

Dredging the Mersey for Liverpool2 container port development



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Liverpool, on the River Mersey in north-west England, has been a major port for almost 300 years and the area has undergone many changes during that time to accommodate trends in shipping. The Port of Liverpool is already the UK's largest transatlantic port and is home to one of the UK's biggest container terminals. Now Peel Ports, as owner and operator, is investing £300m (US\$500 million) to ensure the Port of Liverpool can accommodate around 95% of the world's container fleet, especially with the widened Panama Canal opening in 2015.

The overall construction programme has several main features:

- A quay wall, 854m long, with a quay surface at 12.7m aCD, between the southwest corner of the Royal Seaforth Container Terminal and along the low water edge of an intertidal area known as Seaforth Triangle;
- Dredging in front of the quay wall (to 16.5m bCD) to create a 62m-wide berth pocket that will allow post-Panamax vessels to berth in this area;
- Reclamation of approximately 12ha of intertidal area behind this new wall (using approximately 2.2 million cubic metres of material dredged from the

berth pocket and approach channel deepening works); and

- Dredging areas of the approach channel that are shallower than 8m bCD down to this depth, with the total area for deepening around 3.71km² and an average 1.1m depth of dredge.

Dredging the channel

To carry out the work, which began in July 2014, Peel Ports appointed the family-owned Van Oord business, which operates a global fleet of more than 100 dredgers and specialised marine plant.

The programme involves increasing the navigable depth from 6.9m bCD to 8m bCD producing an estimated volume of five million cubic metres of dredged material. The arisings will be put to use in the up-filling of the intertidal zone within the Seaforth triangle which forms the new Liverpool2 deep water container terminal. The balance of dredged materials will then be returned to nature and deposited at the offshore licensed disposal sites.

The channel is divided into three main dredging areas: Queens Channel, Askew Spit and Crosby Channel.

- Queens Channel has the largest

quantity and also the deepest layer thickness to be dredged at approx 1.17m.

- Askew Spit has a layer thickness of around 1m to be removed and is characterised by being mainly toe-line work on the inside of Askew Bend.
- Crosby Channel has the lowest layer height of material to be removed.

A trailing suction hopper dredger is used to remove soft silts while a cutter suction dredger is used to dredge coarser granular materials. Areas of rock and firm clay are excavated by backhoe.

Planning the works

As mentioned above, a key requirement in planning the works was being able to reuse some of the arising for another part of the Liverpool2 development programme. These have to be delivered in specific windows for the construction and only with material that meets the required standard.

This requires very close liaison between the two teams on plans and schedules, testing to ensure the material is meeting the required standards and providing information regarding potential additional sites for material to be used at the Seaforth Triangle, as the latter can emerge during the

Below: Dredging vessels in action; Right: A view on board the Ham 316 taken while working in the Mersey





Liverpool2 current site location



Proposed site of Liverpool 2

dredging process.

Even before dredging began, boreholes, vibrocores and any further ground information was entered into a 3D soil model at Van Oord's head office in Rotterdam. This model combined grain size, silt content and layer thickness of the deposits to create a map of the most promising areas to guide the dredging crew.

The dredging vessel was on-site a month before works were due to begin, allowing time for the Van Oord team to trial all quality assurance procedures and communications protocols, both of which are critical to the smooth delivery of the works. During that time, trial dredging also took place in the areas covered by the programme.

Much of the volume of material to be removed is from a weather-exposed area (Queen's Channel) and is disposed of at offshore sites which are also weather exposed. As a consequence, the most weather-exposed areas in summer are being dredged during the summer to reduce programme risk. Work has begun from the 'outside in', starting with Queens Channel, then Askew Spit and lastly Crosby Channel. This will always provide the opportunity to continue dredging inside the channel during adverse weather conditions.

Firing range and port operations

One unusual feature of the works is that there is a nearby rifle firing range operated by the UK's Ministry of Defence (MoD). The facility, at Altcar, carries out live firing, requiring close communication with the MoD to ensure the safety of the vessels and avoiding disruption to the range's activities.

As well as this, there are other demands inevitably created by working in a busy port environment. The programme of work includes flexibility, especially on the disposal and placement at Formby Point and Taylor's Bank, to minimise the impact of the work on others.

Environmental impact assessment

Typically, any construction activity of this type would undergo an Environmental Impact Assessment (EIA), which would then be used to produce an Environmental Statement (ES) for formal consultation

with statutory consultees, the public and other interested parties.

Major consultees in this development included various public bodies such as the Marine Management Organisation (MMO), local authorities, Natural England and the Environment Agency, as well as the Centre for Environment, Fisheries and Aquaculture Science. The Environmental Statement produced through the EIA was an essential component of being able to secure a marine licence from the MMO as well as a number of other consents.

Before the EIA begins properly, there is a screening phase to determine if an EIA is required, and assuming so, there follows a scoping stage to consider what should be included. This development had previously been subject to an EIA and Environmental Statement in 2005 when it was previously proposed. As a result of this, some aspects of the development and its potential impact could be considered in terms of the previous assessment, where there had been no significant changes during the intervening period.

The EIA process considered the development as a whole, as opposed to just the dredging, with a number of mitigating measures and agreements being put in place before work began in order to satisfy the MMO and other regulatory bodies.

In the case of dredging, the EIA identified that it would have a negligible impact on water levels and tidal currents, sediment and water quality, and surrounding coastal defences and training walls. However, there was also agreement reached on routine measures to avoid any impacts, such as zoned disposal, trial placements and monitoring of dredged material.

As a further example of mitigation measures, there are a number of special environmental considerations in the area that include migratory fish and birds on the foreshore. To minimise disturbance to them, Van Oord is following a specific methodology for sensitive sites, for example, not directly shining lights onto the water or foreshore. Although not a particularly noisy operation, this is also monitored, with control measures put in place to deal with increasing noise levels.

About the author

Douglas K Coleman, one of the UK's most experienced project directors, was appointed by Peel Ports in 2012 as its programme director for the Liverpool2 development. Before joining Peel Ports, Coleman was project director at Forth Ports for six years, where he was responsible for construction development across the Group's extensive land and property assets. His career also included nine years with Capita, where he was ultimately Scottish regional director. His main responsibilities were the delivery of multifaceted infrastructure and regeneration projects, specialising in brownfield site development works. He has also previously worked overseas in the Middle East and North Africa.

About the organisation

Peel Ports is Britain's second largest group of ports, handling 70 million tonnes of cargo every year. Peel Ports owns five major gateways across the UK. The Peel Group is one of the leading infrastructure, real estate and investment enterprises in the UK. Its diverse network of businesses ranges from ports to airports, land to leisure, media to hotels, wind farms to biomass, and a portfolio of investments in major public companies. The company has 66 Sites, 2,400ha acres, 5.54 million square metres of potential space, US\$6.67 billion of potential built investment value, 28 rail connections, seven ports, four airports and three strategic partners.

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