

PROJECT SHEET

NORTH HARBOR OF LERWICK, SCOTLAND

DREDGING AND RECLAMATION

INTRODUCTION

The Port of Lerwick is situated on the east coast of the Shetland Islands, and is operated by Lerwick Port Authority, formerly the Lerwick Harbour Trust, which was founded in 1877. The 2008 dredging and reclamation works were one of the largest marine projects to be carried out in Scotland in recent years and constituted the largest single investment in the port to date. The works were executed by Westminster Dredging Co. Ltd. Arch Henderson designed, procured and project managed the dredging and reclamation project to remove in excess of 500,000 m³ of bulked dredge fill to create improved deepwater access (-9m CD) for the purposes of existing general and oil logistics services and the future offshore decommissioning trade.

SCOPE OF WORK

- Provide a clear channel (100m wide) to -9.0m ACD from the deep water in the south harbor through the Bressay Sound to link with the deep water to the east of Greenhead
- Widen the existing north channel between Greenhead and Turra Taing from 90m to 120m, all to -9.0m ACD
- Widen the existing Gremista deepwater landing berth, and the approach and turning basin to the south of the Shetland Catch base, all to -9.0m ACD
- Improve the approaches and berthing to Greenhead Base and the link with the new north channel, all to -9.0m ACD, including the future well-head berth for Greenhead Base
- Materials dredged by TSHD Waterway to be deposited in designated reclamation site. Materials dredged by BHD Manu Pekka to be deposited in the Greenhead reclamation area

FEATURES

Client	Lerwick Port Authority
Contractor	Westminster Dredging Co.
Location	Port of Lerwick, Scotland
Period	2007 – 2008



A Location map

B On shore revetment work carried out by CAT 385

C TSHD Waterway pumping material into Greenhead reclamation area. The ship is connected to the shore pipeline by a floating pipeline and purpose built quick action bow coupling

D Aerial view of the project in progress

up to a level of -4.0m ACD, remainder to be deposited offshore

- Supply and place geotextile, filter layer and rock armor stone on the outer slope of the reclamation site
- Additional works ordered by the engineer
- Dredge Mairs yard to -6.0m ACD
- Provide a south approach and turning basin at Heogan to -8.0m ACD
- Widen existing link area with the west channel widening section, omit sections in the east and west link areas



- Dredge the western Greenhead Basin in front of berths 1-3
- Transport core bund, filter and 2-3 tons of rock materials from Dales Voe to the Greenhead reclamation site.

BENEFITS

Dredging to nine meters below Chart Datum brought a range of significant benefits, particularly for the pelagic fishing and offshore oil sectors. These included wider and deeper access to Greenhead Base, an improved alignment of the new deepwater North Channel, and the possibility of access and berthing for larger vessels at the Shetland Catch pier. The project also included the deepening of the landing berth at Heogan to 8 meters, and the deepening of an area at Mairs Yard, north of Holmgarth, for a future quay.

SEABED RECLAMATION

The project further involved using dredge material to reclaim approximately 5 hectares of seabed, protected with approximately 70,000 tons of rock armor to accommodate a future decommissioning lay-down area. The project design commenced in 2007 and all works were completed on program and to budget in November 2008. The materials to be dredged were shaly sand and gravel, beneath which was a layer of weathered rock overlying fresh rock. The dredging plant and method of construction were chosen to provide the

maximum beneficial use of the arisings and therefore to minimize disposal at sea.

EQUIPMENT

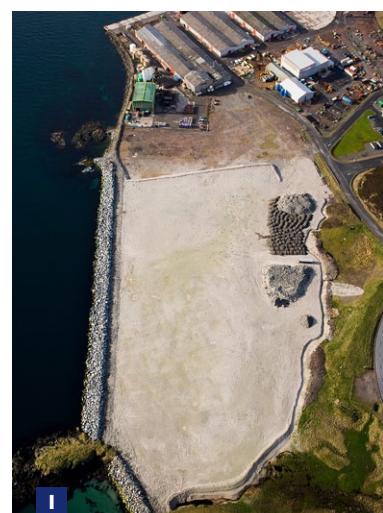
The overlying layer of sand and gravel was dredged by the TSHD (Trailing Suction Hopper Dredger) Waterway and then pumped ashore to the bundled reclamation area north of Greenhead Base, including temporary outer seaward bunding to limit fines migration as far as possible until a permanent outer bund was constructed. Once a sufficient area had been dredged, the BHD (Backhoe Dredger) Manu Pekka was able to commence direct dredging of the weathered rock.

SPECIALLY DEVELOPED LIQUID EXPLOSIVES

The fresh rock layer was pre-treated with drilling and blasting using the drill barge Playmate. Some 54 tons of liquid explosive specially developed for underwater use were used for the first time on this scale in the UK, allowing the works to progress much quicker than with conventional explosives. The dredged rock was deposited by split hopper barges before being moved into position as part of the rock revetment formed to provide protection for the reclamation area bund. The bund core was filled with overburden rock material supplied by the client from Dales Voe, another beneficial use. A filter layer founded on geotextile was then overlaid with armor stone weighing 3-6 tons imported from Norway, the only material not produced from within the works or by beneficial use.

FUTURE EXPANSION

The reclamation of land north of Greenhead Base will allow the future expansion of activities at the Base, most probably to suit the offshore decommissioning industry. The port has a number of further development proposals which will have been facilitated by this forward-looking and environmentally beneficial project.



E Rock imported from Norway

F Drill barge Playmate

G Bund core made of local overburden rock material

H Greenhead reclamation area showing discharge pipeline at centre top, and retaining bund progressing toward Otter Island

I Greenhead reclamation completed with rock armor revetment and surplus materials stockpiled on site

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