Works Proposals – Option 3

Part 1 Site Specific Method Statements – MS02-3

Dredging Works

Introduction

Prior to any works commencing on site Site Specific Method Statements will be prepared for all the major elements of the work. These method statements will outline precisely how Bam will approach and carry out the works associated with the Bantry Inner Harbour Development – Phase 1 Contract. These method statements will be submitted to the Employers Representative for approval, work will not commence prior to the relevant method statements being approved.

The method statements will be prepared by the Project Manager Collins Connolly and the Site Agent Seamus O’Sullivan, however the various other members of the site management team will be asked to contribute to the relevant sections of the method statements as required. The method statements will be prepared in line with the Works Requirements, Specifications, Guidance Documents and Consultations meetings with various other stakeholders.

While the more specific in-depth method statements will be prepared once we get to site, below are the overall method statements which will outline our general approach and methodology to the Bantry Inner Harbour Development – Phase 1 Contract.

Dredging Works

Introduction

This method statement incorporates Bam overall approach for the Dredging Works, option 3-variant. Prior to any works commencing on site more comprehensive and detailed, task specific method statements will be prepared by Bam for each element of the works.

Scope of Works

The works will consist of the following:

- Proposed Plant
- Dredging Methodology
- Transport of Spoil
- Processing of Spoil
- Deposition of Spoil
- Surveying
Location of the Works

Figure 1: Site Location Map

Figure 2: Dredging layout drawing
Proposed Plant

Details are listed below of plant and equipment to be utilized in the Inner Harbour Dredging works, including access and egress support to be used in the works.

The details provided are specific to the project. All floating plant, dredging equipment, transportation plant and equipment relating to dredging, treatment, transportation and disposal are detailed.

Most of the equipment is BAM owned or will otherwise be hired/ subcontracted.

<table>
<thead>
<tr>
<th>Item</th>
<th>Activity/ Roles</th>
<th>Quantity [nos.]</th>
</tr>
</thead>
<tbody>
<tr>
<td>65t long reach excavator with GPS system &amp; 4t breaker</td>
<td>Dredging of silts from causeway</td>
<td>1</td>
</tr>
<tr>
<td>Aoibheen spudleg Dredger barge</td>
<td>Dredging inner harbour</td>
<td>1</td>
</tr>
<tr>
<td>2 no dump barges</td>
<td>Dredging inner harbour</td>
<td>2</td>
</tr>
<tr>
<td>35 ton excavator with clamp shell grab</td>
<td>Managing dredge materials</td>
<td>1</td>
</tr>
<tr>
<td>A25 Dumper</td>
<td>Managing dredge materials</td>
<td>2</td>
</tr>
<tr>
<td>Work boat</td>
<td>Managing dump barge</td>
<td>1</td>
</tr>
<tr>
<td>Safety boat</td>
<td>Managing safety in the harbour</td>
<td>1</td>
</tr>
<tr>
<td>Allu PMX500 Power mixer</td>
<td>Dredge stabilisation</td>
<td>1</td>
</tr>
<tr>
<td>Allu PF7+7 power feeder</td>
<td>Dredge stabilisation</td>
<td>1</td>
</tr>
<tr>
<td>Landing craft</td>
<td>Transport machinery</td>
<td>1</td>
</tr>
</tbody>
</table>

Further equipment is also available from our subcontractors and sister companies in the BAM group.

All mechanical plant will be in good working order and subject to a regular maintenance regime. Only suitably qualified and experienced personnel will be allowed to operate plant and equipment.

All Vehicles will be fitted with reversing beacons and a flashing light and will be directed by a banksman. All plant certification will be checked by the BAM Civil Safety Officer prior to commencing works on site. A register of all plant and equipment checks will be kept on site for the duration of the project.
Dredging Methodology

It is the intention of BAM to carry out the dredging of the contaminated and non-contaminated material using a combination our own long reach excavator (CAT 365) which will work from the shore and the Aoibheann Dredger mounted on floating barge (ACN 5) as per the photograph below. It has been identified that the dredged materials will be used on site as fill in the following locations.

- Quayside Reclamation area
- Amenity Area
- Town Pier Widening
- Cove nourishment area

Figure 5: The Aoibheen Dredger which will be utilized for the dredging works

In order to dredge the contaminated material the following steps will be followed:

Note: Prior to dredging operations commencing, a marine mammal survey will be carried out, a silt curtain will be put in place in liaison with the Harbour Master on marine traffic.

- The dredging design will be input into a monitor control box in the excavator as described in the surveying section below.
- The dredged area will be plotted out and broken into grids so as to allow a controlled methodical approach to the dredging operations.
- The Aoibheann will be moved into position over the first grid section to be excavated.
- A dump barge will be tied alongside the Aoibheann, the dredged material will be deposited into this dump barge which will then transport it to the temporary offloading quay in the Amenity area and the Quayside Reclamation area.
- The excavator will dredge the top 0.85 to 1.8m of the silt material, the GPS dig system will be used to verify the depths. The material will also be visually monitored during the excavation to ensure the contaminated materials and gravels are segregated as the contaminated material has been found to exceed 3m in places.
- All excavators carrying out the dredging works will be fitted with environmental dredging buckets which will minimise the loss of any dredge spoil into the harbour.

- Additionally a silt curtain will be erected across the mouth of the harbour during dredging operations.

Figure 6: Environmental Dredging Buckets & Silt Curtains will be used for the dredging operations

- Once the material has been loaded into the dump barge it will be transferred to the Amenity area or the Quayside Reclamation area where it will be off loaded and treated. Treatment will be covered further in the Processing section below.

- The contaminated material will be stabilised by adding cement using the Allu Stabilisation System which will be attached to the end of a long reach excavator and will ensure that the material is stable enough to be incorporated into the permanent works. See Processing of Spoil section.

- The material will be sampled and tested in accordance with the Works Requirements continuously throughout the dredging operation. Furthermore daily water samples will be taken and tested to ensure that the dredging operations are not having an adverse effect on the environment.

- At all times communication will be maintained with the Marine Mammal Observer, if in the event of marine mammals being observed within the influence zone then the dredging works will be suspended immediately and will only recommence once the Marine Mammal Observer gives the go ahead.

- As the top layer of silts are excavated, the underlying inert gravels and clays are available for excavation. The material will be dredged in the same manner outlined above and will also be stabilised if required in the manner outlined above. The material will also be tested to ensure that it is inert. While a portion of these gravels will be used in the permanent works as engineered fill, the majority of the gravels will be transported to the Cove and used as beach nourishment. Refer to the Beach nourishment method statement in this submission.

- Dredging tolerances shall be that as outlined in appendix 6/71.
• Working hour restrictions as per Appendix 1/9 and it is understood that the dredging window is November to March inclusive.

• Note: materials will also be dredged from land, this is covered in the Quayside reclamation works and the Town pier construction work.

Transport of Spoil

• All material will be handled in such a way as to minimise the impacts on water quality, the environment and other harbour users. Material handling and storage areas will be monitored to ensure that there is no surface water run off which could cause damage to the environment.

• All dredged materials will be moved to its permanent deposition/treatment area over water, as per appendix 6/71. If during the works hazardous materials are identified this will have to be transported off site by land transport to an appropriately licenced facility.

• As covered above the excavated dredged material will be transported to a temporary loading quay at the Amenity area or the Quayside Reclamation area by a dump barge here it will be excavated from the barge by a 30 ton tracked excavator using a clamp shell grab into a 25ton dump truck where it will be in a holding cell for treatment. All transport of dredge material is local within the site boundary and will not be transported outside the site boundary on land.

• All dredge material will have quantities, times etc recorded and made available for inspection to the Engineer.

Processing of Spoil

• As mentioned above once the material is excavated from the dump barge it will be placed in cells behind the Amenity area revetment where the water collected during the dredging operation can drain prior to the material being stabilised. The water draining from the dredge material will naturally filter through the geotextile and rock revetment of the Amenity area.

• As per appendix 6/71 it is estimated that the ratio required for treatment and stabilisation is between 10 to 12%, the actual ratio will be determined on site by trial mixes. The stabilisation design mix will be offered to the engineer for approval prior to the full scale dredging programme proceeding. Bam have engaged the services of AGL consulting to review all geotechnical matters.
- Once the material has dewatered it will be treated using cement stabilisation. Stabilisation is required so that the material can be incorporated into the permanent works as engineered fill. All treated materials will be tested as per Appendix 1/73 and dredging, treatment and disposal records maintained as per Appendix 6/71.

- To mix the cement through the wet dredge material, Bam will mount an Allu PMX500 power mixer to a 35 ton excavator. This is a rotating agitator mixing which will feed and mix the cement from Allu PF7+7 power feeder with Allu DAC system into the dredge material, the attachment is powered by the hydraulics of the excavator. The agitator will be lowered into the cell of dredge material and the cement added through the agitator. The agitator then mixes the cement through the dredge material ensuring the mix is homogeneous throughout. The material is then for a sufficient period for the chemical reaction between the water and cement to take place. Once the moisture content of the material is reduced to the required levels it will be placed and compacted into the permanent works.

![Figure 8: Dredge material being treated using the Allu treatment system](image)

![Figure 9: Allu Stabilisation System](image)
Deposition of Spoil

As mentioned above it is the intention of Bam to incorporate all the dredge materials into the permanent works both in the Harbour works and the Cove area. The deposition of material within the Cove area is covered in the Cove Nourishment method statement.

The material will be deposited into its permanent location and treated in-situ. All run off will be filtered through the revetment of the Amenity area which will have a geotextile screen to ensure no sediments are displaced into the watercource. Additionally this will be the case at the Quayside reclamation area.

Surveying

Prior to dredging works commencing, an “in bathometric” survey will be carried out in order to determine the most up to date existing bed profile. The surveying will be carried out in accordance with the specification as outlined in Appendix 1/12 of the Works Requirements. The information from the survey will be made available to the Employer. The information will also be used to determine the total quantity of material to be dredged. Throughout the dredging works, numerous interim surveys will be carried out on a grid basis for checking purposes and interim measurements. Finally, once the dredging works are complete, an “out” survey will be carried. All information will again be made available and requested drawings, survey reports etc. will be submitted for final acceptance and approval by the Employers Representative.

Notification will be given for the “in” and “out” survey and the Employer and or the Employers Representative will be invited to witness. During interim surveys, this invitation is also there should the ER wish to attend.

In order to dredge to the requirements of the Contract drawings, the Works will need to be set out. It is the intention of BAM to utilise a long reach excavator on a floating barge to carry out the excavation. The excavator will be fitted with a “Dig Master” system. The system is run from a global positioning system, from this operator is aware of the location x, y & z respectively and also the orientation of the bucket of the machine. The system is set up by taking the dredge design information and creating a surface model of the design. This is then inputted into the machine control box. The required design is then visible on a monitor in the cab in both plan and section view relevant to the XYZ position of the excavator bucket.

Safety

- Risk assessments have been carried out and are included in the Health and Safety Plan. The Health and Safety Plan is included in section 3 of the submission.
- All work will be carried out in accordance with the Health and Safety Plan for the site.
- The site operates an induction procedure for personnel prior to commencing work on site.
- P.P.E. will be worn by everyone involved on this project at all times to include a minimum of high visibility vest, hard hat, safety glasses and safety boots.
- All plant will be in good working order and equipped with yellow flashing beacons.
Programme of Works

Refer to construction program as included in section 2 of this submission

Figure 10: Screenshot of dredging programme from main programme

Quality an Environmental management

The project Quality Plan will be implemented after being approved by the ER and the inspection and test plan will be adhered to rigidly. A copy of the Quality Management Plan will be kept on site. Seamus O’Sullivan will be the person with responsibility for quality control. Site audits will be carried out to ensure compliance with the Quality Plan. Periodic company audits will be carried out to ensure QA standards are being maintained on the project.

All works will be undertaken in accordance with the Site Specific Environmental Management Plan and the Waste Management Plan. These plans have been included in section 5 of the submission. The main environmental impacts and considerations associated with the works are as follows:

- Waste Management: Waste management will be as specified in the site WMP
- Water Pollution: No contaminated water to be discharged into the harbour.
- Noise: All plant and machinery used on site will be serviced regularly to avoid excessive noise. Noise levels on site are not expected to exceed the legal but where necessary, mandatory warnings signs shall be erected informing all when ear protection is required to be worn.
- Protection of Watercourse: The water course shall be protected from pollution, by ensuring that generators, pumps etc are placed in drip trays. Spill kits shall be located adjacent to the watercourse and clearly identified. Spill kits shall also be placed in all machines. Details of procedure for dealing with oil spillages and procedure for protecting water courses are contained in BAM Environmental Management Plan
- Hazardous Substances: All hazardous substance will be stored in the hazardous store and all generators will be placed on a drip tray at all times.
- Washing of concrete trucks to take place at a designated concrete wash out area.