

RPS

Fishguard Port Development

Marine Civil Engineering Works

Options Appraisal - Cruise Berth

DOCUMENT CONTROL SHEET

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	1					

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1.0 Introduction

RPS were commissioned by Stena Ltd to assess options for a new cruise berth facility at Fishguard Port, Pembrokeshire in South Wales.

In light of a proposed land reclamation and marina development by Conyger PLC within Goodwick harbour adjacent to the port, and plans to upgrade the Stena ferry terminal, an evaluation of the future needs of port is required to allow the best use of the area for all parties.

This report highlights the opportunities, challenges and potential options available to develop the cruise opportunity at Fishguard Port. The options discussed are by no means exhaustive, however can be used as a basis to determine short term and long term plans for the port and coordinate with the proposed marine development.

2.0 Needs and Objectives

The development of a cruise terminal in Fishguard would open up the potential for cruise in Wales and be a boost to the tourist industry in the South and West Wales area. The cruise industry in the UK and Ireland is growing steadily, with more people embarking from and visiting UK and Irish ports each year. The UK is Europe's largest market for cruise accounting for 27% of the total number cruise passengers on the continent. In 2013 1.9 million people either began their holiday from a UK port or stopped at a UK port during their cruise, a 7 % rise on 2012.

In 2014, 38,500 passengers are predicted to visit Welsh ports, with the majority stopping in Holyhead, Anglesea. Although the number of visitors is growing year on year, the number of visitors to Welsh ports is lagging behind the rest of the UK, arguably because of lack of facilities for larger cruise vessels.

Across the Irish Sea there is a considerable market for cruise in Ireland. Cruise ship visits in 2013 totalled 277, carrying over 400,000 visitors. Many of which were trans-Atlantic cruises, stopping off on their way to the Baltic or Scandinavia.

The potential market for cruise in Wales is there - judging by the success of the cruise industry in the rest of the UK and Ireland. In order to tap into this market upgrades must be made to Welsh ports to accommodate larger vessels.

The largest cruise vessel in recent times to visit Fishguard was "The Wind Surf" at 162 m long and 5 m draft in 2013. The Wind Surf was close to the maximum ship size that can be accommodated in Fishguard. Fishguard is limited by depth, length of quay and (pending condition surveys) condition of quay for large cruise ships. In order to create a significant cruise industry in the area upgrades are essential.

Fishguard's Position As A Cruise Destination At Present	
Strengths	Weaknesses
- cruise destination within a coastal national park - distinctive rural destination - government policy to improve cruise industry in Wales	- well kept but aging infrastructure - limited capacity for large cruise vessels - possible limited local transport links and infrastructure
Opportunities	Threats
- build on local transport links - dedicated cruise facilities and business - local job opportunities in berthing welcome and local tours - tourism boost for Wales as a whole	- more accessible destinations closer to urban areas - cruise industry in Wales lacking experience

Table 2.1 SWOT Analysis of Fishguard Cruise Potential

Welsh and Irish ports were investigated, in parallel with current cruise ship operations, in order to determine a suitable level of upgrade to compete with similar ports. A summary of the local Welsh ports in Table 2.2 below compares the local Welsh ports and highlights the shortcomings of the port at present. The Welsh Government push for a larger cruise industry provides an opportunity, and with the right upgrades Fishguard could be another stop on the cruise route.

Welsh Cruise Terminals	Max Length (m)	Max Beam (m)	Max Draft (m)
Newport	244	30.1	10.4
Cardiff	240	26	9
Holyhead	300	N/A	10
Milford Haven	220	N/A	9-12.8
Pembroke	160	N/A	8
<i>Fishguard</i>	170	N/A	5.5
Swansea	200	26.2	9

Table 2.2 Welsh Cruise Terminal Maximum Capacity

The present maximum of 170 m length and 5.5 m draft is not adequate for the larger cruise ships. In order for Fishguard to compete with other local ports and expand as a cruise destination, **a berthing length and depth of 230 m and 8.0 – 9.0m depth would be required.**

To achieve the overall objective of bringing a sustainable cruise facility to Fishguard, upgrades are necessary to enable the larger ships to enter the port.

Options considered within this report fall into two categories. The first allows the cruise ship to enter the port and berth alongside the northern quay. Upgrades will be necessary to allow this, both in terms dredging to deepen the berthing pocket and lengthening of the berthing face. The proposal includes the full refurbishment and realignment of the existing quay to ensure stability during dredging of the berth pocket and stability of the quay when subjected to berthing and mooring loads generated by the cruise vessel.

The second option is a tendering operation, mooring the cruise ship offshore within the navigation channel and transferring passengers via a tendering vessel. Pontoons could be installed against the existing northern quay to allow passengers to disembark into the port. This option can be a temporary or permanent solution, allowing flexibility for future operational decisions.

The berthing and mooring loads generated by cruise or tendering vessels must be considered in the design of the mooring bollards, fenders and pontoons.

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3.0 Existing Infrastructure

Fishguard Port is a linear port, approximately 80 m and 1500 m in length, built on reclaimed land at the base of a steep vegetated slope (Figure 3.1). The land is owned by Stena, but leased in part to Network Rail, who operate the Fishguard Harbour station and one railway at the northern end of the port. Recently the Goodwick Station to the south of the port has been reopened, leading to the possibility of closing the Fishguard Harbour Station in the future.



Figure 3.1 Aerial View of Fishguard Port

Currently Fishguard port operations are dominated by the twice daily ferry service to Rosslare, operated by Stena. The 'Stena Europe' is the current ship in operation, with a length of 149 m, beam of 27 m and draught of 6.1 m. The ferry docks on a temporary linkspan alongside the Fishguard Harbour railway station approximately half way along the length of the port.

The majority of the space within the southern half of the port is taken up by access and exit lanes for ferry traffic, and parking for passengers and freight. A security office, a passenger cafe/terminal building and a footbridge connecting Quay Road behind the port and the public footpath to the front of the port are the only structures before the linkspan. The ferry operation as it stands would not impede a cruise berth installation at the northern quay.

However any permanent works carried out such as construction of a refurbished quay wall or piling for the pontoons may limit the opportunities to expand the ferry operations to the northern end of the port. This would need to be considered in the overall master plan for Fishguard Port. The proposed location of the cruise berth is highlighted in Figure 3.2.

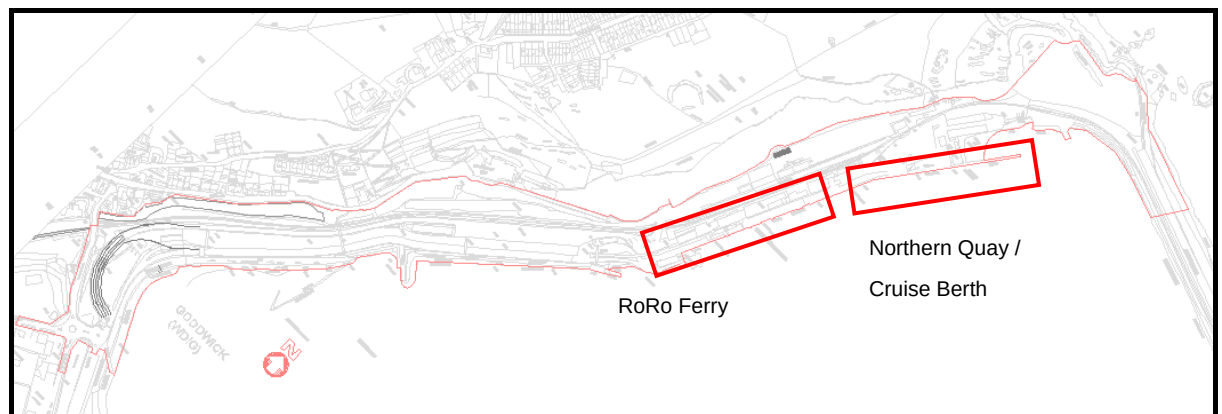


Figure 3.2 Extent of Site

The northern end of the port houses Stena offices, some redundant, two workshops, and the RNLI station. Three fuel storage tanks at the back of the quayside service the ferry, with the pipeline connected through a tunnel in the deck to the quayside.

The RNLI has a base at the northern end of the port, with the lifeboat docked on the landside edge of the northern quay. Fishing boats and small public boats may also dock along the shoreside edge of this quay.

The northern quay (pictured in Figure 3.3 and 3.4) is constructed from concrete blocks, laid diagonally. The full extent of the structure is unknown along with the founding depth. The width of the quay is limited at around 2 m, enough for small fishing boats, but restrictive for larger vessels. Bollard loading capacity due to the age and condition of the quay would be difficult to estimate without a full survey and core through the deck, but can be assumed to be limited.



Figure 3.3 & 3.4 Northern Quay, Facing North and Facing South

There are several physical or engineering restrictions on the berthing of cruise vessels at Fishguard which are relevant. The primary restrictions are the capacity; in terms of length, depth of water and mooring capability, of the existing quay structures and the depth of water in the approach channel.

The largest cruise vessel in recent times to visit Fishguard was "The Wind Surf" at 162 m long and 5 m draft in 2013. The Wind Surf was close to the maximum ship size that can be accommodated in Fishguard. The navigation channel leading to the port has a navigable depth of 7.5 to 8m and a depth at the Northern quay wall of 5.0 m, as shown in Figure 3.4 and 3.5.

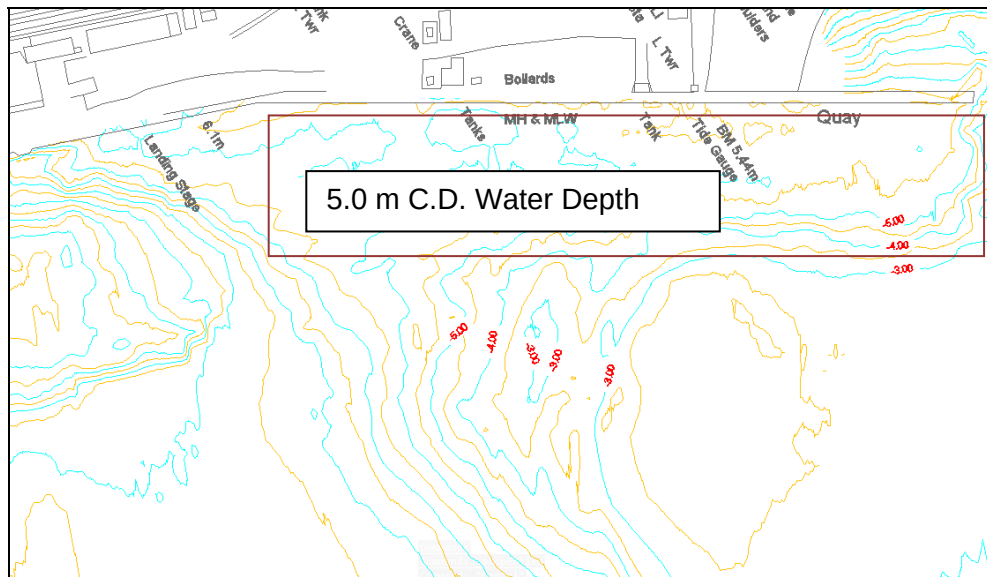


Figure 3.4 Berthing Pocket Alongside Northern Quay

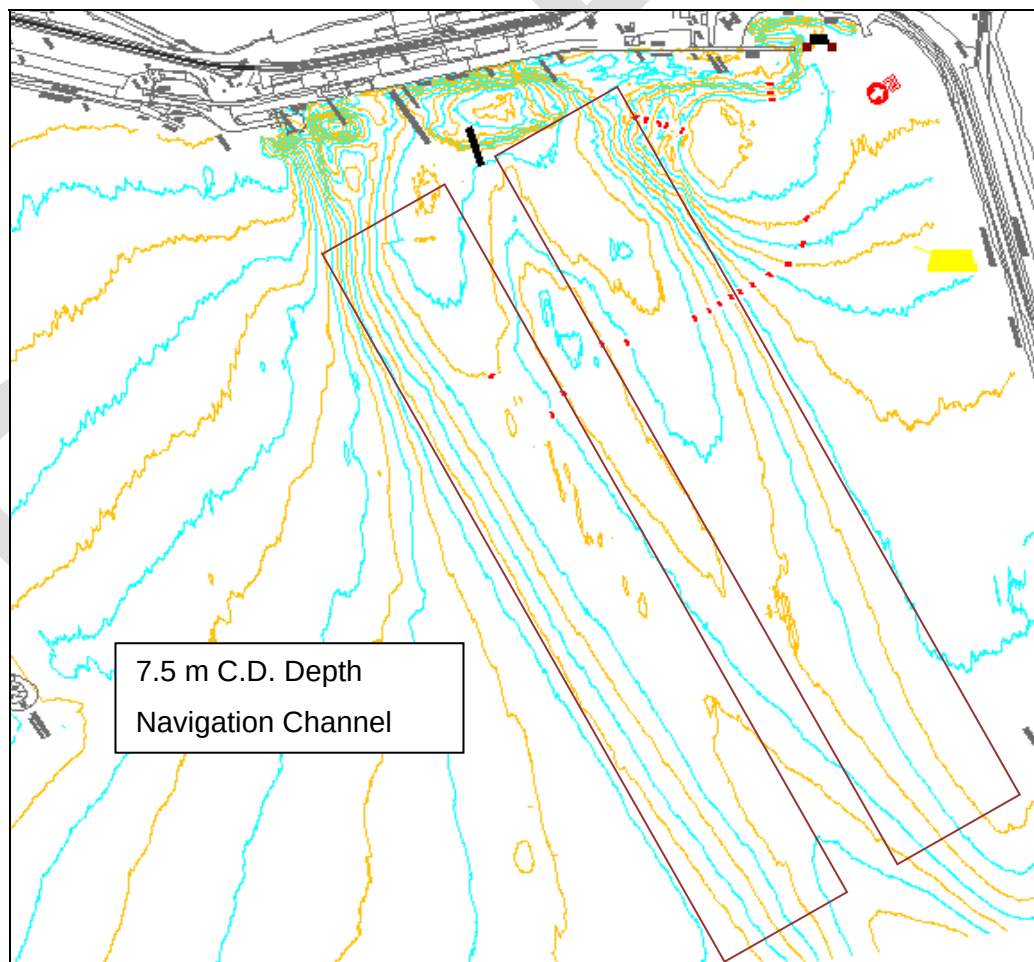


Figure 3.5 Navigation Channel

The proposals for the new cruise terminal take into account the requirements as discussed in Section 2.0. Fundamentally the requirement is to provide facilities to accommodate a cruise ship of 230 m in length and 8.0 m draft within Fishguard Port.

The port of Fishguard in its present arrangement is limited by water depth, quay length, and structural capacity, in particular at the northern quay. The navigation channel has a depth of 8.5 m at its deepest point, with similar depths at the quay side and with shallower depths, of up to 5 m at the northern quay. The straight length of the quay from the end of the northern quay to the first corner is approximately 210 m, short of the 270m required for a 230 m ship. It is assumed that the quay wall is not founded at a depth to enable dredging to 9.0 m. The northern quay cannot be expected to take berthing loading from a large cruise vessel.

RPS have commissioned a borehole to confirm the construction and foundation level of the Northern Quay wall to determine the potential for accepting mooring loads and potential deepening of the berth alongside. However, based on a visual inspection, it is unlikely that it can accommodate the vessels required. This will be confirmed pending the outcome of the borehole.

This study has not directly considered the use of the existing Ro-Ro berth as a potential Cruise berth, for alongside mooring, given the disruption this would cause to the operation or the significant capital works required to move the Ro-Ro operation to a new berth.

The potential for a cruise berth would also need to be considered in the road network assessment. Increased traffic generated by tour buses, and the possibility of staff and passenger parking will be included in the assessment alongside the marina and port traffic.

4.0 Proposed Facilities - Cruise Terminal

Given the significant limitations of the existing infrastructure, two approaches have been considered to enable development of cruise facilities at Fishguard port. The first involves refurbishing, upgrading or replacing the existing quay wall and creating a new berth by realigning the quay wall and dredging the navigation channel and berthing pocket to allow the Cruise Vessels to berth alongside the quay. The second is to install pontoons alongside the existing Northern quay to berth a tendering vessel. The tendering vessel will transport passengers from the cruise ships moored offshore in deeper water outside the navigation channel.

The advantages and disadvantages of each of these two approaches are considered in the following section of the report. These options are not exhaustive and can be further developed in more detail once site investigation and topographical survey information becomes available.

4.1 Option 1: New Berth

There are a number of variations on this option which can be developed further if required however, the basic premise is that the existing quay is not long enough, deep enough nor strong enough to support the berthing and mooring of Cruise vessels of the capacity anticipated. Therefore, the primary proposal would be the construction of a new quay wall, realigned off the existing quay to provide a sufficiently long berthing and mooring face.

The new quay wall, shown in sketch IBM00553-SK-006 in Appendix A involves constructing a new quay wall, offset from the original wall and infilled behind to maintain a longer, straight berth. The new wall is proposed to be offset 12 m which allows the straightening of the quay, removing the corner and creating a 270 m berthing face. Consideration has been given to maintaining Stena operations during and post construction.

The choice of construction for the new quay wall will be subject to detailed design but is likely to be sheet piled, tied with rock anchors back into the ground behind. On the northern quay a newly faced wall with sheet piles on either side is proposed. A more detailed design will be further assessed once survey and borehole information is available. The advantages and disadvantages of the new quay wall proposal are detailed in Table 4.1.

Option	Advantages	Disadvantages
New Quay Wall - Realigned with Dredged Berth Pocket	- Fully refurbished quayside, with deeper berthing pocket - Extended life of structure - Known load capacity of structure - Maintain RNLI berth with no disruption	- Expense compared to pontoon structures - Time to construct and install - would not be ready for summer 2015 - Marine licence required - Need to negotiate with Stena to prevent clashes with upgrades to the linkspan or extended services - Dredging of berthing pocket required
No Dolphins to Extend Berthing Line	- No need for tendering vessels - passengers disembark straight to onward transport - Quayside is unrestricted and open to public vessels when cruise ship is not docked - Port receives berthing charges for cruise ships	

Table 4.1 New Quay Wall

There is a significant amount of capital dredging associated with the scheme; within the berthing pocket, the turning circle and the approach channel. The complexity and cost of this dredging will largely depend on the nature of the material to be removed. The significant provision of this scheme is that it allows Cruise vessels to berth directly alongside the quay, with all the associated benefits that this affords.

4.2 Option 2: Tendering

Given the depth restrictions and capacity limitations of the existing quay; options for mooring the cruise vessels offshore and tendering the passengers to the quay side have been considered. This allows the cruise ship to moor in deeper water within the navigation channel while passengers are transported to shore via a tendering vessel. Pontoons installed off the northern quay will allow the passengers to disembark into the port. Two main types of pontoons have been considered, piled and non-piled with five configurations presented to demonstrate the flexibility of the solutions. The options are broadly described below and in Table 4.2, which highlights the advantages and disadvantages of each. Typical layouts are contained in Appendices B and C for piled and non-piled options respectively.

Layout 1 - The pontoons are installed to the landside edge of the quay. A minimum of two piles are required to anchor the pontoons and another single pile required for the access bridge. See IBM0553-SK-001 in Appendix B for layout sketch.

Layout 2 - The pontoons are installed perpendicular to the quay with a minimum of two piles for stabilisation of the pontoons. This layout allows RNLI to continue undisturbed and allows

the majority of the shoreside edge of the quay free for berthing. See IBM0553-SK-002 in Appendix B for layout sketch.

Layout 3 - The pontoons are installed alongside the outer quay wall. This layout avoids compromising access to the RNLI and provides generous space for passengers. See IBM0553-SK-003 in Appendix B for layout sketch.

Layout 4 - The pontoons are installed on the end of the quay, restrained by two piles installed at opposite corners. This layout requires the least number of pontoons, as the tender ferries are able to berth on either side. See IBM0553-SK-004 in Appendix B for layout sketch.

Layout 5 - No piling is required for this option, with the pontoons being anchored to the quay by the access bridge. The access bridge moves on a hinge to rise and fall with the changing tide level. This option is the most flexible, and possibly quickest to become operational with no major construction works needed, either piling or upgrades to the existing quay. This layout allows the option to remove the pontoons during months where large cruise ships are not scheduled, freeing up the berthing face for other vessels. See IBM0553-SK-005 in Appendix C for layout sketch. Photos and the layout have been provided by Marine Design Limited.

Option	Advantages	Disadvantages
Pontoons - Piled	- No dredging required - Could potentially be operational for summer 2015 - Less expensive compared to permanent structures - Pontoons can be removed when out of season, leaving an open berthing face - Limited or no upgrades to current quay structure required	- Tendering vessel required - Longer disembarkation time for passengers compared to berthing alongside quay - Marine licence required for piling - Loss of berthing face when pontoons installed - Loss of port revenue compared to berthing alongside - Possible disruption to RNLI depending upon orientation and position of pontoons
Pontoons - No piles	- No dredging required - Could potentially be operational for summer 2015 - Less expensive compared to permanent structures and piled pontoons	- No piling required - No marine licence required - Loss of berthing face when pontoons installed - Loss of port revenue compared to berthing

	• No marine licence required • Pontoons can be removed when out of season, leaving an open berthing face • Limited or no upgrades to current quay structure required • No disruption to RNLI	alongside • Longer disembarkation time for passengers compared to berthing alongside quay
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Table 4.2 Pontoon Options

There are several additional issues to be considered if the tendering options are to be implemented, the primary consideration being the loss of “attractiveness” of the Port to potential Cruise operators given the associated issues with tendering passengers to and from the port. However, the tendering options do allow for the Port to be considered as a Cruise destination for a relatively low cost and potentially in a short timeframe.

5.0 Project Cost Estimate

Costs have been prepared for each of the options considered and these are presented in Table 5.1 below. The project cost estimates for the new quay wall and dredging is based upon the following assumptions:

- 270m long new quay wall and dredging pocket to 9.0m C.D.
- Dredging to 9.0m of 350 m diameter turning circle
- Ground conditions assumed as sands and silts - no rock dredging included (potential x10 increase in dredging costs)

There is a significant amount of further design required to allow more accurate costing of a permanent facility such as a new quay wall and capital dredge to be undertaken. The rates used in the estimate are based on recently available costs.

The cost estimates for the pontoons associated with the tendering are derived directly from a pontoon supplier. Costs associated with the supply of additional tenders have not been included.

Table 5.1 - Cost Estimate - (Pontoon Estimate - Marine Designs Limited Nov 2014)

Option	Details	Cost Estimate
New Quay Wall		
	To include new sheet piled wall 270 m on the shore side and approximately 80 m around the end and on the landside edge of the north quay. Additional backfill, deck slab and dredging of berth pocket and turning circle are also included.	£8,100,000
Pontoon Options		
1	7 x 8.5m x 5m wide, 1m freeboard concrete pontoon, 2 piles	£551,000
2	3 x 8.5m x 5m wide, 1m freeboard concrete pontoon, 2 piles	£323,000
3	5 x 8.5m x 5m wide, 1m freeboard concrete pontoon, 2 piles	£436,714
4	2 x 8.5m x 5m wide, 1m freeboard concrete pontoon, 2 piles	£265,200
5	2 x 8.5m x 5m wide, 1m freeboard concrete pontoon	£230,000

6.0 Forward Planning / Future Works

Should the desire exist to develop Fishguard as a cruise destination then it is certainly feasible from an engineering point of view. However, given the limitations of the existing infrastructure there are capital works to be undertaken. All of the works proposed will require further investigations and design development.

Currently a topographical survey of the site has been commissioned alongside a borehole cored through the deck of the northern quay. The topographical survey will be used to understand the area available for redevelopment, and the current access routes into and out of the site. The topographical survey encompasses the entire port site, the road network leading into the site, the slope behind the port and points along Quay Road to the west of the site.

The deck core will expose the structure of the quay, depth of the foundation and the strata below. These results will inform the next step of the options appraisal. The integrity and stability of the quay will determine how much additional strengthening may be required to accommodate mooring loads from the cruise ships or pontoons.

There is further Geotechnical Investigation proposed as part of the ongoing design of the Marina development which could be expanded to include boreholes and sampling in the areas of the proposed turning circle, berthing pockets and quay wall.

An assessment of the tidal conditions and potential sediment movement and disposition would need to be undertaken as part of the design of the larger scheme.

Discussions with the relevant authorities would need to be opened to determine the likely Planning and Environmental requirements of any scheme, although it is obvious the installation of pontoons would attract far less risk. The creation of a full cruise berth is also likely to require a full EIA as part of any planning application.

7.0 Conclusions and Recommendations

Given the limitations of the existing port infrastructure there are two main routes to be considered to accommodate Cruise vessels at Fishguard; the creation of a new quay and berth and the tendering of passengers to and from a vessel moored offshore.

The development of a new berth, from the existing quay will incur significant capital costs and will take several years to implement.

There are several options available to facilitate tendering operations from the existing quay structure and these, particularly the non-piled option, could be implemented relatively quickly for a relatively low capital cost.

There is scope to combine both of the options considered. Installing pontoons to establish access for a cruise vessel in the short term may be preferable, with the new quay wall construction following in the longer term. The benefit to the port here would be to capitalise on shorter lead in time, getting cruise ships into Fishguard sooner. Then, once a cruise industry is established and future plans for the port and marina development finalised the quay wall could be upgraded to suit.

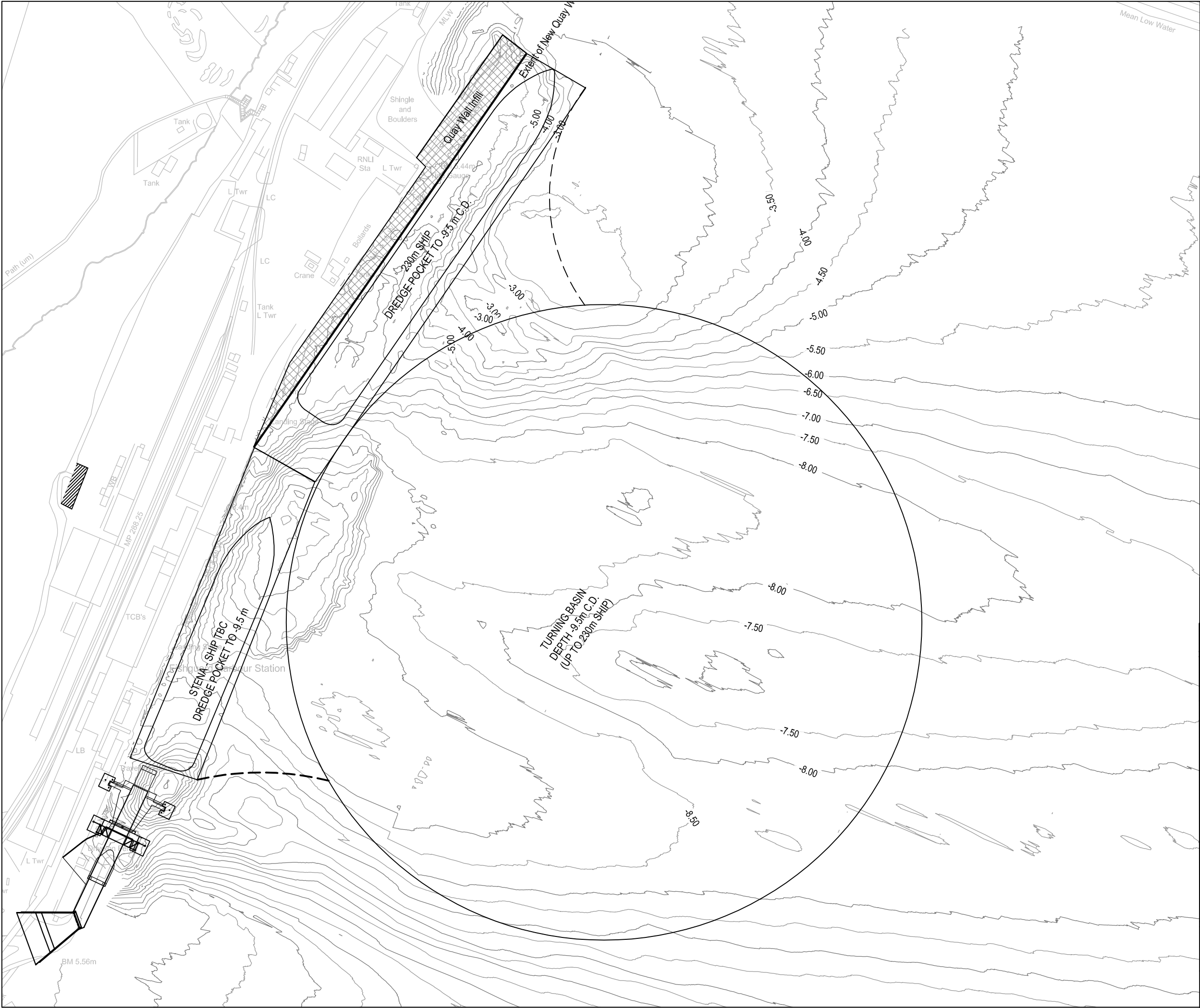
The pontoons could be incorporated into any future redevelopment which potentially protects the initial capital investment.

The options as detailed in this preliminary report will be further assessed in line with results obtained from the deck core and topographical survey. These options are by no means exhaustive and will be expanded upon when the extra information is available. Additionally all options must be considered within the wider plans of the Axis development and any future Stena plans for the Ro-Ro ferry operations.

It would be beneficial, if there is ongoing Geotechnical Investigations proposed, to expand the scope to obtain the necessary information to inform a potential Cruise berth. This would allow the scheme to be developed to a stage whereby it could be presented to Planning and Environmental authorities for discussion and inform the overall costing of the scheme.

Appendix A

Proposed Layout - New Quay Wall



NOTES

4. DATUM:

5. CONCRETE	MIX TYPE	COVER	FINISH

rev	amendments	drawn date	checked date

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Client

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Project

Fishguard Development

Title

New Quay Wall Proposal

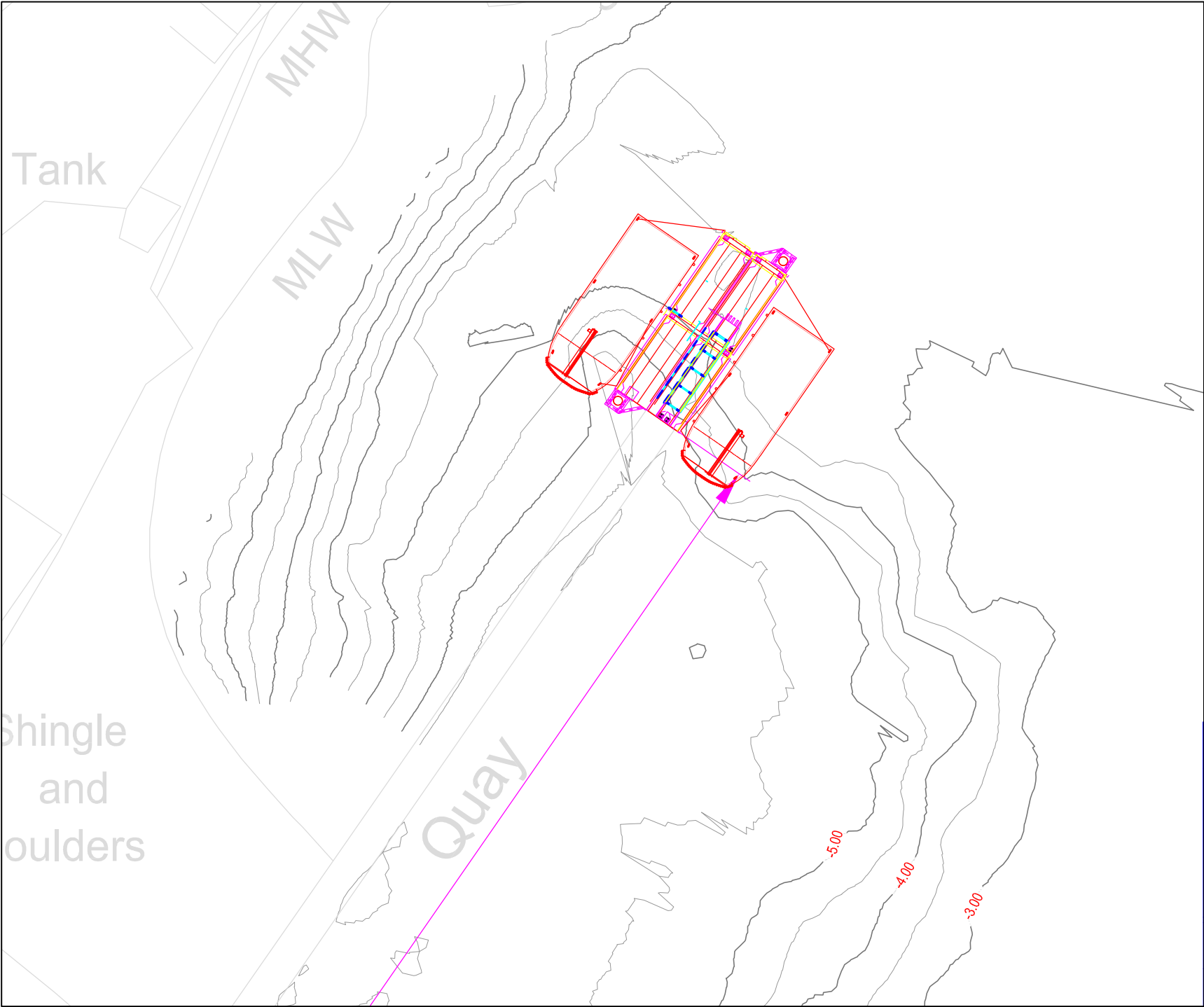
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Drawing Number	Rev
IBM0553-SK-006	-

Project Leader	Drawn By	Date	Initial Review
DPR	EJC	05-12-14	-

Appendix B

Proposed Layouts - Pontoon Options (Piled Solution)



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Project

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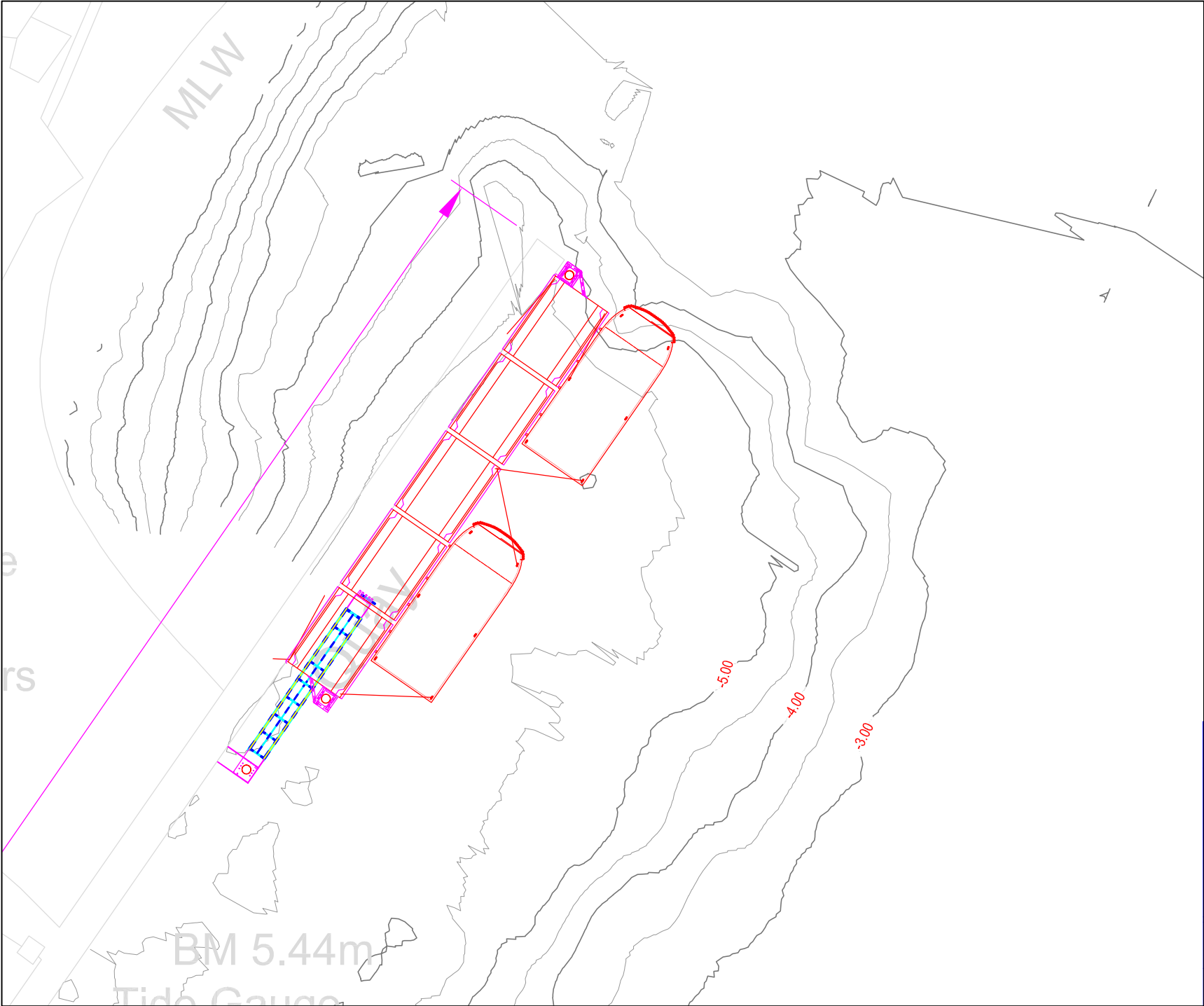
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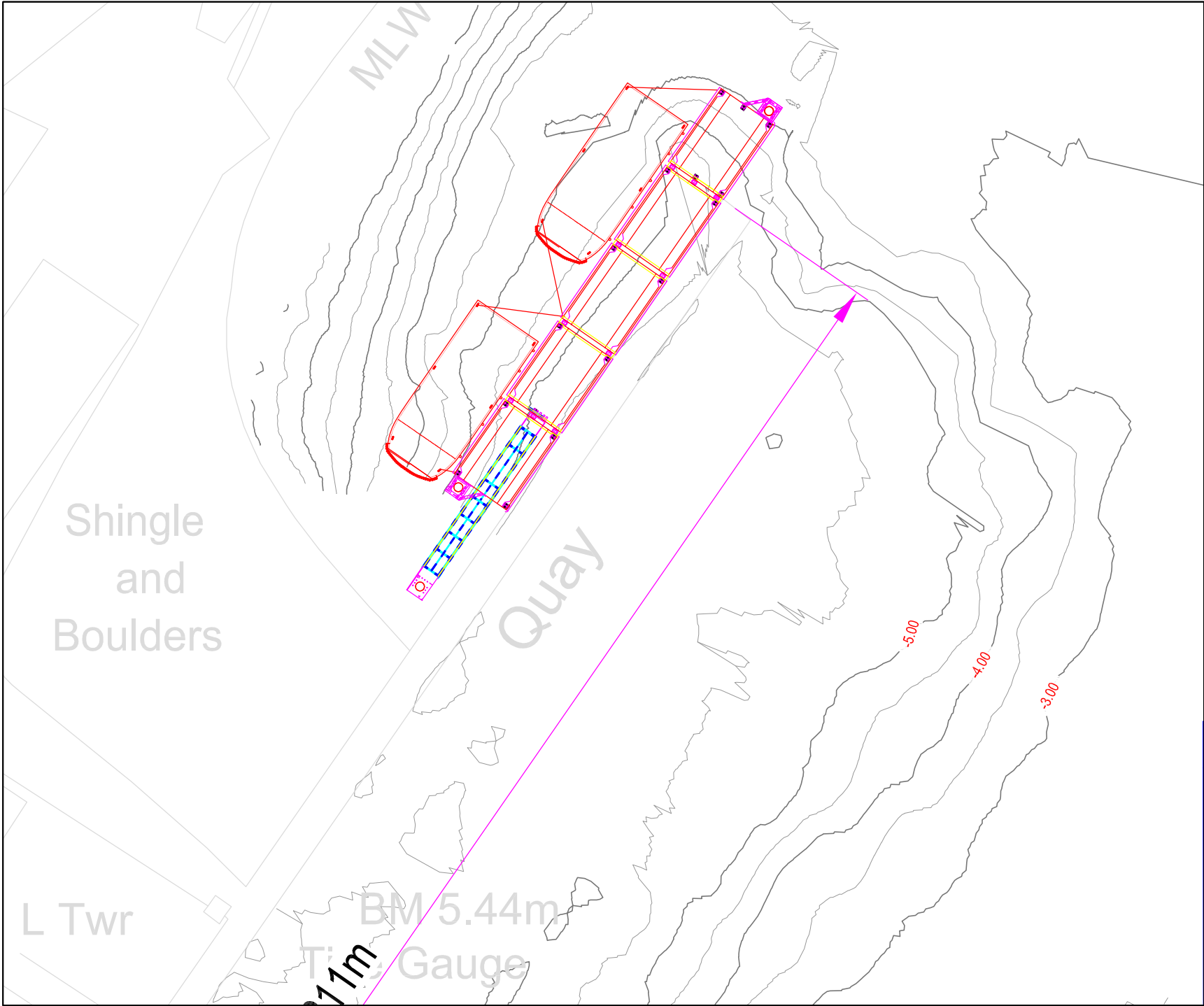
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Project Leader	Drawn By	Date	Initial Review
DPR	EJC	04-12-14	-



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Project			
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Title			
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IBM0553-SK-003			-
Project Leader	Drawn By	Date	Initial Review
DPR	EJC	04-12-14	-



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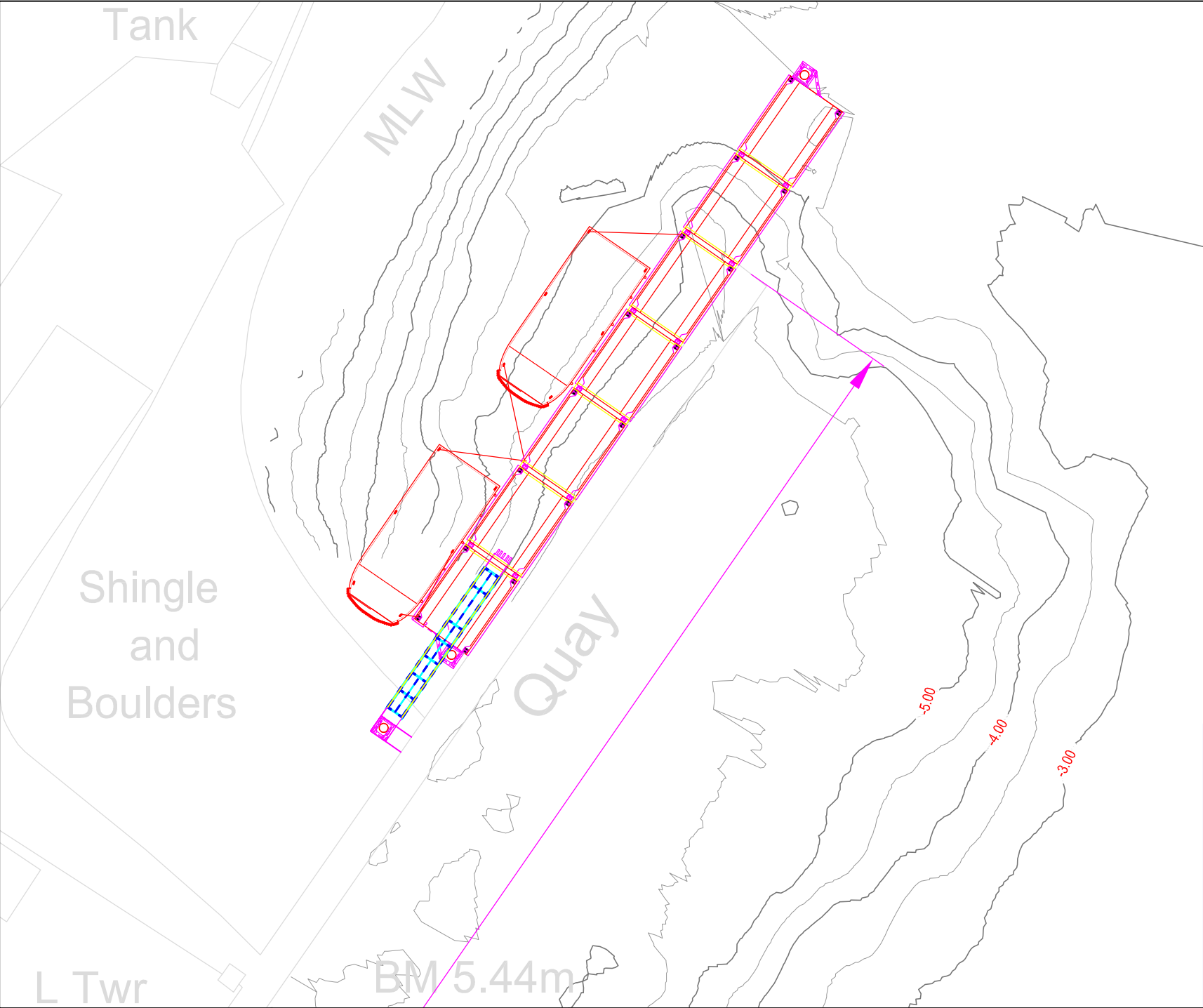
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Fishguard Development

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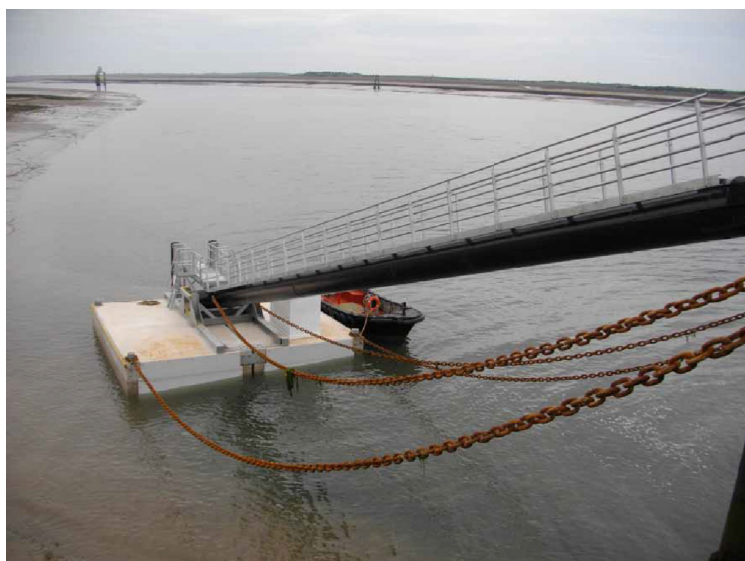
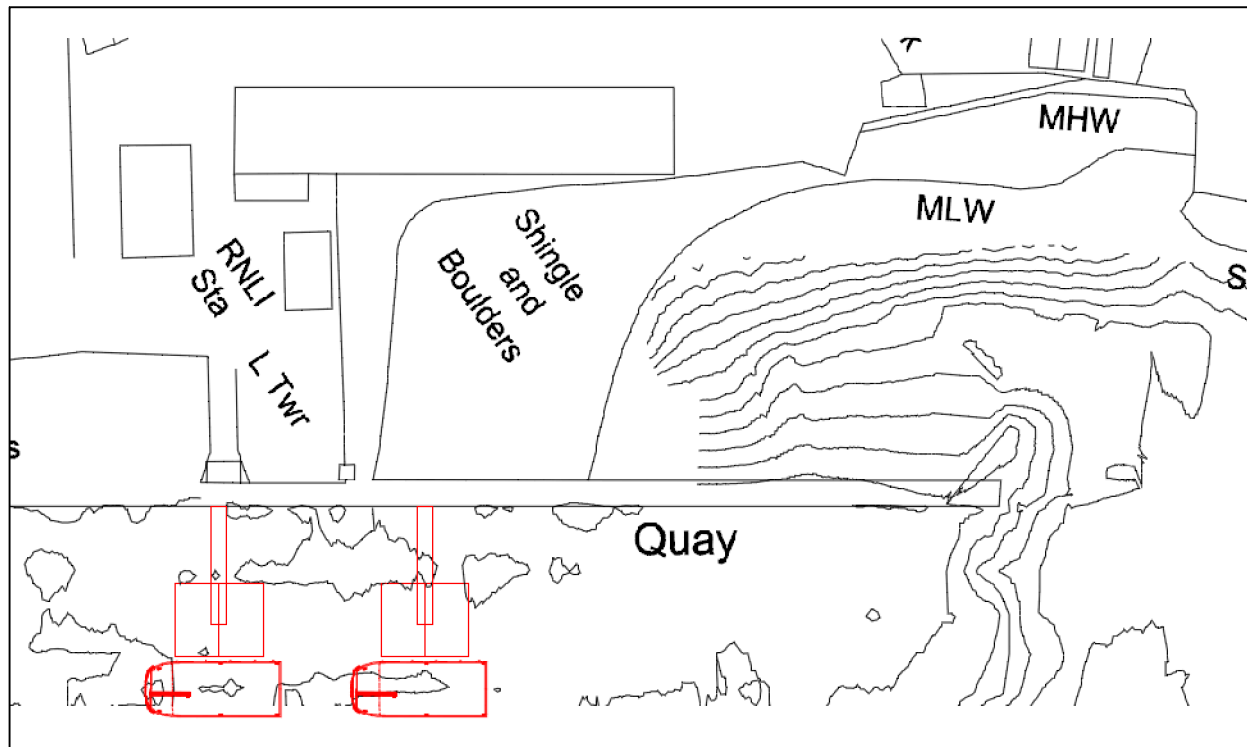


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Project			
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Title			
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Project Leader	Drawn By	Date	Initial Review
DPR	EJC	04-12-14	-

Appendix C

Proposed Layout - Pontoon Option (Non-Piled Solution)



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Title			
Tendering - Option 5			
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Drawing Number			Rev
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Project Leader	Drawn By	Date	Initial Review
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