

Appropriate Assessment Screening

Greenore Port: Rock Removal – Phase 2 and Floating Buoy Installation

Final - Wednesday, 03 February 2016

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2 Context

In March 2011 Greenore Port were granted a Foreshore License to remove two rock outcrops from the seabed of a quayside berth in order to facilitate docking for vessels – a copy of the Foreshore License is provided in **Appendix 1**. This work was largely undertaken from February to April 2015. In the event the works were more challenging than initially thought for a number of operational reasons and, after a short extension, effectively halted at the commencement of the nesting season for Black Guillemots which nest in the port area. During the monitoring period which covered 64 days, seals were seen to enter the sensitive area (500 metres distant from operations) on five occasions, all individual adult or sub-adult common seals. It was noted that during that time of the year the overall population in Carlingford Lough was greatly reduced with a marked preference for haul-out sites in the outer lough in the vicinity of Blackhouse Island and associated reefs. This may be explained by the fact that grey seals moult from January to March and therefore spend more time hauled out than at other times of the year, and in winter, common seals are known to travel considerable distances in search of food.

The present appropriate assessment screening addresses two activities which will take place at the same time in the port area (but not simultaneously). These are the continuation and completion of the rock removal, and the emplacement of a floating buoy anchored to the sea bed. These activities are further subdivided as follows:

- continuation and completion of the rock removal outcropping in the seabed and its beneficial recovery to the quayside for land based re-use. This rock removal will facilitate safe berthage of vessels in the berth pocket
- operation of the port following rock removal
- emplacement of a single floating buoy anchored to the sea bed at the exposed outer end of the harbour to ensure ongoing safe berthage of vessels
- operation of floating buoy anchored to the sea bed

See full application for technical details. Possible impacts are addressed below.

Since the port is adjacent to Natura sites including an SPA and an SAC, appropriate assessment screening is required under the Habitats Directive and under Irish statutes and guidelines.

The obligation to undertake appropriate assessment derives from Article 6(3) and 6(4) of the Habitats Directive, and both involve a number of steps and tests that need to be applied in sequential order. Article 6(3) is concerned with the strict protection of sites, while Article 6(4) is the procedure for allowing derogation from this strict protection in certain restricted circumstances. Each step in the assessment process precedes and provides a basis for other steps. The results at each step must be documented and recorded carefully so there is full traceability and transparency of the decisions made. They also determine the decisions that ultimately may be made in relation to approval or refusal of a plan or project. AA is not a prohibition on new development or activities but involves a case-by-case examination of the implications for the Natura 2000 site and its conservation objectives.

In general terms, implicit in Article 6(3) is an obligation to put concern for potential effects on Natura 2000 sites at the forefront of every decision made in relation to plans and projects at all stages, including decisions to provide funding or other support.

Account is also taken of the NPWS guidance document entitled **Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters** (NPWS, 2015) which was issued subsequent to the issue of the former Foreshore License for rock removal in the berth pocket (ref. MS 51/2/223).

3 Foreshore License

This AA screening document accompanies a contemporary Foreshore License application for the continuation and extension of the rock removal, and the emplacement and operation of a floating buoy.

The application is for the removal of rocky outcrops of 1600 m³ in total volume in the inner edge of the outer berth to provide a consistent berth depth alongside of minus 7.5 metres Chart Datum. Approximately 1600 m² on plan of rock is to be removed, in other words to a depth of approximately 1 metre over the area. Drawings showing the location, existing survey, and sections are provided in **Appendix 2**. Once broken out and removed by excavator, the rock fragments will be recovered to the quayside and beneficially used to infill and level the surfacing at the ports nearby storage area.

The second part of the project is for the emplacement of a floating buoy anchored to the seabed by a chain fixed to an embedded steel pile. This will entail deployment of a conventional rotary bored drilling rig to drill the hole in the rocky seabed which will generate noise and vibration, and the subsequent operation of the floating buoy.

A diagram showing the design is provided in **Appendix 3**.

4 Description of Development Site

The development site consists of the outer berth of Greenore Port, a busy shipping port serving merchant size ships. Ships come alongside the quay wall and general cargo is loaded on and off by crane. Approximately 150 metres to the south west is an area of mudflats and mixed sediment designated Special Protection Area (SPA) and a Special Area of Conservation (SAC).

One hundred metres to the east just around Greenore Point, the Special Area of Conservation (SAC) continues to Balaggan Point. See **Appendix 4**.

Because of the proximity of these sites Appropriate Assessment was requested. The sites are described in further detail below.

5 Natura 2000 Sites

5.1 SPA

Carlingford SPA is bounded by Carlingford to the west and Greenore to the east. The area is designated for the presence of significant numbers pale-bellied brent geese (*Branta hrota*) and the

presence of intertidal mudflats. The presence of bar-tailed godwits (*Limosa lapponica*) is also noted. The site synopsis reports the presence of 175 geese. A more recent survey (2009/2010) would suggest that that number is increasing somewhat, in line with the national increase in the total population of pale-bellied brent geese.

Black guillemots nest in the port area and several species of diving birds (other auks, cormorants, shags, sawbills, red-throated and great northern divers) are described in the SPA supporting documentation.

The site synopsis is included for reference in **Appendix 5**

5.2 SAC

Carlingford Lough SAC is an extensive area of mixed shoreline habitat stretching from the Newry River all the way to Balaggan Point, a length of 15 kilometres. This area is designated for the **Perennial Vegetation of Stony Banks** and **Annual Vegetation of Drift Lines**, both habitats listed on Annex I of the E.U. Habitats Directive. The synopsis goes into some detail in regard to flora growing in the area, as well as making reference to Grey Seals, which fish along the channel and haul out on rocks 500 metres or more north of the development site at low tide. Up to 25 common seals are also reported to use this area (subsequent research has shown numbers to reach up to 350 in summer (Wilson, 2011)). The seals are noted to haul out often at “The Black Rock” at high tide; The Black Rock is a basalt intrusion off-shore about half way between Carlingford and Greenore and about 900 metres distant from the port. This site synopsis also refers to several species of diving bird including red-breasted merganser (*Mergus serrator*), great crested grebe (*Podiceps cristatus*) and black guillemot (*Cephus grylle*). The latter species breeds in small numbers on the breakwater at the port (five pairs in 2009).

The full site synopsis is included for reference in **Appendix 6**.

6 Appropriate Assessment

Given the location of the development site and its proximity to Natura 2000 sites, Appropriate Assessment under Article 6 of the Habitats Directive and the relevant DEHLG guidance document was requested.

6.1 Step 1

The first step is to determine if the proposed projects are directly connected with or necessary to site management for nature conservation. The main purpose of the proposed projects is to facilitate safe berthing at the port; it is therefore not connected with or necessary for nature conservation.

Step 2

The second step is to determine if the proposal (alone or in combination) is likely to have a significant impact on the designated site, or more specifically on the integrity of the site in terms of its structure and function, with reference to the site synopses and, where available, more recent information. To this end the possible impacts of the development are reviewed below:

6.2.1 Potential Impacts

6.2.1.1 *Removal of habitat for sub aquatic flora and fauna*

The removal of the underwater rock will result in the direct loss of habitat which may support some seaweed, which may in turn support some fauna such as various invertebrates, crustaceans and small fish. The removal of rock could therefore have a knock-on effect on diving birds using the area. However given the small area of rock that will be impacted 1600 m², the fact that this area is routinely blocked due to ships alongside, and has been previously dredged, it is concluded that any deprivation of habitat on diving birds will be insignificant. Following removal of rock outcrops, there is opportunity for re-establishment of the flora on the newly exposed rock surface. Observations in the area have shown that birds generally avoid the shipping berths and prefer to hunt along the channel, which doubtless provides a far greater abundance and variety of prey. The excavation is expected to take 25 days.

6.2.1.2 *Transfer of the excavated rock*

The excavated rock will be transferred to the Port storage area (behind Hanlon's warehousing) using road worthy trucks and initially stockpiled along one edge of the yard to minimise disruption to ongoing cargo operations. Once all breaking and excavation in the berth pocket has been completed and all material transferred to the Port's storage area, it will be spread over the site using excavators and tractors & trailers and compacted using road rollers to produce a strengthened surface without potholes. The timing of this spreading will be carefully controlled and carried out in stages to ensure ongoing cargo operations are not disrupted to any great extent. Temporary lifting and re-location of some steel reinforcement cargoes will be required to ensure adequate areas are available for strengthening and to ensure that adequate and even compaction is achieved throughout. The laying of stone surfacing to fill potholes and strengthen the working surface will be progressed in bays as the existing cargo operations dictate. It is expected that approximately 200-300mm depth of stone will be laid on average over the existing stone surface to provide adequate surface strengthening and to fill potholes to the general working level. During any extremely dry weather, the surface will be sprayed with water from a tanker to ensure that the spreading and surfacing with stone from the stockpile does not generate a dusty environment and to ensure optimum conditions for compaction are achieved.

6.2.1.3 *Emplacement of anchor for floating buoy*

The piled anchor for the mooring would be installed using a conventional rotary bored drilling rig located on a barge. The rig would lower a pile to the seabed and begin to rotary drill the seabed below the pile as it draws the pile into the seabed in conjunction with progress of the drilling. Thus the main drilling noise is generated within a pile casing.

Flushed returns or rock cuttings are driven by water or air pressure to the surface for handling into skips – or removed by a bucket tool within the drilled hole for recovery into a skip. Once the hole is drilled to depth, concrete is poured through the centre of the drilling tools to form a core and surround to the toe of the pile and hold it firmly in place in the seabed. Noise generated would be equivalent to a rotary bored piling rig – which is much less than impact pile driving. See attached extract from BS5228-1 "Noise on Construction Sites" where a large rotary bored piling rig is quoted as having an equivalent A-weighted sound pressure level (LAeq,T) of 83dBA at a standard distance of 10m. No impact driving would be necessary as we are sure of encountering rock and we know that a rotary bored pile will be required in any case – so impact driving is not necessary. The pile may be

trimmed to level by divers using cutting/burning tools underwater and remain protruding only 300mm above the bed or it may be installed pre-trimmed to the correct level and surrounded in concrete. The pile must protrude by typically 300mm to allow connection of shackle and chain which rises to the floating buoy.

Emplacement of the pile and fittings on the seabed will result in the extirpation of a small area of seabed that is exposed to the fastest part of the channel with current speeds up to 5 knots as per Admiralty mapping. This is unlikely to have any effect in itself but the chain connecting to the floating buoy may represent a possible collision risk to birds, seals and cetaceans requiring mitigation.

6.2.1.4 Modification of tidal processes

The removal of the rock in the berth pocket will result in a change to tidal processes. The rock is underwater in all tidal states. When the tide ebbs and flows around them it produces a degree of turbulence. This turbulence may facilitate the growth of seaweed and fauna such as crustaceans, which may be of value to birds using the area. Once rock outcrops are removed the flow is likely to be slightly faster, and possibly more laminar with less niches for crustaceans and the like to inhabit. The possible worst impact will therefore be a slight reduction in the available food for diving birds using the area.

However this impact is considered insignificant in the context of extensive sub-aquatic rocky habitat of this kind all along the channel, and in view of the regular berthing of ships etc. Furthermore the black guillemots that use the breakwater and quay wall for nesting are not observed to hunt in this area, preferring the open channel to the east and south.

The emplacement of the floating buoy attached to the seabed may result in a small change in the flow characteristics at that point but this is considered to be insignificant given the small extent of protrusion into the flow

The operations will not significantly affect the Perennial Vegetation of Stony Banks or the Annual Vegetation of Drift Lines in any way due to the fact that these are not used or implicated in breaking, drilling, dredging, taking material off site or the ongoing use of the berth pocket with a floating mooring point..

6.2.1.5 Noise and Vibration

The removal of the rocks will be carried out using a long reach rock breaker from the quayside or from a floating pontoon. This will result in considerable noise and vibration. Both could impact on birds, mammals and fish present in the area. While the nearby Natura sites are not designated for fish, it is possible that an impact on fish could have a knock-on effect on both birds (divers) and mammals (seals, otters, cetaceans). Drilling to emplace the floating buoy is likely to generate considerably less noise and vibration than breaking and dredging, and will be of much shorter duration (3 – 4 days).

6.2.1.6 - Noise

Tests on the rock breaker were carried out in accordance with European Directive 2000/14/EC, (which deals with noise emission in the environment by equipment for use outdoors). The test involved measuring noise generated on a metal anvil with full power of the rock breaker on a released surface. This resulted in a guaranteed noise level L_w of 131dB. At a distance of 56 metres,

this dropped to 85dBA. Sound transmission in air and water is not directly comparable and it is difficult to model how sound will disperse under water in the context of sound reflecting off the water's surface, the breakwater, the quay wall, and the seabed.

In addition to this, a considerable amount of noise and, in particular, vibration is routinely generated by port activities. A typical merchant ship undertaking various operations generates noise in the range of 140 to 185 decibels (Arveson P, Vendittis D (2000)). Furthermore when loading and offloading into and out of the metal hold of ships, typically done using a large grab, very significant noise is often generated through the impact of the grab on the ships hold or hull and noise generated by other machinery in the hull and on the quay side.

Nevertheless given the fact that underwater noise may affect species covered by the designation, or have knock-on effects, this impact must be assessed.

Given the sensitivity of various species to sub-aquatic noise, it may be concluded that sound levels at 100 metres from the site are so low as not to adversely affect fauna. Furthermore the applicant has plans to start the work gradually at the beginning of each breaking session (soft start) to alert nearby fauna to move away from the area and to provide a marine mammal observer to check the response of nearby mammals. If a response is seen, work will be stopped to give the animal time to move away.

The effect of the large rotary bored piling rig is estimated at 86 Db in air as per the relevant British Standard (BS 5228), significantly less than the noise generated by the rock breaker referenced above – see **Appendix 7**

The expected impact on relevant species in the area is as follows:

6.2.1.6.1 Seals

In terms of risk characterisation, identification and assessment, both grey seals (*Halichoerus grypus*) and harbour seals (*Phoca vitulina*) frequent the Lough, notably the channel, and haul out on the Black Rock, Green Island and various rocks at low tide. It is proposed to mitigate any impact on seals and other marine mammals through a 500 metre exclusion zone, soft start-up, absence of marine mammals for 30 minutes prior to the soft start-up as set forth in the Foreshore License.

Seals may enter the exclusion zone after the soft start-up and may exhibit a graduated range of responses to noise and:

- ignore it
- show some curiosity, even approaching the area
- show alarm, swim away (there are no haulouts within 500 metres of the centre of operations)

These responses will be noted by the MMO in accordance with the Foreshore License and relevant guidelines.

6.2.1.6.2 Otter

Otters typically hunt at night and would therefore not be exposed to the noise.

6.2.1.6.3 Cetaceans

Both bottle-nosed dolphins (*Tursiops truncatus*) and porpoises (*Phocoena phocoena*) have been recorded in the Lough, but these sightings are very rare. According to the Irish Whale and Dolphin Group (IWDG) cetaceans have been observed only three times since 2004 (a pod of nine bottle-nosed dolphins in August 2008 being the most recent, prior to that records from 2007 and 2004 for "dolphin-type" species). Given the rarity of their occurrence, the soft start-up, and relatively low level of the noise, the potential impact on cetaceans is considered negligible.

6.2.1.6.4 Birds

Waterbirds including waders, waterfowl, gulls, terns and divers use both the nearby mudflats as well as the channel (divers). The impact of the noise on the birds using the mudflats will be negligible given the distance (200 metres) and their habituation to various background noise already existing at the port and other activities (aquaculture).

Divers including black guillemot, guillemot, razorbill, great crested grebe, red-throated diver and great northern diver use the channel. Little is known about the effect of sound and noise on diving birds as little research has been done in this area. This is partly because diving birds use sight rather than sound to hunt and it is unclear how birds perceive underwater sound. In a single study carried out on a species of tubenose (fulmar), gull (kittiwake) and thick-billed murre in Canada; no adverse effects were seen on these species as a result of seismic survey-generated sound (Stemp 1995 in Turnpenny, Nedwell 1994); in this study the sound level at source was several orders of magnitude higher than what is proposed at Greenore. Thick-billed murre are auks, like black guillemots, and dive and hunt for fish in the same way.

Black guillemots breed on the breakwater and in some crevices on the quay wall. Their breeding season starts in May and continues through July. Because there is a possibility that the noise and vibration may disturb the breeding birds, particularly between 15th May and end June, when they may be incubating eggs, work should be avoided during this period.

6.2.1.6.5 Fish

Fish may be affected by loud underwater sound depending on species. For example flat fish are relatively unaffected while cod (who have a swim bladder in close proximity to their inner ear) are more sensitive (Turnpenny, Nedwell (1994)). In the case of the proposed development the sound levels are not sufficient to have any significant effect either on fish directly, or knock-on effect on their predators, diving birds.

6.2.1.7 - Vibration

The rock breaking will generate some vibration through the solid substrate. This vibration may transmit to the breakwater and disturb birds nesting there. Though this is an unlikely scenario, it cannot be ruled out, therefore breaking should be avoided during the breeding season of black guillemots using the breakwater.

6.2.1.8 Exposure and dispersal of underlying sediment

The breaking work will have three effects:

Firstly the removal of the rock will expose new material, rock and underlying sediment, with the result that the previous habitat will be removed and replaced with this. However the area is so small

as to be insignificant and will doubtless over time revert to a similar character as to what existed before the breaking and removal.

Secondly the breaking may release sediment previously covered. Given the nature of the ports operations, and the fact that operations have been ongoing for over 100 years, it is possible that toxic materials may have become embedded in the sediment over time. Sampling and chemical analysis of the superficial substrate around the present rock outcrops reveals that levels of toxic materials are insignificant, see **Appendix 8**. Taking into account the speed of the tidal flow and the nearby deep channel, it is likely that rapid dispersion of any suspended sediment and its low concentration, will result in the effects from turbidity being considered to be insignificant.

Thirdly the rock breaking will result in the local generation of sub-aquatic particulate material of various sizes. This may have the effect of smothering nearby eel grass growing on the mudflats, and of smothering in-fauna which is of use to birds. However the volume and particle size distribution of any material not collected by the bucket during operations will be such that any such effect will be insignificant.

6.2.1.9 Presence of Chain Anchoring Floating Buoy.

The chain connecting the floating buoy to the seabed may represent a collision hazard. Seals are capable of swimming at up to 10km per hour and in bursts up to 20 km per hour. Given the additional sea velocity at the point of up to 5 knots (9.3km per hour), the possibility of collision with diving birds, seals and cetaceans exists, though is probably remote. It is recommended to colour or mark the chain in such a way that it is visible in its immediate vicinity underwater. Subaquatic animals are likely to become used to its emplacement over time. Indeed in time it may provide a suitable perch for auks hunting the channel.

6.2.1.10 Cumulative Impacts

The two activities, breaking/dredging rock, and drilling into the seabed for the piled anchorage, will not take place simultaneously, therefore there is no cumulative impact from these two activities.

A separate project to build a car ferry terminal at Greenore Port linking Greenore and Greencastle (ref: 13/241) will involve pile driving. To avoid any possible in combination or cumulative effect, no breaking, drilling or dredging will be undertaken while piling the ferry terminal is ongoing.

No other significant cumulative impacts are likely.

7 AA Screening Summary

Factor	Impact	Significance/Mitigation
Removal of sub-aquatic habitat	Area affected is insignificant relative to overall area	Nil
Modification of tidal processes	Change affects only immediate area of quay wall	Nil
Noise and vibration	Possible impact on marine mammals Possible impact on breeding birds Possible impact on breeding and moulting common seals	MMO in place (previous works successfully used MMO- See Appendix 9 for summary report) Avoid working May- July Avoid working June - October
Exposure of superficial & underlying sediments	Amount of toxic substances negligible following testing	Nil
Creation of suspended sediment in the water column and deposition nearby on mudflats	Amount of sediment generated extremely small, particularly when compared to possible background turbidity levels in the Lough. No smothering expected.	Nil
Boring drill for floating buoy emplacement	Noise generation	Nil or negligible given the relatively low level of noise generated.
Presence of floating buoy anchored by chain	Collision hazard	Nil if suitably coloured so that subaquatic animals may avoid it

8 Conclusion

The proposed work is expected to have no significant impact on the designated areas and their conservation objectives. In order to avoid any possible impact on seals during the construction phase, an MMO will be in place to monitor any direct impact and take remedial action if any effect is observed. These works will be in accordance with the current DoAH&G guidelines (Jan 2014). Work will be avoided in the months of mid May to October to avoid any impact on breeding black guillemots and breeding/moulting seals. The chain connecting the floating buoy to the seabed will be appropriately coloured or tagged to enable seals and diving birds to observe it and avoid any possible collision.

9 References

- Arveson, P. & Vendittis, D. (2000). Radiated noise characteristics of a modern cargo ship. *Journal of the Acoustical Society of America*, 107(1), 118-129.
- Turnpenny A. W. H., Nedwell J. R. (1994) 'The effects on marine fish, diving mammals and birds of underwater sound generated by seismic surveys'. FARL Report Reference: FCR 089/94, October 1994
- Committee on Potential Impacts of Ambient Noise in the Ocean on Marine Mammals, National Research Council, (2003), *Ocean Noise and Marine Mammals*
- Wilson, (2011), *Surveying the seals of Carlingford Lough: A preliminary study 2008–11*
- Svennson (1988) *Birds of the Western Palearctic*
- Crowe (2005) *Ireland's Wetlands and their Wetland Birds*
- Cronin, M., Duck, C., Ó Cadhla, O., Nairn, R., Strong, D. & O'Keefe, C. (2007). An assessment of population size and distribution of harbour seals in the Republic of Ireland during the moult season in August 2003.

10 Appendices

Appendix 1. Previous Foreshore License



Comhshaol, Oidhreacht agus Rialtas Áitiúil
Environment, Heritage and Local Government

23 March 2011

Mr Diarmuid O'Loan
RPS Consulting Engineers
Elmwood House
Boucher Rd
Belfast BT12 6RZ
Northern Ireland



Our Ref: MS 51/2/223
(Please quote on all correspondence)

**Foreshore Licence Application: Removal of rock outcrops in outer berth at
Greenore Port, Co. Louth.**

Dear Diarmuid

I refer to the application by Greenore Port Ltd for permission to remove two outcrops in the outer berth at Greenore Port, Co Louth and use of the removed material for levelling and infilling of the stone surface at the port's storage compound.

This application has been approved and licence fee received. Please find enclosed section 3.3 licence to undertake the works.

Yours sincerely,

Bernard Nolan
Foreshore Unit
Planning Policy and Legislation
Department of the Environment Heritage and Local Government
Newtown Road
Wexford

053 9117367
Bernard.nolan@environ.ie



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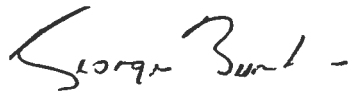
LICENCE UNDER SECTION 3(3) OF THE FORESHORE ACT 1933

The Minister for the Environment, Heritage and Local Government in exercise of the powers conferred on him by Section 3(3) of the Foreshore Act 1933, as amended, hereby authorises Greenore Port Limited to carry out dredging works at Greenore Port, Greenore, Co Louth for the purpose of removing 2 rock outcrops from the existing berths.

The licence is granted on condition that:

1. The Licensee shall use that part of the Foreshore the subject matter of this licence for the purposes as outlined in the application and for no other purposes whatsoever.
2. The works shall be confined to the locations outlined in Drawing No.: IBM0302-FS-01.
3. No material will be disposed of on the foreshore.
4. Works shall not take place on the foreshore during the period 1st May to 30th June.
5. The Licensee shall notify the Department of the Environment, Heritage and Local Government at least 14 days in advance of the commencement of the works on the foreshore.
6. A Contractors Method Statement for all operations on the foreshore shall be submitted to the Department of the Environment, Heritage and Local Government prior to the commencement of the works
7. The Licensee shall arrange the publication of a local marine notice giving general description of operations and approximate dates of commencement and completion in respect of near shore and landfall cable laying operations
8. An Exclusion Zone for marine mammals (whales, dolphins and seals) shall be established, extending to 500 metres away from the rock breaking operations, prior to the commencement of operations. All operations shall commence during suitable weather and visibility to ensure that this Exclusion Zone can be achieved.
9. At least 14 days in advance of the commencement of the works on the foreshore the Licensee shall notify Department of the Environment, Heritage and Local Government indicating date(s) and location(s) for which marine mammal observations are intended and including relevant details concerning the qualifications & experience of the proposed Marine Mammal Observer MMO(s).
10. A qualified Marine Mammal Observer shall be on site during the commencement of all operations to ensure that the Exclusion Zone is clear of marine mammals.
11. Rock-breaking shall have a daily "soft start"

12. The Marine Mammal Observer shall undertake thirty minutes of survey prior to commencement of the "soft-start" procedure to ensure that no marine mammals are within the Exclusion Zone.
13. The MMO shall advise the Works Superintendent 1 hour before scheduled activity if environmental conditions (e.g., lighting, sea state) are insufficient for effective visual monitoring. In such conditions, the activity shall be postponed until acceptable conditions prevail.
14. Operations may continue if weather conditions deteriorate or if marine mammals enter the Exclusion Zone following the appropriate start up.
15. Within 4 weeks of completion of the works on the foreshore the Licensee shall a report on MMO operations) to the Department of the Environment, Heritage and Local Government (NPWS)



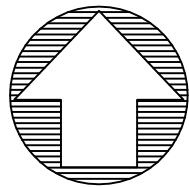
George Burke
Principal

An officer authorised in this behalf by the said Minister
Dated this 23rd day of March 2011

Appendix 2. Drawing of the Dredge Area and Floating Mooring Point

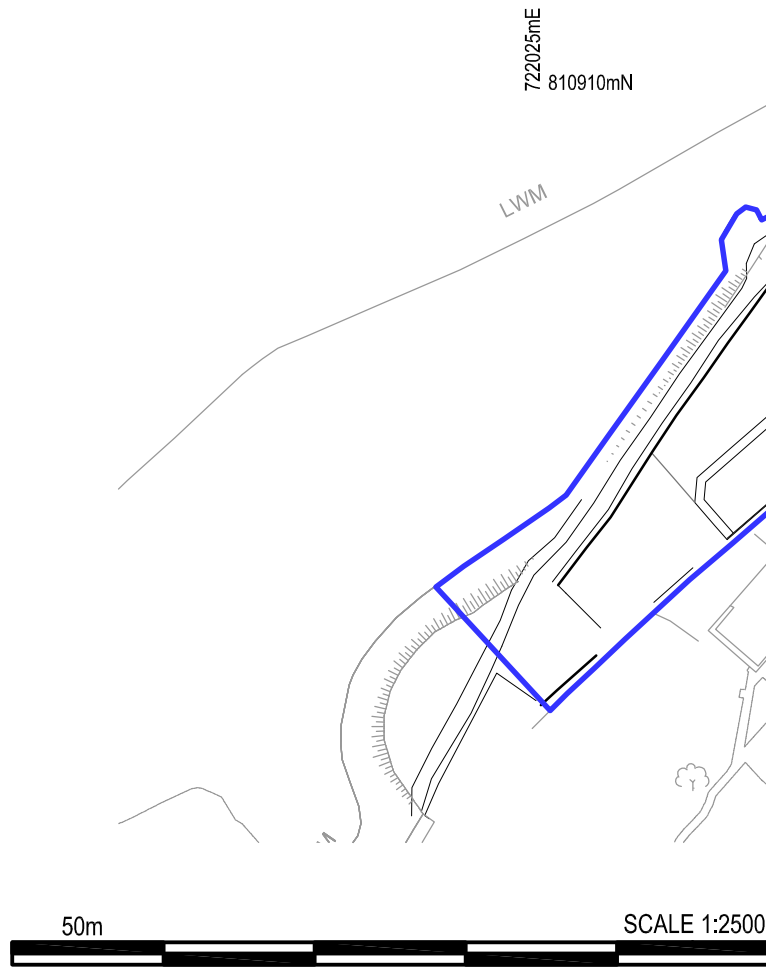


Foreshore Areas		
Reference	Area (metres squared)	Area (hectares)
Dredge Area	1598.822	0.16
Mooring Area	657.175	0.07
Total Area	2256	0.23



Dredging Area
Foreshore Boundary

Mooring Area
Foreshore Boundary



Location Plan
[1:2500]

- RPS CONSULTING ENGINEERS
ORDNANCE SURVEY IRELAND
LICENCE No. EN 0029315
© ORDNANCE SURVEY IRELAND
AND GOVERNMENT OF IRELAND
- Map Series:
1:2500

1568-C
REVISION DATE = 21-Oct-2006
SURVEY DATE = 01-Oct-1997

1568-D
REVISION DATE = 21-Oct-2006
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1636-A
REVISION DATE = 21-Jun-2006
SURVEY DATE = 01-Sep-1997

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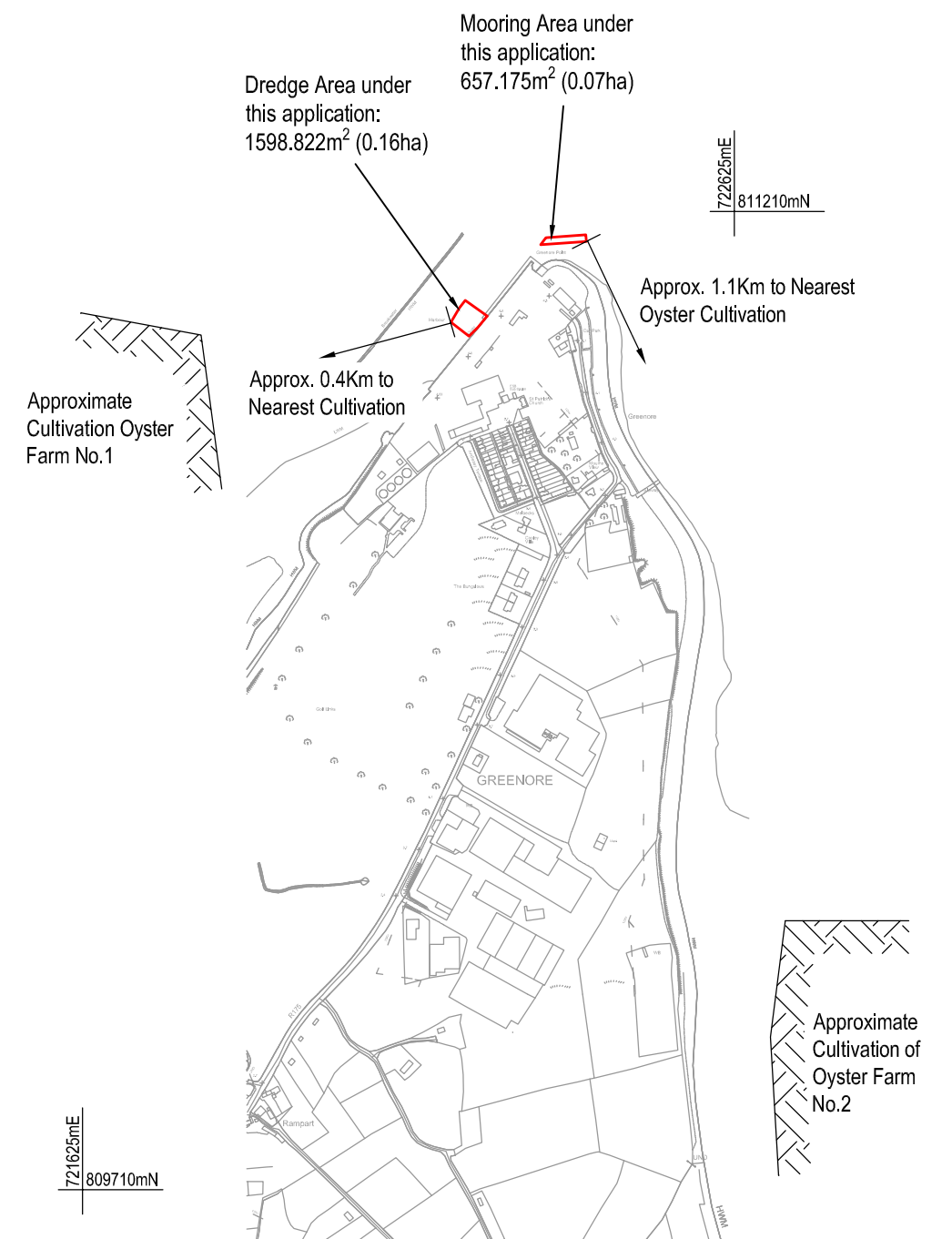
1636
REVISION DATE = 21-Sep-2004
SURVEY DATE = 30-Jun-1995
- All coordinates to ITM

- GREENORE PORT
OWNERSHIP BOUNDARY
- EXTENT OF WORKS UNDER
THIS FORESHORE
APPLICATION

rev	amendments	drawn date	checked date
<div><div>RPS</div><div>Elmwood House 74 Boucher Road Belfast BT12 6RZ</div><div>T F W E</div><div>+44 (0) 28 90 667914 +44 (0) 28 90 668286 www.rpsgroup.com/ireland ireland@rpsgroup.com</div></div>			
Client Greenore Port			
Project Greenore Berth 1 Repairs			
Title Site Location Plan			
Drawing Status Foreshore	Sheet Size A3	Drawing Scale 1:2500	
Drawing Number IBM0601-FS-2000		Rev -	
Project Leader DOL	Drawn By CC	Date 05/02/2016	Initial Review DOL



Admiralty Chart
[1:2500]



Location Map
[1:10,560]

- RPS CONSULTING ENGINEERS ORDNANCE SURVEY
IRELAND LICENCE No. EN 0029315
© ORDNANCE SURVEY IRELAND AND GOVERNMENT OF IRELAND
- Map Series:
1:2500
1568-C REVISION DATE = 21-Oct-2006
SURVEY DATE = 01-Oct-1997
1568-D REVISION DATE = 21-Oct-2006
SURVEY DATE = 01-Sep-1997
1636-A REVISION DATE = 21-Jun-2006
SURVEY DATE = 01-Sep-1997
1:5000
1636 REVISION DATE = 21-Sep-2004
SURVEY DATE = 30-Jun-1995
- All coordinates to ITM

RPS Elmwood House T +44 (0) 28 90 667914 74 Boucher Road F +44 (0) 28 90 668286 Belfast W www.rpsgroup.com/ireland BT12 6RZ E ireland@rpsgroup.com			
Project Greenore Berth 1 Repairs			
Title Site Location Map And Admiralty Chart			
Drawing Status Foreshore	Sheet Size A3	Drawing Scale As Shown	
Drawing Number IBM0601-FS-2001			Rev -
Project Leader DOL	Drawn By CC	Date 05/02/2016	Initial Review DOL

Appendix 3. Floating Mooring Point attached to the Seabed



Appendix 4. Conservation maps



Figure 1 SPA



Figure 2 SAC

Appendix 5. SPA Site Synopsis

SITE SYNOPSIS

SITE NAME: CARLINGFORD LOUGH SPA

SITE CODE: 004078

The site comprises part of the southern sector of Carlingford Lough, Co. Louth, extending from the harbour at Carlingford to Greenore Point. It includes all of the intertidal sand and mud flats to the low tide mark. Much of the shoreline is artificially embanked.

The site supports part of a nationally important population of wintering Cormorant (233 average maximum, 1995/96-1999/00). A range of other waterfowl species occurs, notably Brent Goose (175), Oystercatcher (172), Dunlin (267), Bar-tailed Godwit (25), Redshank (35) and Turnstone (19). The intertidal flats provide feeding areas for the wintering birds.

While the numbers of wintering birds are relatively low, the site does support a good range of species. The presence of Bar-tailed Godwit is of particular note as this species is listed on Annex I of the E.U. Birds Directive.

8.2.2004

Carlingford Lough SPA Qualifying Interests:

A046 Brent Goose *Branta bernicla hrota*

A999 Wetlands

Appendix 6. Carlingford SAC Site Synopsis

SITE SYNOPSIS

SITE NAME: CARLINGFORD SHORE

SITE CODE: 002306

Carlingford Shore stretches for approximately 15 km along the shoreline to the LWM of Carlingford Lough which is also the estuary of the Newry River. It is flanked by glacial moraines and mountains - the Mourne Mountains to the north and Carlingford Mountain to the south-west. The underlying rock within the SAC is mainly carboniferous limestone. This outcrops over sections of the SAC in the form of bedrock shore or reefs. Granite boulders are occasionally found. Intertidal mudflats and sand/gravel banks also occur.

The site is a candidate SAC selected for perennial vegetation of stony banks and drift lines, both habitats listed on Annex I of the E.U. Habitats Directive.

The stony banks or shingle found along much of the site vary in width from less than a meter to approximately 50 m south of Ballagan Point. The best examples are found in this area. The perennial vegetation of the upper beach of these shingle banks is widely ranging, well developed and often stable. In places lichens encrust the stones farther back from the sea. Typical species present throughout the site include Oraches (*Atriplex* spp.), Sea Beet (*Beta vulgaris*), Wild Carrot (*Daucus carota*), Red Fescue (*Festuca rubra*), Sea-milkwort (*Glaux maritima*), Lyme-grass (*Leymus arenarius*) and Wild Radish (*Raphanus raphanistrum*). This grades landward into lowland dry grassland mainly though there are patches of wet grassland.

The vegetation of the stony banks is often interspersed with the vegetation occupying accumulations of drift material and gravels rich in nitrogenous organic matter. The vegetation is sparse. Species seen include Saltwort (*Salsola kali*), Sea Rocket (*Cakile maritima*), Sea Sandwort (*Honkenya peploides*), Sea Spurge (*Euphorbia paralias*), Sea Mayweed (*Matricaria maritima*) and Oraches. The Red Data Book Species the Oyster Plant (*Mertensia maritima*) is also found. This plant is protected under the Flora Protection Order 1999.

There are small patches of saltmarsh on the drier sections of outcropping reefs and at the landward edge of the site. Species present include Sea Aster (*Aster tripolium*), Sea Purslane (*Halimione portulacoides*), Lax-flowered Sea Lavender (*Limonium humile*), Common Saltmarsh-grass (*Puccinellia maritima*), Sea Arrowgrass (*Triglochin maritima*) and Sea Plantain (*Plantago maritima*). In areas which are more regularly flooded is Sea Blite (*Suaeda maritima*). A small brackish lake is present on the landward side of the railway line.

Relatively extensive expanse of intertidal flats - more a sand rather than mud dominant type - occur, particularly between Greenore Point and Carlingford Harbour. The flats in this area are broken by outcropping reefs and some shingle deposits and saltmarsh on the drier higher rocks. These flats are very important feeding grounds for wildfowl and waders. Patches of green algae (filamentous, *Ulva* sp. And *Enteromorpha* sp.) and Lugworm casts occur in places, while fucoid seaweeds are common on the more stony flats. Abundant Barnacle shells and Lichens are also present on many of the rocks. Eelgrass (*Zostera*) beds are found on the flats – the main food source for the internationally important population of Pale-bellied Brent Geese at the site. Small tufts of Cord-grass (*Spartina*) are also found.

The threshold for internationally important numbers of birds within the site has been exceeded in single years, by some species such as Pale-bellied Brent Geese in the

80's and 94/95. The site is nationally important for a number of species such as Great Crested Grebe, Cormorant, Ringed Plover and Red-Breasted Merganser. This classification is based on species which attained interim all-Ireland importance on the basis of the three year mean maximum counts for the winters 94/95-96/97. There are a number of bird species recorded including, Golden Plover and Bar-tailed Godwit, which are listed under Annex I of the E.U. Birds Directive. The intertidal flats between Greenore and Carlingford have been designated a Special Protection Area under the EU Birds Directive.

Black Guillemots (6) were recorded in pairs nesting in wooden breakwater in Greenore and 8 birds were seen at the breakwater. A colony of Terns in Northern Ireland feed in the SPA particularly Sandwich Tern with some Common Tern. Grey Seals also use the site. Approximately 25-30 haul out on reefs between Greenore and Carlingford. This seal is listed in Annex II under the E.U. Habitats Directive.

The principal activity in the site is recreational usage and shellfish production. Almost the entire area at the MLWM between Carlingford Harbour and Greenore is under production of Oyster and some small amount of Clams.

Carlingford Shore has a wide diversity of habitats including very good examples of perennial vegetation of stony banks and drift lines. The presence of the Red Data Book Species adds to the ecological interest. The wide area of mud and sand flats within the site is internationally important for birds and is designated as a Special Protection Area. Grey Seal, an Annex II species under the E.U. Habitats Directive adds to the conservation value of the site.

23.10.2002

Carlingford Shore SAC Qualifying Interests:

1210 Annual vegetation of drift lines

1220 Perennial vegetation of stony banks

Appendix 7. Exert from BS5228-1

BS 5228-1:2009+A1:2014

BRITISH STANDARD

Licensed copy:RPS Group (Ireland), 06/08/2014, Uncontrolled Copy, © BSI

Table C.3 Sound level data on piling and ancillary operations

Ref no.	Equipment	Power rating, kW	Equipment size, weight (mass), capacity	Octave band sound pressure levels at 10 m, Hz							A-weighted sound pressure level, $L_{Aeq,T}$ (dBA) dB at 10 m
				63	125	250	500	1k	2k	4k	
1	Pre-cast concrete piling – hydraulic hammer										
	Hydraulic hammer rig	145	16 m length / 5 t hammer / plywood dolly	82	82	82	89	83	78	75	89
2	Tubular steel piling – hydraulic hammer										
	Hydraulic hammer rig	186	4 t hammer	80	87	88	84	83	78	74	87
3	Hydraulic hammer rig	—	240 mm diameter	87	93	85	87	83	80	75	88
4	Hydraulic hammer rig	—	(1 t) 2 m length / 300 mm diameter	73	65	65	64	70	72	72	77
5	Drop hammer pile rig power pack	23	—	79	65	60	59	66	63	53	69
	Tubular steel piling – hydraulic jacking										
6	Piling	2800 kN	10 t / 13 m length / 900 mm width / soil	80	74	70	65	61	57	49	68
7	Power pack	147	6 t	77	78	73	66	63	57	50	70
	Sheet steel piling – vibratory										
8	Vibratory piling rig	—	52 t / 14 m length / soft clay	83	82	79	82	84	82	77	88
	Sheet steel piling – hydraulic jacking										
9	Piling	1500 kN	10 t / 7.4 m length / 600 mm width / sandy clay	74	71	63	60	56	54	50	63
10	Power pack	147	6 t	80	75	69	67	61	55	49	68
11	Piling	980 kN	7.4 t / 12 m length / 500 mm width	68	60	59	57	51	50	45	59
12	Rig power pack	—	5 t	74	70	66	60	54	51	46	63
13	Water jet pump	—	—	75	75	62	58	55	54	48	63
	Rotary bored piling – cast in situ										
14	Large rotary bored piling rig	—	110 t / 20 m deep / 1.2 m diameter	84	92	81	80	78	76	68	83
15	Tracked drilling rig with hydraulic drifter	104	12.5 t	75	79	76	73	74	79	74	82
16	Crane mounted auger	—	—	87	86	77	73	75	72	67	79
17	Mini piling rig	29	5.4 t / auger 10 m deep x 450 mm diameter piles	87	77	72	73	71	69	65	76
18	Mini piling rig	—	Auger 12 m deep x 250 mm diameter piles	74	72	65	71	70	68	63	75
19	Compressor for mini piling	45	1 t	75	71	65	70	71	69	62	75
20	Mini tracked excavator	17	2.8 t	76	73	62	66	62	59	54	68

Appendix 8. Chemical Analysis of Sediments 2010/2011



Diarmuid O Loan
RPS Group
Elmwood House
74 Boucher Road
Belfast
Antrim
BT12 6RZ

Dear Diarmuid

Please find attached the results for the batch of samples described below.

Samples Registered on:	25-May-2010
Results for Batch Number	20020767
Your Purchase Order Number:	IBM0302

You will be invoiced shortly by our accounts department.

If we can be of further assistance then please do not hesitate to contact us.

Yours sincerely

William Fardon
Customer Services Team Leader
Tel: (0113) 231 2177
nls@environment-agency.gov.uk

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation. Details of analytical procedures and performance data are available on request. The date of sample analysis is available on request.

The Environment Agency carries out analytical work to high standards and within the scope of its UKAS accreditation, but has no knowledge of whether the circumstances or the validity of the procedures used to obtain the samples provided to the laboratory were representative of the need for which the information was required.

The Environment Agency and/or its staff does not therefore accept any liability for the consequences of any acts or omissions made on the basis of the analysis or advice or interpretation provided.





Client: RPS Group
Folder No: 001313904
Comments: C162461
Quote No: 6174

Project: Dredging Analysis
Sampled on: 21-May-10 @ 10:40

Matrix: Sediment

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>MRV</u>	<u>Accred</u>	<u>Lab ID</u>	<u>Testcode</u>
Density	1.39	g/ml	0.1	None	LE	881
Dry Solids @ 105°C	78.6	%	0.5	UKAS	LE	911
Loss on Ignition @ 500°C	3.93	%	0.5	UKAS	LE	911
Carbon : Dry Wt	2.65	%	0.4	UKAS	LL	404
Carbon, Organic : Dry Wt as C	2.01	%	0.4	None	LL	404
Grain Size : 4000 to 7999 microns	17.1	%	0	UKAS	LL	994
Grain Size Fraction : < 20 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : < 63 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : > 8000 microns	32.1	%	0	UKAS	LL	994
Grain Size Fraction : 1000 to 2000 microns	7.49	%	0	UKAS	LL	994
Grain Size Fraction : 125 to 249 microns	3.90	%	0	UKAS	LL	994
Grain Size Fraction : 2000 to 3999 microns	15.3	%	0	UKAS	LL	994
Grain Size Fraction : 250 to 499 microns	11.4	%	0	UKAS	LL	994
Grain Size Fraction : 500 to 999 microns	12.5	%	0	UKAS	LL	994
Grain Size Fraction : 63 to 125 microns	0.00	%	0	UKAS	LL	994
Grain Size Inclusive Kurtosis	0.651	mm	-12	UKAS	LL	994
Grain Size Inclusive Mean	2.64	mm	0	UKAS	LL	994
Inclusive Graphic Skewness :- {SKI}	-0.450	Unitless	-1	UKAS	LL	994
Kurtosis	-1.61	Unitless	-12	UKAS	LL	994
Particle Diameter : Mean	4.68	mm	0	UKAS	LL	994
Particle Diameter : Median	3.90	mm	0	UKAS	LL	994
Sorting Coefficient	1.82	Unitless	-3	UKAS	LL	994
Hydrocarbons : Total : Dry Wt as Ekofisk	391	mg/kg	0.05	UKAS	LL	402
Mercury : Dry Wt	0.0150	mg/kg	0.001	UKAS	LL	1042
Arsenic : Dry Wt	3.66	mg/kg	0.1	UKAS	LL	1041
Cadmium : Dry Wt	0.104	mg/kg	0.01	UKAS	LL	1041
Chromium : Dry Wt	25.0	mg/kg	0.05	UKAS	LL	1041
Copper : Dry Wt	13.9	mg/kg	0.1	UKAS	LL	1041
Lead : Dry Wt	26.8	mg/kg	0.2	UKAS	LL	1041
Lithium : Dry Wt	12.2	mg/kg	0.1	UKAS	LL	1041
Nickel : Dry Wt	24.8	mg/kg	0.3	UKAS	LL	1041
Zinc : Dry Wt	56.8	mg/kg	0.2	UKAS	LL	1041
Aldrin DW	<1.00	ug/kg	1	UKAS	LL	672
DDE -pp DW	<2.00	ug/kg	2	UKAS	LL	672
DDT -op DW	<1.00	ug/kg	1	UKAS	LL	672
DDT -pp DW	<2.00	ug/kg	2	UKAS	LL	672
Dieldrin DW	<3.00	ug/kg	3	UKAS	LL	672
Endrin DW	<2.00	ug/kg	2	UKAS	LL	672
HCB DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -alpha DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -beta DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -delta DW	<1.00	ug/kg	1	UKAS	LL	672





HCH -gamma DW	<1.00	ug/kg	1	UKAS	LL	672
Hexachlorobenzene DW	<1.00	ug/kg	1	UKAS	LL	672
Isodrin DW	<2.00	ug/kg	2	UKAS	LL	672
TDE -pp DW	<1.00	ug/kg	1	UKAS	LL	672
Acenaphthene : Dry Wt	49.6	ug/kg	2	UKAS	LL	1051
Acenaphthylene : Dry Wt	<2.00	ug/kg	2	None	LL	1051
Anthracene : Dry Wt	49.8	ug/kg	2	UKAS	LL	1051
Benzo(a)anthracene : Dry Wt	57.4	ug/kg	2	UKAS	LL	1051
Benzo(a)pyrene : Dry Wt	45.8	ug/kg	2	UKAS	LL	1051
Benzo(b)fluoranthene : Dry Wt	122	ug/kg	10	UKAS	LL	1051
Benzo(ghi)perylene : Dry Wt	48.4	ug/kg	10	UKAS	LL	1051
Benzo(k)fluoranthene : Dry Wt	21.7	ug/kg	10	UKAS	LL	1051
Chrysene : Dry Wt	53.0	ug/kg	2	UKAS	LL	1051
Dibenzo(ah)anthracene : Dry Wt	11.9	ug/kg	5	UKAS	LL	1051
Fluoranthene : Dry Wt	80.2	ug/kg	2	UKAS	LL	1051
Fluorene : Dry Wt	68.0	ug/kg	10	UKAS	LL	1051
Indeno(123cd)pyrene Dry Wt	39.5	ug/kg	10	UKAS	LL	1051
Naphthalene : Dry Wt	615	ug/kg	30	None	LL	1051
Phenanthrene : Dry Wt	194	ug/kg	10	UKAS	LL	1051
Pyrene : Dry Wt	66.1	ug/kg	2	UKAS	LL	1051
PCB 028 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 052 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 101 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 118 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 138 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 153 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 180 DW	<0.100	ug/kg	0.1	UKAS	LL	685
Dibutyl Tin : Dry Wt as cation	<4.00	ug/kg	3	UKAS	LE	897
Tributyl Tin : Dry Wt as cation	10.0	ug/kg	3	UKAS	LE	897
Dry Solids @ 30°C	78.0	%	0.5	None	LE	1130
Accreditation Assessment	2	No.	1	None	LE	924
Sample Preparation	Report	Text		None	LE	924

Folder Number:1313904

The sample was received in a 1ltr plastic pot weighing approx. 1840g in total.

The sample appeared to be black gritty wet sediment with wheat.

138.07g of the sample was taken for drying at <30degC which gave 108.92g of dried sample (weights include tray weight).

The sample was received unpreserved.

All parameters are determined on the air-dried (<30degC) portion except those requiring a wet sample fraction where as received (wet) sample was used.

Dry Weight (DW) results are reported as determined at <30degC.





Client: RPS Group
Folder No: 001313905
Comments: C162462
Quote No: 6174

Project: Dredging Analysis
Sampled on: 21-May-10 @ 10:26

Matrix: Sediment

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>MRV</u>	<u>Accred</u>	<u>Lab ID</u>	<u>Testcode</u>
Density	1.83	g/ml	0.1	None	LE	881
Dry Solids @ 105°C	80.7	%	0.5	UKAS	LE	911
Loss on Ignition @ 500°C	9.22	%	0.5	UKAS	LE	911
Carbon : Dry Wt	2.31	%	0.4	UKAS	LL	404
Carbon, Organic : Dry Wt as C	1.16	%	0.4	None	LL	404
Grain Size : 4000 to 7999 microns	7.07	%	0	UKAS	LL	994
Grain Size Fraction : < 20 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : < 63 microns	0.220	%	0	UKAS	LL	994
Grain Size Fraction : > 8000 microns	71.5	%	0	UKAS	LL	994
Grain Size Fraction : 1000 to 2000 microns	1.57	%	0	UKAS	LL	994
Grain Size Fraction : 125 to 249 microns	1.44	%	0	UKAS	LL	994
Grain Size Fraction : 2000 to 3999 microns	5.20	%	0	UKAS	LL	994
Grain Size Fraction : 250 to 499 microns	3.93	%	0	UKAS	LL	994
Grain Size Fraction : 500 to 999 microns	4.44	%	0	UKAS	LL	994
Grain Size Fraction : 63 to 125 microns	0.840	%	0	UKAS	LL	994
Grain Size Inclusive Kurtosis	0.00400	mm	-12	UKAS	LL	994
Grain Size Inclusive Mean	6.73	mm	0	UKAS	LL	994
Inclusive Graphic Skewness :- {SKI}	-0.890	Unitless	-1	UKAS	LL	994
Kurtosis	1.09	Unitless	-12	UKAS	LL	994
Particle Diameter : Mean	7.75	mm	0	UKAS	LL	994
Particle Diameter : Median	8.96	mm	0	UKAS	LL	994
Sorting Coefficient	1.07	Unitless	-3	UKAS	LL	994
Hydrocarbons : Total : Dry Wt as Ekofisk	340	mg/kg	0.05	UKAS	LL	402
Mercury : Dry Wt	0.00400	mg/kg	0.001	UKAS	LL	1042
Arsenic : Dry Wt	2.34	mg/kg	0.1	UKAS	LL	1041
Cadmium : Dry Wt	0.0920	mg/kg	0.01	UKAS	LL	1041
Chromium : Dry Wt	18.5	mg/kg	0.05	UKAS	LL	1041
Copper : Dry Wt	15.7	mg/kg	0.1	UKAS	LL	1041
Lead : Dry Wt	38.9	mg/kg	0.2	UKAS	LL	1041
Lithium : Dry Wt	11.2	mg/kg	0.1	UKAS	LL	1041
Nickel : Dry Wt	19.5	mg/kg	0.3	UKAS	LL	1041
Zinc : Dry Wt	46.8	mg/kg	0.2	UKAS	LL	1041
Aldrin DW	<1.00	ug/kg	1	UKAS	LL	672
DDE -pp DW	<2.00	ug/kg	2	UKAS	LL	672
DDT -op DW	<1.00	ug/kg	1	UKAS	LL	672
DDT -pp DW	<2.00	ug/kg	2	UKAS	LL	672
Dieldrin DW	<3.00	ug/kg	3	UKAS	LL	672
Endrin DW	<2.00	ug/kg	2	UKAS	LL	672
HCB DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -alpha DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -beta DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -delta DW	<1.00	ug/kg	1	UKAS	LL	672





HCH -gamma DW	<1.00	ug/kg	1	UKAS	LL	672
Hexachlorobenzene DW	<1.00	ug/kg	1	UKAS	LL	672
Isodrin DW	<2.00	ug/kg	2	UKAS	LL	672
TDE -pp DW	<1.00	ug/kg	1	UKAS	LL	672
Acenaphthene : Dry Wt	65.9	ug/kg	2	UKAS	LL	1051
Acenaphthylene : Dry Wt	<2.00	ug/kg	2	None	LL	1051
Anthracene : Dry Wt	53.7	ug/kg	2	UKAS	LL	1051
Benzo(a)anthracene : Dry Wt	91.3	ug/kg	2	UKAS	LL	1051
Benzo(a)pyrene : Dry Wt	74.7	ug/kg	2	UKAS	LL	1051
Benzo(b)fluoranthene : Dry Wt	119	ug/kg	10	UKAS	LL	1051
Benzo(ghi)perylene : Dry Wt	51.8	ug/kg	10	UKAS	LL	1051
Benzo(k)fluoranthene : Dry Wt	28.1	ug/kg	10	UKAS	LL	1051
Chrysene : Dry Wt	82.3	ug/kg	2	UKAS	LL	1051
Dibenzo(ah)anthracene : Dry Wt	14.0	ug/kg	5	UKAS	LL	1051
Fluoranthene : Dry Wt	141	ug/kg	2	UKAS	LL	1051
Fluorene : Dry Wt	107	ug/kg	10	UKAS	LL	1051
Indeno(123cd)pyrene Dry Wt	46.0	ug/kg	10	UKAS	LL	1051
Naphthalene : Dry Wt	295	ug/kg	30	None	LL	1051
Phenanthrene : Dry Wt	250	ug/kg	10	UKAS	LL	1051
Pyrene : Dry Wt	116	ug/kg	2	UKAS	LL	1051
PCB 028 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 052 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 101 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 118 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 138 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 153 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 180 DW	<0.100	ug/kg	0.1	UKAS	LL	685
Dibutyl Tin : Dry Wt as cation	10.9	ug/kg	3	UKAS	LE	897
Tributyl Tin : Dry Wt as cation	300	ug/kg	3	UKAS	LE	897
Dry Solids @ 30°C	78.7	%	0.5	None	LE	1130
Accreditation Assessment	2	No.	1	None	LE	924
Sample Preparation	Report	Text		None	LE	924

Folder Number:1313905

The sample was received in a 1ltr plastic pot weighing approx. 1924g in total.

The sample appeared to be black gritty wet sediment with wheat.

124.02g of the sample was taken for drying at <30degC which gave 98.75g of dried sample (weights include tray weight).

The sample was received unpreserved.

All parameters are determined on the air-dried (<30degC) portion except those requiring a wet sample fraction where as received (wet) sample was used.

Dry Weight (DW) results are reported as determined at <30degC.





Client: RPS Group
Folder No: 001313906
Comments: C162463
Quote No: 6174

Project: Dredging Analysis
Sampled on: 21-May-10 @ 10:14

Matrix: Sediment

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>MRV</u>	<u>Accred</u>	<u>Lab ID</u>	<u>Testcode</u>
Density	1.18	g/ml	0.1	None	LE	881
Dry Solids @ 105°C	85.2	%	0.5	UKAS	LE	911
Loss on Ignition @ 500°C	21.0	%	0.5	UKAS	LE	911
Carbon : Dry Wt	0.901	%	0.4	UKAS	LL	404
Carbon, Organic : Dry Wt as C	0.622	%	0.4	None	LL	404
Grain Size : 4000 to 7999 microns	10.1	%	0	UKAS	LL	994
Grain Size Fraction : < 20 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : < 63 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : > 8000 microns	88.3	%	0	UKAS	LL	994
Grain Size Fraction : 1000 to 2000 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : 125 to 249 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : 2000 to 3999 microns	0.170	%	0	UKAS	LL	994
Grain Size Fraction : 250 to 499 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : 500 to 999 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : 63 to 125 microns	0.00	%	0	UKAS	LL	994
Grain Size Inclusive Kurtosis	0.467	mm	-12	UKAS	LL	994
Grain Size Inclusive Mean	9.00	mm	0	UKAS	LL	994
Inclusive Graphic Skewness :- {SKI}	-0.260	Unitless	-1	UKAS	LL	994
Kurtosis	14.5	Unitless	-12	UKAS	LL	994
Particle Diameter : Mean	9.04	mm	0	UKAS	LL	994
Particle Diameter : Median	9.12	mm	0	UKAS	LL	994
Sorting Coefficient	0.110	Unitless	-3	UKAS	LL	994
Hydrocarbons : Total : Dry Wt as Ekofisk	284	mg/kg	0.05	UKAS	LL	402
Mercury : Dry Wt	0.00800	mg/kg	0.001	UKAS	LL	1042
Arsenic : Dry Wt	4.36	mg/kg	0.1	UKAS	LL	1041
Cadmium : Dry Wt	0.117	mg/kg	0.01	UKAS	LL	1041
Chromium : Dry Wt	24.5	mg/kg	0.05	UKAS	LL	1041
Copper : Dry Wt	40.1	mg/kg	0.1	UKAS	LL	1041
Lead : Dry Wt	15.7	mg/kg	0.2	UKAS	LL	1041
Lithium : Dry Wt	13.4	mg/kg	0.1	UKAS	LL	1041
Nickel : Dry Wt	21.7	mg/kg	0.3	UKAS	LL	1041
Zinc : Dry Wt	94.3	mg/kg	0.2	UKAS	LL	1041
Aldrin DW	<1.00	ug/kg	1	UKAS	LL	672
DDE -pp DW	<2.00	ug/kg	2	UKAS	LL	672
DDT -op DW	<1.00	ug/kg	1	UKAS	LL	672
DDT -pp DW	<2.00	ug/kg	2	UKAS	LL	672
Dieldrin DW	<3.00	ug/kg	3	UKAS	LL	672
Endrin DW	<2.00	ug/kg	2	UKAS	LL	672
HCB DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -alpha DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -beta DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -delta DW	<1.00	ug/kg	1	UKAS	LL	672



HCH -gamma DW	<1.00	ug/kg	1	UKAS	LL	672
Hexachlorobenzene DW	<1.00	ug/kg	1	UKAS	LL	672
Isodrin DW	<2.00	ug/kg	2	UKAS	LL	672
TDE -pp DW	<1.00	ug/kg	1	UKAS	LL	672
Acenaphthene : Dry Wt	215	ug/kg	2	UKAS	LL	1051
Acenaphthylene : Dry Wt	21.9	ug/kg	2	None	LL	1051
Anthracene : Dry Wt	233	ug/kg	2	UKAS	LL	1051
Benzo(a)anthracene : Dry Wt	343	ug/kg	2	UKAS	LL	1051
Benzo(a)pyrene : Dry Wt	282	ug/kg	2	UKAS	LL	1051
Benzo(b)fluoranthene : Dry Wt	512	ug/kg	10	UKAS	LL	1051
Benzo(ghi)perylene : Dry Wt	259	ug/kg	10	UKAS	LL	1051
Benzo(k)fluoranthene : Dry Wt	101	ug/kg	10	UKAS	LL	1051
Chrysene : Dry Wt	290	ug/kg	2	UKAS	LL	1051
Dibenzo(ah)anthracene : Dry Wt	61.6	ug/kg	5	UKAS	LL	1051
Fluoranthene : Dry Wt	389	ug/kg	2	UKAS	LL	1051
Fluorene : Dry Wt	408	ug/kg	10	UKAS	LL	1051
Indeno(123cd)pyrene Dry Wt	153	ug/kg	10	UKAS	LL	1051
Naphthalene : Dry Wt	1710	ug/kg	30	None	LL	1051
Phenanthrene : Dry Wt	1070	ug/kg	10	UKAS	LL	1051
Pyrene : Dry Wt	335	ug/kg	2	UKAS	LL	1051
PCB 028 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 052 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 101 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 118 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 138 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 153 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 180 DW	<0.100	ug/kg	0.1	UKAS	LL	685
Dibutyl Tin : Dry Wt as cation	41.6	ug/kg	3	UKAS	LE	897
Tributyl Tin : Dry Wt as cation	200	ug/kg	3	UKAS	LE	897
Dry Solids @ 30°C	88.6	%	0.5	None	LE	1130
Accreditation Assessment	2	No.	1	None	LE	924
Sample Preparation	Report	Text		None	LE	924

Folder Number:1313906

The sample was received in a 1ltr plastic pot weighing approx. 1644g in total.

The sample appeared to be black gritty wet sediment with wheat.

80.37g of the sample was taken for drying at <30degC which gave 71.85g of dried sample (weights include tray weight).

The sample was received unpreserved.

All parameters are determined on the air-dried (<30degC) portion except those requiring a wet sample fraction where as received (wet) sample was used.

Dry Weight (DW) results are reported as determined at <30degC.



Client: RPS Group
Folder No: 001313907
Comments: C162464
Quote No: 6174

Project: Dredging Analysis
Sampled on: 21-May-10 @ 09:50

Matrix: Sediment

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>MRV</u>	<u>Accred</u>	<u>Lab ID</u>	<u>Testcode</u>
Density	1.64	g/ml	0.1	None	LE	881
Dry Solids @ 105°C	11.9	%	0.5	None	LE	911
Loss on Ignition @ 500°C	8.81	%	0.5	None	LE	911
Carbon : Dry Wt	3.22	%	0.4	None	LL	404
Carbon, Organic : Dry Wt as C	1.43	%	0.4	None	LL	404
Grain Size : 4000 to 7999 microns	8.18	%	0	None	LL	994
Grain Size Fraction : < 20 microns	0.00	%	0	None	LL	994
Grain Size Fraction : < 63 microns	0.00	%	0	None	LL	994
Grain Size Fraction : > 8000 microns	89.7	%	0	None	LL	994
Grain Size Fraction : 1000 to 2000 microns	0.00	%	0	None	LL	994
Grain Size Fraction : 125 to 249 microns	0.00	%	0	None	LL	994
Grain Size Fraction : 2000 to 3999 microns	0.300	%	0	None	LL	994
Grain Size Fraction : 250 to 499 microns	0.00	%	0	None	LL	994
Grain Size Fraction : 500 to 999 microns	0.00	%	0	None	LL	994
Grain Size Fraction : 63 to 125 microns	0.00	%	0	None	LL	994
Grain Size Inclusive Kurtosis	0.460	mm	-12	None	LL	994
Grain Size Inclusive Mean	9.13	mm	0	None	LL	994
Inclusive Graphic Skewness :- {SKI}	-0.230	Unitless	-1	None	LL	994
Kurtosis	13.5	Unitless	-12	None	LL	994
Particle Diameter : Mean	9.08	mm	0	None	LL	994
Particle Diameter : Median	9.15	mm	0	None	LL	994
Sorting Coefficient	0.100	Unitless	-3	None	LL	994
Hydrocarbons : Total : Dry Wt as Ekofisk	401	mg/kg	0.05	None	LL	402
Mercury : Dry Wt	0.00700	mg/kg	0.001	None	LL	1042
Arsenic : Dry Wt	3.99	mg/kg	0.1	None	LL	1041
Cadmium : Dry Wt	0.108	mg/kg	0.01	None	LL	1041
Chromium : Dry Wt	21.1	mg/kg	0.05	None	LL	1041
Copper : Dry Wt	29.5	mg/kg	0.1	None	LL	1041
Lead : Dry Wt	17.1	mg/kg	0.2	None	LL	1041
Lithium : Dry Wt	11.9	mg/kg	0.1	None	LL	1041
Nickel : Dry Wt	17.0	mg/kg	0.3	None	LL	1041
Zinc : Dry Wt	62.3	mg/kg	0.2	None	LL	1041
Dibutyl Tin : Dry Wt as cation	<3.00	ug/kg	3	None	LE	897
Tributyl Tin : Dry Wt as cation	<3.00	ug/kg	3	None	LE	897
Dry Solids @ 30°C	90.9	%	0.5	None	LE	1130
Accreditation Assessment	1	No.	1	None	LE	924
Sample Preparation	Report	Text		None	LE	924





Folder Number:1313907

The sample was received in a 1ltr plastic pot weighing approx. 1892g in total.

The sample appeared to be black wet stones.

178.96g of the sample was taken for drying at <30degC which gave 163.14g of dried sample (weights include tray weight).

The sample was received unpreserved.

All parameters are determined on the air-dried (<30degC) portion except those requiring a wet sample fraction where as received (wet) sample was used.

Dry Weight (DW) results are reported as determined at <30degC.





Client: RPS Group
Folder No: 001313908
Comments: C162465
Quote No: 6174

Project: Dredging Analysis
Sampled on: 21-May-10 @ 10:05

Matrix: Sediment

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>MRV</u>	<u>Accred</u>	<u>Lab ID</u>	<u>Testcode</u>
Density	1.52	g/ml	0.1	None	LE	881
Dry Solids @ 105°C	82.1	%	0.5	UKAS	LE	911
Loss on Ignition @ 500°C	3.01	%	0.5	UKAS	LE	911
Carbon : Dry Wt	1.06	%	0.4	UKAS	LL	404
Carbon, Organic : Dry Wt as C	1.06	%	0.4	None	LL	404
Grain Size : 4000 to 7999 microns	9.62	%	0	UKAS	LL	994
Grain Size Fraction : < 20 microns	1.17	%	0	UKAS	LL	994
Grain Size Fraction : < 63 microns	1.98	%	0	UKAS	LL	994
Grain Size Fraction : > 8000 microns	83.4	%	0	UKAS	LL	994
Grain Size Fraction : 1000 to 2000 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : 125 to 249 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : 2000 to 3999 microns	0.960	%	0	UKAS	LL	994
Grain Size Fraction : 250 to 499 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : 500 to 999 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : 63 to 125 microns	0.440	%	0	UKAS	LL	994
Grain Size Inclusive Kurtosis	0.444	mm	-12	UKAS	LL	994
Grain Size Inclusive Mean	8.94	mm	0	UKAS	LL	994
Inclusive Graphic Skewness :- {SKI}	-0.290	Unitless	-1	UKAS	LL	994
Kurtosis	13.3	Unitless	-12	UKAS	LL	994
Particle Diameter : Mean	8.77	mm	0	UKAS	LL	994
Particle Diameter : Median	9.09	mm	0	UKAS	LL	994
Sorting Coefficient	0.120	Unitless	-3	UKAS	LL	994
Hydrocarbons : Total : Dry Wt as Ekofisk	412	mg/kg	0.05	UKAS	LL	402
Mercury : Dry Wt	0.00800	mg/kg	0.001	UKAS	LL	1042
Arsenic : Dry Wt	3.30	mg/kg	0.1	UKAS	LL	1041
Cadmium : Dry Wt	0.108	mg/kg	0.01	UKAS	LL	1041
Chromium : Dry Wt	16.9	mg/kg	0.05	UKAS	LL	1041
Copper : Dry Wt	419	mg/kg	0.1	UKAS	LL	1041
Lead : Dry Wt	13.3	mg/kg	0.2	UKAS	LL	1041
Lithium : Dry Wt	11.9	mg/kg	0.1	UKAS	LL	1041
Nickel : Dry Wt	15.4	mg/kg	0.3	UKAS	LL	1041
Zinc : Dry Wt	105	mg/kg	0.2	UKAS	LL	1041
Aldrin DW	<1.00	ug/kg	1	UKAS	LL	672
DDE -pp DW	<2.00	ug/kg	2	UKAS	LL	672
DDT -op DW	<1.00	ug/kg	1	UKAS	LL	672
DDT -pp DW	<2.00	ug/kg	2	UKAS	LL	672
Dieldrin DW	<3.00	ug/kg	3	UKAS	LL	672
Endrin DW	<2.00	ug/kg	2	UKAS	LL	672
HCB DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -alpha DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -beta DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -delta DW	<1.00	ug/kg	1	UKAS	LL	672





HCH -gamma DW	<1.00	ug/kg	1	UKAS	LL	672
Hexachlorobenzene DW	<1.00	ug/kg	1	UKAS	LL	672
Isodrin DW	<2.00	ug/kg	2	UKAS	LL	672
TDE -pp DW	<1.00	ug/kg	1	UKAS	LL	672
Acenaphthene : Dry Wt	75.5	ug/kg	2	UKAS	LL	1051
Acenaphthylene : Dry Wt	2.90	ug/kg	2	None	LL	1051
Anthracene : Dry Wt	145	ug/kg	2	UKAS	LL	1051
Benzo(a)anthracene : Dry Wt	184	ug/kg	2	UKAS	LL	1051
Benzo(a)pyrene : Dry Wt	176	ug/kg	2	UKAS	LL	1051
Benzo(b)fluoranthene : Dry Wt	277	ug/kg	10	UKAS	LL	1051
Benzo(ghi)perylene : Dry Wt	188	ug/kg	10	UKAS	LL	1051
Benzo(k)fluoranthene : Dry Wt	60.8	ug/kg	10	UKAS	LL	1051
Chrysene : Dry Wt	164	ug/kg	2	UKAS	LL	1051
Dibenzo(ah)anthracene : Dry Wt	46.3	ug/kg	5	UKAS	LL	1051
Fluoranthene : Dry Wt	213	ug/kg	2	UKAS	LL	1051
Fluorene : Dry Wt	138	ug/kg	10	UKAS	LL	1051
Indeno(123cd)pyrene Dry Wt	99.3	ug/kg	10	UKAS	LL	1051
Naphthalene : Dry Wt	486	ug/kg	30	None	LL	1051
Phenanthrene : Dry Wt	538	ug/kg	10	UKAS	LL	1051
Pyrene : Dry Wt	224	ug/kg	2	UKAS	LL	1051
PCB 028 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 052 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 101 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 118 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 138 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 153 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 180 DW	<0.100	ug/kg	0.1	UKAS	LL	685
Dibutyl Tin : Dry Wt as cation	65.6	ug/kg	3	UKAS	LE	897
Tributyl Tin : Dry Wt as cation	850	ug/kg	3	UKAS	LE	897
Dry Solids @ 30°C	89.5	%	0.5	None	LE	1130
Accreditation Assessment	2	No.	1	None	LE	924
Sample Preparation	Report	Text		None	LE	924

Folder Number:1313908

The sample was received in a 1ltr plastic pot weighing approx. 1766g in total.

The sample appeared to be black gritty wet sediment with wheat.

140.77g of the sample was taken for drying at <30degC which gave 126.52g of dried sample (weights include tray weight).

The sample was received unpreserved.

All parameters are determined on the air-dried (<30degC) portion except those requiring a wet sample fraction where as received (wet) sample was used.

Dry Weight (DW) results are reported as determined at <30degC.



Client: RPS Group
Folder No: 001313909
Comments: C162466
Quote No: 6174

Project: Dredging Analysis
Sampled on: 21-May-10 @ 09:35

Matrix: Sediment

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>MRV</u>	<u>Accred</u>	<u>Lab ID</u>	<u>Testcode</u>
Density	1.38	g/ml	0.1	None	LE	881
Dry Solids @ 105°C	87.5	%	0.5	UKAS	LE	911
Loss on Ignition @ 500°C	15.1	%	0.5	UKAS	LE	911
Carbon : Dry Wt	0.916	%	0.4	UKAS	LL	404
Carbon, Organic : Dry Wt as C	0.793	%	0.4	None	LL	404
Grain Size : 4000 to 7999 microns	9.98	%	0	UKAS	LL	994
Grain Size Fraction : < 20 microns	1.10	%	0	UKAS	LL	994
Grain Size Fraction : < 63 microns	1.89	%	0	UKAS	LL	994
Grain Size Fraction : > 8000 microns	83.2	%	0	UKAS	LL	994
Grain Size Fraction : 1000 to 2000 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : 125 to 249 microns	0.150	%	0	UKAS	LL	994
Grain Size Fraction : 2000 to 3999 microns	0.980	%	0	UKAS	LL	994
Grain Size Fraction : 250 to 499 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : 500 to 999 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : 63 to 125 microns	0.480	%	0	UKAS	LL	994
Grain Size Inclusive Kurtosis	0.463	mm	-12	UKAS	LL	994
Grain Size Inclusive Mean	8.94	mm	0	UKAS	LL	994
Inclusive Graphic Skewness :- {SKI}	-0.300	Unitless	-1	UKAS	LL	994
Kurtosis	14.0	Unitless	-12	UKAS	LL	994
Particle Diameter : Mean	8.75	mm	0	UKAS	LL	994
Particle Diameter : Median	9.08	mm	0	UKAS	LL	994
Sorting Coefficient	0.120	Unitless	-3	UKAS	LL	994
Hydrocarbons : Total : Dry Wt as Ekofisk	232	mg/kg	0.05	UKAS	LL	402
Mercury : Dry Wt	0.00800	mg/kg	0.001	UKAS	LL	1042
Arsenic : Dry Wt	3.11	mg/kg	0.1	UKAS	LL	1041
Cadmium : Dry Wt	0.165	mg/kg	0.01	UKAS	LL	1041
Chromium : Dry Wt	17.9	mg/kg	0.05	UKAS	LL	1041
Copper : Dry Wt	20.7	mg/kg	0.1	UKAS	LL	1041
Lead : Dry Wt	18.1	mg/kg	0.2	UKAS	LL	1041
Lithium : Dry Wt	10.5	mg/kg	0.1	UKAS	LL	1041
Nickel : Dry Wt	15.8	mg/kg	0.3	UKAS	LL	1041
Zinc : Dry Wt	76.2	mg/kg	0.2	UKAS	LL	1041
Aldrin DW	<1.00	ug/kg	1	UKAS	LL	672
DDE -pp DW	<2.00	ug/kg	2	UKAS	LL	672
DDT -op DW	<1.00	ug/kg	1	UKAS	LL	672
DDT -pp DW	<2.00	ug/kg	2	UKAS	LL	672
Dieldrin DW	<3.00	ug/kg	3	UKAS	LL	672
Endrin DW	<2.00	ug/kg	2	UKAS	LL	672
HCB DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -alpha DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -beta DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -delta DW	<1.00	ug/kg	1	UKAS	LL	672

HCH -gamma DW	<1.00	ug/kg	1	UKAS	LL	672
Hexachlorobenzene DW	<1.00	ug/kg	1	UKAS	LL	672
Isodrin DW	<2.00	ug/kg	2	UKAS	LL	672
TDE -pp DW	<1.00	ug/kg	1	UKAS	LL	672
Acenaphthene : Dry Wt	108	ug/kg	2	UKAS	LL	1051
Acenaphthylene : Dry Wt	4.00	ug/kg	2	None	LL	1051
Anthracene : Dry Wt	56.3	ug/kg	2	UKAS	LL	1051
Benzo(a)anthracene : Dry Wt	106	ug/kg	2	UKAS	LL	1051
Benzo(a)pyrene : Dry Wt	91.6	ug/kg	2	UKAS	LL	1051
Benzo(b)fluoranthene : Dry Wt	138	ug/kg	10	UKAS	LL	1051
Benzo(ghi)perylene : Dry Wt	73.5	ug/kg	10	UKAS	LL	1051
Benzo(k)fluoranthene : Dry Wt	25.7	ug/kg	10	UKAS	LL	1051
Chrysene : Dry Wt	105	ug/kg	2	UKAS	LL	1051
Dibenzo(ah)anthracene : Dry Wt	19.3	ug/kg	5	UKAS	LL	1051
Fluoranthene : Dry Wt	157	ug/kg	2	UKAS	LL	1051
Fluorene : Dry Wt	131	ug/kg	10	UKAS	LL	1051
Indeno(123cd)pyrene Dry Wt	49.0	ug/kg	10	UKAS	LL	1051
Naphthalene : Dry Wt	732	ug/kg	30	None	LL	1051
Phenanthrene : Dry Wt	261	ug/kg	10	UKAS	LL	1051
Pyrene : Dry Wt	163	ug/kg	2	UKAS	LL	1051
PCB 028 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 052 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 101 DW	0.120	ug/kg	0.1	UKAS	LL	685
PCB 118 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 138 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 153 DW	<0.100	ug/kg	0.1	UKAS	LL	685
PCB 180 DW	<0.100	ug/kg	0.1	UKAS	LL	685
Dibutyl Tin : Dry Wt as cation	8.53	ug/kg	3	UKAS	LE	897
Tributyl Tin : Dry Wt as cation	10.0	ug/kg	3	UKAS	LE	897
Dry Solids @ 30°C	86.8	%	0.5	None	LE	1130
Accreditation Assessment	2	No.	1	None	LE	924
Sample Preparation	Report	Text		None	LE	924

Folder Number:1313909

The sample was received in a 1ltr plastic pot weighing approx. 1942g in total.

The sample appeared to be black gritty wet sediment with wheat and sweetcorn.

134.25g of the sample was taken for drying at <30degC which gave 117.26g of dried sample (weights include tray weight).

The sample was received unpreserved.

All parameters are determined on the air-dried (<30degC) portion except those requiring a wet sample fraction where as received (wet) sample was used.

Dry Weight (DW) results are reported as determined at <30degC.



Client: RPS Group
Folder No: 001330988
Comments: CRM
Quote No: 6174

Project: Dredging Analysis
Sampled on: 24-May-10 @ (Time not supplied)

Matrix: Sediment

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>MRV</u>	<u>Accred</u>	<u>Lab ID</u>	<u>Testcode</u>
Carbon : Dry Wt	0.517	%	0.4	UKAS	LL	404
Carbon, Organic : Dry Wt as C	0.509	%	0.4	None	LL	404
Grain Size : 4000 to 7999 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : < 20 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : < 63 microns	7.08	%	0	UKAS	LL	994
Grain Size Fraction : > 8000 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : 1000 to 2000 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : 125 to 249 microns	45.0	%	0	UKAS	LL	994
Grain Size Fraction : 2000 to 3999 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : 250 to 499 microns	15.7	%	0	UKAS	LL	994
Grain Size Fraction : 500 to 999 microns	0.00	%	0	UKAS	LL	994
Grain Size Fraction : 63 to 125 microns	32.2	%	0	UKAS	LL	994
Grain Size Inclusive Kurtosis	0.525	mm	-12	UKAS	LL	994
Grain Size Inclusive Mean	0.144	mm	0	UKAS	LL	994
Inclusive Graphic Skewness :- {SKI}	-0.0600	Unitless	-1	UKAS	LL	994
Kurtosis	0.480	Unitless	-12	UKAS	LL	994
Particle Diameter : Mean	0.164	mm	0	UKAS	LL	994
Particle Diameter : Median	0.147	mm	0	UKAS	LL	994
Sorting Coefficient	0.780	Unitless	-3	UKAS	LL	994
Hydrocarbons : Total : Dry Wt as Ekofisk	1.36	mg/kg	0.05	UKAS	LL	402
Mercury : Dry Wt	0.0872	mg/kg	0.001	UKAS	LL	1042
Arsenic : Dry Wt	18.9	mg/kg	0.1	UKAS	LL	1041
Cadmium : Dry Wt	0.211	mg/kg	0.01	UKAS	LL	1041
Chromium : Dry Wt	55.5	mg/kg	0.05	UKAS	LL	1041
Copper : Dry Wt	29.8	mg/kg	0.1	UKAS	LL	1041
Lead : Dry Wt	21.0	mg/kg	0.2	UKAS	LL	1041
Lithium : Dry Wt	60.0	mg/kg	0.1	UKAS	LL	1041
Nickel : Dry Wt	40.1	mg/kg	0.3	UKAS	LL	1041
Zinc : Dry Wt	128	mg/kg	0.2	UKAS	LL	1041
Aldrin DW	<1.00	ug/kg	1	UKAS	LL	672
DDE -pp DW	<2.00	ug/kg	2	UKAS	LL	672
DDT -op DW	<1.00	ug/kg	1	UKAS	LL	672
DDT -pp DW	<2.00	ug/kg	2	UKAS	LL	672
Dieldrin DW	<3.00	ug/kg	3	UKAS	LL	672
Endrin DW	<2.00	ug/kg	2	UKAS	LL	672
HCB DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -alpha DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -beta DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -delta DW	<1.00	ug/kg	1	UKAS	LL	672
HCH -gamma DW	<1.00	ug/kg	1	UKAS	LL	672
Hexachlorobenzene DW	<1.00	ug/kg	1	UKAS	LL	672
Isodrin DW	<2.00	ug/kg	2	UKAS	LL	672





TDE -pp DW	<1.00	ug/kg	1	UKAS	LL	672
Acenaphthene : Dry Wt	32.7	ug/kg	2	UKAS	LL	1051
Acenaphthylene : Dry Wt	89.8	ug/kg	2	None	LL	1051
Anthracene : Dry Wt	191	ug/kg	2	UKAS	LL	1051
Benzo(a)anthracene : Dry Wt	345	ug/kg	2	UKAS	LL	1051
Benzo(a)pyrene : Dry Wt	285	ug/kg	2	UKAS	LL	1051
Benzo(b)fluoranthene : Dry Wt	488	ug/kg	10	UKAS	LL	1051
Benzo(ghi)perylene : Dry Wt	232	ug/kg	10	UKAS	LL	1051
Benzo(k)fluoranthene : Dry Wt	196	ug/kg	10	UKAS	LL	1051
Chrysene : Dry Wt	305	ug/kg	2	UKAS	LL	1051
Dibenzo(ah)anthracene : Dry Wt	73.6	ug/kg	5	UKAS	LL	1051
Fluoranthene : Dry Wt	541	ug/kg	2	UKAS	LL	1051
Fluorene : Dry Wt	58.7	ug/kg	10	UKAS	LL	1051
Indeno(123cd)pyrene Dry Wt	255	ug/kg	10	UKAS	LL	1051
Naphthalene : Dry Wt	1150	ug/kg	30	None	LL	1051
Phenanthrene : Dry Wt	430	ug/kg	10	UKAS	LL	1051
Pyrene : Dry Wt	463	ug/kg	2	UKAS	LL	1051
PCB 028 DW	4.00	ug/kg	0.1	UKAS	LL	685
PCB 052 DW	6.00	ug/kg	0.1	UKAS	LL	685
PCB 101 DW	5.28	ug/kg	0.1	UKAS	LL	685
PCB 118 DW	4.16	ug/kg	0.1	UKAS	LL	685
PCB 138 DW	3.52	ug/kg	0.1	UKAS	LL	685
PCB 153 DW	5.20	ug/kg	0.1	UKAS	LL	685
PCB 180 DW	3.20	ug/kg	0.1	UKAS	LL	685
Dibutyl Tin : Dry Wt as cation	743	ug/kg	3	UKAS	LE	897
Tributyl Tin : Dry Wt as cation	460	ug/kg	3	UKAS	LE	897



Method Description Summary for all samples in batch Number 20020767

Testcode	Method Reference and Description
402	NLS I UVF 10.2 - HCs - methanol digested; pentane xch; by UV fluorescence spectrometry
404	LL I CHN 11.2 & 11.3 - combusted; determined by TCD; Organic C - acid pretreated to remove inorganic carbonates
672	LL O PESTICIDES - solvent extracted; determined by GCMS (SIM)
685	LL O PCBs - solvent extracted; determined by GCMS (SIM)
881	Density - volume taken; mass determined; density calculated
897	LE O Organotins (GCMS) 01 - acetic acid/methanol extracted; derivatised; determined GCMS (SIM); from "as received" sample
911	LE I Dry Solids & Lol 01 - Dry Solids (105C), Loss on Ignition (500C) - thermally treated; determined by gravimetry
924	Sample Preparation; Dry Solids (30°C); from "as received" sample
994	NLS I Particle Size Laser LL I 9.4 - bands - determined by laser light diffraction
1041	LL ME ICPMS 12.1 & 12.4- Metals - microwave aqua regia digested; determined by ICPMS
1042	LL ME Hg 10.8 - Mercury - microwave aqua regia digested; acidic SnCl ₂ reduced; determined by CV-AFS
1051	LL O PAHs - solvent extracted; determined by GCMS (EI)
1130	Not Available

Laboratory Site Manager

All reporting limits quoted are those achievable for clean samples of the relevant matrix. No allowance is made for instances when dilutions are necessary owing to the nature of the sample or insufficient volume of the sample being available. In these cases higher reporting limits may be quoted and will be above the MRV.

Solid sample results are determined on a "dried" sample fraction except for parameters where the method description identifies that "as received" sample was used.

Please note all samples will be retained for thirty working days after reporting unless otherwise agreed with Customer Services

Key to Accreditation: UKAS = Methodology accredited to ISO/IEC 17025:2005, MCertS = Methodology accredited to MCertS Performance Standard for testing of soils, none = Methodology not accredited

Key to Lab ID: LE = Leeds, LL = Llanelli, NM = Nottingham, SX = Starcross, SC = Sub-Contracted outside NLS, FI = Field Data, NLS = Calculated

END OF TEST REPORT

Appendix 9. MMO Report from Previous Works at Greenore

Rock Breaking & Dredging Greenore Port

Marine Mammal Observer Report

20th May 2015

1 Executive Summary

This document covers the MMO activity in support of a Foreshore License granted for the breaking and dredging of rock from the outer berth of Greenore Port. The Foreshore License reference was MS 51/2/223.

1.1 All marine mammal detections made during the programme of works

A total of five observations of common seals were made within the exclusion zone. Several other incidental observations of both grey and common seals outside the exclusion zone were noted.

No cetaceans were observed with the exception of three possible harbour porpoises approximately 1600 metres from observation point.

1.2 All detections made prior to the commencement of the operation/activity (e.g., before ramp-up)

One common seal noted prior to soft start-up resulting in a short delay to commencement.

1.3 All operational responses to the presence of animals in the area and the associated outcomes;

A short delay in soft start-up (8 minutes) when a seal entered the monitored exclusion area prior to soft-start-up.

No operational response to three common seals entering the exclusion area during soft start-up.

No operational response to one common seal entering the exclusion area during full power operation.

In all cases the seals were observed to leave the exclusion area within a few minutes.

1.4 All occurrences of night-time operation/activity, continuation into poor weather and stoppages

No marine mammal monitoring required.

1.5 Any and all problems arising during implementation of the prescribed mitigation

None.

1.6 A concluding statement regarding the operational efficacy of the mitigation measures performed.

The mitigation measures set forth in the Foreshore License were operationally efficient.

2 Date and location(s) of the plan/project.

17-Feb-15 to 30-Apr-15 (initial)

1-May-15 to 14-May-15 (extension)

Greenore Port, Greenore, County Louth, Ireland

3 Name, address and qualifications of the MMO(s) on the Platform/Vessel.

Breffni Martin

BSc Biology 1983 UCD

JNCC MMO Certificate – Carolyn Barton Training – JNCC approved

Work undertaken from quay wall (not from platform/vessel).

4 Name of any other Platform/Vessel involved in the operation/activity.

Spud leg pontoon barge “ACN 5” used as a work platform for excavator in the berth pocket.

5 Latitudes, Longitudes or Grid references for the area(s) of operations monitored by the MMO.

Normal Grid Ref = J 223 111

10 digit Grid Ref = J 22322 11142

Latitude = 54.03489 (north)

Longitude = -6.13280 (west)

Latitude = 54°2'6" (north)

Longitude = 6°7'58" (west)

Tetrad = J21F

6 Details of the observation platform used for marine mammal monitoring, including its height above sea level.

The edge of the quay wall was used for observations. This area provided an ideal observation point with a full view of the exclusion zone and operating area. The quay wall is approximately 8 metres above Chart Datum.

7 Details of all sound-producing operations/activities undertaken during the period of works.

Sound-producing activities stemmed primarily from rock breaking generating typical maximum noise level L_w of 131dB in air dropping to 85dBA at a distance of 56 metres. Other sounds were produced by dredging the broken rock and manoeuvring the barge into position.

8 Details of monitoring watches conducted for marine mammals.

The MMO agreed a target soft start-up time with the operator the day before the planned operations taking account of tide, weather, visibility as well as operational aspects (access, equipment readiness etc). The MMO was in place at least 30 minutes before target soft start-up

time monitoring. The MMO remained until after soft start-up. The MMO also regularly checked the distribution of seals at known haul-outs in the wider area.

9 Details of all marine mammal sightings recorded during monitoring watches.

A total of five sightings within the exclusion zone (see above) and 12 outside it. The 12 observations outside the exclusion zone all involved seals either hauled out or passing from the inner lough to the outer lough, with the exception of three distant possible harbour porpoises.

10 Details of all marine mammal sightings recorded outside monitoring watches (e.g., incidental observations), including records from additional personnel on board.

The MMO lives in the area and observes and notes the distribution of seals in Carlingford Lough on an almost daily basis. A population of up to 350 common seals and 80 grey seals use the lough, primarily the northern part and the outer lough (several km distant from Greenore Port).

No cetaceans were observed in the exclusion area.

11 Details of any problems encountered during marine mammal monitoring, start-up procedures, ramp-up (soft-start) procedures or during full scale operation/activity.

None – the operational crew were very professional and regular contact was maintained throughout operations to ensure animal welfare at all times.