

REPORT

Millport Coastal Flood Protection Scheme: Environmental Statement

Chapter 13 Commercial and Recreational Navigation

Client: North Ayrshire Council

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Appendices

Appendix 13.1 Millport Navigation Desktop Assessment.

Acronyms

Acronym	Acronym description
CARS	Conservation Area Regeneration Scheme
CIA	Cumulative Impact Assessment
CMC	Clyde Moorings Committee
COLREGs	International Regulations for the Prevention of Collisions at Sea
CYCA	Clyde Yacht Clubs Association
EIA	Environmental Impact Assessment
ES	Environmental Statement
LDP	Local Development Plan
MARPOL	International Convention for the Prevention of Pollution from Ships
MPS	Marine Policy Statement
NPF	National Planning Framework
SNMP	Scotland National Marine Plan
UNCLOS	UN Convention on the Law of the Sea

Glossary

Glossary Term

Glossary Text

Environmental Impact Assessment (EIA)

A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Statement.

Environmental Statement (ES)

A document reporting the findings of the EIA and produced in accordance with the EIA Directive as transposed into UK law by the EIA Regulations.

Millport Coastal Flood Protection Scheme (FPS)

The scheme consists of offshore rock armour structures which will be built in the vicinity of the rock islets within Millport Bay. Onshore works will include flood walls, improvement works to existing coast protection structures, and works to raise the level of existing grass areas. Works on the foreshore include shore-connected rock armour breakwaters and rock armour revetments.

13 Commercial and Recreational Navigation

13.1 Introduction

1. This chapter of the Environmental Statement (ES) considers the potential impacts of the proposed Millport Coastal Flood Protection Scheme (the proposed scheme) on Commercial and Recreational Navigation.
2. The Environmental Scoping Report for the Millport Coastal FPS included a section covering potential navigation impacts within the Tourism and Recreation chapter. Consultation on the Scoping Report with statutory stakeholders, and discussions with community groups has identified Navigation and Moorings to be an important issue that requires separate consideration as part of the EIA for the project. Therefore this issue has been covered as a separate chapter within this Environmental Statement.
3. This chapter provides a summary description of key aspects relating to existing Commercial and Recreational Navigation followed by an assessment of the magnitude and significance of the effects upon the baseline conditions resulting from the construction, operation and decommissioning of the Proposed Scheme as well as those effects resulting from cumulative interactions with other existing or planned projects.
4. The potential effects on Commercial and Recreational Navigation are assessed conservatively using realistic worst-case scenarios for the proposed scheme.
5. All figures referred to in this chapter are provided in Volume II of this ES.
6. The assessment of potential effects has been made with specific reference to Scotland's National Planning Framework and Planning Policy, discussed further in **Chapter 2 Policy and Legislation**. These are the principal decision-making documents for flood protection schemes.
7. This chapter has been prepared by Royal HaskoningDHV in accordance with the relevant legislation and policies, adhering to the methodology for Environmental Impact Assessment (EIA) and Cumulative Impact Assessment (CIA) as discussed in Section 13.4.
8. Due to the close association between Commercial and Recreational Navigation and Tourism and Recreation, this chapter should be read in conjunction with **Chapter 23**. This chapter should also be read in conjunction with **Chapter 12 Commercial Fisheries**.
9. Additional information to support the assessment of impacts on Commercial and Recreational Navigation is provided separately in **Appendix 13.1 (Volume III): Millport Navigation Desktop Assessment**.

13.2 Policy, Legislation and Guidance

10. The assessment of potential effects has been made with specific reference to Scotland's National Planning Framework and Planning Policy (discussed further in **Chapter 2 Policy and Legislation**). These are the principal decision-making documents for flood protection schemes. There are several pieces of legislation applicable to commercial and recreational navigation. The following key pieces of International and UK legislation which are relevant to this chapter.

13.2.1 International Regulations and Convention

13.2.1.1 International Regulations for the Prevention of Collisions at Sea (COLREGs) (1972)

11. The International Regulations for the Prevention of Collisions at Sea (COLREGs) (International Maritime Organisation, 1972) set out navigational rules to be followed by ships and other vessels at sea to prevent collisions between two or more vessels.
12. The COLREGs include 41 rules divided into six sections: Part A - General; Part B - Steering and Sailing; Part C - Lights and Shapes; Part D - Sound and Light signals; Part E - Exemptions; and Part F - Verification of compliance with the provisions of the Convention. There are also four Annexes containing technical requirements concerning lights and shapes and their positioning; sound signalling appliances; additional signals for fishing vessels when operating in close proximity, and international distress signals.

13.2.1.2 The International Convention for the Prevention of Marine Pollution by Ships 73/78 (MARPOL)

13. The International Convention for the Prevention of Pollution from Ships (MARPOL), to which the UK is a signatory, seeks to prevent and minimise marine pollution from ships arising from operational and accidental events.

13.2.2 National Legislation

14. Table 13-1 provides a summary of the key national legislation and policy relevant to the scheme.

Table 13-1 Summary of key national legislation and policy relevant to this chapter

Legislation	Relevance
Marine (Scotland) Act 2010	The act defines the requirement for marine licences in Scottish waters which includes the “ <i>construction of any works in or over the sea, and on or under the seabed</i> ” and the carrying “ <i>out of any form of dredging within the Scottish marine area (whether or not involving the removal of any material from the sea or seabed)</i> ”. The application for a licence must have regard to the need to protect the environment, protect human health, prevent interference with legitimate uses of the sea and other matters considered relevant by Scottish Ministers.
Marine and Coastal Access Act 2009	The Act provides executive devolution to Scottish Ministers of the new marine planning and conservation powers in the offshore region (12-200 nautical miles), coinciding with the existing executive devolution of marine licensing.
Marine Navigation Act 2013 (Commencement) (Scotland) Order 2013	This order brought the Marine Navigation Act 2013 into force in Scotland on the 1 st October 2013.

13.2.3 National Planning Policy

Marine Policy Statement

15. The Marine Policy Statement (MPS) adopted by all UK administrations in March 2011 provides the policy framework for the preparation of marine plans and establishes how decisions affecting the marine area should be made to enable sustainable development. The MPS sets out a vision of having ‘clean, healthy, safe, productive and biologically diverse oceans and seas’ by supporting the development of Marine Plans. It also sets out the framework for environmental, social and economic

considerations that need to be considered in marine planning. Regarding the topics covered by this chapter, the MPS also states (in Paragraph 3.4.7) that marine plan authorities and decision makers should: “*take into account and seek to minimise any negative impacts on shipping activity, freedom of navigation and navigational safety and ensure that their decisions are in compliance with international maritime law*”. In addition, as outlined in Paragraph 3.4.6 of the MPS, environmental impacts arising from shipping activity can be through: “accidental pollution from ships in the course of navigation or lawful operations, pollution caused by unlawful operations or physical damage caused by collisions”.

Scotland’s National Marine Plan

16. By adopting the MPS, the Scottish Government committed to the requirement to introduce Marine Plans for Scotland. The Scottish Government developed the first marine plan for Scottish inshore and offshore waters, the Scotland National Marine Plan (SNMP) (Scottish Government, 2015). The Plan was developed in accordance with the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act (MCAA) 2009, the MPS and the Maritime Spatial Planning Directive (discussed further in **Chapter 2 Policy and Legislation**).
17. The following marine planning policies are relevant to Commercial and Recreational Navigation:
18. Recreation and Tourism 2: The following key factors should be taken into account when deciding on uses of the marine environment and the potential impact on recreation and tourism:
 - The extent to which any proposal interferes with access to and along the shore, to the water, use of the resource for recreation or tourism purposes and existing navigational routes or navigational safety.
19. Transport 1: Navigational safety in relevant areas used by shipping now and in the future will be protected, adhering to the rights of innocent passage and freedom of navigation contained in UN Convention on the Law of the Sea (UNCLOS). The following factors will be taken into account when reaching decisions regarding development and use:
 - The extent to which the locational decision interferes with existing or planned routes used by shipping, access to ports and harbours and navigational safety. This includes commercial anchorages and defined approaches to ports.
 - Where interference is likely, whether reasonable alternatives can be identified.

Where there are no reasonable alternatives, whether mitigation through measures adopted in accordance with the principles and procedures established by the International Maritime Organization can be achieved at no significant cost to the shipping or ports sector.

National Planning Framework

20. Scotland’s third National Planning Framework (NPF) (Scottish Government, 2014a) includes the following ambitions relevant to the marine environment at Millport, and these have been considered when undertaking the EIA for the scheme:
 - The coast and islands will capitalise on their world-class environment
 - Para 4.29 “*The environment of our coastal areas, on land and at sea, is an outstanding, internationally important resource. These natural assets support quality of life and underpin important economic sectors like tourism, outdoor recreation and food and drink.*”
 - Para 4.32 “*Outdoor recreation is important throughout the coastal and marine area, with the West Highlands being a particular asset. Sailing is worth around £100 million to the Scottish economy and is a growing sector. The west coast and the Hebridean islands are*

a main focus for development, but there is also potential in the north and on the east coast. Cruise activity is also expected to develop.”

Planning Policy Scotland

21. Planning policy for Scotland is set out in the document Scottish Planning Policy (Scottish Government, 2014b). The planning policy document outlines the Scottish Government’s approach to facilitating the delivery of the aims set out in National Planning Framework (NPF).
22. The Planning Policy states that: *“the environment is a valued national asset offering a wide range of opportunities for enjoyment, recreation and sustainable economic activity. Planning plays an important role in protecting, enhancing and promoting access to our key environmental resources, whilst supporting their sustainable use.”*

13.2.4 Regional Legislation and Policy

Clyde Regional Marine Plan

23. A pre-consultation on the draft Clyde Regional Marine Plan took place between 18th March and 27th May 2019. The Plan will create a framework for integrated, sustainable and co-ordinated planning and management of the Clyde Marine Region’s environmental, economic and community resource. The objective and policies relevant to this chapter are:
24. Shipping, Ports, Harbours and Ferries, Objective SHIP 1: Continue collaborative efforts to increase the cruise ship market in the Clyde Marine Region within environmental limits. Promote the Region as a tourist destination by supporting sustainable development of the market for smaller cruise vessels, whilst seeking opportunities for related socio-economic activity.
25. All sectors, general policy, Policy SEC 1: Applications for development(s) and/or activities will be supported where the proposal can demonstrate that:
 - They will not have any adverse impacts on the efficient and safe movement or navigation of vessels to and from ports, harbours, marinas, moorings and anchorages, including ferry operations; and
 - Access to the shore and water is optimised for sport, recreation and tourism, where possible, including, but not limited to piers, jetties, slipways, moorings, anchorages and navigational.

13.2.5 Local Planning Policy

North Ayrshire Adopted Local Development Plan (2019)

26. The scheme falls within the North Ayrshire Council local authority boundaries. The Adopted Local Development Plan (LDP) for North Ayrshire, was adopted on 28th November 2019 (North Ayrshire Council, 2019). Millport Conservation Area Regeneration Scheme (CARS) and Flood Defence Scheme is listed as a strategic project for North Ayrshire within the North Ayrshire LDP.
27. For the purpose of the Local Plan, Millport and the footprint of the proposed scheme is categorised to be within ‘Developed Coast’.
28. Policy 24: Alignment with Marine Planning is relevant to this chapter and states:
 - *We will, in principle, support developments with a marine component or implication (such as marinas, ports, harbours, marine tourism and recreation, fish farming, and land-based development associated with offshore energy projects and defence establishments) where they are within a recognised developed coastal location and provided they are consistent with Scotland’s National Marine Plan and the emerging Regional Marine Plan for Clyde Marine Region.*

- All marine proposals should identify environmental impacts and mitigate against these to ensure there are not any unacceptable adverse impacts.
- Generally, development requiring new defences against coastal erosion or coastal flooding will not be supported except where there is a clear justification for a departure from the general policy to avoid development in areas at risk or where a scheme has already been identified in the Spatial Strategy or the current Ayrshire Shoreline Management Plan.

Ayrshire Joint Structure Plan 'Growing A Sustainable Ayrshire' (2007)

29. The Ayrshire Joint Structure Plan 'Growing A Sustainable Ayrshire' (North Ayrshire Council, East Ayrshire Council and South Ayrshire Council, 2007) establishes a framework that brings together the aspirations of communities with those of business and industry, and the area's many supporting agencies and organisations, to provide a strategic land use context to the year 2025.
30. With relevance to this chapter, the plan states: *"Ayrshire contains some of the best and most accessible coastline and islands in Scotland with internationally renowned links golf and major sailing and other leisure and recreational opportunities... The opportunity exists therefore, to develop a major coast-based maritime recreational area focussed on the Firth of Clyde stretching out to include Arran the other islands."*

13.3 Consultation

31. To inform the ES, North Ayrshire Council has undertaken a thorough pre-application consultation process, which has included the following key stages:
- Scoping Reports submitted to Marine Scotland and North Ayrshire Council (RHDHV, 2017);
 - Scoping Opinion received from Marine Scotland and North Ayrshire Council (2017);
 - Public consultation and discussions with community groups (2016-2019); and Individual consultation meetings, undertaken specifically to inform development of the scheme proposals and the EIA process.
32. Full details of the proposed scheme consultation process to date is presented within **Chapter 3 EIA Methodology and Consultation**. The consultation of particular relevance to navigation is summarised in Table 13-2.

Table 13-2 Consultation responses relevant to navigation

Consultee	Date/ Document	Comment	Response / Where addressed in the ES
The Crown Estate Scotland	Response to Scoping Report	Identified that the proposals have the potential to impact on TCES customers and tenants. Meeting proposed to discuss the proposals and the consenting process in further detail.	See below for summary of meeting discussions.
	Consultation Meeting, 16 th May 2017	Under the Marine (Scotland) Act 2010, Peel Ports (Clydeport) as Harbour Authority is responsible for the granting of Navigation Consents in relation to all moorings within their area of jurisdiction. This responsibility is discharged by Clydeport via the Clyde Moorings	

Consultee	Date/ Document	Comment	Response / Where addressed in the ES
		<p>Committee (CMC), which is made up of Clydeport, Crown Estate Scotland, RYA, Clyde Yacht Clubs Association (CYCA), MoD/Queens Harbour Master, British Marine Federation and the Clyde Fishmen's Association.</p> <p>Two small vessel anchorages are located in the bay, the presumption is for these areas to be kept free of moorings. The CMC would therefore have an interest should any moorings or other structures encroach into these areas</p> <p>Cumbræ Yacht Slip has a licence to lay moorings.</p> <p>North Ayrshire Council has 2 licences for visitor moorings.</p> <p>Moorings licences have also been granted to DRG Offshore Engineering Services Ltd. and the Field Studies Council for moorings located at the pier.</p> <p>The proposed options were discussed (<i>only those issues relating to the proposed scheme are summarised here</i>):</p> <ul style="list-style-type: none"> • The offshore breakwater proposals would result in the western visitor moorings needing to be relocated. Could utilise the former navigation channel. • The western small vessel anchorage would need to be adjusted, probably extending further eastwards. • The proposal would result in improved shelter within the bay and likely result in higher visitor mooring occupancy. 	Small vessel anchorages and visitor moorings are shown in Figure 13-1.
	Response to Interim Environmental Assessment	A meeting was requested to discuss the proposals.	See below for summary of meeting discussions.
	Consultation Meeting, 21 st August 2019	The information discussed in 2017 was confirmed.	Proposals for changes to mooring provision included in this chapter.

Consultee	Date/ Document	Comment	Response / Where addressed in the ES
		<p>TCES commented that NAC need to consider what is needed more generally for local mooring in Millport provision in the short term, as well as specific impacts of the scheme.</p> <p>Any changes to moorings provision needs to be agreed by Clyde Moorings Committee. TCES to begin discussions about potential changes with CMC at the next meeting.</p> <p>Appropriate contact details for Clydeport were provided.</p>	
Clydeport	Consultation meeting, 28 th October 2019	<p>An overview of the scheme proposals was provided by the project team.</p> <p>North Ayrshire Council are Harbour Master for Millport Harbour, with Clydeport responsible for the wider area. The extent of North Ayrshire Council's responsibilities as Harbour Master is to be checked.</p> <p>NYB delegate responsibilities for navigation aids etc to Clydeport for the Firth of Clyde, so Clydeport are the Local Lighthouse Authority.</p> <p>The Flood Protection Scheme submission will include proposals for navigation aids.</p> <p>A dredging licence from Clydeport is required for any dredging.</p> <p>Clydeport did not identify any additional navigation constraints or significant further requirements for the consents process.</p>	<p>Included in Figure 13.1 in this chapter.</p> <p>Proposals for navigation aids discussed in this chapter.</p>
Millport Harbour Users Group	Community Group Meeting, 16 th August 2016	<p>The harbour users expressed concern about the proposed extension of Millport Pier to form a nearshore breakwater. This option was previously preferred following the initial high-level options appraisal. Concerns principally related to navigation issues, the current condition of Millport Pier,</p>	<p>The alternative proposals were fully considered as part of the scheme development, and form the basis for the proposed scheme.</p>

Consultee	Date/ Document	Comment	Response / Where addressed in the ES
		<p>and the visual impact of a structure close to the shore.</p> <p>An alternative solution was suggested by the community, comprising an offshore breakwater between the Leug and the Spoig rock outcrops located offshore in Millport Bay. Comments about this proposal included:</p> <ul style="list-style-type: none"> • the area between the Leug and the Spoig is currently a navigation risk, which a breakwater would remove • an offshore breakwater could provide additional protection to the pier, reducing maintenance costs • the visual impact of an offshore breakwater would be less than a breakwater extension to the pier • offshore construction would mean the pier would not need to be closed during construction • the visitor moorings would be more useable with an offshore breakwater <p>NAC highlighted that if the proposed scheme involved construction of a breakwater further offshore, instead of an extension to the existing pier, it could be difficult to justify undertaking improvements to the pier as part of the Scottish Government funding for the scheme.</p> <p>The need to limit the impact of the works on tourism and transport, including the length of time that the pier is closed was highlighted.</p> <p>The preference was that both navigable channels to either side of the Leug and Spoig should not be restricted.</p> <p>The marker pole on the Millers' Thumb (rock outcrop close to the entrance to the inner harbour).</p>	<p>Mitigation measures considered in this this chapter.</p> <p>Proposed navigation aids discussed in this chapter.</p>

Consultee	Date/ Document	Comment	Response / Where addressed in the ES
		Marker beacons would also be needed on the Leug and Spoig to avoid navigation problems by sailors who don't know the waters.	
	Ongoing consultation, 2017-2019	North Ayrshire Council has continued to engage with the Millport Harbour Users Group in relation to all harbour issues, including matters relating to the FPS proposals and other issues. The group includes representatives from Clyde Marine and Millport Marine Facilities Association. Issues discussed have included the future plans for the timber part of Millport Pier (and associated moorings) and the possible future opportunity for the development of a marina in Millport Bay.	Future potential for a marina development discussed in this chapter and in Chapter 23 Tourism and Recreation.
Northern Lighthouse Board	Response to Scoping Report	Noted that the proposals will impact on marine navigation, and will reply formally in response to the Marine Licence application.	
	Response to Interim Environmental Assessment	<p>Peter Douglas of NLB noted that <i>“given the localised nature of this issue I would suggest that the Council and views of local marine users (including the Waverley) would be of more validity than mine – it’s some years since I ventured into Millport.”</i> Further comments (on the proposed scheme only) are provided below.</p> <p>The offshore breakwater options will require a complete change to how the harbour operates. There will be gains in that there will be a larger and better protected area for moorings. Ensuring that visiting mariners aren't put at risk would require some or all of the following measures:</p> <ul style="list-style-type: none"> • A publicity campaign, Notices to Mariners etc. • A navigation light (port hand or east cardinal) on The Clach • A navigation light (starboard hand) on The Leug 	Proposed navigation aids and other mitigation measures are discussed in this chapter.

Consultee	Date/ Document	Comment	Response / Where addressed in the ES
		<ul style="list-style-type: none"> Leading lights/directional light or hazard marker in the vicinity of the corner of Crichton Street/Millburn Street (close to the planned rock breakwater) Discontinuation of the existing rear leading light and the light on The Eileans <p>A meeting will be held with the NLB during detailed design of the preferred scheme to agree the requirements for mitigation measures.</p>	
	Consultation Meeting, 20 th August 2019	<p>The project team met with Peter Douglas of the NLB on site.</p> <p>The requirements for navigation aids were discussed. The following details are in addition to those mentioned in the NLB response to the Interim Environmental Assessment.</p> <ul style="list-style-type: none"> The navigation beacons on the Leug and the Clach will need to be more substantial than the existing beacon on the Leug. Needs to be visible at least 2m above MHS. A beacon may be needed on the end of the Crichton Street breakwater. This is to be reviewed and discussed further with NLB and Clydeport. <p>Communicating changes is as important as physical navigation aids. Clyde Cruising Club edit the navigation pilots for the local area.</p> <p>Formal agreement of the proposals for the navigation aids will be via the Marine Licence, but would want to agree things informally first.</p>	<p>Proposed navigation aids and other mitigation measures are discussed in this chapter</p> <p>NLB and Clydeport have been consulted regarding proposals for navigation aids.</p>
P.S. Waverley	Telephone discussion with Captain Andy O'Brian, 3 rd May 2018	<p>The turning circle of the PS Waverley is "about half a mile". If offshore breakwaters were to be constructed, the PS Waverley would not have sufficient space to be able to turn inshore of the</p>	

Consultee	Date/ Document	Comment	Response / Where addressed in the ES
		<p>breakwaters, so the PS Waverley could not return to Millport Pier.</p> <p>Captain O'Brien gave his personal opinion that the potential benefits of providing additional shelter in Millport Bay (from offshore breakwaters) would outweigh the impact of the Waverley not being able to return to the pier.</p>	
P.S. Waverley	Email from Waverley Excursions Ltd., 10 th September 2019	<p>North Ayrshire Council were contacted by the General Manager of Waverley Excursions for an update on the current status of the scheme proposals. It was confirmed that the proposed scheme includes an offshore breakwater, which would mean that the P.S. Waverley would not be able to access Millport Pier after construction of the scheme.</p> <p>North Ayrshire Council also stated that they will not be undertaking repairs to the timber part of Millport Pier. This means that without the proposed FPS, the pier would still not be accessible for the P.S. Waverley.</p>	Impact of the proposed scheme on the P.S. Waverley is discussed in this chapter.
RYA Scotland	Response to Scoping Report	<p>Recreational boating should be scoped into the EIA within Tourism and Recreation. RYA Scotland will be happy to be involved with that process and paragraphs have added in if that should be helpful.</p> <p>The location of the existing moorings should be shown on a map.</p> <p>Winds from south or southwest can make anchorage at Millport untenable.</p> <p>Welcome Anchorages is updated annually and covers Millport. Clyde Cruising Club Sailing Directions and Anchorages volume on the Firth of Clyde gives directions for sailing to and anchoring and mooring at Millport / Great Cumbrae.</p>	<p>Impacts on recreational boating covered in this chapter.</p> <p>Location of moorings included in Figure 13-1 in this chapter.</p> <p>Impacts on moorings covered in this chapter.</p> <p>Desk study assessing issues and risks relating to navigation, included</p>

Consultee	Date/ Document	Comment	Response / Where addressed in the ES
		<p>Consultation on additional visitor moorings was undertaken in 2015 and raised some interesting views from the local community</p> <p>Works will impact on moorings during construction and operation.</p> <p>Will a formal navigation impact assessment be prepared?</p> <p>Key mitigation includes publicising a programme of works, informing Clyde Cruising Club so sailing directions can be updated and signs posted at harbours.</p> <p>Updating aids to navigation will require approval of the Northern Lighthouse Board.</p> <p>Recommend consultation with Clyde Cruising Club, CMC, Clyde Marine Planning Partnership, Sportscotland; Clyde Yacht Clubs Association.</p>	<p>as Appendix 13.1 to this chapter.</p> <p>NLB have been consulted re. navigation aids.</p> <p>Consultation to date is summarised in this Section.</p>
	Response to Interim Environmental Assessment	<p>Consider that the benefits of Options 2 & 3 outweigh the loss of the existing navigation route between the Spoig and the Eileans, provided that mitigation in relation to marking and existing moorings is addressed. Details of the new layout can be passed to the Clyde Cruising Club for inclusion in the updates to the Clyde volume of their <i>Cruising Directions and Anchorages</i>.</p> <p>The bay will become more sheltered while the current will be able to pass through and help maintain the channel depth. The breakwater scheme will also provide opportunities for local developments in relation to improved facilities for visiting recreational sailors.</p>	Covered in this chapter, and Chapter 23, Tourism and Recreation.

13.4 Methodology

33. General methods for EIA are discussed in **Chapter 3 EIA Methodology and Consultation**. This section describes the methodology used to obtain baseline data, characterise the existing commercial and recreational navigation in the area and assess the potential impacts of the proposed scheme in more detail.
34. The primary study area is Millport Bay, with potential impacts on navigation in the outer Firth of Clyde also considered.
35. Baseline data was obtained through a number of sources, namely:
- Desk study – Review of Waverley Berthing, Royal HaskoningDHV, November 2016;
 - Desk study – Millport Navigation Baseline, Royal HaskoningDHV, June 2018; and
 - Desk study – Millport Navigation Assessment, Royal HaskoningDHV, July 2019.
36. The receptors referred to in this chapter are considered to include the owners and operators of commercial vessels, fishing vessels and recreational vessels.
37. The approach to determining the significance of an impact on follows a systematic process for all impacts. This involves identifying, qualifying and, where possible, quantifying the sensitivity, value and magnitude of all ecological receptors which have been scoped into this assessment. Using this information, a significance of each potential impact has been determined. These steps are set out in the remainder of this section.
38. The sensitivity and value of discrete receptors and the magnitude of effect are assessed using expert judgement and described with a standard semantic scale. These expert judgements of receptor sensitivity, value and magnitude of effect are guided by the conceptual understanding of baseline conditions.
39. The *sensitivity* of a receptor (Table 13-3) is dependent upon its:
- Tolerance: the extent to which the receptor is adversely affected by an effect;
 - Adaptability: the ability of the receptor to avoid adverse impacts that would otherwise arise from an effect; and
 - Recoverability: a measure of a receptor's ability to return to a state at, or close to, that which existed before the effect caused a change.

Table 13-3 Definitions of Sensitivity Levels for Navigation Receptors

Sensitivity	Definition (sensitivity level)
High	<ul style="list-style-type: none"> • Permanent or temporary effects on tolerance, resulting in injury to personnel and/or significant damage to vessel or structure; • High level of commercial impacts potentially resulting in permanent effects on commercial operations; or • Limited ability to adapt to new effect.
Medium	<ul style="list-style-type: none"> • Permanent or temporary effects on tolerance, resulting in moderate damage to vessel or structure; • Medium level of commercial impacts potentially resulting in permanent effects on commercial operations; or • Receptor has some ability to adapt to the effect in the medium term (5-10 years)

Low	<ul style="list-style-type: none"> Limited permanent or temporary effects on tolerance, not resulting in damage to vessels or injury to personnel; Low level of commercial impact; or Receptor able adapt to majority of new effect or recover to an acceptable status over the short term (1-5 years).
Negligible	<ul style="list-style-type: none"> Very limited temporary effects on tolerance, with no damage to vessels or injury to personnel; Very low level of commercial impact; or Receptor able to adapt to new effect or recover to an acceptable status almost immediately (less than one year).

40. In addition, a *value* component may also be considered when assessing a receptor (Table 13-4). This ascribes whether the receptor is rare, protected or threatened.

Table 13-4 Definitions of the Different Value Levels for a Navigation Receptor

Value	Definition (value)
High	Receptor is of national or international importance in the context of sailing, shipping and/or navigation. Likely to be rare with minimal potential for substitution. May also be of significant wider-scale, functional or strategic importance
Medium	Receptor is not designated but is of local to regional importance for sailing, shipping and/or navigation.
Low	Receptor is not designated but is of local importance for sailing, shipping and/or navigation.
Negligible	Receptor is not designated and is not deemed of importance for sailing, shipping and/or navigation.

41. The *magnitude* of the impact is assessed according to:
- The extent of the area subject to a predicted impact;
 - The duration the impact is expected to last prior to recovery or replacement of the resource or feature;
 - Whether the impact is reversible, with recovery through natural or spontaneous regeneration, or through the implementation of mitigation measures or irreversible, when no recovery is possible within a reasonable timescale or there is no intention to reverse the impact; and
 - The timing and frequency of the impact, i.e. conflicting with critical seasons or increasing impact through repetition.

42. Table 13-5 summarises the definitions of magnitude that have been used for the navigation receptors.

Table 13-5 Definitions of Magnitude of Navigation Impacts

Sensitivity	Definition (magnitude)
High	<ul style="list-style-type: none"> Large change in vessel traffic numbers (i.e. >20 per cent); Large spatial extent (i.e. throughout and beyond the near-field study area); Permanent or long-term duration (i.e. throughout and beyond the proposed scheme construction); and/or Very frequent / constant occurrence (i.e. very likely or definite).

Medium	<ul style="list-style-type: none"> • Medium change in vessel traffic numbers (i.e. 5-20 per cent); • Medium spatial scale (i.e. throughout the near-field study area); • Medium-term duration (i.e. throughout the proposed scheme construction); and/or • Frequent occurrence (i.e. likely).
Low	<ul style="list-style-type: none"> • Small change in vessel traffic numbers (i.e. <5 per cent) • Small spatial scale (i.e. within one or two sub-areas within the near-field study area); • Short-term duration (i.e. part of the proposed scheme construction); and/or • Infrequent occurrence (i.e. unlikely).
Negligible	<ul style="list-style-type: none"> • Very small change in vessel traffic numbers (i.e. <1-2 per cent) • Small spatial scale (i.e. within one or two sub-areas within the near-field study area); • Very short-term duration (i.e. part of the proposed scheme construction); and/or • Very infrequent occurrence (i.e. very unlikely).

13.4.1.1 Impact Significance

43. Following the identification of receptor importance and magnitude of the effect, it is possible to determine the significance of the impact, as described in **Chapter 3 EIA Methodology and Consultation**.
44. Impacts are unlikely to be significant where features of low importance are subject to small scale or short-term effects. If an impact is found not to be significant at the level at which the resource or feature has been valued, it may be significant at a more local level.
45. Following the identification of receptor importance and magnitude of effect, the significance of the impact has been considered using the matrix presented in Table 13-6 below and knowledge of the ecological features affected.
46. The assessment of potential impacts has been undertaken assuming implementation of embedded mitigation and commitments for the proposed scheme. Residual impacts include any additional mitigation measures required. An assessment of residual impacts is then made, after assuming implementation of additional mitigation measures where required, i.e. the significance of the effects that are predicted to remain after the implementation of all committed mitigation measures.

Table 13-6 Impact significance matrix

		Negative Magnitude				Beneficial Magnitude			
		High	Medium	Low	Negligible	Negligible	Low	Medium	High
Sensitivity	High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Minor	Minor	Minor	Moderate	Major
	Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
	Negligible	Minor	Minor	Negligible	Negligible	Negligible	Negligible	Minor	Minor

47. The impact significance categories are defined as shown in Table 13-7.

Table 13-7 Impact significance definitions

Impact Significance	Definition
Major	Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or, could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision making process.
Negligible	No discernible change in receptor condition.
No Change	No impact, therefore no change in receptor condition.

48. Note that for the purposes of this EIA, major and moderate impacts are deemed to be significant. In addition, whilst minor impacts are not significant in their own right, it is important to distinguish these from other non-significant impacts as they may contribute to significant impacts cumulatively or through interactions.
49. Embedded mitigation has been referred to and included in the initial assessment of impact. If the impact does not require mitigation (or none is possible) the residual impact remains the same. However, if mitigation is required, an assessment of the post-mitigation residual impact is provided.
50. For the purposes of this ES, 'major' and 'moderate' impacts are deemed to be significant (in EIA terms). In addition, whilst 'minor' impacts may not be significant, it is important to distinguish these from other non-significant (negligible) impacts as they may contribute to significant impacts cumulatively.
51. Following initial assessment, if the impact does not require additional mitigation (or none is possible) the residual impact will remain the same. If, however, additional mitigation is proposed there will be an assessment of the post-mitigation residual impact.

13.4.1.2 Cumulative Impact Assessment

52. For an introduction to the methodology used for the Cumulative Impact Assessment (CIA), please refer to **Chapter 3 EIA Methodology and Consultation** also provides an introduction to the methodology used for the Cumulative Impact Assessment (CIA). This chapter includes those cumulative impacts that are specific to Commercial and Recreational Navigation.
53. The CIA involves consideration of whether impacts on a receptor can occur on a cumulative basis between the Project and other activities, projects and plans for which sufficient information regarding location and scale exist.
54. It is assumed that any consented development would be subject to mitigation and management measures which would reduce impacts to non-significant unless there were exceptional circumstances, it is accepted that such projects or schemes may contribute to a wider cumulative impact.

55. Finally, in cases where this proposed scheme has negligible or no impact on a receptor (through for example avoidance of impact through routing or construction methodology) it is considered that there is no pathway for a cumulative impact.

13.5 Existing Environment

13.5.1 Overview of Navigation to Millport

56. Navigation access to Millport requires vessels to travel in the Firth of Clyde. Clydeport Operations Limited are the Harbour Authority for the Firth of Clyde, including Millport Bay, as shown in Figure 13-1.
57. North Ayrshire Council are the Harbour Authority for the harbour within Millport itself. The limits of responsibilities are shown in Plate 13-1.

13.5.2 Ports and Shipping

58. The closest ports to Millport are Rothesay (approximately 12km to the northwest) and Greenock and Port Glasgow (approximately 24km to the northeast), as shown on in Figure 13-1.
59. The Hunterston deep water terminal is located on the mainland due east of Millport, approximately 3km away, as shown in Figure 13-1. Hunterston Terminal was previously a coal-handling port, and has a 1.6km long jetty. The site is owned by Peel Ports Group and the current masterplan for the redevelopment of the Hunterston Port and Resource Centre (PARC) its redevelopment includes proposals for Liquid Natural Gas import and storage, a combined cycle gas turbine power station, a train manufacturing plant, concrete batching, marine construction and decommissioning, land-based aquaculture and plastics recycling. These proposals could support over 1,700 jobs and add £140m economic value to Scotland.
60. Largs Yacht Haven, with berths for 730 vessels, is also located close to Millport, approximately 5km to the north east. Kip Marina at Inverkip is 18km to the northeast of Millport and can host 150 vessels. Troon Yacht Haven is located approximately 29km to the south east of Millport and has berths for 400 vessels. The locations of these marinas are shown on Figure 13-1.
61. The Cumbrae ferry slipway is located in the northeast of the island, approximately 3km from Millport town. Largs ferry terminal is 2km away on the mainland, across the Firth of Clyde to the north east of the Cumbrae ferry slipway. A commercial ferry service is operated by Calmac between Largs and the Cumbrae slipway, operating every 30 minutes (in each direction) in winter and every 15 minutes in summer. Other ferry services in the outer Firth of Clyde operate between Wemyss Bay and Rothesay, and between Ardrossan and Brodick.
62. Smaller harbours are located around the North Ayrshire and Argyll coast, including at Brodick (Arran), Irvine, Saltcoats and Fairlie.
63. Navigation channels are defined to either side of Great Cumbrae. Figure 13-2 shows that the channel to the west of Great Cumbrae experiences moderately high use, from commercial, military and cargo vessels. The channel to the east of Great Cumbrae experiences high use from ferry traffic and recreational vessels (AIS Shipping Traffic data 2012-2015).

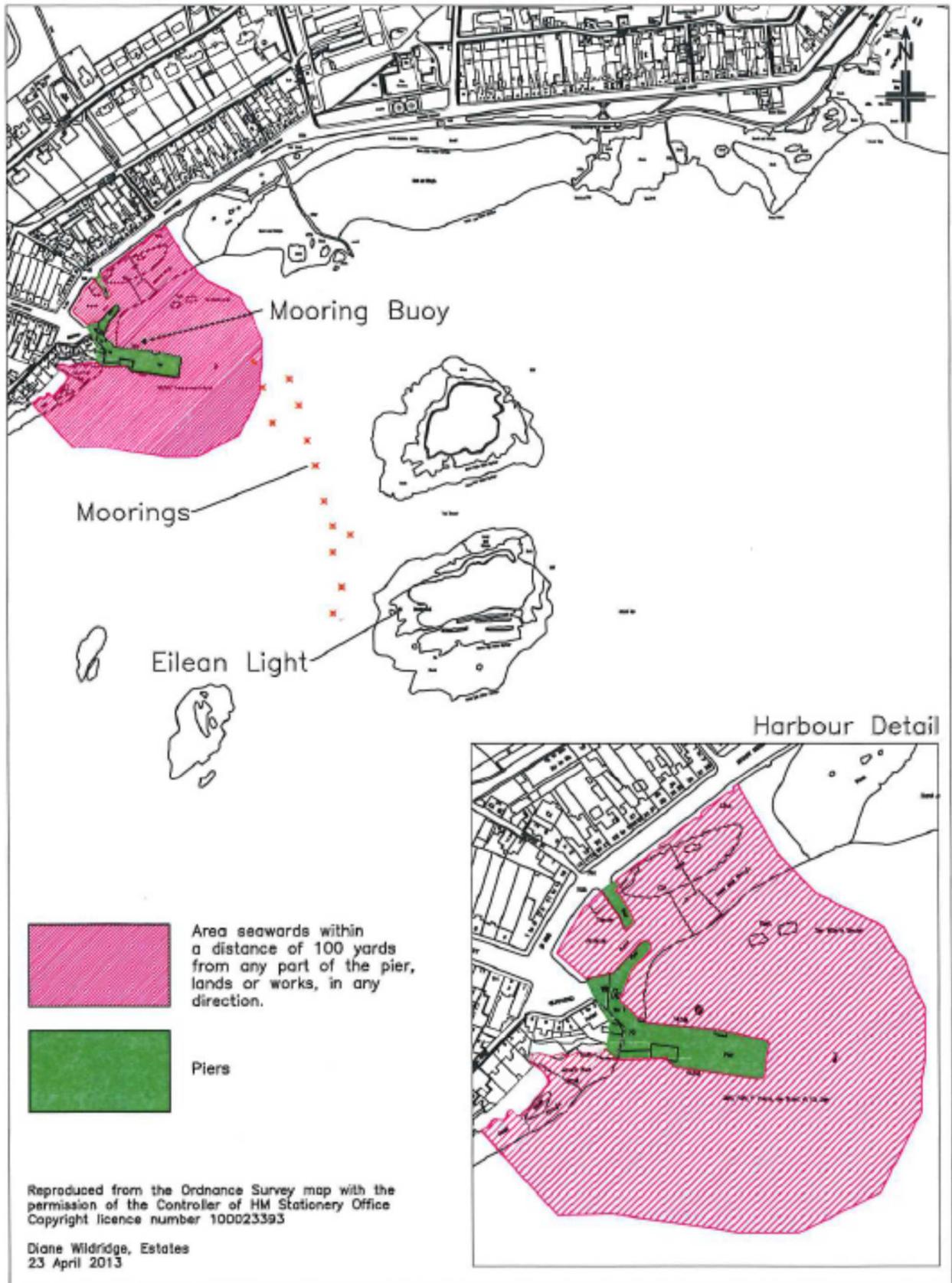


Plate 13-1: North Ayrshire Council Jurisdiction Plan for Millport Harbour

64. The Clyde Cruising Club Sailing Directions and Anchorages volume for the Firth of Clyde includes directions for sailing to and anchoring and mooring at Millport / Great Cumbrae. Information about mooring at Millport is also included in Welcome Anchorages (updated annually).
65. Commercial dredging is not undertaken within the outer Firth of Clyde.

13.5.3 Other Commercial Navigation

66. The Paddle Steamer Waverley (known as the P.S. Waverley) is the world's last sea-going paddle steamer and frequently operates on the Clyde between June and September. Visitors disembarking at Millport from the P.S. Waverley support the local tourism economy for Millport. During the summer of 2013, the P.S. Waverley made 18 visits to Millport.
67. Due to the unsafe condition of the timber section of Millport Pier the P.S. Waverley is currently unable to berth at Millport Pier. When the vessel is operational, it now docks at Keppel Pier (the Marine Station), with visitors transported to Millport town by bus.
68. When the P.S. Waverley was able to berth at Millport Pier it would approach Millport through the marked navigation channel between The Eileans and The Spoig, see Plate 13-1. After berthing along the seaward face of the timber section of the pier, the vessel would leave Millport Bay via the unmarked channel to the west of The Leug.
69. The luxury cruise ship the Hebridean Princess calls at Great Cumbrae up to four times per year. Due to the draft of the Hebridean Princess it is not able to berth alongside Millport Pier, so it anchors in the deeper waters inland of The Eileans. The ship's tender transports passengers to Millport.
70. Commercial fishing from Millport is limited to very small vessels, as discussed in **Chapter 12**.

13.5.4 Recreational Navigation

71. Millport Bay is used by small vessels for recreational sailing. Vessels are operated by local boat owners and by visitors to the area who berth at the mooring buoys and small vessel anchorages within the bay (refer to Section 13.5.6). Sailing clubs in the vicinity of Millport are located at Largs, Prestwick and Troon.

13.5.5 Millport Pier and Harbour

72. Millport Pier and the harbour area are shown in Figure 13-3.
73. Millport's inner harbour is very sheltered. It is currently heavily silted and of limited use to vessels due to the high bed levels. The harbour includes a small slipway, but this does not extend to low water.
74. Millport Pier is an important asset which supports the economy of Millport and Cumbrae. It has historically been used by a range of vessels including pleasure boats, tour boats, fishing boats, the P.S. Waverley and the cruise ship the Hebridean Princess. The timber section of Millport pier currently extends into sufficient depth of water to provide access for vessels at all states of the tide. However, the timber part of the pier is in very poor condition and is currently unsafe to use.
75. There is currently no step-ashore access at Millport Harbour because of the condition of the timber part of Millport Pier. Vessels need to moor in Millport Bay and use a tender to get to shore.

13.5.6 Moorings within Millport Bay

76. The following moorings are available in Millport Bay:

- Two small vessel anchorages are located in the lee of the Leug and in Kames Bay;
- Cumbrae Yacht Slip (Millport Marine Facilities Association) has a licence to lay moorings on the seabed inshore of the Eileans;
- North Ayrshire Council has two licences for visitor moorings within the bay (29 moorings total); and
- Two individual moorings are located adjacent to Millport Pier.

77. The locations of these moorings are shown in Figure **Error! Reference source not found.**

78. No data is available on the level of use of the moorings in Millport Bay. The moorings at Millport Pier are known to be in constant use. The Cumbrae Yacht Slip moorings are understood to be fully occupied in the summer months, and well used throughout the year. Anecdotal evidence indicates regular but low level use of the small vessel anchorages and the North Ayrshire Council visitor moorings.

13.5.7 Anticipated Trends in Baseline Conditions

79. It is important to recognise that the baseline conditions are not static, but can vary due to external conditions independent of anything that may be happening in Millport itself. This might include (for example) changes in local and/or national economic conditions affecting the volume of trade by sea, and associated vessel movements. Changes in economic conditions might also impact on recreational vessel movements.

80. The offshore rock armour breakwaters forming part of the proposed scheme would provide increased shelter to vessels mooring in Millport Bay. This could encourage more visitors and might justify investment in additional mooring provision. The Millport Harbour Users Group has considered a proposal for future development of a marina in Millport Bay, which could be progressed following completion of the proposed flood protection scheme. Marina development proposals do not form part of this proposed scheme and are therefore not considered by this EIA.

81. Climate change is not expected to have a significant impact on baseline conditions for navigation. If climate change impacts are not addressed by ports and harbours on the Firth of Clyde then this might impact vessel movements throughout the area.

13.6 Proposed Scheme Design

13.6.1 Proposed Scheme in the Context of Commercial and Recreational Navigation

82. This section summarises the parameters of the proposed scheme, during operation of the completed scheme and whilst it is under construction, in the context of commercial and recreational navigation.

83. **Error! Reference source not found.** compares the proposed scheme design to the current situation, in the context of commercial and recreational navigation. Issues for scheme operation are presented first, because this sets the context for any issues during construction, which are summarised in **Error! Reference source not found.** Issues during decommissioning are expected to be similar to any

issues during scheme construction. Refer to **Chapter 5 Project Description** for more detail regarding specific activities, and their durations, which fall within the construction phase.

Table 13-8 Proposed scheme in the context of navigation

Issue	Current situation	Proposed scheme
Navigational safety – alignment and space	Vessels approach from offshore along a straight line with an alignment of 333°. The channel is about 160m wide based on the -2mCD depth contour.	The offshore breakwaters will block the existing approach channel. This will require vessels to navigate to the harbour using the channel to the west of the Leug (between the Leug and the shore), see Figure 13-3. Vessels approaching this channel from the mainland to the east will need to turn eastwards to pass the Leug. The western channel is about 190m wide based on the -2mCD depth contour.
Navigational safety – prevailing winds	Prevailing winds from the south to south west sectors are generally in the direction of travel for vessels approaching Millport. Therefore there is currently some risk of vessels being driven into the shore when turning west towards Millport Harbour. Further offshore, the risk to navigation from the prevailing winds mainly relates to vessels mooring in Millport Bay, which are exposed to wind-generated waves.	For vessels approaching Millport Harbour along the western channel there would be an increased risk of being driven into the shore (to the west of Millport Pier) due to winds from the south. This risk is considered to be relatively low and manageable by competent recreational sailors due to the width of the channel. The risks to navigation within the nearshore waters of Millport Bay will be reduced with the construction of the offshore breakwater, because the mooring areas and the approach to Millport Harbour will be less exposed to wave action.
Navigational safety – bathymetry	The sea bed along the current navigation channel is generally lower than -4mCD, with occasional local reductions in depth on the east side of the channel to approx. -2.5mCD.	The sea bed along the western channel is generally lower than -5mCD, with the channel shelving quite steeply on the east and west sides.
Stopping length (large vessels)	Large vessels can commence their stopping manoeuvre between the Eileans. The available stopping distance is more than four times the maximum vessel length.	Large vessels will require speed to maintain manoeuvrability around The Leug. This will influence the stopping manoeuvre, however it is expected that this would remain feasible. The available stopping distance will still be more than four times the length of the largest vessel expected to visit Millport Bay (comparable to the Hebridean Princess).
Approaching Millport Harbour	There is sufficient room to approach the harbour, including for large vessels.	Some more manoeuvring effort will be required by large vessels, but the activity is considered feasible.
Departure from Millport Pier	Vessels use both the marked leading line as well as the West passage.	The west passage is already well used for departure from Millport Pier. No alternative departure route will be available.

Issue	Current situation	Proposed scheme
Moorings	<p>Two small vessel anchorages are located in the lee of the Leug and in Kames Bay.</p> <p>Cumbrae Yacht Slip has a licence to lay moorings on the seabed inshore of the Eileans.</p> <p>NAC visitor moorings within the bay (29 moorings total).</p> <p>Two individual moorings adjacent to Millport Pier.</p>	<p>The small vessel anchorage near to the Leug will need to be moved further eastwards, using the shelter provided by the breakwater, as shown in Figure 13-4. The anchorage in Kames Bay will not be affected.</p> <p>The Cumbrae Yacht Slip moorings will not be affected following construction of the proposed scheme.</p> <p>The western visitor moorings will need to be relocated. There is sufficient space in the former navigation channel for the relocation of the visitor moorings, as shown in Figure 13-4. The eastern visitor moorings will not be affected.</p> <p>The moorings at Millport Pier will not be affected when the proposed scheme is operational.</p>

Table 13-9 Worst case scenario during scheme construction

Issue	Proposed scheme
Construction vessel movements	<p>During construction of the scheme, additional vessels will be moving within Millport Bay to deliver construction materials.</p> <p>It is most likely that rock armour deliveries will travel from Glensanda Quarry (Oban) to Millport via the North Sea, the Irish Sea and the Firth of Clyde. Rock armour for construction of the offshore breakwaters would be transferred at sea to the jack-up barge. Rock armour for construction of the rock revetment and shore connected breakwater would be offloaded to a foreshore stockpile in West Bay.</p> <p>Other materials deliveries are expected to be loaded onto a barge at Troon for transport to Millport Pier. Materials would be offloaded for temporary storage on the pier or transport to the works location where they are needed.</p> <p>It is currently expected that there would be no more than two barge deliveries of rock or other material per day to Millport.</p>
Construction of the offshore breakwater	<p>Construction vessels will require a sufficiently large working area, for example to allow relocation of the jack-up barge. A working area of 100m to the north and south of the footprint of the proposed breakwaters, and 50m to the east of the Leug, is currently assumed, as shown in Figure 1-1. This working area will be off-limits to other vessels, and will need to be defined by marker buoys by the construction contractor. Therefore, access to Millport Pier and Harbour will be restricted because the western channel will be narrowed by this working area.</p>
Construction of the foreshore works	<p>Construction plant working on the foreshore to construct the rock revetment to Clyde Street, and the shore connected rock breakwater, will require a working area which will extend into the intertidal zone. For safe working, this area will be off-limits to vessels, and will need to be defined by marker buoys by the construction contractor. A working area extending 20m seaward of the toe of the foreshore structures is currently assumed. Therefore, the width of the western channel between the shore and the Leug will be reduced slightly because of this working area.</p>
Use of Millport Pier and Harbour	<p>It is expected that the construction contractor will need to use Millport Pier for delivery and storage of materials. Therefore access to Millport Pier will be restricted during the construction works. Whilst it might be possible for local users to reach agreement with contractor to continue to use the berths, and/or to access Millport Pier, in the worst-case scenario the two</p>

Issue	Proposed scheme
	<p>vessel moorings at the Pier will need to be relocated during the works and no access to the Pier will be possible.</p> <p>Access to Millport Harbour could be maintained during the works, assuming that the contractor will not use this for materials deliveries. The existing depth limitations on use of Millport Harbour would continue to be a constraint on vessel use, unless harbour dredging was to be undertaken as enabling works.</p>
Use of moorings	<p>The visitor moorings currently located to the west of the Eileans would need to be removed at the start of construction of the offshore breakwater. The moorings would be relocated on completion. It is currently expected that the offshore breakwater would be constructed over a 4 to 5 month period during the Spring of 2022. Therefore the visitor moorings could be back in place for Summer 2022.</p> <p>Use of the Cumbrae Marine Slip moorings (inshore of the Eileans) could continue during the construction works, but access may need to be from the east of the Eileans, due to the restricted width of the western channel.</p> <p>The small vessel anchorage to the east of Millport Bay will continue to be accessible during the construction works.</p>

13.6.2 Embedded Mitigation

84. Embedding mitigation into the proposed scheme design is a type of primary mitigation and is an inherent aspect of the EIA process. A full account of embedded mitigation measures is contained in **Chapter 5 Project Description**. Where embedded mitigation measures have been developed into the design of the proposed scheme with specific regard to commercial and recreational navigation, these are described in Table 13-10. Additional mitigation measures are also included to follow best practice and policy requirements. These mitigation measures are described in Table 13-11.

Table 13-10 Embedded mitigation measures for Commercial and Recreational Navigation

Parameter	Mitigation measures embedded into the scheme design
Navigation aids	<p>The proposed scheme includes the following navigation aids, to reduce risks to visiting mariners, as shown in Figure 13-4:</p> <ul style="list-style-type: none"> • A navigation light (port hand or East cardinal) on The Clach; • A navigation light (starboard hand) on The Leug; • Hazard marker on the Crichton Street/Millburn Street rock breakwater; • Discontinuation of the existing rear leading light and the light on The Eileans. <p>New navigation aids (relating to the offshore structures) will need to be constructed in advance of any offshore works, to enable navigation to continue via the western navigation channel during the construction works.</p>
Reduction in navigation risk by closing the gap between the Leug and the Spoig	<p>The construction of the offshore breakwater, with appropriate navigation aids, removes the risk that visiting mariners would try to navigate across the very narrow and shallow channel between the Leug and the Spoig.</p>
Communication of changes to navigation	<p>The changes to navigation in Millport Bay will need to be communicated widely in advance of the works, via local media and the relevant stakeholders.</p>

Table 13-11 Embedded mitigation through Best Practice and Policy

Parameter	Mitigation measures through Best Practice and Policy
Method statements for offshore works and materials deliveries	<p>Method statements to be agreed between North Ayrshire Council and the construction contractor which include requirements of the contractor and of other marine users relating to navigation.</p> <p>Proposed activities will be limited to the agreed transit routes for materials deliveries, proposed dredge area and the rock placement area.</p> <p>A notice to Mariners will be issued no less than 5 working days prior to the commencement of the works and at regular intervals during the works.</p>
Best practice for construction	<p>General best practice methods will be followed for dredging, offshore construction works and deliveries by sea, including:</p> <p>All navigation activities will be undertaken by qualified mariners in a competent manner (e.g. with due care and attention, not under the influence of alcohol or drugs, etc.).</p> <p>All navigation activities will be undertaken using suitable and appropriately maintained vessels and equipment;</p> <p>All other navigation activities will be undertaken in accordance with applicable navigation regulations, guidance, Notice to Mariners (NtMs), use of Traffic Separation Schemes where appropriate (TSS), etc.;</p> <p>Care will be taken to ensure there are no foreign objects lost overboard and left on the sea floor. Any lost materials will be reported to the MMO immediately.</p>

13.7 Impact Assessment

85. Following the methodology presented in Section 13.4 above, the impacts associated with the commercial and recreational navigation receptors have been assessed and are presented in this section. Where measures over and above the embedded mitigation described in Section 13.6.2 are required to avoid, reduce, remedy/compensate or enhance the adverse impacts of the proposed scheme, this information has been provided. Impacts to commercial fisheries receptors are considered in **Chapter 12 Commercial Fisheries**. Impacts to tourism and recreation receptors are considered in **Chapter 23 Tourism and Recreation**.

13.7.1 Potential Impacts during Construction

86. During the construction phase of the scheme, there is the potential for the construction of the offshore breakwaters and foreshore works, and the movements of construction vessels, to impact on commercial and recreational navigation, and associated moorings, in Millport Bay. Impacts have also been identified for the operational phase of the scheme, which are different to those during construction, so those impacts are considered separately in Section 13.7.2 below.

87. Five potential impacts on commercial and recreational navigation receptors resulting from the construction stage have been identified. These are:

- Construction vessel movements;
- Accidental release of pollutants;
- Disturbance to local navigation;
- Restricted use of Millport Pier and Harbour; and
- Disturbance to local vessel moorings.

13.7.1.1 Construction Impact 1: Construction vessel movements

88. The movement of construction vessels to Millport and within Millport Bay will increase the risk of vessel to vessel collisions. It is estimated that between 200 and 300 vessel movements (100-200 round trips) from Glensdana Quarry to Millport will be required for the delivery of rock armour, assuming using a 10,000m³ barge. It is estimated that there will be between 30 and 50 vessel movements between Troon and Millport to deliver other construction materials.
89. Baseline data for the area indicates that there is a generally high level of vessel movements throughout the Firth of Clyde. The projected construction vessel movements are therefore expected to represent only a small proportional increase in vessel numbers in the wider area over the relatively short duration rock armour construction works (estimated to be 4 to 6 months), and the longer duration of deliveries of other materials (between 12 and 15 months).
90. Nearer inshore, baseline data indicates a moderate level of vessel movements in Millport Bay. As well as the vessels delivering materials (as above), there would also be occasional movements of the jack-up barge that is required for construction of the offshore breakwaters, estimated at between 10 and 20 movements over approximately 4 months. If dredging is required to clear the sea bed of sediment, then there will be a dredging vessel operating in Millport Bay for up to a 2 week period.
91. Therefore, the impact value of vessel movements within Millport Bay will vary depending on the actual number of commercial and recreational vessels using the area, and will vary between a low to medium magnitude impact. Overall, the duration of this activity will be short term, which reduces the overall magnitude of impact to **low** (for near inshore and offshore).
92. The sensitivity of the receptors within the transit route will vary due to a number of factors, such as the ability to manoeuvre and/or adapt in relation to the movements of construction vessels. The vessels that would be used for materials deliveries are slow moving and large and as such the risk of collision is much lower than smaller, fast vessels. Overall, it is likely that the receptors will be able to tolerate and adapt to increased vessel movements, therefore vessel sensitivity is considered to be **low**.
93. The value of the receptors will vary depending on the particular vessel. Given the speed of the vessels but also the size it is considered that the receptor value is considered to be **medium**.
94. Mitigation measures include issuing notices to mariners in advance of the construction works.
95. Overall, there is the potential for the proposed construction vessel movements to present an increased risk of vessel to vessel collision. However, this will be limited to the estimated 12 to 15 month construction period. The combined potential impacts for magnitude, receptor sensitivity and value suggest a potentially **minor adverse impact**.

13.7.1.2 Construction Impact 2: Accidental release of pollutants

96. There is a potential risk associated with accidental pollution from construction vessels such as oil, waste or sewage. However, assuming all navigation activities will be undertaken in accordance with applicable navigation regulations and guidance, there should be a **low** magnitude of impact, as this potential impact is unlikely to occur.
97. If the impact were to occur, the sensitivity of the receptors would be **medium** as there are species that could be affected by the oil. However, any spilt oil would be expected to be limited through adequate contingency planning and strict adherence to safety measures. Dredging activity is not

possible during bad weather which further restricts the likelihood for impact. Within the surrounding area any oil spill is likely to wash up on the nearby sandy beaches and rocky foreshore which have moderate sensitivity to oil.

98. Overall, the potential impact would **minor adverse impact**, because it is unlikely that such an event would occur and the factors considered above.

13.7.1.3 Construction Impact 3: Disturbance to local navigation

99. The construction of the offshore breakwaters and the foreshore works have the potential to impact on local navigation, by all types of vessels. The existing navigation channel between the Spoig and the Eileans will be closed when construction of the offshore breakwaters begins, requiring vessels to take a different route to Millport Pier and Harbour (when accessible). Navigation aids marking the new navigation route, as described in **Chapter 5 Project Description** and shown in Figure 13-3, will need to be installed before the existing navigation channel is closed, i.e. before construction of the offshore breakwaters. The width of the western channel (between the Leug and the shore) will also be restricted due to the working area required for the offshore and foreshore works.
100. Whilst a working area 20m wide should be allowed seaward of the foreshore works, this area will not significantly impact on the navigable channel, as it is unlikely to extend seaward of the -2mCD depth contour. A working area of 50m to the west of the Leug will extend into the deeper part of the channel (approximately -4mCD), reducing the navigable channel width to about 150m.
101. Construction of the offshore breakwater between the Leug and the Spoig will have a short duration (estimated as 2 to 3 months). The foreshore works are estimated to have a duration of about 4 months. The channel restrictions due to the offshore works are unlikely to be in place at the same time as those for the foreshore works.
102. The impact value of disturbance to local navigation will depend on the actual number of commercial and recreational vessels using the area during the construction works, and will vary between a **low to medium** magnitude impact.
103. The sensitivity of the receptors depends on the ability of the vessels to navigate via the western channel. The width of this channel, even with restrictions in place during construction works, is comparable to the width of the existing channel. The western navigation route is less direct than the existing route, requiring vessels to turn towards the east to pass the Leug. Vessel sensitivity is assessed as **medium**.
104. The value of the receptors is assessed as **low** as this impact mainly relates to local navigation by small recreational vessels.
105. Overall, there is the potential for the construction of the offshore and foreshore structures to result in an increased risk of disturbance to local navigation. However, this will be limited to the 2 to 3 month construction period for the offshore breakwater between the Leug and the Spoig. Appropriate navigation aids will also be put in place, as well as communication with mariners prior to commencement of the works. Considering these mitigation measures the combined potential impacts for magnitude, receptor sensitivity and value suggest a potentially **minor adverse impact**.

13.7.1.4 Construction Impact 4: Restricted use of Millport Pier and Harbour

106. The construction of the offshore breakwaters has the potential to impact on the use of Millport Pier and the Harbour.

107. Vessel access to Millport Pier will be significantly restricted during the construction works. In the worst-case scenario, access by non-construction vessels will not be possible for the 12 to 15 month duration of the works. Access to Millport Harbour could be maintained if the contractor does not use it for materials deliveries.
108. The existing constraints on use of Millport Pier and Harbour should be noted. The condition of the timber part of Millport Pier means that this cannot currently be used. Millport Harbour is heavily silted, and the bed levels mean that vessel access is limited to high spring tides. Improvements to the condition of Millport Pier could be undertaken by the contractor to enable materials deliveries at the Pier. Taking into account the limited use of Millport Pier and Harbour at present, the overall magnitude of impact is assessed to be **low**.
109. The sensitivity of the vessels which berth at Millport Pier to this impact is assessed to be **high**. The sensitivity of other vessels is considered to be **low**, because other vessels have adapted to the changing availability of the Pier and Harbour facilities in recent years.
110. The value of the receptors is assessed as **low** as this impact relates to local recreational navigation users.
111. Alternative mooring provision could be made available for the vessels that currently berth at Millport Pier to mitigate the impact of restricted access. This could either be within the local moorings area inshore of the Eileans (Cumbrae Marine Slip licence area), or possibly at Keppel Pier.
112. Overall, there is the potential for the construction of the offshore breakwaters to increase the restrictions on use of Millport Pier and Harbour. This will be limited to the 12 to 15 month construction period for the offshore breakwaters. The combined potential impacts for magnitude, receptor sensitivity and value suggest a **minor to moderate adverse impact**, mainly due to the current restrictions on use of these facilities.

13.7.1.5 Construction Impact 5: Disturbance to local vessel moorings

113. The construction of the offshore breakwaters has the potential to impact on local vessel moorings. The local visitor moorings and the small vessel anchorage located inshore of the Leug and the Spoig will not be accessible during the construction works. Information would be provided about the closure of these moorings via the relevant stakeholders in advance of the construction works.
114. Construction of the offshore breakwaters is estimated to have a duration of 4 to 5 months, undertaken in the spring and early summer. Assuming that the new locations of the visitor moorings and small vessel anchorage are agreed in advance of the construction works, these could be available again from mid-summer after completion of the breakwaters.
115. The vessel berths at Millport Pier could be unavailable for the 12 to 15 month duration of the main phase of the construction works. These berths are generally occupied throughout the year. The vessels could potentially moor at the local vessel moorings inshore of the Eileans for the duration of the construction works.
116. The impact value of disturbance to local moorings depends on the actual number of vessels that would otherwise use the moorings during the period of the area during the construction works. Due to the moderate level of occupancy, and the medium-term duration of the construction works, overall magnitude of impact is assessed to be **medium**.

117. The sensitivity of the receptors depends on the individual vessel. The sensitivity of the vessels which berth at Millport Pier is assessed to be **high**, assuming that they may not be able to find suitable alternative moorings for the full duration of the construction works. The sensitivity of other vessels is considered to be **low**, because these are generally recreational vessels that could berth elsewhere, assuming they have received the prior information regarding the closure of the moorings.
118. Alternative mooring provision could be made available for the vessels that currently berth at Millport Pier to mitigate the impact of restricted access. This could either be within the local moorings area inshore of the Eileans (Cumbrae Marine Slip licence area), or possibly at Keppel Pier.
119. The value of the receptors is assessed as **low** as this impact relates to local recreational navigation users.
120. Alternative mooring provision could be made available for the vessels that currently berth at Millport Pier to mitigate the impact of restricted access. This could either be within the local moorings area inshore of the Eileans (Cumbrae Marine Slip licence area), or possibly at Keppel Pier. Overall, there is the potential for the construction of the offshore breakwaters to result in an increased risk of disturbance to local moorings facilities. This will be limited to the 12 to 15 month construction period for the offshore breakwaters. The combined potential impacts for magnitude, receptor sensitivity and value, considering the proposed mitigation measures, suggest a **minor to moderate adverse impact**.

13.7.2 Potential Impacts during Operation

121. There is potential for adverse impacts on commercial and recreational navigation at Millport during the operation of the scheme, due to the presence of rock armour breakwaters in the coastal waters. Five potential impacts on commercial and recreational navigation receptors resulting from the operation stage have been identified:
- Change to existing navigation practices;
 - Change to local mooring facilities;
 - Increased shelter within Millport Bay, increasing the level of interest from navigation users;
 - Improved shelter for small fishing vessels, recreational boating and tourist vessels; and
 - Enhanced conditions for sailing and watersports.

13.7.2.1 Operation Impact 1: Change to existing navigation practices

122. The operational phase of the proposed scheme will impact on local navigation for all types of vessels. The existing navigation channel between the Spoig and the Eileans will be closed by the offshore breakwaters, requiring vessels to take a different route to Millport Pier and Harbour. Navigation aids marking the new navigation route will be installed, and communication of the changes will be undertaken via the relevant stakeholders.
123. With mitigation measures of appropriate navigation aids and communication of the navigation changes, the magnitude of the ongoing impact is reduced to **medium**. The magnitude of the impact will continue to reduce with time as vessel operators become familiar with the navigation changes.
124. The sensitivity of the receptors depends on the ability of the vessels to navigate via the western channel. The width of this channel is greater than the width of the existing channel. The western navigation route restricts access to Millport Pier and Harbour compared to the existing route, requiring vessels to turn towards the east to pass the Leug. With appropriate navigation aids in place, and communication with mariners via the relevant stakeholders about the proposed changes, vessel sensitivity is considered to be **low to medium**.

125. The value of the receptors is assessed to be **medium** as this impact could affect vessels operating regionally. The P.S. Waverley is assessed as having a high value, but the changes to navigation do not alter the current navigation practices for the Waverley, due to the current condition of Millport Pier.
126. Overall, there is the potential for the construction of the offshore breakwaters to result in an ongoing impact as a result of the changes to local navigation. The combined potential impacts for magnitude, receptor sensitivity and value suggest a potentially **minor to moderate adverse impact**.

13.7.2.2 Operation Impact 2: Change to local mooring facilities

127. The operational phase of the proposed scheme has the potential to impact on local vessel moorings. The local visitor moorings and the small vessel anchorage currently located inshore of the Leug and the Spoig will need to be moved. The new locations will be agreed with the appropriate stakeholders in advance of construction of the scheme. Information would be provided about the new locations of the moorings, via local media and the relevant stakeholders.
128. Assuming that the visitor moorings will be moved as part of the construction works, and the new location of the small vessel anchorage agreed in advance of the works, the overall magnitude of impact is assessed to be **negligible**. The sensitivity and value of the receptors are assessed to be **low**, for these local recreational vessels. The combined potential impacts for magnitude, receptor sensitivity and value suggest a potentially **negligible impact**.

13.7.2.3 Operation Impact 3: Increased shelter in Millport Bay, increasing interest from navigation users

129. An increase in the number of moorings at Millport, and improved shelter in Millport Bay is likely to increase the level of interest from navigation users and consequently increase vessel traffic in the Firth of Clyde towards Millport. This could have consequential impacts for other traffic in the Firth of Clyde.
130. The potential for increased interest from navigation users should be taken into account when relocating the visitor moorings, providing additional moorings if possible.
131. Assuming appropriate mooring provision, and information provided about the changes to navigation in Millport Bay, the overall magnitude of this impact is assessed to be **negligible**. The sensitivity and value of the receptors are assessed to be **low**, for these local recreational vessels. The combined potential impacts for magnitude, receptor sensitivity and value suggest a potentially **negligible impact**.

13.7.2.4 Operation Impact 4: Improved shelter in Millport Bay for all vessels

132. The aim of the proposed scheme, and in particular the offshore breakwaters, is to reduce wave activity in Millport Bay. Millport Bay, inshore of the breakwaters, will be significantly more sheltered during storm events than at present.
133. The sheltered area inshore of the breakwaters could provide a safe temporary mooring for all vessels during a storm. This could include Calmac ferries, which currently need to travel further north in the Firth of Clyde to shelter during storms from the south.
134. The improved shelter will also benefit local vessels that are anchored in Millport Bay on a more permanent basis.

135. The magnitude of this impact is assessed to be **medium**. The benefit is significant in terms of the improvement in conditions and associated vessel safety, but infrequent in terms of the number of storm events for which conditions are improved. The sensitivity and value of the receptors is also assessed as **medium**, due to the benefit to both local vessels and potentially providing shelter to larger vessels operating regionally, including Calmac ferries.
136. The combined potential impacts for magnitude, receptor sensitivity and value suggest a potentially **moderate beneficial** impact. No mitigation measures are necessary for this beneficial impact.

13.7.2.5 Operation Impact 5: Enhanced conditions for sailing and watersports

137. The aim of the proposed scheme, and in particular the offshore breakwaters, is to reduce the wave activity in the nearshore zone at Millport, and consequently reduce flood risk to the seafront area.
138. The proposed scheme will significantly reduce wave action in Millport Bay and will therefore result in reduced disruption to recreational sailors and other watersports users during the operational phase, in comparison with disruption that can currently occur during storm events.
139. Reduced wave activity will also result in an enhanced (safer) environment for recreational sailors, sea kayakers, swimmers and canoeists who utilise the coastal waters at Millport.
140. Based on these benefits above, the proposed scheme is considered to have a long term impact of **major beneficial** significance for recreational sailing and watersports in Millport. No mitigation is necessary for this beneficial impact.

13.7.3 Potential Impacts during Decommissioning

141. No decision has been made regarding the final decommissioning policy for the offshore infrastructure of the proposed scheme as it is recognised that industry best practice, rules and legislation change over time.
142. As a flood protection scheme, it is most likely that the structures would continue to be maintained, and potentially enhanced in the future (e.g. to address climate change impacts) rather than being decommissioned.
143. If decommissioning of the proposed scheme is required, then this might consist of removal of the rock armour breakwaters. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. As discussed in **Chapter 5 Project Description**, a decommissioning plan will be submitted for approval by the regulatory authorities prior to construction. As such, for the purposes of a worst-case scenario, impacts no greater than those identified for the construction phase are expected for the decommissioning phase.

13.8 Cumulative Impact Assessment

144. This section describes the CIA for Commercial and Recreational Navigation, taking into consideration other plans, projects and activities. This has been undertaken as a two-stage process, with the first stage comprising assessment of all the impacts from the previous sections for the potential to act cumulatively with other projects or schemes. This summary assessment is set out in Table 13-12 below.

Table 13-12 Potential Cumulative Impacts

Impact	Potential for Cumulative Impact	Data confidence	Rationale
Construction			
Impact 1: Vessel movements	There may be cumulative impacts on navigation if there are any other works ongoing close to Millport that also require construction vessel movements.	Low - limited information is available about other potential construction projects close to Millport. Full details of construction vessel movements for the Millport FPS are not yet confirmed.	If more than one construction project is ongoing locally that requires construction vessels, the potential for interactions between those vessels could increase real and perceived impacts on commercial and recreational navigation.
Operation - No impacts expected.			
Decommissioning - Impacts no greater than those identified for the construction phase.			

145. Table 13-13 summarises the projects which have been scoped into the CIA due to their possible temporal or spatial overlap with the potential effects arising from the proposed scheme. The assessment set out in Table 13-13 demonstrates that there is **minor** potential for cumulative impacts arising between the proposed offshore elements of the proposed scheme and other proposed developments in the study area for navigation.

Table 13-13 Summary of projects considered for the CIA in relation to Commercial and Recreational Navigation

Project	Status	Distance from proposed scheme	Project data status	Included in CIA?	Rationale
Works to Hunterston Terminal	Possible works to former coal terminal which is visible from Millport on the mainland.	3 km	General information about proposed Hunterston masterplan. Timing of any works is unknown.	Yes	If any works to the Hunterston terminal are ongoing at the same time as construction of the Millport FPS, then there is potential for interaction between the movements of construction vessels.

13.9 Inter-relationships

146. Table 13-14 lists the inter-relationships between other chapters within the ES.

Table 13-14 Inter-topic relationships

Topic	Related Chapter	Where addressed in this chapter	Rationale
Commercial fisheries	12	All impacts addressed in this chapter relate to any commercial fishing vessels operating in Millport Bay, as well as impacts to recreational vessels.	Commercial fisheries in the area are likely to use the navigation routes to Millport, and the mooring facilities. Chapter 12 refers readers to this chapter for the assessment of navigation impacts on commercial fisheries.

Topic	Related Chapter	Where addressed in this chapter	Rationale
Infrastructure and Utilities	14	Navigation and moorings impacts are fully addressed by this chapter rather than in Chapter 14..	Navigation provision and moorings facilities may be considered to be 'Infrastructure'. The importance of the assessment of navigation impacts resulted in the decision to prepare a standalone chapter for this issue. Chapter 14 refers readers to this chapter.
Tourism and Recreation	23	Impacts on tourism and recreational users that relate to navigation are fully addressed by this chapter rather than in Chapter 23.	Visitors to Millport may arrive by boat. Recreational boating is an aspect of Millport's tourism offer. The importance of the assessment of navigation impacts resulted in the decision to prepare a standalone chapter for this issue, rather than covering the impacts within Chapter 14 Infrastructure and Utilities and Chapter 23 Tourism and Recreation. Chapter 23 refers readers to this chapter for the assessment of navigation impacts on tourists and recreational users.

13.10 Interactions

147. The impacts identified and assessed in this chapter have the potential to interact with each other, which could give rise to synergistic impacts as a result of that interaction. The worst case impacts assessed within this chapter take these interactions into account and for the impact assessments are considered conservative and robust. For clarity, the areas of interaction between impacts are presented in Table 13-15 along with an indication as to whether the interaction may give rise to synergistic impacts.

Table 13-15 Potential for interactions between impacts to commercial and recreational navigation

Potential interaction between impacts					
Construction	1. Construction vessel movements	2. Accidental release of pollutants	3. Disturbance to local navigation practices	4. Restricted use of Millport Pier and harbour	5. Disturbance to local vessel moorings
1. Construction vessel movements		Yes	Yes	Yes	Yes
2. Accidental release of pollutants	-		-	-	-
3. Disturbance to local navigation practices	-	-		-	Yes
4. Restricted use of Millport Pier and harbour	Yes	-	Yes		Yes
5. Disturbance to local vessel moorings	-	-	Yes	Yes	

Potential interaction between impacts					
Operation	1, Change to existing navigation practices	2. Change to local moorings facilities	3. Increased shelter in Millport Bay, increasing interest	4. Improved shelter for vessels in Millport Bay	5. Enhanced conditions for sailing/ watersports
1. Change to existing navigation practices		Yes	Yes	Yes	Yes
2. Change to local moorings facilities	-		Yes	Yes	Yes
3. Increased shelter in Millport Bay, increasing interest	-	Yes		Yes	Yes
4. Improved shelter for vessels in Millport Bay	Yes	Yes	Yes		Yes
5. Enhanced conditions for sailing/ watersports	-	Yes	Yes	-	

13.11 Summary

148. The main potential impacts of the proposed scheme on tourism and recreation receptors have been identified. A summary of the potential impacts and proposed mitigation is presented in Table 13-16.

Table 13-16 Potential Impacts Identified for Commercial and Recreational Navigation

Potential Impact	Receptor	Value	Magnitude	Significance	Examples of Potential Mitigation Measures	Residual Impact
Construction						
Impact 1: Construction vessel movements	Owners and operators of commercial vessels, fishing vessels and recreational vessels	Medium	Low	Minor adverse	Short duration of offshore construction works. Notice to mariners.	Minor adverse
Impact 2: Accidental release of pollutants	Human health, ornithological receptors and ecological receptors	Medium	Low	Minor adverse	Best practice construction methods, appropriate safety practices and contingency plans.	Minor adverse
Impact 3: Disturbance to local navigation practices	Owners and operators of commercial vessels, fishing vessels and recreational vessels	Low to Medium	Low to Medium	Minor adverse	Limited duration of offshore construction works, navigation aids, consultation with mariners	Minor adverse

Potential Impact	Receptor	Value	Magnitude	Significance	Examples of Potential Mitigation Measures	Residual Impact
Impact 4: Restricted use of Millport Pier and harbour	Owners and operators of commercial vessels, fishing vessels and recreational vessels	Low	Low to High	Minor to moderate adverse	Alternative provisions for vessels that usually berth at the Pier.	Minor to moderate adverse
Impact 5: Disturbance to local vessel moorings	Owners and operators of commercial vessels, fishing vessels and recreational vessels	Low	Low to High	Minor to major adverse	Short duration of offshore construction works. Alternative provisions for vessels that usually berth at the Pier.	Minor to moderate adverse
Operation						
Impact 1: Change to existing navigation practices	Owners and operators of commercial vessels, fishing vessels and recreational vessels	Medium	Medium	Moderate adverse	Appropriate navigation aids, communication of changes, consultation with mariners	Minor to moderate adverse
Impact 2: Change to local moorings facilities	Owners and operators of commercial vessels, fishing vessels and recreational vessels	Low	Negligible	Negligible	Alternative location of moorings agreed through consultation. Moorings reinstated after construction, additional moorings provided if possible, communication of changes.	Negligible
Impact 3: Increased shelter in Millport Bay, increasing interest	Owners and operators of commercial vessels, fishing vessels and recreational vessels	Low	Negligible	Negligible	Additional moorings provided if possible. Communication about changes to navigation.	Negligible
Impact 4: Improved shelter for vessels in Millport Bay	Owners and operators of commercial vessels, fishing vessels and recreational vessels	Medium	Medium	Moderate beneficial	Beneficial impact	Moderate beneficial

Potential Impact	Receptor	Value	Magnitude	Significance	Examples of Potential Mitigation Measures	Residual Impact
Impact 5: Enhanced conditions for sailing/ watersports	Watersports users	Medium	High	Major beneficial	Beneficial impact	Major beneficial
Decommissioning						
As a flood prevention scheme, the Proposed Scheme is anticipated to be maintained rather than removed, and therefore decommissioning activities are currently unknown. This will be assessed at the time of any decommissioning activities required.						

13.12 References

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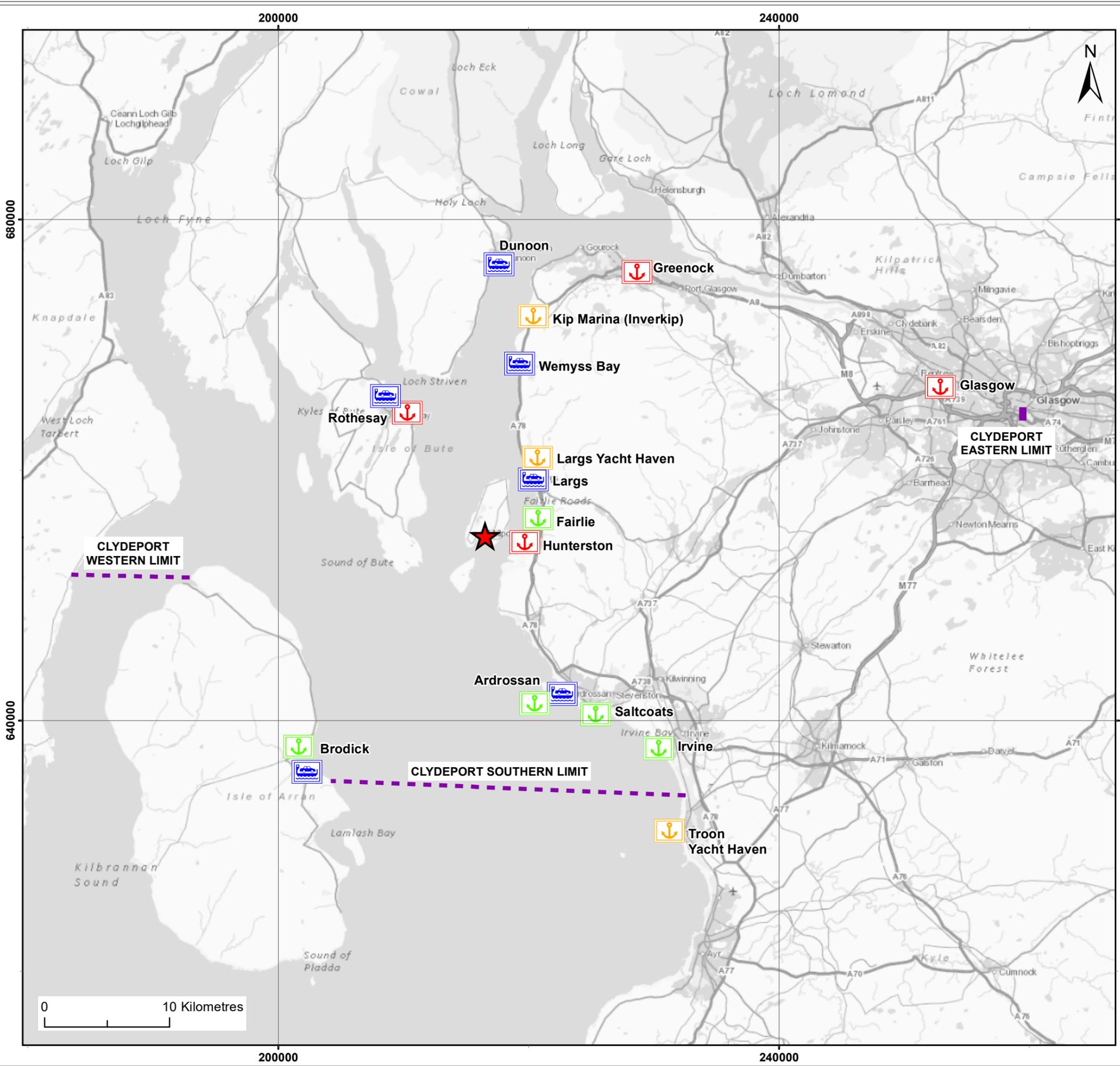
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Legend

- Site Location
- Port
- Ferry Terminal
- Harbour
- Marina

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Client:	Project:
North Ayrshire Council	Millport Flood Protection Scheme - EIA Report

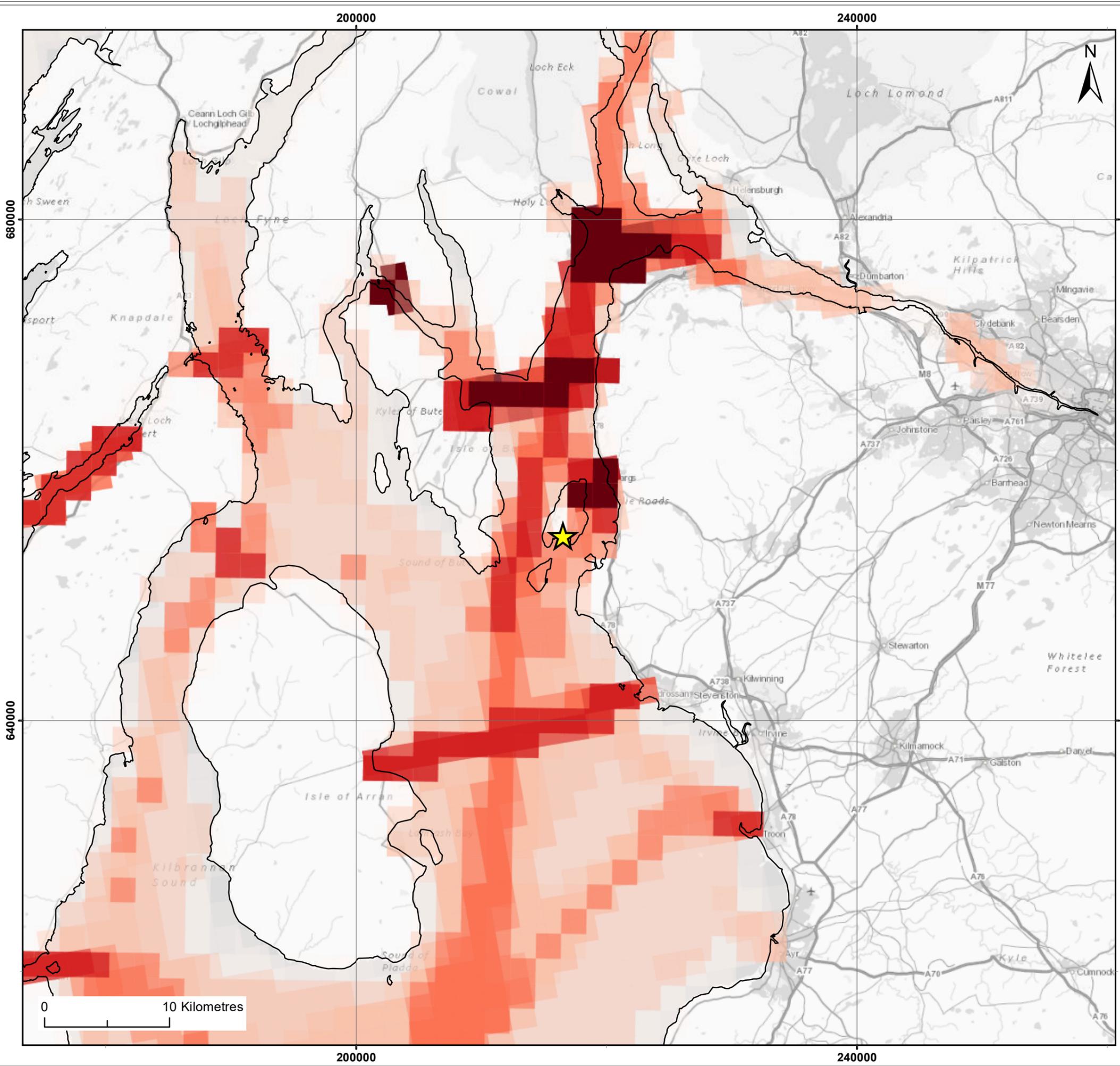
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Co-ordinate system: British National Grid



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Legend

- ★ Site Location

Average weekly density of vessels

- 5 transits or less
- 5 - 20 transits
- 20 - 50 transits
- 50 - 150 transits
- 150 transits or greater

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Client:	Project:
North Ayrshire Council	Millport Flood Protection Scheme - EIA Report

Title: **Marine Traffic**

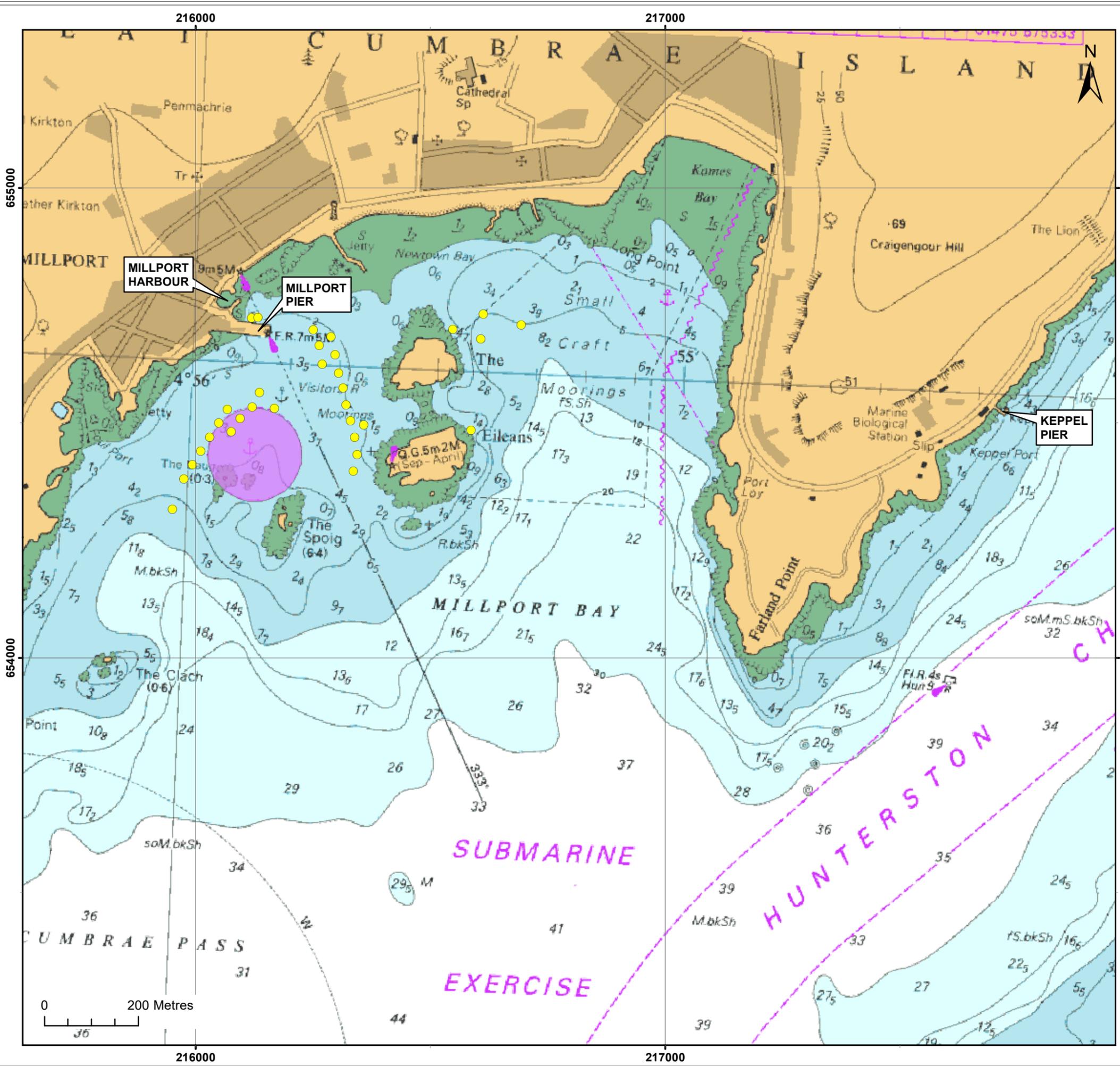
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- Legend**
- Small vessel anchorages (Clyde Anchorages)
 - Visitor Moorings

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Client: North Ayrshire Council	Project: Millport Flood Protection Scheme - EIA Report
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Title:
Existing navigation and moorings in Millport Bay

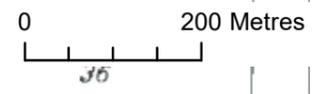
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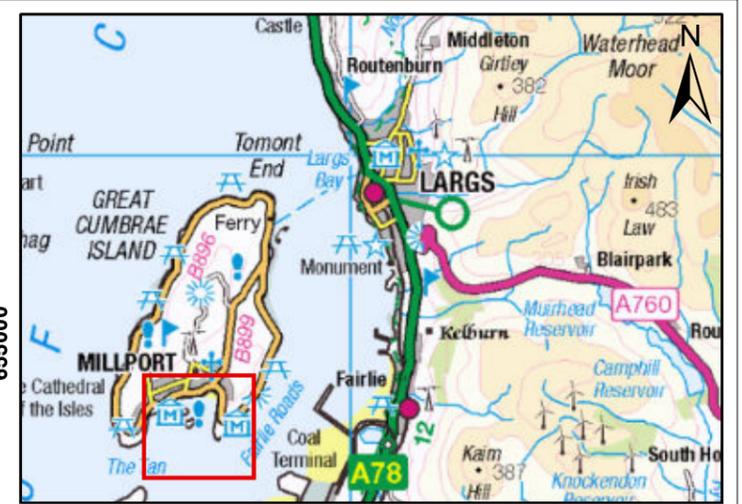
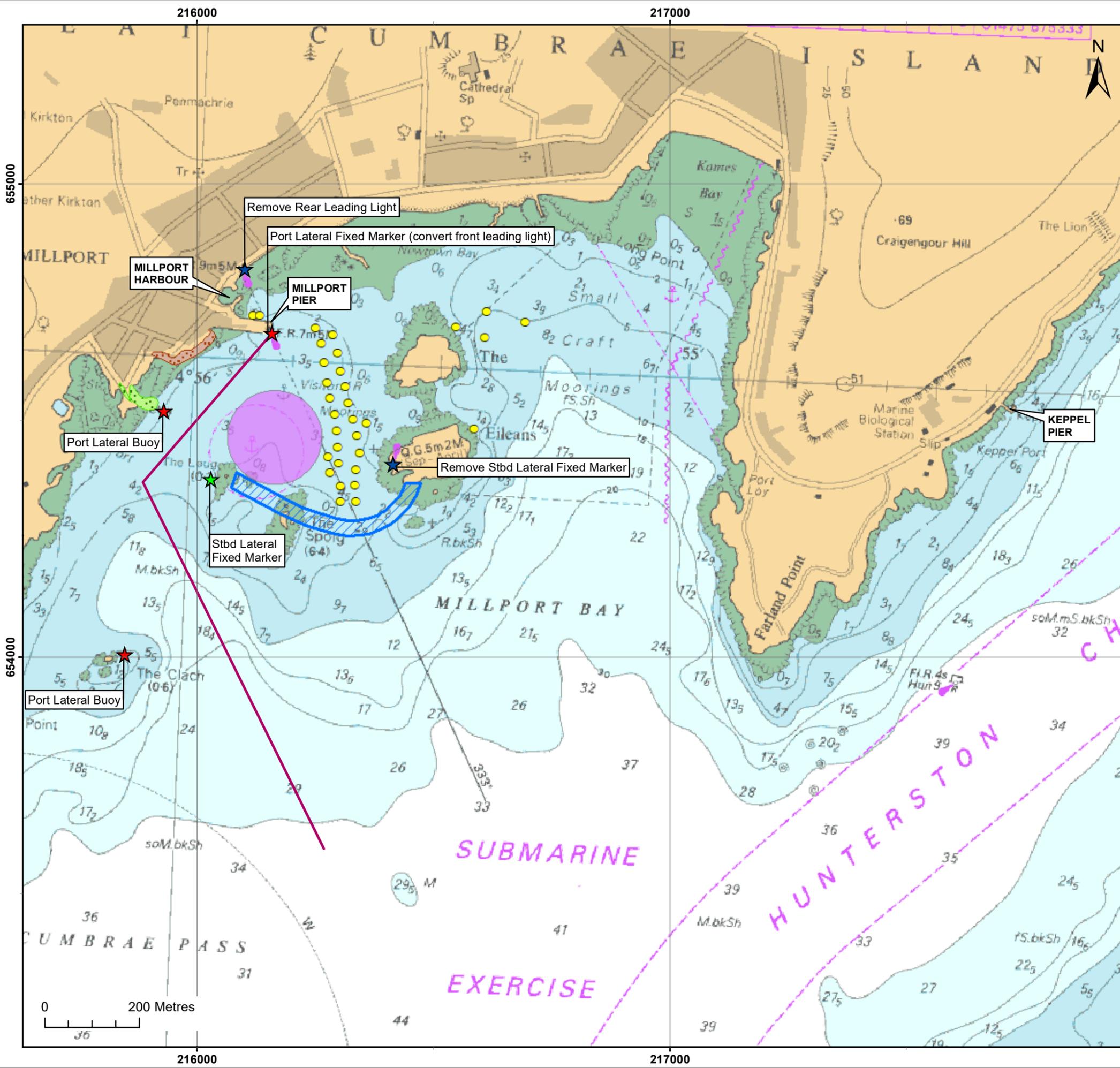
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- Legend**
- Offshore Breakwater
 - Nearshore Rock Breakwater
 - Nearshore Rock Revetment
 - Proposed Relocated Small vessel anchorages
 - Proposed Relocated Visitor Moorings
 - Proposed Navigation Route

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Client:	Project:
North Ayrshire Council	Millport Flood Protection Scheme - EIA Report

Title:
 Proposed changes to navigation and moorings with scheme

Figure: 13.4 Drawing No:

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REPORT

Millport Coastal Flood Protection Scheme: Environmental Statement

Appendix 13.1 Vessel Navigation Desktop Assessment

Client: North Ayrshire Council

Reference: PB4749-RHD-ZZ-XX-RP-Z-00013.1

Status: Final/F01

Date: 20 January 2020

Note / Memo

To: Project Team
From: Cliff Ohl
Date: 20 January 2020
Copy: Amy Savage, Jacco Valstar
Our reference: WATPB4749N00XF1.0
Classification: Project related

Subject: Millport - Vessel Navigation Desktop Assessment

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1 Introduction

1.1 Background

Developed by Royal HaskoningDHV (RHDHV) on behalf of North Ayrshire Council, the proposed Millport Coastal Flood Protection Scheme (FPS) includes the following offshore breakwaters:

- Approx. 120m long rock armour breakwater connecting The Leug and The Spoig
- Approx. 210m long rock armour breakwater connecting The Spoig and the southern Eilean

Refer to the figure below for overview of the proposed scheme, with breakwaters indicated by blue hatching. RHDHV note / memo reference WATPB4749N001D0.1 provides further background information the including environmental assessment and stakeholder consultation.

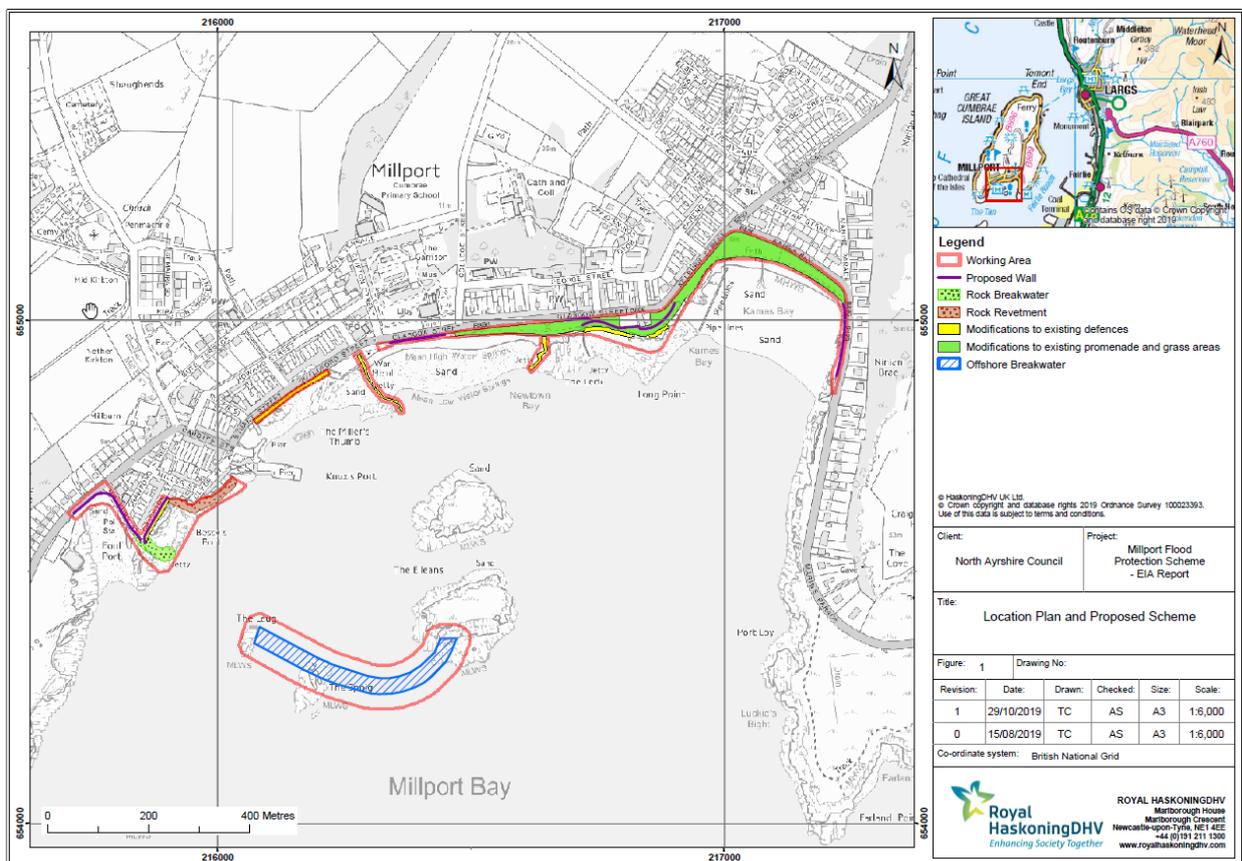


Plate 1 Location Plan and Proposed Scheme

The FPS includes works that have implications for:

- Vessel navigation to and from Millport Bay;
- Moorings within Millport Bay; and
- Millport Pier (including ability of the pier to provide mooring/berthing facilities for vessels).

Typically arriving at high tide, larger vessels visiting Millport approach from the southeast along the charted leading line (manoeuvre between The Spoig and The Eileans) and depart Millport Harbour via the western channel between the coastline and The Leug.

The offshore breakwaters proposed in the FPS will block the existing approach, requiring vessels to navigate to the inner harbour via the western channel between the Leug and the coastline.

1.2 Scope

In support of the FPS, this note describes work by RHDHV to:

- Assess the western navigation channel (lateral dimensions) to accommodate vessels navigating to and from Millport harbour and associated moorings;
- Consider the design vessels Hebridean Princess, P.S. Waverley and likely fishing and recreational vessels calling at Millport;
- Develop the outline / concept design for the aids to navigation including approximate locations of markers, examples / photos of similar markers and capital cost estimate (at feasibility level of accuracy).

The following issues are excluded from the scope: dredging, navigable depth, under keel clearance, tidal windows, health and safety issues.

2 Basis of Study

2.1 Design Vessels

Commercial and recreational vessel navigation at Millport is assumed to be the following:

Table 2-1 Design Vessels

Name	Hebridean Princess ¹	P.S. Waverley ²	Fishing / Recreational ³
Type	Cruise Vessel	Paddle Steamer	Maximum
Length, LOA (m)	72	73	8
Beam (m)	14	17.5	3.5
Draught (m)	3	1.9	1.5

Note:

- 1 The Hebridean Princess cannot berth alongside Millport Pier due to draught constraints but anchors in the deeper waters inland of The Eileans.
- 2 The P.S. Waverley is the world's last sea-going paddle steamer and frequently operates on the Clyde between June and September; however, the P.S. Waverley does not currently berth at Millport due to the poor condition of the timber pier at Millport.
- 3 Assumed based on 15 tonne vessel displacement restriction for moorings at Millport (refer to: <http://www.setsail-northayrshire.co.uk/sailing-north-ayrshire/mooring-payment/>).

2.2 Tug Assistance

For all manoeuvres considered herein, tug assistance is assumed to not be required / not provided.

2.3 Environmental Conditions

2.3.1 Winds and waves

For the purposes of this assessment, operational conditions and wave heights during vessel manoeuvres are assumed to be:

- Wind speeds no greater than Beaufort 7 (i.e. lower than 33kn or 61kph);
- Significant wave height less than 3m.

The above are conservative / limiting values adopted for assessment purposes only and are not intended to be representative of appropriate conditions for navigation.

2.3.2 Tidal currents

Figure 2-1 provides tidal stream information, with time in hours referred to High Water at Greenock, direction in degrees to True North and rate in knots (at spring and neap tide). Maximum spring tide rate at diamond "A" is 1.4 knots in direction 229 degrees (i.e. current in the southwest direction). This tidal current can be considered as a cross current for vessels approaching Millport from the south (i.e. vessels with a north or northwest heading).

Tidal Streams referred to HW at GREENOCK								
Hours	Geographical Position	A 55°44'60N 4 54'07W		B 55°43'00N 4 55'67W				
Before High Water	Directions of streams (degrees)	Rates at spring tides (knots)	Rates at neap tides (knots)	-6	052	0.8 0.5	233	0.1 0.1
				-5	048	1.1 0.7	343	0.2 0.1
				-4	044	1.0 0.6	027	0.2 0.1
				-3	052	0.8 0.6	027	0.4 0.2
				-2	053	0.8 0.5	023	0.4 0.3
				-1	050	0.6 0.4	017	0.4 0.2
High Water								
After High Water	Directions of streams (degrees)	Rates at spring tides (knots)	Rates at neap tides (knots)	0	035	0.1 0.1	009	0.3 0.2
				+1	231	0.6 0.4		0.0 0.0
				+2	237	1.3 0.8	193	0.3 0.2
				+3	229	1.4 0.9	198	0.3 0.2
				+4	229	1.3 0.8	196	0.5 0.3
				+5	230	0.8 0.5	196	0.7 0.4
+6	119	0.6 0.4	204	0.2 0.1				

Figure 2-1 Tidal streams in knots referred to HW at Greenock (UKHO 2019)

The location of diamond A is provided in Figure 2-2:

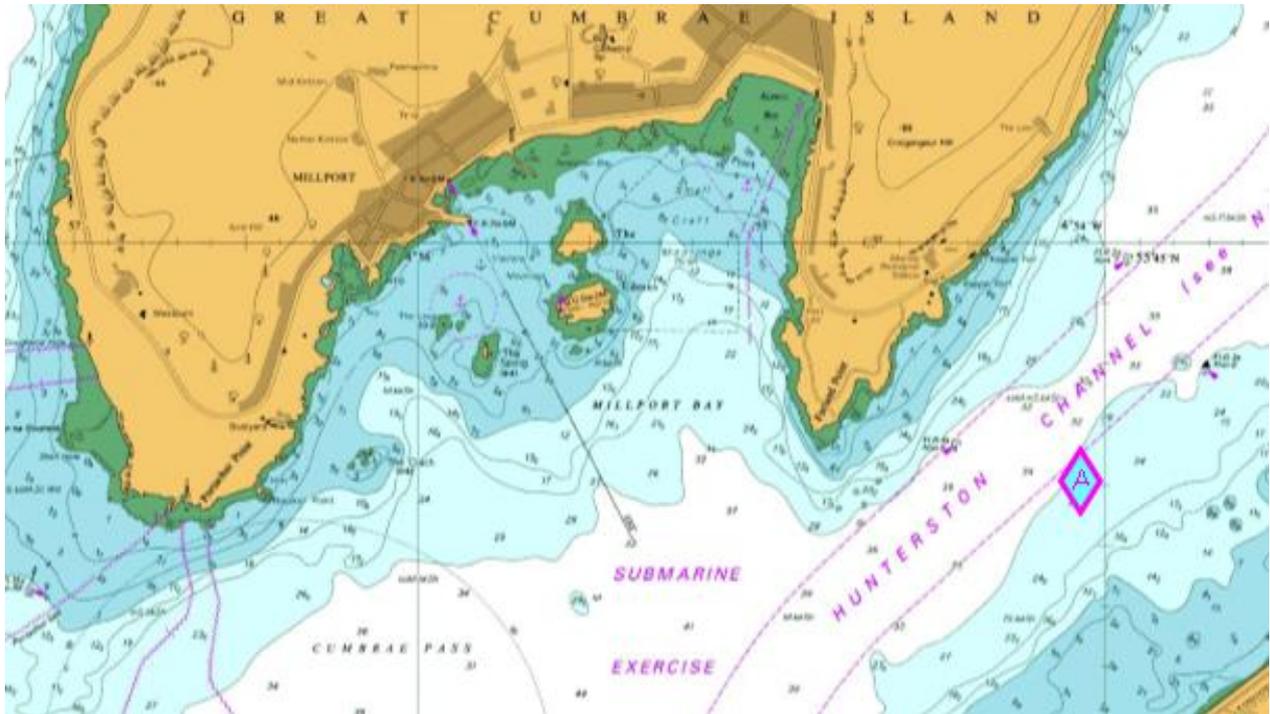


Figure 2-2 Tidal diamond location (UKHO 2019)

2.4 Aids to Navigation

Refer to Appendix A1 for the following comments received from the Northern Lighthouse Board:

The proposed scheme requires a complete change to how the harbour operates. There will be gains in that there will be a larger and better protected area for moorings. Ensuring that visiting mariners aren't put at risk would require some or all of the following measures:

- A publicity campaign, Notices to mariners etc.;
- A navigation light (port hand or East cardinal) on The Clach;
- A navigation light (starboard hand) on The Leug;
- Leading lights/directional light or hazard marker in the vicinity of the corner of Crichton Street/Millburn Street (close to the planned rock breakwater; and
- Discontinuation of the existing rear leading light and the light on The Eileans.

3 Assessment / Design

3.1 Methodology

Assessment herein is principally based on:

- Comparison of existing channel and manoeuvring area dimensions with the proposed new channel and manoeuvring area, i.e. the western channel between the coastline and The Leug.
- Consideration of the lateral dimensions of manoeuvring areas in relation to design vessel dimensions;

Outline / concept design for the aids to navigation is based principally on the recommendations of consultees and consideration of safety in design (e.g. safe access for installation, operation and maintenance).

Guidance has been taken from the following industry standards and relevant publications:

- PIANC (2014) for channel design dimensions;
- Thoresen (2003) and ROM (1999) for dimensions of berthing and vessel manoeuvring areas.

3.2 Channel and Manoeuvring Areas

The following table and figures provide relevant lateral dimensions of manoeuvring areas in the approach to Millport, with proposed new breakwaters indicated in orange hatching and an approximate design vessel outline in black (based on the Hebridean Princess).

Table 3-1 Approximate lateral dimensions of manoeuvring areas

Ref	Description	Dimension (approx.)	Note (reference LOA = 72m and Beam = 12m, as Hebridean Princess)
A B C	Channel width (The Clach - The Spoig) (The Leug – coastline) (The Leug – coastline)	> 150 m	<ul style="list-style-type: none"> • > 10 x Beam • Feasible for all design vessels
D	Turning area ~diameter (sheltered)	> 215 m	<ul style="list-style-type: none"> • > 3 x LOA • Feasible for Hebridean Princess (more manoeuvrable vessel with bow thruster and twin stern propellers) and for typical recreational and fishing vessels visiting Millport • Not suitable for less manoeuvrable vessels (e.g. P.S. Waverley)
E	Channel bend radius	> 290 m	<ul style="list-style-type: none"> • ~ 4 x LOA • Feasible for Hebridean Princess (more manoeuvrable vessel with bow thruster and twin stern propellers) and for typical recreational and fishing vessels visiting Millport • Not suitable for less manoeuvrable vessels (e.g. P.S. Waverley)
F	Stopping distance	> 360 m	<ul style="list-style-type: none"> • > 5 x LOA • Feasible for all design vessels

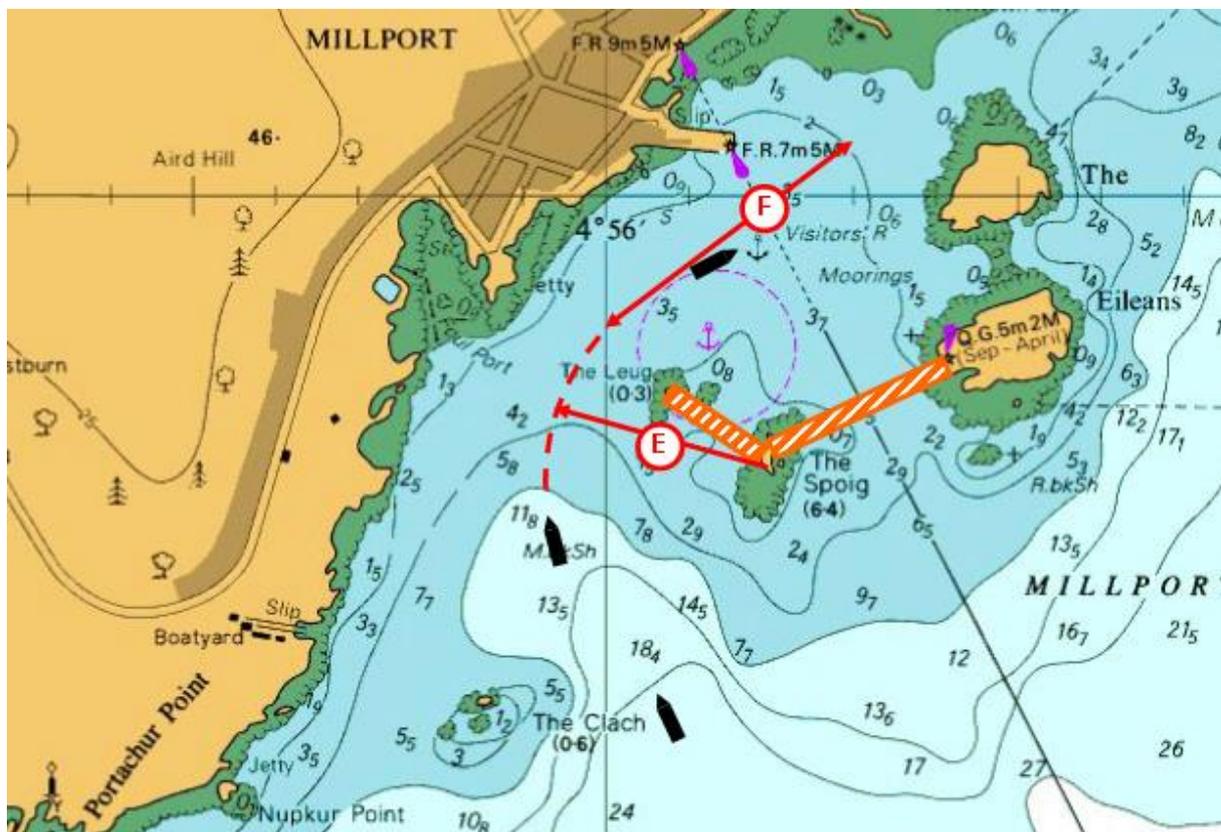
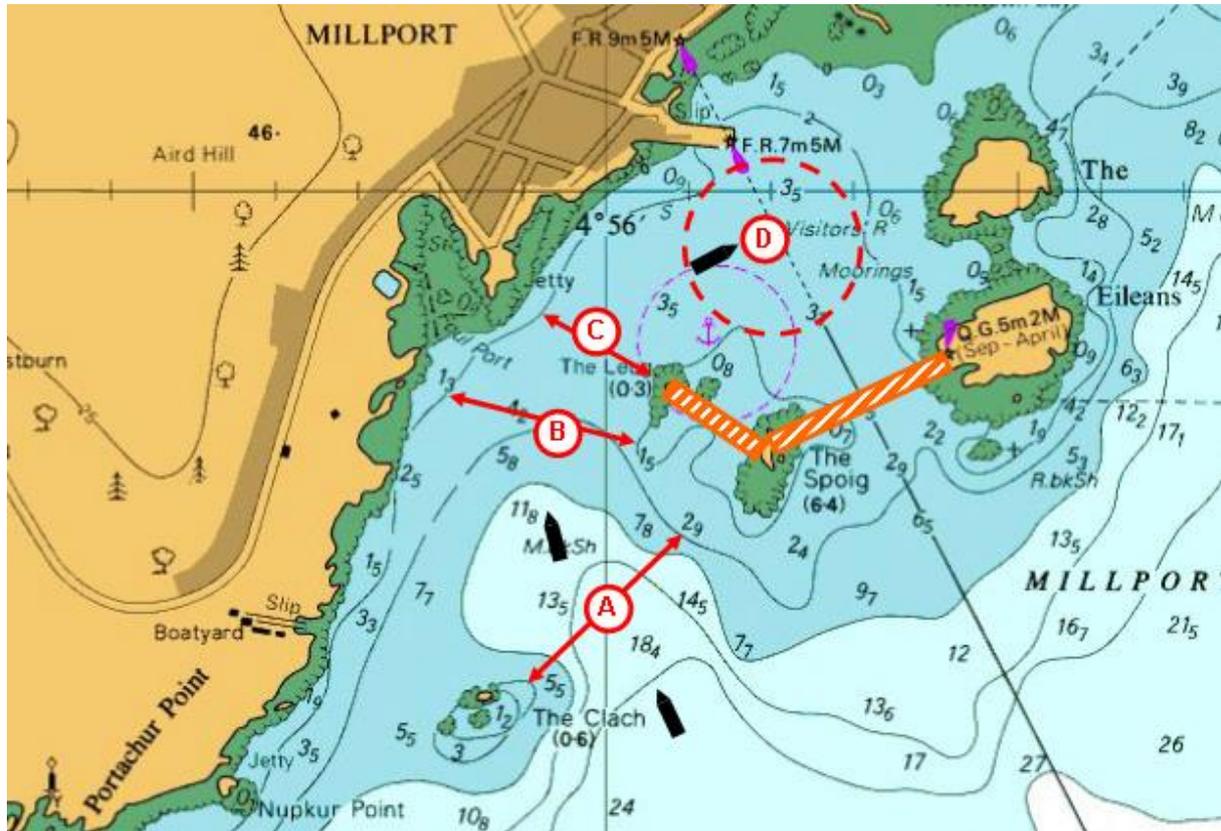
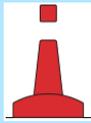
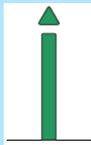
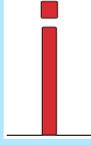


Figure 3-1 Relevant lateral dimensions of manoeuvring areas

3.3 Aids to Navigation

The following modifications to the existing aids to navigation are recommended for outline / concept design stage in accordance with IALA (2014):

Table 3-2 Proposed aids to navigation

Location	Action	Type	Schematic	Note	Cost Estimate*
The Clach	Install	Port hand lateral floating buoy (approx. 1m diameter)		Buoy to be positioned approximately over the 2m depth contour (-2mCD)	£30,000.00
The Leug	Install	Starboard hand lateral fixed marker		Marker on the Eileans could possibly be relocated, depending on condition, access, etc.	£50,000.00
SE of Crichton Street Breakwater	Install	Port hand lateral floating buoy (approx. 1m diameter)		Buoy to be positioned approximately over the 2m depth contour (-2mCD) Buoy provides safer access relative to fixed marker on rock)	£30,000.00
Millport pier	Convert	Existing front leading light converted to port hand lateral fixed marker			£10,000.00
Stuart Street	Remove	Rear leading light			£10,000.00
The Eileans	Remove	Starboard hand lateral fixed marker			£10,000.00

Note:

* Cost estimate in GBP (2020) includes capital costs only (i.e. not maintenance or operations) and level of accuracy is appropriate for feasibility study.

The above list does not include temporary aids to navigation which will be required during construction.

In addition to the above modifications, would be possible to move the existing leading line to the area of Crichton Street / Millburn Street to indicate the new approach. However, this possible change should be considered further in consultation with the appropriate stakeholders.

The figures below provide example photos of similar marks and approximate proposed locations, subject to more detailed design at a future stage.

4 Conclusions and Recommendations

4.1 Conclusions

Based on the above analysis the proposed new channel and manoeuvring areas are:

- Feasible for navigation of the Hebridean Princess (72m length) and, by inspection, for typical recreational and fishing vessels visiting Millport;
- Not likely to be feasible for the P.S. Waverley (principally due to the small channel bend radius between The Leug and the coastline in comparison to the relatively large turning circle of this vessel).

Although the overall dimensions of the P.S. Waverley (73m length) are similar to the Hebridean Princess, the Hebridean Princess is fitted with a bow thruster and twin stern propellers and is more manoeuvrable than the paddle steamer.

Refer to Section 3.3 for Aids to Navigation outline / concept design, including:

- Installation of 2No. new lateral buoys and 1No. new lateral fixed marker;
- Conversion of the existing front leading light to a lateral marker;
- Removal of existing rear leading light and 1No. fixed marker.

4.2 Recommendations

The following should be considered further for improved safety of navigation during and after implementation of the proposed FPS:

- Organising a publicity campaign to inform both mariner's and the public;
- Issuing notices to mariners, in consultation with the Harbour Master;
- Stakeholder review of the Aids to Navigation outline / concept design provided herein;
- Removal of the western visitor moorings and adjustment of the small vessel anchorage, e.g. relocating these facilities to the north of the proposed new breakwater.

5 References

IALA 2014 Aids to Navigation Manual

PIANC (Permanent International Association of Navigation Congresses) 1997 Approach Channels, A Guide for Design, Report of Working Group II-30, Supplement to Bulletin No. 95, June 1997.

ROM 3.1-1999 Recommendations for Design of the Maritime Configuration of Ports, Approach Channels and Harbour Basins

Thoresen CA 2014 Port Designer's Handbook: Recommendations and Guidelines.

United Kingdom Hydrographic Office (UKHO) 2019 Admiralty Charts 1867, 1907.

A1 – CONSULTATION RESPONSE – NORTHERN LIGHTHOUSE BOARD

From: Peter Douglas <PeterD@nlb.org.uk>
Sent: 04 May 2018 15:28
To: Amy Savage
Cc: Kerrie Craig; Barbara Hume; Gillian Burns; navigation
Subject: RE: Millport Flood Protection Scheme - navigation

Follow Up Flag: Follow up
Due By: 30 July 2018 09:00
Flag Status: Flagged

Dear Amy,

Thank you for your e-mail and the proposals for Millport.

Given the localised nature of this issue I would suggest that the Council and views of local marine users (including the Waverley) would be of more validity than mine – it's some years since I ventured into Millport.

Option 1 clearly has less impact on the mariner – the area to the North of the pier/breakwater will receive more shelter but is limited by depth – I assume the Waverley uses the South side of the pier. Ideally the leading line would be revised and run from the east end of the breakwater, but this would reduce the navigable gap width, so it may be better to leave as is.

Option 3 requires a complete change to how the harbour operates. There will be gains in that there will be a larger and better protected area for moorings. Ensuring that visiting mariners aren't put at risk would require some or all of the following measures:

- A publicity campaign, Notices to mariners etc.
- A navigation light (port hand or East cardinal) on The Clach
- A navigation light (starboard hand) on The Leug
- Leading lights/directional light or hazard marker in the vicinity of the corner of Crichton Street/Millburn Street (close to the planned rock breakwater
- Discontinuation of the existing rear leading light and the light on The Eileans

Hope this is helpful; would be very happy to meet either here or better still at Millport.

Regards,

Peter

Peter Douglas
Navigation Manager
Northern Lighthouse Board

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