

REPORT

Millport Coastal Flood Protection Scheme: Environmental Statement

Chapter 4 Site Selection and Assessment of Alternatives

Client: North Ayrshire Council

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Acronyms

Acronym	Acronym description
EIA	Environmental Impact Assessment
FRA	Flood Risk Assessment
RAG	Red Amber Green
SRR	Scheme Recommendation Report
SSSI	Site of Special Scientific Interest

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	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.

4 Site Selection and Assessment of Alternatives

4.1 Background

1. The town of Millport is located at the southern end of the island of Great Cumbrae, 2.5km offshore from mainland North Ayrshire in the Firth of Clyde.
2. Millport is a small town which is built within a narrow low-lying coastal strip, with most properties located on the landward side of the coastal road. A number of small islands are located in Millport Bay, namely The Leug and The Spoig and The Eileans. Millport Pier is located on the western side of the bay. The project area is located within a conservation area and contains a number of important areas of ecological interest including Kames Bay and Ballochmartin Bay, which are designated as Sites of Special Scientific Interest (SSSI). Tourism is a major component of the economy of Millport.
3. Millport is at risk from coastal flooding due to wave overtopping, which poses a risk to both residential and commercial properties within the flood risk zone. Flood risk could result in serious economic damage, of up to £100 million over the next 100 years. Investment in flood defences has the potential to mitigate that risk and to encourage economic development and regeneration of Millport.
4. In order to identify the most appropriate, cost effective and environmentally acceptable option for flood protection at Millport, a process of option appraisal has been undertaken to ensure the objectives of the flood protection scheme are met.
5. The options appraisal process has comprised the following key stages, which have occurred alongside ongoing consultation with the local community and statutory consultees:
 - Initial Options Appraisal (2015), including eight potential options (Section 4.2);
 - Scheme Recommendation Report (2018), including three potential options (Section 4.4); and
 - Interim Environmental Appraisal (supporting the Scheme Recommendation Report) (Section 4.4.1).
6. The objectives for the successful delivery of the Millport Flood Protection Scheme are as follows:
 - Approval of a preferred scheme by North Ayrshire Council, which is also generally accepted by the community and achieves both value for money and affordability;
 - Effective flood protection delivered for the community of Millport as soon as possible;
 - All necessary consents and approvals obtained to enable scheme construction; and
 - Minimise and manage health and safety risks during site investigation, design, construction, operation and maintenance and decommissioning.

4.2 Initial Options Appraisal

7. An initial Options Appraisal was undertaken in 2015 (Royal HaskoningDHV, 2015b) which assessed the erosion and flooding damages and benefits associated with various potential coast protection options for Millport, based on flood risk mapping from the 2015 Flood Risk Assessment (FRA) (Royal HaskoningDHV, 2015a).
8. This was a high level study, undertaken with the aim of providing an initial assessment of the likely viability of a flood protection scheme for Millport. Further work to develop the proposed options, as well as public and statutory consultation, was expected to be required if the study confirmed that a flood protection scheme was justified.

9. The outputs from the 2015 FRA informed the development of the following eight primary options that were assessed in the Options Appraisal:
 - Option 1a – Flood walls;
 - Option 1b – Flood walls and revetments;
 - Option 1c – Flood walls, revetment and rock breakwaters;
 - Option 2a – Offshore breakwater and flood walls;
 - Option 2b – Offshore breakwater, flood walls and rock breakwaters;
 - Option 3 – Property level protection;
 - Option 4a – Harbour breakwater (rock armour breakwater extension to Millport Pier) and flood walls; and
 - Option 4b – Harbour breakwater (rock armour breakwater extension to Millport Pier), flood walls and rock breakwaters.
10. The report concluded that all of the primary options were economically viable, with a positive net present value and a benefit cost ratio greater than 1.0. Option 4b (Harbour breakwater, flood walls & breakwaters) would have the highest net present value and the highest benefit cost ratio of 5.07. Based on the high-level options appraisal, Option 4b (Harbour Breakwater with Flood Walls and Rock Breakwaters) was considered to be the preferred option on technical and economic grounds.
11. Following consultation on the proposed options, concerns were highlighted by the community. A meeting was held with harbour users to understand these issues and to reflect them in the scheme development. Following this meeting and further community design workshops, **three options** were proposed and assessed within the Scoping Report (Royal HaskoningDHV, 2017).

4.3 Scoping Phase

12. A Scoping Report was submitted to competent authorities and statutory consultees in March 2017 as part of the EIA process (Royal HaskoningDHV, 2017). This outlined the proposed project and broadly described the impacts to be assessed as part of the EIA and methodology for these assessments. Formal responses were received in April and May 2017. The responses provided comments on the approach to the assessments of environmental impact and agreement on which topics could be scoped in or out of the EIA. The responses also informed the assessment of options for works within the coastal waters at Millport Bay. The preferred options have been selected based on the elements presented in the Scoping Report, desk based assessments and surveys, as presented in the sections below.

4.4 Scheme Recommendation Report

13. The aim of the Scheme Recommendation Report (SRR) (Royal HaskoningDHV, 2018) was to present the findings of the work completed to date, including consultation with the community of Millport and relevant organisations, to develop an appraisal of the potential scheme options. The report considered the three potential solutions, the offshore works for the three options were as follows:
 - **Option 1** (Figure 4-1): The timber section of Millport Pier would be removed. The existing masonry part of Millport Pier would be retained and extended seaward by about 135m. The nearshore breakwater would be constructed using either tied sheet piles with a concrete deck and a rock armour revetment along the seaward face. Alternatively, a rock armour breakwater could be constructed around a 30m long bored pile pier structure.

- **Option 2** (Figure 4-2): A 120m long rock armour breakwater would be constructed to connect The Leug and The Spoig. A 210m long breakwater would be constructed between The Spoig and the southern Eilean. Alternative breakwater layouts have previously been considered and ruled out based on potential risks to navigation, coastal process impacts and high costs. No works would be undertaken to the timber section of Millport Pier. The future management of the pier would be considered separately.

- **Option 3** (Figure 4-2): This option is the same as Option 2 in terms of the offshore breakwaters. In addition, the timber part of Millport Pier would be replaced with a 30m x 25m bored concrete pile structure, which would have a similar open appearance to the existing pier.

14. The three options considered within the SRR and Interim Environmental Appraisal involved the same onshore and foreshore works, for which the range of potential solutions is limited, these include:

- Flood walls (Crichton Street, Glasgow Street, Kames Bay);
- Raised crest walls to the existing sea walls (West Bay Road, Millburn Street, Marine Parade (part));
- Landscaping works to raise the ground level (Glasgow Street, Kelburn Street, Kames Bay);
- Shore connected rock breakwater (Crichton Street); and
- Rock revetment (Clyde Street).

15. The SRR used the following criteria in order to compare the three potential solutions:

- How the solutions would perform;
- How the proposed solutions would impact the environment (provided as an Interim Environmental Appraisal, as an appendix to the report, see Section 4.4.1 below);
- The economic benefits and costs of the potential solutions;
- The risks for successful delivery; and
- Do the options meet the scheme objectives.

4.4.1 Interim Environmental Appraisal

16. An Interim Environmental Appraisal was produced, as an appendix to the SRR, which summarised initial findings and interpretations of surveys and desk based assessments and detailed how the design of the scheme has been developed. A Red Amber Green (RAG) assessment was presented for all three scheme options which led to identification of the preferred scheme options. Development considerations captured within the RAG assessment included topics which were scoped in the Scoping Report (or scoped back in following consultation), and for which initial environmental assessments have been conducted. This included:

- | | |
|--|---|
| <ul style="list-style-type: none"> • Coastal Processes • Marine Water and Sediment Quality • Terrestrial and Coastal Ecology • Marine mammals and basking shark • Fish and Shellfish Resource | <ul style="list-style-type: none"> • Benthic Ecology • Tourism and Recreation • Archaeology and Cultural Heritage • Landscape, Seascape and Visual Impact • Infrastructure and Other Users |
|--|---|
-

4.4.2 The Preferred Solution

17. The preferred solution was **Option 2**, for the following key reasons:

- Option 2 has the highest Benefit Cost Ratio (2.51) and the highest Net Present value.
- Options 2 enables the provision of additional moorings in Millport Bay, or even the development of a small marina in the future, which (if viable) would be undertaken as a separate project.
- Option 2 minimises impacts on Millport Pier, taking into consideration concerns of the local community about the impact that potential changes to Millport Pier which form part of Options 1 and 3 could have on the local economy. These concerns are greatest in relation to Option 1 where the timber section of the pier will be removed and replaced with a nearshore breakwater. Option 3 includes replacement of the timber pier (with a structure of similar open appearance to the existing pier), but with additional cost and with limited flood protection benefits, meaning those costs are not eligible for Scottish Government grant funding.
- Option 2 avoids potentially significant health and safety risks identified for any works in the vicinity of Millport Pier (for Option 1), where the ground conditions remain uncertain. All marine construction works can have significant risks for health and safety, however these risks can be mitigated through appropriate risk assessment and best practice construction methodology.

4.5 Additional Consultation to Confirm Preferred Solution

18. In order to confirm the preferred scheme further consultation with local communities and statutory consultees was undertaken following publication of the SRR, this is covered fully in **Chapter 3 EIA Methodology and Consultation**. This consultation included the following:

- Following publication of the SRR, a consultation event and questionnaire was held (February 2019) to update local residents on progress with scheme development, including the findings of the Scheme Recommendation Report that was presented to North Ayrshire Council's Cabinet. The community design workshops explored the requirements for the onshore works, including the location, appearance, landscaping and access needs for the flood walls and other structures.
- Targeted consultation meetings were held with groups of residents in July 2019 to discuss the scheme design proposed for the Cross House, Clyde Street and Crichton Street.
- Meetings were held with Scottish Water, The Crown Estate Scotland, the Northern Lighthouse Board, Clydeport, and representatives of the Bute Estate.
- In August 2019 there was a consultation event and questionnaire which updated the Millport community on the progress with the development of the scheme proposals. The aim of the questionnaire provided alongside this event was to provide a further opportunity for comment before the formal Flood Protection Scheme documents were prepared and submitted for statutory consultation and approval by the Scottish Government.

4.6 Optimisation of Scheme Following Additional Consultation

19. Following the February 2019 consultation event, a number of changes were made to the scheme design to address comments. These changes did not fundamentally alter the preferred option, and included:

- Addition of concrete stepped revetments at Crichton Street and the Cross House, to improve access to the foreshore and reduce the height of onshore flood walls.
- Improvements to the condition of the crest wall to the Stuart Street sea wall, to tie-in with the remainder of the proposed scheme.
- Inclusion of improvements to the jetties located at either end of Newtown beach.
- Flood protection to Kelburn Street to be achieved by ground raising and landscaping.

- Proposals for flood protection to Kames Bay changed to ground raising and terraced concrete steps located on the seaward side of the grass area.
- Flood embankment proposed for the southern part of Marine Parade removed from the scheme following a review of design assumptions.

20. Following the August 2019 community consultation and the stakeholder meetings, the design for the preferred scheme was updated to address comments and identified constraints. Changes to the scheme design included:

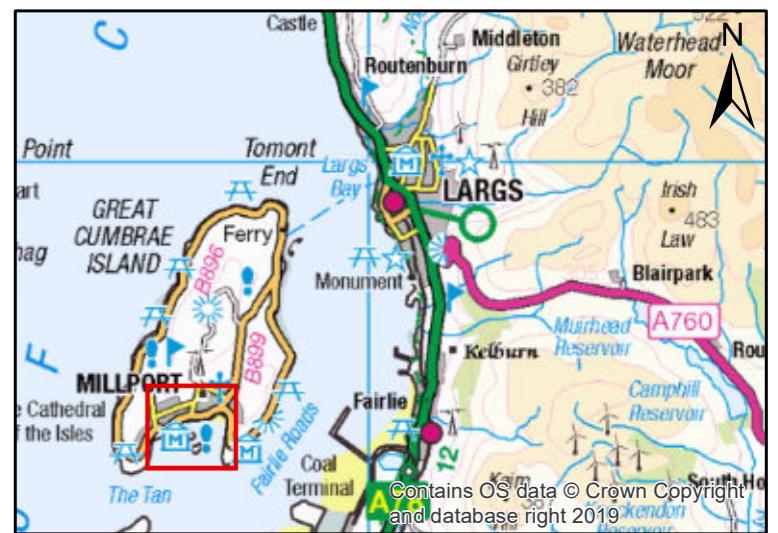
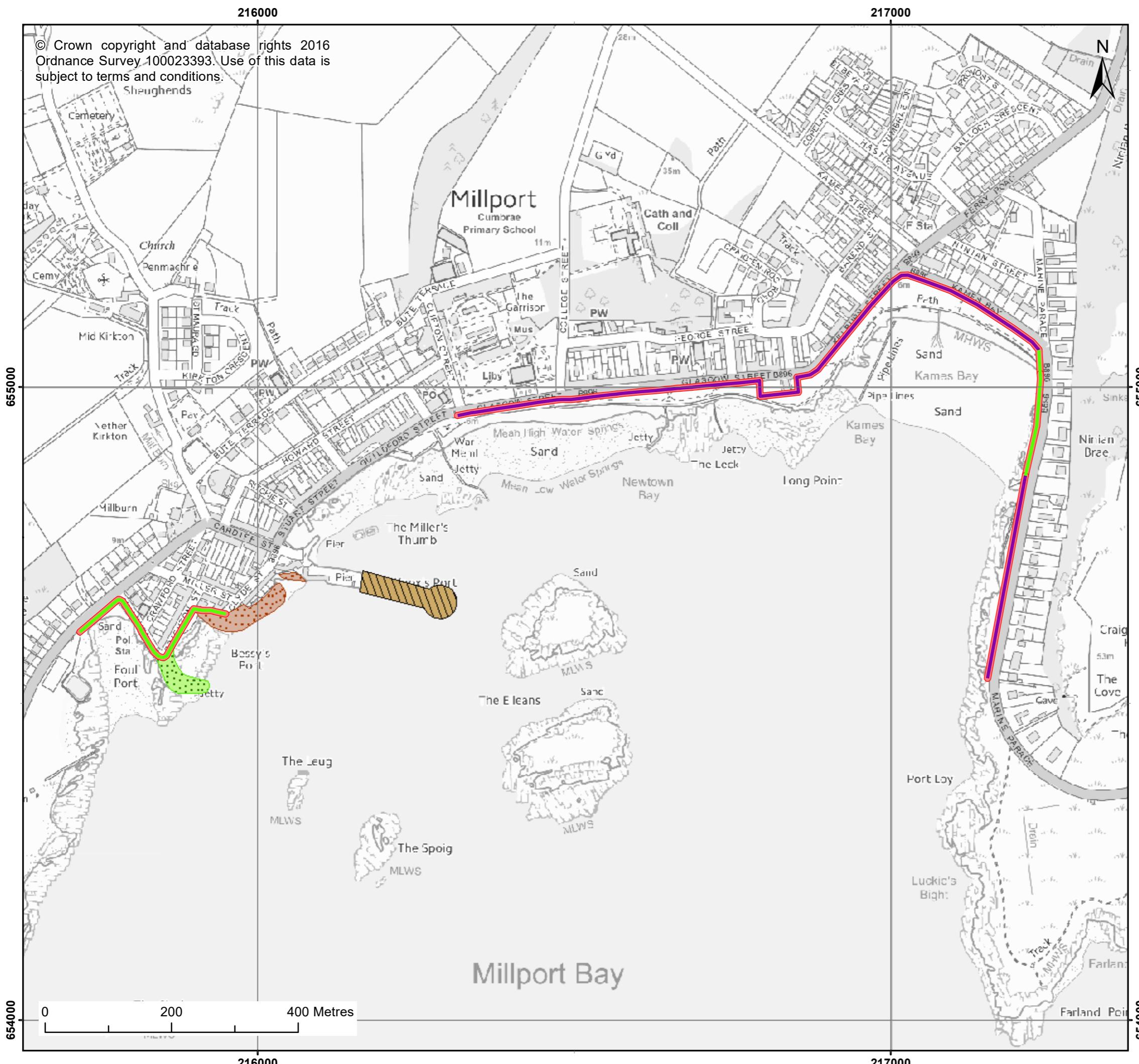
- Removal of the rock revetment proposed for the Quayhead, and modified alignment of the north end of the Clyde Street revetment, to address utilities constraints.
- Revised alignment for the terraced steps to Kames Bay, to address utilities constraints.
- Revised alignment for the flood walls around the Cross House, to address utilities constraints, known flood paths and preferences of Cross House residents.

4.7 Final Scheme Design for Environmental Impact Assessment

21. The final scheme design, based on the SRR (including Interim Environmental Appraisal) and design optimisation following consultation is presented within **Chapter 5 Project Description** and represented in Figure 1-1.

4.8 References

- | |
|---|
| Royal HaskoningDHV (2015a), Millport Coastal Flood Risk Assessment |
| Royal HaskoningDHV (2015b), Millport Flood Risk Assessment Options Appraisal. |
| Royal HaskoningDHV (2017), Millport Flood Protection Scheme Scoping Report. |
| Royal HaskoningDHV (2018), Scheme Recommendation Report |



Legend

Proposed Works

Onshore Works

- Works to existing coastal defences
 - New Flood Wall
 - Working footprint

Works on the foreshore

-  Rock Breakwater
 -  Rock Revetment

Offshore works - Option 1

- #### Harbour breakwater

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Client:	Project:
North Ayrshire Council	Millport Flood Protection Scheme

Title: Location Plan and Proposed Scheme
(including offshore works Option 1)

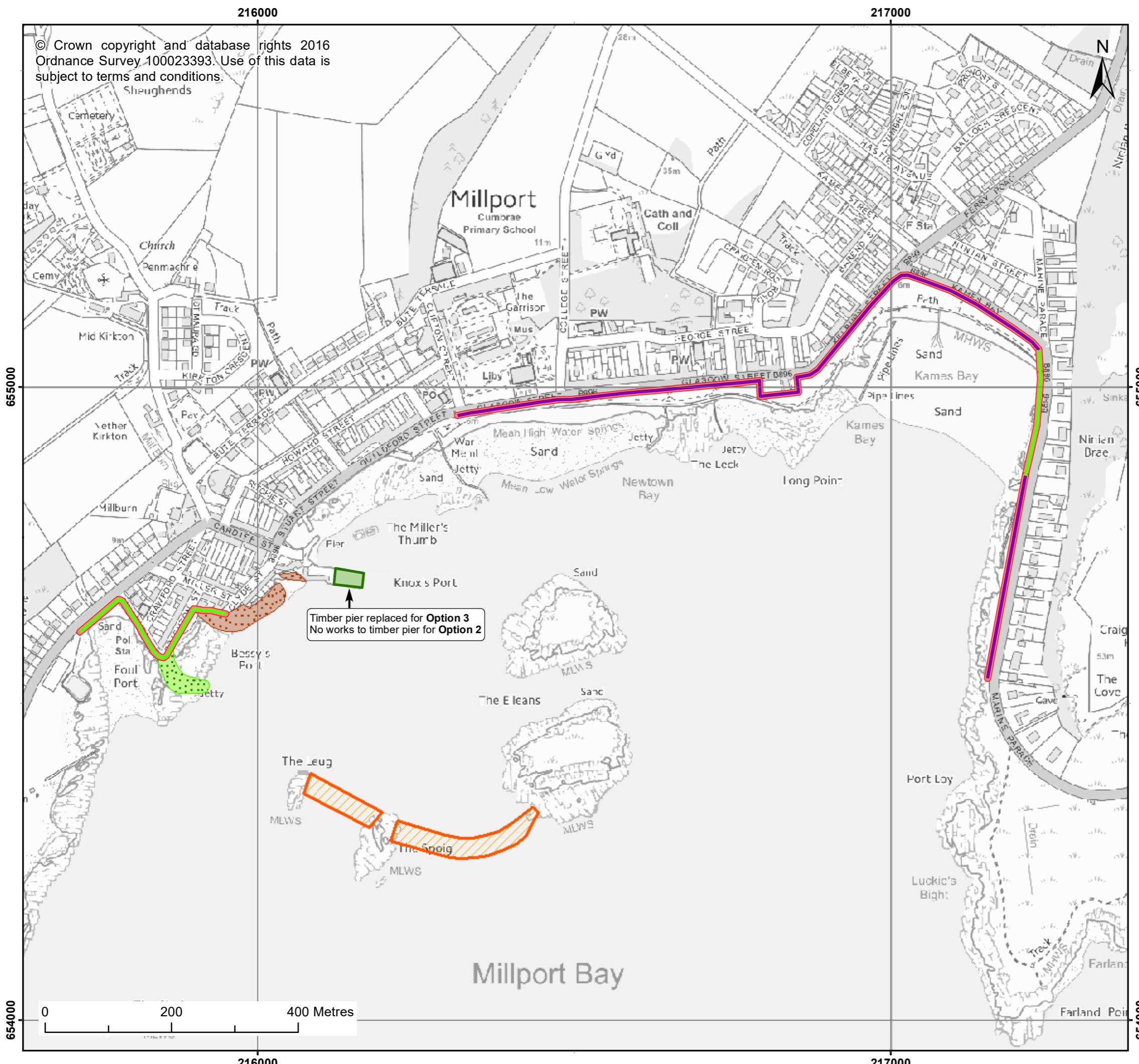
Figure: 4.1 Drawing No:

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid



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Legend

Proposed Works

Onshore Works

- Works to existing coastal defences
 - New Flood Wall
 - Working footprint

Works on the foreshore

-  Rock Breakwater
 -  Rock Revetment

Offshore works - Option 3

- Offshore Breakwater

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Client:	Project:
North Ayrshire Council	Millport Flood Protection Scheme

Title: Location Plan and Proposed Scheme
(including offshore works Option 2 & 3)

Figure: 4.2 Drawing No:

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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0	25/09/2017	TC	AS	A3	1:6,000

Co-ordinate system: British National Grid