind.

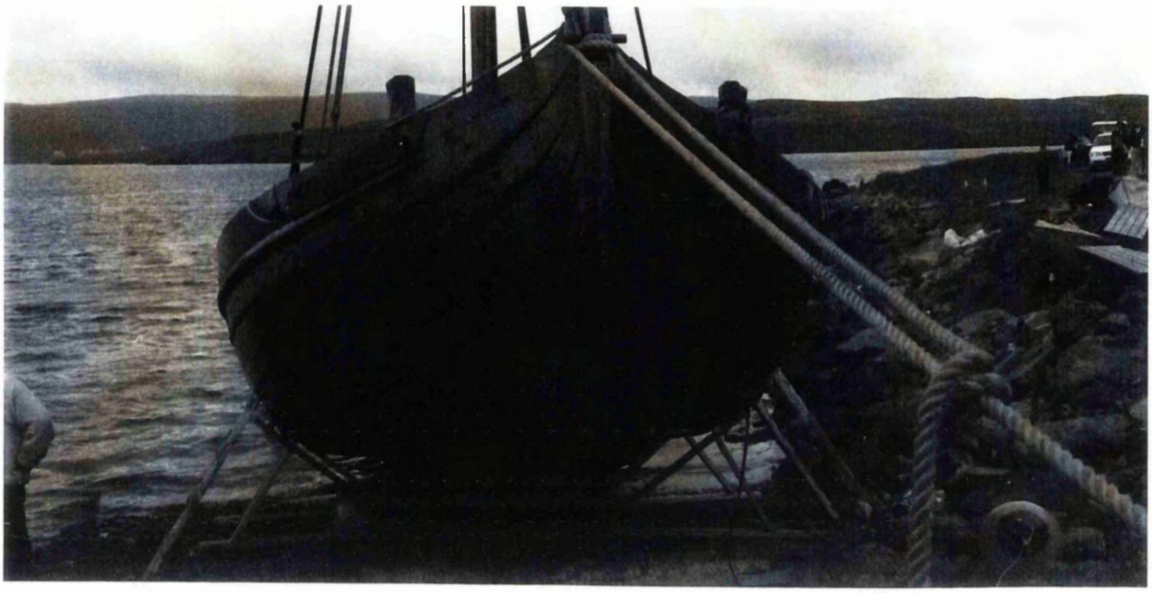


Figure 7.3: This view of the "Borgundknarren" shows the sudden outward curve at the 'meginhufr'. Photo: Author

The Sunnmøre Museum in Ålesund, on the West Coast of Norway, is the owner of the "Borgundknarren", the vessel chosen to make this journey. As mentioned previously, she is a replica of the Skuldelev 1 vessel now on exhibit at the Viking Ship Museum in Roskilde, Denmark. She was built as a replacement to the Skuldelev 1 replica "Saga Siglar" which was lost in a storm in the Mediterranean after completing her journey around the world.

As the "Borgundknarren" is a replica of the Skuldelev 1 find, research was undertaken at the Viking Ship Museum in Roskilde to view the original. At the museum shipyard there is another replica of the Skuldelev 1 vessel being constructed within the closest tolerances to the original find of any so far (see Figure 7.4). This vessel will not have any of the modern equipment carried on the other replicas and she will have a hand woven woollen sail. The experimental archaeology aspect of the museum is currently having the natural materials produced on site. The sail is being woven from wool obtained from a primitive type of sheep from the West Coast of Norway. This wool is not shorn from the sheep, but plucked eliminating the cut edges of the wool mid fibre (Lightfoot 1999: pers. comm.)

Once the replica is completed a series of trials will be performed which will be used to evaluate the performance of the other replicas. During the visit the keel had been laid and the strakes were attached up to the fifth strake [*meginhufr*] which was in the process of being laid.

Max Vinner has experience with the sailing of this type of vessel as he has sailed before on the "Saga Siglar" and he also has experience in dragging Viking Age vessels. In particular, his experiments with the "Helge Ask" (Provins 1996, and see chapter 5), a replica of Skuldelev 5 (the small warship). The first issue to be discussed was the basic physics involved in dragging ships. A different method must be employed on each different type of vessel. In each of the aforementioned experiments, different methods were employed in the portage activity, ranging from using the oars through the oarholes as handles to lift and pull ("Helge Ask"), to lifting the vessel onto a purpose built carriage to drag it over long distances ("Krampmacken"), to having the crew use their backs to lift the vessel while the main forward movement came from a rope attached to the keel ("Havørn").

In order to shift a vessel the size of the "Borgundknarren" a combination of techniques must be employed in addition to some new ideas that need to be tested. The first problem to be addressed is the weight of the vessel and where to attach a pulling point that would be able to handle the force of the pulling without damaging the vessel. Instead of attaching a line to the hole in the keel, a rope harness encircling the vessel must be fashioned. This would need to be set around the hull in a way that it is pulling the vessel from the rear. This is more akin to pushing the ship, instead of concentrating the force on one point on the bow, which would result in pulling the dead weight of everything behind the contact point. A harness would distribute the force evenly around the hull and make it so that the entire vessel would be pulled at once. It is important that this harness system is not allowed to tighten resulting in a crushing force upon the framing of the vessel.

The other main issue to be dealt with in dragging a large vessel is how to lift the vessel in order to reduce the friction between the vessel and the ground to the point where she can slide forward with minimal effort. The size of the vessel does not allow for the vessel to be lifted by the gunwales as they are too high to get a hold of when the vessel is on land. These types of vessels do not have oarholes that can be used as lifting points either. But, because of the unique design of a knarrs hull formed by the outward curve at the (*meginhufr*) fifth strake; it is possible to lift the vessel on the small of the back using the thigh muscles. This technique of lifting is the same as was employed on the "Havørn" expedition. This technique requires careful use of the muscles and careful placement of the small of the back as any misplaced exertion can cause serious injury. As the thigh muscles are the strongest lifting muscles in the body it should be possible to take enough weight off of the keel to allow her to be pulled up a grade with minimal effort. In no way is this an attempt to lift and carry the vessel, but to reduce the weight of the hull on the keel and break the friction between the keel 'rollers'.

During the construction of the "Borgundknarren" time and monetary constraints necessitated some compromises. These are mentioned here only to allow the reader to become familiar with the vessel. These variations from the line drawings of the Skuldelev 1 vessel should not effect the outcome of these trials. The first is in the construction of the vessel. On the stem and stern post, these are not one solid piece to which the strakes are joined. It is very difficult to find and fashion this section from one piece of timber; therefore this section was constructed using three pieces fit together in such a way that it is identical to the original except for the visible joins. Another variation would be the use of the synthetic sail (Duradon). This is mainly due to the extremely high cost of having a sail of this size woven from wool.

Figure 7.4: The 'meginhufr' being clenched to "Skuldelev", the most accurate replica of Skuldelev 1 to date. She is now under construction at the Viking Ship Museum in Roskilde, Denmark. Photo: Author.

The "Borgundknarren" makes use of hemp ropes impregnated with tar for the rigging. These are an alternative to materials such as tree bark (as experimented with on Saga Siglar, but the technique is lost (Ragnar Thorseth in Schuster 1991: 30) walrus hide, sealskin, horsehair or a variety of other possible rope and lashing materials.

Because the "Borgundknarren" serves most of its time as a charter vessel for the Sunnmøre Museum it is equipped with an inboard diesel engine for safety reasons. This naturally adds a prop and rudder to the stern and a fuel tank to the cargo area. The rudder is left in a fixed position whilst under sail which does not affect the handling of the vessel via the steering oar. This is an unavoidable circumstance that should not affect the outcome of this experiment. The presence of this equipment does require extra care to be taken while dragging the vessel across the open land so as not to damage it. The added weight of all the permanent machinery will affect the dragging by making it more difficult. It is safe to say that none of the additional modern equipment will in any way make dragging easier. In order to comply with international shipping regulations for the carriage of passengers the "Borgundknarren" had a life raft stored on the bow, a radar reflector hoisted in the rigging and a VHF radio. The addition of all this equipment should in no way affect the sailing of the vessel as if she were a fully laden cargo vessel she would have carried significantly more weight than this.

7.2 Expedition Background and Research

Even though the portage scenario is what is of primary interest on during this experiment, and is the focus of this thesis, the methods that were used by the Viking Age mariners to arrive at the correct locations to perform this activity is an extremely important aspect of investigating the use of the maritime cultural landscape that must not be ignored. As the research into methods of identifying the location of possible portage sites has been the subject of my research, the choice of Mavis Grind was based upon the data on this site in chapter 6.

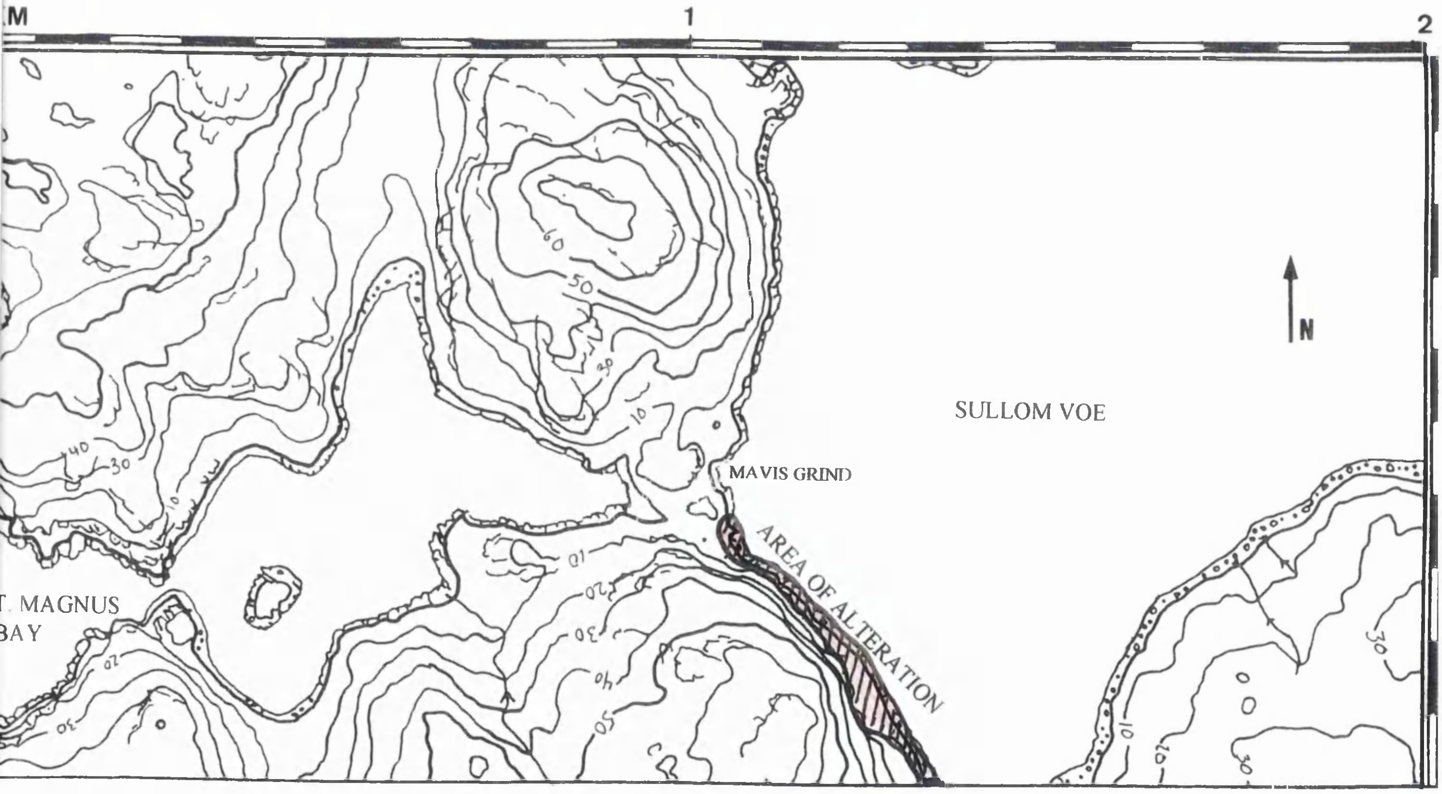


Figure 7.5: Map of the portage site at Mavis Grind, Shetland, showing alterations to the site due to modern activities. (Illustration: Author)

Obviously, there were numerous logistical concerns involving this site. This involved not only obtaining permission to perform the experiment, but to make ready the site for dragging a Viking ship (see Figure 7.5). This involved using local contractors to smooth the grade of the landing (for justification see chapter 6: Mavis Grind) and to remove some of the man-made obstacles which had been placed on site over time. These included a fence that ran through the middle of the traverse and anti-tank pylons placed in St.Magnus Bay during WWII.

7.3 Navigating in the Norse Maritime Landscape

As portaging is a method of navigating within the maritime landscape, it is necessary to discuss other methods of navigation directly related to the portage scenario. The goal of this experiment was to navigate to the site of Mavis Grind without the use of modern devices and to portage over as part of this macro-topographical navigation experiment. Therefore, a discussion of the bearing-dial used to maintain the course to Shetland is directly relevant to this experiment in maritime operations.

The bearing-dial that was used for the navigation from Hernar, Norway to Shetland is based upon the discovery and interpretation of a wooden artefact found on a Norse site in Greenland by C.L Vabæk in 1951. This object has been stratigraphically dated to about AD 1000 (Thirslund 1997:11). As it was only a fragment of the whole, it has been interpreted as being circular when in its entirety (Sølver 1953:294). When the object is constructed as it has been interpreted (a full circle with a small handle underneath and a small pointer in the centre of the top surface) a bearing can be taken by holding it in a horizontal position in the aft of the vessel by the helmsman. Before this object can be used to obtain a bearing it must be calibrated to the known location of the rising sun. This is achieved by aiming one of a series of evenly spaced notches in this direction and marking it. Then, as the sun completes its journey across the sky, notches are marked on the dial at intervals in time. From this it is possible to use this primitive compass to aid in maintaining a constant latitude whilst sailing (Sølver 1953:295). The drawbacks to this method of navigation is that it is only effective in navigating by latitude, observations can only be taken in fair weather and the initial calibration is only effective for a small period of time.

The use of this object in the manner described above has been the subject of many debates since its interpretation as a bearing-dial by Capt. Sølver (1953). Taylor et al. (1954) provides a forum for which this interpretation is discussed. Taylor (1954:78) refutes the idea that this object could in any way be used for navigation, yet provides no other suggestions as to how the Vikings were able to regularly and successfully make offshore journeys. The main consensus from this discussion is that the use of this object as a means of navigation cannot be proven either way, therein lies the reason to attempt to navigate to a specific destination using this implement as the principle method of determining a course.

The idea has also been proposed that the parabolic curve formed by the gunwale of a Viking ship can serve as the curve formed by the shadow of the pin on a bearing disc; thus allowing the navigator to read his direction from the shadow of the mast on the gunwale. An individual whom had spent their life on and around the sea would be able to approximate their location by knowing the prevailing winds and currents and by observing the change of the wind over the water. Other methods of roughly determining location were changes in the colour of the sea due to tide streams and effects of sub surface features and the smell of land in the air. It is also possible that a weary land bird would land on the vessel for a rest before heading back thus indicating that they were close to land. Local knowledge of the currents and coastline is also a major consideration when navigating in this manner.

7.4 The Crossing

The morning of our departure, the navigator took the appropriate readings with the bearing dial, marking the curve as time progressed (Appendix C: time mark 07:30). This would be necessary in order to be able to get an accurate reading during the journey. The currents around islands and archipelagos run in cycles with the tides and seasons, therefore if one had spent a good part of their life sailing these waters they would have to have the local knowledge to recognise these and know their approximate location; if not their actual location geographically, their progress in the journey. This would be especially true in the case of traditions being handed down from father to son, just as true in the career of a mariner as it would be in the boat building trade. The ability to recognise variations in the currents and swell was an extremely important aspect of early navigation, especially when extending coastal navigation to island hopping (Appendix C: time mark 34:00).

Having noted that the bearing-dial would be ineffective in inclement weather, the opportunity arose to test this. As clouds moved in it became difficult to take readings from the bearing-dial. It was possible to take a reading from the shadow on the bearing dial through a slight cloud cover, but the problem was locating the position of the sun. It was also possible to approximate the location of the sun by observing the few rays of light that would penetrate the cloud cover and triangulate them to find the sun where the angles met. This combined with the vague shadow on the bearing dial and a reading of the swell provided enough data to maintain a course.

After the arrival of a small bird, it was possible to clearly make out a landform and thus necessitate the use of a chart to attempt to fix our position. A Viking Age mariner would have been able to recognise the landform from memory or a description passed down over time and as none of the crew could do this it seemed only logical to use modern devices. As soon as land was sighted it was just a matter of returning to coastal navigation by landmarks to achieve the destination. A clear passage to the south east of the Out Skerries avoids any navigational dangers.

The object excavated by Vabæk in 1951 may or may not be a navigational device, but when used in the prescribed manner, it is effective as such. The journey across the North Sea without a chart or compass was accomplished in approximately 32 hours and resulted in the successful arrival at the chosen destination.

7.5 The Dragging: Preparations

The arrival in Shetland heralded the start of the next stage in the experiments of the "Borgundknarren". As mentioned above, some modifications to the site at Mavis Grind were necessary. These changes were primarily removing any modern additions to the site. A fence line had to be removed as to allow passage over the isthmus and a channel was cleared through the concrete anti-landing pylons placed in St. Magnus Bay during the Second World War. A post was also set in the ground to be used as a securing point for rigging a block and tackle. A major alteration to the site dealt with changing the slope of the landing on the East Side of the site in Sullom Voe. During the 1970's, when the trunk road was being built, the coastline was extended into Sullom Voe and raised to form a level platform for the roadbed. The previous road lay almost at sea level and Tommy Moncrieff can remember not only that the original road was low enough to allow the sea to wash over it on rough days; but that it was easy to see both shorelines as one drove across the isthmus (Moncrieff 1999: pers. comm.).

As it was impossible to grade the site to its original state, especially to how it would have been during the Viking Age, the decision was made to grade the slope into Sullom Voe from a 3:1 ratio to approximately a 5:1 ratio. This was accomplished by dumping in a layer of heavy aggregate that was then levelled to the appropriate angle. This ramp extended into the sea in the manner that a natural sloping beach would. While this was being done some of the larger boulders which were deposited in the water during the construction of the seawall for the road were moved out of the landing area. Even though it is known that these boulders were deposited during the road construction and we were moving them to facilitate an easier landing, it is not uncommon for any boulders which would have been obstacles to a shore landing to be removed all throughout the ages (see Lunna chapter 6). In addition to removing the concrete pylons from the West Side of the site, a layer of aggregate was spread along the route of the traverse (see Figures 7.6-7.9).

This account of the dragging is intended to cover the information that is not included in Appendix C; there may be repetition where it is necessary in understanding all the activities that occurred during this section of the experiment.

Figure 7.6: The Sullom Voe landing at Mavis Grind before the prepartions for the dragging. Photo: Author

Figure 7.7: The Sullom Voe landing at Mavis Grind undergoing modifications to its slope. Photo: Author

Figure 7.8: Western landing at Mavis Grind showing the anti-tank bollards and flotsam and jetsam to be removed. Photo: Author

Figure 7.9: Western landing at Mavis Grind showing the cleared landing and aggregate fill. Photo: Author

Besides the preparation of the actual site there exists many logistical considerations when dragging a vessel which need to be organised before the actual landing and dragging can begin. From Norway, a cargo of approximately 25 split pine logs, each with a cross section measurement of approximately 25cm and a length of 1.5m, were brought along. In addition to proving ideal 'rollers' for the dragging of boats, this type of timber is a valuable commodity on Shetland where they do not have trees growing naturally, nor did they during the Viking Age (Whittington 1996:99). It seems logical that such a cargo would have been transported to Shetland from Norway during the Viking Age as a raw material that could serve numerous functions before finding itself permanently fashioned into its final form. In addition to the cargo of timber, approximately 30 additional logs of approximately 30cm diameter and 2m in length were brought to the site to be split and used to lay the 'roller' track. These additional timbers were mainly available to extend the amount of available 'roller' track to traverse the road upon the outset of the dragging. In addition to the site preparations the vessel still had to be made ready to be dragged a distance of approximately 120 metres (depending on the state of the tide) including crossing the road and negotiating a slight curve before heading down a slope of approximately an 8:1 gradient.

The morning of the dragging the vessel had to be unloaded and in position by the high tide occurring at 0950 British Summer Time. Due to the shallow draught of the vessel it was possible to manoeuvre her parallel to the shoreline and begin offload directly onto the shore (Appendix C: time mark 39:41). A gangplank was laid to the shore and a line of men began offloading personal gear, staple items and all of the sailing equipment that was not permanently attached to the vessel and the decking. The last thing to be removed from the hull was the approximately 15 tonnes of ballast. By the time this was completed she rode much higher in the water due to the buoyancy of the empty hull. This coupled with the incoming tide made the offloading slightly more difficult as time went on, yet gave the advantage allowing her to be beached higher when in position. It was possible to empty the vessel of all the items that were to be removed within roughly a 3.5-hour period.

The mast and rigging remained standing throughout the experiment with the yard and sail stowed onboard. This provided the opportunity to judge whether the effort needed to remove the mast and rigging would be necessary when dragging a vessel. If the mast were to be removed from a knarr replica, it would require either the use of a crane or a tall cliff that could be sailed very near to. Lines would then have to be secured to the mast with some sort of lifting rigging which would not only pull the mast out of the step but would also stabilise it. Unlike the "Gokstad" vessel and other warships, the knarrs mast is fixed and cannot be easily raised and lowered by a crew using the standing rigging as control points.

With the vessel in the state described above, she was ready to begin the dragging. For the dragging of the vessel, 200 yards of 3" circumference line and the same of 2" circumference line were rigged, with numerous other bits of line from the "Borgundknarren" available if necessary. This line was fed through an eight-inch triple block to increase the pulling force. A working cargo vessel would carry large amounts of rope for rigging, securing cargo and any other purpose it could fulfil. As the rigging of the mast was to be left standing it was not possible to use these lines for the dragging as on other expeditions (see "Havørn" chapter 5).

The most important component in this dragging system is manpower; this was in the form of Shetlanders. In addition to providing the pulling power, they were a valuable source of information dealing with the maritime traditions of Shetland. Throughout their lives they were told tales of the Vikings in Shetland and how they would drag their ships across Mavis Grind, where the North Sea meets the North Atlantic.

The village of Brae provided us with more than sufficient manpower to execute this operation. As mentioned earlier, the vessel needed to be lifted in order to get her started. Based on prior experience, this would require 1 man per metre on each side of the vessel. This equation seems to work well for most aspects of dragging, as it was also ideal to have approximately one 'roller' per metre. For this aspect of the operation it was also necessary to have four hands ready to shore the vessel during periods of inactivity, a task easily accomplished with 'rollers'. Instructions were given on how to place the small of the back under the 'meginhufr' and lift with the thighs while leaning in the direction which the vessel would be dragged. This told, it would require as many hands as possible to haul on the drag line. This line was attached to a static point on the pinnacle of the site, an elevation of approximately 6 metres above sea level. In this case it was the fixed post mentioned earlier. Any static object such as a large boulder, rock outcrop or tree (if available) could be used for this purpose provided it was possible to anchor to it. The number of hands on the drag line varied between 30 and 55.

This amount of manpower could have been available during the Viking Age from various sources. During raiding mission, the crew of a warship would be significantly larger than that of a cargo vessel and the vessel would be lighter, and sources tell us that they would travel in fleets thus multiplying the manpower available for the dragging of each ship. It is also likely that they would use draught animals, when available, as experimented with during the "Helge Ask" trials (see chapter 5). If an established settlement were present within the vicinity of the portage site, it is more than likely that the local inhabitants would be able to assist in the dragging for news and goods from elsewhere. As previously mentioned, the "Borgundknarren" is an extreme example of portaging due to her size and weight. Smaller vessels would require only a fraction of the manpower to efficiently drag them the same distance.

7.6 The Dragging: Trial 1

With the arrival of high tide and all hands now instructed as to what would be required of them and the "Borgundknarren" ready to be hauled across the isthmus it was time to bring the vessel to the landing and begin the actual dragging. Before the 'rollers' were laid out it was necessary to smear them with a slippery solution to help reduce the friction as the 'rollers' were not freshly hewn and covered with sap. For just this purpose, a bucket of cod liver oil was brought with the ship from Norway. All of the 'rollers' were liberally coated with the oil and then the track was laid about 1/3 the distance of the drag. These were laid in sections which included both the heavier, thicker logs acquired in Shetland and the lighter, thinner ones brought from Norway. It was immediately apparent that the smaller logs provided numerous advantages over the larger ones. Not only were they lighter and therefore easier to manoeuvre from where the ship had been to where it was going, but pine 'rollers' held some distinctive advantages over the other which were a hardwood. This will be discussed in more detail below.

A line was attached to the small hole (ca. 4cm) in the bow section of the keel for the first attempt at portaging the vessel. This was done initially by means of a metal rod inserted through the hole with the rope looped around both sides (Appendix C: time mark 40:52). This method proved unsound due to the constant slippage of the rod out of the keel.

Next, the drag line itself was threaded through the hole in the keel (Appendix C: time mark 41:50). The dragging team was positioned with 15-20 hands per side on the vessel and more than 45 hands on the drag line. It was also necessary to have hands occupied with supporting the vessel by means of lines attached to the mast. These lines were rigged by releasing shrouds, both port and starboard, and then adding an extension line to each so that they could be controlled from a distance. The terrain surrounding the dragging route required these teams to scramble up crags all the while ensuring that the vessel did not heel over.

With the large line now secured directly through the hole in the keel, "Borgundknarren" was positioned in front of the landing and slowly pulled forward. As she inched forward, 'rollers' were inserted under the fore section of the keel below the water level as the weight from the hull pinned them in place against the seabed. It continued in this manner until the keel was about halfway out of the water. Little more than half the length of the keel was resting on 'rollers' when a very loud crack rang out from the bow. Apparently, the small hole in the keel was not strong enough to take the force required to move over 8 tons of ship (see Figure 7.10).

Figure 7.10: The split in the keel made during trial 1. Photo: Author

Figure 7.11: "Borgundknarren" waiting for repairs and the tide to recede. Photo: Author

The skipper and crew now had to make repairs before we could continue with the dragging (see Figure 7.11 and Appendix C: time mark 41:50). The decision was made to wait until low tide before we made another attempt with a harness system to support the entirety of the vessel (see Figure 7.12).

Figure 7.12: "Borgundknarren" shored with props and "rollers" on the Sullom Voe landing at Mavis Grind. Photo: Author

7.7 Dragging: Trial 1 Reviewed

The repairs to the keel made, a harness system was devised which would not only provide a dragging set-up that would not damage the vessel but would also enable the force of the drag line to be applied effectively (Appendix C: time mark 43:51). This harness was placed on the keel so that it encircled the keel, yet did not apply excessive force on the planking. There is in the stern section of the keel a small hole identical to the one in the bow section. By running a small rope through this hole it was possible to keep the strap from riding up the planking and damaging the vessel. This also kept the strap in place so when force was applied it would be transmitted straight to the vessel (see Figure 7.13). The same rigging was applied to the section of strapping in the bow.

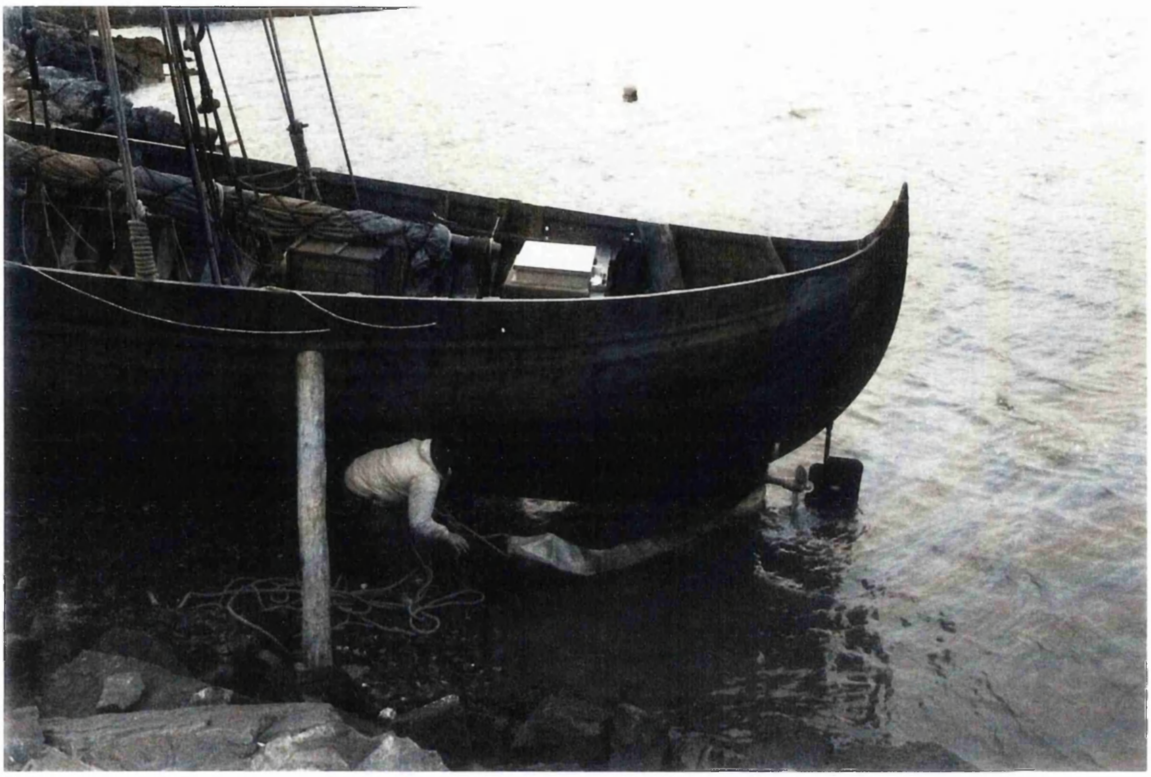


Figure 7.13: Attaching the harness system for trial 2. Photo: Author

7.8 Dragging: Trial 2

After the various teams were reassembled and in the appropriate position, the slack was taken up and the dragging commenced. Another valuable lesson was learned at this point in the experiment. 'Rollers' should have been placed beneath the entire length of the keel before the tide had subsided. The aft section of the keel was now resting securely on the shore resulting in enough friction to hold her fast. 'Rollers' were employed as levers to lift her enough that additional 'rollers' could be inserted under the stern section of the keel. It was necessary to hop on these levers to break the friction when the hauling had begun. Another method of ensuring that the vessel did not hold fast was to rattle the 'rollers'. The source of this information was D.P. Wilcock, the local blacksmith. He had been present at the hauling out and repairing of numerous fishing vessels and was familiar with the traditions of doing this. Whenever a vessel was to be launched, a crew would use hammers to rattle the 'rollers' thus breaking the friction between them and the keel (Wilcock: 1999: pers. comm.). This attempt at dragging covered about 5 meters before another loud crack echoed through air (Appendix C: time mark 44:16).

A quick inspection revealed that no damage had come to the vessel and the harness system was faring well. The rope had been cut in two where it ran through the block and tackle. The amount of force exerted by the drag line crew was enough to sheer the line. This was easily remedied by running the line around a thimble that would spread the force throughout the entire thickness of the line thus reducing the shearing force on the individual strands.

7.9 Dragging: Trial 3

This time all of the factors involved in dragging a large vessel and the knowledge gained from trial and error enabled the vessel to be shifted quite easily up the slope and onto the road. The only challenge remaining was to negotiate the slight curves in the route across the isthmus. The slope behind her it was now time to rotate the vessel whilst maintaining her balance (Appendix C: time mark 45:44). This was accomplished by directional pulling on the drag line and the lifting crew pushing under careful direction.

Another static point was secured for the drag line rigging down the slope towards St. Magnus Bay. It was difficult for the crews on the mast line to maintain enough pressure on these lines, so the task of maintaining balance lay primarily upon the lifting crew. Occasionally, it was necessary to stop the operation and right the vessel.

As the negative slope gradient increased, the effort involved in dragging the ship naturally decreased (Appendix C: time mark 46:00). This caused a problem in its own right by introducing the chance that the ship may run away. To counter this possibility, a belay was rigged from the stern to a static point at the top of the hill. Another problem that arose with going down slope was being able to shift the 'rollers' from behind the vessel to lay the track in front fast enough. This is where the pine 'rollers' held a distinct advantage over the more cumbersome hardwood ones. A few pauses had to be made to allow for the vessel to be righted and the track to be laid. It was possible to move her from a standstill using a straight pull (minus the block and tackle) on the harness (Appendix C: time mark 46:40).

The "Borgundknarren" came to a halt on the seabed at the bottom of the slope, but when the tide rose she would theoretically float off. Once below the high tide line the experiment was completed. It took all day to complete the experiment in portaging, including the time taken to sort out the problems we encountered. The actual time dragging her on the third trial was approximately 3.5 hours.

Figure 7.14: "Borgundknarren" at rest below the high tide line in St.Magnus Bay on the west side of Mavis Grind. Photo: Author

Figure 7.15: The final push to launch the "Borgundknarren". Note the line in the top right corner attached to the top of the mast, providing stability. Photo: Author

7.10 Observations and Assessment

To conclude this chapter on the archaeological experiments involving the navigation of the replica of a Viking Age cargo vessel there are many observations to report. The sun compass or bearing dial is an issue of much contention in regards to its validity in navigation. This experience has shown that when using it within its window of calibration, it is possible to maintain a course with considerable accuracy. Needless to say, this was only one aspect of the navigational practises during the Viking Age, as this method only allows for the plotting course latitudes. A life spent at sea enables one to read the currents, wind and weather in such a way that certain localised patterns become recognisable even when out of sight of land. Despite the numerous arguments over the validity of the object found in Greenland to be a fragment of a bearing-dial, when used as such the results are promising.

When performing a portage, there are certain criteria that must be met in order to facilitate the landing of a knarr, but they are primarily the characteristics of any harbour or landing. The key factor in any operation involving a vessel coming into contact with the shore or transferring cargo from one vessel to another is the state of the sea. Almost all of the areas investigated in this thesis are extremely sheltered from both the wind and waves, providing calm conditions in all but the most inclement weather. Sullom Voe and St. Magnus Bay both meet these criteria. The usual choice is composed of a sheltered bay or cove with a gently sloping shore.

During the dragging numerous observations were made as to what was working and what wasn't. To say that this would be the way that the Vikings would drag this vessel, if they even did drag a vessel of this size and design, would be over interpreting the results of this trial. Certain methods that were experimented with were possible and provided positive results, whilst others resulted in catastrophic failures, of which it could be said that it is unlikely these methods were utilised.

Whereas on other experiments involving smaller vessels (see "Havørn" chapter 5) the use of a hole in the keel as a fastening for the drag line was successful, yet on the "Borgundknarren" the size and weight of the vessel made this impossible. As mentioned earlier this resulted in the splitting of the keel, an accident which could cause serious problems during any expedition. It can only be assumed that the use of this method on smaller vessels was possible and *may have* been utilised, but not on larger vessels. It is a less time consuming method of dragging and requires less rigging to perform the portage.

Another observation in the equipment and methodology used to drag this or any other vessel is the type of timber used as 'rollers'. In this experiment it was possible to utilise both hardwood timbers of approximately 30cm diameter and softwood timbers of a slightly smaller diameter (25cm). The smaller timbers performed better than the larger ones for numerous reasons. The first is obvious, because they were smaller and lighter, they were easier to move from behind the vessel to in front of her. Another advantage being that they were untreated (except for the fish oil) softwood, the weight of the vessel allowed the keel to create a shallow groove in which it could track ever so slightly. This reduced the lateral slippage without adding to the friction coefficient. On the hardwood timbers some lateral slippage was causing some of the dragging and lifting force to be lost. If the softwood timbers were deemed better for this activity in the Viking Age, this would reduce the amount of wear that would be evident on the keel of any Viking Age ship finds. The oak timber used for the keel is a hardwood that could be preserved by dragging it over a softer timber.

A contrasting theory to the use of timbers is provided by local Shetland tradition. Throughout its history, Shetland has been involved in the practice of whaling. Local tradition holds that the best material for hauling the fishing boats out was whale ribs. Jimmy Moncrieff of the Shetland Amenity Trust was able to provide a sample section of a whale rib for examination (see Figure 7.16).

Figure 7.16: A section of whalebone provided by Jimmy Moncrieff. Photo: Author

This material would be ideal for the dragging of boats either in a portage scenario or hauling out for storage and repair. It is quite dense and therefore maintains a hard and slippery surface, ideal for reducing the friction caused by the weight of the vessel. In general, it is a valuable commodity with numerous uses; therefore it is easily tradable. In the case of Viking Age Shetland, it was easier to obtain than timber. Another material, which was recalled from local tradition as a useful surface upon which to drag small boats, was halibut. Halibut was considered a substandard catch and therefore used as a firm, pre-oiled surface to drag the boats on. The local tradition post-dates the Viking

Age, but provides an interesting alternative to the previously mentioned options and the evidence for this would be non-existent in the archaeological record.

Regarding the extra weight of the "Borgundknarren" and the fact that she was fully rigged during the experiment there are some observations and explanations to be made. During the sailing trials, the extra weight would make no difference to her performance as she could be considered carrying a full cargo. The added weight of the permanent equipment in the "Borgundknarren" did make a difference in the dragging. This was an extremely large and heavy vessel to be dragging at the outset. The goal of this experiment was to see if it was possible to drag what is considered a very large and heavy type of Viking Age Vessel. Indeed, it was possible. The additional weight and balance difficulties provided by the rigged mast only added another factor to the experiment. Numerous experiments have been conducted under the premise that the mast has to be lowered before the dragging can begin (see chapter 5 "Krampmacken", "Helge Ask", "Havørn"). Here it was proven that although it took considered care, it is possible to keep the mast and rigging intact during a dragging, and it can serve as an aid in keeping the hull upright. Having the rigging standing saved time once she was launched after the dragging. The argument could go on ad infinitum as to whether or not this ever actually occurred, but the fact remains that it is possible.

Dragging ships is part of the Shetland heritage and many of the Shetlanders have their own stories that revolve around this activity. D.B. Wilcock (mentioned above) was able to provide information regarding the traditions of dragging ships at Mavis Grind. This was before the construction of the modern road and apparently people were dragging boats across here quite regularly (Wilcock 1999: pers. comm., Johnson 1941: Shetland Archives Ref. D.9/113b/38).

This experiment in early navigational techniques and portaging a Viking Age cargo vessel provided valuable information for the study of portages in the Norse maritime landscape of Scotland and the Isles, and any other areas where the Vikings operated. Through trial and error it was possible to determine some of the methodology and technology which may have been used to portage a vessel of this design. When this information is compared to the other experiments involving the dragging of Viking Age vessels it contributes to the discipline with a data set relevant to yet another vessel type. All of this data can be used in the analysis of portages in the maritime landscape by providing examples of the act of portaging and the difficulties that are encountered. This data also helps to determine the feasibility of dragging vessels in both the micro- and macro-topographical landscape and the use of the different vessel types in these navigational scenarios.

Future experiments could continue to contribute to this line of research by using other Viking Age vessel designs and increasingly varied scenarios. This said, sufficient research must be compiled on the proposed portage site before an experiment is to be considered. The portage criterion forwarded in chapter 3 of this thesis lays the groundwork for these investigations. The value of archaeological experimentation is not to be under-estimated, yet the notion that *possible therefore correct* must not be allowed to sacrifice the integrity of the experiment.

8. Conclusion

This investigation into portages in the Norse maritime landscape of Scotland and the Isles has included many of the approaches necessary in the study of the *maritime cultural landscape.* Terrestrial and underwater archaeology, landscape studies, history and ethnography, place-name studies, maritime studies and experimental archaeology have all been combined to provide the most thorough investigation into the portage scenario as possible. The combination of these research questions and methods has provided a significant body of information on possible portage sites. In light of this, it has become possible to apply the data from this study to maritime cultures throughout time and space. This investigation also resulted in the formulation of the *portage criterion* and the introduction of the terms and concepts of the *micro- and macro-topographical maritime landscapes* (chapter 3). These allow for possible portage sites located in the future to be analysed in comparison to a criterion and to interpret the role of the portage site in relation to local navigation, trade and communication.

A total of 33 possible portage sites in Scotland and the Isles were investigated with the *portage criterion* and many more were studied for comparative purposes. The opportunity also arose to perform an archaeological experiment centred on one of the investigated sites (see chapter 7 and Appendix C "Viking Voyage"). This gave perspective not only into the actual methods employed in dragging Viking Age vessels, but also in the utilisation of the maritime landscape as a whole. This experience also furthers the view that not only must a variety of research methods be employed in archaeological research inquiries, but that current practitioners of specialised skills must be consulted. In the case of navigation and seamanship, an experienced mariner can sense his location with incredible accuracy and confidence. This being the case, the navigation of the Viking Age mariner around Scotland and the Isles was a finely honed skill involving regular routes.

This utilisation of the *micro- and macro-topographical landscape* (as defined in chapter 3) allows these routes to be identified in relation to their role in the maritime cultural landscape. A key component of this is the type of vessel that would be best suited to the different routes in the maritime landscape. While many of the routes can be utilised by a variety of vessel designs, some of the routes are only navigable by more specialised designs. This topic is addressed in chapter 4, where the different Viking Age ship finds are grouped according to their capacity to navigate in similar environments and their specific uses. These groupings put many vessels into groups that they are not usually associated with, but for the purposes of this investigation, they fit the criterion of that specific group. Modern vessel types with Scandinavian (Viking) predecessors are also included in the analysis of the various types because they provide ethnological data on the performance characteristics and uses of these designs.

Chapter 5 takes this study one step further by analysing the capabilities and performance of replica Viking Age vessels. These trials provide data on sailing characteristics, seaworthiness, practicality, and allow for information on the construction techniques to be collected. This is not to say that the information derived from archaeological experiments is entirely correct, but this method of investigation provides tenable answers to questions that are unanswerable directly through the archaeological and historical record.

Where the *portage criterion* presents the methodology for investigating portages, the definition of portage proposed here describes the physical attributes and practices used in the portage scenario. One of the postulations from this multi-disciplinary investigation into portages in the Norse maritime landscape has been the formulation of a definition of portaging as it applies to archaeological inquiry and landscape studies.

> **Portage** (*as evident in archaeological studies*) is used as a noun or verb to describe a complex scenario involving the characteristics of a maritime landscape or the activities directly related to the micro and/or macro-topographical navigation of an area.
>
> As a noun, **portage** generally refers to a low-lying isthmus of land over which a vessel or cargo is brought over for re-launching or re-loading on the opposite side. This strip of land does not have to be narrow or low-lying, if carriage of vessels or cargo occurs as required by the portaging activity. By this definition, numerous vessels can be employed in a particular portage episode.
>
> As a verb, **portage** or **portaging** is the actual act of dragging a vessel or transferring cargo across an isthmus, or neck of land for the navigation of a particular route. That this activity be an element in the navigation of a continuous route in the micro or macro-topographical landscape is necessary.

More research in to the *micro- and macro-topographical* navigation of the Norse in the maritime landscape of Scotland and the Isles needs to be undertaken to further our understanding of their uses of portaging as a navigational practice on different levels. This thesis has forwarded many methods, locations and reasons for the practice of portaging and should be used as a comparative resource for future investigations into any aspect of the Norse maritime cultural landscape of Scotland and the Isles.

Another objective of this thesis is to stress the importance of thorough research methodologies when investigating the maritime landscape. Where necessary, the proposed portage sites were subjected to both terrestrial and underwater survey, an approach that is required by any inquiry into this cultural landscape. This research design does not apply only to the study of portages, but to any archaeological investigation within this environment. During the fieldwork aspect of this investigation, numerous areas that warrant further investigation were encountered. At the site of Lunna (see chapter 6), there is a submerged slipway which needs to be fully recorded and critically examined. Many sites in Shetland are currently submerged due to the increase in sea level or by erosion that may have caused sliding into the sea. Therefore, any coastal survey *must* include an underwater survey to be considered complete.

This necessity is echoed throughout Scotland. With a strong history of maritime cultures, to neglect this resource is to draw an incomplete conclusion from any study that does not perform an investigation in the submerged vicinity of any cultural affinity. This includes inland lochs, as the anaerobic environment promotes preservation of artefacts. In relation to the study of portages, some of the lochs involved in the portage scenario would be an ideal location for the discovery of vessels. This type of investigation can be performed by a variety of technologies such as: side-scan sonar, sub-bottom profilers, magnetometers, remotely operated vehicles, not to mention diver surveys. This research design, combined terrestrial and underwater investigation, should become the standard research methodology for this environment.

This thesis introduces new concepts which need to be considered by subsequent inquiries into navigation and communication in the maritime cultural landscape of not only Viking Age Scotland and the Isles, but areas where any maritime culture was present. The concepts of a *micro- and macro-topographical* maritime landscape should be used to understand the different methods of operating within the maritime environment, whereas the *portage criterion* can be applied to sites which may have served as such, thus altering the character of the maritime landscape. The portage sites which have been examined in chapter 6 can aid in not only the study of Viking Age navigation, but as many of these continued in use up until modern times, they can help interpret the maritime environment as utilised by many different maritime cultures. Utilising the data provided in this thesis, this would be the next phase of research directed at the investigation of portages. Additionally, the information provided in this work can be used by other disciplines to further the understanding of cultures utilising the maritime landscape.

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Appendix A: Site Number Coding

During my investigation into possible portage sites in the Norse maritime landscape of Scotland and the Isles, I found it necessary to develop a system for labelling the different types of sites. In addition to providing a general location of the site and its possible type, these designations relate to a database providing the basic information about the site.

The portages examined in the course of my research have been coded according to a system of my own invention. This system links not only the site types, but also their geographical location. This system uses the Ordnance Survey National Grid divisions as a geographical locator, the type of site are represented by an abbreviation, and the number of that type of site within the $100km^2$ geographical boundary. An example being *Ta1NM* - this would be a Tarbert site, located within the NM section of the Ordnance Survey National grid, and it would be the first tarbert site located within this grid. This will allow for quick and easily identification and recognition of portage sites within an area, as well as tell you the type of site.

Site Coding Formula

The formula used for the coding of sites in my gazetteer and elsewhere in my thesis is based upon the following data:

Ta5NM - Site Type as designated by a known place-name.

Ei – Eið (Old Norse: isthmus); Aith is the most frequently occurring form of this place-name.

Ta – Tairm beart (Gaelic: carrying or bringing over); Tarbert and slight variations thereof are the most commonly occurring forms of this place-name.

Uk – This is used to indicate a site of unknown place-name origin or an infrequent occurrence of the place-name.

Or – Örfiris-ey (Old Norse: tidal island with the causeway drying at low water); Oransay is an example of this place-name, *as it has not occurred often this may be relegated to the* **Uk** *site type for the purposes of this investigation.*

Dó – Dóirlinn (Gaelic: causeway to a tidal island, drying at low water)

Dí – Díg (Gaelic: ditch)

Ta5NM - A **Site #** which is representative of the number of this *site type* within a 100km² square as designated by the National Grid Reference System is applied after the site type designator.

Ta5NM – A **National Grid Reference** for easy location of the site within Scotland.

Example:

Ta1NM – Tarbert place-name site

Ta**1**NM – The first tarbert type site in this National Grid area.

Ta1**NM** – This site is located within NM 100 km² grid square on the Ordnance Survey National Grid.

Appendix B: Glossary of Specialist Terms

Aft – The aftermost part of a ship, towards or at the *stern.*

Amidships – The centre of a vessel, transversely and or longitudinally.

Anchorage – An area near the coast where a vessel is likely to lie at anchor with a good and firm holding.

Ballast – Additional weight carried in a ship to give her stability and to provide a satisfactory trim *fore* and *aft.*

Beam – (1) The transverse measurement of a ship at her widest part; (2) one of the transverse members of a ship's framing upon which the decks are laid.

Beiteäss (beitass) – the Old Norse name for the luff spar used on some Viking Age vessels, the *knarr* in particular, to hold the luff (leading edge of the sail) in the sail taut enabling the vessel to beat to windward.

Bilge – The internal space in the lowest part of a vessel.

Bilge (turn of) – The transition formed where the *planking* becomes oriented in more of a horizontal position than a vertical one.

Boat – A small vessel generally operating on inland waterways and in the inshore zone.

Bow – The foremost end of a ship, where the *stem* of a Viking Age vessel would be located.

Cable – (1) Generally any very large cable or rope. (2) A distance at sea measuring 100 fathoms or 200 yards (183m).

Cataract – A large waterfall or downpour of water; a rush of water.

Caulk – The act of inserting material between to members of a vessel to make the joints watertight. *–ing* – The material which is used to caulk a vessel.

Clench – The act of deforming the end of a fastening so that it cannot be undone. With iron rivets this is usually done over a *rove,* but it can also refer to the hammering of a shackle to permanently secure a cable.

Clinker built – A boat built in the tradition of overlapping the *strakes* during construction and fastening them together by means of *clenched* iron rivets (clinkers). The upper *strakes* are usually fastened outboard of the lower *strakes*. In some areas this technique is referred to as *lapstrake*.

Coastal navigation – The art of navigating by relying largely on visual contact with the shore.

Draught – (1) The depth of water needed to float a ship. (2) The use of animals to provide labour in the pulling of loads.

Dromon – A large Byzantine warship propelled by many oars and with a mast and sail.

Eddy – A small local current usually caused by tidal streams as they ebb and flow around or against objects fixed or moored to the sea bed. The same effect can occur in rivers by the current flowing around similar obstacles.

Fairway – The navigable channel of a harbour for ships both entering and leaving.

False keel – The fitting of an additional *keel* or other form of protection to the outside of the main *keel* to protect the *keel* from damage and wear during beaching and would sometimes be used to increase *draught* bettering sailing performance.

Far haf – The Shetland term meaning the deeper waters far off the coast. Much of the sixern fisheries operated in the *far haf*.

Fembøring – A term used to describe a tradition of fishing boat construction on the West Coast of Norway. The *rigging* of these vessels is often used as a basis for the sail configurations on replica Viking Age vessels.

Floor – The first and lowest transverse framing element that crosses the keel.

Fore – The foremost part of a ship; where the *bow* and *stem* are located.

Fourareen/forern – The four-oared boat used in Shetland.

Frame/framing – A timber or *rib* of a ship that supports the *hull* structure. In the case of *clinker built* boats, the framing is added after the *planking* has been laid, whereas in a frame first vessel, these timbers are used to define the shape of the *hull* during construction.

Freeboard – The distance from the waterline to the top of the *gunwale* measured at the centre of the vessel.

Futtock – A *framing* timber which does not cross the *keel* or reach the sheerline.

Færing – A rowing boat with four oars that may, or may not, have the capability of being *rigged* for sailing.

Garboard – The first *strake* in a *clinker built* vessel that is fitted into or immediately next to the *keel.*

Gunwale – A piece of timber which goes around the uppermost *strake*, in the case that this *strake* is not protected in such a manner, it can refer to the uppermost portion of this *strake.*

Hogged - The condition of a vessel where both her *bow* and *stern* are sagging.

Hull – The main body of a ship apart from her masts, *rigging* and all internal fittings.

Isthmus – A narrow piece of land connecting two larger pieces of land.

Karve or karfi – Vessels used as the personal transportation of royalty of nobility according to the Norse Sagas.

Keel – The primary longitudinal strength member upon which the *hull* of a vessel is constructed.

Keelson – A longitudinal member fitted over the *floors* and above the *keel* to increase strength and distribute stress.

Knarr or knorr – A deep sea trading vessel of the Viking Age with a wide *beam* and larger cargo capacity than other known Viking Age vessels.

Knee – A naturally grown crook used to connect and strengthen joints between framing members.

Landing – A place where a vessel can be landed or beached without the aid of man-made structures such as a *slipway.*

Lapstrake – see *Clinker built* (above).

Leidang – A system described in historical sources by which a navy could be levied.

Lines – (1) A drawing that shows the shape of a vessel's *hull.* (2) The ropes or cables with which a vessel is *rigged.*

Local knowledge (nautical definition) – Intimate knowledge of a localised area which allows for navigation of this area to be performed successfully.

Mastfish – The large timber into which the base of the mast is fixed.

Meginhufr – The fifth *strake* on a *knarr*. It is thicker than the others and its angle of attachment is such that a hydrofoil effect is experienced when under sail.

Narrows – A section of water whereas the coastlines on both sides form a narrow passage through which the water passes.

Naust (noost or noust) – A boathouse or shelter into which vessels would be hauled.

Ness Yole – A type of vernacular boat in Shetland with stringent guidelines regarding its *hull* form and construction.

Plank – see *strake* (below).

Reef – (1) The operation of shortening a sail in order to reduce the area exposed to the wind. (2) An outcrop of rocks or other matter protruding from the sea bed.

Rib – A simple form of *frame* used in shipbuilding.

Rigging (rig) – This term embraces all ropes, wires and chains used in vessels to support masts and yards and all other mechanisms aboard.

Rocker – The fore and aft curvature of the bottom of a vessel.

Rollers – The objects which are placed on the ground in front of a vessel to facilitate the dragging of the vessel. They may or may not actually roll, but mainly serve to reduce friction. They may be timbers, whalebone or any other object which serves this purpose. The reason they are called rollers is because of the common use of this term in reference to these objects

Room (rom) – the space between transverse *beams.*

Rove – A metal washer.

Rowlock – Any mechanism which is employed to secure an oar in place so it will not jump out while in use. This can be a crutch in which the oar handle is placed or a thole pin with a thong to hold the oar in place (kaeb and hummlibund).

Scarf – The joining of two timbers by bevelling the edges so that the same thickness is maintained throughout the length of the joint.

Sexæring – A six-oared boat.

Shoal – A patch of water in the sea with a depth less than the surrounding water.

Sixareen/sixern – A traditional six-oared boat once used in long lining for whitefish in the traditional fisheries of Shetland.

Slipway – A landing area which utilises man-made structures or alterations to the *landing*/launching place.

Steering oar – The large member utilised in the steering of Viking Age vessels located on the starboard (right) side of the vessel.

Stem – The extended front piece of a vessel *scarfed* to the *keel*. This would sometimes be the location of elaborate adornment.

Stern – The aftermost part of a vessel. In Viking Age vessels there would be a sternpost which would be *scarfed* to the keel.

Strake – A *plank* or series of *planks* stretching from *stem* to *stern* to form the *hull*.

Stringer – A longitudinal member used to strengthen the inside of the *planking*.

Taft – Shetland term for the '*thwart*' (see below).

Thimble – A circular or heart shaped ring, grooved on the outside to receive a rope which is spliced around it to form an eye.

Thole – A projection above the sheer level (*gunwale*) which an oar could be pivoted against.

Thwart – A transverse member that can be used as a seat.

Tidal Stream – The course that the tide follows on the ebb and flow.

Tilfer - The removable mast step found in the traditional boats of Shetland.

Transom – An external transverse partition normally in the *stern* of a vessel, or in the case of a pram at both the *stem* and *stern*.

Traverse – For the purposes of this thesis, the route taken across land from one body of water to another.

Treenail – A wooden peg used in ship fastenings. Also known as a trenail or trunnel.

Trireme – A Mediterranean war galley propelled by three banks of oars.

Yole – A small boat with square sails. Sometimes with a sprit sail in the boats of Orkney and Denmark.

Appendix C: Supplement to the Video " The Viking Voyage"

The times given in this temporal indexing of the video " The Viking Voyage" are calculated from the beginning of the tape. As the recordings may vary slightly on each tape, this index serves as a guide to the approximate locations of certain activities. When a reference is made in the text to the video, the notation 'time mark' is used to locate the segment.

00:00 Introduction

01:00 A general map of the geographical location where the experiment will take place.

01:30 The "Borgundknarren" being prepared for the journey in the port of Bergen, Norway.

02:20 A view of the 'sun compass' which will be used for navigation.

03:00 Scenes from the Viking Ship Museum in Roskilde, and a discussion on the upcoming journey with Tinna Damgård-Sørensen and the Author.

04:14 A discussion around Skuldelev 1 in the Viking Ship Museum in Roskilde.

05:00 Views of the Skuldelev 1 replica being constructed on the Museum Island at the Viking Ship Museum in Roskilde.

05:24 Clips from the Danish television production involving the portaging of "Helge Ask".

05:30 A discussion with Max Vinner on the techniques and possibilities of portaging of a Viking Age cargo vessel..

06:36 Finishing the loading of the ship in Bergen and setting off for Hernar.

07:20 A test of the sailing capabilities of the "Borgundknarren".

07:30 An in-depth discussion of the 'sun compass' and how it will be used for navigation.

08:42 A map of the route and of the island of Hernar.

09:08 Sailing to the island of Hernar, off the West Coast of Norway.

09:16 A presentation of the saga literature relevant to the journey.

11:00 Examples of Viking Age rigging and how it is used.

12:30 A discussion on the steering oar.

13:00 Waiting on the island of Hernar for the weather to improve.

14:00 Checking the seas for the opportune moment.

14:22 A discussion on how the shrouds are rigged, while some of the rigging is replaced.

15:25 A last calibration of the 'sun compass' before the journey.

15:52 Departure from Hernar and the disposal of the modern chart and compass.

16:54 A map of the journeys progress,.

18:05 A discussion of some of the modern conveniences onboard "Borgundknarren".

19:30 The sail is reefed because of the strong winds, but the mast is showing stress.

20:00 Sailing sequences.

22:00 9.5/ 10 hrs. into the journey a review of the journeys progress is made.

23:00 The Viking Age sites at Jarlshof and Scatness.

24:25 Val Turner of the Shetland Amenity trust and Julie Bond of Bradford University at the steatite quarry at Catspund, Cunningsburgh.

25:18 Fishing with a steatite sinker.

26:20 Explanation of live ballast by the Author.

27:40 Map of progress.

27:50 The decision is made to use the auxiliary motor to maintain the schedule.

28:47 Discussion of Viking Age tactics and the 'doldrums'.

30:00 The weather worsens.

30:40 Map of progress.

31:10 The sail is raised again.

32:00 Trying to raise land.

32:52 Land is raised.

34:00 Discussion of local knowledge and landmark recognition and how it might have been accomplished in the Viking Age.

35:12 The GPS is used to confirm our location.

35:30 The Out Skerries are approached.

36:00 Sailing scenes from Shetland.

38:00 Preparing the site of Mavis Grind for the portage.

38:30 Views of the site at Mavis Grind.

38:40 The excavations at Scatness discussed by Julie Bond and Steve Dockrill of Bradford University.

39:41 Unloading the ballast and preparing the rigging for the portage.

40:52 Trying to use a metal bar through a hole in the keel to drag the vessel.

41:50 Using a rope threaded through a hole in the keel to drag the vessel.

42:28 D.B. Wilcock explains the practice of portaging in the same terms as Max Vinner.

43:00 Discussions on dragging a cargo vessel whilst repairing the damage.

43:51 A supporting harness is rigged for another try at dragging.

44:16 The rope breaks.

44:30 The dragging begins.

45:15 Progress is made over the isthmus.

45:44 Steering the vessel on land.

46:00 Controlling the vessel as it is manoeuvred down a slope.

46:40 The "Borgundknarren" is re-launched into the tidal zone.

47:00 Discussions on the experimental portaging of the "Borgundknarren" by the Author, Tinna Domgård-Sørensen, Per Weddegjerde and Sir Robin Knox-Johnston.

48:47 Reloading the vessel for its departure.

49:30 The "Borgundknarren" sails back to Norway.