Aberdeen Harbour Expansion Project

Construction Environmental Management Document

21 October 2019
AHEP-DRA-APP-0001 Rev 5

DRAGADOS

Contents

Chapter 14
Piling Management Plan

Revision Log

Minor updates to formatting have been made throughout the document. The main/significant changes are listed in the table below.

Revision Number	Date	Location of Revision	Revision Details
Rev 3	16/05/2018	Front of Document	Document updated to Revision 2 and date updated.
		14.1.2, Table 14.1	Table updated to remove individuals names
		Section 14.2.1	Numbers of piles updated. At this time, no marine piling is planned
Rev 4	10/01/2019	Section 14.1.1, 14.1.2	Removed reference to sheet piling
	10/01/2019	Section 14.1.2	Updated contact number and role of responsible person overseeing piling activities from Marine Work Manager to Head of Section – Open Quays
Rev 5	21/10/2019	Throughout the document	Formatted the document to align

Contents

14 Piling Management Plan

14.1 Introduction

14.1.1 Objective

This Piling Management Plan (PMP) has been developed to manage rotary ~~and sheet~~ 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	Responsibilities
Construction Manager	The AHEP Construction Manager will appoint a "Responsible Person" to manage the rotary and sheet piling activities that take place on site
Head of Section - Marine Works	Maintain a complete overview of current and planned rotary and sheet piling activities, Liaise daily with construction management on the piling plans and ensure compliance with this plan.
Environmental Clerk of Works (ECoW)	Monitoring drilling fluid management. Monitoring spraying and dust dispersion around the piling sites.
Environmental Manager	Environmental management responsibilities

The AHEP Construction Manager will appoint a "Responsible Person" to manage the rotary ~~and sheet~~ 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 contact details of the responsible person are listed in Table 14.2.

Table 14.2: Responsible Staff

Name of Responsible Person	Contact Details
Head of Section – Open Quays	01224 063606
Environmental Manager	01224 063630
Environmental Clerk of Works (ECoW)	01224 063631

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 rotary piling for the AHEP Permanent Works i.e. quayside and fixed marine equipment:

- West Quay Construction: 58 Onshore Rotary Piles;
- North Quay Construction: 46 Onshore Rotary Piles
- West Quay Bollards: 20 Onshore Rotary Piles; and
- Test Piles: If required, approximately 2 Onshore Rotary Piles.
- **Total = 126 Onshore Rotary Piles**

On land rotary 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.

Although rotary piling will occur below the marine high water spring line, this piling will be undertaken through up-filling to the existing shore line as described previously.

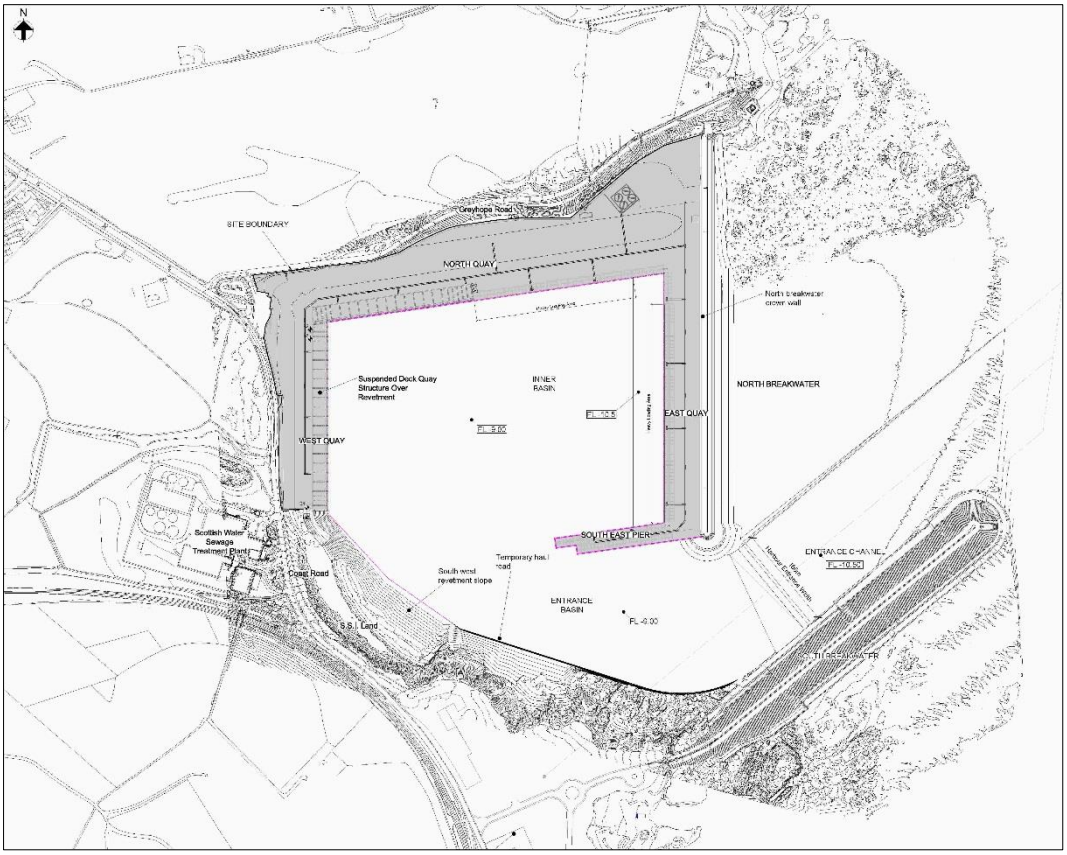


Figure 14.1: Layout of harbour showing the West and North Quay suspended decks

14.2.1.2 Onshore Temporary Works

If required, 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 marine sheet piling is planned. No sheet piling is permitted within 20 metres 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

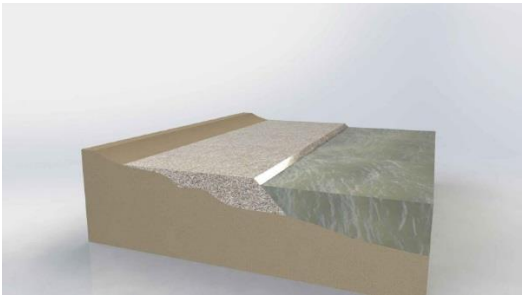
In order to construct the West and North Quays, rotary piling will be undertaken. The process for installing the rotary piles is described below:

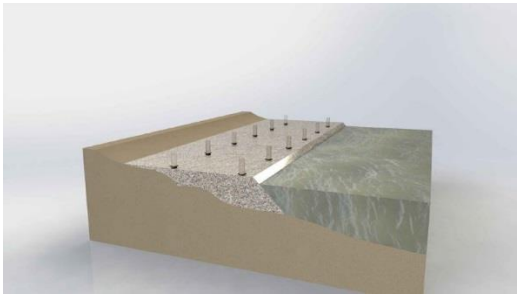
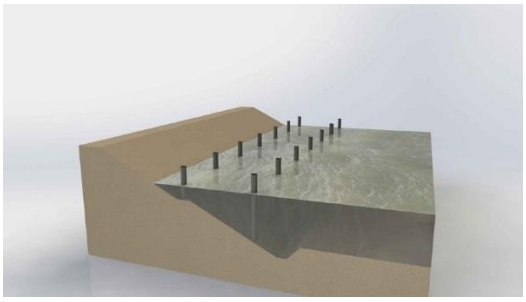
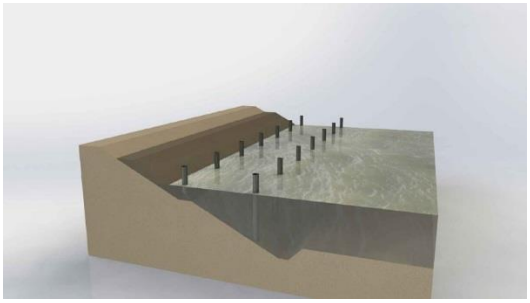
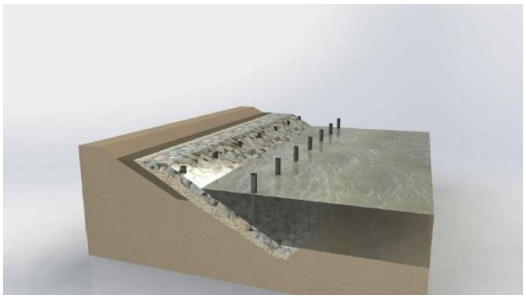
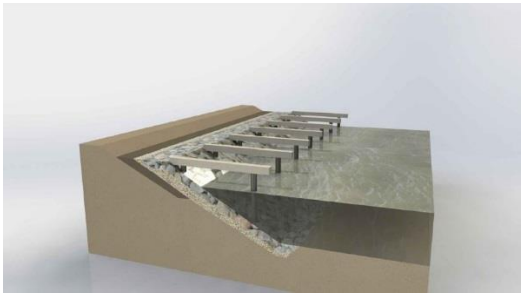
- The drill auger excavates the soil and rock to the required design depth; thereby constructing an open bore;
- To prevent collapse of the bore, temporary steel casing is vibrated into the ground. In the case of deep bores where temporary steel casing may not be suitable, the use of a support fluid 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.

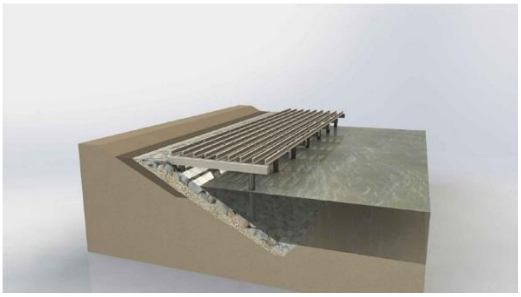
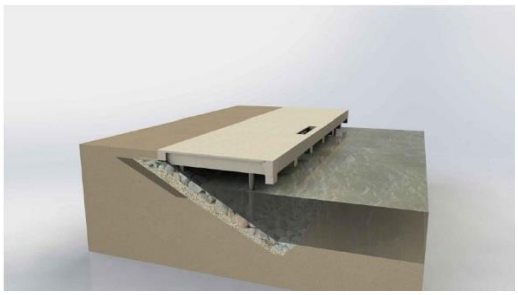
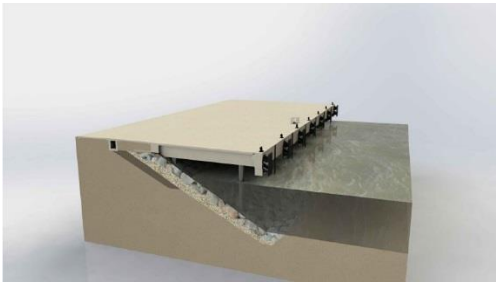
14.3.2 Suspended Quay Construction Sequence

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

Stage 1: Fill existing shoreline to same level as land.	

Stage 2: Installation of large diameter rotary bored cast-in-situ piles. Temporary steel casing is left to protect piles during subsequent excavation.	
Stage 3: Removal of fill material and sea bed to design formation level.	
Stage 4: Install revetment inner rock core material	
Stage 5: Install revetment outer rock armour slope and filter.	
Stage 6: Install pre-cast concrete trough units and cast infill concrete to tie box to piles.	

Stage 7: Install Y beams between concrete tough units	
Stage 8: Cast in-situ deck overlay. Cast edge beams and lay steel reinforcement prior to casting deck.	
Stage 9: Cast concrete deck	
Stage 10: Construct paved area to rear of suspended deck along with service trench. Install fenders, twin horn bollards and ladders to quay edge.	

14.3.3 Steel Sheet Piles

If required, the sequence of installation for sheet piles is:

- Sheet 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.

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 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

At this time, as all piles are to be installed from land, it is not expected that drilling support fluid will be required. However, if drilling fluid is to be used, in order minimise drilling fluid ground contamination during rotary piling operations, the following mitigation measures will be implemented:

- Sheeting 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 rotary and/ or sheet 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 rotary and/ or sheet piling sites.