MWP

Waste Licence Application For Howth Harbour Dredging and Reclamation Project

BAT Assessment

Department of Agriculture, Food and the Marine

21/11/2023

Contents

Project No.	Doc. No.	Rev.	Date	Prepared By	Checked By	Approved By	Status
19934	19934-MWP-XX-XX-WL-C-6028	P01	21/11/23	EL	PP/OH	PP	Information

MWP, Engineering and Environmental Consultants
Address: Cork Office: Park House, Bessboro Road, Blackrock, Cork, T12 X251
Tralee Office: Reen Point, Blennerville, Tralee, Co. Kerry. V92 X2TK
Limerick Office: The Elm Suite, Loughmore Centre, Raheen Business Park, Limerick. V94 R578
www.mwp.ie

1 Introduction

This report provides details of best available techniques (BAT) applicable to the proposed Howth Dredge Spoil Treatment and Recovery Facility as part of the Howth Harbour Dredging and Reclamation project. The report includes details of conformance with relevant EPA National BAT Notes. It should be noted that there is no specific EPA BAT Guidance Notes with respect to Soil Recovery and as such a site-specific determination of BAT has been provided. The drawing numbering referencing is as per the Waste Licence Application. Cross referencing of the Environmental Impact Assessment (EIAR) which accompanied the Waste Licence Application is also used where relevant so as to avoid unnecessary repetition.

2 Interpretation of BAT

BAT was introduced as a key principle in the IPPC Directive 96/61/EC. This Directive has been incorporated into Irish law via the Protection of the Environment Act 2003. To meet the requirements of this Directive, relevant Sections of the Environmental Protection Agency Act 1992 and the Waste Management Act 1996 have been amended to replace BATNEEC (Best Available Technology not entailing Excessive Costs) with BAT.

Best available techniques (BAT) is defined in Section 5 of the Environmental Protection Agency Acts, 1992 to 2007, and Section 5(2) of the Waste Management Acts 1996 to 2010, as the "most effective and advanced stage in the development of an activity and its methods of operation, which indicate the practical suitability of particular techniques for providing, in principle, the basis for emission limit values designed to prevent or eliminate or, where that is not practicable, generally to reduce an emission and its impact on the environment as a whole", where:

- B - 'best' in relation to techniques, means the most effective in achieving a high general level of protection of the environment as a whole 'available techniques' means those techniques developed on a scale which allows
- A - 'available techniques' means those techniques developed on a scale which allows implementation in the relevant class of activity under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced within the State, as long as they are reasonably accessible to the person carrying on the activity
- T - 'techniques' includes both the technology used and the way in which the installation is designed, built, managed, maintained, operated and decommissioned.

The range of BAT associated emission levels specified indicate those that are achievable using a combination of the process techniques and abatement technologies specified as BAT in Section 5. The licensee must demonstrate to the satisfaction of the Agency, during the licensing process, that the installation/facility will be operated in such a way that all the appropriate preventative measures are taken against pollution through the application of BAT and justify the application of other than the most stringent ELV in the range.

At the installation/facility level, the most appropriate techniques will depend on local factors.

A local assessment of the costs and benefits of the available options may be needed to establish the best option. The choice may be justified based on:

- the technical characteristics of the facility/installation.
- the geographical location of the facility/installation.
- local environmental considerations.
- the economic and technical viability of upgrading the existing.

The overall objective of ensuring a high level of protection for the environment will often involve making trade-off judgments between different types of environmental impacts, and these judgments will often be influenced by local considerations. On the other hand, the obligation to ensure a high level of environmental protection including the minimisation of long-distance or transboundary pollution implies that the most appropriate techniques cannot be set based on purely local considerations.

2.1 BAT Hierarchy

In the identification of BAT emphasis is placed on pollution prevention techniques rather than end-of-pipe treatment.

The IPPC Directive 2008/1/EC and the Environmental Protection Agency Acts 1992 to 2007 (Section 5(3)), require the determination of BAT to consider in particular the following, having regard to the likely costs and advantages of measures and to the principles of precaution and prevention:

(i) the use of low-waste technology,

(ii) the use of less hazardous substances,

(iii) the furthering of recovery and recycling of substances generated and used in the process and of waste, where appropriate,

(iv) comparable processes, facilities or methods of operation, which have been tried with success on an industrial scale,

(v) technological advances and changes in scientific knowledge and understanding,

(vi) the nature, effects and volume of the emissions concerned,

(vii) the commissioning dates for new or existing activities,

(viii) the length of time needed to introduce the best available techniques,

(ix) the consumption and nature of raw materials (including water) used in the process and their energy efficiency,

(x) the need to prevent or reduce to a minimum the overall impact of the emissions on the environment and the risks to it,

(xi) the need to prevent accidents and to minimize the consequences for the environment, and

(xii) the information published by the Commission of the European Communities pursuant to any exchange of information between Member States and the industries concerned on best available techniques, associated monitoring, and developments in them, or by international organisations, and such other matters as may be prescribed

3 Sector Specific Guidance Note

There is no Specific EPA BAT Guidance Notes with respect to Recovery of Dredge Spoil. This BAT Assessment is site specific and covers activities set out below:

1. R05 - Recycling/reclamation of other inorganic materials, which includes soil cleaning resulting in recovery of the soil and recycling of inorganic construction materials:
    - R05 - Recovery of inorganic materials in the form of backfilling
2. R11 - Use of waste obtained from any of the operations numbered R 1 to R 10.
3. R13 - Storage of waste pending any of the operations numbered R 1 to R 12 (excluding temporary storage (being preliminary storage according to the definition of 'collection' in section 5(1)), pending collection, on the site where the waste is produced)".

The only waste to be accepted at the facility will comprise dredge spoil material from Howth Harbour (EWC 17 05 06).

The following documents were considered in preparation of the application for Best Available Techniques:

- Final Draft BAT Guidance Note on Best Available Technique for the Waste Sector: Waste Transfer and Materials Recovery (2011

4 Process Description

4.1 Overview of Waste Facility Activities

The proposed facility activities covered by this BAT Assessment are summarised in the following Figure 1.1.

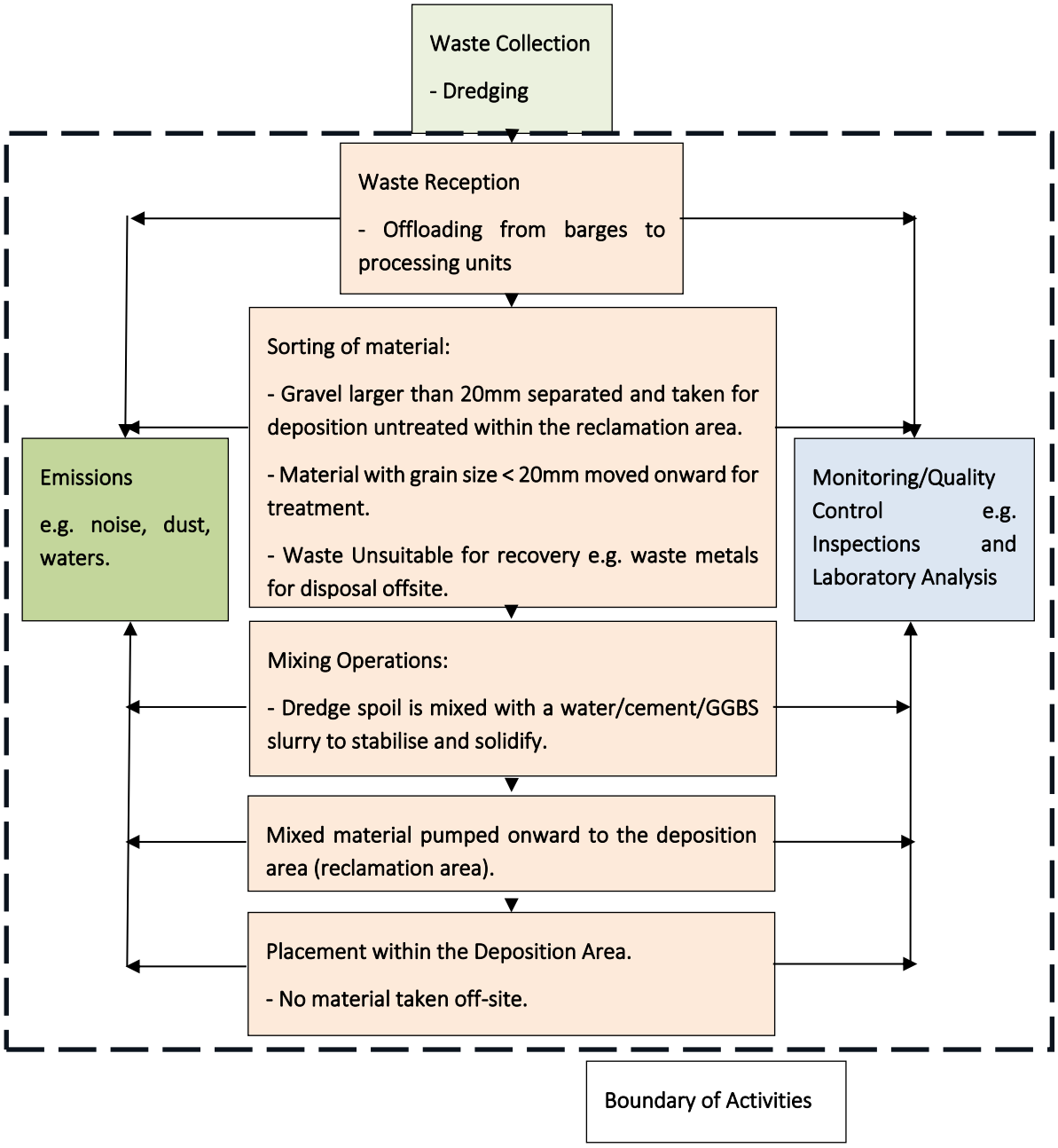

Figure 1.1 Summary of Facility Activities

4.2 Re-use and Recovery of Waste Material

Several options were considered for the management of proposed dredge material waste from Howth Harbour.

Please refer to Chapter 3 of the EIAR for more detail.

The options included:

- Burial of Dredge Material at Sea (open and capped).
- Disposal at a licensed landfill facility in Ireland.
- Disposal of the Dredge Spoil at a Contaminated Dredge Spoil Facility Abroad.
- Beneficial re-use of the dredge material to reclaim land adjacent to Howth Harbour. Three locations were assessed.

It was concluded that the re-use of the dredge material as backfill reclaim land to the west of the West Pier at was the preferred method of waste management.

- Disposal directly onto the seabed is precluded by the concentrations of contaminants within the dredge material.
- Disposal and capping on the seabed was considered to have too large an environmental uncertainty.
- Disposal to a licenced landfill in Ireland or abroad would require treatment prior to transfer and potential environmental impacts and costs.
- The dredging and treatment of the material prior to placing in an area west of the West Pier was considered to be a cost-effective beneficial reuse of the dredge material.

4.3 Site Location

The site location to the west of the West Pier was decided upon initially based on harbour operational requirements. Activities related to fisheries are carried out on the West and Middle Piers. The additional land would be of most use to the west of the West Pier. A location just east of the east pier was considered to have likely to have a significant adverse impact on the present amenity value of this pier. It was also considered not feasible in terms of area available and sub optimal in terms of harbour operations to lose water area within the harbour.

The site location was then assessed in the EIAR and NIS for impacts on the environment. Please refer to those documents for more information on site location/selection.

4.4 Environmental Management System

The way the facility is managed is a critical element in ensuring emissions are minimised.

- Management of the facility will be carried out by trained and competent personnel in the DAFM with support from consultants.
- The DAFM regards environmental protection management as an integral and essential part of good practice. It is committed to achieving and maintaining a high standard of environmental quality in all of its operations.
- The DAFM is committed to providing the necessary information, training and equipment to enable their employees to carry out their duties safely and in an environmentally responsible manner.

- An environmental management system will be in place by the Main Contractor during the construction. The main contractor will be ISO 14001 certified.
- The EMS will include an 'Environmental Monitoring Programme' for the monitoring of water, dust and noise, and will be revised subject to compliance with any conditions attached to any decision to grant planning permission and a Waste Licence for the Site.
- The facility will maintain full and complete records, including a log of intakes, documentation relating to planning, health and safety, environmental monitoring, the environmental management system (EMS), etc. The record keeping will be revised to achieve compliance with any conditions attached to any decision to grant planning permission and a Waste Management Licence for the proposed SRF. The Main Contractor will be responsible for maintaining detailed records of all waste material brought to the site.
- Full details of all waste materials brought to this facility will be kept at the site office. Site records will be always available for inspection by the Local Authority and/or EPA.
- An annual report will be prepared by the site manager and submitted to the EPA as will be required in accordance with any Waste Licence.
- A corrective action procedure will form part of the EMS and will be used for recording and reporting non-conformities and corrective actions.

4.5 Waste Acceptance

Controlling the waste input to a transfer station/material recovery facility is an important operational matter that has a direct effect upon the pollution/nuisance potential of the facility. It is essential that measures are introduced to ensure that waste acceptance is restricted to those wastes for which the facility was designed, and which are permitted by the licence.

Extensive sampling and testing of harbour bed material i.e. the proposed waste material, have been carried out.

The nature of the proposed dredge material is known. The process of mixing the material with a water/cement/GGBS slurry is an established method of stabilising and solidifying dredge material having been recently used on the Middle Pier Upgrade project. Tests have been carried out on trial mixes. The results in terms of binding in of contaminants, permeability and strength of the resulting treated material are understood.

Because the volumes involved in the present project are far greater than for the Middle Pier Upgrade a more sophisticated transfer and mixing process is proposed for this project.

Only suitable material will be permitted to be accepted in the facility i.e. dredge spoil EWC 17 05 06).

Material not suitable for recovery at the facility (e.g metal waste) will be rejected at barges stage. It will be separated and moved to the quarantine/storage area to await disposal off site.

5 Risk to the Environment

5.1 General

The underlying objective of BAT is to prevent, eliminate, or reduce emissions from processes. Emissions, and hence environmental pollution, can be prevented, eliminated or reduced by:

- Proper design of the facility.
- Effective management of the facility; and
- The selection of appropriate processes, technologies and facility operations.

The following sections examine the potential emissions from waste treatment activities to air, water and land.

5.2 Potential Emissions to Air

Potential emissions to air arising from the facility can include:

- Dust from wastes and from operational/engineering activities. The impacts of any dust deposition from the operations will be direct, of short duration, temporary and largely confined to the site area.
- Vehicle emissions.

Potential emissions to air are addressed in Chapter 8 of the EIAR.

5.3 Potential Emissions to Water and Land

Potential emissions to water (including groundwater) arising from the facility can include:

- Leachate.
- Suspended sediment.
- Fuels/oils, etc.

Potential emissions to water are addressed in Chapter 7 of the EIAR.

5.4 Potential Nuisance Related and Other Emissions

Potential emissions to the environment include:

- Noise.
- Mud on to public roads.
- Litter.

Potential emissions of noise and vibrations are addressed in Chapter 12 of the EIAR.

Mud on roads will occur only with the Harbour FHC roads. They will be cleaned regularly throughout the construction of the reclamation area.

The proposed waste material is not likely to attract pests.

Waste debris within the dredge spoil that could be considered litter will be segregated and disposed offsite to a licenced facility.

6 Control Techniques

6.1 General

The existing or possible measures for eliminating, reducing and controlling emissions at a soil recovery facility are described in this section.

6.2 Techniques for Prevention and Minimisation of Resource Consumption

The Main Contractor will identify opportunities for reduction in the quantity of material resources, energy and water used on site during construction works including renewable energy, recycling and reuse initiatives, wherever possible.

6.2.1 Energy Use

The applicant should demonstrate that in the design of the facility and in any treatment processes it contains, energy efficiency has been considered.

The process of treating and depositing dredge material requires a few steps. Where possible gravity is used to move materials on site. Where possible, recycled materials (e.g., GGBS) are used in the treatment process.

- Dredge material is brought to the quayside.
- It is agitated and pumped to the treatment/mixing plant.
- Cement/GGBS will be stored on site in silos and gravity fed into the mixing hopper when they will be mixed with water and the dredge material to form a slurry like material suitable for onward pumping to the reclamation area.
- The mixing/treatment plant will be powered electrically. The Contractor will ensure efficient use of energy for the mixing/treatment plant.
- The pipeline discharge point will be moved around the site as necessary to allow for the even build-up of material.
- Given the slurry like nature of the resulting mixture it will be able to flow and level off within the deposition area without the need for further plant/equipment to move on for final deposition.
- Treatment and pumping plant will be provided by the Contractor.
- The Site Compound will be powered electrically either through the mains or through diesel generators. The Contractor will ensure efficient use of energy for the site compound.
- Construction vehicles will in general be diesel powered. The Contractor will ensure efficient use of energy for vehicles.

6.2.2 Raw Materials

The site has been designed to minimise unnecessary imported material use. Treated dredge material will be treated and reused as engineering fill where possible as a substitute for importing material.

A similar but in situ mixing process was used in the reclamation of a 0.2ha area on the east side of the middle pier in Howth during the recently (May 2022) completed Middle Pier Upgrading works (Waste Facility Permit No. WFP-FG-18-0003-02). In that case, dredge material was placed and stored within a bunded area like but considerably smaller in scale than proposed for this project. Then, using an Allu type system approximately 190kg/m3 of binder was added to each cubic metre of dredge material. The binder consisted of 70% Ground Granulated Blast Furnace Slag (GGBS) and 30% Ordinary Portland Cement (OPC). The binder was first mixed with water before being injected into the insitu dredge spoil via a pipe on the arm of a long reach excavator to which a mixing unit was attached. The storage area had been divided into 4 by 4m plan sections and the mixing was controlled by a GPS device on the arm and by measuring the rate of feed of the binder into the pipe.

The required ratio of binder to dredge spoil and of GGBS to OPC within the binder had been set following the testing of a range of mixes prior to and during construction. The testing prior to construction indicated that optimum strength would be obtained by using 150 to 175kg of binder per cubic metre of dredge spoil. The optimum GGBS to OPC ratio was found to be 70% GGBS to 30% OPC.

The contractor used a greater proportion of binder to dredge material, 190kg/m3 in order to achieve a quicker rate of strength gain to suit his in-situ mixing method. This additional binder caused the processed material to gain strength quicker enabling the mixing plant to track onto the processed material earlier than would otherwise be the case. Tests carried out on the processed material indicated greater strength gains than indicated by the laboratory tests.

The project won the ACEI 2023 Award for Innovation under the category of small/medium sized projects.

While the scale of the proposed development is an order of magnitude greater than the Howth Middle Pier project, the essence will be the same in the term of the mix required to stabilise the dredge material, albeit with a potentially better mixing process.

This work was carried out under Waste Facility Permit No. WFP-FG-18-0003-02.

6.3 Techniques for Prevention and Minimisation of Emissions to Air

Dust/Fine Particulates (PM10, PM2.5) and Bioaerosols

Dust emissions from waste handling and other activities have the potential to cause nuisance to site neighbours and could be a health hazard for site workers, neighbours and visitors and pose risks to the receiving environment.

Minimisation of dust emissions will be ensured by the following:

- Treatment/mixing works will be carried out within enclosed waste handling units.
- Dampening of exposed earthwork activities and site access route during dry weather.
- Covering of stockpiles and/or dampened during dry weather.
- Control of vehicle speeds, speed restrictions and vehicle access; and
- Sweeping of hard surface roads. Internal and public roads will be inspected regularly for cleanliness and cleaned as necessary.
- Daily site inspections should take place to examine dust measures and their effectiveness.
- Generators will be located away from sensitive receptors.
- Stockpiles will be located as far as possible from sensitive receptors and covered and/or dampened during dry weather.
- Employee awareness is also an important way that dust may be controlled on any site. Staff training and the management of operations will ensure that all dust suppression methods are implemented and continuously inspected.

6.4 Techniques for Prevention and Minimisation of Emissions to Water

Emissions to Seawater

Handling and storage of waste will be conducted in a way that does not result in any significant negative impacts on sea water quality. This will be achieved by carrying out suitable construction methods to prevent direct discharges into open sea water of potentially contaminated water and establishing suitable operational control techniques as follows:

- An impermeable liner will be constructed within the perimeter embankment preventing loss of fluidised treated contaminated dredge spoil from the reclamation area during construction.
- The treated and solidified dredge material will have a very low permeability.
- Excess water (supernatant) will be collected from the surface of the deposited material and returned to the treatment area for reuse to help fluidise the dredge spoil as necessary to make it pumpable. Further excess water can be pumped through geotubes to remove contaminated suspended sediment prior to discharge to the sea.
- Oil interceptors and silt traps will be used to safeguard against potential pollution from oil spillage and vehicle washing.
- Surface water drainage system constructed as part of the finishing/landscaping works will drain surface water off the site without interaction with the deposited dredge material. Geotextiles will be used to

separate the surface water drainage system from the very low permeability stabilised and solidified dredge material.

- Ongoing water monitoring during the works and until handover of the licence.

6.5 Techniques for Prevention and Minimisation of Fuel/Oil Spillage

Spillage of fuel or oil from fixed or mobile storage tanks at a transfer station could result in significant contamination of the soil or water.

- Where practical, storage of fuel or oil is to be avoided.
- Where fuel/oil storage tanks are required, these shall be suitably bunded in accordance with best practice.
- Inspect tanks regularly to check for leaks.
- Lock valves when tanks are not in use.
- Empty bunds on a regular basis.

6.6 Techniques for Prevention and Minimisation of Nuisances

Mud/Housekeeping

Mud can create a negative visual impact and cause a nuisance to site neighbours. Mud can be generated from poor site operational practice and the escape of waste during transit.

- The site is designed to keep the wet dredge mix within enclosed systems and pipelines however, vehicles will track over the dredge material once hardened.
- Wheel cleaning facility will be provided for vehicles leaving the site.
- Regular inspections of roadways will be carried out and they will be cleaned as necessary.

Noise and Vibration

Noise and vibration can arise from the operation of fixed or mobile plant used in waste handling and treatment or when delivering waste to site. This can potentially create a nuisance to site neighbours and the environment. Noise can either be continuous or intermittent depending on the operation of equipment or frequency of waste delivery at a site.

To address potential predicted exceedances of noise limits on West Pier, the prescribed mitigation measures are as follows:

- Onsite noise monitoring will be undertaken once the works have started. This will assess the level of noise impacting on the West Pier. This will occur at different times depending on the location of the dredging barge. The results of this monitoring will define a working area between the hours of 7pm and 9pm in order to comply with the evening time noise limit.
- Liaison with the businesses on the West Pier to let them know what works are taking place when and to get feed back on the noise impacts will take place.
- Solid hording will be put up around the pump compound on West Pier in order to reduce noise impact coming from equipment.

- During the works, best practice noise reduction measures described in British Standard 5228-12009+A1:2009, Code of Practice for Noise and Vibration Control on Construction and Open Sites will be incorporated into the Construction and Environmental Management Plan.

7 Best Available Techniques (BAT)

7.1 General

BAT is to carry out agreed systems and control techniques. The proposed measures for eliminating, reducing, and controlling emissions at the proposed facility are described in the previous section.

7.2 Environmental Management System

The Main Contractor carrying out the construction works will be required to hold ISO 14001 Certification and produce a site-specific Environmental Management System (EMS).

The EMS will incorporate the following features:

- Management and Reporting Structure.
- Schedule of Environmental Objectives and Targets.
- Annual Environmental Report (AER).
- Environmental Management Programme (EMP).
- Documentation System.
- Corrective Action Procedures.
- Awareness and Training Programme.
- Communications Programme.
- Waste acceptance procedure.
- Waste management system for all incoming wastes and wastes on-site.
- Appropriate storage and handling.
- Wastewater management.
- The provision of an impermeable surface across all areas of the facility where waste is handled and stored, with kerbing or sloping to protect any adjacent permeable areas.
- The minimisation of underground tanks, pipework and bunding.

7.3 Environmental Liabilities

BAT in respect of provision of adequate financial indemnity/security to address the liabilities associated with accidents (unforeseen events/unknown liabilities), as well as for the provision of security for closure and aftercare is as set out within responses under Section 9 of the application.

8 BAT Associated Emission Levels

8.1 Emission Levels for Discharges to Water

There will be no emissions to water of environmental significance.

Baseline levels for turbidity and suspended sediments will form the basis of emission levels for monitoring.

8.2 Emission Levels for Discharges to Air

There will be no emissions to air of environmental significance.

Emissions to air from Soil Recovery Facilities generally occur as fugitive emissions from vehicle and materials movements on site.

The impact of dust is typically monitored using rates of dust deposition.

The following limit measure by the Bergerhoff Method is proposed.

- 350mg/m2/day.

8.3 Emission Levels for Noise

The following noise levels are proposed in accordance with the guidance, measured at noise sensitive locations in the vicinity of the activity.

Daytime dB $L_{AR,T}$ 07:00 to 19:00hrs (30 Mins)	Evening time dB $L_{AR,T}$ 19:00 to 23:00hrs (30 Mins)	Nighttime dB $L_{AR,T}$ 23:00 to 07:00hrs (15-30 Mins)
55	50	45*

*There will be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise-sensitive locations.

9 Compliance Monitoring

It is essential that the activity and operation of the facility be monitored to an agreed programme throughout the entire life of the facility.

9.1 Monitoring of Emissions to Air

Dust emissions will be monitored. Any significant dust falling outside of the Harbour limits will be cleaned up.

It is proposed to carry out monthly dust deposition level measurements using the Bergerhoff Method.

Measurements will be carried out at two locations as shown in the application Drawings No.: 5505.

9.2 Monitoring of Emissions to Water

Monitoring of turbidity will be undertaken within the harbour and at sensitive locations outside the harbour to ensure that excess suspended sediment from the dredge plume do not impact on such areas. These monitoring points will also be used to monitor any excess suspended sediment when the seawater initially trapped within the perimeter embankment is drained to the sea.

Monitoring within the harbour will be on a continuous basis during the dredging operations.

Monitoring of turbidity outside the harbour will be undertaken on a discrete basis. During the dredging process monthly sampling of water from the water column at a location off Charlemount Beach will occur and will be tested for suspended sediment concentrations and water quality parameters.

Limits on turbidity or suspended solids in the harbour during the construction phase will be agreed with the relevant authority prior to commencement of works. The water quality will be monitored during works by the following methods:

- Fixed station in situ water quality monitoring.
- Boat-based in situ water quality monitoring.
- Visual water quality monitoring.
- Laboratory water quality monitoring.

Measurements will be carried out at three locations as shown in the application Drawings No.: 5505.

Fixed station in situ water quality monitoring

Turbidity sensors will be used to determine turbidity during the dredging operation using in-situ readings. Continuous, real-time, in situ water quality data will be collected through the use of sensors deployed on a buoy near the construction site. High-frequency data is averaged at regular intervals and uploaded via telemetry to a website.

Fixed locations for turbidity sensors will be identified and agreed with the relevant authority.

Boat-based in situ water quality monitoring

Monthly mobile manual monitoring will also take place by boat-based water quality monitoring, the frequency of which will be approved by the relevant authority. The manual monitoring will be a combination of in situ testing and/or lab testing as agreed with the relevant authority.

Visual water quality monitoring

Daily visual monitoring will also be carried out from the shore and dredging vessel by the Contractor and Resident Engineer. The visual monitoring will include:

- Visual monitoring for suspended solids within and outside of the harbour.
- Daily inspection of surface water management systems including the stockpile drainage locations and any authorised discharge locations.
- A log will be kept of all visual monitoring.

Laboratory water quality testing

Samples will be collected at agreed regular intervals and locations to test for suspended solids.

Water quality monitoring will continue at monthly intervals with sampling and analysis of water from just west of the reclamation area and adjacent to Claremount beach. This monitoring will continue for 24 to 36 months or until the licence is surrendered if later than this.

Measurements will be carried out at three locations as shown in the application Drawings No.: 5505.

9.3 Monitoring of Noise

Noise monitoring locations will be set up to ensure compliance with emission limits.

Measurements will be carried out at two locations as shown in the application Drawings No.: 5505.

9.4 Monitoring of Waste

- A register will be used to record the types, quantities, date and manner of recovery of all wastes. Waste composition information.
- The recording of the treatment quantity (tonnes per annum (rolling 12-month total quantity)) and storage quantity (cubic metres at any one time).
- Annual waste minimisation report showing efforts made to reduce specific consumption together with material balance and fate of all waste materials