

TECHNICAL APPENDIX 2.1

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Background

The proposal for Hatston comprises a 300m extension to the existing pier and the creation of 7.5 hectares of quayside laydown area through reclamation; there will be a ship lift, additional link span and fuel facility incorporated in the development.

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Appendix A – Layout Drawings

1.0 Introduction

The following RAMS looks at the proposed construction activities of providing an initial Phase 1 reclamation works followed by a new 300m long quay extension to existing, with approx. 7.5 Hectares of reclaimed land forming industrial laydown using material imported from local quarry sources between 7.0Km and 9.5Km from the site.

The overall location plan (Drawing 202043FS-01) and phased layouts (Drawings 202043FS-10 (Works Phase 1 Reclamation), 202043FS-20 (Works Phase 2 Pier Extension), 202043 – 21 (Dredging Layout) and 202043FS-30 (Works Phase 3 Ship Lift layout) attached in Appendix A shows phased details of proposed development together with surrounding infrastructure that requires to be protected during the works and when the facility comes into use.

The main areas of risk are the existing foreshore marine environment and existing working quay and freight areas during reclamation and quay construction together with import of large fill volumes from local quarry sources over existing local roads.

2.0 Information Available

A hydrographic and sub bottom survey of the seabed has been obtained from Orkney Islands Council and existing OS maps for the proposed site with all levels indicated as being relative to Chart Datum for marine and land sites.

It is proposed that the main quay berth depth at the site should be a minimum of minus 10m to Chart Datum.

Based on Admiralty Charts and Tide Tables, the sea levels assumed in the feasibility report have been taken as follows -

Mean High Water Springs +3.0m Chart Datum

Mean Low Water Springs +0.6m Chart Datum

0.0m Chart Datum is 1.40m below Ordinance Datum

3.0 Site Conditions and Services

The existing Hatston Pier has a long causeway approach from shore with all main freight handling and storage being some distance from the quay edge which is inefficient. The main priority at this site was to maximise laydown areas directly adjacent to the quays in order to maximise efficiency of storage, operation and maintenance together with efficient load in / out from vessels.

4.0 Scheme Proposal

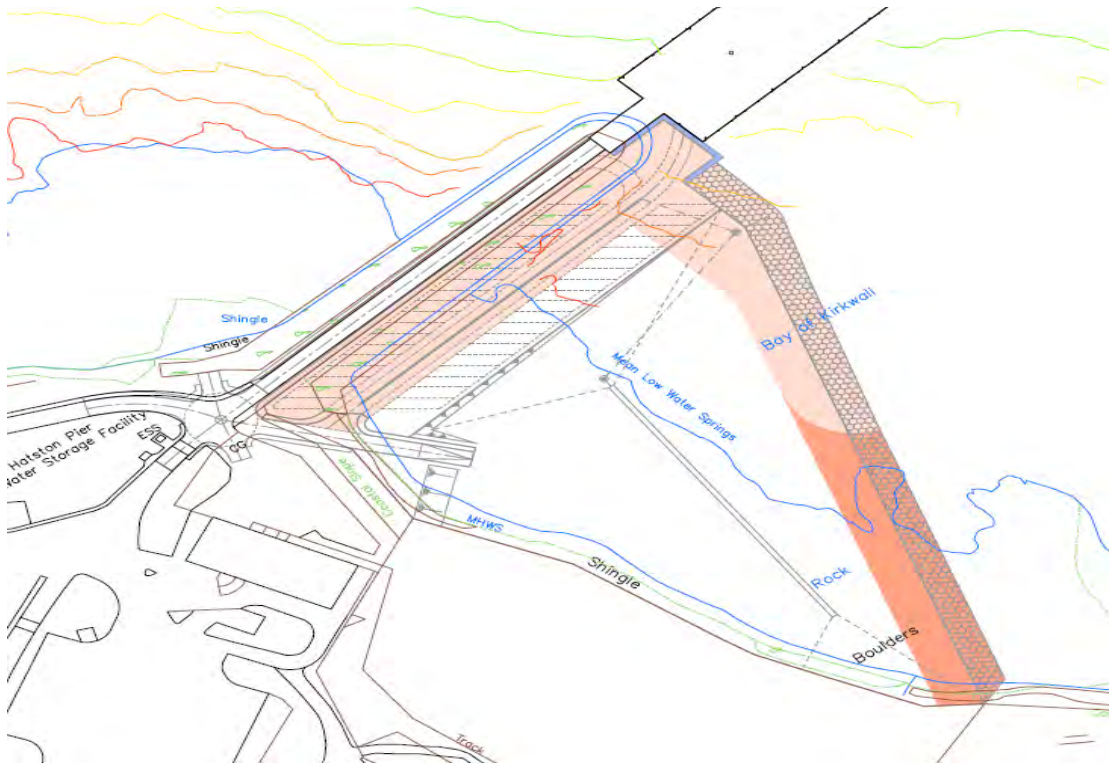
Phase 1 Reclamation Works

The scheme design considers using material sourced from nearby local commercial quarries with one being OIC run and the other being private. Other sources of fill imported from outside Orkney may be considered by contractors but this is deemed not to be economically viable from current assessment except for the import of outer protective armour stone to reclamation fill if required and cannot be sourced locally.

Phase 1 reclamation, armour and drainage works are programmed to be completed approx. 6 months ahead of Phase 2 and 3 works commencing. The outer reclamation bund would be advanced and protected on seaward side ahead of core infill being placed behind. This process will ensure migration of fines is minimised at all times. Stage 1 below would be advanced first with existing armour stone uplifted and stored for reuse as outer slope protection to Stage 2. At start of stage 2 then a section of sheet pile retaining wall will be installed at intersection with existing suspended deck using vibro piling hammer.



Phase 1 Reclamation - Stage 1

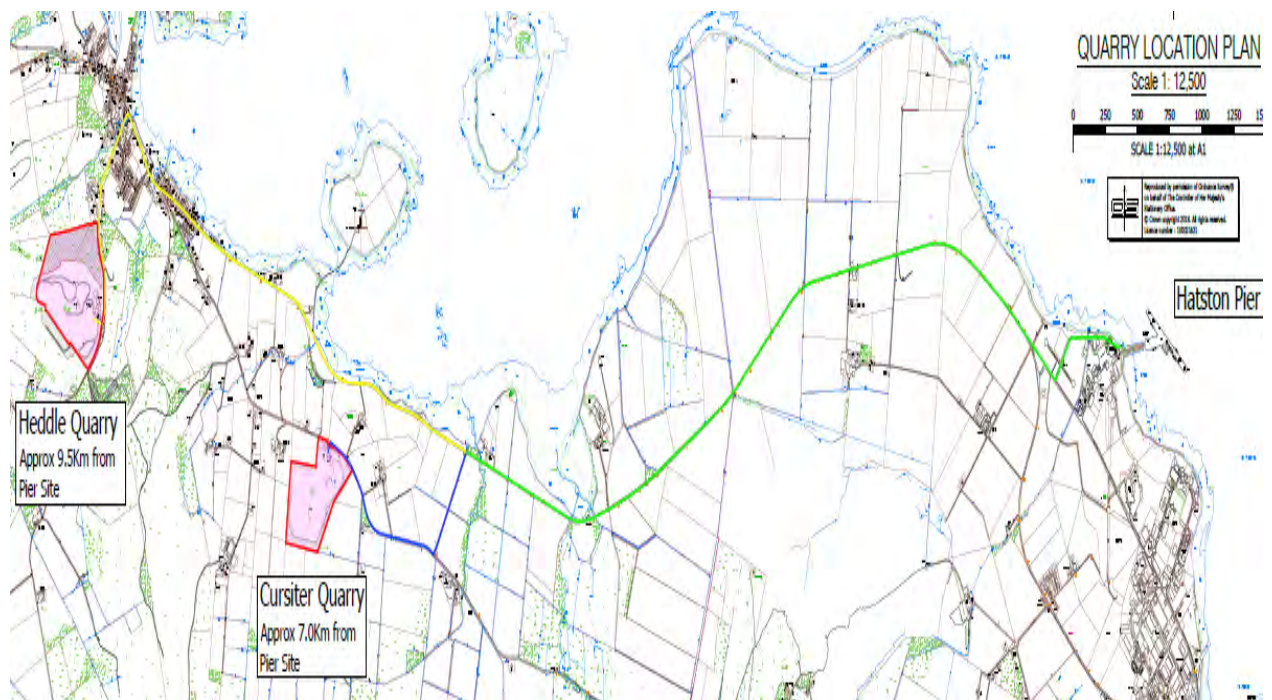


Phase 1 Reclamation – Stage 2



Phase 1 Reclamation – Stage 3 & 4 Complete (Area 29,600m²) including sheet piled area adjacent existing suspended deck

A total of approx. 195,000m³ (394,000 tonnes) of fill material is required from local quarries for Phase 1 reclamation together with imported rock armour to supplement existing on site rock armour. It is envisaged that the fill material would be imported over approx. 10 month period using up to 6 to 7 trucks per hour from existing quarries some 7.5Km to 9Km away from the site as shown below.



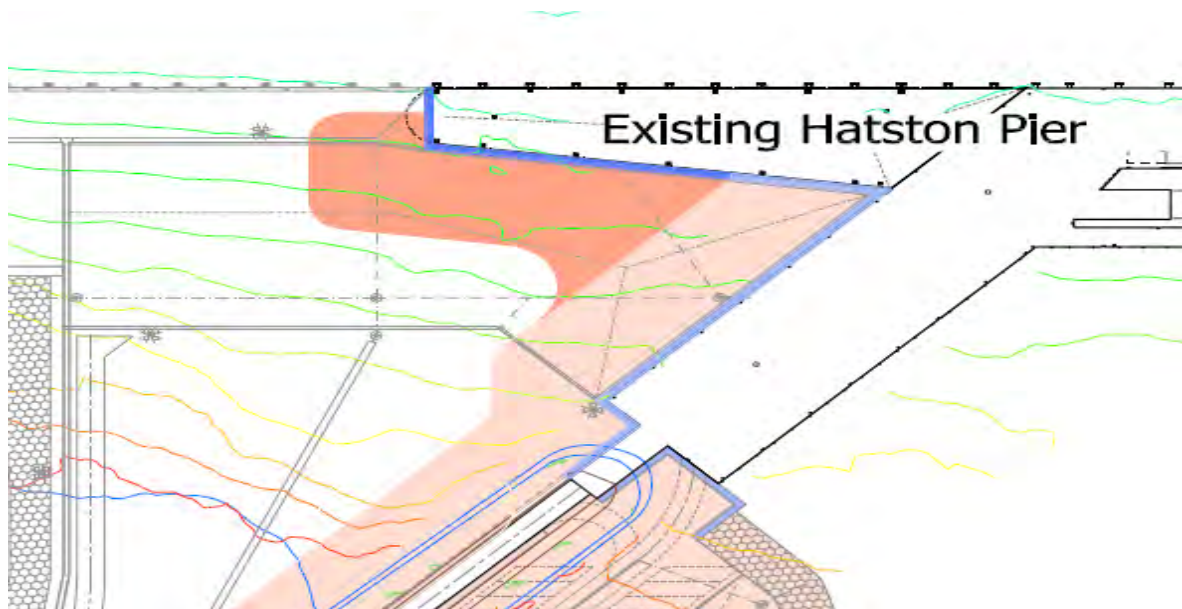
During the formation of reclamation works then silt booms will be used to minimise migration of fines until such time as the outer geotextile protection is in place.

Phase 2 & 3 Reclamation & Quays Works

Reclamation and quay works would be commenced and advanced parallel on the north east side of the existing Hatston causeway in order to ensure complete demarcation from current freight access and egress to existing Hatston Pier.



Stage 5 forming works access approach parallel to existing causeway



Stage 6 forming reclamation access to commence steel sheet piling using vibro piling hammer adjacent existing suspended deck pier

Stage 7 sheet piling at commencement of new 300m quay will involve pre-treatment of seabed ahead vibro piling sheet piles to final depth soon after last blast.

A pontoon platform barge (spud leg) will be used to support drilling equipment including an Atlas Copco 9H5 rig with further barge and crane used for lifting and progressing piling operation including vibro hammer of sheet piles into blasted trench.



Drilling rig for pre-treating hard strata on pile clutch line ahead of piling



Vibro hammer piles to final level level in to blasted pre-treated trench

Drilling Methods

The principal contractor will provide setting out of hole positions at 1m centres along clutch lines giving the depth of rock to be removed across the line to be blasted.

Drilling is likely to be undertaken using an Atlas Copco 9H5 tracked drill rig using a rotary percussive DTH hammer with a Symmetrix N131 casing system or equivalent.

Hole size will generally be 110mm dia. and drilling patterns will be reviewed following trial pile installation to ensure the required depth is being achieved.

The spud leg pontoon barge will provide suitable access for the drilling rig/mast. The barge will be positioned over the area to be blasted. The driller will set up the rig at the borehole location and ensure the drilling mast is vertical using an inclinometer.

The driller will drill through the overburden using the simultaneous drilling and casing system. When the casing is firmly sealed into rock head, the pilot bit will be disconnected from the casing and the drill string will be removed leaving the casing securely in the rock. All cuttings will be directed to silt basins and not to sea.

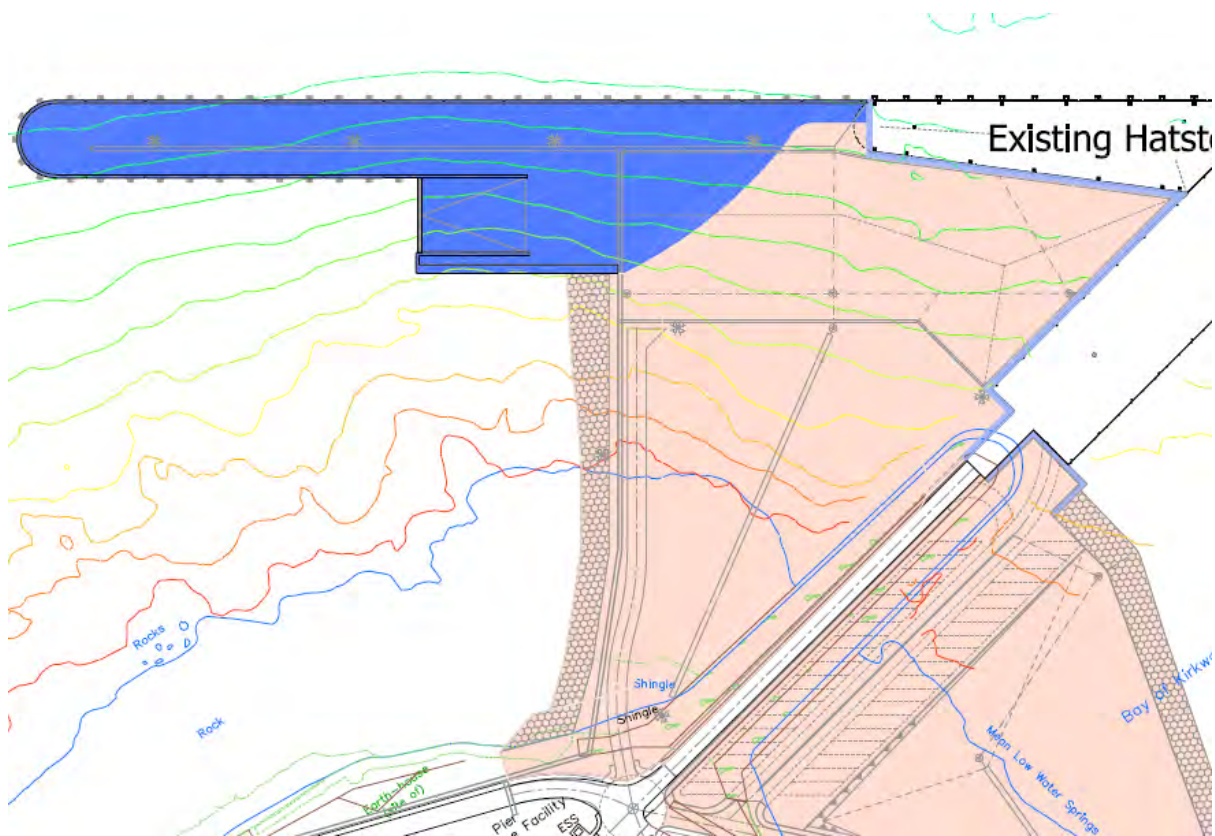
The down-the-hole hammer and string will then be lowered into the casing, allowing the driller to open the rock socket to the required depth.

Once the borehole is complete, the hole will be flushed out thoroughly, checked that it is free from obstructions and that it is at the required depth.

There will be a written Blast Proposal for each blast which will show patterns and drill depths of the holes to be drilled. The Blast Proposal will be made available for inspection by any interested party.

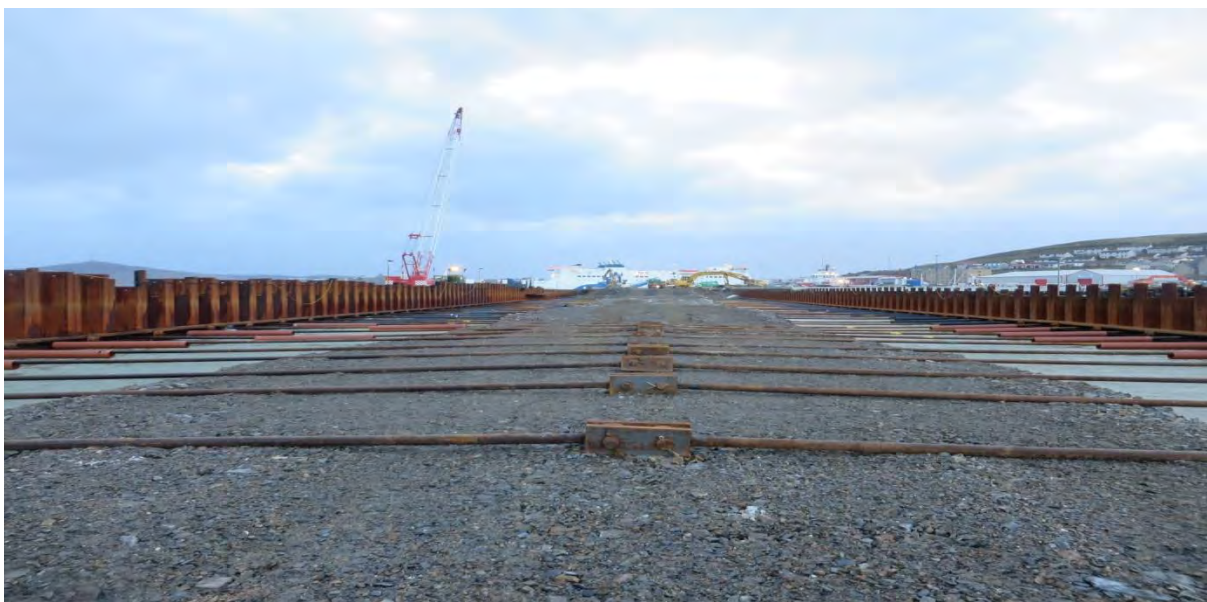
The shotfirer will design each blast to give optimum results taking into account the specific character of each section of work. Present assessment of rock quality indicates that explosive charge of around 15 to 20Kg will be required per hole at 1m centres along complete pile line. The hole firing sequence will be designed so that each hole is fired individually to minimise the MIC (Maximum Instantaneous Charge) and hence reduce vibration.

Contractor will place Vibrographs at predetermined onshore locations as agreed with the client and statutory authorities through the CEMP. These will be monitored as blasting continuous to ensure vibration below any pre-agreed level.



Stage 8 – Pre-treatment of hard strata and then vibro pilings will continue to form quay

Both quay and reclamation will continue to be filled and vibro compacted using H pile on vibro hammer or equivalent to ensure minimum future consolidation. Once fill approached tie rod level then these will be installed before continuing to deck level and main concrete cope and deck works are completed. At all times then piling will progress ahead of filling together with silt booms as required so that migration of fines are minimised at all times.



The total inert stone fill from proposed quarry source to Phase 2 and 3 quay works is estimated in the region of 520,000m³ (£1.1 million tonnes) with filling of Phase 2 estimated at 22 months and Phase 3 up to 10 months working simultaneously. Phase 2 is estimated at 6 to 7 trucks per hour and Phase 3 to 4 trucks per hour.

Dredging

Once all quay works are complete and seabed survey post treatment undertaken then a small dredging campaign will commence to reduce outside berth and approach to future boat lift. It is anticipated that land based dredging technique would be used to remove dredge spoil directly into the marine reclamation works with the licensed offshore dredge disposal site only used if there is a material issue bringing ashore during construction.

5.0 Risk Assessment & Method Statement

1.0 An updated otter survey to any previous study will be undertaken along immediate foreshore not more than 2 weeks before marine works commence on site. Any actions required from this study will be agreed and implemented before any works commence.

2.0 The total extent of the proposed marine works will be set out from fixed shore based control stations linked to Ordnance Survey coordinated grid system. Moored marker buoys will be placed on perimeter line of marine works to clearly mark the total extent of works.

3.0 Only inert stone fill free of all fine clay and organic material from adjacent industrial site excavation will be used for forming proposed marine access and reclamation core bund construction.

4.0 Ahead of filling works commencing from the foreshore then a silt boom will be moored out from shore ahead of advancing fill operation.

5.0 As core filling commences and advances inside moored marker buoys then completed core bund exposed slope profiles will have geotextile membrane placed and secured to slopes between MHWS and seabed toe to reduce migration of sediment as far as possible.

6.0 The advancing head of the perimeter core bund will be protected by the silt boom moored and advanced in front as core bund works progress.

7.0 Once a slope work front is finished and position and profile accurately checked against contract setting out coordinates then inert secondary and primary stone armour will carefully place over the protective geotextile slope membrane to permanently secure in place.

8.0 During construction works then a banksman will be observing any marine, sediment and material movement including further mitigation as required due to changing weather, wave and tidal action.

Only experienced marine contractors will be invited to tender for the works and they will be asked to submit a Contract Environmental Management Plan (CEMP), RAMS and Contractor Waste Management Plan (WMP) for approval by statutory authorities and construction contract as required and before any works commence on site. The CEMP will include construction restrictions during breeding seasons and methods for preventing and dealing with fuel and construction plant and material spillage during the works.