

**PORT OF RAAHE, FINLAND**

PROJECT 1: DEEP-WATER HARBOUR EXPANSION

PROJECT 2: END QUAY AND RO-RO RAMP



**A**

**FEATURES**

Client	Port of Raahе Ltd and Town of Raahе
Project 1	Deep-water harbour expansion
Project 2	End retaining quay wall and ro-ro ramp
Location, both	Deep-water harbour, Port of Raahе, Finland
Period 1	June 2018 – August 2018 (expansion)
Period 2	June 2018 – December 2018 (quay & ramp)
Contractor	Terramare Oy

**SCOPE**

Project 1: The expansion of Port of Raahе, which consisted of the capital dredging of the deep-water harbour to the level –11.365 m. Port of Raahе has expanded its deep-water harbour basin for LNG-powered bulk cargo vessels.

Project 2: The construction of a new 85 metres long retaining quay wall, including a 39 metres wide ro-ro stern door ramp at the end of the deep-water harbour basin.

**A** View of the worksite at the deep-water harbour.

Terramare Oy  
Laurinmäenkuja 3 A  
PO Box 14, FI-00441 HELSINKI, FINLAND  
P +358 9 613 621 | F +358 9 6136 2700  
www.boskalis.com/terramare

**QUANTITIES | DREDGING, TOTAL**

Dredging, expansion	47,900 m <sup>3</sup>
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**QUANTITIES | RETAINING QUAY WALL AND RAMP**

Retaining quay wall, length	85 m
depth / height	–10 m / +2.44 m (fom 0-level)
Including ro-ro ramp, width	39 m
Quay wall elements, total	17 pcs (K- and S-elements)
Quay wall elements, height	12.5 m
Concrete structures, total	1,438 m <sup>3</sup>
Reinforcement steel, total	278 tonnes
Backfilling (blasted rock)	34,800 tonnes
Erosion protection slabs, underwater concreting	610 m <sup>3</sup> , total

**MAIN PLANT**

Backhoe dredger	Attila (Hitachi EX 1900–5)
Towable barges	SCG 3 & 4 (500 m <sup>3</sup> each)
Tug	Hevi (R-Towing Oy)
Floating crane	Nosto-Pekka (max. 200 tonnes)
Other plant	Slipform casting equipment Excavators on land



## INTRODUCTION

Terramare has carried out expansion dredging in the deep-water harbour at the Port of Raahé. The expansion is part of the Bothnia Bulk project, which will enable new, more environmentally friendly LNG-powered bulk cargo vessels to operate at the harbour. In addition to the expansion dredging, a new 85 metres long end quay was implemented at the deep-water harbour in a separate contract. The new quay includes a 39 metres wide ro-ro stern door ramp, which will diversify the activities of the deep-water harbour's main quay.

In summer 2018, commissioned by Port of Raahé Ltd and the Town of Raahé, Terramare implemented major expansion deepening of the deep-water harbour. The site was dredged to a minimum depth of -11.365 metres. The dredging masses were dumped into a separate basin, from which they will be utilised later in future harbour field expansions at the Port of Raahé.

## EXPANSION DREDGING

In summer 2018, commissioned by Port of Raahé Ltd and the Town of Raahé, Terramare implemented major expansion deepening of the deep-water harbour. The site was dredged to a minimum depth of -11.365 metres. The dredging masses were dumped into a separate basin, from which they will be utilised later in future harbour field expansions at the Port of Raahé.

## END QUAY AND RO-RO RAMP

In addition to the expansion dredging in the deep-water harbour, Terramare implemented as a separate contract a new 85 metres long end quay, which includes a 39 metres wide ro-ro stern door ramp. The end quay was built in connection with the harbour basin's main quay. The quay work began with dredging and levelling of the slope of the main quay. Dredging masses were dumped in the same basin as the masses of the expansion dredging.

The end quay was implemented as a retaining wall quay, for which a total of 17 K and S elements, each 12.5 metres high, were slipform cast and installed. The quay elements were lifted, transported and installed into position with Terramare's floating crane Nosto-Pekka. The tops of the elements installed in the quay line were anchored to the harbour field. The contract also included the construction of quay's ro-ro ramp, quay surfacing work and installation of quay accessories. In front of the quay elements, an erosion slab was installed all the way to the sea bottom.

The dredging of both contracts was carried out by Terramare's backhoe dredger Attila. The dredging masses were transported to the dumping basin with the barges SCG 3 and SCG 4, both of which have a load capacity of 500 m<sup>3</sup>.

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- B** Aerial view of Port of Raahé and the locations of the worksites.
- C** Pictured are the backhoe dredger Attila and towable barge SCG 3.
- D** The slipform casting site of the 12.5-metre high quay wall elements.
- E** The retaining quay wall, including a ro-ro ramp.