



Aberdeen Harbour Expansion Project

Construction Environmental Management Document

11th May 2017

DRAGADOS

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Chapter 14

Piling Managment Plan

14 Piling Management Plan

14.1 Introduction

14.1.1 Objective

This Piling Management Plan (PMP) has been developed to manage piling activities at the Aberdeen Harbour Expansion Project (AHEP) site.

The requirement to produce a PMP is listed under Schedule 3.2.4 of both of the Marine Licences for Construction and Dredging issued by Marine Scotland (MS), and Schedule 2 of the Harbour Revision Order (HRO). This plan is considered to fulfil these requirements.

This PMP has been developed to provide information on the piling management requirements and procedures associated with the proposed construction stage of the AHEP.

This PMP should be treated as a ‘live’ document and will be updated throughout all stages of the construction process, where required. Dragados will ensure that all piling activities adhere to the approved PMP.

14.1.2 Roles, Responsibility and Cross-Referencing

Table 14.1 details the responsibility of selected staff with regards to construction piling management.

Table 14.1 Roles and Responsibility Table

Job Title	Name	Responsibilities
Head of Section - Marine Works	Javier Ernesto	Maintain a complete overview of current and planned piling activities, Liaise daily with construction management on the piling plans and ensure compliance with this plan.
Construction Manager	Jose Enrique Perez	The AHEP Construction Manager will appoint a “Responsible Person” to manage the piling activities that take place on site
Ecological Clerk of Works (ECOW)	Emma Bias	Monitoring drilling fluid management. Monitoring spraying and dust dispersion around the piling sites.

The AHEP Construction Manager will appoint a “Responsible Person” to manage the piling activities that take place on site. The primary function of this role will be

to maintain a complete overview of current and planned piling activities, to liaise daily with construction management on the piling plans and ensure compliance with this plan and other associated plans such as the Marine Mammal Mitigation Plan (MMMP).

The name and contact details of the responsible person are listed in Table 14.2.

Table 14.2: Responsible Staff

Name of Responsible Person	Contact Details
Javier Ernesto	01224 063600

14.1.2.1 Cross-Reference

This plan should be read in conjunction with the following CEMDs:

- Noise and Vibration Management Plan;
- Nigg Bay Site of Special Scientific Interest Management Plan;
- Fish Species Protection Plan;
- Marine Mammal Mitigation Plan; and
- Pollution Prevention Plan.

14.2 Piling Operations

14.2.1 Piling Requirements

14.2.1.1 Permanent Works

The following list outlines the required piling for the Aberdeen Harbour Expansion Project Permanent Works i.e. quayside and fixed marine equipment:

- West Quay Construction: 50 Onshore Piles;
- North Quay Construction: 46 Piles (28 Marine/18 Onshore);
- West Quay Bollards: 28 Onshore Piles; and
- Test Piles: Approximately 5 Onshore Piles.
- **Total = 111 Onshore Piles and 28 Marine Piles**

On land piling requires the existing shoreline to be up-filled to form a working platform for the installation of the front row of piles. This is essentially a temporary land reclamation. The rotary piles can then be installed from rigs on the land, with no need for offshore jack-up barges.

Marine rotary piling requires a piling rig on a jack-up barge.

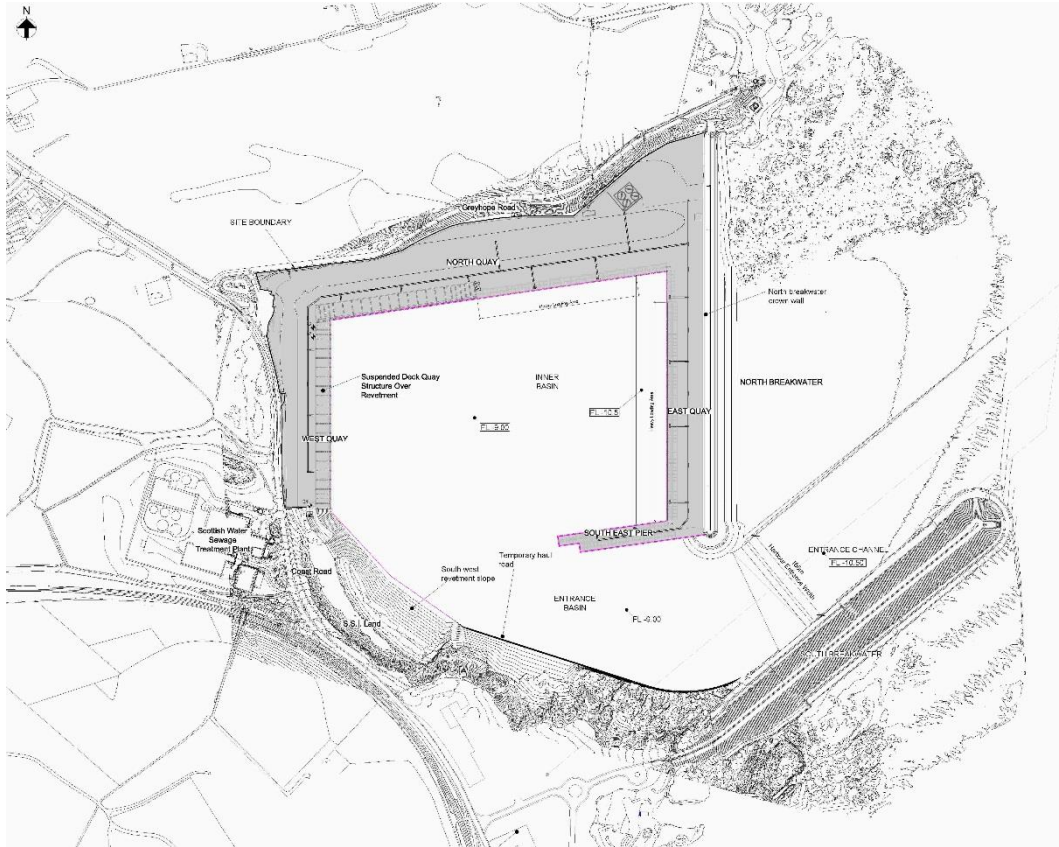


Figure 14.1: Layout of harbour showing the West and North Quay suspended decks

14.2.1.2 Onshore Temporary Works

Temporary sheet piles will be installed onshore to support a slope when its toe is excavated. This work will most likely take place within the following sites:

- Southern Compound; and
- North Breakwater Haul Road

Temporary works may also be required to support an excavation at the site behind the West Quay for the placement and subsequent backfill of the petrol interceptors. Deep drainage pipes may also require excavations supported by temporary sheet piles.

No sheet piling is permitted within 20 meters of the Nigg Bay Site of Special Scientific Interest (SSSI) outer boundary without prior authorisation from Aberdeen City Council (ACC) and Scottish Natural Heritage (SNH) (See Nigg Bay SSSI Management Plan for further details).

14.3 Methodology

14.3.1 Rotary Bored Cast-In-Situ Concrete Piles

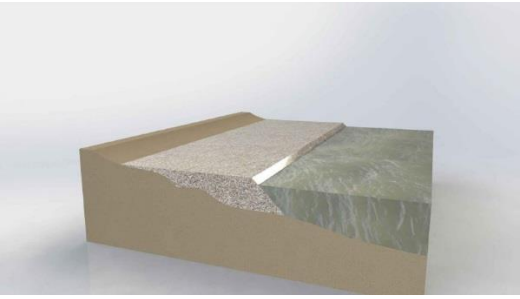
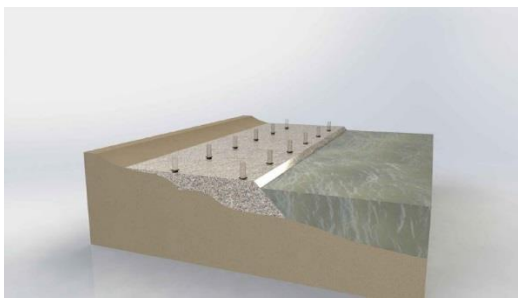
In order to construct the West and North Quays, rotary piling will be undertaken. The process for installing the rotary piles is described below:

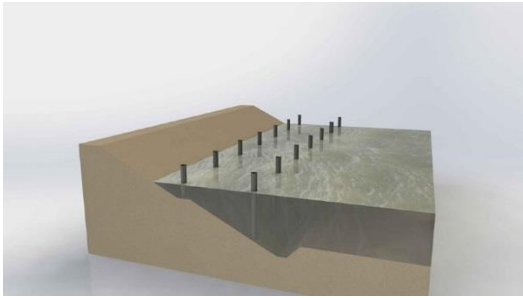
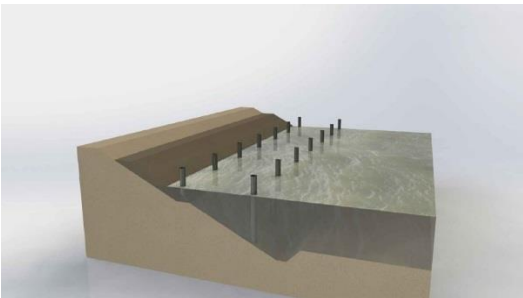
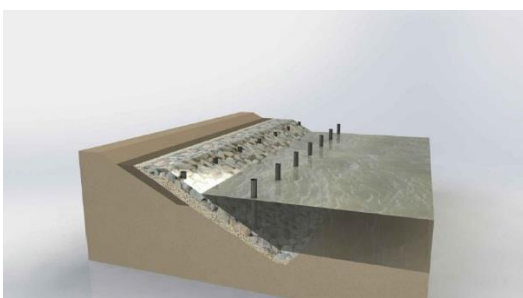
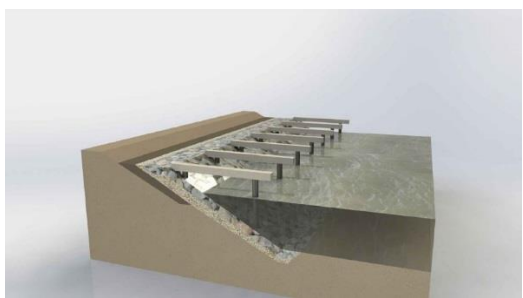
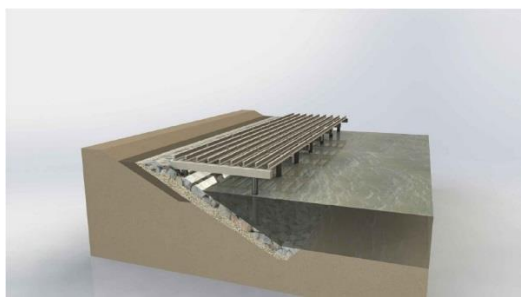
- The drill auger excavates the soil and rock to the required design depth; thereby constructing an open bore;
- To prevent collapse of the bore, temporary steel casing is vibrated into the ground. In the case of deep bores where temporary steel casing may not be suitable, the use of a support fluid such as vinyl polymer or, more commonly, bentonite drilling fluid may be used;
- Once the auger has reached design depth, a cleaning bucket is used to ensure cleanliness of the base;
- Should bentonite be used to support the bore, the slurry is re-circulated and replaced within the bore to avoid any detriment to concrete quality;
- The reinforcement cage is lowered into the open bore;
- Concrete is delivered into the bore by discharge into a hopper feeding a tremmie pipe. The concrete is poured from the base of the bore to surface; and
- The temporary steel casing is removed, leaving the concrete pile in situ.


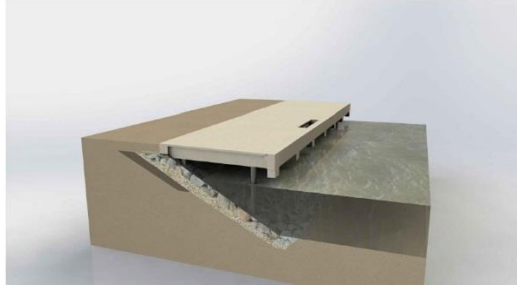
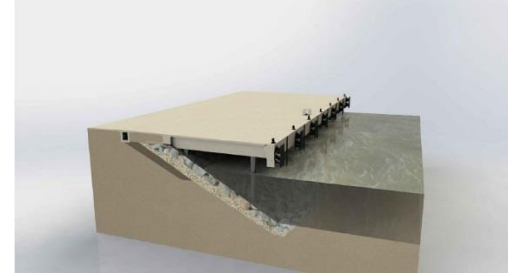
14.3.2 Suspended Quay Construction Sequence

The rotary pile process can be better understood when considered in the suspended quay construction sequence. This sequence will be followed for the installation of the west and north quay as is described below:

Table 14.3: Suspended Quay Construction Sequence

<p>Stage 1:</p> <p>If required, fill existing shoreline to same level as land</p>	
<p>Stage 2:</p> <p>Installation of large diameter rotary bored cast-in-situ piles. Temporary steel casing is left to protect piles during subsequent excavation.</p>	

<p>Stage 3:</p> <p>Removal of fill material and sea bed to design formation level.</p>	
<p>Stage 4:</p> <p>Install revetment inner rock core material</p>	
<p>Stage 5:</p> <p>Install revetment outer rock armour slope and filter.</p>	
<p>Stage 6:</p> <p>Install pre-cast concrete trough units and cast infill concrete to tie box to piles.</p>	
<p>Stage 7:</p> <p>Install Y beams between concrete trough units</p>	

<p>Stage 8:</p> <p>Cast in-situ deck overlay. Cast edge beams and lay steel reinforcement prior to casting deck.</p>	
<p>Stage 9:</p> <p>Cast concrete deck</p>	
<p>Stage 10:</p> <p>Construct paved area to rear of suspended deck along with service trench. Install fenders, twin horn bollards and ladders to quay edge.</p>	

14.3.3 Steel Sheet Piles

For sheet piles, the sequence of installation is:

- Piles manufactured off-site in standard lengths;
- Sheet pile pitched in clutches of piling rig or within pile driver suspended by crane;
- Pile driver installs sheet pile below ground using hydraulic impact hammer or vibration rig. Should additional lengths be required, these are welded onto the installed section and re-driven;
- Once installed to depth, pile trimmed to required level at ground level; and
- It is expected that the majority of temporary works will be completed using vibration piling techniques to minimise noise pollution however it is possible that impact piling may be used in a limited capacity at depths beyond 40m.

14.4 Records

Dragados and their appointed piling coordinator will keep a detailed record of piling operations and completed piling activities. These records are required to contain the following information:

- Pile number and location;
- Pile installation technique; and
- Duration of works.

Marine piling operation logs also require the following additional information to be recorded if at any stage of the project impact piling is used:

- Date of activity and location;
- Daily weather activities;
- Sea state;
- Piling start and end times;
- Mitigation measures used; and
- Underwater noise data.

These records will be provided to Marine Scotland on a half yearly basis.

14.5 Mitigation Measures

14.5.1 Use of Impact Piling

Impact piling is not currently proposed within the schedule of works for the AHEP piling operations, with rotary piling being proposed instead.

The use of marine impact piling during construction is not permitted unless a revised PMP is approved by Transport Scotland (TS) and Marine Scotland (MS).

14.5.2 Drilling Fluid Control and Recirculation

In order to minimise drilling fluid ground contamination during rotary piling operations the following mitigation measures will be implemented:

- Sheet piling will be implemented around the piling sites and drilling circulation circuit while drilling fluids will be used;
- Sandbags will be placed at the drop of the boreholes where possible to minimise overflow spillage; and
- A regular maintenance and inspection regime of the drilling fluid pipeline and joints will be implemented to minimise leakage.

The ECoW is responsible for monitoring drilling fluid management.

14.5.3 Dust Control

Dust and particle dispersal will be controlled by dampening the piling sites with water sprays as operations take place. This is further described in the Pollution Prevention Plan.

The ECoW is responsible for monitoring spraying and dust dispersion around the piling sites.

14.6 Monitoring

If deployed in the marine environment, the noise produced by piling activity will be measured and recorded as outlined in the MMMP. This includes the following monitoring and mitigation measures as outlined in Section 11.6 of the MMMP:

- a) Marine Mammal Observers and Passive Acoustic Monitoring will be used to ensure that operations do not start while marine mammals are within the 500m mitigation zone.
- b) A watch, of at least 30 minutes duration, will be undertaken prior to drilling commencing. Drilling operations may only start after marine mammals have been outside the exclusion zone for 30 minutes. (ie. no animal has been since for at least 30 minutes).

Reporting of activity including watches prior to activities commencing, marine mammals observed, delays to operations commencing and any post operation sightings will be completed (Section 11.7 of the MMMP). The forms are included in Appendix B of the MMMP and will be used as templates and standardised across operations.

Please refer to the MMMP Section 11.11 for further monitoring requirements in regards to marine mammals and construction activities in the marine environment.