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Doyle Shipping Group

Greenore Port – Development of Berth No.2

Foreshore Application Report

Report No. CM983-MA-F-R001

June 2017

Revision 00

Document Control

Document:	Foreshore Application Report
Project:	Greenore Port – Development of Berth No.2
Client:	Doyle Shipping Group
Report Number:	CM983-MA-F-R001
File Origin:	Z:\PROJECTS 2016\C983 TENDER Greenore Port\Project\Foreshore\CM983-MA-F-R001-00 Foreshore Application Report.docx

Document Checking:

Revision	Revision / Review Date	Details of Issue	Authorised		
			Prepared By	Checked By	Approved By
00	30/06/17	Foreshore Application	PM	SMC	AC
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1 Introduction

1.1 Introduction

Greenore Port was opened in 1873 by the London and North Western Railway to provide a UK ferry link to their rail network with the service continuing up until the 1950s when both the ferry and railway connection ceased operation. In 1963 Greenore became the first port in the Republic of Ireland to handle containerised traffic and then during the 1980s when container traffic started to move to the larger developing ports of Dublin and Cork, the Port began handling large volumes of bulk cargoes as well as playing a vital role in the export of live cattle and frozen beef to the Middle East during the 1980s and 1990s. Today the main commodities handled at the Port are bulk animal feed, fertiliser, coal, steel, timber and general cargo.

Greenore Port is owned by Doyle Shipping Group (DSG) who are an independent provider of shipping agency services in Ireland.

For the purposes of this foreshore application, the following works are proposed:

- Dredging of the existing sea bed;
- Disposal of dredged material at land;
- Reuse of suitable dredge material;
- Construction of combi sheet pile wall;
- Construction of anchor beam and tie rods to retain the combi sheet pile wall;
- Construction of capping beam and new concrete deck/apron;
- Installation of pier furniture and services.

The works are considered as emergency works by Greenore Port. The berthing wall at the existing Berth No.2 has experienced undermining and subsequent outward rotation. Temporary remedial works were carried out in 2016 with the objective of eliminating this rotation. The deck at Berth No.2 has become damaged. It is likely that this has been caused by the undermining and rotation (Figure 1).

Figure 1 Deck at Berth No.2

2 Existing Infrastructure

2.1 Berth No.1

Berth No.1 is the main berth at Greenore Port, and is used for the unloading of bulk animal feed, fertiliser, coal, steel, timber and general cargo. The berth also has the capacity to allow for the loading of cattle.

The berth is approximately 118m long and was redeveloped in 2000. The wall structure comprises a combi-steel sheet pile wall socketed into bedrock. The wall was backfilled with dredge material before a new concrete deck was placed thereon. The wall is finished with a return wall on the south west end, adjacent to Berth No.2.

The seabed level is approximately -8.0m Chart Datum (-11.05m OD Malin) adjacent to Berth No.1. The deck level of the berth is approximately +8.05m Chart Datum (+5.0m OD Malin).

2.2 Berth No.2

Berth No.2 is the ancillary berth at the site. It is used for the unloading of cargo from smaller vessels. The berth is approximately 139m long.

The wall of the berth is the original wall, which was recently temporarily stabilised as it has shown signs of undermining and outward rotation.

Water depths at Berth No.2 are limited due to the existing bed level which vary between 0m Chart Datum at the south west end and -8.0m Chart Datum adjacent to Berth No.1. This therefore limits the size of vessels using the berth, and means the berth is tidally dependant.

Berth No.2 terminates at the concrete caissons located at the south west end.

2.3 Capacity of Greenore Port

Greenore Port is a major contributor to the Irish economy. Annually, approximately 300,000tonnes of bulk animal feed, 50,000tonnes of fertiliser, 175,000tonnes of steel, 100,000tonnes of rock is exported/imported at the port.

Vessel restrictions at Greenore Port are as follows:

Berth No.1: 60,000 T deadweight, 205m in length, 32m beam, 8.5m draught;

Berth No.2: 5,000 T deadweight, 100m in length, 14m beam, 6m draught;

The Port currently has the capacity to accommodate vessels of 205m in length. These vessels currently berth at Berth No.1 only. The current trend in commercial shipping is the manufacturing of larger vessels, with smaller vessels becoming less frequent.

Greenore Port can currently accept 1No. large and 1No. small vessel at the port. There are current restrictions caused by channel depth, channel width and towage power within Carlingford Lough. This will not change as a consequence of the works.

2.4 Securing and overhanging

Larger vessels use Berth No.1 for berthing and unloading/loading of goods. One of the major issues at Greenore Port is the ratio of vessel length to the length of Berth No.1. Larger vessels are considerably longer (205m) than the existing berth wall (118m). This results in the vessel's bow and stern 'overhanging' the berth wall. Under normal weather and tidal conditions this is acceptable. However, when unfavourable conditions prevail, the 'overhang' causes the vessel to pivot around the berth. This leads to stresses within the hull of the vessel, high tensile stresses on the mooring ropes, and stress on the mooring bollards which are then transferred to the berth wall. This increases the risk of damage to the vessel hull, the quay wall, and to the mooring lines. Greenore Port must instruct vessels to move to anchorage under these conditions as the safety risks are too high.

3 Proposed Development

3.1 General

The refurbished Berth No. 2 quay wall will span the gap between the existing Berth No.1 and the caissons, with an overall length of 139m as indicated in the foreshore drawings. The Berth No. 2 quay wall act as a continuation of Berth No. 1, and will therefore be in line with the existing berthing face.

3.2 Quay Wall

The quay wall will be constructed by a steel combi-wall system. This comprises tubular steel king piles and steel sheet piles socketed into bedrock. A reinforced concrete capping beam will be constructed on top of the combi-wall. The void between the existing quay wall and the proposed quay wall will be filled with suitable dredged material and imported engineering fill material.

The elevation of the quay wall will comprise painted (black) steel. The paint will be a product that will reduce the effects of salt water corrosion. A cathodic protection system (anodes) will be welded to the quay wall as a secondary measure to reduce the effects of salt water corrosion.

3.3 Quay Deck

The quay deck will be a reinforced concrete deck constructed on the capping beam and engineering fill material. The deck surface will be sloped to accommodate the proposed surface water drainage system. The level of the quay deck will match the existing Berth No.1 deck levels to create a continuous deck.

3.4 Dredging

Dredging will be required to increase water depths at Berth No.2. It is proposed to dredge the sea bed to -7.5m Chart Datum. The dredge pocket shall be 40m wide and 90m long. Suitable excavated material will be re-used behind the new quay wall. Material which does not comply with the required engineering properties will be disposed of in a suitably licenced facility.

Greenore Port reserves the right to seek a Dumping at Sea Licence from the Environmental Protection Agency if it is deemed necessary to dispose of the dredged material at sea.

3.5 Quay Furniture

3.5.1 Bollards

100tonne capacity mooring bollards will be bolted to the new quay deck at approximately 10m centres. The bollards will facilitate the berthing of varying vessel lengths.

Figure 2 Typical 100tonne Bollard

3.5.2 Fenders

Black Rubber fenders shall be bolted to the outside of the quay wall. These fenders will absorb the berthing loads from vessels, as well as protecting the ships hulls and quay wall structure. The fenders shall extend to Mean Low Water Springs.

3.5.3 Ladders

Emergency escape ladders will be positioned at approximately 30m centres along the quay wall. These ladders will allow persons escape the water in the case of emergency. The top of ladder will be level with the new deck. An additional rung shall be countersunk into the quay deck. The ladders will extend to 1.5m below Mean Low Water Springs. Refer to drawing

3.5.4 Life Saving Equipment

Lifesaving equipment (lifebuoys and fire extinguisher) will be positioned on the quay deck at approximately 30m centres.

3.6 Services

3.6.1 Lighting

The existing spot-lighting system on the site will be used.

3.6.2 Power Outlets

Additional power outlets will be provided along Berth No.2. These outlets will connect to the existing power system.

3.6.3 Fire Hydrants

Fire hydrants and potable water outputs shall be provided at 50m c/c.

3.6.4 Surface Water Drainage

New surface water drainage shall be provided on the new Berth No. 2 deck. The quay deck shall drain to the gulleys which will be provided with silt traps. Water will then be conveyed to a hydrocarbon interceptor before conveyance to sea via the existing outfalls.

3.6.5 Foul Water Drainage

Foul water will not be generated as part of these works. The Louth County Council owned foul water drainage infrastructure, which runs through the site, will not be negatively impacted upon because of the development.

3.6.6 Crane Rails

The existing crane rails at the location of Berth No.2 shall be removed and disposed of in a suitably licenced facility as part of the works. This type of crane is no longer required at the Port.

3.6.7 Drawings

The following drawings illustrate the nature and extent of the works;

Drawing No.	Drawing Title
CM983/MA/0501/DWG/00	Location Map (1:10560)
CM983/MA/0502/DWG/00	Foreshore Licence Map (1:2,500)
CM983/MA/0503/DWG/00	Section 10 Consent Map (1:12,500)
CM983/MA/0504/DWG/00	Compendium Map for Information
CM983/MA/0505/DWG/00	Existing Site Layout
CM983/MA/0506/DWG/00	Proposed Site Layout
CM983/MA/0507/DWG/00	Existing Quay Wall Elevations
CM983/MA/0508/DWG/00	Proposed Quay Wall Elevations
CM983/MA/0509/DWG/00	Cross Sections
CM983/MA/0510/DWG/00	Quay Furniture
CM983/MA/0511/DWG/00	Admiralty Chart

4 Operational Stage

4.1 Quay Use

The use of Berth No.2 will not constitute a material change from the existing uses. The berth will be used for the unloading/loading of fertiliser, coal, steel, timber and general cargo. The new quay wall will allow for the safer berthing of vessels, which have seen an increase in size in recent years.

There will be no intensification of usage of the port as a result of the works. The current restrictions identified in Section 2.3 will remain in place.

The proposed works will not result in a greater discharge rate from vessels. The main benefit of the works will be the reduction in safety risks.

4.2 Equipment

The following equipment is expected to be operated by the Port during the operational stage:

- Liebherr LHM 420 Crane
- Liebherr LHM 320 G Crane
- Standard Heavy Good Vehicles
- Volvo 480
- Reach Stackers
- Drop Trailers and Stackers
- Skid Steers
- Forklifts
- BM Loaders
- Hoppers

The above equipment is currently in use at the Port, so there will be no change of plant on the pier deck. The existing gantry crane will be replaced by a harbour mobile crane, similar to that already operating in the Port.

5 Foreshore Areas

5.1 Known Foreshore Applications

A number of foreshore applications have been made by Greenore Port and their previous owners over the years. These applications are indicated on drawing CM983/MA/0504/DWG for information. It indicates the applicant's property, previous foreshore licences granted, pending applications, and the areas proposed as part of this application. The following are the known relevant foreshore licences at the site:

- Pending application for dredging and the installation of a single point mooring (FS006676);
- Foreshore Lease for the area to the north of Berth No.1. (MS/51/2/114);
- 2001 Foreshore Consent application at Berth No.2. (reference unknown);

5.2 Greenore Property

Greenore Port's property extends onto the foreshore as indicated on drawing CM983/MA/0504/DWG. The proposed refurbished Berth No.2 will remain within this boundary. Dredging works will extend onto state owned foreshore.

5.3 Section 10 Consent

Greenore Port are applying for a Section 10 Consent from the Department of Housing, Planning, Community and Local Government for the permanent works (and some dredging works) on their private foreshore.

5.4 Foreshore Licence

Greenore Port are applying for a Foreshore Licence from the Department of Housing, Planning, Community and Local Government for the dredging element of this proposal.

6 Hydrodynamic Regime

6.1 Datum

Greenore Port have determined that Greenore Chart Datum is 3.05m below Ordnance Datum (Malin).

6.2 Tide Levels

The following tide levels have been determined at Greenore Port:

Datum	Mean High Water Springs	Mean High Water Neaps	Mean Low Water Neaps	Mean Low Water Springs
Greenore Chart Datum	+5.3m	+4.3m	+1.8m	+0.7m
Ordnance Datum Malin	+2.2m	+1.2m	-1.3m	-2.4m

Table 1 Existing Tide Levels

6.3 Bed Levels

Bed levels immediately adjacent to Berth No.1 vary between -7.5m CD and -8.5m CD. Bed levels immediately adjacent to Berth No. 2 vary between -7.5m CD and 0.0m CD.

6.4 Currents

No charted tidal current information is available at the site. It is locally known that the ebbing tide causes significant currents at the Port, which, have the effect of flushing out the berth.

6.5 Waves

Long period swell waves do not propagate to the site.

Short period wind generated waves can develop on the site as a result of strong north easterly winds. The port orientation and nearby breakwater results in relatively calm conditions at the location of the Port, making it an ideal location for a port terminal.

6.6 Flood Risk

A Flood Risk Assessment is enclosed in Appendix 1 of this report.

7 Seabed Sediment Analysis

7.1 Introduction

Greenore Port carried out analysis of sea bed sediments on 13th and 14th March 2017 within the proposed dredge boundary. The purpose of the analysis is to determine the presence of contaminants (if any) within the sea bed material. Seven samples were extracted on the sea bed surface and at 1m depths.

7.2 Marine Institute Requirements

The Marine Institute provides guidelines for the assessment of dredge material for disposal in Irish Waters. The Marine Institute provided a site-specific sampling and analysis plan for this development.

7.3 Laboratory Results

The results of the sediment analysis are enclosed in Appendix 2.

7.4 Waste Classification

The sea bed material which will be subject to dredging was classified in accordance with The Classification, Labelling and Packaging of Dangerous Substances and Mixtures Regulation (EC) No 1272/2008. The results of the classification are enclosed in Appendix 3. All the samples are classified as non-hazardous and the appropriate List of Waste Code is 17 05 06 (Dredging spoil other than those mentioned in 17 05 05).

7.5 Marine Institute Guidelines

The Marine Institute (MI) provides guidelines on the assessment of ecological risks associated with dredging and disposal at sea activities. The guidelines propose threshold guidance levels for lower and upper levels of sediment contamination. Contamination values below the lower guidance levels are considered uncontaminated. Contamination values between the lower and upper guidance levels are considered marginally contaminated. Contamination values above the upper guidance level are considered heavily contaminated. An assessment of the results reveals very low levels of contamination of a number of the samples, rendering them marginally contaminated. The contamination levels will not preclude the option of disposing the dredge material at sea, should Greenore Port chose to apply for a Dumping at Sea Licence.

7.6 Commentary

The sea bed material to be dredged will be suitable for disposal at a suitably licenced site.

Greenore Port reserves the right to seek a Dumping at Sea Licence from the Environmental Protection Agency if it is deemed necessary to dispose of the dredged material at sea.

8 Outline Construction Method Statement

This construction method statement is outline only, and subject to change based on the outcome of planning, foreshore and other statutory licence applications as well as the preferred contractor methodology.

8.1 Mobilisation

A pre-condition survey of the site will be carried out by the contractor to determine the suitability of the plant proposed. The following will be mobilised to the site for the dredging elements of the works:

- Long Reach back-hoe excavator;
- Dredge barge;
- 1000m^3 hopper barge;
- Tug Boat;
- 8-wheel tipper trucks;
- Safety boat.

When the dredging works are completed, the following plant will be mobilised to site for the quay wall construction element of the works.

- Back-hoe excavator x 2;
- Piling rig;
- 70ton mobile crane;
- Hydraulic pile hammer;
- Road sweeper;
- Articulated dump trucks;
- 8-wheel tipper trucks;
- Safety Boat (retained).

Figure 3 Typical Dredge Barge, Back Hoe Excavator, and Hopper Barge

8.2 Site Compound

The contractor will set up the site compound upon mobilising to site. Appropriate fencing will be erected around the perimeter of the site. The site compound will be minimised to limit obstructions to the normal operation of the port. The compound will incorporate a site office, canteen, welfare facilities and storage.

8.3 Dredging Works (Overburden Material)

A notice to mariners will be issued prior to the commencement of the dredging works.

The contractor will carry out a bathymetric survey to determine sea bed levels.

The dredge barge will be commissioned and certified at Berth No.2. The tug boat will then tow the barge to the areas requiring dredging.

The long reach excavator, located on the dredge barge, will use a dig control system to determine dredge level achieved. The excavated material will be placed in a hopper barge to be later discharged into tipper trucks on the existing quay edge. Storage of the material will not take place on the quay.

It is likely that dredging activities will take place 24hrs per day, 7days per week to achieve the maximum production rates within tidal envelopes.

8.4 Dredging Works (Rock Material)

A layer of limestone will require excavation to achieve the dredge levels. This will constitute approximately 1,260m^3. The rock breaking will be carried out from the dredge barge. The

long reach excavator will be equipped with a rock breaking chisel. The broken bedrock will then be excavated by the long reach excavator and brought ashore for later installation behind the new quay wall. Dredge arisings will be separated on site within Greenore Port's property. Material washing will not be required

It is likely that dredging activities will take place 24hrs per day, 7days per week to achieve the maximum production rates within tidal envelopes.

8.5 Disposal of Dredge Arisings

The following volumes of dredge materials are estimated:

Material to Be Dredged	Volume (m^3)	Mass (tonnes)
Gravel	10,894	14,162*
Silt	2,880	3,744*
Sand	2,984	3,879*
Limestone Rock	1,260	2,520**

* Assume bulk density is 1,300kg/m^3
** Assume bulk density is 2,000kg/m^3
Table 2 Dredge Volumes

Subject to the quality of material dredged, it is estimated that 1,260m^3 of rock, and 3,410m^3 of gravel will be placed behind the new quay wall to fill the void created. The remaining 13,348m^3 (17,352tonnes) of gravel, silt and sand will require disposal at a suitably licenced site.

8.6 Anticipated Dredge Production Rates

It is anticipated that overburden (gravel, silt and sand) will have a maximum dredging rate of 500m^3 per 24 hours. The bedrock will be excavated at a slower speed (approximately 40m^3 per 24 hours).

It is estimated that the haulage contractor would dispose of overburden material over 12 hours per day. It is therefore estimated that 32No. 20 tonne tipper trucks will be required per 12-hour day, over a period of approximately 27 days.

8.7 Construction of Quay Wall

The piles will be delivered to site factory manufactured and painted.

The piling rig will be placed on the barge over the line of the new quay wall. The rig will be used to core into bedrock for the installation of the combi-sheet pile wall. A crane will be positioned on the existing quay structure. When the coring into the bedrock is completed, the crane will install the circular steel piles (king piles). The piles will be socketed into the bedrock with high strength grout. The coring rig will then move to the next king pile position. Similarly, the next king pile will be installed and grouted. When two king piles have been installed, an impact hammer will be fitted onto the crane, and three sheet piles will be driven into the

bedrock, spanning the gap of the king pile. The process will be repeated over the length of the wall.

Suitable excavated material won from the dredging works will be placed behind the combi wall and compacted. There may be a requirement to import some engineering fill material, depending on the engineering properties of the dredge material.

Additional piles will be driven approximately 3m behind the line of the existing Berth No.2 wall. These piles will bear the weight of the concrete deck and operational site plant (cranes etc.).

An anchor sheet pile wall will be driven through the existing quay deck sub structure. Tie bars will connect this sheet pile wall to the quay wall.

Divers will weld anodes to the face of the quay wall underwater.

8.8 Decking

The existing concrete deck will be broken down to the formation level. Excavated concrete will be used as fill material where appropriate, behind the quay wall and under the new concrete deck. If the concrete is not suitable to be used as fill material, it will be disposed of in a suitably licenced facility.

The new quay apron will comprise a reinforced concrete deck. Provision for services lines and gulleys will be placed within the reinforcement steel. Formwork will be fixed to the top of the combi-wall. The formwork shall be shaped and sealed such as to prevent the leakage of concrete. The concrete will be vibrated by mechanical means and brush finished.

The deck shall be sloped to ensure that rain water runs to the gulley locations.

8.9 Furniture and Services

Bolts for the bollards shall be cast into the reinforced concrete deck. The bollards shall then be positioned on the bolts and fastened.

Emergency bollards shall be post-fixed to the reinforced concrete deck.

Ladders shall be welded to the in-pan of the sheet piles at 30m centres. Recesses shall be cast into the concrete deck / capping beam to allow for the positioning of the ladders. The ladders shall be delivered to site, prefabricated and hot-dipped galvanised. The top rung of the ladder shall be cast into the pier deck.

A hydrocarbon interceptor (bypass separator) shall be positioned under the new quay deck before the installation of the deck.

8.10 Programme of Works

The preliminary construction programme is estimated to last 6 months, with the following key elements:

Event:	Time
Mobilisation	1 week
Piling for Combi Wall	5/6 weeks
Back filling/ancillary piling/concrete deck	7/8 weeks
Dredging	5/6 weeks
Ancillary infrastructure	3/4 weeks

9 Construction Environmental Management Plan

This section comprises a draft high level Construction Environmental Management Plan (CEMP) for the works. The final CEMP can only be prepared subject after planning permission, foreshore consent, and other consents are provided.

9.1 Responsible Person

Greenore Port will appoint a competent and experienced Contractor through public tender. A qualification requirement of the tender will be that the Contractor will be required to be suitably qualified and have the relevant experience in relation to construction environmental management and health and safety. Regular meetings will be held between the Contractor and Greenore Port's representatives in relation to the CEMP.

9.2 Working Hours

Dredging works may take place 24hrs per day / 7 days per week, in order to take advantage of the tidal envelope (low tide will not always occur during the daytime).

It is anticipated that all other works will take place between 7am and 7pm Monday to Friday and 7am and 1pm on Saturdays.

9.3 Traffic Management Plan

A Traffic Management Plan (TMP) will be agreed with Louth County Council, the National Roads Authority and the National Transport Authority as required.

The appointed Contractor will be responsible for:

- The implementation of the TMP;
- Design, planning, installation, maintenance and decommissioning of traffic safety measures as required;
- Detailed traffic management plans compiled in accordance with Chapter 8 of the Traffic Signs Manual, Department of Transport, 2010 including:
    - Phasing of works;
    - Detailed traffic management drawings;
    - Traffic management for marine plant;
    - Timing of operations and works;
    - Road lighting;

- Compliance with the Temporary Closing of Roads Regulations and amendments (Roads Act 1993);
- Public signage;
- Temporary warning and information signs;
- Traffic cones and taping;
- Road danger lamps;
- Temporary construction of roadways;
- Appointment of Traffic Safety and Control Officer, responsible for:
    - Liaison with Greenore Port, An Garda Síochána, and Louth County Council Traffic Manager;
    - Management of traffic;
    - Notification of accidents to An Garda Síochána;
    - Ensure the safe working operation of plant, and machinery;
    - Pre and post works road condition surveys;
    - Weekly reporting to Greenore Port;
- Issuing of notices to the Automobile Association and local newspapers where required;
- Cleaning of internal site roads;
- Making traffic orders, authorisation of signage and signals;

9.4 Management of Waste

A Site Waste Management Plan will be agreed with Louth County Council.

Site contractors will be responsible for the collection, control and disposal of all wastes generated by the construction works.

Likely wastes generated include:

- Dredge arisings (refer to Section 7);
- Excavated quay deck;
- Surplus concrete;
- Timber formwork;

- Steel off cuts;

9.4.1 Management of Waste

Dredge arisings will be separated on site within Greenore Port's property. Material washing will not be required. Suitable excavated bedrock and gravel shall be used to fill the void behind the new quay wall. Material which does not have the required engineering properties shall be disposed of at a suitably licenced site. Greenore Port reserves the right to seek a Dumping at Sea Licence from the Environmental Protection Agency if it is deemed necessary to dispose of the dredged material at sea.

The reinforcement shall be removed from the excavated reinforced concrete quay deck where possible. The excavated concrete shall be used as fill material behind the quay wall. The steel reinforcement is recyclable and will be placed in a segregated skip before being accepted by a recycling company.

In the unlikely event that surplus concrete is ordered, Greenore Port will identify a number of locations within their large compound for the placing of the material to fill concrete apron voids.

All timber formwork shall be recovered by the Contractor and reused on alternative sites as it will be the property of the Contractor.

Due to the variable nature of the bedrock, a number of the piles may not meet the required top level. The piles that exceed the top level will be cut to size. The off cuts will be used to extend any piles that do not reach the top level. Any other surplus steel will be placed in a segregated skip for recycling.

Any cardboard packaging will be recycled after being flattened and placed in a covered skip.

On-site storage of hazardous waste will be minimised. Potential wastes will include waste fuel, paints, or other residues. These will be suitably bunded. Hazardous wastes will be recovered wherever possible and failing this, disposed of appropriately.

A general skip will be maintained on site for general waste that is non-recyclable, such as food waste, contaminated plastic and cardboard, polystyrene etc. Suitable municipal waste recycling facilities will be made available on site for glass, cardboard, plastic etc.

Sewage generated during the construction works will be conveyed through the existing system, as the existing on-site facilities will be utilised.

9.5 Noise Management

A variety of items of plant will be in use, such as excavators, lifting equipment, dumper trucks, compressors and generators. There will be vehicular movements to and from the site that will make use of the existing local road network towards the port.

Due to the nature of the activities undertaken on a construction site, there is potential for generation of increased levels of noise. The potential for vibration at neighbouring buildings and residential dwellings is typically limited to HGV movements.

The proposed works is however unlikely to result in significant vibration at local residences from on-site construction activities due to the separation distances.

A Noise Management Plan will be agreed with Louth County Council. The following mitigation measures are proposed:

With regard to construction activities, reference will be made to "*BS5228: Noise Control on Construction and Open Sites*", which offers detailed guidance on the control of noise from demolition and construction activities. In particular, it is proposed that various practices be adopted during construction, including:

- Appointing a site representative responsible for matters relating to noise;
- Monitoring typical levels of noise during critical periods and at sensitive locations.

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These will include:

- Selection of plant with low inherent potential for generation of noise;
- Siting of noisy plant as far away from sensitive properties as permitted by site constraints;
- Any ancillary pneumatic percussive tools will be fitted with mufflers of silencers as recommended by the manufacturers;
- Machines shall be shut down when not being used;
- Handling of plant and materials shall take place in a manner that minimises noise emissions;
- Generators, compressors and pumps shall be placed behind existing structures, where possible, to act as a screen;
- Vehicle audible warning systems shall be set to the minimum volume as required by the PSCS and Health and Safety Authority.

9.6 Management of Dust, Odour and Air Quality

9.6.1 Management of Dust

Dust and particulate matter emissions may arise from the delivery of material and other goods to the site and from the storage of material on the site.

Potential causes of dust and particulate matter emissions may include the following:

- Unpaved haul routes – poor quality haul routes will result in the amount of dust generated being exacerbated. All routes are paved on approach to the application site;
- Stockpiles and storage compounds – the stockpiling of material for long periods of time will result in an increase in dust emissions. This is dependent on the type of material, the quantity of silt contained therein and the moisture content of the material;
- Demolition works, which is inherently dusty;
- Excavation and earthworks;
- Concrete batching;
- Cutting, grinding and sawing;
- Scabbling;
- Waste disposal and burning.

Dust and particulate matter becomes airborne when either the wind causes the material to be picked up, or mechanical actions as outlined above causes them to be thrown up into the air. The distance that the dust and particulate matter re-settles depends on the size of the particulates, the wind speed and other atmospheric conditions. Smaller particles can travel a greater distance in general. Long spells of dry weather exacerbate the conditions.

Sensitive receptors such as private dwellings are generally located greater than 50m to the east and south of the existing berth wall. The effect of dust generally reduces at these distances. The prevailing wind direction in Greenore is generally west to south west, so it will not transport dust in the direction of these properties, but in the direction of the existing harbour infrastructure.

Dredging in the harbour will, by nature, be under water. No dust will be generated from these works.

Filling of the void between the old and new quay structures with dredged material will generally be carried out under water, so there will be no significant impact on air quality from these activities.

The maximum predicted construction vehicle movement will average at three vehicles per hour. This will not significantly impact upon dust being generated at sensitive receptors on haulage routes.

9.6.1.1 Mitigation Measures

The following mitigation measures are proposed:

- Excavation of the quay deck will require cutting, grinding and sawing. In order to minimise the dust generated, the deck will be regularly watered;
- Site roads shall be regularly swept, cleaned and maintained as appropriate. Vehicles departing the site shall be subject to wheel washing;
- Public roads outside the site shall be regularly checked for cleanliness and cleaned as necessary;
- Stock piling of material shall be minimised, and exposure to wind shall be minimised where possible.
- Stock piled material shall be sprayed if required;
- Burning shall not be permitted.

9.6.2 Management of Odour

Capital dredging will be required in order to increase water depths. There is a potential for odour to be created due to the disturbance of sea bed sediments. These works will be carried out in the coastal environment, where wind speeds are generally greater than inshore as there are no physical obstructions. This will result in the rapid dispersion of odours. The prevailing wind is not likely to transport the odours to sensitive receptors such as Greenore town.

A complaint investigation plan will be implemented to record any complaints regarding odour. If the complaint is verified, mitigation measures shall be implemented (such as temporary suspension of the works).

9.7 Marine Mammal Observer

In order to avoid potential disturbance or injury to marine mammals during the dredging and piling activities, the following shall be implemented by the Contractor:

- A qualified and experienced marine mammal observer (MMO) shall be appointed to monitor for marine mammals and to log all relevant events using standardised data forms.
- The MMO shall be present to ensure all dredging and piling works and in accordance with the Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources in Irish Waters (DAHG, 2014).

Pre-Start Monitoring

- Dredging and piling activities will only commence where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring, as determined by the MMO, is not possible the sound-producing activities will be postponed until effective visual monitoring is possible.
- An agreed and clear on-site communication signal will be used between the MMO and the Contractor as to whether the relevant activity may or may not proceed. It shall only proceed on positive confirmation with the MMO.
- The MMO shall conduct pre-start-up constant effort monitoring at least 30 minutes before the sound-producing activity is due to commence. Sound-producing activity will not commence until at least 30 minutes have elapsed with no marine mammals detected within the Monitored Zone by the MMO.
- This prescribed Pre-Start Monitoring will subsequently be followed by a pre-arranged Ramp-Up Procedure wherever possible. This will include continued monitoring by the MMO.
- Dredging and piling activity shall not commence if marine mammals are detected within a 500m radial distance of the drilling sound source, i.e., within the Monitored Zone.
- Dredging and piling activities shall only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring, as determined by the MMO, is not possible the sound-producing activities shall be postponed until effective visual monitoring is possible.
- Once normal dredging and piling operations commence, there is no requirement to halt or discontinue the activity at night-time, nor if weather or visibility conditions deteriorate nor if marine mammals occur within a 500m radial distance of the sound source, i.e., within the Monitored Zone.
- If there is a break in dredging or piling sound output for a period greater than 30 minutes (e.g., due to equipment failure, shut-down or location change) then all Pre-Start Monitoring shall be undertaken in accordance with the above conditions prior to the recommencement of dredging activity.
- Full reporting on MMO operations and mitigation undertaken shall be provided to the National Parks and Wildlife Service.

9.8 Archaeology

All overburden dredging works shall be archaeologically monitored by an experienced, licensed archaeologist with marine dredging/maritime archaeological experience. Should archaeological material, wreckage, timbers or other artefacts be recorded during the monitoring, the archaeologist will be empowered to suspend dredging operations in that area to recover and record the material. The recovered items should be placed in temporary wet

storage tanks provided on the pontoon barge. In the event that the dredger impacts on a possible shipwreck, then the dredge barge will be moved to a different area while a standby archaeological dive team, in place for such eventualities, is mobilised to undertake an assessment of the impacted material/wreck.

9.9 Water Quality Monitoring

Water quality monitoring shall be carried for the duration of the dredging activities. The following data shall be recorded:

- Water Turbidity to NTU (nephelometric turbidity units).
- Water Dissolved Oxygen (mg/l).
- Water Temperature (OC)

The Contractor shall provide Water Quality Recorders for taking the required readings. Readings shall be taken at 10 minute intervals.

The location for the water quality monitoring stations will be agreed with Louth County Council.

Material shall not be stockpiled close to the sea. The material shall be positioned so that rainwater will runoff to the surface water drainage system.

9.10 Health and Safety

Greenore Port is aware of the duties of the Client in accordance with the provisions of the Safety, Health and Welfare at Work Act 2005 and the Safety, Health and Welfare at Work (Construction Regulations) 291 of 2013.

A Project Supervisor Design Process and Project Supervisor Construction Stage will be appointed for the design and construction stages of the contract.

Appendix 1 – Flood Risk Assessment

BYRNELOOBY

Doyle Shipping Group

Greenore Port – Development of Berth No.2

Flood Risk Assessment

Report No. CM983-MA-P-R002

May 2017

Revision 00

Document Control

Document:	Flood Risk Assessment
Project:	Greenore Port – Development of Berth No.2
Client:	Doyle Shipping Group
Report Number:	CM983-MA-P-R002
File Origin:	Z:\PROJECTS 2016\C983 TENDER Greenore Port\Project\Planning Application\CM983-MA-P-R002-00 Flood Risk Assessment.docx

Document Checking:

Revision	Revision / Review Date	Details of Issue	Authorised		
			Prepared By	Checked By	Approved By
00	25/05/17	Draft	SMC	AC	AC
Disclaimer: Please note that this report is based on specific information, instructions and information from our Client and should not be relied upon by third parties.					

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Contents

1 Introduction

1.1 Background

This Flood Risk Assessment has been carried out in accordance with the *The Planning System and Flood Risk Management Guideline for Planning Authorities,* (Office of Public Works, 2009).

1.2 Topographic Survey

Several topographic surveys of the site were carried out between 2013 and 2015 by Six-West Ltd. Levels were recorded to OD Malin Head. These surveys, which have not been included in the planning documentation, provided information on levels at the Port.

1.3 Hydrographic Survey

A hydrographic survey of the sea bed adjacent to berth 1 and berth 2 was carried out by Six-West Ltd in December 2015. Sea bed levels were recorded to Chart Datum (Greenore), which is approximately 3.05m/3.13m below OD Malin Head.

1.4 Proposed Development

The site of the proposed development is located in Greenore Port, Greenore, Co. Louth. The works will comprise the refurbishment of the existing Berth No.2 by the installation of a new steel combi wall. To facilitate the works, dredging of the sea bed will be carried out in front of the quay wall. A new quay deck will be constructed to match the existing deck levels.

1.5 Existing Surface Water Drainage

Storm water generated drains through a series of gulleys located on the quay decks at Berth No. 1 and Berth No.2. The network drains to an outfall through the quay wall. Refer to drawing CM983-MA-DWG003-P.

1.6 Proposed Surface Water Drainage

The Berth No.2 deck will match the level of the Berth No.1 deck. It will comprise reinforced concrete which will fall at a slope away from the quay wall. A new network of gulleys and drainage will be constructed on the new quay deck to collect the surface water generated. The network will drain to a hydrocarbon interceptor before discharging to the sea.

2 The Planning System & Flood Risk Management Guidelines

According to The Planning System and Flood Risk Management Guideline for Planning Authorities an *"assessment of flood risk requires an understanding of where the water comes from (i.e. the source), how and where it flows (i.e. the pathways) and the people and assets affected by it (i.e. the receptors)."*

It is a requirement of a site-specific flood risk assessment to determine all potential sources of flood risk to a site, examine the impact of the development on flood risks, and determine flood mitigation and management measures if required.

The guidelines recommend a staged approach to flood risk assessment:

> **Stage 1 Flood risk identification** – to identify whether there may be any flooding or surface water management issues related to either the area of regional planning guidelines, development plans and Local Area Plans or a proposed development site that may warrant further investigation at the appropriate lower level plan or planning application levels;
>
> **Stage 2 Initial flood risk assessment** – to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped; and
>
> **Stage 3 Detailed flood risk assessment** – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

For the purposes of this assessment, a Stage 3 Detailed Flood Risk Assessment will be carried out.

3 Flood Risk Identification

3.1 Existing Site

The proposed development is located at Greenore Port, Greenore, Co. Louth. The site is located on and adjacent to tidal waters in Carlingford Lough.

3.2 History of Flooding

The Office of Public Works (OPW) Flood Hazard Mapping website keeps a record of reported flood events (www.floodmaps.ie). There are no reports of flood events near the proposed development recorded on the website.

Discussions with Greenore Port Ltd indicate that flooding is not known to occur at the application area.

3.3 Louth County Development Plan 2015-2021

The Louth County Development Plan provides "Land Use – Flood Extents" maps for County Louth. The Plan identifies flood zones (as described in Section 3.5.1). It identifies the application area as being outside a flood zone and within "Port/Port Related Activity".

3.4 CFRAM Flood Risk Mapping

CFRAM is Catchment Flood Risk Assessment and Management. The national CFRAM programme commenced in Ireland in 2011.

The CFRAM Programme is central to the medium to long-term strategy for the reduction and management of flood risk in Ireland.

The OPW is the lead agency for flood risk management in Ireland and is the national competent authority for the EU Floods Directive. OPW works in close partnership with all Local Authorities in delivering the objectives of the CFRAM Programme.

The North Western – Neagh Bann CFRAM Flood Risk Review identified Greenore town as an Area for Further Assessment (AFA) for fluvial and coastal flooding based on a review of historic flooding and the extents of flood risk determined during a preliminary flood risk assessment carried out by the OPW. This report, however, did not include the Port as an AFA, therefore the Preliminary Flood Risk Assessment (PFRA) mapping for the area has been used to inform the assessment. An extract from the PFRA mapping is indicated in Figure 1. The figure indicates that the site is unlikely to be at risk from fluvial flooding, however there is some coastal flooding potential.

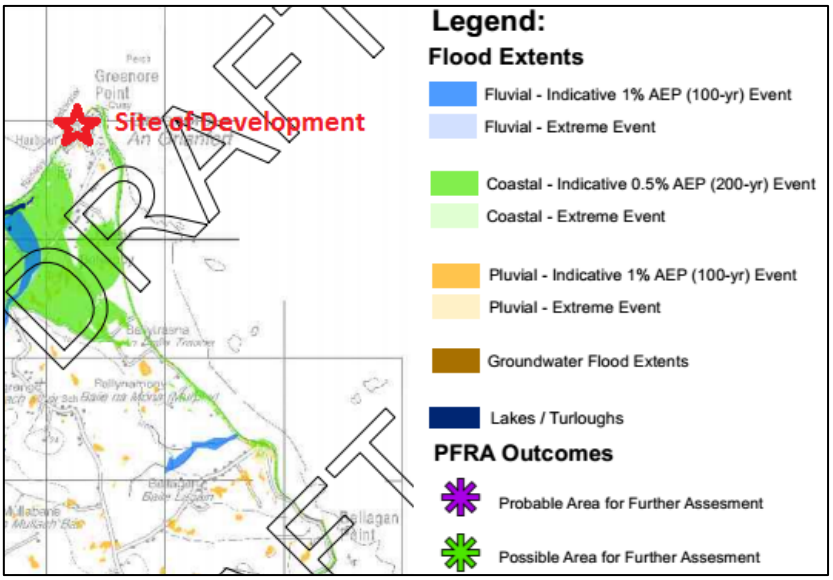

Figure 1 Extract from PFRA Mapping

3.5 ICPSS Flood Risk Mapping

The Irish Coastal Protection Strategy Study (ICPSS) is a national study that was commissioned in 2003 with the objective of providing information to support decision making about how best to manage risks associated with coastal flooding and coastal erosion. The Study was completed in 2013 and provides strategic current scenario and future scenario (up to 2100), coastal flood hazard maps, and strategic coastal erosion maps for the national coastline. This major study provides invaluable and essential information required to inform policy in this area, particularly for local authorities in relation to the proper planning and development of coastal areas.

A numerical model of extreme water levels was generated to determine extreme events as part of the ICPSS. The relevant published data was reviewed and contains data relevant to the site of the proposed development.

Node Point NE_27 is located at Greenore Port and is therefore the most relevant data point to the proposed development. The estimated extreme water levels (for both tidal and surge) at Node Point NE_27 are listed in Table 1.

Return Period (AEP)	Combined Tide and Water Level above OD Malin	Chart Datum Conversion
1 in 2 years (50%)	+3.10m	+6.2m
1 in 5 years (20%)	+3.23m	+6.33m
1 in 10 years (10%)	+3.33m	+6.43m

1 in 20 years (5%)	3.42m	+6.52m
1 in 50 years (2%)	3.55m	+6.65m
1 in 100 years (1%)	3.65m	+6.75m
1 in 200 years (0.5%)	3.75m	+6.85m
1 in 1000 years (0.1%)	3.97m	+7.07m

Table 1 Extreme Still Water Levels (Combined Tide and Surge Levels) for Node Point NE_27.

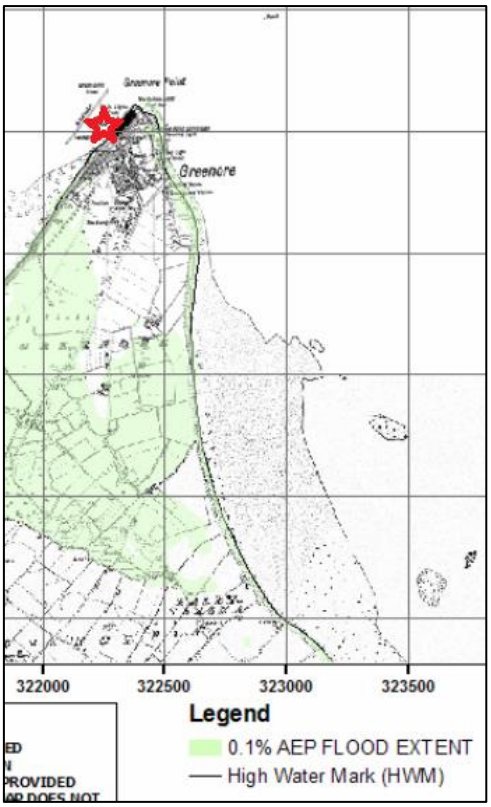

Figure 2 Extract from Carlingford to Greenore Predictive Flooding Extent Map, 0.1% AEP

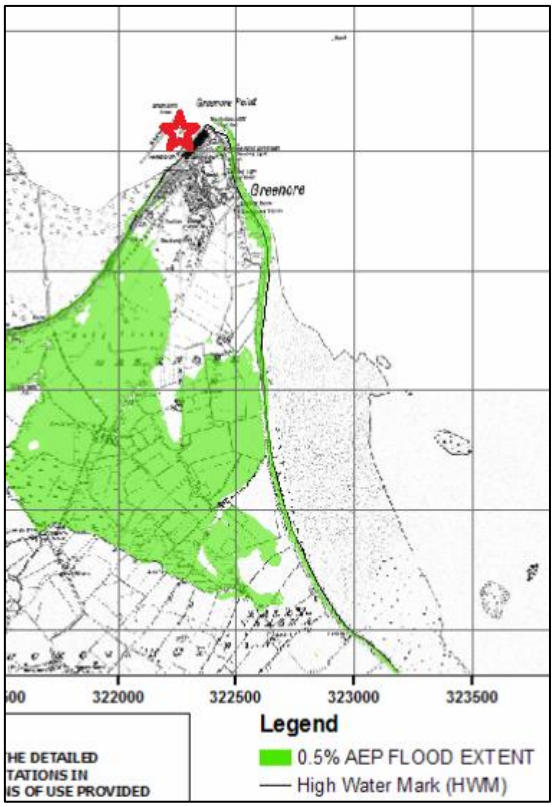

Figure 3 Extract from Carlingford to Greenore Predictive Flooding Extent Map, 0.5% AEP

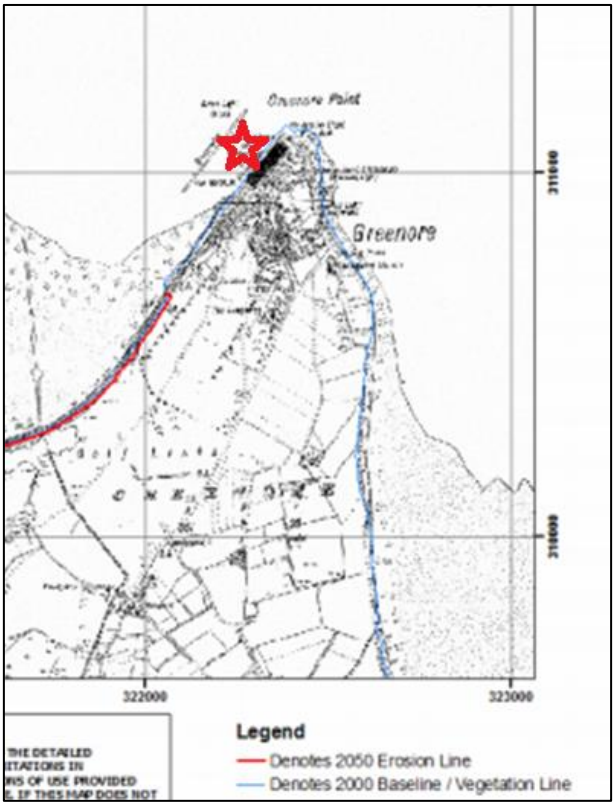

Figure 4 Extract from Carlingford to Greenore Predictive 2050 Erosion Line

3.5.1 Flood Zones

Flood Zones are determined in accordance with the Flood Risk Management Guidelines.

"There are three types or levels of flood zones defined for the purposes of these Guidelines:

***Flood Zone A** – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);*

***Flood Zone B** – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and*

***Flood Zone C** – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B."*

Referring to Table 1 yields the following:

- Flood Zone A therefore comprises land with elevations less than +3.75m OD Malin (+6.85mCD).
- Flood Zone B therefore comprises land with elevations between + 3.75m & 3.97m OD Malin (+6.85mCD & +7.07mCD).
- Flood Zone C therefore comprises land with elevations greater than 3.97m OD Malin (+7.07mCD).

The topographic survey carried out indicates the existing Berth No.2 deck level of between 4.0m and 5.0m OD Malin (7.1mCD & 8.1mCD). The proposed Berth No.2 deck level shall match the existing Berth No.1 deck level at approximately 5.0m OD Malin (8.1mCD). This is greater than +3.97m OD Malin (7.07mCD). The risk of coastal flooding is therefore considered low.

3.6 Sources of Flooding Flood Risks

The following types of flooding are worth considering for the site:

Coastal flooding is flooding from the sea which is caused by higher than normal sea levels and/or high waves resulting in the sea overflowing onto the land. It is unlikely that coastal flooding is considered a risk to the proposed development, as described in Section 3.5.1.

Pluvial Flooding is usually associated with convective summer thunderstorms or high intensity rainfall cells within longer duration events, pluvial flooding is a result of rainfall-generated overland flows which arise before run-off enters any watercourse or sewer. The intensity of rainfall can be such that the run-off totally overwhelms surface water and underground

drainage systems. There is a surface water drainage network existing and proposed on the site. Pluvial Flooding is not considered a risk.

Fluvial Flooding is flooding from a river or another watercourse. This is not considered a risk to the development.

Groundwater Flooding is flooding caused by groundwater escaping from the ground when the water table rises to or above ground level. This is not considered a risk to the development.

4 Flood Risk Management

The Planning and Flood Risk Management Guidelines for Planning Authorities provides guidance for the key principles of a risk-based sequential approach to managing flood risk. The mechanism gives an order of precedence for local authorities to satisfied in relation to development from a flood risk point of view are:

1) **Avoid** development location in a high-risk flood area;
2) **Substitute** the type of development if located within a high-risk flood area;
3) **Justify** the development if substitution does not reduce the flood risk sufficiently;
4) **Mitigate**

4.1 Sequential Approach

The first stage in the sequential approach is to determine the Flood Zone. In this case, it has been determined to be Flood Zone C (low probability of flooding).

4.2 Vulnerability

The second stage is to determine the vulnerability of the development in accordance with Table 3.1 of the Guidelines. The vulnerability of the development can therefore be classed as **"Water-Compatible Development"**.

In accordance with Table 3.2 of the Guidelines, the development is therefore considered **"Appropriate"** and does not require a justification test.

4.3 Potential Impact of Development on Flooding Elsewhere

The proposed development will include the development of an additional 695m^2 of quay deck, on what would previously have been foreshore. Storm water generated on the deck will discharge to sea, immediately adjacent to the deck. Though there will be a small increase in the hardstanding area, there will not be additional runoff generated. It is therefore considered that the development will not have an impact on flooding elsewhere.

5 Impacts and Mitigation Measures

This section describes the potential impacts of the proposed development on the surrounding area, the risks associated with the impacts, and any mitigation measures proposed.

5.1 Hydrological Impacts

The development will not negatively impact upon flood levels, drains or surrounding land use.

5.2 Impact on Infrastructure

The development will not cause the flooding of adjacent infrastructure such as roadways, drainage, water supply etc.

The operator shall ensure that any chemicals, solvents, fuels and other material that can potentially harm the environment are appropriately bunded.

All silt traps and hydrocarbon interceptors shall be regularly maintained and cleaned.

6 Conclusion

A site-specific Flood Risk Assessment has been prepared in accordance with *The Planning System and Flood Risk Management Guideline for Planning Authorities,* (Office of Public Works, 2009) for the development of Berth No.2 at Greenore Port.

CFRAM and ICPSS Flood Risk Mapping information was used to determine the future extreme water levels and risk of flooding at the site.

A sequential approach was used to determine that the site has a low probability of flooding (Flood Zone C).

7 Recommendations

To mitigate against the risk of environmental contamination, all chemicals, solvents, and fuels shall be adequately bunded. All silt traps and hydrocarbon interceptors shall be regularly maintained and cleaned.

Appendix 2 – Sediment Analysis

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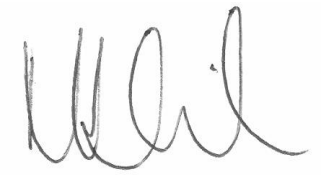
Certificate of Analysis

Report No.: 17-60545-1

Issue No.: **1**
Date of Issue **10/04/2017**

Customer Details:	Priority Geotechnical Ltd, Unit 12, Owenacurra Business Park, Midleton, Co Cork
Customer Contact:	Hugh Power
Customer Order No.:	PO 9460
Customer Reference:	Not Supplied
Quotation Reference:	170302/02
Description:	7 sediment samples
Date Received:	17/03/2017
Date Started:	20/03/2017
Date Completed:	
Test Methods:	Details available on request (refer to SOP code against relevant result/s)
Notes:	None



Approved By: **Matthew Hickson, Laboratory Manager**

UKAS TESTING
1663

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Results Summary

Report No.: 17-60545-1

Customer Reference: Not Supplied

Customer Order No: PO 9460

					Customer Sample No	**1**	**2**	**3**	**4**
					RPS Sample No	324825	324826	324827	324828
					Sample Type	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**				
dry solids (at 105øC)		N	208	%	0	67.8	68.3	73.7	57.2
dry solids (assisted air-drying at <30øC)		N	208		0	Completed	Completed	Completed	Completed
visual inspection		N	in house		0	S/C	S/C	S/C	S/C
aluminium	7429-90-5	UI	in house	mg/kg	12	32500	30200	37600	36800
arsenic	7440-38-2	UI	in house	mg/kg	0.5	5.27	5.64	7.67	9.01
cadmium	7440-43-9	UI	in house	mg/kg	0.1	0.12	0.35	0.23	0.30
chromium	7440-47-3	UI	in house	mg/kg	0.5	43.3	60.3	63.2	71.3
copper	7440-50-8	UI	in house	mg/kg	0.5	26.2	23.3	20.9	35.0
mercury	7439-97-6	UI	in house	mg/kg	0.01	0.01	0.02	0.04	0.07
lithium	7439-93-2	UI	in house	mg/kg	6	21.5	23.1	33.8	30.7
nickel	7440-02-0	UI	in house	mg/kg	0.5	22.0	27.8	29.8	34.0
lead	7439-92-1	UI	in house	mg/kg	0.5	55.7	17.9	27.4	33.8
total organic carbon		US	in house	%	0.03	0.94	0.35	0.94	1.55
zinc	7440-66-6	UI	in house	mg/kg	2	74.9	58.5	84.8	136
acenaphthene	83-32-9	N	in house	ug/kg DW	0.1	9.79	15.7	33.4	15.3
acenaphthylene	208-96-8	N	in house	ug/kg DW	0.1	12.2	9.83	7.73	16.8
aldrin	309-00-2	N	in house	ug/kg DW	1	< 1.00	< 1.00	< 1.00	< 1.00
anthracene	120-12-7	N	in house	ug/kg DW	0.1	11.9	15.3	27.5	24.0
benzo(a)anthracene	56-55-3	N	in house	ug/kg DW	0.1	16.4	16.1	16.7	39.3
benzo(a)pyrene	50-32-8	N	in house	ug/kg DW	0.1	16.7	11.4	15.5	40.2
benzo(b)fluoranthene	205-99-2	N	in house	ug/kg DW	0.1	20.9	15.9	21.2	47.6
benzo(g,h,i)perylene	191-24-2	N	in house	ug/kg DW	0.1	20.8	14.2	16.4	48.8
benzo(k)fluoranthene	207-08-9	N	in house	ug/kg DW	0.1	13.2	11.0	12.1	25.4
carbonate % dry matter		N	in house	%	0.1	19.4	34.7	17.9	26.3
chrysene	218-01-9	N	in house	ug/kg DW	0.1	13.9	13.6	19.0	40.7
dibutyltin (DBT)	1002-53-5	U	395	ug/kg as cation DW	5	< 5.00	< 5.00	< 5.00	< 5.00
dibenzo(a,h)anthracene	53-70-3	N	in house	ug/kg DW	0.01	< 0.100	< 0.100	< 0.100	< 0.100
density (on dry solid)		N	in house	g/cm3 DW	0	1.3	1.3	1.1	1.4
dieldrin	60-57-1	N	in house	ug/kg DW	1	< 1.00	< 1.00	< 1.00	< 1.00
endrin	72-20-8	N	in house	ug/kg DW	1	< 1.00	< 1.00	< 1.00	< 1.00

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Results Summary

Report No.: 17-60545-1

Customer Reference: Not Supplied

Customer Order No: PO 9460

					Customer Sample No	**1**	**2**	**3**	**4**
					RPS Sample No	324825	324826	324827	324828
					Sample Type	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**				
fluoranthene	206-44-0	N	in house	ug/kg DW	0.1	35.7	34.4	46.3	82.0
fluorene	86-73-7	N	in house	ug/kg DW	0.1	11.6	21.4	28.4	21.7
hexachlorobenzene (HCB)	118-74-1	N	in house	ug/kg DW	1	< 1.00	< 1.00	< 1.00	< 1.00
indeno(1,2,3-c,d)pyrene	193-39-5	N	in house	ug/kg DW	0.1	20.4	17.0	18.0	51.4
naphthalene	91-20-3	N	in house	ug/kg DW	0.1	71.5	139	107	75.4
2,2',4,5,5'-pentachlorobiphenyl (PCB congener 101)	37680-73-2	N	in house	ug/kg DW	0.1	< 0.10	< 0.10	< 0.10	< 0.10
2,3',4,4',5-pentachlorobiphenyl (PCB congener 118)	31508-00-6	N	in house	ug/kg DW	0.1	< 0.10	< 0.10	< 0.10	< 0.10
2,2',3,4,4',5-hexachlorobiphenyl (PCB 138)	35065-28-2	N	in house	ug/kg DW	0.1	< 0.10	< 0.10	< 0.10	< 0.10
2,2',4,4',5,5'-hexachlorobiphenyl (PCB 153)	35065-27-1	N	in house	ug/kg DW	0.1	< 0.10	< 0.10	< 0.10	< 0.10
2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180)	35065-29-3	N	in house	ug/kg DW	0.1	< 0.10	< 0.10	< 0.10	< 0.10
2,4,4'-trichlorobiphenyl (PCB congener 28)	7012-37-5	N	in house	ug/kg DW	0.1	< 0.10	< 0.10	< 0.10	< 0.10
2,2',5,5'-tetrachlorobiphenyl (PCB congener 52)	35693-99-3	N	in house	ug/kg DW	0.1	< 0.10	< 0.10	< 0.10	< 0.10
phenanthrene	85-01-8	N	in house	ug/kg DW	0.1	35.3	50.9	57.1	83.4
pyrene	129-00-0	N	in house	ug/kg DW	0.1	36.1	33.4	44.2	84.5
tributyltin (TBT)	56573-85-4	U	395	ug/kg as cation DW	2	< 2.00	20.3	< 2.00	4.02
total hydrocarbon content by GC-FID		N	in house	ug/kg	0.1	4780	6830	3490	3770
alpha-hexachlorocyclohexane (alpha-HCH)	319-84-6	N	in house	ug/kg DW	1	< 1.00	< 1.00	< 1.00	< 1.00
beta-hexachlorocyclohexane (beta-HCH, beta-BHC)	319-85-7	N	in house	ug/kg DW	1	< 1.00	< 1.00	< 1.00	< 1.00
delta-hexachlorocyclohexane (delta-HCH)	319-86-8	N	in house	ug/kg DW	1	< 1.00	< 1.00	< 1.00	< 1.00
gamma-hexachlorocyclohexane (lindane)	58-89-9	N	in house	ug/kg DW	1	< 1.00	< 1.00	< 1.00	< 1.00
p,p'-DDD (p,p'-TDE)	72-54-8	N	in house	ug/kg DW	1	< 1.00	< 1.00	< 1.00	< 1.00
p,p'-DDE	72-55-9	N	in house	ug/kg DW	1	< 1.00	< 1.00	< 1.00	< 1.00
p,p'-DDT	50-29-3	N	in house	ug/kg DW	1	< 1.00	< 1.00	< 1.00	< 1.00
particle size analysis NMBAQC		NS	in house		0	Completed	Completed	Completed	Completed
sample type		NS	in house						
textural group (GRADISTAT)		NS	in house					Muddy Gravel	Muddy Gravel
sediment name		NS	in house						
arithmetic mean (method of moments)		NS	in house	um		9680	2690	5500	2130
arithmetic sorting (method of moments)		NS	in house	um		14500	4600	5730	2900
arithmetic skewness (method of moments)		NS	in house	um		1.21	2.56	0.487	1.22

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Results Summary

Report No.: 17-60545-1

Customer Reference: Not Supplied

Customer Order No: PO 9460

					Customer Sample No	**1**	**2**	**3**	**4**
					RPS Sample No	324825	324826	324827	324828
					Sample Type	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**				
arithmetic kurtosis (method of moments)		NS	in house	um		2.72	9.02	1.52	3.29
geometic mean (method of moments)		NS	in house	um		1190	660	689	172
geometic sorting (method of moments)		NS	in house	um		12.7	7.09	24.7	20.8
geometic skewness (method of moments)		NS	in house	um		-0.227	-0.600	-0.766	-0.103
geometic kurtosis (method of moments)		NS	in house	um		2.41	3.76	2.19	1.53
logarithmic mean (method of moments)		NS	in house	phi		-0.250	0.600	0.538	2.54
logarithmic sorting (method of moments)		NS	in house	phi		3.67	2.83	4.63	4.38
logarithmic skewness (method of moments)		NS	in house	phi		0.227	0.600	0.766	0.103
logarithmic kurtosis (method of moments)		NS	in house	phi		2.41	3.76	2.19	1.53
mean (Folk and Ward method - um)		NS	in house	um		1630	709	755	151
sorting (Folk and Ward method - um)		NS	in house	um		13.0	6.79	22.6	18.6
skewness (Folk and Ward method - um)		NS	in house	um		0.087	0.159	-0.631	0.140
kurtosis (Folk and Ward method - um)		NS	in house	um		0.725	1.10	0.620	0.574
mean (Folk and Ward method - phi)		NS	in house	phi		-0.705	0.497	0.405	2.73
sorting (Folk and Ward method - phi)		NS	in house	phi		3.70	2.76	4.50	4.22
skewness (Folk and Ward method - phi)		NS	in house	phi		-0.087	-0.159	0.631	-0.140
kurtosis (Folk and Ward method - phi)		NS	in house	phi		0.725	1.10	0.620	0.574
mean description (Folk and Ward method)		NS	in house				Coarse Sand	Coarse Sand	Fine Sand
sorting description (Folk and Ward method)		NS	in house						
skewness description (Folk and Ward method)		NS	in house			Symmetrical	Coarse Skewed		Coarse Skewed
kurtosis description (Folk and Ward method)		NS	in house			Platykurtic	Mesokurtic		
MODE 1 - um		NS	in house	um		38300	302	13600	6800
MODE 2 - um		NS	in house	um		214	1700	6800	9.41
MODE 3 - um		NS	in house	um		1700	19200		
MODE 1 - phi		NS	in house	phi		-5.24	1.75	-3.74	-2.74
MODE 2 - phi		NS	in house	phi		2.25	-0.743	-2.74	6.75
MODE 3 - phi		NS	in house	phi		-0.743	-4.24		
D10 - um		NS	in house	um		71.4	96.2	5.2	4.1
D50 - um		NS	in house	um		1040	492	3280	97.9
D90 - um		NS	in house	um		36100	7340	14200	6830

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Results Summary

Report No.: 17-60545-1

Customer Reference: Not Supplied

Customer Order No: PO 9460

					Customer Sample No	**1**	**2**	**3**	**4**
					RPS Sample No	324825	324826	324827	324828
					Sample Type	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**				
(D90/D10) - um		NS	in house	um		506	76.3	2750	1650
(D90 - D10) - um		NS	in house	um		36100	7240	14200	6820
(D75/D25) - um		NS	in house	um		86.4	13.4	316	333
(D75 - D25) - um		NS	in house	um		17200	2650	11800	3720
D10 - phi		NS	in house	phi		-5.18	-2.88	-3.83	-2.77
D50 - phi		NS	in house	phi		-0.056	1.03	-1.72	3.35
D90 - phi		NS	in house	phi		3.81	3.38	7.60	7.92
(D90/D10) - phi		NS	in house	phi		-0.736	-1.18	-1.99	-2.86
(D90 - D10) - phi		NS	in house	phi		8.98	6.25	11.4	10.7
(D75/D25) - phi		NS	in house	phi		-0.562	-1.47	-1.33	-3.41
(D75 - D25) - phi		NS	in house	phi		6.43	3.75	8.30	8.38
% gravel		NS	in house	%		41.4	31.9	56.1	36.5
% sand		NS	in house	%		49.4	59.8	16.6	16.5
% mud		NS	in house	%		9.24	8.35	27.4	47.0
% very coarse gravel (>32<64mm or <-5>-6phi)		NS	in house	%		15.5	0.00	0.00	0.00
% coarse gravel (>16<32mm or <-4>-5phi)		NS	in house	%		10.2	5.00	0.00	0.00
% medium gravel (>8<16mm or <-3>-4phi)		NS	in house	%		3.55	3.91	31.2	5.46
% fine gravel (>4<8mm or <-2>-3phi)		NS	in house	%		5.36	9.70	16.0	18.0
% very fine gravel (>2<4mm or <-1>-2phi)		NS	in house	%		6.73	13.3	8.82	13.1
% very coarse sand (>1<2mm or <0>-1phi)		NS	in house	%		9.08	14.6	4.85	7.84
% coarse sand (>0.5<1mm or <1>0phi)		NS	in house	%		3.59	3.07	0.22	0.38
% medium sand (>0.25<0.5mm or <2>1phi)		NS	in house	%		15.3	20.2	3.59	1.61
% fine sand (>0.125<0.25mm or <3>2phi)		NS	in house	%		15.6	18.2	4.69	2.35
% very fine sand (>0.0625<0.125mm or <4>3phi)		NS	in house	%		5.79	3.66	3.20	4.31
% very coarse silt (>0.03125<0.0625mm or <5>4phi		NS	in house	%		2.42	1.78	3.29	7.02
% coarse silt (>0.015625<0.03125mm or <6>5phi)		NS	in house	%		1.74	1.47	4.32	9.77
% medium silt (>0.007813<0.015625mm or <7>6phi)		NS	in house	%		1.74	1.67	5.99	11.0
% fine silt (>0.003906<0.007813mm or <8>7phi)		NS	in house	%		1.71	1.74	6.13	9.90
% very fine silt (>0.001953<0.003906mm or <9>8phi		NS	in house	%		0.96	0.96	3.63	5.50
% clay (<0.001953mm or >9phi)		NS	in house	%		0.66	0.74	4.02	3.78

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Results Summary

Report No.: 17-60545-1

Customer Reference: Not Supplied

Customer Order No: PO 9460

					Customer Sample No	**5**	**6**	**7**
					RPS Sample No	324829	324830	324831
					Sample Type	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**			
dry solids (at 105øC)		N	208	%	0	75.9	39.6	42.9
dry solids (assisted air-drying at <30øC)		N	208		0	Completed	Completed	Completed
visual inspection		N	in house		0	S/C	S/C	S/C
aluminium	7429-90-5	UI	in house	mg/kg	12	24300	40800	41000
arsenic	7440-38-2	UI	in house	mg/kg	0.5	5.12	10.4	10.6
cadmium	7440-43-9	UI	in house	mg/kg	0.1	< 0.10	0.24	0.37
chromium	7440-47-3	UI	in house	mg/kg	0.5	38.1	84.2	93.5
copper	7440-50-8	UI	in house	mg/kg	0.5	6.12	23.5	108
mercury	7439-97-6	UI	in house	mg/kg	0.01	0.02	0.06	0.07
lithium	7439-93-2	UI	in house	mg/kg	6	16.5	45.5	42.1
nickel	7440-02-0	UI	in house	mg/kg	0.5	20.3	35.5	39.0
lead	7439-92-1	UI	in house	mg/kg	0.5	12.2	40.0	47.3
total organic carbon		US	in house	%	0.03	0.40	2.45	2.47
zinc	7440-66-6	UI	in house	mg/kg	2	39.5	135	199
acenaphthene	83-32-9	N	in house	ug/kg DW	0.1	8.69	27.5	60.6
acenaphthylene	208-96-8	N	in house	ug/kg DW	0.1	19.1	25.1	23.6
aldrin	309-00-2	N	in house	ug/kg DW	1	< 1.00	< 2.52	< 2.33
anthracene	120-12-7	N	in house	ug/kg DW	0.1	8.30	28.2	64.6
benzo(a)anthracene	56-55-3	N	in house	ug/kg DW	0.1	6.76	58.5	77.0
benzo(a)pyrene	50-32-8	N	in house	ug/kg DW	0.1	7.55	73.6	70.7
benzo(b)fluoranthene	205-99-2	N	in house	ug/kg DW	0.1	8.65	103	95.4
benzo(g,h,i)perylene	191-24-2	N	in house	ug/kg DW	0.1	9.23	72.9	75.6
benzo(k)fluoranthene	207-08-9	N	in house	ug/kg DW	0.1	7.20	49.9	45.7
carbonate % dry matter		N	in house	%	0.1	55.4	14.2	13.2
chrysene	218-01-9	N	in house	ug/kg DW	0.1	4.63	74.2	71.1
dibutyltin (DBT)	1002-53-5	U	395	ug/kg as cation DW	5	< 5.00	< 5.04	< 5.00
dibenzo(a,h)anthracene	53-70-3	N	in house	ug/kg DW	0.01	< 0.100	< 0.252	< 0.233
density (on dry solid)		N	in house	g/cm3 DW	0	1.4	2.0	1.9
dieldrin	60-57-1	N	in house	ug/kg DW	1	< 1.00	< 2.52	< 2.33
endrin	72-20-8	N	in house	ug/kg DW	1	< 1.00	< 2.52	< 2.33

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Results Summary

Report No.: 17-60545-1

Customer Reference: Not Supplied

Customer Order No: PO 9460

Determinand	CAS No	Codes	SOP	Units	RL	Customer Sample No: 5	6	7
						RPS Sample No: 324829	324830	324831
						Sample Type: SEDIMENT	SEDIMENT	SEDIMENT
fluoranthene	206-44-0	N	in house	ug/kg DW	0.1	21.0	135	228
fluorene	86-73-7	N	in house	ug/kg DW	0.1	9.35	32.0	76.7
hexachlorobenzene (HCB)	118-74-1	N	in house	ug/kg DW	1	< 1.00	< 2.52	< 2.33
indeno(1,2,3-c,d)pyrene	193-39-5	N	in house	ug/kg DW	0.1	9.53	83.7	83.9
naphthalene	91-20-3	N	in house	ug/kg DW	0.1	51.4	139	180
2,2',4,5,5'-pentachlorobiphenyl (PCB congener 101)	37680-73-2	N	in house	ug/kg DW	0.1	< 0.10	< 0.25	< 0.23
2,3',4,4',5-pentachlorobiphenyl (PCB congener 118)	31508-00-6	N	in house	ug/kg DW	0.1	< 0.10	< 0.25	< 0.23
2,2',3,4,4',5-hexachlorobiphenyl (PCB 138)	35065-28-2	N	in house	ug/kg DW	0.1	< 0.10	< 0.25	< 0.23
2,2',4,4',5,5'-hexachlorobiphenyl (PCB 153)	35065-27-1	N	in house	ug/kg DW	0.1	< 0.10	< 0.25	< 0.23
2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180)	35065-29-3	N	in house	ug/kg DW	0.1	< 0.10	< 0.25	< 0.23
2,4,4'-trichlorobiphenyl (PCB congener 28)	7012-37-5	N	in house	ug/kg DW	0.1	< 0.10	< 0.25	< 0.23
2,2',5,5'-tetrachlorobiphenyl (PCB congener 52)	35693-99-3	N	in house	ug/kg DW	0.1	< 0.10	< 0.25	< 0.23
phenanthrene	85-01-8	N	in house	ug/kg DW	0.1	29.9	120	300
pyrene	129-00-0	N	in house	ug/kg DW	0.1	30.8	120	181
tributyltin (TBT)	56573-85-4	U	395	ug/kg as cation DW	2	< 2.00	< 5.04	132
total hydrocarbon content by GC-FID		N	in house	ug/kg	0.1	1990	2650	2600
alpha-hexachlorocyclohexane (alpha-HCH)	319-84-6	N	in house	ug/kg DW	1	< 1.00	< 2.52	< 2.33
beta-hexachlorocyclohexane (beta-HCH, beta-BHC)	319-85-7	N	in house	ug/kg DW	1	< 1.00	< 2.52	< 2.33
delta-hexachlorocyclohexane (delta-HCH)	319-86-8	N	in house	ug/kg DW	1	< 1.00	< 2.52	< 2.33
gamma-hexachlorocyclohexane (lindane)	58-89-9	N	in house	ug/kg DW	1	< 1.00	< 2.52	< 2.33
p,p'-DDD (p,p'-TDE)	72-54-8	N	in house	ug/kg DW	1	< 1.00	< 2.52	< 2.33
p,p'-DDE	72-55-9	N	in house	ug/kg DW	1	< 1.00	< 2.52	< 2.33
p,p'-DDT	50-29-3	N	in house	ug/kg DW	1	< 1.00	< 2.52	< 2.33
particle size analysis NMBAQC		NS	in house		0	Completed	Completed	Completed
sample type		NS	in house					
textural group (GRADISTAT)		NS	in house					
sediment name		NS	in house					
arithmetic mean (method of moments)		NS	in house	um		7970	89.1	235
arithmetic sorting (method of moments)		NS	in house	um		12100	374	911
arithmetic skewness (method of moments)		NS	in house	um		1.88	9.25	5.74

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Results Summary

Report No.: 17-60545-1

Customer Reference: Not Supplied

Customer Order No: PO 9460

					Customer Sample No	**5**	**6**	**7**
					RPS Sample No	324829	324830	324831
					Sample Type	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**			
arithmetic kurtosis (method of moments)		NS	in house	um		5.02	102	37.9
geometic mean (method of moments)		NS	in house	um		1990	5.7	8.9
geometic sorting (method of moments)		NS	in house	um		8.26	18.6	20.6
geometic skewness (method of moments)		NS	in house	um		-0.950	-0.495	-0.377
geometic kurtosis (method of moments)		NS	in house	um		4.24	2.43	2.74
logarithmic mean (method of moments)		NS	in house	phi		-0.993	7.45	6.82
logarithmic sorting (method of moments)		NS	in house	phi		3.05	4.22	4.37
logarithmic skewness (method of moments)		NS	in house	phi		0.950	0.495	0.377
logarithmic kurtosis (method of moments)		NS	in house	phi		4.24	2.43	2.74
mean (Folk and Ward method - um)		NS	in house	um		2050	4.7	7.4
sorting (Folk and Ward method - um)		NS	in house	um		7.69	23.4	26.8
skewness (Folk and Ward method - um)		NS	in house	um		-0.216	-0.292	-0.171
kurtosis (Folk and Ward method - um)		NS	in house	um		1.00	1.15	1.42
mean (Folk and Ward method - phi)		NS	in house	phi		-1.04	7.75	7.08
sorting (Folk and Ward method - phi)		NS	in house	phi		2.94	4.55	4.75
skewness (Folk and Ward method - phi)		NS	in house	phi		0.216	0.292	0.171
kurtosis (Folk and Ward method - phi)		NS	in house	phi		1.00	1.15	1.42
mean description (Folk and Ward method)		NS	in house				Fine Silt	Fine Silt
sorting description (Folk and Ward method)		NS	in house					
skewness description (Folk and Ward method)		NS	in house			Fine Skewed	Fine Skewed	Fine Skewed
kurtosis description (Folk and Ward method)		NS	in house			Mesokurtic	Leptokurtic	Leptokurtic
MODE 1 - um		NS	in house	um		38300	9.4	9.4
MODE 2 - um		NS	in house	um		2400	151	214
MODE 3 - um		NS	in house	um		302	0.048	0.048
MODE 1 - phi		NS	in house	phi		-5.24	6.75	6.75
MODE 2 - phi		NS	in house	phi		-1.24	2.75	2.25
MODE 3 - phi		NS	in house	phi		1.75	15.1	15.1
D10 - um		NS	in house	um		153	0.0	0.1
D50 - um		NS	in house	um		2710	9.2	11.6
D90 - um		NS	in house	um		34100	174	255

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Results Summary

Report No.: 17-60545-1

Customer Reference: Not Supplied

Customer Order No: PO 9460

					Customer Sample No	**5**	**6**	**7**
					RPS Sample No	324829	324830	324831
					Sample Type	**SEDIMENT**	**SEDIMENT**	**SEDIMENT**
Determinand	**CAS No**	**Codes**	**SOP**	**Units**	**RL**			
(D90/D10) - um		NS	in house	um		223	4030	4490
(D90 - D10) - um		NS	in house	um		33900	174	255
(D75/D25) - um		NS	in house	um		16.8	30.0	23.1
(D75 - D25) - um		NS	in house	um		7400	43.4	62.4
D10 - phi		NS	in house	phi		-5.09	2.52	1.97
D50 - phi		NS	in house	phi		-1.44	6.76	6.43
D90 - phi		NS	in house	phi		2.71	14.5	14.1
(D90/D10) - phi		NS	in house	phi		-0.533	5.75	7.15
(D90 - D10) - phi		NS	in house	phi		7.80	12.0	12.1
(D75/D25) - phi		NS	in house	phi		-0.367	2.10	2.15
(D75 - D25) - phi		NS	in house	phi		4.07	4.91	4.53
% gravel		NS	in house	%		58.1	0.89	3.45
% sand		NS	in house	%		36.0	20.3	22.0
% mud		NS	in house	%		5.87	78.8	74.6
% very coarse gravel (>32<64mm or <-5>-6phi)		NS	in house	%		12.2	0.00	0.00
% coarse gravel (>16<32mm or <-4>-5phi)		NS	in house	%		0.57	0.00	0.00
% medium gravel (>8<16mm or <-3>-4phi)		NS	in house	%		11.8	0.00	0.00
% fine gravel (>4<8mm or <-2>-3phi)		NS	in house	%		15.7	0.33	1.83
% very fine gravel (>2<4mm or <-1>-2phi)		NS	in house	%		17.8	0.56	1.62
% very coarse sand (>1<2mm or <0>-1phi)		NS	in house	%		14.9	1.14	2.26
% coarse sand (>0.5<1mm or <1>0phi)		NS	in house	%		1.29	0.04	0.05
% medium sand (>0.25<0.5mm or <2>1phi)		NS	in house	%		9.28	3.83	4.41
% fine sand (>0.125<0.25mm or <3>2phi)		NS	in house	%		8.26	7.89	8.43
% very fine sand (>0.0625<0.125mm or <4>3phi)		NS	in house	%		2.28	7.37	6.81
% very coarse silt (>0.03125<0.0625mm or <5>4phi		NS	in house	%		1.33	8.40	8.58
% coarse silt (>0.015625<0.03125mm or <6>5phi)		NS	in house	%		1.00	10.6	10.8
% medium silt (>0.007813<0.015625mm or <7>6phi)		NS	in house	%		1.09	13.2	13.0
% fine silt (>0.003906<0.007813mm or <8>7phi)		NS	in house	%		1.12	13.0	12.9
% very fine silt (>0.001953<0.003906mm or <9>8phi		NS	in house	%		0.66	7.61	7.46
% clay (<0.001953mm or >9phi)		NS	in house	%		0.67	26.0	21.9

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Report No.: 17-60545-1
Customer Reference: Not Supplied
Customer Order No: PO 9460

Comments

Job	Description	Job Comments
17-60545	7 sediment samples	Because of the broad classification of the term 'oil', and consequently the wide range of properties of its component hydrocarbons, no single method can strictly determine total petroleum hydrocarbon (TPH) content of a sample. The TPH by GCMS method used to analyse these samples will determine TPH as alkanes and branched alkane fractions, both of which can be extracted into pentane. However, the method can be extended on request to include other hydrocarbons, such as polycyclic aromatic hydrocarbons (PAHs), by incorporating additional extractions using different solvents.

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Deviating Samples

Report No.: 17-60545-1

Customer Reference: Not Supplied

Customer Order No: PO 9460

Our policy on Deviating Samples and reference list of Holding Times applied can be supplied on request. These have been implemented in accordance with UKAS Policy on Deviating Samples (TPS63).
RPS is not responsible for the integrity of samples as received, unless RPS personnel performed the sampling, and it is possible that samples submitted may be declared to be deviating.
Where applicable the analysis method remains UKAS accredited, however results reported for a deviating sample may be invalid. The reason for a sample being declared to be deviating is indicated below.
Where no sampling date was supplied, samples have been declared to be deviating. However, if a date of sampling can be supplied, the results may be reissued with the deviating sample status removed.
Where the sample container used was unsuitable, the appropriate Holding Time was exceeded, or the sample is flagged as deviating for some other reason, re-sampling/re-submisson may be required.

RPS No.	Customer No.	Customer ID	Date Sampled	Containers Received	Deviating Sample	Reason for Sample Deviation
324825	1		Not Provided	plastic container	**Yes**	No sampling date provided
324826	2		Not Provided	plastic container	**Yes**	No sampling date provided
324827	3		Not Provided	plastic container	**Yes**	No sampling date provided
324828	4		Not Provided	plastic container	**Yes**	No sampling date provided
324829	5		Not Provided	plastic container	**Yes**	No sampling date provided
324830	6		Not Provided	plastic container	**Yes**	No sampling date provided
324831	7		Not Provided	plastic container	**Yes**	No sampling date provided

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Report Information

Key to Report Codes

U	UKAS Accredited
M	MCERTS Accredited
N	Not accredited
S	Subcontracted to approved laboratory
US	Subcontracted to approved laboratory UKAS Accredited for the test
MS	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
SI	Subcontracted to internal RPS Group laboratory
USI	Subcontracted to internal RPS Group laboratory UKAS Accredited for the test
MSI	Subcontracted to internal RPS Group laboratory MCERTS/UKAS Accredited for the test
I/S (in results)	Insufficient Sample
U/S (in results)	Unsuitable Sample
S/C (in results)	See Comments
ND (in results)	Not Detected
DW (in units)	Results are expressed on a dry weight basis

Where the dry solids value of a sample is low (<50%), reporting limits are automatically raised for all determinants analysed on an as-received basis.

Soil Typing

Type 1	Clay - Brown
Type 2	Clay - Grey/Black
Type 3	Sand
Type 4	Top Soil (Standard)
Type 5	Top Soil (High Peat)
Type 6	Made Ground (>50% Clay)
Type 7	Made Ground (>50% Sand)
Type 8	Made Ground (>50% Top Soil)
Type X	Other

Sample Retention and Disposal

Samples will generally* be retained for the following times prior to disposal:

Perishables, e.g. foodstuffs	1 month (if frozen) from the issue date of this report
Waters	2 weeks from the issue date of this report
Other Liquids	1 month from the issue date of this report
Solids (including Soils)	1 month from the issue date of this report

*Sample retention may be subject to agreement with the customer for particular projects

Rinville
Oranmore
Co Galway
Tel: 091 387200

Mr Shane McCarthy
Cronin Millar Consultants
3 Westbourne Place
Cobh
Co. Cork

23 February 2017

Re: Sampling and Analysis Plan – Greenore Port No.2 Berth development

Shane,

A revised sampling and analysis plan is detailed below to cover dredging at the Greenore Port. This plan is designed to cover the dumping at sea of 17000 m3 of dredged material.

Your selected analysing laboratory must be able to meet the quality requirements for this project. Given historic contamination at this port, this is of particular importance for the analysis of PCBs in the sediment. You should give your contractor a copy of this plan. You will need to draw their attention especially to Section 3 and Section 4 to confirm that they are capable of meeting the quality assurance standards required as poor quality assurance may hamper the assessment of the material, possibly resulting in repeat sampling and reanalyses.

If you need clarification on anything, please don't hesitate to contact me.

Best regards,

MCronin

_____

Margot Cronin
Marine Environment Chemist

1.0 Sample location and analyses required:

The following surface samples, as listed in Table 1 below) should be taken[1]. Sample locations are shown on the chart in Figure 1 at the end of this document.

Table 1. Locations and details of proposed samples

Sample No.	Depth (m)	Longitude (° W) *	Latitude (° N) *	Parameters for analysis
1	0m	-6.1346	54.0339	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g
2	0m	-6.1347	54.0336	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g
3	0m	-6.1349	54.0335	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g
4	0m	-6.1351	54.0334	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g
5	1m	-6.1355	54.0337	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g
6	1m	-6.1356	54.0334	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g
7	1m	-6.1354	54.0333	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g

* Positions given in decimal degrees, WGS84S

2.0 Parameter Code:

1. Visual inspection, to include colour, texture, odour, presence of animals etc
2. Water content, density (taking into account sample collection and handling)
3. Granulometry including % gravel (> 2mm fraction), % sand (< 2mm fraction) and % mud (< 63μm fraction).
4. The following determinants in the sand-mud (< 2mm) fraction * :
   a) total organic carbon
   b) carbonate
   c) mercury, arsenic, cadmium, copper, lead, zinc, chromium, nickel, lithium, aluminium.
   d) organochlorines HCH and γ-HCH (Lindane), and PCBs (to be reported as the 7 individual CB congeners: 28, 52, 101, 118, 138, 153, 180).
   e) total extractable hydrocarbons.
   f) tributyltin (TBT) and dibutyltin (DBT)
   g) Polycyclic aromatic hydrocarbons (PAH) - Acenaphthene, Acenaphthylene, Anthracene, Benzo (a) anthracene, Benzo (a) pyrene, Benzo (b) fluoranthene, Benzo (ghi) perylene,

[1] Further sampling and analysis, at depth if necessary, may be required in the event that problem areas of heavy contamination are identified as a result of the initial testing.

Benzo (k) fluoranthene, Chrysene, Dibenz (a,h) anthracene, Flourene, Fluoranthene, Indeno 1,2,3 – cd pyrene, Naphthalene, Phenanthrene, Pyrene.

h) Toxicity tests (Microtox or whole sediment bioassay) using appropriate representative aquatic species. (This requirement will depend on the results of the chemical analyses.)

**where the gravel fraction (> 2mm) constitutes a significant part of the total sediment, this should be taken into account in the calculation of the concentrations.*

3.0 Important notes:

3.1 Details of the methodologies used must be furnished with the results. This should include sampling, sub sampling and analytical methods used for each determinant

3.2 Appropriate marine CRM are to be analysed during each batch of analyses and the results to be reported along with sample results.

3.3 The required detection limits for the various determinants are given in Table 2. below.

Table 2. Maximum limits of detection required

Contaminant	Concentration	Units (dry wt)
Mercury	0.05	mg kg^{-1}
Arsenic	1.0	mg kg^{-1}
Cadmium	0.1	mg kg^{-1}
Copper	5.0	mg kg^{-1}
Lead	5.0	mg kg^{-1}
Zinc	10	mg kg^{-1}
Chromium	5.0	mg kg^{-1}
Nickel	15	mg kg^{-1}
Total extractable hydrocarbons	10.0	mg kg^{-1}
TBT and DBT (not organotin)	0.01	mg kg^{-1}
PCB – individual congener	0.1	µg kg^{-1}
OCP – individual compound	1.0	µg kg^{-1}
PAH – individual compound	20	µg kg^{-1}

4.0 Reporting requirements

Reports should include the following information

4.1 Date of sampling

4.2 Location of samples eg ING or lat/long.

4.3 Treatment of samples and indication of sub sampling, compositing etc.

4.4 Tabulated geophysical and chemical test results

4.5 Completed excel spreadsheet for results

4.6 Summary method details

4.7 Method performance specifications: Limit of detection, Precision, Bias

4.8 Clear expression of units and indication of wet weight or dry weight basis

4.9 Blanks & in-house references to be run with each sample batch, and reported with sample results.

4.10 Appropriate Certified Reference Materials (CRM) to be run with each sample batch, and reported in full with sample results.

4.11 If determinant is not detected, report less than values, and indicate LoD/ LoQ used. Other quality assurance information (e.g. accreditation status)

Figure 1: Sampling stations, Greenore Port.
(Positions given in Table 1.)

Appendix 3 – Waste Classification

Unit 15
Melbourne Business Park
Model Farm Road
Cork

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www.ocallaghanmoran.com

O'Callaghan Moran & Associates
ENVIRONMENTAL MANAGEMENT FOR BUSINESS

Ms Paula Galvin,
Senior Planning Consultant,
McCutcheon Halley,
Kreston House,
Arran Court,
Arran Quay,
Dublin 7.
D07 K271

13th April 2017.

Re: Waste Classification of Sediment Samples from Greenore Port No. 2 Berth

Dear Ms. Galvin,

McCutcheon Halley requested O'Callaghan Moran & Associates (OCM) to carry out a waste characterisation of samples of sediment that will be dredged from Greenore Port to determine if they are hazardous or non-hazardous.

The characterisation was based on the results of the analytical tests on seven (7 No) samples carried out by RPS. The results are contained in the RPS Report No. 17-60545-1, which is in Attachment 1. The samples were labelled 1, 2, 3,4,5,6 and 7.

Methodology

Waste Classification

Waste classification in the European Union (EU) is based on Commission Decision of 18 December 2014, amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European parliament and of the Council (2014/955/EEC) and Commission Regulation (EU) No 1357/2014 of 18 December 2014, replacing Annex III to Directive 2008/98/EC.

The classification of hazardous and non-hazardous waste is based on The Classification, Labelling and Packaging of Dangerous Substances and Mixtures Regulation (EC) No 1272/2008. The fifteen properties (HP 1 to HP 15) that render waste hazardous are laid down in Annex III of Directive 2008/98/EC, as amended by Regulation No 1357/2014.

The Environmental Protection Agency (EPA), which is the regulatory body with responsibility for hazardous waste, has issued overarching guidance on the List of Waste and Determining if Waste is Hazardous or Non-Hazardous.

Cont'd

The EPA accepts the use of UK Environment Agency (EA) Guidance on the Assessment and Classification of Waste (Technical Guidance WM 3), which provides more detail on the assessment of hazardous properties, and has specifically approved the Haz Waste Online Classification Engine, which is based on WM 3, to determine the appropriate List of Waste (LoW) Code, formerly known as the European Waste Catalogue (EWC) Code.

Waste Classification

The sample locations and numbers are shown on Figure 1 which is extracted from the Marine Institutes Sampling and Analysis Plan. The classification reports for each of the samples is in Attachment 2. All of the samples are classified as non-hazardous and the appropriate LoW Code is 17 05 06 (Dredging spoil other than those mentioned in 17 05 05).

Yours Sincerely,

Jim O' Callaghan

ATTACHMENT 2

Waste Classification Report

EPXB4-LJ4PT-VJE3P

Job name

17_099_09

Description/Comments

Project

Greenore Port

Site

Waste Stream Template

Example waste stream template for contaminated soils

Classified by

Name:
Ryan Povey
Date:
4/12/2017 10:55:47 AM UTC
Telephone:
+353 (0)21 4321521

Company:
OCallaghan Moran and Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

Report

Created by: Ryan Povey
Created date: 4/12/2017 10:55 UTC

Job summary

Classification of sample: 324825

Non Hazardous Waste
Classified as **17 05 06**
in the List of Waste

Sample details

Sample Name:
324825
Sample Depth:
m
Moisture content:
0%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 06 (Dredging spoil other than those mentioned in 17 05 05)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		5.27 mg/kg	1.32	6.958 mg/kg	0.000696 %		
2	cadmium { cadmium oxide }	048-002-00-0	231-152-8 [1] 215-146-2 [2]	7440-43-9 [1] 1306-19-0 [2]		0.12 mg/kg	1.14	0.137 mg/kg	0.000014 %		
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		43.3 mg/kg	1.46	63.285 mg/kg	0.00633 %		
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		26.2 mg/kg	1.13	29.498 mg/kg	0.00295 %		
5	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	55.7 mg/kg	1.56	86.882 mg/kg	0.00557 %		
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.01 mg/kg	1.35	0.014 mg/kg	0.000001353 %		
7	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		22 mg/kg	2.98	65.478 mg/kg	0.00655 %		
8	zinc { zinc chromate }	024-007-00-3				74.9 mg/kg	2.77	207.784 mg/kg	0.0208 %		
9	naphthalene	601-052-00-2	202-049-5	91-20-3		0.0715 mg/kg		0.072 mg/kg	0.00000715 %		
10	acenaphthylene		205-917-1	208-96-8		0.0122 mg/kg		0.012 mg/kg	0.00000122 %		
11	acenaphthene		201-469-6	83-32-9		0.00979 mg/kg		0.01 mg/kg	0.000000979 %		
12	fluorene		201-695-5	86-73-7		0.0116 mg/kg		0.012 mg/kg	0.00000116 %		
13	phenanthrene		201-581-5	85-01-8		0.0353 mg/kg		0.035 mg/kg	0.00000353 %		
14	anthracene		204-371-1	120-12-7		0.0119 mg/kg		0.012 mg/kg	0.00000119 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15	●	fluoranthene				0.0357	mg/kg		0.036	mg/kg	0.00000357 %		
			205-912-4	206-44-0									
16	●	pyrene				0.0361	mg/kg		0.036	mg/kg	0.00000361 %		
			204-927-3	129-00-0									
17		benzo[a]anthracene				0.0164	mg/kg		0.016	mg/kg	0.00000164 %		
		601-033-00-9	200-280-6	56-55-3									
18		chrysene				0.0139	mg/kg		0.014	mg/kg	0.00000139 %		
		601-048-00-0	205-923-4	218-01-9									
19		benzo[b]fluoranthene				0.0209	mg/kg		0.021	mg/kg	0.00000209 %		
		601-034-00-4	205-911-9	205-99-2									
20		benzo[k]fluoranthene				0.0132	mg/kg		0.013	mg/kg	0.00000132 %		
		601-036-00-5	205-916-6	207-08-9									
21		benzo[a]pyrene; benzo[def]chrysene				0.0167	mg/kg		0.017	mg/kg	0.00000167 %		
		601-032-00-3	200-028-5	50-32-8									
22	●	indeno[123-cd]pyrene				0.0204	mg/kg		0.02	mg/kg	0.00000204 %		
			205-893-2	193-39-5									
23		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
24	●	benzo[ghi]perylene				0.0208	mg/kg		0.021	mg/kg	0.00000208 %		
			205-883-8	191-24-2									
25		dieldrin (ISO)				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		602-049-00-9	200-484-5	60-57-1									
26		endrin (ISO); 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4:5,8-dimethanonaphthalene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		602-051-00-X	200-775-7	72-20-8									
27		hexachlorobenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		602-065-00-6	204-273-9	118-74-1									
28		aldrin (ISO)				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		602-048-00-3	206-215-8	309-00-2									
										Total:	0.0429 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: 324826

Non Hazardous Waste
Classified as **17 05 06**
in the List of Waste

Sample details

Sample Name:
324826
Sample Depth:
m
Moisture content:
0%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 06 (Dredging spoil other than those mentioned in 17 05 05)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		5.64 mg/kg	1.32	7.447 mg/kg	0.000745 %		
2	cadmium { cadmium oxide }	048-002-00-0	231-152-8 [1] 215-146-2 [2]	7440-43-9 [1] 1306-19-0 [2]		0.35 mg/kg	1.14	0.4 mg/kg	0.00004 %		
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		60.3 mg/kg	1.46	88.132 mg/kg	0.00881 %		
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		23.3 mg/kg	1.13	26.233 mg/kg	0.00262 %		
5	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	17.9 mg/kg	1.56	27.921 mg/kg	0.00179 %		
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.02 mg/kg	1.35	0.027 mg/kg	0.000002707 %		
7	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		27.8 mg/kg	2.98	82.74 mg/kg	0.00827 %		
8	zinc { zinc chromate }	024-007-00-3				58.5 mg/kg	2.77	162.288 mg/kg	0.0162 %		
9	naphthalene	601-052-00-2	202-049-5	91-20-3		0.139 mg/kg		0.139 mg/kg	0.000014 %		
10	acenaphthylene		205-917-1	208-96-8		0.00983 mg/kg		0.01 mg/kg	0.000000983 %		
11	acenaphthene		201-469-6	83-32-9		0.0157 mg/kg		0.016 mg/kg	0.00000157 %		
12	fluorene		201-695-5	86-73-7		0.0214 mg/kg		0.021 mg/kg	0.00000214 %		
13	phenanthrene		201-581-5	85-01-8		0.0509 mg/kg		0.051 mg/kg	0.00000509 %		
14	anthracene		204-371-1	120-12-7		0.0153 mg/kg		0.015 mg/kg	0.00000153 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15	●	fluoranthene				0.0344	mg/kg		0.034	mg/kg	0.00000344 %		
			205-912-4	206-44-0									
16	●	pyrene				0.0334	mg/kg		0.033	mg/kg	0.00000334 %		
			204-927-3	129-00-0									
17		benzo[a]anthracene				0.0161	mg/kg		0.016	mg/kg	0.00000161 %		
		601-033-00-9	200-280-6	56-55-3									
18		chrysene				0.0136	mg/kg		0.014	mg/kg	0.00000136 %		
		601-048-00-0	205-923-4	218-01-9									
19		benzo[b]fluoranthene				0.0159	mg/kg		0.016	mg/kg	0.00000159 %		
		601-034-00-4	205-911-9	205-99-2									
20		benzo[k]fluoranthene				0.011	mg/kg		0.011	mg/kg	0.0000011 %		
		601-036-00-5	205-916-6	207-08-9									
21		benzo[a]pyrene; benzo[def]chrysene				0.0114	mg/kg		0.011	mg/kg	0.00000114 %		
		601-032-00-3	200-028-5	50-32-8									
22	●	indeno[123-cd]pyrene				0.017	mg/kg		0.017	mg/kg	0.0000017 %		
			205-893-2	193-39-5									
23		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3									
24	●	benzo[ghi]perylene				0.0142	mg/kg		0.014	mg/kg	0.00000142 %		
			205-883-8	191-24-2									
25		dieldrin (ISO)				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		602-049-00-9	200-484-5	60-57-1									
26		endrin (ISO); 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4:5,8-dimethanonaphthalene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		602-051-00-X	200-775-7	72-20-8									
27		hexachlorobenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		602-065-00-6	204-273-9	118-74-1									
28		aldrin (ISO)				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		602-048-00-3	206-215-8	309-00-2									
										Total:	0.0386 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: 324827

Non Hazardous Waste
Classified as **17 05 06**
in the List of Waste

Sample details

Sample Name:
324827
Sample Depth:
m
Moisture content:
0%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 06 (Dredging spoil other than those mentioned in 17 05 05)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		7.67 mg/kg	1.32	10.127 mg/kg	0.00101 %		
2	cadmium { cadmium oxide }	048-002-00-0	231-152-8 [1] 215-146-2 [2]	7440-43-9 [1] 1306-19-0 [2]		0.23 mg/kg	1.14	0.263 mg/kg	0.000026 %		
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		63.2 mg/kg	1.46	92.37 mg/kg	0.00924 %		
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		20.9 mg/kg	1.13	23.531 mg/kg	0.00235 %		
5	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	27.4 mg/kg	1.56	42.739 mg/kg	0.00274 %		
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.04 mg/kg	1.35	0.054 mg/kg	0.000005414 %		
7	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		29.8 mg/kg	2.98	88.693 mg/kg	0.00887 %		
8	zinc { zinc chromate }	024-007-00-3				84.8 mg/kg	2.77	235.248 mg/kg	0.0235 %		
9	naphthalene	601-052-00-2	202-049-5	91-20-3		0.107 mg/kg		0.107 mg/kg	0.000011 %		
10	acenaphthylene		205-917-1	208-96-8		0.00773 mg/kg		0.008 mg/kg	0.000000773 %		
11	acenaphthene		201-469-6	83-32-9		0.0334 mg/kg		0.033 mg/kg	0.00000334 %		
12	fluorene		201-695-5	86-73-7		0.0284 mg/kg		0.028 mg/kg	0.00000284 %		
13	phenanthrene		201-581-5	85-01-8		0.0571 mg/kg		0.057 mg/kg	0.00000571 %		
14	anthracene		204-371-1	120-12-7		0.0275 mg/kg		0.028 mg/kg	0.00000275 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15	●	fluoranthene				0.0463	mg/kg		0.046	mg/kg	0.00000463 %		
			205-912-4	206-44-0									
16	●	pyrene				0.0442	mg/kg		0.044	mg/kg	0.00000442 %		
			204-927-3	129-00-0									
17		benzo[a]anthracene				0.0167	mg/kg		0.017	mg/kg	0.00000167 %		
		601-033-00-9	200-280-6	56-55-3									
18		chrysene				0.019	mg/kg		0.019	mg/kg	0.0000019 %		
		601-048-00-0	205-923-4	218-01-9									
19		benzo[b]fluoranthene				0.0212	mg/kg		0.021	mg/kg	0.00000212 %		
		601-034-00-4	205-911-9	205-99-2									
20		benzo[k]fluoranthene				0.0121	mg/kg		0.012	mg/kg	0.00000121 %		
		601-036-00-5	205-916-6	207-08-9									
21		benzo[a]pyrene; benzo[def]chrysene				0.0155	mg/kg		0.016	mg/kg	0.00000155 %		
		601-032-00-3	200-028-5	50-32-8									
22	●	indeno[123-cd]pyrene				0.018	mg/kg		0.018	mg/kg	0.0000018 %		
			205-893-2	193-39-5									
23		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3									
24	●	benzo[ghi]perylene				0.0164	mg/kg		0.016	mg/kg	0.00000164 %		
			205-883-8	191-24-2									
25		dieldrin (ISO)				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		602-049-00-9	200-484-5	60-57-1									
26		endrin (ISO); 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4:5,8-dimethanonaphthalene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		602-051-00-X	200-775-7	72-20-8									
27		hexachlorobenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		602-065-00-6	204-273-9	118-74-1									
28		aldrin (ISO)				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		602-048-00-3	206-215-8	309-00-2									
										Total:	0.0478 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: 324828

Non Hazardous Waste
Classified as **17 05 06**
in the List of Waste

Sample details

Sample Name:
324828
Sample Depth:
m
Moisture content:
0%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 06 (Dredging spoil other than those mentioned in 17 05 05)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		9.01 mg/kg	1.32	11.896 mg/kg	0.00119 %		
2	cadmium { cadmium oxide }	048-002-00-0	231-152-8 [1] 215-146-2 [2]	7440-43-9 [1] 1306-19-0 [2]		0.3 mg/kg	1.14	0.343 mg/kg	0.000034 %		
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		71.3 mg/kg	1.46	104.209 mg/kg	0.0104 %		
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		35 mg/kg	1.13	39.406 mg/kg	0.00394 %		
5	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	33.8 mg/kg	1.56	52.722 mg/kg	0.00338 %		
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.07 mg/kg	1.35	0.095 mg/kg	0.000009474 %		
7	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		34 mg/kg	2.98	101.193 mg/kg	0.0101 %		
8	zinc { zinc chromate }	024-007-00-3				136 mg/kg	2.77	377.284 mg/kg	0.0377 %		
9	naphthalene	601-052-00-2	202-049-5	91-20-3		0.0754 mg/kg		0.075 mg/kg	0.00000754 %		
10	acenaphthylene		205-917-1	208-96-8		0.0168 mg/kg		0.017 mg/kg	0.00000168 %		
11	acenaphthene		201-469-6	83-32-9		0.0153 mg/kg		0.015 mg/kg	0.00000153 %		
12	fluorene		201-695-5	86-73-7		0.0217 mg/kg		0.022 mg/kg	0.00000217 %		
13	phenanthrene		201-581-5	85-01-8		0.0834 mg/kg		0.083 mg/kg	0.00000834 %		
14	anthracene		204-371-1	120-12-7		0.024 mg/kg		0.024 mg/kg	0.0000024 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15	●	fluoranthene				0.082	mg/kg		0.082	mg/kg	0.0000082 %		
			205-912-4	206-44-0									
16	●	pyrene				0.0845	mg/kg		0.085	mg/kg	0.00000845 %		
			204-927-3	129-00-0									
17		benzo[a]anthracene				0.0393	mg/kg		0.039	mg/kg	0.00000393 %		
		601-033-00-9	200-280-6	56-55-3									
18		chrysene				0.0407	mg/kg		0.041	mg/kg	0.00000407 %		
		601-048-00-0	205-923-4	218-01-9									
19		benzo[b]fluoranthene				0.0476	mg/kg		0.048	mg/kg	0.00000476 %		
		601-034-00-4	205-911-9	205-99-2									
20		benzo[k]fluoranthene				0.0254	mg/kg		0.025	mg/kg	0.00000254 %		
		601-036-00-5	205-916-6	207-08-9									
21		benzo[a]pyrene; benzo[def]chrysene				0.0402	mg/kg		0.04	mg/kg	0.00000402 %		
		601-032-00-3	200-028-5	50-32-8									
22	●	indeno[123-cd]pyrene				0.0514	mg/kg		0.051	mg/kg	0.00000514 %		
			205-893-2	193-39-5									
23		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3									
24	●	benzo[ghi]perylene				0.0488	mg/kg		0.049	mg/kg	0.00000488 %		
			205-883-8	191-24-2									
25		dieldrin (ISO)				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		602-049-00-9	200-484-5	60-57-1									
26		endrin (ISO); 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4:5,8-dimethanonaphthalene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		602-051-00-X	200-775-7	72-20-8									
27		hexachlorobenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		602-065-00-6	204-273-9	118-74-1									
28		aldrin (ISO)				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
		602-048-00-3	206-215-8	309-00-2									
										Total:	0.0669 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: 324829

Non Hazardous Waste
Classified as **17 05 06**
in the List of Waste

Sample details

Sample Name:
324829
Sample Depth:
m
Moisture content:
0%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 06 (Dredging spoil other than those mentioned in 17 05 05)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		5.12 mg/kg	1.32	6.76 mg/kg	0.000676 %		
2	cadmium { cadmium oxide }	048-002-00-0	231-152-8 [1] 215-146-2 [2]	7440-43-9 [1] 1306-19-0 [2]		<0.1 mg/kg	1.14	<0.114 mg/kg	<0.000011 %		<**LOD**
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		38.1 mg/kg	1.46	55.685 mg/kg	0.00557 %		
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		6.12 mg/kg	1.13	6.89 mg/kg	0.000689 %		
5	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	12.2 mg/kg	1.56	19.03 mg/kg	0.00122 %		
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.02 mg/kg	1.35	0.027 mg/kg	0.000002707 %		
7	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		20.3 mg/kg	2.98	60.418 mg/kg	0.00604 %		
8	zinc { zinc chromate }	024-007-00-3				39.5 mg/kg	2.77	109.579 mg/kg	0.011 %		
9	naphthalene	601-052-00-2	202-049-5	91-20-3		0.0514 mg/kg		0.051 mg/kg	0.00000514 %		
10	acenaphthylene		205-917-1	208-96-8		0.0191 mg/kg		0.019 mg/kg	0.00000191 %		
11	acenaphthene		201-469-6	83-32-9		0.00869 mg/kg		0.009 mg/kg	0.000000869 %		
12	fluorene		201-695-5	86-73-7		0.00935 mg/kg		0.009 mg/kg	0.000000935 %		
13	phenanthrene		201-581-5	85-01-8		0.0299 mg/kg		0.03 mg/kg	0.00000299 %		
14	anthracene		204-371-1	120-12-7		0.0083 mg/kg		0.008 mg/kg	0.00000083 %		

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
15	●	fluoranthene				0.021 mg/kg		0.021 mg/kg	0.0000021 %		
			205-912-4	206-44-0							
16	●	pyrene				0.0308 mg/kg		0.031 mg/kg	0.00000308 %		
			204-927-3	129-00-0							
17		benzo[a]anthracene				0.00676 mg/kg		0.007 mg/kg	0.000000676 %		
		601-033-00-9	200-280-6	56-55-3							
18		chrysene				0.00463 mg/kg		0.005 mg/kg	0.000000463 %		
		601-048-00-0	205-923-4	218-01-9							
19		benzo[b]fluoranthene				0.00865 mg/kg		0.009 mg/kg	0.000000865 %		
		601-034-00-4	205-911-9	205-99-2							
20		benzo[k]fluoranthene				0.0072 mg/kg		0.007 mg/kg	0.00000072 %		
		601-036-00-5	205-916-6	207-08-9							
21		benzo[a]pyrene; benzo[def]chrysene				0.00755 mg/kg		0.008 mg/kg	0.000000755 %		
		601-032-00-3	200-028-5	50-32-8							
22	●	indeno[123-cd]pyrene				0.00953 mg/kg		0.01 mg/kg	0.000000953 %		
			205-893-2	193-39-5							
23		dibenz[a,h]anthracene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3							
24	●	benzo[ghi]perylene				0.00923 mg/kg		0.009 mg/kg	0.000000923 %		
			205-883-8	191-24-2							
25		dieldrin (ISO)				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
		602-049-00-9	200-484-5	60-57-1							
26		endrin (ISO); 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4:5,8-dimethanonaphthalene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
		602-051-00-X	200-775-7	72-20-8							
27		hexachlorobenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
		602-065-00-6	204-273-9	118-74-1							
28		aldrin (ISO)				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
		602-048-00-3	206-215-8	309-00-2							
								Total:	0.0252 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: 324830

Non Hazardous Waste
Classified as **17 05 06**
in the List of Waste

Sample details

Sample Name:
324830
Sample Depth:
m
Moisture content:
0%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 06 (Dredging spoil other than those mentioned in 17 05 05)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		10.4 mg/kg	1.32	13.731 mg/kg	0.00137 %		
2	cadmium { cadmium oxide }	048-002-00-0	231-152-8 [1] 215-146-2 [2]	7440-43-9 [1] 1306-19-0 [2]		0.24 mg/kg	1.14	0.274 mg/kg	0.000027 %		
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		84.2 mg/kg	1.46	123.063 mg/kg	0.0123 %		
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		23.5 mg/kg	1.13	26.458 mg/kg	0.00265 %		
5	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	40 mg/kg	1.56	62.393 mg/kg	0.004 %		
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.06 mg/kg	1.35	0.081 mg/kg	0.000008121 %		
7	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		35.5 mg/kg	2.98	105.657 mg/kg	0.0106 %		
8	zinc { zinc chromate }	024-007-00-3				135 mg/kg	2.77	374.51 mg/kg	0.0375 %		
9	naphthalene	601-052-00-2	202-049-5	91-20-3		0.139 mg/kg		0.139 mg/kg	0.000014 %		
10	acenaphthylene		205-917-1	208-96-8		0.0251 mg/kg		0.025 mg/kg	0.00000251 %		
11	acenaphthene		201-469-6	83-32-9		0.0275 mg/kg		0.028 mg/kg	0.00000275 %		
12	fluorene		201-695-5	86-73-7		0.032 mg/kg		0.032 mg/kg	0.0000032 %		
13	phenanthrene		201-581-5	85-01-8		0.12 mg/kg		0.12 mg/kg	0.000012 %		
14	anthracene		204-371-1	120-12-7		0.0282 mg/kg		0.028 mg/kg	0.00000282 %		

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
15	●	fluoranthene				0.135 mg/kg		0.135 mg/kg	0.000014 %		
			205-912-4	206-44-0							
16	●	pyrene				0.12 mg/kg		0.12 mg/kg	0.000012 %		
			204-927-3	129-00-0							
17		benzo[a]anthracene				0.0585 mg/kg		0.059 mg/kg	0.00000585 %		
		601-033-00-9	200-280-6	56-55-3							
18		chrysene				0.0742 mg/kg		0.074 mg/kg	0.00000742 %		
		601-048-00-0	205-923-4	218-01-9							
19		benzo[b]fluoranthene				0.103 mg/kg		0.103 mg/kg	0.00001 %		
		601-034-00-4	205-911-9	205-99-2							
20		benzo[k]fluoranthene				0.0499 mg/kg		0.05 mg/kg	0.00000499 %		
		601-036-00-5	205-916-6	207-08-9							
21		benzo[a]pyrene; benzo[def]chrysene				0.0736 mg/kg		0.074 mg/kg	0.00000736 %		
		601-032-00-3	200-028-5	50-32-8							
22	●	indeno[123-cd]pyrene				0.0837 mg/kg		0.084 mg/kg	0.00000837 %		
			205-893-2	193-39-5							
23		dibenz[a,h]anthracene				<0.252 mg/kg		<0.252 mg/kg	<0.000025 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3							
24	●	benzo[ghi]perylene				0.0729 mg/kg		0.073 mg/kg	0.00000729 %		
			205-883-8	191-24-2							
25		dieldrin (ISO)				<0.00252 mg/kg		<0.003 mg/kg	<0.000000252 %		**<LOD**
		602-049-00-9	200-484-5	60-57-1							
26		endrin (ISO); 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4:5,8-dimethanonaphthalene				<0.00252 mg/kg		<0.003 mg/kg	<0.000000252 %		**<LOD**
		602-051-00-X	200-775-7	72-20-8							
27		hexachlorobenzene				<0.00252 mg/kg		<0.003 mg/kg	<0.000000252 %		**<LOD**
		602-065-00-6	204-273-9	118-74-1							
28		aldrin (ISO)				<0.00252 mg/kg		<0.003 mg/kg	<0.000000252 %		**<LOD**
		602-048-00-3	206-215-8	309-00-2							
								Total:	0.0685 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: 324831

Non Hazardous Waste
Classified as **17 05 06**
in the List of Waste

Sample details

Sample Name:
324831
Sample Depth:
m
Moisture content:
0%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 06 (Dredging spoil other than those mentioned in 17 05 05)

Hazard properties

None identified

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		10.6 mg/kg	1.32	13.995 mg/kg	0.0014 %		
2	cadmium { cadmium oxide }	048-002-00-0	231-152-8 [1] 215-146-2 [2]	7440-43-9 [1] 1306-19-0 [2]		0.37 mg/kg	1.14	0.423 mg/kg	0.000042 %		
3	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		93.5 mg/kg	1.46	136.655 mg/kg	0.0137 %		
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		108 mg/kg	1.13	121.596 mg/kg	0.0122 %		
5	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	47.3 mg/kg	1.56	73.779 mg/kg	0.00473 %		
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.07 mg/kg	1.35	0.095 mg/kg	0.000009474 %		
7	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		39 mg/kg	2.98	116.074 mg/kg	0.0116 %		
8	zinc { zinc chromate }	024-007-00-3				199 mg/kg	2.77	552.055 mg/kg	0.0552 %		
9	naphthalene	601-052-00-2	202-049-5	91-20-3		0.18 mg/kg		0.18 mg/kg	0.000018 %		
10	acenaphthylene		205-917-1	208-96-8		0.0236 mg/kg		0.024 mg/kg	0.00000236 %		
11	acenaphthene		201-469-6	83-32-9		0.0606 mg/kg		0.061 mg/kg	0.00000606 %		
12	fluorene		201-695-5	86-73-7		0.0767 mg/kg		0.077 mg/kg	0.00000767 %		
13	phenanthrene		201-581-5	85-01-8		0.3 mg/kg		0.3 mg/kg	0.00003 %		
14	anthracene		204-371-1	120-12-7		0.0646 mg/kg		0.065 mg/kg	0.00000646 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		fluoranthene				0.228	mg/kg		0.228	mg/kg	0.000023 %		
			205-912-4	206-44-0									
16		pyrene				0.181	mg/kg		0.181	mg/kg	0.000018 %		
			204-927-3	129-00-0									
17		benzo[a]anthracene				0.077	mg/kg		0.077	mg/kg	0.0000077 %		
		601-033-00-9	200-280-6	56-55-3									
18		chrysene				0.0711	mg/kg		0.071	mg/kg	0.00000711 %		
		601-048-00-0	205-923-4	218-01-9									
19		benzo[b]fluoranthene				0.0954	mg/kg		0.095	mg/kg	0.00000954 %		
		601-034-00-4	205-911-9	205-99-2									
20		benzo[k]fluoranthene				0.0457	mg/kg		0.046	mg/kg	0.00000457 %		
		601-036-00-5	205-916-6	207-08-9									
21		benzo[a]pyrene; benzo[def]chrysene				0.0707	mg/kg		0.071	mg/kg	0.00000707 %		
		601-032-00-3	200-028-5	50-32-8									
22		indeno[123-cd]pyrene				0.0839	mg/kg		0.084	mg/kg	0.00000839 %		
			205-893-2	193-39-5									
23		dibenz[a,h]anthracene				<0.233	mg/kg		<0.233	mg/kg	<0.000023 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3									
24		benzo[ghi]perylene				0.0756	mg/kg		0.076	mg/kg	0.00000756 %		
			205-883-8	191-24-2									
25		dieldrin (ISO)				<0.0233	mg/kg		<0.023	mg/kg	<0.00000233 %		**<LOD**
		602-049-00-9	200-484-5	60-57-1									
26		endrin (ISO); 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4:5,8-dimethanonaphthalene				<0.0233	mg/kg		<0.023	mg/kg	<0.00000233 %		**<LOD**
		602-051-00-X	200-775-7	72-20-8									
27		hexachlorobenzene				<0.0233	mg/kg		<0.023	mg/kg	<0.00000233 %		**<LOD**
		602-065-00-6	204-273-9	118-74-1									
28		aldrin (ISO)				<0.0233	mg/kg		<0.023	mg/kg	<0.00000233 %		**<LOD**
		602-048-00-3	206-215-8	309-00-2									
										Total:	0.099 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non CLP determinands

chromium(III) oxide (EC Number: 215-160-9, CAS Number: 1308-38-9)

Conversion factor: 1.462
Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 7/17/2015
Risk Phrases: R20 , R22 , R36 , R37 , R38 , R42 , R43 , R50/53 , R60 , R61
Hazard Statements: Acute Tox. 4 H332 , Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Resp. Sens. 1 H334 , Skin Sens. 1 H317 , Repr. 1B H360FD , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

dicopper oxide; copper (I) oxide (EC Number: 215-270-7, CAS Number: 1317-39-1)

CLP index number: 029-002-00-X
Data source: Regulation (EU) 2016/1179 of 19 July 2016 (ATP9)
Additional Risk Phrases: N R50/53 , N R50/53 >= 0.25 %
Additional Hazard Statement(s): None.
Reason for additional Hazards Statement(s)/Risk Phrase(s):
10/10/2016 - N R50/53 risk phrase sourced from: WM3 v1 still uses ecotoxic risk phrases
10/10/2016 - N R50/53 >= 0.25 % risk phrase sourced from: WM3 v1 still uses ecotoxic risk phrases

acenaphthylene (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 7/17/2015
Risk Phrases: R22 , R26 , R27 , R36 , R37 , R38
Hazard Statements: Acute Tox. 4 H302 , Acute Tox. 1 H330 , Acute Tox. 1 H310 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315

acenaphthene (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 7/17/2015
Risk Phrases: R36 , R37 , R38 , N R50/53 , N R51/53
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Aquatic Chronic 2 H411

fluorene (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 8/6/2015
Risk Phrases: N R50/53
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

phenanthrene (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 8/6/2015
Risk Phrases: R22 , R36 , R37 , R38 , R40 , R43 , N R50/53
Hazard Statements: Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Carc. 2 H351 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Skin Irrit. 2 H315

anthracene (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 7/17/2015
Risk Phrases: R36 , R37 , R38 , R43 , N R50/53
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

fluoranthene (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 8/21/2015
Risk Phrases: Xn R22 , N R50/53
Hazard Statements: Acute Tox. 4 H302 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

pyrene (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 8/21/2015
Risk Phrases: Xi R36/37/38 , N R50/53
Hazard Statements: Skin Irrit. 2 H315 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

indeno[123-cd]pyrene (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 8/6/2015
Risk Phrases: R40
Hazard Statements: Carc. 2 H351

benzo[ghi]perylene (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 7/23/2015
Risk Phrases: N R50/53
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history

chromium in chromium(III) compounds {chromium(III) oxide}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected.

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition, May 2015
HazWasteOnline Classification Engine Version: 2017.100.3269.6556 (10 Apr 2017)
HazWasteOnline Database: 2017.100.3269.6556 (10 Apr 2017)

This classification utilises the following guidance and legislation:
WM3 - Waste Classification - May 2015
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010
2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010