



Stuart Street

What is the hazard?

- During heavy storms waves break over the top of the vertical sea wall along Stuart Street.

What is at risk?

- Wave overtopping is dangerous for people and vehicles, and causes regular flooding of seafront properties, including local businesses.



Coast protection structures located offshore of the existing defences are proposed to reduce wave energy reaching the Stuart Street sea wall.

The modelling results (Boards 5.1 to 5.4) show the options to protect Stuart Street and parts of Glasgow Street which have been assessed in detail.

Option 1a: Extend Millport Pier (rock breakwater)

An extension to the pier would be constructed from rock armour. This would reduce overtopping to a safe level and remove the flood risk to Stuart Street.



Alternative construction methods for extending Millport Pier

We have also reviewed alternative ways of extending the length of Millport Pier to provide the same level of protection against flooding of Stuart Street. It would be technically feasible to extend the pier as a vertical pier. However, steel sheet pile walls (similar to the Largs Pier extension) are not a feasible solution for Millport because of the high level of the bedrock.

Instead, the pier could be extended by 150m using concrete and steel box units (caissons) with suitable infill material. A rock armour revetment would be constructed along the seaward face to reduce wave energy in a similar way to a full rock breakwater. The pier would have a vertical face on its landward side.

Alternatively, the existing timber pier could be replaced by a caisson structure, with a vertical wall on both the landward and seaward sides over a 30m length. The remaining 120m of the breakwater would be built from rock.

Concrete and steel caissons are a lot more expensive than rock armour structures. A caisson structure would not provide additional flood protection compared with a rock armour breakwater. The additional costs would not be covered by the flood protection grant from the Scottish Government.

Ullapool Pier was extended in 2014 using concrete and steel caissons. The extension was half the size of the existing timber pier at Millport and cost £7 million.

Option 1b: Extend Millport Pier (vertical pier with revetment):

A 150m long, 12.5m wide pier extension with a vertical face on the landward side and a rock revetment along the seaward side would cost about **£25,000,000**

Alternatively, replacing the timber pier (30m long, 25m wide) with a vertical wall pier, plus a 120m long rock breakwater would cost about **£20,000,000**



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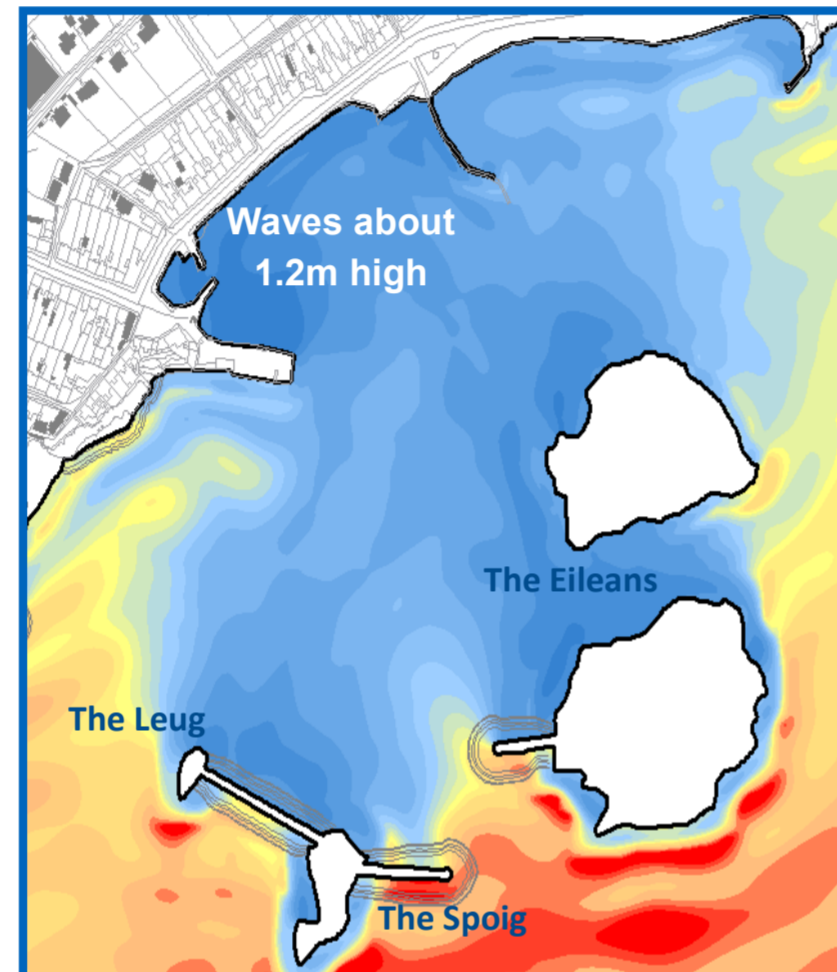
Option 2: Offshore breakwaters

For this option, rock armour breakwaters would be built between the Leug, the Spoig and the Eileans. The navigation channel to the inner harbour would be maintained.

This would reduce overtopping to Stuart Street but there would be a continued flooding and safety risk on the most severe storms.

Replacement of the crest of the sea wall with a wave return wall would sufficiently reduce this residual risk.

Offshore breakwater arrangement for Option 2



Estimated cost of Option 2 offshore breakwaters: £10,575,000

Estimated cost of replacement of Stuart Street crest wall and drainage improvements: £1,014,000

There are a number of issues that would need to be resolved for all of these options, including:

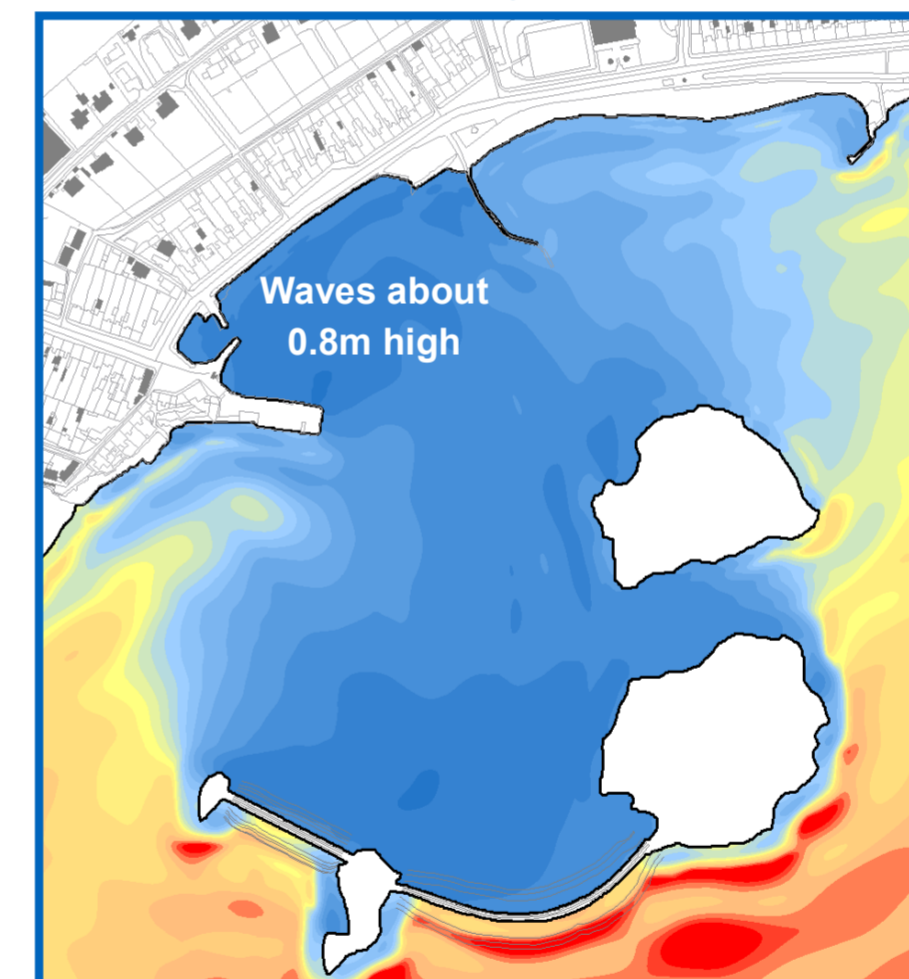
- Confirm navigation requirements and optimise the alignment of structures.
- How to maintain access to the pier and allow its current use to continue.
- Identify funding for any additional works to Millport Pier.

Options 3a / 3b: Offshore breakwaters

For these options a continuous breakwater would be built between the Leug, the Spoig and the southern Eilean. Navigation would be via the western channel. These options would reduce overtopping to a safe level and remove the flood risk to Stuart Street.

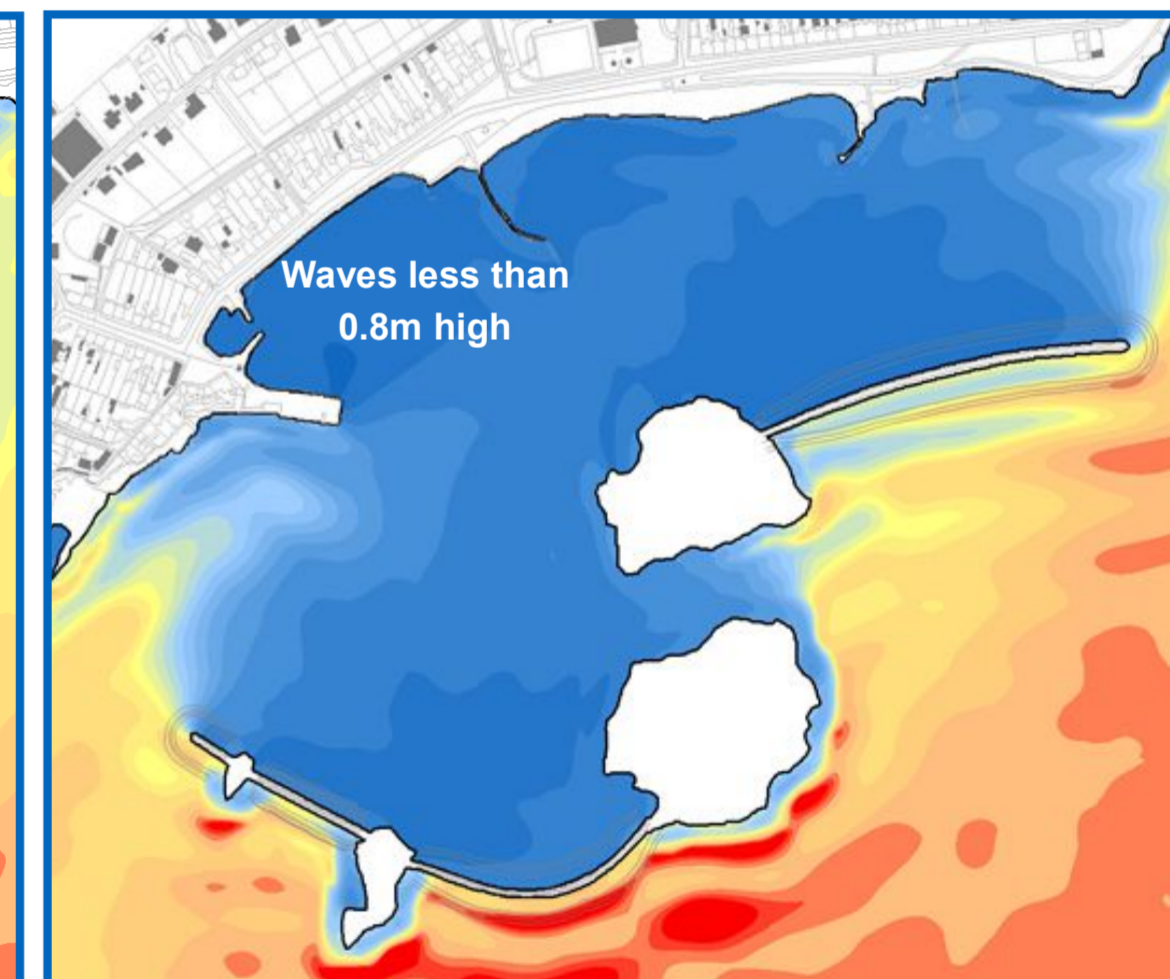
Option 3b is a development of Option 3a, with additional breakwaters to the east and west. This option has a number of constraints (see Board 8.2), so it is not considered to be an appropriate flood protection solution for Millport.

Offshore breakwater arrangement for Option 3a



Estimated cost of Option 3a offshore breakwaters: £12,639,000

Offshore breakwater arrangement for Option 3b



Estimated cost of Option 3b offshore breakwaters: £29,621,000