Edinburgh Marina
Construction Environmental Management Plan

May 2022

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1 CHANGE CONTROL

Any changes to working methods not identified within the method statement (i.e., construction technique, quantity of material to be imported or other significant change to methodology or circumstances) will involve cessation of the works until a full risk assessment has been conducted on these changes and the method statement has been altered accordingly to reflect these changes. Any changes will be issued to all parties concerned.

Recording of change(s) will identify areas where change(s) have occurred throughout the CEMP document.

Table 1-1: Document Change Record

Date	Version	Author	Change Details

2 INTRODUCTION

2.1 Remit & Responsibilities

This document represents the Construction Environmental Management Plan (CEMP) which will form the main document outlining environmental protocols relating specifically to the construction at Edinburgh Marina. This CEMP sets out the minimum requirements which will be adhered to during the construction phase of the Project.

Although this document has been produced by EnviroCentre, EnviroCentre do not accept any responsibility for the contents of assessments, plans or construction procedures that are carried out or added by other parties. This document is considered to be 'Live' and will be populated by Principal Contractor as the works progress, with a copy shared between interested parties listed.

Note: This document is not a Health and Safety Protocol.

2.2 Site Description

At present, the harbour site comprises predominantly reclaimed land from the sea, consisting of vacant brownfield land which is scheduled for development under the approved 2003 masterplan and a number of subsequent Matters Specified in Conditions (MSC) permissions. The overall topography of the surrounding area is generally flat, with the proposed marine works development situated at the edge, and within the extents of the harbour.

Edinburgh Marina sits within the Granton Harbour regeneration development area, approximately 4km north of Edinburgh City Centre and fronting the Firth of Forth. It is approximately 9.5Ha, bounded to the north by the Western Breakwater, to the east by the Eastern Harbour and to the south by wider regeneration proposals and developments. The nearest residential development is situated on Merlin Avenue, approximately 90m south of the proposed development.

Within the wider area there is a combination of brownfield land, commercial/industrial and residential premises, which will be developed as part of the Granton Waterfront Development. Granton Waterfront is split into four development quarters of (1) Central Development Area, (2) North Shore, (3) Forth Quarter, and (4) Granton Harbour.

2.3 Project Description

The wider Granton Waterfront Development is a 60-acre development along the Firth of Forth comprising 1,800 homes, 186-bed spa hotel and 18,500sq/m retail, leisure and commercial space and a 340-berth marina. The new Edinburgh Marina development will include a wide range of high-end leisure and accommodation facilities, situated adjacent to Edinburgh's first ever purpose-built luxury marina. This CEMP deals only with the Edinburgh Marina Development

Edinburgh Marina has been designed to surpass the 5 Gold Anchors rating of the Yacht Harbour Association. Once operational, the marina will offer 340 full-serviced berths, with visitor berths and additional dry berths for boats up to 30m in length. Edinburgh Marina will offer 24 hour access to the sea. Marine services and an extensive chandlery will be located in the new marina office sited within the fully equipped new boatyard. The marina has been designed to accommodate the full-size range of

yachts and cruisers, including some of the largest of the world's superyachts – the first time this has been possible on Scotland's east coast.

Development associated with the proposed marina element of the Granton Harbour Regeneration Scheme, comprises the construction of a harbour wall, incorporating a 225m length of sloping masonry revetment wall and a 110m length of vertical sheet extension to existing quay wall and backfilling; the laying out of a 340 berth marina; construction of an extension to existing north mole and harbour dredging. Figure 2 contained within Appendix A provides the Masterplan layout for the Granton Harbour Regeneration Scheme. These elements benefit from the original outline planning permission, with the adjoining boatyard and marina office now having detailed planning permission. There are currently, (September 2018) further applications in relation to the marina office and boatyard and also the aparthotel and public realm works to the north of that development; these are pending determination.

The proposed development is the redevelopment of the existing harbour area to accommodate a new marina.

2.3.1 Summary of Component Parts

The proposed development encompasses four aspects of works:

Harbour Dredging – **NOTE**: The CEMP does not address dredging- refer to separate Edinburgh Marina Dredging Environmental Management Plan (November 2019)

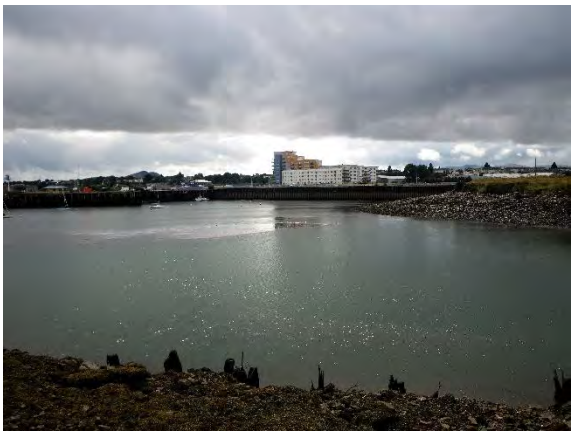
Quay Wall Works – the existing quay wall is dilapidated and poorly defined. The proposed quay wall works aims to formalise the water/land margin, providing the public with context to this area of wider regeneration development. The location and extent of the proposed quay wall and revetment works are demonstrated in Drawing 115875/021 contained within Appendix A of this CEMP. The northern section of the works will reconstruct the sloping masonry revetment, maintaining the connection to the existing northern breakwater, and will be 225m in length. The southern section of the works will comprise of a vertical quay wall with associated sheet piling that will be 110m in length and situated adjacently to the proposed boatyard.

From the original planning application that was granted planning permission in principle in 2003, there is to be an area of backfill to the west of the revetment and quay wall. This will form the public realm associated with the new hotel and serviced apartments on Plot 35 of the masterplan (The current planning application reference is 17/05306/AMC). The material to be used to backfill the quay wall has been previously stockpiled on site, and the site to the west and south-west will be regraded to form the approved surface finish levels.

North Mole Extension – Granton Harbour is a long-established harbour which is protected by an existing sea wall to the north. Drawing 115875/0027, contained within Appendix A of this CEMP, demonstrates the spatial relationship within the site boundary. The proposed marine works comprise further extension to the existing North Mole structure in order to better protect the harbour mouth from excessive wave action. The proposed linear extent of the North Mole extension is 50m. The extension will be vertical faced on the harbour side and sloping masonry on the seaward side as illustrated in Drawing 115875/0027, contained within Volume 2. A method statement for the North Mole Extension is contained within Appendix B of this CEMP. The north mole is a partially Listed Building, at its western extremity, and as such, any works to this section require to be considered under Listed Building Regulations. It is understood that any works proposed to this western section will fall under repairs and maintenance to the existing structure.

New Marina – The proposed marina comprises 340 number of berths of different sizes to accommodate varying sized vessels, the proposed layout as detailed by Figure A-P-00-G7-005H, contained within Appendix A of this CEMP. The linear extent of the berth is 4,407m and the marina development will extend approximately 32.1% of the available useable water area within the harbour. The marina area will extend to approximately 22,879m^2. The marina will be formed through a series of floating berths and pontoons that will rise and fall with the tide (Refer to Drawing No. 115875-0001-A and A-P-00-G7-005H within Appendix A of this CEMP).

At present, methods of construction and their timing are not formalised in detail. To ensure that risks of adverse impacts are identified and kept to acceptable limits, construction management plans will be a requirement within construction contracts for individual developers.



Edinburgh Marina from North Mole looking south

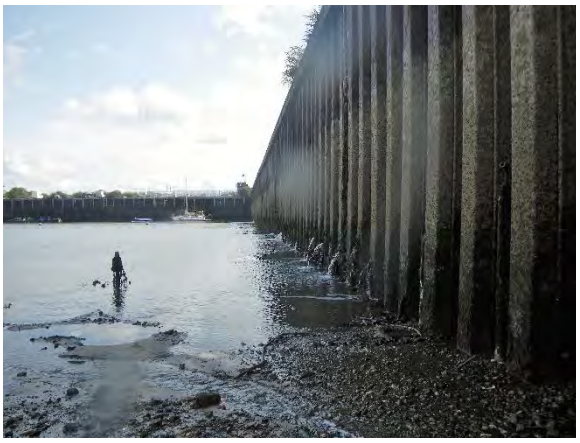
Edinburgh Marina – Looking towards North Mole

North Mole – Harbour Side

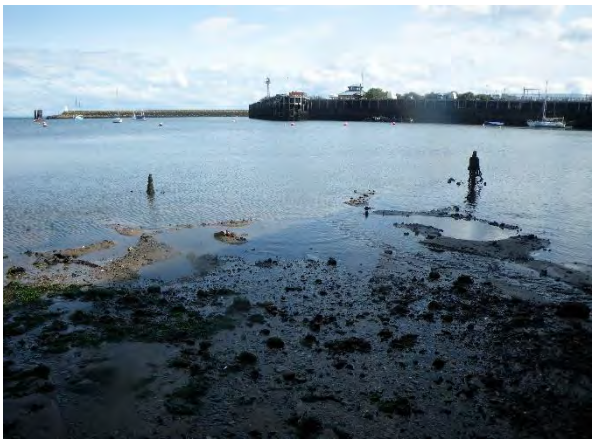
North Mole – Firth of Forth Side

Location of Western Revetment from North Mole

North Mole from the Proposed Revetment



Southern Quay Wall looking east to Middle Pier



Looking east towards Middle Pier

2.4 Construction Methodology

W A Fairhurst were commissioned by Granton Central Developments Ltd to prepare a high level civil engineering statement[1] setting out the likely method of construction and various aspects of civil engineering works to support the development and provide protection for Edinburgh Marina and Granton Harbour. These comprise an extension to the North Mole breakwater, an internal quay wall and an internal harbour revetment. General layout arrangements are demonstrated on Drawing No's. A-P-00-G7-005H and 115875-0100 within Appendix A of this CEMP (Refer also to Appendix B, Civil Engineering Method Statement).

2.4.1 Quay Wall Construction

2.4.1.1 Description

On the west side of the marina basin, a quay wall is to be formed. This will be a continuation of the existing quay wall along the south boundary. The proposed form of construction is a tied sheet pile wall with insitu reinforced concrete capping beam with metal parapet. The form of construction will be similar to the existing.

2.4.1.2 Construction Methodology

The wall is formed from driven sheet piles. The existing sheet pile wall was installed from a barge and it is likely that the same methodology would be used for the additional length of wall. A barge would be positioned at high water and stabilised on jack up legs. From this platform, the sheet pile wall can be installed tying into the existing wall. Individual sheet pile sections are lowered vertically into the sea bed, interlocked with the adjacent pile sections. Piles are usually driven to staged depths to maintain the continuity and allow adjustments. After being driven to full depth, the top of the piles are cut off to the design level. At this stage, the piles will be free standing but not capable of being backfilled. Ties will be installed between the piles and a secure anchorage point on shore. These will be buried reinforced concrete blocks that will resist the thrust from the wall when it is backfilled.

[1] Fairhurst, Edinburgh Marina Civil Engineering Method Statement North Mole Extension, Inner Revetment and Quay Wall 14th September 2018

The wall will be backfilled with suitable material available from elsewhere on the site. The top of the wall is completed by a reinforced concrete capping beam that is cast in-situ to tie the top of the piles together. It will also support to the metal pedestrian parapet that will provide edge protection.

2.4.2 North Mole Extension

2.4.2.1 Form of Construction

The North Mole extension requires a vertical internal face for a length of 50m to maximise space available for the marina. An inclined seaward face of rock armour will provide protection from wave action. Several forms of construction are possible for this structural layout but it is anticipated that a reinforced concrete wall would be formed, resting on the seabed with a natural rock faced revetment to the seaward side. The Reinforced concrete wall would be assembled from hollow pre-cast concrete boxes that can be filled on site with concrete and or ballast rock. The concrete wall will extend for 50m, beyond which a 25m rock revetment will provide additional protection.

2.4.2.2 Construction methodology

For the purposes of the method statement, it is assumed that all works will be carried out using marine based plant. However, subject to an assessment of the existing Esparto Wharf and North Mole it may be possible to create an access to allow some of the work to be undertaken by land, reducing marine based activity.

The overall steps in the construction process are

i. Locally reduce the level of the seabed to design dredge level
ii. Excavate further to the design formation level for the concrete wall
iii. Place a regulating layer of stone to land the concrete units on
iv. Place precast concrete foundation blocks
v. Build up the precast concrete wall units, sealing the joints as they are placed to control subsequent wet concrete placement
vi. Place any binding reinforcement and drop in pre-formed reinforcement cages
vii. Fill concrete units with underwater mix concrete
viii. Backfill around concrete wall externally to revetment founding level, internally to bed level.
ix. Construct revetment on outer face of concrete wall, and for an additional 25m along the line of the wall.

2.4.2.3 Local Dredging

The area of the Western Harbour will be dredged to a finished dredge level sufficient for the planned operation of the marina. The depth varies across the marina with shallower waters for smaller craft closed to the shore.

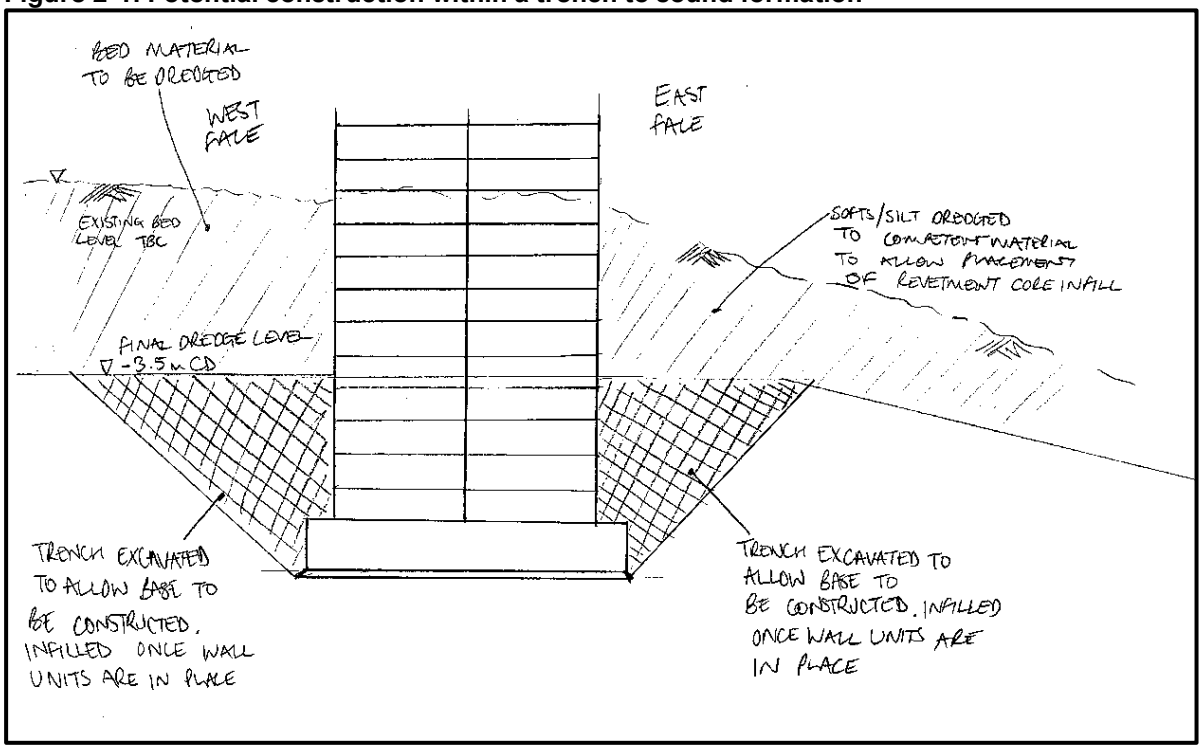
Dredging in advance of the north mole is likely to be by backhoe dredger. Sediment testing has been undertaken across the marina site with some material identified as suitable for disposal at sea site at an approved site and the remainder brought ashore for disposed or treatment and reuse.

This CEMP does not address dredging- refer to the separate Edinburgh Marina Dredging Environmental Management Plan (November 2019)

2.4.2.4 Base Formation

The wall of the breakwater is expected to be founded approximately 4.5m below final dredge level subject to geotechnical investigation and design. A trench will be excavated from the dredge level to the base formation level with sloped sides of a gradient dependent on the geotechnical properties of the bed material. Figure 2.1 represents this construction phase.

Figure 2-1: Potential construction within a trench to sound formation



A 250mm thick layer of Type 1 material will be placed on the base of the excavation and then levelled to allow placement of the reinforced concrete foundation units. These solid units provide a solid and stable foundation from which the wall can be supported. Divers will be employed to direct the placement and levelling of the units.

Once placed, a local bathymetric survey will be undertaken to confirm the base is at the correct level to receive the precast units making up the wall.

2.4.2.5 Precast Unit Construction and Placement

In order to minimise the time of construction on site and the associated cost of marine based plant, the wall will be constructed from precast units, which can be fabricated off site. The units will be transported to site by road or sea, depending on the location of the fabrication site.

The wall comprises a reinforced concrete foundation approximately 7.5m wide and totalling a length of 50m. This will be made up of individual precast units sized to suit placement by crane from a barge and will be keyed together. Hollow units to form the bulk of the wall will be lifted and placed by crane from a barge with divers directing placement of the units, which lock together. This will form a sealed cofferdam into which concrete will be pumped in lifts.

2.4.2.6 Breakwater Construction

Following the construction of the breakwater wall, the rock infill forming the core of the revetment to the east of the wall will be placed using a long reach excavator from a barge. Some reinstatement of bed material may be possible if material properties permit prior to build up of the core of the breakwater.

Prior to placement of the secondary rock layer, consisting typically 300kg sized rock, divers will place a layer of geotextile to prevent material washout. The larger primary rock armour will then be placed on top to provide the full level of wave protection. The rock will be placed using a barge mounted long reach excavator. It is assumed that all rock will be delivered to site by sea and will be placed directly from the delivery barge to the revetment.

2.4.2.7 Wave Wall

In order to provide additional protection along the top of the structure, a precast reinforced concrete wave wall will be placed. The wave wall units will be lifted into place by barge mounted crane or telehandler and secure in place.

2.4.2.8 Finished Walkway

Behind the wave wall, a paved surface will be installed to form the walkway. Fixtures such as lighting can be installed, with service ducts having been cast into the final lift of precast concrete boxes.

2.4.3 Marina revetment

2.4.3.1 Description

The west boundary of the marina basin is formed with a natural stone faced revetment that will enclose and protect an area of reclaimed land. The core of the revetment is expected to be a combination of material recovered from elsewhere on the site and imported structural fill. The facing rocks will be imported to site by road. Along the top of the revetment, a concrete capping detail with integral channel for planting and parapet along the top provides the transition

2.4.3.2 Construction Methodology

The revetment can be constructed using land based plant and machinery working progressively along the line of the revetment until completed. The fill behind the revetment can be placed behind once the revetment is structurally sufficient to protect the infill.

The revetment needs to be founded on a sound strata and so the first operation will be excavation of the bed sediments down to a suitable formation level. The core can then be built up in layers before being sealed behind within a geotextile. This will protect the integrity of the core and prevent future washout of material. The rock armour facing will then be placed on the outer face of the revetment and if the bed was excavated below dredge level, some bed material can be reinstated up to this level. Infill behind the revetment will comprise material from elsewhere on the site that has been tested for suitability. The reclaimed area will be suitable for car parking and landscaping.

2.4.4 Construction Phasing

It should be noted that a detailed construction method statement has not yet been finalised, and as such it is estimated that the marina development as described in Section 2.4 above would take approximately 14 months to construct. The proposed development will be indicatively phased as follows within Table 2-1. Any assumptions used within the relevant assessments throughout this EIAR have also been included. Where timing is Month 1-3 for example, this implies a 3 month construction period.

Table 2-1: Construction Phasing and Assumptions

Proposed Development Component	Timing	Assumptions
Dredging and Reclamation **Refer to Dredging Environmental Management Plan (November 2019)**	Month 1-3	Dredging would operate between 07.00 and 20.00. The fill material would then be compacted using vibrating rollers during daytime hours.
Construct quay wall and foundations	Month 3-6	Assumed that work would be undertaken from Monday morning (07.00) to Saturday lunchtime (13.00), with potential for night-time working. However, within this time the actual

Proposed Development Component	Timing	Assumptions
		construction period would be determined by low tide and restricted to periods between 12.00 and 16.00 and 0.00 and 4.00 over a 4 day period, every 2 weeks.
Piling	Month 3-6	This would take place between 07.00 and 19.00 Monday to Friday and 07.00 to 13.00 on Saturdays.
North Moll Extension and Breakwater	Month 7-8	This would take place between 07.00 and 19.00 Monday to Friday and 07.00 to 13.00 on Saturdays.
Place rock armouring	Month 8-10	This would take place between 07.00 and 19.00 Monday to Friday and 07.00 to 13.00 on Saturdays.
Construct pontoons	Month 10 -14	This would take place between 07.00 and 18.00 Monday to Friday, and 07.00 to 13.00 on Saturdays.
Services to pontoons	Month 15	This would take place between 07.00 and 20.00 Monday to Friday, and 07.00 to 13.00 on Saturdays.

2.4.5 Assumptions

Typical geology of Granton Harbour consists of soft alluvial silts overlying stiff glacial till which overlies bedrock comprising inter-bedded strata of sandstone and mudstone. Detailed Geotechnical Investigation is required to inform the detailed design. This will be provided to the Contractor to inform the Temporary Works design as required.

A Bathymetric Survey of the current bed levels has been carried out to inform the design and construction methodology (Appendix C). The methodology may vary depending on the preferred approach of the Contractor, the availability of marine plant and the comparative cost of temporary works. However, this statement is considered to be a reasonable and practical approach to the Works that highlights the likely interface with the Firth of Forth.

2.5 Marine Traffic Notice

A notice to mariners shall be issued prior to commencement of the activities to advise all vessels entering or leaving the Granton Harbour that the works are taking place.

3 GENERAL SITE MANAGEMENT

3.1 Introduction

This CEMP identifies the management structure roles and responsibilities with regard to managing and reporting on environmental impacts during the construction phase.

The overall environmental objectives that will be applied to the Development are:

- All practicable steps shall be taken to minimise the environmental effects of construction works.
- All activities shall be conducted in accordance with the CEMP, relevant legislation/ regulation. Standards, Codes of Practices, Guidelines, and any local environmental procedures.
- Environmental licences, permits, and consents and other statutory requirements are to be obtained prior to works commencing, and fully complied with.
- All staff (including sub-contractors) shall be aware of the environmental issues relevant to the Project through the provision of site-specific information on the environmental impacts of construction and the mitigation measures to be applied during inductions, briefings and toolbox talks.
- Regular reviewing of the environmental requirements of the project and ensuring that environmental controls remain adequate throughout the duration of the project.

3.2 Roles & Responsibilities

This section describes the roles and responsibilities of key members of the project team and provides contact details for the relevant personnel (Table 3-1).

Table 3-1: CEMP Roles & Responsibilities

Roles and Responsibility Definitions		
Role	**Responsibility**	**Name**
CEMP Manager	Edinburgh Marina Ltd to appoint a senior member(s) of staff to manage the works. This person will be involved in higher level decision making.	To Be Confirmed
CEMP Team	This team could be drawn from staff involved in the design phase who have a detailed knowledge of the site and the pertinent environmental issues.	To Be Confirmed
ECoW	An independent qualified Ecological Clerk of Works (ECoW) will be appointed to assist the CEMP team to manage compliance through the implementation of the mitigation measures.	To Be Confirmed

Once approved and established the CEMP will form part of the day to day management of the site in much the same way as a safety management plan.

3.2.1 CEMP Manager/Deputy

The CEMP Manager (or deputy) will be responsible for implementation and day to day management of the CEMP during construction. In addition, the CEMP Manager (or deputy) will be responsible for ensuring that all staff and operatives receive site

specific health, safety and environmental induction prior to starting work on-site and are provided with relevant information concerning environmental sensitivities and protection measures.

The CEMP Manager (or deputy) will be responsible for reviewing all risk assessment method statements and ensuring an appropriate programme of toolbox talks are developed and effectively communicated.

Duties will include:

- Continuously review the CEMP;
- Identify the environmental competence of all contractors (and sub-contractors) working on the project;
- Notifying Marine Scotland/ SEPA of notable incidents;
- Review method statements for environmental aspects and advise of any suggested improvements prior to work commencing;
- Monitor construction activities to ensure that identified and appropriate control measures are effective and in compliance with the CEMP; and
- Act as a main point of contact between the contractor and the Edinburgh Marina Ltd project team on environmental issues.

The CEMP Manager and Deputy roles will be undertaken by**……**

3.2.2 Ecological Clerk of Works (ECoW)

A suitably qualified Ecological Clerk of Works (ECoW) will be appointed to supervise the implementation of this CEMP as required.

The Ecological Clerk of Works (ECoW) will conduct regular audits and will be on site when required to monitor specific tasks which have an associated ecological/environmental sensitivity. The ECoW will provide toolbox talks and induction material on request to promote good awareness of ecological/environmental constraints and best practices.

ECoW duties include, but are not limited to:

- Being the main point of contact should any issues relating to ecology arise during construction;
- Regular site audit to document compliance with this CEMP;
- Identifying ecological/environmental risks and developing environmental controls;
- To be familiar with ecological/environmental licensing processes and any licences which are in place to facilitate the development;
- Monitoring of site works where an ecological/environmental sensitivity is apparent (i.e., vegetation clearance);
- Direct liaison with the Principal Contractor and CEMP manager/ deputy regarding known and unforeseen ecological/environmental constraints;
- Provision of advice to achieve good environmental performance;
- Provide site specific induction material/undertake toolbox talks/site induction briefings if this is required;
- Investigation and reporting of unplanned incidents (e.g., unexpected occurrence of protected species, pollution events, implications of delays due to adverse weather conditions etc.);
- Raise an alert for any non-compliance with the ecological/environmental protocols;
- Reporting findings to the CEMP manager immediately. If insufficient action is taken, and ecological/environmental damage is a risk, then the ECoW has the authority to stop works and report the situation to the CEMP manager, Principal Contractor, City of Edinburgh Council or relevant regulator (i.e., NatureScot/SEPA/ Police Scotland);

- Carry out regular inspections of the necessary protective fencing, the status of the known ecological/environmental receptors etc.;
- Review method statements aimed at works with an ecological/environmental risk in order to positively advise on any relevant protocols to be factored in;
- Provision of site observation reports to document compliance;
- Be available to provide advice on revisions to the CEMP as required;
- Be available for project progress meetings and any meeting with ecological/environmental regulators as required.

The ECoW will be provided with updated programme of works to determine watching brief requirements and associated ecological issues before commencement of any development related activities on site.

The ECoW will advise the CEMP Manager/ Deputy and Principal Contractor in avoiding, minimising and mitigating adverse ecological effects. The Principal Contractor will consult with the ECoW prior to undertaking specific works as detailed below and within the Schedule of Mitigation within Section 6 of this CEMP and consider the ECoWs advice at all times.

Where the ECoW disagrees with works being undertaken by the Principal Contractor, resulting in a breach of planning conditions or measures detailed in the CEMP, the ECoW will inform the CEMP Manager/ Deputy immediately. On advice of the ECoW the CEMP Manager/ Deputy may halt the works or parts thereof.

As well as site observation reporting, the ECoW will produce a final report to the CEMP Manager/ Deputy summarising/documenting the environmental compliance of the construction period and any positive/negative effects noted on the environment. The evidence for effects will be based on findings detailed in the site observation reports and site meetings including in the minutes of any formal meetings. The report will be made available to the Principal Contractor and City of Edinburgh Council.

If the CEMP Manager identifies ecology/environmental issues, the ECoW will be contacted for advice immediately.

3.2.3 Principal Contractor

The role of Principal Contractor will be fulfilled by **……**

The Principal Contractor will report on environmental activities to the CEMP Manager/ Deputy and will be responsible for the following:

- Ensuring compliance with all relevant legislation;
- Application and gaining of any environmental licensing required;
- Ensuring best working practice and guidance for working including those contained in industry Code of Practice documents;
- Application of the environmental controls and mitigation measures contained in the CEMP;
- Maintaining environmental controls on site as *fit for purpose*;
- Prompt attendance and remediation of any negative environmental incident that may occur on site;
- Reporting any activity that has resulted, or has the potential to result, in an environmental incident immediately to the CEMP Manager/ Deputy; and
- Administering an environmental log, with a periodic (i.e., weekly) summary report to document compliance and required actions.

The Principal Contractor will be required to undertake regular environmental inspections and reporting to monitor and evaluate performance with respect to the environment.

3.2.4 Marine Mammal Observer

A Marine Mammal Observer (MMO) will attend the site during impact piling operations to provide:

- Advice on timing or works and appropriate use of mitigation such as bubble curtains;
- Communication with the project team to agree the protocol and timing of a soft—start (i.e., a gradual ramp up of power of the impact hammer);
- Visual monitoring of the pre-agreed mitigation zone, (a minimum of 500m) for a minimum of 30 minutes, until it can be confirmed there are no marine mammals present) prior to impact piling commencing;
- Appropriate site observation documentation will be submitted to JNCC on completion of impact piling work.

3.2.5 Site Personnel & Subcontractors

Site personnel and subcontractors have a responsibility to:

- Enquire as to the presence of any ecological constraints prior to undertaking specific work/tasks;
- Work to agreed plans, methods and procedures to eliminate and minimise environmental impacts;
- Monitor the workplace for potential ecological/environmental risks and alert the immediate line Manager if any are observed;
- Maintain good ecological/environmental protections and standards;
- Report all incidents and observation of an ecological/environmental nature immediately to their line Manager, CEMP Manager/Deputy and/or the project ECoW; and
- Co-operate as required, with site inspections and audits.

3.3 Training, Awareness & Competence

In accordance with the CDM regulations, all construction personnel will undergo a site-specific induction to include health, safety and environmental issues, before commencing work on the site.

All personnel will be made aware of their responsibilities with respect to the CEMP. A training programme will ensure that all site personnel fully understand:

- the CEMP and its implementation on-site;
- the environmental sensitivity of the site;
- dealing with unforeseen environmental incidents; and
- the roles of Contractor's personnel and stakeholders with respect to environmental issues.

Site personnel shall be competent to perform tasks that have the potential to cause a significant environmental impact. Competence is defined in terms of appropriate education, training and experience.

Prior to the commencement of any works on site, including the setting up of site compounds and access onto the site, the Principal Contractor (and any personnel appointed by the Principal Contractor) will receive a formal briefing by the ECoW or their appointed representative. This briefing will detail all relevant protected ecological/environmental issues as set out within this CEMP. A copy of this document must be read and understood by all contractors conducting the works.

The training provided will be documented and records maintained, including the quantity and type of training received.

3.3.1 Site Inductions

The Site Manager is responsible for induction training. This is to take place before the site operative commences work for the first time on site. The induction will concentrate on the Principal Contractor's management provisions, site rules, safety provisions as well as the specific site risks involved with the project and the environmental & ecological considerations of the project. Evidence of all induction training carried out and names of personnel, who have undertaken formal induction training together with when they were inducted, must be recorded and filed on-site.

Environmental topics covered during induction shall include, but will not be limited to:

- Ecologically sensitive areas and potential protected species restrictions;
- Water resources;
- Duties and responsibilities;
- Relevant procedures;
- Legislation;
- Environmental best practice
- Pollution prevention;
- Emergency response procedures;
- Management structure; and
- Incident reporting.

Contractors working on-site employed by others (e.g., Utilities), shall be inducted as will all other site visitors. Information concerning their works and co-ordination / co-operation with other site operatives shall be discussed and agreed with the Site Manager & CEMP Manager prior to commencement of their works on-site, as appropriate.

3.3.2 Toolbox Talks

Toolbox talks will be conducted by the CEMP Manager/Deputy, the Principal Contractor, ECoW (as appropriate) to highlight issues of concern and to disseminate new information not previously provided. They will also offer site personnel with the opportunity to provide feedback.

Toolbox talks shall include, but will not be limited to, instances where:

- Work is being undertaken in environmentally sensitive areas;
- There are significant changes in environmental conditions, e.g., Heavy rainfall;
- There is a change to existing legislation, which requires an operational change; and
- Site inspections or audits have identified corrective actions which require rolling out.

Toolbox talk topics for environmental management shall include, but will not be limited to:

- Ecologically sensitive areas;
- Protected species;
- Water management: and
- Environmental incidents and reporting.

Records of all Toolbox talks, and attendance will be kept in the site office.

3.4 Construction site, compounds and accommodation, welfare and storage

3.4.1 Site offices

The main site office area will be used by the client and contractors. Whilst each party may have a standalone office building, if practicable, they will be positioned adjacent to each other for ease of communication, co-ordination and for holding project meetings.

Car parking will also be a shared facility however areas may be designated for individual parties, depending on their needs and staff numbers. Construction phase parking will utilise the area designated for the permanent visitor centre car park. Storage compounds will make use of the available space outside this parking area to allow permanent works to be completed without disruption to the temporary facilities.

3.4.2 Welfare Facilities

Welfare facilities in accordance with Schedule 2 of the CDM Regulations 2015 **MUST** be in place prior to construction works commencing on-site. The site will have the following welfare facilities (Table 3-2) within the site compound.

Table 3-2: Welfare Facilities

Type of Facility	Used by	Location	Maintenance/ Cleaning Frequency
Adequate Toilets for anticipated numbers on site	All	Site Compound	Daily
Canteen for preparation and consumption of food	All	Site Compound	Daily
Changing Room with facility for drying clothes	All	Site Compound	Daily
Site Managers Office & Meeting Room	SM	Site Compound	Daily

3.4.3 Storage Compounds

The storage compound will be fenced and gated and have perimeter security lighting. Waste management and fuel storage areas will be located within these compounds.

3.4.4 Site Set-up

Initially offices and storage containers will be transported to the site to provide accommodation and welfare in advance of the works commencing.

Plant will be transported to site to prepare the area for the construction compound and to excavate trenches for the installation of services. Modular office units will arrive on site on articulated lorries and be positioned using lorry mounted crane or a mobile crane.

Storage compounds, lighting, security fencing etc will follow.

Offices and plant to carry out the enabling works will be moved on to site prior to works major works commencing.

3.4.5 Storage of Fuels

All liquids and solids of a potentially hazardous nature (e.g., diesel fuel, oils, solvents etc.) will be stored on surfaced areas, with bunding, to the satisfaction of SEPA in accordance with current guidance[2].

All fuel and/or chemical storage tanks located on site shall be bunded in order to limit the impact of any leakages that occur. The containment area shall be capable of holding 110% of the volume of the largest tank or 25% of the total volume likely to be stored for multiple containers, whichever is greater. Any fuel tankers entering the site will only be permitted to park in designated areas in order to reduce the potential for fuel to leak into marine environment or to damage construction materials present on-site.

Storage areas shall also be organised to provide space for materials to be removed with ease as they are required. If heavy machinery is required to move materials, this should also be considered allowing space for machinery to manoeuvre.

Contractors shall establish within the site an area for the refuelling of plant and vehicles away from the watercourses and on a surfaced area. The location shall take account of other construction activities, and environmental protection requirements will be identified within the outline CMS to ensure that an appropriate area is identified and safeguarded for that use before works start on site. The area shall always be kept clean.

Any spillages or leaks of fuel shall be cleaned up immediately by Contractors. No refuelling shall be carried out outside the designated refuelling area.

3.4.6 Security On-Site

All necessary protection, hoardings, covers and protected walkways will be put in place as and when required. There will be controlled access to the site, for both security and safety reasons. At night the site compound and offices will be kept locked and the offices alarmed.

Physical barriers, hoardings and screens will be installed to ensure that the site is kept secure. Furthermore, appropriate measures will be provided to mitigate against pollution and the dangers of the removal of potentially hazardous substances and materials.

- Contractors shall exercise adequate security to prevent unauthorised entry to or exit from the Compounds and Sites;
- Visitors will be directed to the site office where they will sign in and be inducted (as appropriate for the nature of their visit) by the Site Manager, prior to being permitted out on-site;
- Appropriate H&S Signage will be placed around the construction site guiding traffic routes, giving warnings of hazards and potential dangers (such as “Danger: Keep Out” etc.) and instructing conduct within the site boundaries (such as “Do not remove security fencing” / “Appropriate PPE must be worn…” etc.).
- Gates shall be closed and locked when there is no site activity and site security provisions are set in motion;
- While security and safety lighting are required, there will be a balance between achieving appropriate lighting levels and avoiding unnecessary light spillage, pollution and glare;
- The use of artificial lighting during construction will be minimised to reduce the impact on either local residents or wildlife corridors; and
- All construction personnel shall visibly carry identification.

[2] https://www.netregs.org.uk/media/1475/gpp-2-pdf-jan-2018.pdf

3.5 Spillages

A spill response plan, which all site personnel are made aware of, will be implemented in the event of an environmental incident. The appropriate incident response equipment will be available next to particularly sensitive activities (e.g., over pumping) or areas of a site (such as fuel storage areas).

A supply of spill containment and treatment equipment and materials will always be available near storage areas containing hazardous materials in sufficient quantities to deal with small-scale spillages and all site personnel will be aware of where this equipment is stored.

'*Pollution incident response planning*': GPP21[3] provides guidance on how to draw up a plan to protect the site, and '*Dealing with spills*': GPP 22[4] provides guidance on what actions to take if a spill occurs.

Refer also to 5.2.5 and 5.2.6.

3.6 Construction Monitoring, Continual Improvement & Review

3.6.1 Monitoring

Ecological/environmental monitoring will be undertaken in order to provide information to be taken into account during construction and to feed back into the CEMP and method statements. It will also be used to evaluate the environmental effects of the construction process.

The CEMP Manager/Deputy shall ensure that the CEMP is reviewed regularly (and no less frequently than monthly) to ensure that:

- The requirements of the CEMP are still valid and are being met;
- Identify any negative impacts from construction activities;
- Assess the effectiveness of control measures;
- Identify if further controls/corrective action is required; and
- Forthcoming activities are reviewed and any necessary amendments to the CEMP[5] are put in place before the relevant work begins.

3.6.2 Inspection & Audit

The CEMP Manager/Deputy/ECoW will be responsible for conducting site inspections on a regular basis to confirm that processes are being carried out effectively. A written report of these inspections will be disseminated to the relevant management levels for review and action.

Inspections carried out on the project by external representatives will be recorded by the CEMP Manager/Deputy/ECoW and any actions will be disseminated to the relevant project personnel.

[3] https://www.netregs.org.uk/media/1436/gpp-21-final.pdf
[4] https://www.netregs.org.uk/media/1643/gpp-22-dealing-with-spills.pdf
[5] CEMP amendments may require authorisation by the local authority or relevant regulator.

3.6.3 Non-conformance & Corrective Action

If criteria within the CEMP are not fulfilled and appropriate and corrective action is not taken a non-conformance may be raised by the CEMP Manager/Deputy/ECoW. Examples of circumstances where this may arise include:

- Receipt of a complaint regarding pollution or other environmental impacts caused by the project;
- Departure from approved or agreed procedures; and
- Non-conformance identified as a consequence of any self-assessment, formal audit or other environmental survey or inspection.

The non-compliance will be notified to the CEMP Manager/Deputy as soon as practicably possible. Should it be identified that there is potential for mitigation measures or legislation to be breached the work or activity will stop immediately. Work will only recommence once measures are implemented to ensure the situation is remedied.

Following notification, a non-conformance/corrective action report will be issued by the CEMP Manager/Deputy. It is the responsibility of the Contractor to immediately initiate corrective actions (if not already done so) and, once completed, provide details of the actions undertaken on the non-conformance/corrective action report and return it signed to the CEMP Manager/Deputy within an agreed timeframe. If the non-conformance is considered to breach legislative requirements, the breach should be reported to the appropriate public body.

Corrective action may include changes to work instructions, alterations to the CMS, further site personnel training etc. Non-conformances should be reviewed by the CEMP Manager/Deputy and form part of construction meeting agendas.

3.6.4 Significant Incident Reporting Procedures

In the event of a potential harmful or polluting incident, spillage or discharge, the actions listed below will be followed to notify the appropriate organisations of the occurrence:

- Should an incident occur, the CEMP Manager/Deputy shall inform the management team of the occurrence of an incident at the site as soon as practicably possible following awareness of the incident;
- The CEMP Manager/Deputy shall notify the management team in writing the next working day after the incident, detailing the time and nature of the incident;
- The CEMP Manager/Deputy shall investigate the incident and notify the Client representative of the outcome as soon as practicably possible; and
- Where necessary, the CEMP Manager/Deputy will report the incident to the appropriate regulatory body.

3.6.5 Control of Records

Environmental records, including waste management records, will be maintained in accordance with the respective procedure(s) and legal requirements. The records are to be maintained, in either hard copy or electronic format as required by the individual procedure that the records relate to, in such a way that they are readily identifiable, retrievable and protected against damage, deterioration or loss. The procedure that the records relate to also specifies the retention time for the records and who has the authority to dispose of them.

4 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

4.1 Purpose of the Construction Environmental Management Plan

This plan for Edinburgh Marina is a live document and is intended to identify the specific controls that will be used to ensure effective management of potential environmental effects and controls. As a live document the CEMP is intended to evolve and develop over time.

4.2 Risk Assessments and Method Statements

All known Safety Health and Environmental (SHE) hazards and risks will be reviewed. Risk assessments, method statements and safe working practices will be attached to the CEMP as an appendix once prepared. All risk assessments are to include reference to known environmental issues. Risk assessments and method statements will be recorded and retained on site. Where information is insufficient the contractor shall be contacted, and a joint review carried out to establish a suitable safe system of work.

4.2.1 Health & Safety Method Statement

A Health & Safety Method Statement (H&SMS) for the proposed development will be prepared. The Method Statement will includes controls measures during the construction process.

The H&SMS will comprise the following as a minimum:

- Location of the activity and access/egress arrangements;
- Work to be undertaken and methods;
- Plant and materials to be used;
- Labour and supervision requirements; and
- Health, safety and environmental considerations.

4.3 Navigation

The marina footprint will be dredged prior to commencing construction works i.e., quay wall works, extending the north Mole breakwater and marina construction and will be subject to a separate CEMP. It is understood that a backhoe dredger will be used and dredged material will be disposed of at either Oxcars Main (FO044) OR Narrow Deep B (FO038) (as per the dredge licence), or if unsuitable for disposal at sea, either used within the wider marina masterplan area where possible, or transported off site by road to an appropriately licenced disposal facility (Refer also to the Dredging Environmental Management Plan (November 2019)).

Forth and Tay Navigation must be informed of the intended arrival time and subsequent movements vessels associated with construction activities in accordance with the Forth Ports General Directions published on the website.

Forth Ports reserved the right to assign a pilot to the vessel or vessels should the need arise.

The vessels associated with construction activities must maintain radio contact on VHF Ch71 during the works to ensure safe navigation is preserved.

A Risk assessment will be prepared and submitted for approved by Marine Scotland and Forth Ports prior to the commencement of construction works..

The vessel contractor will be made aware of the need to consider other potential users within the eastern harbour that may be affected by wash from the vessel(s).

Moving the vessel

To be handled by a competent vessel and crew at all times, advised to harbour and other traffic and co-ordinated prior to commencement through a single contact.

Obstruction of channel

- Ensure vessel is on the 'non' channel side of the sheet pile installation if possible.

Foundering of vessel in the channel

- As above and additionally contractor emergency procedures to be in place, dovetailing with harbour emergency procedures;
- Contractor insurance; and
- Best operating practice for the vessel.

Collision with other vessels

- Navigational and minimum ambient lighting on vessel;
- Local Notice to Mariners;
- Publicity in local press for recreational users, who are most likely to be affected.
- Communication issues
- VHF ch12 continuous monitoring; and
- Mobile numbers of single contact point with emergency action responsibility on vessel and vice versa with Harbour contacts.

Support vessels

- Control of movement by harbour;
- VHF ch12 continuous monitoring; and
- Contractor methods and risk assessed boarding and transfer methods to vessel/shore for all weather conditions.

Wave/wash of passing vessels affecting passenger transfers

- Pre-planned and co-ordinated movements to lessen risk by contractor.

Damage to vessels

- Lighting or other highlighting of danger areas to be used particularly during darkness;
- Local Notice to Mariners; and
- Publicity in local press for recreational users.

Contact with vessels passing by the construction area

- Methods and risk assessments to be provided, agreed and adhered to (e.g. vessel mounted crane jib extending during placement of rock and the like).

- Vessel operation to be arranged in such a way that encroachment can be made into the navigational channel with minimal disturbance and risk to the working vessel and vessels entering and egressing the Harbour.

4.4 Water Quality Management

Working in a marine environment requires a high level of control during construction where there is a risk of accidental pollution from the following sources:

- Spillage or leakage from oils and fuels from demolition/ removal machinery or site vehicles/vessels;
- Spillage of oil or fuels when re-fuelling; and
- Suspended soils from demolition and removal works.

The vessel crew working on the North Mole Extension are to regularly check equipment for evidence of leaks and fitness of hydraulic hoses and seals, and conduct maintenance or repairs as necessary to prevent drips, leaks or likely equipment failures. Inspections of pipelines, pump(s) etc. are to be undertaken daily to meet this requirement.

4.4.1 Re-fuelling, oiling etc. of Plant and Equipment

Plant and equipment will comply with the following:

- All plant and equipment will be checked daily for oil and fuel leaks, and a record of such checks kept;
- No fuel to be stored within 10m of the water's edge, this includes the generator/bowser for the compound layout;
- Plant and equipment will be in good working order, kept clean and fitted with drip trays where appropriate;
- COSHH items to be stored in a suitable COSHH store. All items should be labelled.
- Fuel/oil, of 200 litres or more, must be stored in secondary containment (bund) which contains at least 110% of the maximum capacity. If more than one container the bund must be capable of storing 110% of the biggest container's capacity or 25% of the total capacity, whichever is greatest.
- Daily checks to be carried out on plant. All equipment to be modern, anything which is defective to be removed from site.
- Re-fuelling to be carried out on hardstanding and not within 10m of the water's edge. Re-fuelling to be carried out by designated re-fuellers.
- Fuel should only be transported in suitable Jerry cans.
- Spill kits will be available in compound, works areas and large items of plant.
- Drip trays will be supplied for all engine driven units. In the event of a fuel spill, the team will immediately use the containment kit to control and neutralise the effect of the spill;
- The team will immediately contain and neutralise any spills of oil or fuel using appropriate containment equipment;
- All refuelling activities will be supervised by site personnel with spill kit / emergency response training.

4.4.2 Petrol

Petrol is to be stored in a secure area. Containers are to be secured to prevent them falling over.

Petrol will be segregated from other flammable materials and stored away from sources of ignition.

The storage area will be a no-smoking zone.

Spill kits will be available.

Spillage Controls

- Ensure cylinder is closed when not in use.
- Ensure that delivery hoses are in good condition.
- Check system for leaks - Spill kit available.
- Do not allow to pollute natural watercourse or drains.
- Store in bunded area

4.4.3 Diesel Fuel

Diesel fuel is to be stored in a secure area. Containers are to be secured to prevent them from falling over.

Diesel fuel will be segregated from other flammable materials.

Spillage Controls

- Ensure tank is closed when not in use.
- Ensure that delivery hoses are in good condition
- Check system for leaks - Spill kit available.
- Do not allow to pollute natural watercourse or drains.
- Store in bunded area

4.4.4 Pollution Prevention

Section 5 of the CEMP "*Pollution Prevention and Emergency Response*" provides measures for potential environmental emergencies that could arise during construction.

This Emergency Response Plan will be reviewed by the contractor and finalised in the approved CEMP. The contractor will also supply emergency contact details for nominated site personnel, relevant regulatory bodies and emergency services. These details will be available on site notice boards and will be displayed along with a plan of the Project Site that displays safe storage areas and the location of response equipment, such as spill kits. Emergency Spill Response is set out within Section 5.2.5 and 5.2.6.

4.4.5 Spill Response

The contractor's vessels shall be equipped with suitable spill kits and will be operated in accordance with Maritime Safety.

Minimise the stored volumes of fuel, lubricants and oil in discrete containers on board vessels. When required they will be stored in a secure area and any spills will be cleaned immediately. Any visible or reasonably suspected fuel, lubricant or hydraulic fluid loss will be treated as an 'incident'.

For minor spills, a spill kit will be provided including; bilge socks, heavy duty absorbent polypropylene pads, floating booms and blowback refuelling collars on vessels for use in the event a substance is spilled either on deck or to waters.

A register of Materials Safety Data Sheets (MSDS) relating to all hazardous substances, will be maintained

Daily Visual Monitoring of the reclamation walls are to be undertaken and any concerns to be reported to Edinburgh Marina Ltd and SEPA/ Marine Scotland to instigate management actions.

In the unlikely event a structural failure works are to immediately cease, immediate actions are to be taken to minimise impacts outside the approved the works and the incident is to be reported to Edinburgh Marina Ltd, so that remedial actions can be instigated.

In the event of a spill, the spill source will be immediately isolated, stopped and contained.

Contaminated spill kit material will be safely (temporarily) stored prior to disposal to a licenced waste facility.

4.4.6 Monitoring and reporting

The contractor will undertake audits which include:

- ensuring that emergency response plans and equipment and materials are available, working an unobstructed ensuring firefighting equipment has been serviced when required
- updating the emergency response contacts list when required
- hazardous materials are appropriately stored
- MSDS are appropriate to the material stored.

Daily visual inspections are undertaken If emergency response procedures are initiated, or any spills of hazardous materials occur, the action will be regarded as an incident and reported as described in *Section 5: Pollution Prevention and Emergency Response*. Equipment that uses fuel, lubricants, and/or hydraulic fluid, will be inspected during scheduled maintenance for the condition of hoses, valves, seals and reservoirs. Storage areas, containers, transfer hoses and valves for fuel/lubricants/hydraulic fluids will be inspected during maintenance.

4.5 Ecological Management

Appropriate regard for the protection of local habitats and protected species during the construction works will include the following measures:

- All reasonably practicable measures will be employed to minimise harm to, and disturbance of, wildlife caused by noise, dust, waste and pollution;
- Ensure no activities outside the works zone through clear delineation of the works area, and communication during site inductions;
- Where fauna may be entrapped, suitable escape measures are put in place;
- Regular inspections will be undertaken to check that detrimental impacts on ecological features are being minimised; and
- Ensure appropriate waste management (lidded bins), including food scraps, to reduce potential for feral species to become established on-site.

While security and safety lighting is required, there will be a balance between achieving appropriate lighting levels and avoiding unnecessary light spillage, pollution and glare.

The use of artificial lighting during construction will be minimised to reduce the impact on terrestrial and marine fauna. Temporary lights used during construction will be fitted with shades to prevent light spillage out with the working area.

Reference will be made to the Royal Commission on Environmental Pollution (RCEP) Report on Artificial Light in the Environment[6] and Guidance Notes for the Reduction of Obtrusive Light GN01:2011[7].

Temporary lighting required during works, and permanent lighting post development, should not affect the foraging success of nocturnal and diurnal species.

[6] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/228832/9780108508547.pdf.pdf

[7] https://theilp.org.uk/publication/guidance-note-1-for-the-reduction-of-obtrusive-light-2020/

4.5.1 Piling Protocol

Piling will not commence during periods of darkness or poor visibility (such as fog), or during periods when the sea state is not conducive to visual mitigation (above sea state 4[8]), as there is a greater risk of failing to detect the presence of marine mammals[9].

The mitigation zone will be monitored visually by a Marine Mammal Observer (MMO) for an agreed period prior to the commencement of piling. This will be a minimum of 30 minutes.

The MMO will scan the waters using binoculars (10X42 or similar) or spotting scopes (20-60 zoom or equivalent) and by making visual observations. Sightings of marine mammals will be appropriately recorded in terms of date, time, position, weather conditions, sea state, species, number, adult/juvenile, behaviour, range etc. on the JNCC standard forms. Communication between the MMOs and the contractor and the start/end times of the activities will also be recorded on the forms.

Piling will not commence if marine mammals are detected within the mitigation zone or until 20 minutes after the last visual or acoustic detection. The MMO will track any marine mammals detected and ensure they are satisfied the animals have left the mitigation zone before they advise the crew to commence piling activities.

A soft-start will be employed, with the gradual ramping up of piling power incrementally over a set time period until full operational power is achieved. The soft-start duration will be a period of not less than 20 minutes. This will allow for any marine mammals to move away from the noise source.

If a marine mammal enters the mitigation zone during the soft-start then, whenever possible, the piling operation will cease, or at least the power will not be further increased until the marine mammal exits the mitigation zone and there is no further detection for 20 minutes.

When piling at full power this will continue if a marine mammal is detected in the mitigation zone (as it is deemed to have entered voluntarily[10]).

If there is a pause in the piling operations for a period of greater than 10 minutes, then the pre-piling search and soft-start procedure will be repeated before piling recommences. If a watch has been kept during the piling operation, the MMO should be able to confirm the presence or absence of marine mammals, and it may be possible to commence the soft-start immediately. However, if there has been no watch, the complete pre-piling search and soft-start procedure will be undertaken.

4.6 Construction Traffic Management

4.6.1 Site Access

At present, vehicle access to the site is from Lower Grantham Road/ Lochinvar Drive and West Harbour Road/ Chestnut Street. The approved access/egress is still to be confirmed.

[8] Detection of marine mammals, particularly porpoises, decreases as sea state increases. According to the JNCC guidance ideally sea states of 2 or less are required for optimal visual detection but the risks of not detecting individuals within the mitigation zone can be reduced by the combined use of visual monitoring and PAM.

[9] There is a 'variation of standard piling protocol' allowed in the guidance if required.

[10] The guidance states that there is no scientific evidence for this voluntary hypothesis, instead it is based on a common sense approach. Factors such as food availability may result in marine mammals approaching piling operations, in particular, the availability of prey species stunned by loud underwater noise may attract seals into the vicinity.

Approved routes will be communicated to all site operatives, contractors and suppliers ahead of arrival, and in accordance with City of Edinburgh Council requirements.

Edinburgh Marina Ltd will comply with the Construction (Design and Management) Regulations 2015 which requires:

- The site to be organised so that pedestrians and vehicles can move safely and without risks to health; and,
- Suitable signs are displayed where necessary at access/ egress points for reasons of health and safety.

4.6.2 Control of Vehicles

The amount and types of vehicles used on the construction site shall be varied comprising of delivery vehicles, and those remaining on site for fixed periods such as 360° excavators, dump trucks, forklifts, etc. All these vehicles will require co-ordinating by Edinburgh Marina Ltd and sub-contractors to whom the vehicles belong.

Signage

Site Signage/Directional Signage will be erected (to indicate construction traffic route as per plan) and regularly around traffic routes and site entrance. Safety Signage will also be displayed on the site perimeter Heras fencing. Edinburgh Marina Ltd will ensure that properties potentially affected by passing construction traffic will be notified and issued with an accompanying letter/plan from the Edinburgh Marina Ltd Health and Safety Manager ahead of site commencement. Information will be notified/displayed on signs to inform for other road users of construction traffic.

All subcontractors must identify the type and number of vehicles they anticipate using during their works.

All site roads where possible will be wide enough to enable vehicles to pass. Where not possible suitable signage will be provided regarding priority.

Vehicles requiring parking on site will do so in a designated parking area.

Delivery vehicles and other site traffic will proceed around the site via the access road to the designated storage areas.

Speed limit for unmade roads is 5mph and 10mph for surfaced roads.

Where conditions dictate that provision of turning point is not practical then a banksman must be used to assist vehicle/plant when reversing.

4.6.3 Pedestrian Access

Access to the site will be provided via a dedicated walkway and crossing point.

Internal pedestrian access/walkways will be located close to the site access and centrally between welfare and compound areas.

Pedestrian site access will be signed to warn pedestrians they are crossing the access / haul road and conversely signage will be erected on the access road to warn drivers of the crossing point.

Appropriate P.P.E signage will be displayed at site entrances.

4.6.4 Parking

There will be strictly no on-street parking/manoeuvring/unloading by construction traffic. All vehicles will be parked/unloaded within the site perimeter (i.e., car park/material storage), to ensure emergency accesses are maintained at all times.

All site parking for contractors will be restricted to the dedicated parking area on site.

Site personnel, construction plant and HGVs will be required to observe the clockwise traffic flows around the central materials compound of the site.

No parking will be allowed on the operational area of the construction site.

Vehicles may park temporarily on site to unload stores/tools. By using a dedicated car park for contractors parking is kept away from construction operations.

Visitor parking will be provided at the site office.

4.6.5 Site Storage

Site materials compound/storage is to be located as close as possible to the area of work where they are required whilst maintaining access routes.

4.6.6 Material Deliveries

Access to the site for delivery vehicles will be restricted to site working hours and to avoid, where possible, peak traffic times.

All plant and materials will where possible be delivered in suitable sized loads to ensure lorries have sufficient turning areas within the confines of the site. A banksman will assist any delivery vehicles in turning / entering / exiting the site. Where possible all materials / plant will be loaded and unloaded within the site perimeters.

Banksmen will be utilised as and when required.

Designated vehicle unloading areas will be provided to facilitate efficient distribution of materials to their respective workface. These unloading areas will be in the form of hard standing. Sufficient area shall be maintained by Edinburgh Marina Ltd for these purposes at all times. Unloading over a pedestrian crossing is strictly forbidden.

No loading and / or unloading of land and materials is permitted outside of the confines of the site areas without supervision.

Materials generally will be stored on site as close as possible to their place of use and in a safe and orderable fashion. Where possible materials will only be delivered to site when they are required.

Where in the course of the project abnormal loads are identified, Edinburgh Marina Ltd with the assistance of sub-contractors, will ensure a specific method statement and risk assessment including the designated route is agreed with all parties in advance of any movement.

4.6.7 Refuelling Points

Individual double bunded fuel storage tanks will be used by subcontractors who will be operating heavy plant on site. The distribution of fuel will be the responsibility of each individual Contractor. All refuelling points will have spill kits available and maintained for use in the unlikely event of a spillage.

4.6.8 Wheel Washing and Road Cleaning

Wheel washing station will be introduced if/as deemed necessary. Roads within the site will be regularly cleaned by telehandler road brush, and material will largely be prevented from escaping. Road condition both within and out-with the site will be regularly monitored by the site manager. Provision will be made for road to be cleaned by telehandler road brush if/where deemed necessary, and likewise for the requirement of approved road sweeping/cleaning contractor.

4.7 Noise & Vibration

Contractors shall control noise on the working areas in accordance with BS 5228: Noise Control on Construction and Open Sites. Site inspections shall include checks to ensure that plant is being operated with any specified acoustic covers in place. Excessively noisy plant shall be removed from site for repair or maintenance. Quieter construction methods will be used, where required and where considered reasonable and feasible.

The aim is as far as reasonably practicable, to control and limit noise and vibration levels so that affected properties and other sensitive receptors are protected from excessive noise and vibration levels associated with construction activities.

The construction works will comply with BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites.

All Contractors and Sub-contractors will be required to produce a ‘Register of Plant & Equipment and Statutory Certification’ within their ‘Health & Safety Method Statement’ which is reviewed prior to construction works commencing. They will also be required to assess their plant and machinery to be utilised on site. The assessment will include noise level predictions and assessments of plant and machinery in respect to ensuring that excessive noise levels are identified and suitable control measures implemented to minimise those noise levels.

Equipment will be switched off when not in use (including during breaks and down times of more than 30 minutes).

Where reasonable and feasible, haulage routes will be located as far away as possible from residential receivers. Truck movements would be restricted to identified haulage routes and the routes outlined in Section 5.6 Traffic Management. Where possible loading and unloading are to be undertaken away from residences.

Where possible, noisy plant should not be used simultaneously and/or close together to avoid cumulative noise impacts.

Equipment and excavation work sites should be oriented, where possible, to reduce noise emissions to sensitive receivers.

The Principal Contractor shall aim to be a proactive and considerate neighbour; any potentially affected residents shall be approached in advance of any potential disturbance and kept informed of works

progress. A noise complaint handling procedure will be established and responded to quickly. Where work is required outside of standard hours, the Principal Contractor should provide information such as total construction time, what works are expected to be noisy, their duration, what is being done to minimise noise and when respite periods will occur, to affected residents, reasonably ahead of time.

4.7.1 Selection and Use of Equipment

With regards to general construction activities, the contractor will follow best practicable means to reduce the noise effect on the local community, including some (or all of the following):

Plant and equipment

- Modern, silenced and well maintained plant will be used at all times, conforming to relevant standards;
- Equipment and vehicles to be shut down when not in use;
- Semi-static equipment is to be sited and oriented as far as is reasonably practicable away from noise sensitive receptors and will have localised screening if deemed necessary;
- Generators and water pumps required for 24-hour operation will be super silenced or screened as appropriate; and
- Where possible, mains electricity to be used instead of generators.

Construction

- Monitoring will undertake when justified nuisance complaints have been identified at residential properties and when method statements indicates adverse (noise) effects due to construction work being undertaken within close proximity at occupied residential properties (i.e., Heron Place and Hesperus Broadway).
- Machinery and equipment should not be operated in a way that causes unnecessary pollution from noise. Where complaints are received regarding air emissions, remedial action should be undertaken.
- Materials will be handled with care e.g., material such as steelwork will be placed rather than dropped.
- Drop heights of materials from lorries and other plant will be kept to a minimum.
- Fixed and semi-fixed ancillary plant such as generators, compressors and pumps liable to create noise and/or vibration whilst in operation will, as far as reasonably practicable, be located away from sensitive receptors.
- The use of barriers to absorb and/or deflect noise away from noise sensitive areas will be employed where required and reasonably practicable.
- All plant used on site, paying particular attention to the integrity of silencers and acoustic enclosures will be maintained in good and efficient working order and operated such that noise emissions are minimised as far as reasonably practicable.
- As far as reasonably practicable, any plant, equipment or items fitted with noise control equipment found to be defective will not be operated until repaired.
- Machines in intermittent use will be shut down or throttled down to a minimum during periods between work.
- Large concrete pours (for which an extension of working hours may be necessary) will commence as early as possible within normal working hours so that activities can be completed within normal working hours as far as possible.

Management of works programme

- Wherever practicable, noisy works, which are audible at the site boundary, should be undertaken during normal daytime working hours;
- Routes and programming for the transport of construction materials, fill, personnel etc. are to be carefully considered in order to minimise the overall noise impact generated by these movements;
- Personnel will instructed on measures to reduce noise and vibration as part of their site induction training; and
- Use of radios is to be prohibited except where two-way radios are required for reasons of safety and communication.

4.7.2 Underwater Noise - Piling

Marine mammals are known to frequent the Firth of Forth, the construction phase could potentially impact these animals through noise pollution from piling (refer to the Piling Protocol in Section 4.4.1).

With reference to the Edinburgh Marina Environmental Impact Assessment Report (EIAR) (September 2018), the following marine mammal species have the potential to be present within the zone of influence of the development:

- Bottlenose dolphin;
- harbour porpoise;
- grey seal;
- harbour seal; and
- minke whale.

Otter

Otter are present in the landscape, evident by the discovery of spraints at various locations within the site boundary. No confirmed otter holts or temporary resting sites (couches) were noted however there is opportunity for otter to rest at the site. Given the freshwater habitats of the River Almond to the west and Water of Leith to the east, where otter are known to be present, it is likely that otter are regularly active along this coastline exploiting food resources presented within the intertidal zone.

The animals could be affected by one blow with the piling hammer on full impact if situated within 25m. Piling methods are not yet known, however, should it entail impact piling a soft start procedure will be implemented on all impact hammering to allow the animals to swim away from the works area.

Where practicable, Impact hammering will only be utilised for piles which are embedded into bedrock, otherwise they should be driven to level by vibro hammer. Impact driving will also not be continuous, as there will be pile set-up, pitching and vibro-driving in between the impact hammer being utilised.

The hammer will have an acoustic shroud around to minimise the noise emitted during impact driving.

All plant is to be of modern type. Daily checks to be carried out to maintain functionality and environmental performance.

A Marine Mammal Observer (MMO) will always be present on site prior to and during impact hammer operations.

4.8 Dust and Air Emissions

Dust control procedures will be implemented to avoid as far as is reasonably practicable the emission of dust and other particulates that would adversely affect air quality to ensure there is negligible significant deterioration of current air quality as a result of the works.

Dust is generally considered to be any airborne solid matter up to about 2 mm in size. Particle sizes can vary considerably, depending on their origin, and the smallest particles can be breathed in. Some dust, such as limestone dust, is chemically active. To avoid causing complaints, the site should operate a management system that ensures that:

- Dust and air emissions from general operations is minimised through adoption of good working practice
- Special consideration for control measures is given in circumstances where general good practice may not be sufficient to avoid causing problems.
- Within the limitations of the site boundaries and the orientation of receptors relative to the prevailing direction of strongest winds, stockpiles will be located in a manner that minimises dust generation.
- Applying a coarse gravel surface (or similar) along the haulage road (where considered appropriate).

Construction dust has the potential to migrate from the site and cause a nuisance to surrounding areas. During dry and windy weather conditions, the potential for construction dust to migrate from the site increases.

4.8.1 Overall Risk

The prevailing weather conditions of the Granton area, including relatively high rainfall, will assist in reducing the likelihood of construction dust nuisance. However, there is potential for construction dust nuisance to be a significant problem on dry and windy days.

4.8.2 Dust Management

Wind-blown dust, generated from dry, exposed ground or soil and wastes stockpiles, will be prevented generally with the use of water sprays. Surfaces and stockpiles will be damped down to minimise dust as necessary. In wetter conditions, deposits of mud on roads, pavements and areas of hard standing may need to be cleared. Small occurrences will be cleared manually with a broom and shovel; elsewhere road sweepers will be called upon. The need to control mud and dust is covered in site inductions and in relevant task risk assessments, method statements and briefings.

Control procedures will be implemented to avoid as far as is reasonably practicable the emission of dust and other particulates that would adversely affect air quality to ensure there is no significant deterioration of current air quality as a result of the works.

The types of activities with the potential to generate dust on site include:

a. General Site Works (including site/compound layout and management);
b. Haul routes, construction plant and vehicle movements;
c. On site earth moving operations;
d. Enabling works prior to use (e.g., Site clearance and laying of hard standing);
e. Excavation, infilling and earthworks activities;
f. Cutting, grinding, drilling and sawing;

g. Erection of gantries and safety barriers, including foundations or footings etc.;
h. Surfacing works;
i. Transportation, storage and handling of materials;
j. Wind-blown dust particles.

Vigilance of weather conditions and potential for dust clouds will be undertaken and recorded on a daily basis.

The weather forecast for the day will be assessed at the start of the day using the Met Office website, with attention being taken of wind speed and direction, and rainfall. Conditions will then be monitored visually during the day.

During dry and windy weather conditions, the potential for construction dust to migrate from the site increases.

If during dry windy conditions any operations are identified as causing or likely to cause visible emissions across the site boundaries, or if dust emissions are observed within the site, the CEMP Manager/ Deputy, will immediately instruct the following:

- Instruct staff to apply water suppression (via hose) to area/activity (yard, stockpile etc.)
- Instruct staff to damp down surfaces with bowser as a precaution.

4.8.3 The Principal Contractor Role and Responsibilities

It will be the responsibility of the principal contractor to implement the dust control measures to ensure that dust from this site does not become a cause for nuisance. The Principal Contractor shall report on environmental activities to the Client Team and will be responsible for the following:

- Implementing and maintaining construction dust controls on site;
- Attend to any construction dust incident that may occur on site;
- Report any construction dust activity that has resulted, or has the potential to result, in an environmental incident immediately to the Client; and
- Complete a log of construction dust observations and weather conditions.

The principal contractor will assign an appropriate person within their organisation to hold responsibility for ensuring construction dust levels comply with the relevant standards. However, it should be noted that all members of staff have a responsibility for ensuring that the dust control measures are followed.

4.8.4 The ‘Appropriate Person’ Role and Responsibilities

The ‘Appropriate Person’ shall:

- Ensure the requirements of the dust management are explained to all site staff and sub-contractors and if required provide specific training and toolbox talks on construction dust sensitivities and appropriate control/mitigation measures;
- Review method statements to ensure measures are in place to minimise dust emissions and suggest improvements prior to commencing with construction activities;
- Monitor construction activities to ensure that identified and appropriate control measures are effective;
- Review the dust control measures on a regular basis (and no less frequently than weekly) to ensure that they remain valid and are being met;

- Review forthcoming activities and make any necessary amendments to the control measures and subsequently update the CEMP. Any amendments to the CEMP to be shared with all interested parties;
- Maintain the log of construction dust observations and weather conditions;
- Report any construction dust incidents to the Principal Contractor.

Name:…… will oversee dust management on site.

4.8.5 Staff and Subcontractors Responsibilities

Staff and subcontractor have the responsibility to:

- Work to agreed plans, methods and procedures to eliminate and minimise construction dust impacts;
- Understand the importance of avoiding construction dust pollution on-site and how to respond in the event of an incident to avoid or limit environmental impact;
- Report all incidents immediately to their line manager who will inform the 'Appropriate Person' and Principal Contractor;
- Monitor the workplace for potential construction dust risks and alert the immediate line manager if any are observed; and
- Co-operate as required, with site inspections and audits.

4.8.6 Lines of Communication

Procedures detailing how information shall be communicated to the Client shall be agreed between the Principal Contractor and Client prior to works commencing. This shall include lines of communication for public engagement. The dust control measures will thereafter be up-dated with the agreed reporting procedure.

4.8.7 Control of Records

A construction dust log shall be maintained in accordance with the respective company procedure and contract requirements. The log shall be maintained in such a way that it is readily identifiable, retrievable and protected against damage, deterioration or loss.

4.8.8 Complaints

The formal procedure for handling project complaints/concerns will be agreed between the Principal Contractor and Client prior to works commencing. The dust control measures will thereafter be up-dated with the agreed procedure.

4.8.9 Change Control Processes

Where any amendments and variations to the dust control measures are required, either as a result of changes to construction methods, design or mitigation the method of recording the change will be agreed between the Principal Contractor and Client prior to works commencing.

4.8.10 Control Measures

All site works will be undertaken in such a way that best practise is followed at all times to minimise construction dust emissions, and all necessary measures will be implemented as far as reasonably possible to reduce airborne dust levels and to prevent damage, loss, injury or nuisance caused by dust at all times during construction.

The mitigation measures provided in Table 4-1 are not exhaustive and actions may be removed or added as a result of future source-pathway-receptor reviews, confirmation of construction methodologies, future improvements in best practise techniques, etc.

Table 4-1: Mitigation Measures

Mitigation Measures	
Communications	
1.	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the CEMP Manager/Deputy.
2.	Display the head or regional office contact information.
Site Management	
3.	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
4.	Make the complaints log available to the local authority when asked.
5.	Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation, in the log book.
Monitoring	
6.	Undertake daily on-site and off-site inspection, to monitor dust, record inspection results, and make the log available to the local authority when required. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.
7.	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked
8.	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
Preparing and Maintaining the Site	
9.	Plan site layout so that machinery and dust causing activities are located away from sensitive receptors, as far as is possible.
10.	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site
11.	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period
12.	Avoid site runoff of water or mud.
13.	Keep site fencing, barriers and scaffolding clean using wet methods.
14.	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
15.	Cover, seed or fence stockpiles to prevent wind whipping.
Operating Vehicle/Machinery and Sustainable Travel	
16.	Ensure all vehicles switch off engines when stationary - no idling vehicles.
17.	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.

Mitigation Measures	
18.	Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
Operations	
19.	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems.
20.	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
21.	Use enclosed chutes and conveyors and covered skips.
22.	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
23.	Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
Waste Management	
24.	Avoid bonfires and burning of waste materials.
Construction	
25.	Avoid scabbling (roughening of concrete surfaces) if possible
26.	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
27.	Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
28.	For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
Trackout	
29.	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
30.	Avoid dry sweeping of large areas.
31.	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
32.	Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
33.	Record all inspections of haul routes and any subsequent action in a site log book.
35.	Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
35.	Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.

4.9 Non Native Species

Edinburgh Marina Limited will act in accordance with The Code of Practice on Non-Native Species (approved by the Scottish Government in 2012 and made under 14C of the Wildlife and Countryside Act 1981). This will include undertaking risk assessments relevant to all scheduled activities to minimise the risk of introducing marine non-native species into the adjacent waterbodies.

Useful contacts are listed below:

- Marine Scotland: marinescotland@scotland.gsi.gov.uk
- NatureScot: info@sears.scotland.gov.uk

Vessels used during the construction phase of the project e.g., dredge and hopper barges, may be mobilised from waters having the potential to introduce marine species from other locations.

Marine pests are often introduced either by release of ballast water in water adjacent to the port, or from biofouling species that become attached to the hulls of vessels or released from niche spaces such as sea chests and intakes.

Potential environmental impacts that may occur as a result of the introduction of marine organisms include the following:

- Establishment of non-indigenous marine pest species;
- Competition for food and space with native species;
- Removal of native species;
- Predation of native species; and
- Introduction of associated pests and disease.

The environmental objective for introduced marine organisms is to minimise the risk of marine pest species introduction, establishment and spread into and within Scottish waters as a result of dredging activities.

The objective for the Project in relation to introduced marine organisms is to:

- Prevent the introduction of introduced marine organisms from dredging operations; and
- Remove any visible plant, fish, animal matter and mud from the vessel, in particular the hulls should be cleaned regularly.
- Safely dispose of any plant and animal material removed from the vessel.
- Provide toolbox talks and posters to aid identification of non-native species. These will aid on the management and control of marine non-native species.
- Ideally, all equipment and vessels required will be from within biogeographic regions where possible and have undergone the necessary inspections prior to arriving on site.
- Implement appropriate management measures where known or suspected introduced marine organisms are detected during vessel inspections or during dredging operations.

4.9.1 Management Measures

Prior to the mobilising to site, an appropriate risk assessment (supported by relevant documentation) of the plant, equipment and vessels (if required) should be undertaken to demonstrate, to the satisfaction of Marine Scotland, that the plant and associated equipment (including vessels) present a low risk in terms of the introduction of non-indigenous marine organisms e.g., in sediment, as biofouling (or in ballast water).

4.9.2 Reporting

Documentation demonstrating compliance with the above will be provided to Edinburgh Marina Limited before the arrival of vessels to site.

4.10 Waste Management

The CEMP Manager/ deputy will indicate how waste shall be managed on site and identify:

- The wastes, and their category, that will be generated by the project
- Opportunities for reuse and / or recycling
- Proposed methods of storage, segregation, handling and transportation of waste
- Means of disposal including licensing requirements of carriers and destination sites
- Recording of all waste movements from the site
- Reporting and monitoring process

Waste collected from the site shall be stored prior to disposal. The contractors shall ensure that all wastes are stored and labelled in accordance with the Duty of Care. In particular, care shall be taken to identify and segregate Special (Hazardous) Wastes.

The waste carrier registration certificates of all contractors and sub-contractors used to carry waste shall be checked with SEPA. The waste management licences of the receiving site shall also be checked with SEPA. A periodic check to see that waste is disposed of at the site listed on the Waste Transfer Notes shall be made.

Disposal of any surplus rock or subsoil (not currently anticipated) shall be agreed with SEPA (if brought to land). Opportunities shall be taken, so far as practicable, to recycle materials for example scrap metal, timber, paper, plastic and oils. Advice on these matters shall be taken from local authority recycling officers and waste contractors.

Opportunities to minimise waste through the design process (where applicable) will be considered and actions taken where identified and cost effective.

Waste elimination (through design) and minimisation shall be an integral part of the process. All waste streams by European Waste Code (EWC) will be assessed against the waste hierarchy to determine the most effective waste management option.

Waste may arise from either materials imported to site or from those generated on site. Nevertheless, there are important considerations to waste management including waste reduction, waste segregation, disposal of waste, financial impacts associated with waste disposal and recording, monitoring, education and reviewing. This plan outlines the procedures that will be put in place and demonstrates how benefit the environment, how the effects can be measured and how these procedures and practices are sustainable.

Waste generated by site activity will be segregated by type into separate skips in a secure dedicated area. Skips will be removed from site by a licensed contractor to a licensed waste transfer station where they will be further segregated and a report on waste types and recycling achieved sent to the contractor.

4.10.1 Waste Storage

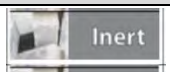
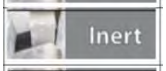
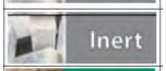
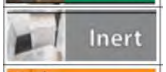
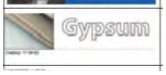
Recycling and waste receptacles are to be kept clean and clearly identifiable to avoid contamination of materials. The labelling systems shall be the Waste Awareness Colour Coding Scheme.

The colour scheme refers to labels that can be fitted to waste skips, indicating the types of waste that can be placed in them, thus helping with waste segregation and reducing disposal costs. The generic colour scheme is as follows[11]:

- **White:** Gypsum – gypsum and plasterboard products (do not contaminate these materials with other substances as this will affect their recyclability.)
- **Grey:** Inert – clean concrete, rubble, hardcore, brick and block etc. that will not decompose or create a hazard when buried.
- **Black:** Mixed general waste – any waste except contaminated waste that cannot be recycled in other skips on the site.
- **Blue:** Metal – all types of clean metal, including rebar offcuts, scrap metal (no empty paint tins, as these are considered hazardous) etc.
- **Green:** Wood – all types of clean, untreated timber or wood products (treated timbers may contain hazardous preservatives.)
- **Brown**: Packaging – cardboard, paper products etc. (not polythene sheeting or ties, this should go in the "mixed" skip.)
- **Orange:** Hazardous – only for contaminated waste such as asbestos, paint tins, mastic tubes, tarmac, or any product fitted with a COSHH label etc.

The colour scheme system helps contractors to comply with waste legislation, reduce cost and enable recycling where possible (Figure 4-1).

Figure 4-1: Example National Colour Coding System for Wastes

Waste Types e.g., bricks	Waste Category	European Waste Codes EWC	Colour Codes	Origin of Waste
Concrete	Inert	17 01 06		Site Strip
Tarmac	Inert	17 03 01		Site Strip
Brick/ Block	Inert	17 01 06		Site Strip
Timber		17 02 01		Construction
Subsoils	Inert	17 05 04		Site Strip
Subsoils	Hazardous	17 05 03		Site Strip
Metals	Non-hazardous	17 04 07		Construction
Plasterboard	Non-hazardous	17 08 02		Construction
Packaging		15 01 01 *see note 1* 15 01 02 *see note 2* 15 01 03 *see note 3*		
Construction	Mixed	17 09 04		Construction

Note 1 - 15 01 01 is the EWC code for paper & cardboard packaging
Note 2 - 15 01 02 is the EWC code for plastic packaging
Note 3 - 15 01 03 is the EWC code for wooden packaging

4.10.2 Training and Awareness Raising

The Principal Contractor will provide on-site instruction of appropriate separation, handling, recycling, reuse and return methods to be used by all parties at all appropriate stages of the Project. Toolbox talks

[11] https://ccsbestpractice.org.uk/entries/colour-coding-waste-skips/

will be carried out every month on waste issues and all sub-contractors will be expected to attend. Waste management will also be discussed during the site induction process.

4.10.3 Duty of Care

A log will be maintained of all materials that come on to site, and details will be obtained from the waste disposal company of the exact amount of waste materials removed from site. Details will also be provided outlining the recovery/disposal actions for the specific waste streams Waste receptacles will be monitored by the Principal Contractor to ensure that contamination has not occurred, results will be recorded The Principal Contractor will continually review the type of surplus materials being produced and change the site set up to maximise reuse or recycling and the use of landfill will be the last option. The Principal Contractor will also visit any waste transfer facility to ensure effective discharge of 'Duty of Care'.

Section 34 of the Environmental Protection Act 1990 (as amended) places a legal duty of care on all those who produce, keep or manage controlled waste, including waste carrier and brokers. The act introduces a system of monitoring, control and recording of the management of waste en-route and at its destination. This duty has no limit and extends until the waste has either been finally disposed of or fully recovered.

The Waste (Scotland) Regulations 2012 amended Section 34 to implement a number of actions in the Scottish Government's Zero Waste Plan. Under these amendments, holders of waste, including producers, have a duty to take reasonable steps to increase the quantity and quality of recyclable materials.

The "Duty of Care: A Code of Practice"[12] (the "Code") explains these duties which apply to anyone who produces, keeps, imports or manages controlled waste in Scotland. The Code is made under section 34(7) of the Environmental Protection Act 1990 (as amended) and replaces all previous versions applicable in Scotland.

Under section 34(10) of the 1990 Act, this Code is admissible as evidence in court and the court shall take it into account in determining any questions to which it appears to be relevant. The intention is that the Code will assist the courts, when hearing cases under Section 34 of the 1990 Act, in determining whether persons subject to the duty took reasonable measures to comply with it.

To comply with the Duty of Care, the following shall be undertaken:

- Apply the waste hierarchy to the management of waste and promote 'high quality' recycling.
- Present glass, metal, plastic, paper and card (including cardboard) for separate collection.
- Take steps to maintain the quality of dry recyclables presented for separate collection.
- Take care of the waste to prevent escape.
- Ensure waste is transferred to someone who is authorised to receive it, for example, a registered waste carrier or waste manager with the relevant authorisation.
- Complete a waste transfer note for any transfer of waste, including a full description of the waste, and retain a copy of this note for two years.
- Describe the waste accurately and provide information for the safe handling, transport, treatment, recovery or disposal by subsequent holders.
- Take reasonable measures to ensure that the waste does not cause pollution or harm to human health.

[12] https://www2.gov.scot/resource/0040/00404095.pdf (accessed 10/07/19)

4.10.4 Waste Transfer

Waste shall only be transferred to licensed waste disposal contractors.

A Waste Transfer Note (WTN) must be completed and signed by both the person handing over the waste and the person receiving it. The WTN must contain enough information about the waste for it to be handled safely and either recovered or disposed of legally. The WTN must include:

- A description of the waste;
- Any processes the waste has been through;
- How the waste is contained or packaged;
- The quantity of the waste;
- The place, date and time of transfer;
- The name and address of both parties;
- Details of the permit, licence or exemption of the person receiving the waste;
- The appropriate European Waste Catalogue (EWC) code[13]; and
- The standard industry code (SIC) of the business.

All movements of special waste must be accompanied by a Special Waste Consignment Note (SWCN) rather than a transfer note. This is required to comply with the Special Waste (Scotland) Regulations 1996 (as amended).

4.10.5 Inert & Non-Hazardous Materials – Storage & Segregation

Inert construction materials and waste (sand, gravel, composted root zone materials, polyethylene piping, pathway materials, etc.) will be stored within the construction compound with the provision for small temporary storage of materials across the wider development site dependent on working needs.

The materials storage area within the main construction compound will be split into two main designated areas; for the delivery and storage of new materials; and for the storage and collection of waste materials. Further segregation of materials within both designated areas will be carried out to prevent cross-contamination.

4.10.6 Hazardous Materials & Special Waste – Oil Storage

All oil, fuel and chemical storage, chemical mixing, fuel deliveries, re-fuelling operations and machinery maintenance tasks will be confined to the main construction compound.

Any diesel, petrol and lubricating oils required during this phase shall be stored in double bunded tanks (bunded to 110% capacity) within the construction compound. Waste oils and oily rags will be stored in appropriate sealed containers in a secure bunded area and will be collected by an authorised contractor for recovery and/or disposal.

4.10.7 Hazardous Materials & Special Waste – Liquid Waste

Any run-off from the bunded storage area within the construction compound, and wastewater from machinery wash down will drain to foul sewer or to an appropriate water treatment and recycling system, either a combination of an oil/water separate and a dedicated reed bed or a mechanised cleansing unit.

[13] Guidance on using the European Waste Catalogue (EWC) to code waste November 2015
https://www.sepa.org.uk/media/163421/ewc_guidance.pdf

Sewage waste from the construction compound will be either discharged to foul sewer where practical or stored in sealed tanks and collected for appropriate disposal by a registered contractor.

4.10.8 Potential Waste Streams & Management

The types of waste likely to be generated during Phase 1 include unused and contaminated construction materials, waste packaging materials, wastewater and waste vegetation, topsoil and subsoil. Each waste type will be classified as inert waste, non-hazardous waste or hazardous waste according to listings from the European Waste Catalogue and Special Waste Amendment (Scotland) Regulations (2005).

Each waste stream will be managed safely and legally, through a combination of re-use (on site or off-site), recycling or disposal. Note that more than one management option may apply waste stream, depending on the quantities and quality of the waste produced.

The waste management options available to contractors are:

Solid Waste –

1 Return unused waste materials (including packaging where possible) to the supplier for re-use;
2 Re-use on site during construction;
3 Stockpile for future use;
4 Recycling off-site;
5 Incineration (with or without energy recovery); and
6 Disposal to landfill (as the final option)

Liquid Waste –

- Recycling and re-use on site (using an appropriate wastewater treatment system);
- Discharge to foul sewer; and
- Collection by a licensed contractor for disposal off-site.

4.10.9 Responsibilities

Edinburgh Marina Ltd expects all Contractors/ Subcontractors to participate fully in waste minimisation and waste management initiatives implemented by the site including any segregation and recycling activities.

Waste containers (bins and skips) are impermeable and will prevent liquid wastes leaching. Sufficient space on site has been allocated for waste storage and segregation. Waste containers are clearly labelled for difference waste types to aid in segregation and are checked regularly. Separate facilities are provided for hazardous or special waste.

4.10.10 Waste Performance Monitoring & Reporting

Monthly waste reports will be produced.

5 POLLUTION PREVENTION AND EMERGENCY RESPONSE

5.1 General Arrangements

The main priority is to avoid spillages and emergency situations. This will be achieved through minimising the risk of spillage at source through avoiding the use of polluting materials where possible. Where the use of polluting materials is unavoidable, then suitable containment in a sensible location is essential.

5.1.1 Responsibilities

All persons working for or on behalf of Edinburgh Marina Limited have responsibilities to ensure they are aware or have been made aware of the processes and equipment in place to deal with emergency incident.

5.2 General Incidents

5.2.1 Emergency Procedures

Emergency procedures in the event of fire, accident, contact with live services, dangerous occurrence or a significant environmental incident will be displayed throughout the site facilities.

Where an environmental incident occurs, competent personnel should firstly assess and where appropriate, deal with the incident. Where the nature or scale of the environmental incident is outside the capability of the competent person/s they shall notify without delay, Edinburgh Marina Limited who will contact an appropriate environmental incident containment organisation to deal with the incident and mitigate any impact to the environment.

All persons working for or on behalf of Edinburgh Marina Limited have a responsibility to report the occurrence of any environmental incident regardless of magnitude to their superior.

Edinburgh Marina Limited have the responsibility to ensure environmental incidents are reported through the appropriate incident review process and where applicable oversee the implementation of improvement actions, both immediate and preventative.

Edinburgh Marina Ltd have the responsibility to, where appropriate, notify the relevant agency or organisation of the occurrence of an environmental incident should this be required.

The Management representative(s) or nominated person(s) are responsible for reviewing environmental incidents and ensuring the appropriate correction and corrective actions have been conducted and relevant preventative actions have been implemented.

A site-specific Emergency Response Plan will be developed by the contractor and will detail the response to any environmental incidents on site. The Emergency Response Plan shall, as a minimum, include:

- A Site Plan showing:
    - layout and access details;
    - access routes and meeting points for emergency services;
    - areas used to store raw materials, products and wastes; and
    - location of hydrants, ‘fireboxes’ and pollution prevention equipment and materials.

5.2.2 Planning & Prevention

Risk assessments are routinely conducted for all Edinburgh Marina Limited activities and contain an assessment of the potential of an activity, process or substance to cause an incident.

Where the risk is considered small or insignificant actions are identified within the assessment.

Where the potential for a medium, large or significant risk is identified the appropriate operational controls may be implemented to ensure risks are minimised or eliminated and if and when an incident occurs, response actions are known and effective.

5.2.3 Routine Testing

Where practicable the contract/site shall conduct periodic testing of applicable emergency preparedness and response procedures. Where testing is conducted the results of the test and any improvement actions will be recorded.

5.2.4 Response Equipment

The most likely source of environmental incident is spillage of liquids and substances either accidentally or during handling or transfer.

Prior to attempting to tackle any environmental incident personal safety is paramount. The use of correct Personal Protective Equipment (PPE) may prevent an incident becoming even more serious with response personnel sustaining injury. When considering whether to tackle an environmental incident even with the use of PPE if exposure is likely to cause injury the job is best left to the experts. PPE used for this purpose should be located near to spill and containment equipment and should be confirmed as being suitable for the hazard.

Suggested PPE includes:

1. Coverall overalls or aprons
2. Wellington boots or safety shoes
3. Rubber or nitrile gauntlets or gloves
4. Respiratory protective equipment (note that this must be face fit tested)
5. Head protection (may be required if working in a restricted space)

For small liquid spillages of substance releases containment can be effective by the placement of spill or release containment equipment local to the potential sources of an incident which can effectively cleaned up preventing any environmental risk.

For larger spills or releases, containment equipment should be sufficient to prevent spills or releases contaminating the environment and provide an additional time break to conduct an effective clean-up operation, with or without the help of specialists.

The provision of spill or release containment equipment should be appropriate to the potential hazard.

5.2.5 Dealing with Spills

The precise contents and capacity of the spill kits will depend on the detailed inventory of products that will be stored and handled on site, however they are likely to contain:

- Absorbent mats;
- Drain covers;
- Gloves;
- Floating “booms” or “sausages”;
- Knives;
- Oil-absorbent granules;
- Polythene sheeting and bags;
- Shovels; and
- String.

Spill kits will be clearly marked, sign-posted and held close to the area where materials are stored and handled.

Spill or release containment equipment provided for emergency response purposes should:

- Not be used for routine operations. Daily equipment or materials should be provided for these purposes.
- Have its location identified on site plans.
- Be readily accessible.
- Be appropriate to the potential hazard i.e., chemical or oil specific.
- Have its inventory logged, periodically checked and any used equipment replaced.
- Be replaced if used for an emergency situation.
- Be disposed of in accordance with relevant legislation if contaminated (hazardous/special waste).

Spill kits should ideally contain:

Oil specific spill kits should be suitable to absorb hydrocarbons but repel water and contain absorbent pads, socks and cushions, plugging compound and disposal bags and ties.

Chemical specific spill kits should absorb acids and caustics and should be used when unsure of the spilt liquid and contain absorbent pads or roll, socks, cushions, plugging compound and disposal bags and ties.

The provision of drain covers should be considered especially where spills could enter the water system.

A number of specialist spill contractors will be identified that can be called upon should there be a requirement to control a major spill.

5.2.6 Spill Management

In the event a spill occurs the following actions will be taken:

- When a spill occurs Edinburgh Marina Limited will be informed immediately;
- In dealing with the spillage the personal safety of the site-workers and the general public will not be compromised;
- Where required to stop or contain the spillage, work will be halted;
- The cause of the spillage will be stopped;
- The spill will be contained. Particularly pathways to any drains and water courses will be blocked as soon as possible; and
- The spilled materials will be removed and disposed of in accordance with the relevant waste regulations.

In the event of major or complicated spills, the following additional actions will be taken:

- Edinburgh Marina Limited will assess the incident and if appropriate request a specialist spill contractor to attend the site.

After an incident all waste generated by clean-up activities will be disposed of in accordance with current legislative requirements and the site waste management plan and copies of all transfer notes retained.

5.2.7 Fire

Health and Safety procedures and processes shall be established to minimise the risk of, and the appropriate management of a fire emergency. Consideration shall be given to the appropriate management of any subsequent fire water (the run-off generated from firefighting activities), such as temporary storage on-site.

This water should be considered contaminated and it has the potential to cause pollution. In developing strategies for dealing with a fire emergency, consideration shall be given to minimising the risk to the environment associated with fire water. The guidance on the control of fire water detailed in SEPA's PPG18: Managing Fire Water and Major Spillages shall be followed as appropriate.

5.2.8 Incident Reporting

If during the course of site staff duties an Environmental / Health and Safety incident is noted, then the incident will be reported, immediately to Edinburgh Marina Limited.

Edinburgh Marina Limited shall co-ordinate any actions that are required to make the area safe or limit environmental impacts resulting from the incident.

In the event of a potential harmful or polluting incident, spillage or discharge, the actions listed below will be followed to notify SEPA of the occurrence:

- Should an incident occur, Edinburgh Marina Limited shall inform the regulator of the occurrence of an Environmental incident at the site as soon as practicably possible following notification of the incident.

- Edinburgh Marina Limited will notify the Regulators in writing the next working day after the incident, detailing the time nature of the incident; and

- Edinburgh Marina Limited will investigate the incident and notify the Regulators of the outcome within 14 days of the incident.

5.2.9 Emergency Response Training

Relevant site personnel shall be trained in the use of pollution control equipment.

5.3 Incident Response

Incident response will be in line with the provisions of Guidance for Pollution Prevention (GPP) 21: Pollution Incident Response.

5.4 Emergency Contacts

In the event of an emergency occurring in or adjacent to the site, contact the emergency services including Police Scotland, Scottish Ambulance Service, HM Coastguard and Scottish Fire & Rescue Service on: 999 or HM Coastguard on VHF Channel 16 (International Distress, Safety and Calling Channel).

In addition to the foregoing, the marina operator is committed to complying with the Port Marine Safety Code and 2018 Guide to Good Practice on Port Marine Operations.

Table 5-1: Emergency Contact Information

Role	Organisation	Responsibilities	Key Person	Contact Details
Client	Edinburgh Marina Ltd	Edinburgh Marina Ltd will make development decisions.	To be confirmed	
Principal Contractor	To be confirmed	The principal contractor will ensure the safe management of the project.	To be confirmed	
ECoW	To be confirmed	Provision of ecological/ environmental advice as required		
HM Coastguard		999 or VHF Channel 16		
Police Scotland		999		
Scottish Fire & Rescue Services		999		
Scottish Ambulance Service		999		
Health & Safety Executive		0345 300 9923		
Marine Scotland The Marine Scotland Duty Officer is not a replacement for contacting the usual Emergency Services (Fire, Police, Ambulance and Coastguard) where these are required		0300 244 4000 and ask for the Marine Scotland Duty Officer. MS.SpillResponse@gov.scot or spillresponse@marlab.ac.uk. A marine emergency includes oil and or chemical pollution incidents from shipping and offshore installations (and the application of chemical dispersants and deployment of containment equipment) and marine mammal stranding.		
Forth Ports Group Health, Safety & Environment Manager		01324 668400		
SEPA 24hr Pollution Hotline		0800 80 70 60		
SEPA		Silvan House, SEPA 3rd Floor, 231 Corstorphine Rd, Edinburgh EH12 7AT. Tel: 0131 449 7296		
NatureScot		Silvan House, 3rd Floor East, 231 Corstorphine Road, Edinburgh, EH12 7AT. Tel: 0131 316 2600		

6 SCHEDULE OF MITIGATION

The Schedule of Mitigation (SM) brings together the identified mitigation measures to avoid or minimise the environmental effects of the development. It sets out in broad terms how mitigation can be appropriately managed and implemented during construction. The SM is based on general good management practises.

On review of the site environmental sensitivities and proposed construction activities the following topic areas have been identified which specifically require mitigation measures:-

- Potential impacts on marine mammals from underwater noise;
- Potential impacts on the water environment; and
- Potential impacts on terrestrial ecology.

The above list is not exhaustive and appropriate mitigation measures shall be identified as required by the Principal Contractor to ensure the environment is protected.

Table 6-1 outlines the Schedule of Mitigation for the proposed construction works at Edinburgh Marina.

Table 6-1: Schedule of Mitigation

Reference	Topic Area	Mitigation
Water Environment		
WQ-1	**General**	Site shall be secured against any unauthorised access to reduce risk of vandalism (that potentially causes pollution)
WQ-2	**General**	An incident management plan to be prepared providing site spill responses, emergency contact details, equipment inventories etc.
WQ-3	**Chemical pollution (oil/fuel/cements)**	Oils and chemicals on floating plant will be prevented from entering Edinburgh Marina, e.g., during a spillage incident or machinery failure.
WQ-4	**Chemical pollution (oil/fuel/cements)**	Any refuelling activities will either be undertaken in a designated area or where this is impractical (i.e., floating plant) follow an agreed procedure.
WQ-5	**Chemical pollution (oil/fuel/cements)**	Spill kits shall be located in appropriate places including on floating plant.
WQ-6	**Chemical pollution (oil/fuel/cements)**	The barge and any floating plant shall be inspected prior to start-up, at regular intervals throughout the day and at the end of the working day for leakage or signs of damage.
WQ-7	**Chemical pollution (oil/fuel/cements)**	All wastes shall be stored in designated areas that are isolated from surface drainage system and bunded to contain any spillage.
WQ-8	**Chemical pollution (oil/fuel/cements)**	Fuel, oil and chemical storage will be sited on an impervious base within a bunded and secured area.
WQ-9	**Oil, Fuel, Site Vehicle Use and Storage**	The risk of oil/fuel contamination will be minimised by good site working practice (further described below) but should a higher risk of oil/fuel contamination be identified then installation of an oil separator will be considered. The storage of oil/fuel is considered a Controlled Activity which will be deemed to be authorised if it complies with the Regulations. The mitigation measures to minimise any risk of contaminant release are in line with SEPA GPP and PPG documents
WQ-10	**Pollution Incident Response Plan**	This will provide site spill response procedures, emergency contact details and equipment inventories and their location. All staff will be made aware of this document and its content during site induction. A copy will be available in the site office at all times.
WQ-11	**Sanitary facilities**	Sanitary facilities on the floating plant and within the site compound should be fully contained with no discharge to the water environment.
WQ-12	**Tidal levels**	Consideration should be given to the possibility of extreme tidal levels occurring including wave action.
WQ-13	**Tidal levels**	Weather forecasts should be monitored on a regular basis to ensure timely action can be undertaken to secure the site.
Marine Ecology		
E-1	**Marine Faunal Species**	Mitigation measures relating to marine faunal species include ensuring that there are no physical barriers to marine faunal species movement along the Firth of Forth at all times.
E-2	**General**	Temporary lights used during construction should be fitted with shades to prevent light spillage out with the working area.
E-3	**All protected species**	In the event that a protected species is discovered on site all work in that area would stop immediately and the Project Team Representative informed.
E-4	**ECoW**	A suitably qualified Ecological Clerk of Works (EnvCoW) will monitor the construction works to ensure that the CEMP and associated mitigation measures are being implemented effectively.

E-5	**Underwater Noise**	A soft-start will be employed, with the gradual ramping up of piling power incrementally over a set time period until full operation power is achieved. The soft-start duration will be a period of not less than 20 minutes. This will allow for any marine mammals to move away from the noise source.
E-6	**Underwater Noise**	The construction period during which underwater noise impacts will be generated is three months. During this period however construction activities will generally occur between 0700 and 1900 and so will be short term and intermittent. However as there is the potential for disturbance on cetaceans, basking sharks if present, the project will commit to following relevant provisions of the Guidelines For Minimising Acoustic Disturbance To Marine Mammals from Seismic Surveys (JNCC 2004). Principally this will include the following: • Providing an observer who will monitor the surrounding sea area for indications of cetaceans and/ basking sharks. • Noise generating activity will be suspended if sensitive species pass within 500 m of the site. • Where practicable a soft start will be used when beginning potentially noisy underwater work. The construction programme should take consideration of the most sensitive periods within the salmonid migration
E-7	**Underwater Noise**	The planning stage of piling activities should consider the following: • *Timing and duration* – Avoid conducting piling activities during times when marine mammals are likely to be breeding, calving, feeding, or resting in biologically important habitats located within the potential noise impact footprint. • *Piling method* – Use low noise piling methods, such as vibro-piling, instead of impact piling methods where possible. Vibro-piling methods produce lower noise levels and are not impulsive in character. This reduces the likelihood of hearing injury to occur within marine mammals. The piling method should be optimised taking into account time on-site and likely noise levels. • *Soft start* - The use of a 'soft start' or 'ramping up' process, in which pile driving energy is gradually increased to normal operating levels, gives nearby animals an opportunity to vacate the area before sound levels increase to an extent that may cause injury. There is some concern that this technique may actually attract animals, and so should be used with this is mind and always with trained marine mammal observers present (Jefferson et al. 2009). Also, it is likely that behavioural changes and possibly masking will still occur for nearby animals (Madsen et al. 2006). • *Contract documentation* – Include the standard management and mitigation procedures, and any additional measures to be put in place, in the contract documentation. • *Trained team* – Ensure that a suitably qualified person is available during piling activities to conduct the standard operational procedures outlined below. A suitably qualified person should have qualifications in ecology or environmental sciences and demonstrated experience with the identification and management of marine mammals. A briefing on environmental matters, including information on guidelines, marine mammal identification and legal obligations should be provided to all staff involved in the piling activities. Likely marine mammal concentration areas, key feeding sites, and other aggregation areas should be identified during the planning stage and this information should be provided to trained team members and the marine mammal observer to improve the identification and observation of marine mammals. *Bubble curtains* - Demonstrated to significantly lower both pile driving sound pressure levels and peak frequencies. Typically a bubble curtain consists of a perforated hose that is anchored to the sea floor around the area where piling is taking place. Compressed air is pumped through the hose and a 'curtain' of bubbles produced. Bubble screens can reduce the sound pressure levels up to a biologically significant 25dB in the frequency range of concern for marine mammals. Other variations of bubble curtains such as screens and jackets are commonly used to reduce pile driving noise at offshore wind-farms and are worth considering

E-8	**Marine Mammal Protection Protocol (MMPP) – general measures**	A suitably qualified Marine Mammal Observer (MMO), competent in the identification of marine mammals, will be present during the impact piling. The MMO will undertake observation for marine mammals within the mitigation zone before and during impact piling. The MMO will advise the contractors and crews on the implementation of the procedures set out in the agreed protocol, to ensure compliance with those procedures.
E-9	**Marine Mammal Protection Protocol (MMPP) – general measures**	The MMO will be equipped with binoculars (10X42 or similar) and/or a spotting scope (20-60 zoom or equivalent), a copy of the agreed protocol and the Marine Mammal Recording Form (MMRF).
E-10	**Marine Mammal Protection Protocol (MMPP) – general measures**	A soft-start will be employed, with the gradual ramping up of piling power incrementally over a set time period until full operation power is achieved. The soft-start duration will be a period of not less than 20 minutes. This will allow for any marine mammals to move away from the noise source.
E-11	**Marine Mammal Protection Protocol (MMPP) – general measures**	Piling will not commence during periods of darkness or poor visibility (such as fog), or during periods when the sea state is not conducive to visual mitigation (above sea state 4 is considered not conducive), as there is a greater risk of failing to detect the presence of marine mammals
E-12	**Marine Mammal Protection Protocol (MMPP) – general measures**	The JNCC guidance defines the mitigation zone as a pre-agreed radius around the piling site prior to any piling. This is the area where a MMO keeps watch for marine mammals (and delays the start of activity should any marine mammals be detected). The extent of this zone represents the area in which a marine mammal could be exposed to sound that could cause injury and will be determined by factors such as the pile diameter, the water depth, the nature of the activities (for example whether drilling will also take place) and the effect of the substrate on noise transmission. The radius of the mitigation zone should be no less than 500 metres, and this is measured from the pile location. The MMO should be located on the most appropriate viewing platform to ensure effective coverage of the mitigation zone.
E-13	**Marine Mammal Protection Protocol (MMPP) – general measures**	The mitigation zone will be monitored visually by the MMO for an agreed period prior to the commencement of piling. This will be a minimum of 30 minutes. Piling will not commence if marine mammals are detected within the mitigation zone or until 20 minutes after the last visual or acoustic detection. The MMO will track any marine mammals detected and ensure they are satisfied the animals have left the mitigation zone before they advise the crew to commence piling activities.
E14	**Marine Mammal Protection Protocol (MMPP) – general measures**	If a marine mammal enters the mitigation zone during the soft-start then, whenever possible, the piling operation will cease, or at least the power will not be further increased until the marine mammal exits the mitigation zone and there is no further detection for 20 minutes.
E-15	**Marine Mammal Protection Protocol (MMPP) – general measures**	When piling at full power this will continue if a marine mammal is detected in the mitigation zone (as it is deemed to have entered voluntarily).
E-16	**Marine Mammal Protection Protocol (MMPP) – general measures**	Piling will not commence during periods of darkness or poor visibility (such as fog), or during periods when the sea state is not conducive to visual mitigation (above sea state 4 is considered not conducive), as there is a greater risk of failing to detect the presence of marine mammals

E-17	**Marine Mammal Protection Protocol (MMPP) – general measures**	During periods when conditions are not conducive to visual monitoring, a soft-start must be conducted, meaning a gradual ramp-up of power over a period of not less than 20 minutes.
E-18	**Marine Mammal Observer Protocol – Impact Piling**	**Marine Mammal Observer:** A suitably qualified Marine Mammal Observer (MMO), competent in the identification of marine mammals at sea, will be present during the impact piling. The MMO will undertake observation for marine mammals within the mitigation zone before and during impact piling and will be dedicated to that one task for the duration of any watch. The MMO will advise the contractors and crews on the implementation of the procedures set out in the agreed protocol, to ensure compliance with those procedures. The JNCC guidance provides the following definitions of an MMO: **MMO**: Individual responsible for conducting visual watches for marine mammals. It may be requested that observers are trained, dedicated and/or experienced. **Trained MMO**: Has been on a JNCC recognised course. **Dedicated MMO**: Trained observer whose role on board a vessel is to conduct visual watches for marine mammals. **Experienced MMO**: Trained observer with three years of field experience observing for marine mammals, and practical experience of implementing the JNCC guidelines. The MMO will be land based and will be Trained. The identity and credentials of the MMO will be agreed with Marine Scotland. **MMO Equipment:** The MMO will be equipped with binoculars (10X42 or similar) and/or a spotting scope (20-60 zoom or equivalent), a copy of the agreed protocol and the Marine Mammal Recording Form (MMRF), which is a Microsoft Excel spreadsheet containing embedded worksheets named Cover Page, Operations, Effort and Sightings. A Microsoft Word document named Deck forms is also available, and the MMO may prefer to use this when observing before transferring the details to the Excel spreadsheets. Although these forms were developed for seismic surveys, they can be used for piling operations, although many columns will not be applicable. The ability to determine the range of marine mammals is a key skill for MMOs, therefore a hand-held rangefinder will be used to verify the range. All MMO forms, including a guide to completing the forms; and instructions on how to make a rangefinder are available on the JNCC website: http://jncc.defra.gov.uk/marine/seismic_survey **Communication:** The contractor will be responsible for the communication channels between those providing the mitigation service and the crews working on the piling. A formal chain of communication from the MMO to the contractor, who will start/stop piling, will be established. In order to confirm the chain of communication and command the MMO will attend any relevant pre-mobilisation meetings. **Mitigation Zone:** The JNCC guidance defines the mitigation zone as a pre-agreed radius around the piling site prior to any piling. This is the area where a MMO keeps watch for marine mammals (and delays the start of activity should any marine mammals be detected). The extent of this zone represents the area in which a marine mammal could be exposed to sound that could cause injury and will be determined by factors such as the pile diameter, the water depth, the nature of the activities (for example whether drilling will also take place) and the effect of the substrate on noise transmission. The radius of the mitigation zone should be no less than 500 metres, and this is measured from the pile location. The mitigation zone is calculated following a review of underwater noise modelling; and reflects the risk zones of PTS and TTS for the species of concern, therefore cannot be defined at this time. The MMO should be located on the most appropriate viewing platform to ensure effective coverage of the mitigation zone, during periods of rough seas, an elevated vantage point would be beneficial.

E-19	**Impact Piling Protocol**	The standard JNCC protocol is outlined below[14] (please see the Acoustic Deterrent Device (ADD) protocol to be followed during times of sea states exceeding 4 (or 2 if deemed necessary by the MMO) or during periods of darkness and/or low visibility i.e. fog): 1. The MMO will not initiate this protocol during periods of darkness or poor visibility (such as fog) or during periods when the sea state is not conducive to visual mitigation (above sea state 4 is considered not conducive[15]) as there is a greater risk of failing to detect the presence of marine mammals. Harbour porpoise have small dorsal fins, therefore the MMO shall take additional precautions if the sea state exceeds 2. As works will occur over the winter period it is likely that sea state 2 will be exceeded on a regular basis. An elevated platform for the MMO to monitor from would be beneficial when the sea state is 2 or above, the impact piling works could also be scheduled on a day where the sea is expected to be calm. 2. The mitigation zone will be monitored visually by the MMO for an agreed period prior to the commencement of piling. This will be a minimum of 30 minutes. 3. The MMO will scan the waters using binoculars or a spotting scope and by making visual observations. Sightings of marine mammals will be appropriately recorded in terms of date, time, position, weather conditions, sea state, species, number, adult/juvenile, behavior, range etc. on the JNCC standard forms. Communication between the MMO and the contractor and the start/end times of the activities will also be recorded on the forms. 4. Piling will not commence if marine mammals are detected within the mitigation zone or until 20 minutes after the last visual detection. The MMO will track any marine mammals detected and ensure they are satisfied the animals have left the mitigation zone before they advise the crew to commence piling activities. 5. A soft-start will be employed, with the gradual ramping up of piling hammer power incrementally over a set time period until full operational power is achieved. The soft-start duration will be a period of not less than 20 minutes. This will allow for any marine mammals to move away from the noise source. 6. If a marine mammal enters the mitigation zone during the soft-start then, whenever possible, the piling operation will cease, or at least the power will not be further increased until the marine mammal exits the mitigation zone and there is no further detection for 20 minutes. 7. When piling at full power this will continue if a marine mammal is detected in the mitigation zone (as it is deemed to have entered voluntarily[16]). 8. If there is a pause in the piling operations for a period of greater than 10 minutes, then the pre-piling search and soft-start procedure will be repeated before piling recommences. If a watch has been kept during the piling operation, the MMO should be able to confirm the presence or absence of marine mammals, and it may be possible to commence the soft-start immediately. If there has been no watch, the complete pre-piling search and soft-start procedure will be undertaken. To prevent the need for the pre-piling search and therefore delays to the piling operations a noise generator could be deployed, which is a metal, spring loaded hammer device which creates a continuous underwater noise, mimicking the sound of the impact hammer; which would in turn deter marine mammals from entering the mitigation zone. This should be used for no longer than 1 hour, or in exceptional circumstances 2 hours (i.e. a breakdown of machinery), after which the standard soft-start procedure will commence. All uses of the noise generator should be logged and handed to the MMO to include in the deck forms. Passive Acoustic Monitoring (PAM) is of little value for monitoring species with low vocalisation rates, such as seals and baleen whales, including minke whales which are often encountered in inshore waters, which is why ADD are recommended in this instance.

[14] There is a 'variation of standard piling protocol' allowed in the guidance if required.

E-20	**Marine Mammal Protection Protocol (MMPP) – general measures**	If there is a pause in the piling operations for a period of greater than 10 minutes, then the pre-piling search and soft-start procedure will be repeated before piling recommences. If a watch has been kept during the piling operation, the MMO should be able to confirm the presence or absence of marine mammals, and it may be possible to commence the soft-start immediately. If there has been no watch, the complete pre-piling search and soft-start procedure will be undertaken. To prevent the need for the pre-piling search and therefore delays to the piling operations, a noise generator could be deployed to create a continuous underwater noise which mimics the sound of the impact hammer; which would in turn deter marine mammals from entering the mitigation zone. This should be used for no longer than 1 hour, or in exceptional circumstances 2 hours (i.e. a breakdown of machinery), after which the standard soft-start procedure will commence. All uses of the noise generator should be logged and handed to the MMO to include in the deck forms.
E-21	**Marine Mammal Protection Protocol (MMPP) – general measures**	As per the JNCC guidance, reports detailing the piling activity and marine mammal mitigation (the MMO reports) will be sent to Marine Scotland at the conclusion of piling activity. Reports will include: • Completed Marine Mammal Recording Forms; • Date and location of the piling activities; • A record of all occasions when piling occurred, including details of the duration of the pre-piling search and soft-start procedures, and any occasions when piling activity was delayed or stopped due to presence of marine mammals; • Details of watches made for marine mammals, including details of any sightings, and details of the piling activity during the watches; • Details of any problems encountered during the piling activities including instances of non-compliance with the agreed piling protocols; and • Any recommendations for amendment of the protocols.
E-22	**Marine Mammal Protection Protocol (MMPP) – general measures**	Passive Acoustic Monitoring (PAM) is of little value for monitoring species with low vocalisation rates, such as seals and baleen whales, including minke whales which are often encountered in inshore waters, which is why ADD are recommended in this instance.
E-23	**Marine Mammal Protection Protocol (MMPP) – general measures**	If any dead cetacean is observed during construction or operation, it should be reported to the Scottish Marine Animal Stranding Scheme (SMASS) (www.strandings.org) and live marine mammal strandings will be reported to British Divers Marine Live Rescue (www.bdmlr.org.uk).
E-24	**Marine Mammal Protection Protocol (MMPP) – general measures**	Prepare and implement a Seal Injury Avoidance Scheme ("SIAS") Mitigation measures identified within the SIAS includes: • Have a Marine Mammal Observer Present during all dredging and overwater piling activities to ensure that no seals enter the area during the operations; and • Develop and implement a Vessel Management Plan.

[15] Detection of marine mammals, particularly porpoises, decreases as sea state increases. According to the JNCC guidance ideally sea states of 2 or less are required for optimal visual detection.
[16] The guidance states that there is no scientific evidence for this voluntary hypothesis; instead it is based on a common sense approach. Factors such as food availability may result in marine mammals approaching piling operations; in particular, the availability of prey species stunned by loud underwater noise may attract seals into the vicinity.

E-25	**Otters**	• Despite no signs of otter during field visits and anecdotally in the local area, the possible presence of otter on site and in the wider landscape should be included in tool box talks and site induction for construction staff operating in this area. • Works associated with land above the high water mark should be preceded by a pre-works check for otter resting sites. If an otter is observed within the proposed working areas, seek guidance from an Ecological Clerk of Works (ECOW) and do not commence works until the otter has dispersed. • Should an otter resting site be discovered, prior to or during works, said works should be assessed with regards to the need for additional mitigation species disturbance licensing. • Artificial lighting should be directed towards the working areas only in order to minimise the effects on otter which can be more active between dusk and dawn. • Pollution of the marine environment should be prevented in order to safeguard water quality and marine life which otter rely on within these habitats.
E-26	**Otters**	The following mitigation measures are recommended to minimise the effects on otters: • Potential otter holts and shelters should be checked prior to works commencing by a qualified ecologist; • The removal of boulders and concrete with the potential to shelter otter must be supervised by a qualified ecologist; • All site contractors should be made aware of the potential presence of otter in the locale, and in the event that otter is discovered on site, all work in that area must stop immediately and a suitably qualified ecologist contacted; • The development design seeks to retain or create new otter sheltering habitat wherever possible; • Works and related site mobilisations will commence no earlier than one hour after dawn and will cease no later than one hour before sunset to avoid times where otter are likely to be active; • Temporary lights used during construction must be fitted with shades to prevent light spillage outside the working area. Temporary lights must not illuminate scrub and scattered trees as lighting can affect commuting and foraging success of otter and other species; • Any trenches or pits made during construction must be covered when unattended or a shallow angled plank inserted to allow animals to escape, should they become trapped inside them. The ends of any pipeline must be capped when unattended, or at the end of each working day to prevent animal access; • Scottish Environment Protection Agency (SEPA) Guidance for Pollution Prevention (GPPs) would be followed; and • In the event that any protected species is discovered all work in that area must stop immediately and a suitably qualified Ecologist contacted. Details of the NatureScot Area Officer and Scottish Society for the Prevention of Cruelty to Animals (SSPCA) relevant Officer could be held in site emergency procedure documents. Assuming mitigation is applied, no loss of resting site, or permanent loss of important foraging and/or commuting habitat is anticipated to occur that could significantly affect the local population and distribution of otter.

E-27	**Introduction of non-native species**	Works should adhere to the Code of Practice on Non-Native Species (2012). Assuming the following mitigation is applied, no introduction or spread of NNS is anticipated to occur that could significantly affect the ecological integrity of the site: • Development and implementation of a Marine Biosecurity Plan specific to construction and also operation of the completed development; • An Environmental/Ecological Clerk of Works (ECoW) team will be appointed to monitor compliance, produce auditable records and provide onsite advice; • All relevant staff receive a copy of the site/ operation biosecurity plan summary and instructions sheet; • ECoW to receive training in NNS identification; • Identification of commonly found NNS will also be outlined in toolbox talks given to staff by the ECoW; • All staff will be encouraged to report any 'suspect' marine plant or animal to the Environmental Manager or EcoW; • Measures will be in place to preserve water quality and prevent watercourse pollution following SEPA Guidelines for Pollution Prevention (GPPs); • Routine inspections of equipment and vessels for NNS and biosecurity measures taken if NNS found at site or on equipment; and • Inspection of any 'high risk' vessels or materials entering the harbour during construction and operation
Other Environmental Considerations		
O-1	**Best Practice**	Best practice will be adopted throughout all phases of development, following current guidance. The programme of works, including timing, direction and method of capital dredge, will be planned, monitored and managed to minimise the potential negative environmental impacts.
O-2	**Construction Method Statement (CMS)**	Construction Method Statement (CMS) detailing pollution prevention measures will be agreed with the regulatory authority prior to works commencing, as part of the wider CEMP. The following good practice guidelines shall be adhered to and incorporated into the CMS: • GGP 5: Works and maintenance in or near water; • PPG 6: Working at construction and demolition sites; • PPG 7: Safe Storage – The safe operation of refuelling facilities; • GPP 21: Pollution and incident response planning; and • GPP 22: Dealing with spills
O-3	**CEMP**	Construction techniques and methodologies would be fully incorporated into a Construction Environmental Management Plan (CEMP) (including a Pollution Prevention Plan) and be fully developed once a contractor is appointed.
O-4	**Terrestrial Noise**	In line with the decision notice associated with the outline planning application 01/00802/OUT which was granted, with conditions, the following noise mitigation measures will be included where required: • Noise levels generated will be controlled by practicable means through contract specification, local authority control and the use of temporary barriers and 'quiet' plant. • A construction noise management plan, can help mitigate any effects at the most exposed sensitive receptors. • Acoustic double glazing

O-5	**Air Quality**	Construction of the proposed development is considered to be a temporary impact and can be controlled through developing a site-specific Dust Management Plan as part of a Construction Environmental Management Plan (CEMP). The dust impact assessment requires specific information on site operations during construction, including preparatory earthworks, general construction and the potential for trackout during construction of the proposed development. Currently this information is still being finalised. It is therefore proposed to defer the construction dust assessment and formulation of a construction dust management plan until such time as details on construction have been finalised. In line with the decision notice associated with the outline planning application 01/00802/OUT which was granted, with conditions, the following mitigation will be included where required: • Close liaison with the traffic management section of City of Edinburgh Council should be made in relation to the agreed routes and hours of working for construction vehicles. • Haul routes to be located away from off-site sensitive properties and to be watered regularly (wet suppression of dust) to ensure that any deposit of material on the local road network is minimised; • All site vehicles and plant to have upward-facing exhausts to minimise surface dust resuspension - Bunds or screens may be constructed as wind breaks, to reduce wind speeds. Earth bunds should be seeded as soon as possible prior to which they are to be maintained damp; • The aggregate stocking area should be located away from sensitive areas and residential properties; - Stockpiles should also be watered and water curtains on any additionally be used at the site boundaries near sensitive properties; • Off-site vehicles to be sheeted, their wheels and bodies to be cleaned and the access road to be hard-surfaced and maintained damp; - Early paving of permanent roads; • Minimisation of drop heights, and the use of chutes to discharge material close to where it is required - Vehicle wheel and chassis cleaning - Imposition of speed limits, to reduce dust emissions from ground surfaces
O-6	**Concrete**	There is unlikely to be concrete batching undertaken on-site. However, in the case that batching was to be undertaken on-site the following mitigation measures would be implemented to minimise the potential impact of concrete batching on the water environment in line with PPG6: • Concrete batching will take place on an impermeable designated area and at least 10m from any watercourse. • Equipment and vehicles will be washed out in a designated area that has been specifically designed to contain wet concrete/ wash water. • A closed loop system will be used for wash waters. Wash waters will be stored in a contained lined pond for settlement before being reused (e.g. for mixing and washing). • No discharge of wash waters will occur on-site. All excess wash water that cannot be reused will be disposed of off-site. The following mitigation is proposed for concrete handling and placement: • Pouring of concrete will take place within well shuttered pours to prevent egress of concrete from the pour area. • Pouring of concrete during adverse weather conditions will be avoided. • The CEMP will include a Pollution Incident Response Plan, and drivers of vehicles carrying concrete will be informed so as to raise awareness of potential effects of concrete and of the procedures for clean-up of any accidental spills. Concrete acidity (pH) will be as close to neutral (or site-specific pH) as practicable as a further precaution against spills or leakage.

O-7	**Oil, Fuel, Site Vehicle Use and Storage**	The risk of oil contamination will be minimised by good site working practice (further described below) but should a higher risk of oil contamination be identified then installation of an oil separator will be considered.
		The storage of oil is considered a Controlled Activity which will be deemed to be authorised if it complies with the Regulations.
		The mitigation measures to minimise any risk of contaminant release are in line with SEPA PPG and GPP documents and include the following:
		• Storage:
		  ○ Storage for oil and fuels on site will be designed to be compliant with GPP 2 and 8.
		  ○ The storage and use of loose drums of fuel on site will be not permitted.
		  ○ The bund will provide storage of at least 110% of the tank's maximum capacity.
		• Refuelling and maintenance:
		  ○ Fuelling and maintenance of vehicles and machinery, and cleaning of tools, will be carried out in a designated area where possible in line with PPG 7.
		  ○ Multiple spill kits will be kept on site.
		  ○ Drip trays will be used while refuelling.
		  ○ Regular inspection and maintenance of vehicles, tanks and bunds will be undertaken.
		Emergency procedure: The Pollution Incident Response Plan will include measures to deal with accidental spillages.

O-8	**Maritime Archaeology**	It is unlikely archaeological remains will be found during the construction activities. However, in the event this occurs the Contractor will seek advice from the Clients Representative as soon as practicably possible.
O-9	**Waste Management**	• The Contractor will adopt an integrated approach to waste management and minimisation by applying the waste hierarchy; • A list of clearly defined waste responsibilities will be prepared and implemented; • Present glass, metal, plastic, paper and card (including cardboard) for separate collection; • Take steps to maintain the quality of dry recyclables presented for separate collection; • Take care of the waste to prevent escape; • Ensure waste is transferred to someone who is authorised to receive it, for example, a registered waste carrier or waste manager with the relevant authorisation; • Complete a waste transfer note for any transfer of waste, including a full description of the waste, and retain a copy of this note for two years; • Describe the waste accurately and provide information for the safe handling, transport, treatment, recovery or disposal by subsequent holders; • Take reasonable measures to ensure that the waste does not cause pollution or harm to human health; • All movements of special waste must be accompanied by a Special Waste Consignment Note (SWCN). Copies of SCCN must be retained for three years; and • Monthly waste reports must be provided to Edinburgh Marina Limited.

O-10	**Navigation**	Mitigation with regard to the marina construction commences with the requirement for the successful contractors to provide full methods, risk assessments and mitigation measures and to agree and amend these as necessary. Mitigation relates to correct lighting and buoyage during and post construction. New navigation lights shall be installed as appropriate and buoyage may be deployed to ensure marina traffic follows a visible and shallow entry angle into the main shipping channel. Health and Safety during construction will be followed in accordance with The Construction (Design and Management) Regulations 2015. The following recommendations are generic and will be specified according to the construction method and type of plant deployed. *Moving the vessel* To be handled be a competent vessel and crew at all times, advised to harbour and other traffic and co-ordinated prior to commencement through a single contact. *Obstruction of channel* • Ensure vessel is on the 'non' channel side of the sheet pile installation if possible. ***Foundering of vessel in the channel*** • As above and additionally contractor emergency procedures to be in place, dovetailing with harbour emergency procedures; • Contractor insurance; • Vessel surveys; and • Best operating practice for the barge. ***Collision with other vessels while engaged in construction*** • Navigational and minimum ambient lighting on barge; • Local Notice to Mariners; • Publicity in local press for recreational users, who are most likely to be affected. • Communication issues • VHF ch12 continuous monitoring; and • Mobile numbers of single contact point with emergency action responsibility on barge and vice versa with Harbour contacts. ***Support vessels*** • Control of movement by harbour; • VHF ch12 continuous monitoring; and • Contractor methods and risk assessed boarding and transfer methods to vessels for all weather conditions. ***Wave/wash of passing vessels affecting passenger transfers or barge*** • Pre-planned and co-ordinated movements to lessen risk by contractor. ***Damage to piling mid construction by vessels*** • Contractor to advise on fragility of structure when not complete and proposed mitigation should irreparable damage be a risk. ***Damage to vessels by piles mid construction*** • Lighting or other highlighting of danger areas to be used particularly during darkness; • Local Notice to Mariners; and • Publicity in local press for recreational users.

		Contact with vessels passing by the operation of piling • Methods and risk assessments to be provided, agreed and adhered to (e.g. vessel jib extending into navigational channel and the like). • The piling operation to be arranged in such a way that no physical encroachment can be made into the navigational channel. In addition to the foregoing, the marina operator is committed to complying with the Port Marine Safety Code and 2018 Guide to Good Practice on Port Marine Operations. • Navigation will be included within the CEMP when it is prepared.
O-11	**Construction Monitoring**	The following elements would be included within the monitoring plan: • Regular visual inspection of: ○ Harbour waters, more frequent during periods of dredging activity, in order to monitor levels of sediment suspension and dispersion. • Water quality monitoring: A monitoring plan, covering baseline, construction and post-construction will be agreed with SEPA and Marine Scotland. • Monitoring as required to satisfy the conditions of any future discharge licence(s) or other environmental legislation. • Monitoring following any pollution incidents. • On-going liaison with SEPA and Marine Scotland as required during construction. All activities with potential to affect the water environment require to be authorised under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). The level of authorisation required is dependent on the anticipated environmental risk posed by the activity to be carried out. These activities could include construction drainage.
O-12	**Pollution Prevent**	• A pollution incident response plan relating to the construction of the proposed development will provide site spill response procedures, emergency contact details and equipment inventories and their location. All staff will be made aware of this document and its content during site induction.

APPENDICES

A DRAWINGS

0 10 20 50 100

Metres

THE NORTH MOLE

North nole flat top extended 50m measured at inside corner

Revetment to be at min height of MHVS for min distance of 25m from end of North Mole extension

35m ø turning circle

Revetment to engineer's details

STOFFORD PARADE

green parking

MHWS

8A

Marina Office

8B

HESPERUS WALK

HESPERUS PLACE

38m ø turning circle

38m ø turning circle

38m ø turning circle

fuel point

MIDDLE PIER

boat hoist

pilot station

pedestrian walkway

EAST GRANTON

Ledgend Total Berths – 340

- 76 No 10m x 4m
- 56 No 12m x 4.5m
- 107 No 14m x 4.9m
- 59 No 16m x 5.15m
- 27 No 18m x 5.75m
- 9 No 25m x 7.5m
- 5 No 30m x 9m
- 1 No 45m x 11m

Inner Marina Dredge Level CD −2.5m

Hoist Access + Mid Marina Dredge Level CD −3.0m

Channel + Outer Marina Dredge Level CD −4.0m

Notes.

Rev	Description	Date	By
H	MHWS added.	28.09.18	KM
G	Berth number updated.	04.05.18	KM
F	Revised Plot 8A & 8B, middle pier, and berth layout	03.05.18	KM
E	Revised and resized sheet.	14.02.18	KS

Granton Central Developments Ltd

Edinburgh Marina

Granton Harbour, Edinburgh

Masterplan
Marina Extract

Planning

Project number	60074
Date	10/02/2016
Drawn by	WG
Checked by	WG
Drawing No	A-P-00-G7-005
Revision	H
Scale	NTS @A1

Wilson +Gunn ARCHITECTS

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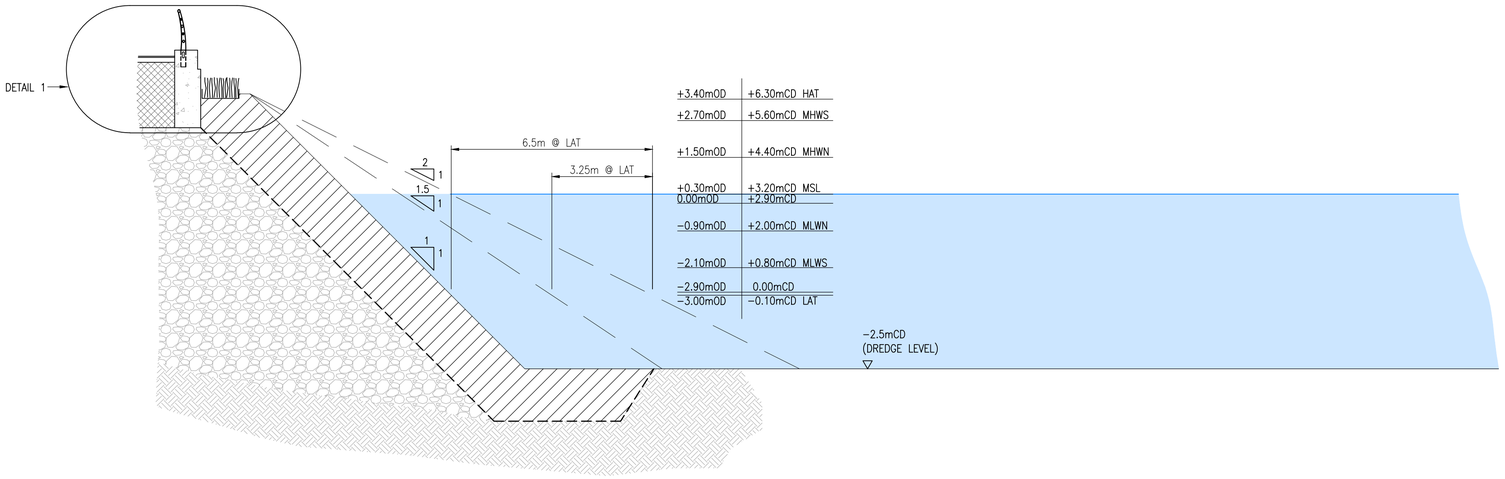
hello@wilsongunnarchitects.com

THE ROYAL INCORPORATION OF ARCHITECTS IN SCOTLAND CHARTERED PRACTICE

RIBA Chartered Practice



TYPICAL SECTION
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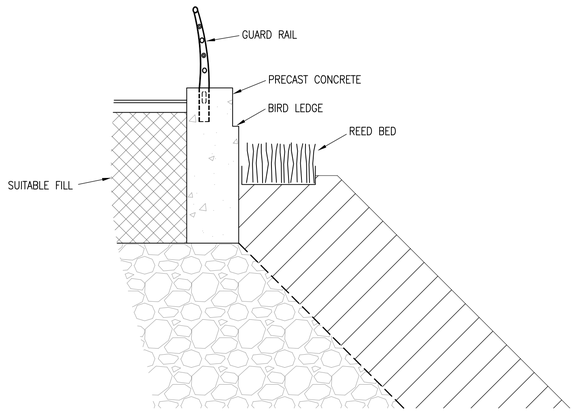
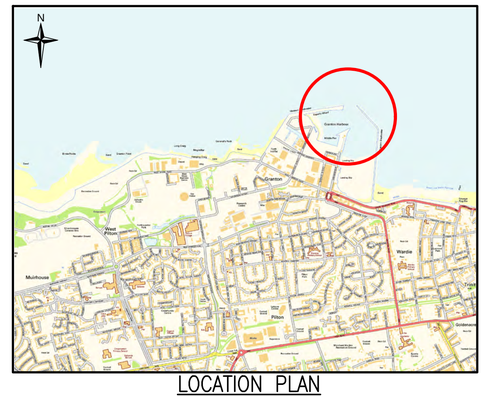


DETAIL 1
(SCALE 1:100)



LOCATION PLAN
(SCALE 1:25000)

Do not scale from this drawing.

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARD/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING RISKS AND INFORMATION.

RISKS LISTED HERE ARE NOT EXHAUSTIVE. REFER TO DESIGN ASSESSMENT FORM NO.

CONSTRUCTION

DEMOLITION

FOR INFORMATION RELATING TO USE, CLEANING AND MAINTENANCE SEE THE HEALTH AND SAFETY FILE

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

Rev.	Date	Description	Drawn	Checked	Approved

NOTES:

1. DRAWING TO BE READ IN CONJUNCTION WITH PRELIMINARY DESIGN ASSUMPTIONS.
2. ALL LEVELS IN METRES TO CHART DATUM UNLESS NOTED OTHERWISE.
3. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
4. ROCK ARMOUR PROFILE AND SIZING BASED ON WAVE ANALYSIS PROVIDED BY THE CLIENT

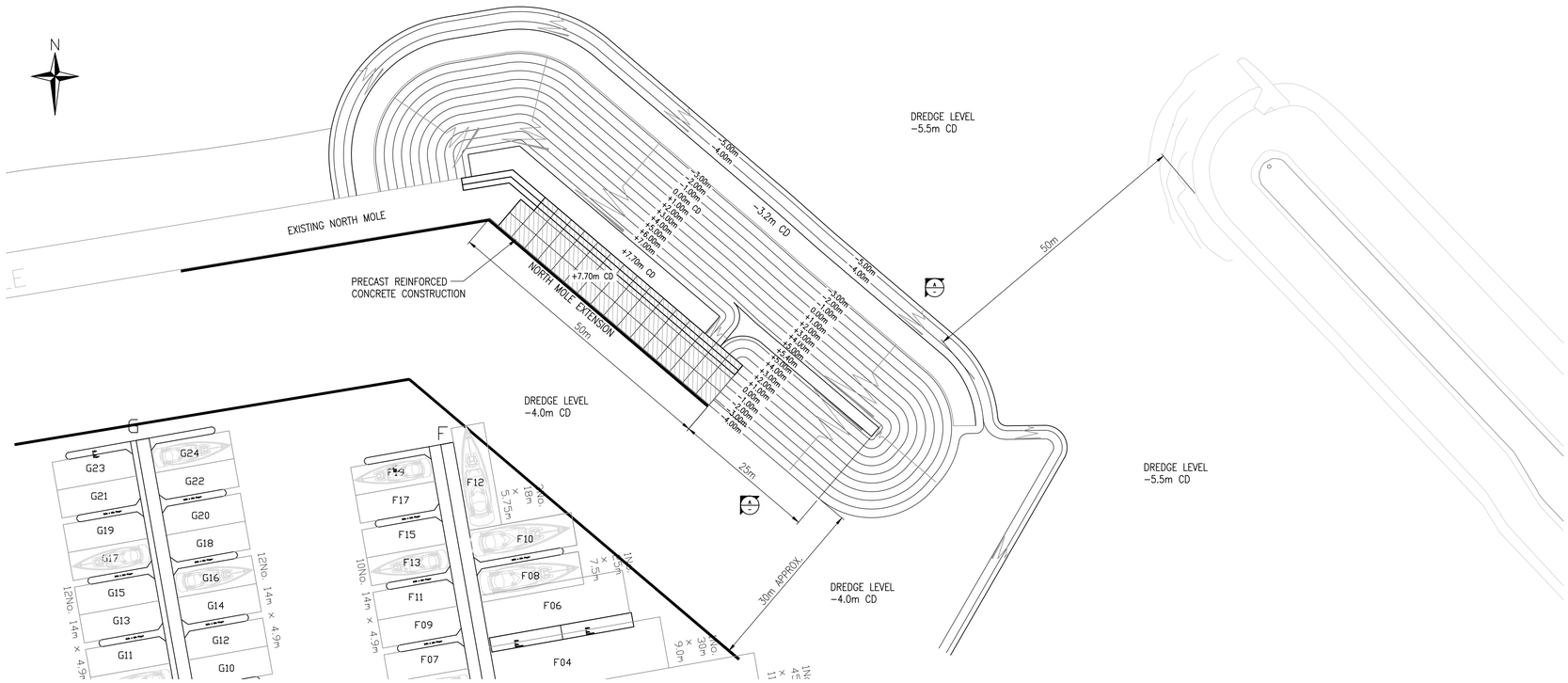
Client:
GRANTON CENTRAL DEVELOPMENTS LTD

Project Title:
NORTH MOLE EXTENSION
EDINBURGH MARINA

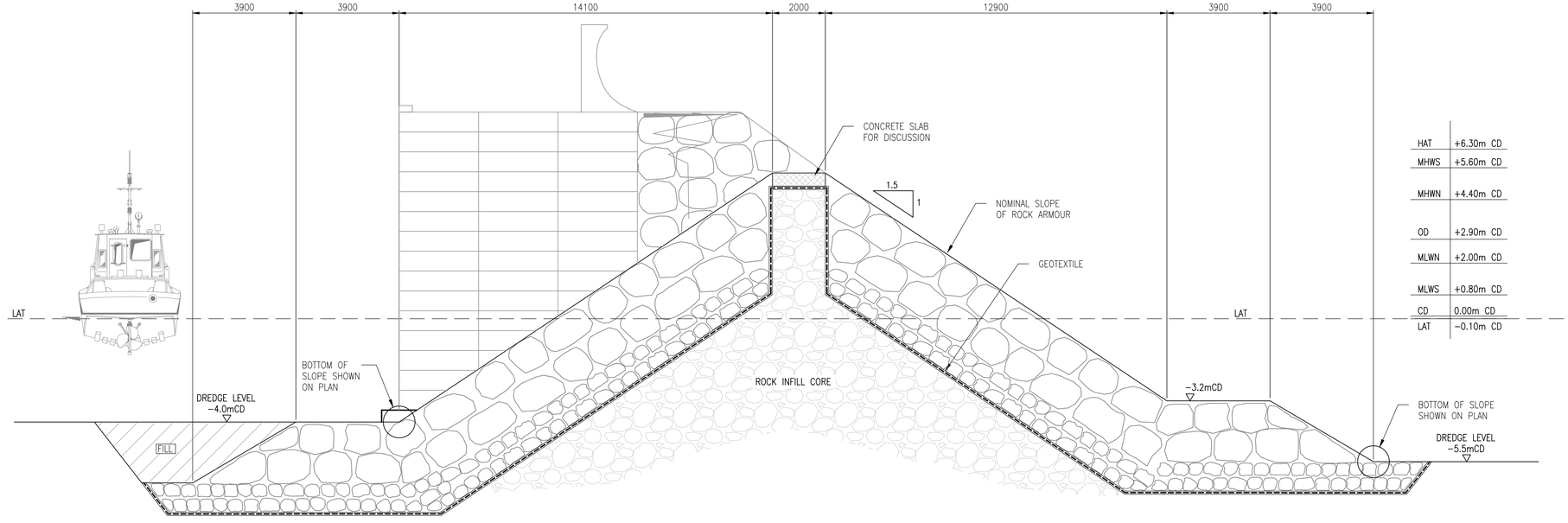
Drawing Title:
TYPICAL SECTION THROUGH INNER QUAY WALL

FAIRHURST
225 Bath Street,
GLASGOW, G2 4GZ
Tel: 0141 204 8800 Fax: 0141 204 8801

Scale at A1:	Status:	
1:500	For Information	
Drawn:	Checked:	Approved:
GAM	GSDS	GSDS
Date:	Date:	Date:
27/02/18	27/02/18	27/02/18
Drawing No.:		Revision:
115875/0021		–



PLAN SHOWING NEW BREAKWATER – 1:500



TYPICAL CROSS SECTION A–A – 1:100

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SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

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CONSTRUCTION

DEMOLITION

FOR INFORMATION RELATING TO USE, CLEANING AND MAINTENANCE SEE THE HEALTH AND SAFETY FILE

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

Rev.	Date	Description	Drawn	Checked	Approved

NOTES:

1. DRAWING TO BE READ IN CONJUNCTION WITH PRELIMINARY DESIGN ASSUMPTIONS.
2. ALL LEVELS IN METRES TO CHART DATUM UNLESS NOTED OTHERWISE.
3. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
4. TOE DETAIL IS BASED ON THE ASSUMPTION THAT BED MATERIAL IS COMPETENT WHEN GI INFORMATION BECOMES AVAILABLE.
5. BREAKWATER LENGTH IS FROM REQUIREMENTS PROVIDED BY THE CLIENT
6. ROCK ARMOUR PROFILE AND SIZING BASED ON WAVE ANALYSIS PROVIDED BY THE CLIENT
7. ASSUMED ENTRANCE CHANNEL DEPTH –5.5m CD
8. EXCLUDES ANY INDICATION REQUIREMENTS FOR NAVIGATIONAL MARKERS

Client:
GRANTON CENTRAL DEVELOPMENTS LTD

Project Title:
NORTH MOLE EXTENSION
EDINBURGH MARINA

Drawing Title:
50m. FIXED BREAKWATER SHOWING 25m MOLE EXTENTION PRELIMINARY DESIGN

FAIRHURST
225 Bath Street,
GLASGOW, G2 4GZ
Tel: 0141 204 8800 Fax: 0141 204 8801

Scale at A1:	Status:	
AS SHOWN	For Information	
Drawn:	Checked:	Approved:
GAM	GSDS	GSDS
Date:	Date:	Date:
06/09/18	06/09/18	06/09/18

Drawing No.: 115875/0027 Revision: –

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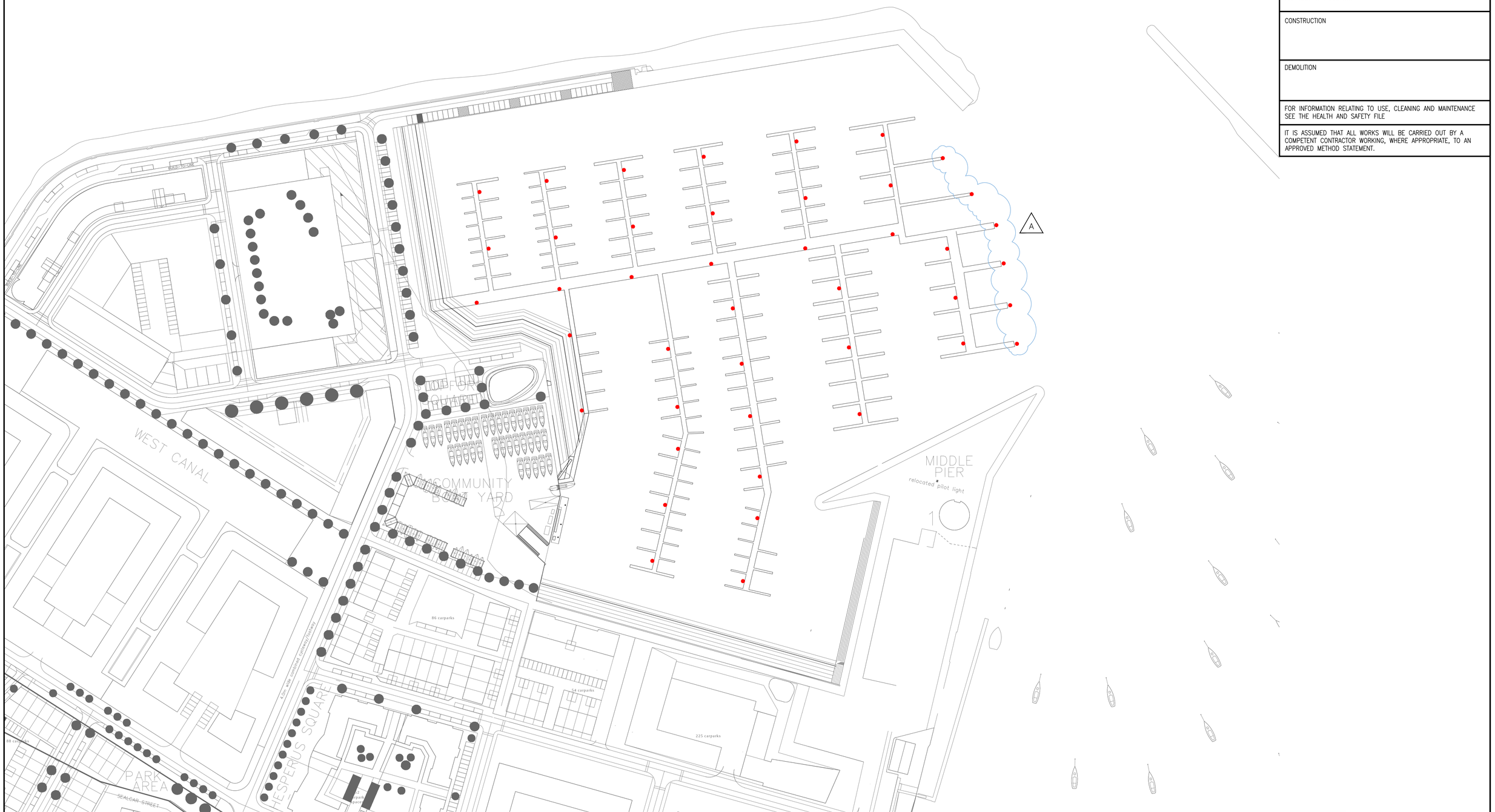
RISKS LISTED HERE ARE NOT EXHAUSTIVE. REFER TO DESIGN ASSESSMENT FORM NO.

CONSTRUCTION

DEMOLITION

FOR INFORMATION RELATING TO USE, CLEANING AND MAINTENANCE SEE THE HEALTH AND SAFETY FILE

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.



Rev.	Date	Description	Drawn	Checked	Approved
A	13/09/17	NOTE 4 ADDED. ADDITIONAL PILE POSITIONS SHOWN CLOUDED.	KAB	CN	

NOTES:

1. LAYOUT OF PILES SHOWN IS A TYPICAL LAYOUT ONLY.
2. THE REQUIRED PILING FOR THE DETAILED DESIGN WILL BE INFLUENCED BY THE GROUND CONDITIONS AND PONTOON AND FINGER DESIGN CRITERIA INCLUDING THE VESSEL SIZES, LOADING CRITERIA, DEFLECTION CRITERIA, WAVE LOADING.
3. PILING ANTICIPATED TO BE PAINTED TUBULAR STEEL WITH CLOSED CAPS.
4. PONTOON LAYOUT SHOWN IS AS PROVIDED BY CLIENT.

LEGEND:

- INDICATIVE PILE LOCATION

Client:

GRANTON HOLDINGS LTD

Project Title:

EDINBURGH MARINA

Drawing Title:

PRELIMINARY PONTOON PILE LOCATIONS

FAIRHURST
225 Both Street,
GLASGOW, G2 4GZ
Tel: 0141 204 8800 Fax: 0141 204 8801

Scale at A1:	Status:	
1:1000	For Information	
Drawn: KAB	Checked:	Approved:
Date: 31/08/17	Date:	Date:
Drawing No.: 115875/0001		Revision: A

B ENGINEERING METHOD STATEMENT

Edinburgh Marina

Civil Engineering Method Statement
North Mole Extension, Inner Revetment and Quay Wall

14th September 2018

FAIRHURST

CONTROL SHEET

CLIENT: **Edinburgh Marina**

PROJECT TITLE: **Edinburgh Marina, Granton**

REPORT TITLE: **Civil Engineering Method Statement**

PROJECT REFERENCE: **115875**

DOCUMENT NUMBER:

Issue & Approval Schedule	ISSUE 1 DRAFT	Name	Signature	Date
	Prepared by	Claire Nicolson	CN	09/05/17
	Checked by	Grant Scholes	GSDS	09/05/17
	Approved by			

Revision Record	Rev.	Date	Status	Description	Signature	
	1	07 Sept 18	Updated	To reflect revised layout of breakwater	By	GSDS
					Checked	CG
					Approved	GSDS
	2	14 sept 18	Expanded	To include quay wall and internal revetment construction	By	GSDS
					Checked	CG
					Approved	GSDS

This document has been prepared in accordance with procedure OP/P02 of the *Fairhurst Quality and Environmental Management System*

Contents

1 Introduction

Fairhurst have been commissioned by Edinburgh Marina Ltd to prepare a high level method statement setting out the likely method of construction various aspects of civil engineering works to support the development and provide protection for Edinburgh Marina and Granton Harbour. These comprise an extension to the North Mole breakwater, an internal quay wall and an internal harbour revetment.

2 Assumptions

Typical geology of Granton Harbour consists of soft alluvial silts overlying stiff glacial till which overlies bedrock comprising inter-bedded strata of sandstone and mudstone. Detailed Geotechnical Investigation is required to inform the detailed design. This will be provided to the Contractor to inform the Temporary Works design as required.

A Bathymetric Survey of the current bed levels has been carried out to inform the design, identify the current extent of dredging and inform the construction methodology. The methodology may vary depending on the preferred approach of the Contractor, the availability of marine plant and the comparative cost of temporary works. However, this statement is considered to be a reasonable and practical approach to the Works that highlights the likely interface with the Forth.

3 North Mole Extension

3.1 Form of Construction

The North Mole extension requires a vertical internal face for a length of 50m to maximise space available for the marina. An inclined seaward face of rock armour will provide protection from wave action. Several forms of construction are possible for this structural layout but it is anticipated that a reinforced concrete wall would be formed, resting on the seabed with a natural rock faced revetment to the seaward side. The Reinforced concrete wall would be assembled from hollow pre-cast concrete boxes that can be filled on site with concrete and or ballast rock. The concrete wall will extend for 50m, beyond which a 25m rock revetment will provide additional protection.

3.2 Construction methodology

For the purposes of this method statement, it is assumed that all works will be carried out using marine based plant. However, subject to an assessment of the existing Esparto Wharf and North Mole it may be possible to create an access to allow some of the work to be undertaken by land, reducing marine based activity.

The overall steps in the construction process are

i. Locally reduce the level of the seabed to design dredge level
ii. Excavate further to the design formation level for the concrete wall
iii. Place a regulating layer of stone to land the concrete units on
iv. Place precast concrete foundation blocks
v. Build up the precast concrete wall units, sealing the joints as they are placed to control subsequent wet concrete placement

vi. Place any binding reinforcement and drop in pre-formed reinforcement cages
vii. Fill concrete units with underwater mix concrete
viii. Backfill around concrete wall externally to revetment founding level, internally to bed level.
ix. Construct revetment on outer face of concrete wall, and for an additional 25m along the line of the wall.

3.2.1 Local Dredging

The area of the Western Harbour will be dredged to a finished dredge level sufficient for the planned operation of the marina. The depth varies across the marina with shallower waters for smaller craft closed to the shore.

Dredging in advance of the north mole is likely to be by backhoe dredger. Sediment testing has been undertaken across the marina site with some material identified as suitable for disposal at sea site at an approved site and the remainder brought ashore for disposed or treatment and reuse.

3.2.2 Base Formation

The wall of the breakwater is expected to be founded approximately 4.5m below final dredge level subject to geotechnical investigation and design. A trench will be excavated from the dredge level to the base formation level with sloped sides of a gradient dependent on the geotechnical properties of the bed material. The figure below represents this construction phase.

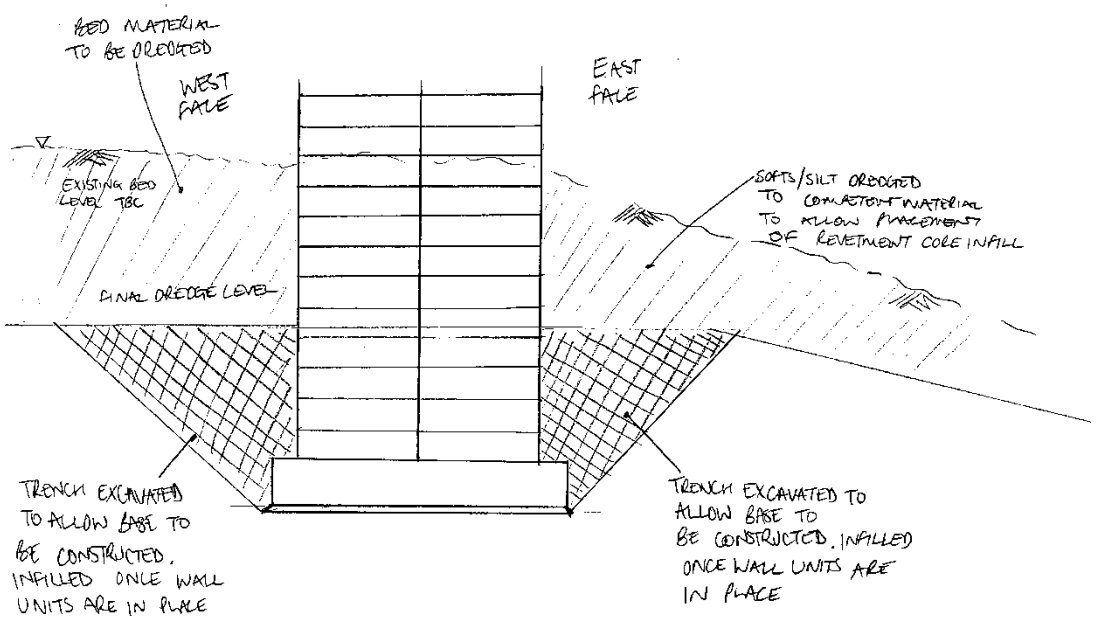


Figure 1: Potential construction within a trench to sound formation

A 250mm thick layer of Type 1 material will be placed on the base of the excavation and then levelled to allow placement of the reinforced concrete foundation units. These solid units provide a solid and stable foundation from which the wall can be supported. Divers will be employed to direct the placement and levelling of the units.

Once placed, a local bathymetric survey will be undertaken to confirm the base is at the correct level to receive the precast units making up the wall.

3.2.3 Precast Unit Construction and Placement

In order to minimise the time of construction on site and the associated cost of marine based plant, the wall will be constructed from precast units, which can be fabricated off site. The units will be transported to site by road or sea, depending on the location of the fabrication site.

The wall consists a reinforced concrete foundation approximately 7.5m wide and totalling a length of 50m. This will be made up of individual precast units sized to suit placement by crane from a barge and will be keyed together. Hollow units to form the bulk of the wall will be lifted and placed by crane from a barge with divers directing placement of the units, which lock together. This will form a sealed cofferdam into which concrete will be pumped in lifts.

3.2.4 Breakwater Construction

Following the construction of the breakwater wall, the rock infill forming the core of the revetment to the east of the wall will be placed using a long reach excavator from a barge. Some reinstatement of bed material may be possible if material properties permit prior to build up of the core of the breakwater.

Prior to placement of the secondary rock layer, consisting typically 300kg sized rock, divers will place a layer of geotextile to prevent material washout. The larger primary rock armour will then be placed on top to provide the full level of wave protection. The rock will be placed using a barge mounted long reach excavator. It is assumed that all rock will be delivered to site by sea and will be placed directly from the delivery barge to the revetment.

3.2.5 Wave Wall

In order to provide additional protection along the top of the structure, a precast reinforced concrete wave wall will be placed. The wave wall units will be lifted into place by barge mounted crane or telehandler and secure in place.

3.2.6 Finished Walkway

Behind the wave wall, a paved surface will be installed to form the walkway. Fixtures such as lighting can be installed, with service ducts having been cast into the final lift of precast concrete boxes.

4 Quay Wall

4.1 Description

On the west side of the marina basin, a quay wall is to be formed. This will be a continuation of the existing quay wall along the south boundary. The proposed form of construction is a tied sheet pile wall with insitu reinforced concrete capping beam with metal parapet. The form of construction will be similar to the existing.

4.2 Construction Methodology

The wall is formed from driven sheet piles. The existing sheet pile wall was installed from a barge and it is likely that the same methodology would be used for the additional length of wall. A barge would be positioned at high water and stabilised on jack up legs. From this platform, the sheet pile wall can be installed tying into the existing wall. Individual sheet pile sections are lowered vertically into the sea bed, interlocked with the adjacent pile sections. Piles are usually driven to staged depths to maintain the continuity and allow adjustments. After being driven to full depth, the top of the piles are cut off to the design level. At this stage, the piles will be free standing but not capable of being backfilled. Ties will be installed between the piles and a secure anchorage point on shore. These will be buried reinforced concrete blocks that will resist the thrust from the wall when it is backfilled.

The wall will be backfilled with suitable material available from elsewhere on the site. The top of the wall is completed by a reinforced concrete capping beam that is cast in-situ to tie the top of the piels together. It will also support to the metal pedestrian parapet that will provide edge protection.

5 Marina revetment

5.1 Description

The west boundary of the marina basin is formed with a natural stone faced revetment that will enclose and protect an area of reclaimed land. The core of the revetment is expected to be a combination of material recovered from elsewhere on the site and imported structural fill. The facing rocks will be imported to site by road. Along the top of the revetment, a concrete capping detail with integral channel for planting and parapet along the top provides the transition

5.2 Construction Methodology

The revetment can be constructed using land based plant and machinery working progressively along the line of the revetment until completed. The fill behind the revetment can be placed behind once the revetment is structurally sufficient to protect the infill.

The revetment needs to be founded on a sound strata and so the first operation will be excavation of the bed sediments down to a suitable formation level. The core can then be built up in layers before being sealed behind within a geotextile. This will protect the integrity of the core and prevent future washout of material. The rock armour facing will then be placed on the outer face of the revetment and if the bed was excavated below dredge level, some bed material can be reinstated up to this level. Infill behind the revetment will comprise material from elsewhere on the site that has been tested for suitability. The reclaimed area will be suitable for car parking and landscaping.

Appendix A: Drawings

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Aberdeen
Bristol
Dundee
Edinburgh
Elgin
Glasgow
Inverness
Leeds
London
Manchester
Newcastle upon Tyne
Sheffield
Watford
Wellesbourne

CIVIL ENGINEERING • STRUCTURAL ENGINEERING • TRANSPORTATION • ROADS & BRIDGES
PORTS & HARBOURS • GEOTECHNICAL & ENVIRONMENTAL ENGINEERING • PLANNING &
DEVELOPMENT • WATER SERVICES • CDM COORDINATOR SERVICES

C BATHYMETRIC SURVEY

Land+Hydrographic Surveys
CHARTERED SURVEYORS

TEL: 01294 313 399 • WEB: WWW.ASPECTSURVEYS.COM

MULTIBEAM BATHYMETRIC SURVEY

WESTERN HARBOUR, GRANTON

MAY 2017

PROJECT REF: A6291

REV: 00

Client:

GRANTON CENTRAL DEVELOPMENTS LTD

Liberation Station

Esplanade

St Helier

Jersey

JE2 3AS

CONTENTS

TABLE OF FIGURES

DOCUMENT ISSUE RECORD

DATE	REVISON	COMPILED	CHECKED	NOTES
25.05.2017	00	JEK	CDT	FIRST ISSUE

1. INTRODUCTION

On the instructions of Granton Central Developments Limited, Aspect Land & Hydrographic Surveys Ltd (herein ALHS) carried out a multibeam (MBES) bathymetric survey of an area at Western Harbour, Granton. The program of events was as follows:

DATE	ACTIVITY
19.05.2017	Hydrographic team mobilised to site. Commencement and completion of MBES. Demobilisation from site.

2. SCOPE OF WORKS

The survey was required to provide an update to the existing bathymetry data of the harbour with the survey area covered the Western inlet of the Harbour and approaches, covering an area approximately 86,000m^2.

FIGURE 1 - WESTERN HARBOUR, GRANTON: INDICATIVE BATHYMETRIC SURVEY EXTENTS

3. GEODESY & DATUM

The horizontal datum used throughout the survey data gathering was OSGB36 (OSTN15™). Data has been rendered in OSGB36 Datum, British National Grid.

OSTN15 defines OSGB36 National Grid in conjunction with the National GPS Network. In this respect OSTN15 can be considered error free (not including any GPS positional errors). The agreement between OSTN15 and the old triangulation network stations (down to 3rd order) is 0.1m rms.

The vertical datum used for all survey data is Chart Datum (CD). Chart Datum at Leith is 2.90m below Ordnance Datum. RTK GPS was used throughout the survey for both horizontal and vertical control. Trimble VRS NOW Network corrections were used to provide RTK corrections for survey operations.

4. MULTIBEAM BATHYMETRIC SURVEY

4.1. EQUIPMENT & METHODOLOGY

A summary of the equipment used for completion of the multibeam bathymetric survey can be seen in the table below:

Survey Vessel	Coastal Sensor (MCA Cat III)
Positioning System	Trimble SPS855/555 RTK GPS
GPS Correction Source	Trimble VRS NOW Network
Echosounder	R2Sonic 2022 Multibeam System 400kHz
Motion Compensator	SMC IMU 108-30

ALHS' R2Sonic 2022 multibeam sonar system was used for the bathymetric survey. This was controlled using Sonic Control software during the course of data gathering.

Very detailed data with full seafloor coverage was gathered throughout the survey area as a result of the R2Sonic 2022's narrow beam width and high ping rate and the selection of 400kHz as an operating frequency.

The system was operated at the maximum ping rate achievable throughout the survey, such that the ping rate was controlled by the depth of water.

Sound Velocity (SV) dips were carried out prior to commencing survey operations and thereafter whenever the surface sound velocity varied by more than 2ms^{-1}. There was very little variation in surface SV observed during data gathering either temporally or geographically.

The SV dips were carried out using a Valeport MiniSVS & P dipping probe with Valeport Terminal X2 software, and the data was incorporated into the Hysweep Survey software for real-time corrections.

Positioning was achieved using a Trimble SPS855/555 system, providing horizontal and vertical positioning. This system also provided the heading. Motion compensation for the survey was provided by an SMC IMU 108-30 positioned at the sonar head.

An R2Sonic Sonar Interface Module (SIM) was used to control the sonar throughout the course of data gathering. The multibeam data was transmitted to the survey laptops running Hypack Hysweep over an Ethernet connection. Hypack Hysweep Survey was used for data gathering. Hypack MBMax software was used for post-processing. The stages of multibeam processing are detailed in Annex C.
Data was gathered to give at least 200% insonification over the survey area. This allowed full quality assurance checks to be carried out. Calibration values for the survey vessel were calculated from a patch test conducted on the day of data collection.

Details of the conduct of the patch test can be seen in Annex D. The values calculated from the patch test were:

Latency	0.05
Pitch	1.00
Roll	0.00
Yaw	4.00

4.2. SURVEY RESULTS

Depths in the area surveyed ranged from 5.12m below to 3.04m above CD. An overview of the bathymetric survey can be seen in the image below:

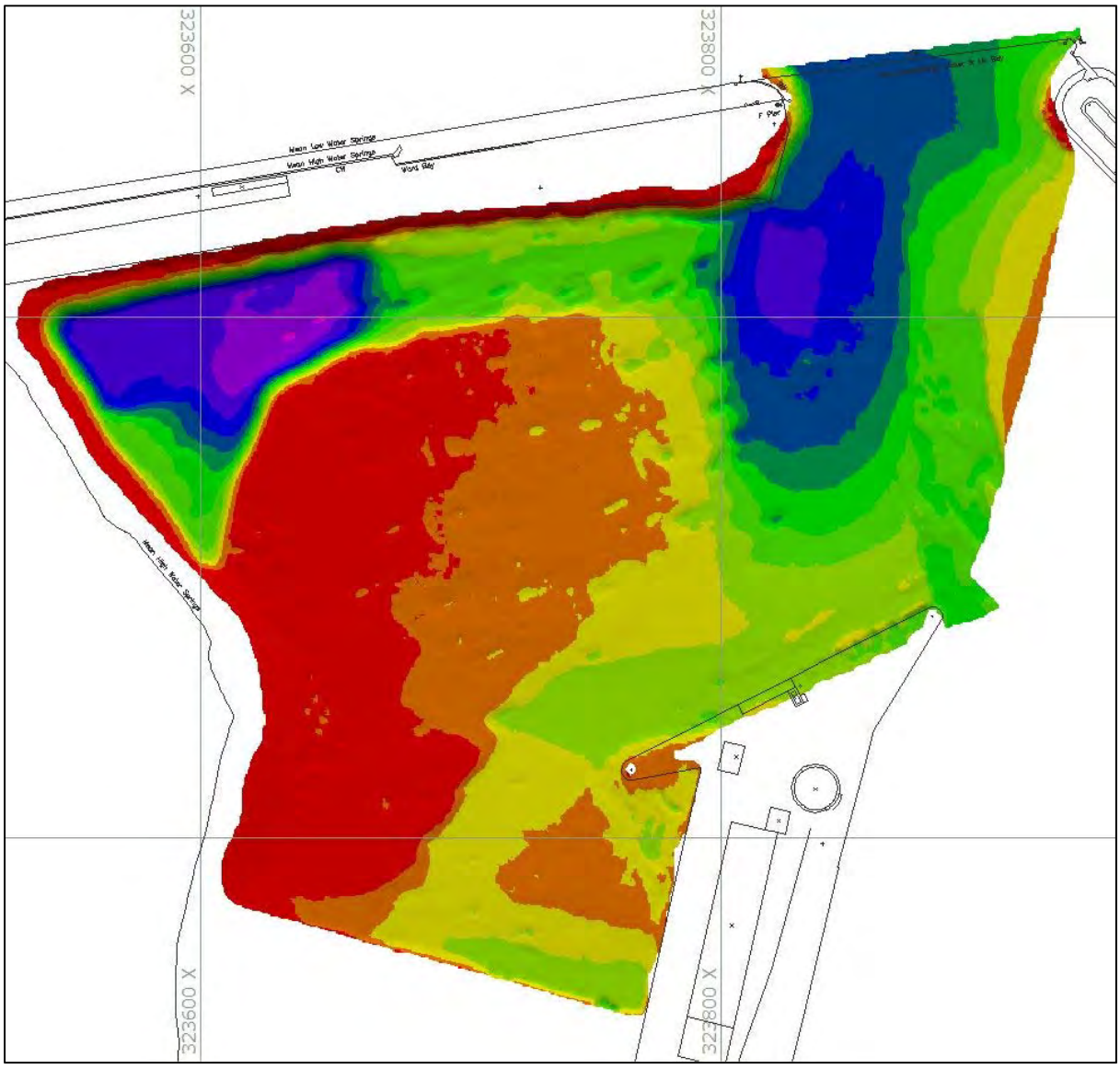


FIGURE 2 - RELIEF SHADED OVERVIEW OF THE MULTIBEAM BATHYMETRIC SURVEY

5. SURVEY VESSEL

The survey vessel *Coastal Sensor* (MCA Cat III) was used to carry out the survey.

Coastal Sensor is an MCA Cat III road transportable 6.1m fibreglass hull SPORTIS SK6100K RIB type vessel with enclosed cabin, central console, twin 60Hp outboard engine and spacious aft deck that can be used for inshore bathymetry, oceanographic or environmental projects.

FIGURE 3 - MCA CAT III VESSEL 'COASTAL SENSOR' CONDUCTING MBES SURVEY

The vessel, the first of its kind to be operated commercially in the UK, has a twin seated fully enclosed-cabin, equipped to power a laptop computer, and with ample room in the cabin for personnel and equipment survey works can continue in otherwise impossible weather conditions.

The vessel was piloted by an RYA qualified coxswain and surveyor and equipped with cm precise CODA RTK GPS (centimetric) positioning equipment.

The vessel was mobilised to and from site by road, and launched from the slipway at Port Edgar Marina, thereafter transiting the 8.6 nautical miles to site.

6. SURVEY PERSONNEL

The following personnel were involved in the planning, data capture and post-processing phase of the survey project;

NAME	POSITION
C. Thomson	QA & Data Release
J. Kerton	Hydrographic Surveyor
A. McCormick	Survey Coxswain

7. SURVEY STANDARDS

The Hydrographic survey is considered complete to International Hydrographic Organisation Special Order standard, with a Full Sea Floor Search being achieved as per IHO publication S44, Table 1. A representation of the section of interest within that document is shown in Table 6:

Order	Examples of Typical Areas	Horizontal Accuracy (95% Confidence Level)	Depth Accuracy for Reduced Depths (95% Confidence Level)	100% Bottom Search	System Detection Capability	Maximum Line Spacing
Special	Harbours, berthing area and associated critical channels with minimum under keel clearances	2m	a = 0.25m b = 0.0075	Compulsory	Cubic features > 1m	Not applicable as 100% search compulsory

Taken from IHO Publication S44, Table 1, Showing Requirements of a Special Order Survey

The error limits for depth accuracy are calculated by introducing the values listed in the above table for a and b into the formula $\pm\sqrt{[a^2+(b*d)^2]}$, where:

- a — constant depth error, i.e. the sum of all constant errors
- b*d — depth dependent error, i.e. the sum of all depth dependent errors
- b — factor of depth dependent error
- d — depth[1]

The multibeam system has shown during this survey to be capable of detecting objects far smaller than the 1m cubic features specified for a Special Order survey.

[1] *IHO 2005. Publication M-13 'Manual on Hydrography'. Chapter 1, Pages 9-10.*

Annex A
Drawing Register

A6291

The following drawing files and data sets are issued in relation to the project;

TITLE	CONTENT
A6291_Western Harbour_MBES_20170519.dwg	MBES Survey - AutoCAD format
A6291_Western Harbour_MBES_20170519 [PDF Layout].pdf	MBES Survey - PDF format
A6291_Granton Western Harbour_MBES_0-5m_CD_20170519.xyz	XYZ File (0.5m Grid)
A6291_Granton Western Harbour_MBES_0-5m_CD_20170519.tif	MBES Geotiff Image
A6291_Western Harbour, Granton_Report of Survey.pdf	Report of Survey

Annex B
Horizontal & Vertical Positioning System Precision

A6291

Trimble SPS855 RTK GPS Receiver, using RTK corrections.

	HORIZONTAL ACCURACY	VERTICAL ACCURACY
REAL TIME KINEMATIC	±10mm + 1ppm RMS	±20mm + 1ppm RMS

All horizontal positions in the survey are referred to OSGB and have used the OSTN 15 model to transform WGS84 positions obtained from GPS observations.

Annex C
Data Processing Procedures

A6291

Multibeam Processing Stages

Sonar Control 2000 software was used to control the MBES system during the data gathering phase.

Data was logged in HYPACK HYSWEEP software.

After data gathering the data was post processed in HYPACK MBMax where the following stages of processing were undertaken:

- Navigation data was processed.
- Motion Sensor data was examined and edited as required.
- Tidal data was examined and edited as required
- Automatic filtering of the data was carried out.
- Individual lines of MBES sounding data were manually edited.
- The data was gridded at an appropriate post spacing for the scale of plot requested by the client. This was exported to AutoCAD for presentation.
- The data was contoured at 0.5m intervals in Hypack and exported to AutoCAD.

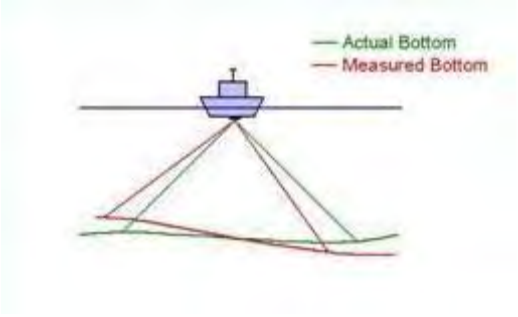
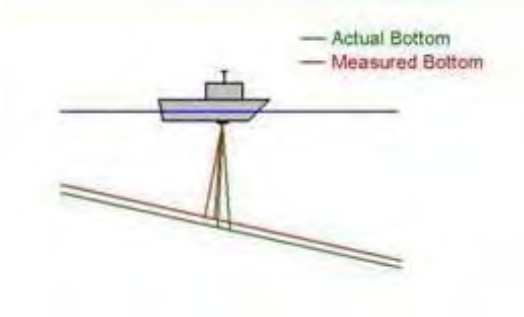
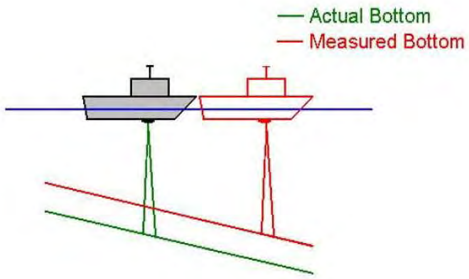
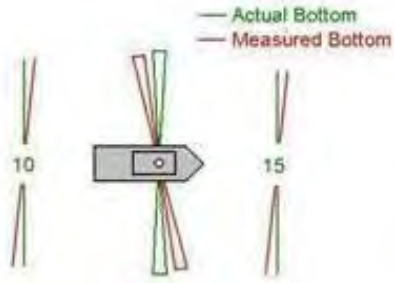
Annex D
Multibeam Echosounder Calibration

A6291

Patch tests are tests which are performed after initial equipment installation, and periodically thereafter as well as if sensors are modified, to quantify any residual biases from the initial system alignment.

During this calibration series, four separate tests must be performed to determine residual alignment biases for:

- Roll offset
- Position Time Delay (Latency)
- Pitch Offset
- Yaw (Heading) Offset

ROLL	PITCH
	
▪ *Sonar and Motion Reference Unit (MRU) alignment relative to vertical.* ▪ *Can cause large depth and position errors at outer beams.*	▪ *Sonar and MRU alignment relative to vertical.* ▪ *Can cause depth and position errors across the swath.*
LATENCY	**YAW (HEADING)**
	
▪ *The delay between position and fix transmission.* ▪ *Will cause positional errors.* ▪ *Error is independent of multibeam system.*	▪ *Sonar and MRU alignment relative to vertical* ▪ *Can cause depth and position errors across the swath.*

Annex E
Standard Disclaimer

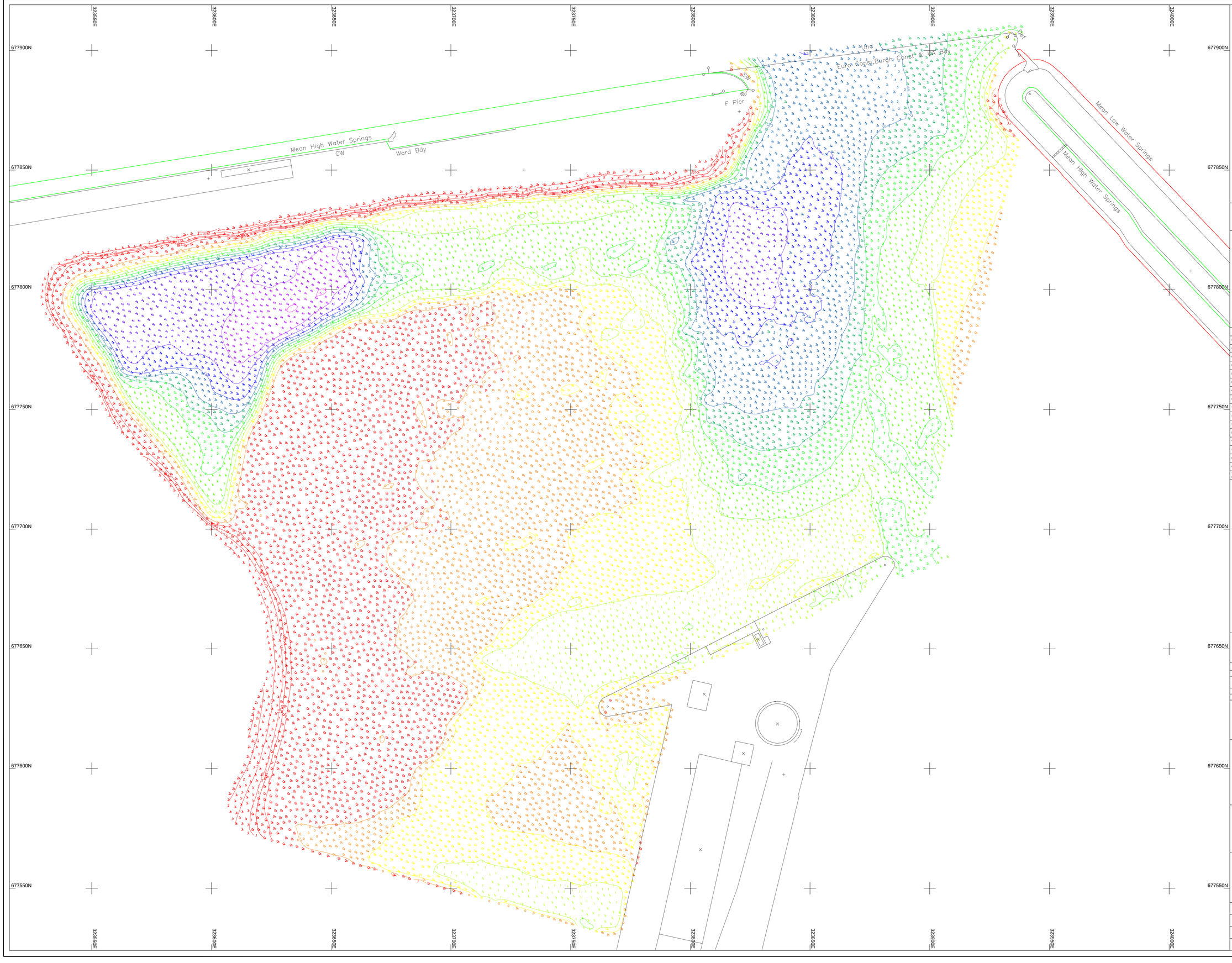
A6291

1. All client-supplied data is taken on trust as being accurate and correct, and the sub-contractor cannot be held responsible for the quality and accuracy of that data set.

2. Geophysical interpretation of bathymetry and sonar is based on an informed opinion of the supplied data, and is subject to inherent errors out with the control of the interpretational hydrographer or geophysicist, which include but are not limited to GPS positioning errors, navigation busts, data quality, assumed speed velocity sediment profiles in the absence of Geotechnical data, sub bottom profile pulse width, and induced scaling errors therein associated with seismic signature. Seabed geomorphology and sub-seabed geology should be further investigated by visual or intrusive methods.

3. The limits of this survey are defined by the data set; out with the survey limits are not covered at any level by the sub-contractor.

4. The data is accurate at the time of data acquisition, the sub-contractor cannot be held responsible for environmental changes, and the client by accepting this report accepts that the environment of the seabed is subject to continuous change, that items of debris, hard contacts etc. may move, appear, be relocated or removed, thickness of surficial sediment change out with the knowledge of the sub-contractor and they will not be held responsible for such actions at any level.



Legend

4.56	Heights relative to ORDNANCE DATUM.
12_8	Depths relative to CHART DATUM.
	Sea-bed contour relative to CHART DATUM.
	Mean High Water Springs
	Mean Low Water Springs

Scale: 1 cm = 5.00 Meters

0 5 10 20 30 40 50

SURVEY IS ROTATED TO GRID NORTH.

Coloured Depth Bands:

< 0.00
0.00 - 0.49
0.50 - 0.99
1.00 - 1.49
1.50 - 1.99
2.00 - 2.49
2.50 - 2.99
3.00 - 3.49
3.50 - 3.99
4.00 - 4.49
4.50 - 4.99
>= 5.00

Survey Parameters & Equipment

Survey Vessel:	Coastal Sensor (MCA Cat III)
Positioning System:	Trimble SPS 855 RTK GPS
GPS Correction Source:	Trimble VRS NOW Network RTK.
Echosounder:	R2Sonic 2022 Multibeam System 400kHz
Motion Compensator:	SMC IMU 108-30
Positioning System Spheroid & Datum:	ETRS89
Grid System:	National Grid of Great Britain
Geoid Model:	OSGM15
Transformation Parameters:	OSTN02
Spheroid:	Airy
Semi Major Axis:	6377563.396
Flattening (1/f):	299.3249646600
Vertical Datum (Topographic):	Ordnance Datum
Vertical Datum (Hydrographic):	Chart Datum
Distance Unit:	Metre

Chart Datum is 2.90m below Ordnance Datum.

The datum was established using corrected OS Rinex data and post-processed using Trimble Business Centre Software.

Notes:

The Bathymetric survey limits are MHWS, data is relative to Chart Datum.

Topographic survey data is relative to Ordnance Datum.

Horizontal and vertical datums were referenced to control stations on site.

Heights in metres above Chart Datum (Leith)

MHWS	MHWN	MLWN	MLWS
5.6	4.4	2.0	0.8

CONTROL STATION COORDINATES (OD)

STN	EASTING	NORTHING	LEVEL

Aspect
Land + Hydrographic Surveys
CHARTERED SURVEYORS
Thornhouse Business Centre
Ballot Road
Irvine
KA12 0HW
Tel : 01294 313399
Fax : 01294 313389
E-mail: mail@aspectsurveys.com
Web: www.aspectsurveys.com

Client :

GRANTON CENTRAL DEVELOPMENTS LTD
SUITE 131, FLOOR 1
LIBERATION STATION
ST HELIER
JERSEY

Project Title :

MULTIBEAM BATHYMETRIC SURVEY
WESTERN HARBOUR
GRANTON

Project No: A6291	Scale : 1:500
Surveyed date : 19th May 2017	Issued date : 25th May 2017
Surveyed by : JEK	Checked by : CDT
Sheet No. : 1 of 1	Plot Scale: 1:1 @ A0