

## Welcome to the Aberdeen Harbour Civil Engineering Trail

This walk from Aberdeen Harbour to Girdle Ness will take you back in time to Aberdeen's beginnings, through history right up to the present day. You'll learn about the engineering of the harbour and see things you may never have noticed before.

Firstly, a little bit of history...

According to the Guinness Book of Records, Aberdeen Harbour is the oldest existing business in Britain. The harbour was first established as a business in 1136 by King David 1st of Scotland, during Norman times when the English were still battling the Welsh and nearly 200 years before William Wallace and Robert the Bruce. It has had a long and colourful history, having been attacked by Viking raiders and pirates, been the site of witch duckings and been bombed by the Luftwaffe. The harbour has been home to fishing boats from its beginning and has seen trade in textiles, quarried stone and shipbuilding through to the oil & gas and renewables industries of recent years. The harbour has changed throughout, adapting to each new industry, growing in size and facilities. It continues to expand today as you'll see by the end of our walk, preparing Aberdeen for the next phase in its industrial development.

# THE TRAIL

This short walk should take approximately 1 hour to complete. It is numbered from Aberdeen Harbour towards Girdle Ness but can be undertaken in either direction. Torry is a short bus ride from Aberdeen city centre with stops near Nigg Bay Golf Club.

This trail has been produced by the Institution of Civil Engineers Scotland in partnership with Aberdeen Harbour and can accompany a guided walk by our volunteers.

### Find out more:

[ice.org.uk/what-is-civil-engineering](http://ice.org.uk/what-is-civil-engineering)

[ice.org.uk/scotland](http://ice.org.uk/scotland)

 [@ICEScotland](https://twitter.com/ICEScotland)

 [ICE Scotland](https://www.linkedin.com/company/ice-scotland)

 [scotland@ice.org.uk](mailto:scotland@ice.org.uk)

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INSTITUTION OF CIVIL ENGINEERS



# Aberdeen Harbour Trail



## GLOSSARY

**Accropode** – man-made blocks of unreinforced concrete designed to resist the action of waves on breakwaters and coastal structures

**Breakwater** – a wooden or stone wall that extends from the shore into the sea and is built in order to protect a harbour or beach from the force of the waves.

**Caisson foundation** – a prefabricated hollow box or cylinder sunk into the ground and then filled forming a foundation. These are used in the building of structures that require foundations beneath water, such as bridge piers & harbour works.

**Coursing** – a course is a layer of the same blocks running horizontally in a wall and can be brick, stone, concrete block, shingles, tile, etc. There are many different styles of masonry coursing.

**Crown wall** – a wall built on top of the breakwater to reduce wave overtopping.

**Precast** – construction product produced by casting concrete in a reusable mould.

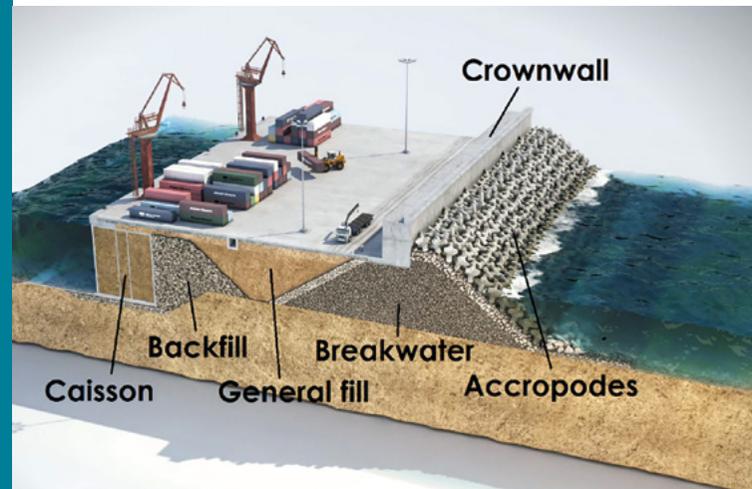
**Quay** – a stone or metal platform lying alongside or projecting into water for loading and unloading ships.

### **Aberdeen South Harbour extension**

Construction of the harbour extension has been mindful of the local environment, both above and below the water. Operations such as blasting rock and dredging the seabed to deepen the harbour used monitoring and observers to keep our marine neighbours safe as well as bubble curtains to dampen any noise.

### **What do the breakwaters do?**

When a wave impacts the breakwater, the energy is dissipated through the structure, protecting the harbour basin and the vessels moored inside.



### **How do you build a breakwater?**

There are several different methods of construction used at Aberdeen South Harbour but the important thing with each is to protect the breakwater from the action of the waves which could wash it away. There are generally three layers; a central core of small rocks, a covering layer of heavier rocks which allow the water to pass through but protect the core, and a layer of accropode units which weigh down the other layers to keep them stable. The outer layer at Aberdeen South Harbour uses the largest accropode units in the world, with each weighing 30 to 40 tonnes.

The construction of the North Breakwater also uses caissons. These are large hollow, concrete boxes (up to 51 metres long and 16 metres high) which are floated into position before being filled with granular material, some of which was dredged from Nigg Bay's seabed, sinking them into place. Following the maritime tradition, all the caissons were named after people involved in the construction, including Brenda, Gary and Catrina.



## 1. ABERDEEN HARBOUR LEADING LIGHTS

This light tower, built in 1842, is one of a pair that align to mark the centre of the channel into Aberdeen Harbour (the other one is further up Sinclair Road). Designed by civil engineer James Abernethy these listed structures are the world's second oldest cast iron light towers and still play a vital role in ensuring the safety of vessels entering and leaving the harbour. Each of the light towers has a red and a green light but these aren't for stop and go; green means ships can leave the Harbour, red means they can enter. The tower nearer the sea was moved in 2013 when the entrance to the harbour was widened.

## 2. ABERDEEN HARBOUR

First established as a business in 1136 by King David 1st of Scotland, Aberdeen Harbour is, according to the Guinness Book of Business Records, the oldest existing business in Britain. The oldest part of the harbour is the North Pier which was built from 1774-80 and the first dock, the Victoria Dock which was built from 1841-48.

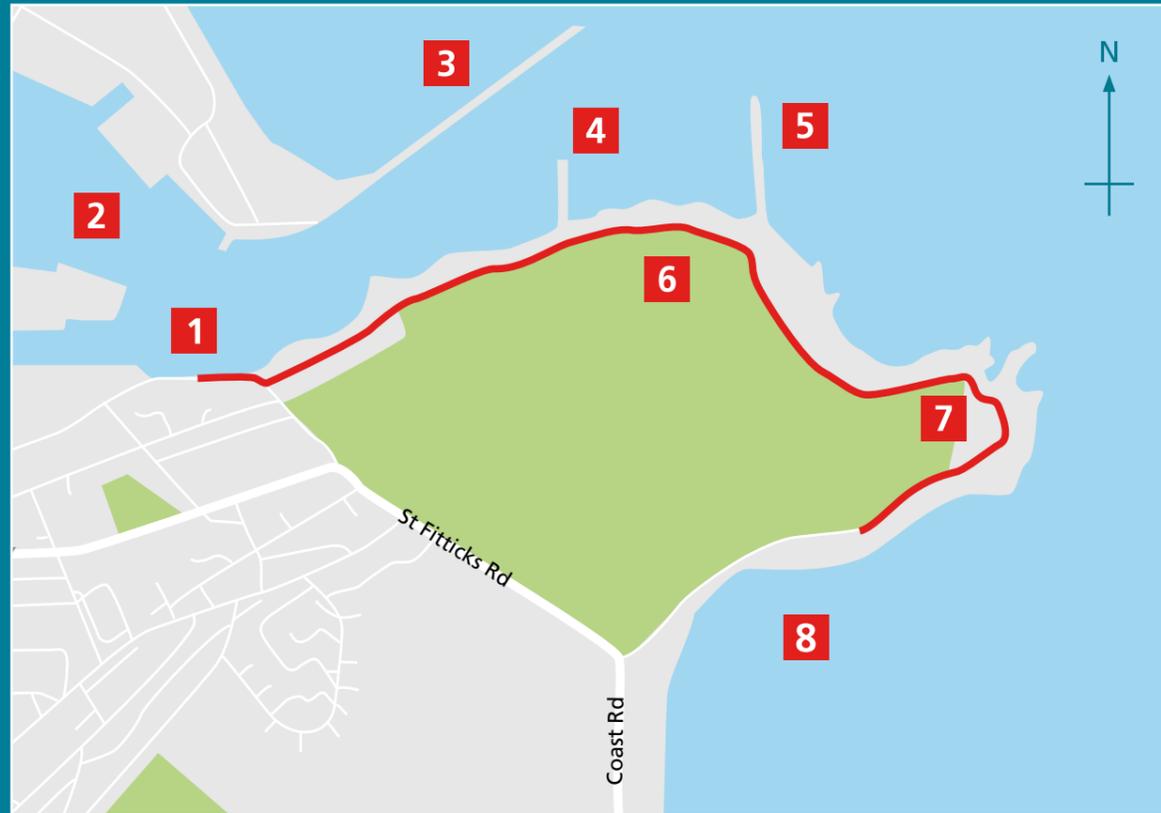


## 3. NORTH PIER

The original North Breakwater completed was the work of a famous engineer, John Smeaton (he's still famous today if you're into engineering). He was so famous, he actually invented the term "civil engineering" to differentiate from military engineers and founded the first ever engineering society in the world (which still meets today). The granite used to build the breakwater came from quarries at Greyhope and Nigg.

Another famous engineer, Thomas Telford was asked to extend the North Pier between 1811 & 1813. Can you spot where Thomas Telford's extension starts? It's where the horizontal stone coursing of John Smeaton's original work changes to the new (at the time) sloped diagonal coursing of the extension. The final concrete section was added by William Dyce Cay between 1874 and 1877. The octagonal iron light tower at the end is still in use.

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## 4. INNER SOUTH BREAKWATER

Thomas Telford completed the Inner South Breakwater and added five new docks to the harbour in 1812. At the time this breakwater defined the entrance to the harbour.

## 5. SOUTH BREAKWATER

The mass concrete South Breakwater was constructed between 1870-1873 under the direction of William Dyce Cay. The concrete lighthouse at the end is still in use today.



## 7. GIRDLE NESS

The lighthouse at Girdle Ness was built following the wreck of the whaling ship Oscar in 1813 with the loss of 43 lives. It was designed by Robert Stevenson of the famed dynasty of lighthouse designers and built by John Gibb, a close associate of Telford. It first became operational in 1833 and at the time it was the only lighthouse in Scotland with twin fixed lights, spaced vertically 70ft apart. The lower light was removed in 1890.



## 8. SOUTH HARBOUR

The South Harbour at Nigg Bay will have 1400m of new quays to provide deeper berths for the offshore energy industries as well as cruise liners. The new harbour is protected by South and North

Breakwaters which are faced with over 9000 precast concrete armour units which help protect them from the action of the waves. Each of these units (accropodes) are fitted with a GPS tracking device to show Harbour engineers if any have moved position.



## 6. TORRY BATTERY

Torry Battery was built in 1860 to defend the harbour & city of Aberdeen partly against the perceived threat from Napoleon III of France. It was initially manned with heavy guns and was

used throughout WW1 and adapted for modern warfare during WW2 with anti-aircraft guns and searchlights. After the war, the battery & surrounding Nissen huts were used as emergency accommodation for homeless families before being abandoned in 1953. It was renovated in the 1970's and became an Ancient Monument in 2000. It is now the site for the sustainable development of the Greyhope Bay project with a visitor centre, café and outdoor decking planned.

