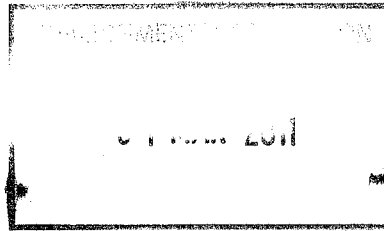


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File ref A. L0003

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25 February 2011

Dear Tara

D 6224/42 Arklow Harbour: Application to Dump Dredge Disposal at Sea

Please find enclosed copies of Issue 2 of the Addendum to the EPA Request for Additional Information dated 30 August 2010 on behalf of Arklow Harbour Commissioners. We have enclosed 4 no. hard-copies of the report and 2 no. soft-copies for your attention.

We hope the enclosed documentation meets your requirements. If you require further information please do not hesitate to contact me on 01-2334455.

Yours sincerely  
for  
Arup

Joyanne Manning

cc Mr Jim Byrne, J P Byrne & Partners Ltd

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Arklow Harbour Commissioners

**Application to Dump Dredge  
Disposal at Sea**

Addendum to EPA Request for  
Additional Information dated 30  
August 2010: Method Statement

D6224.42

Issue 2 | February 2011

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This report takes into account the particular  
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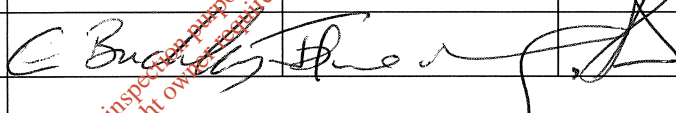
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# Document Verification

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<b>Job title</b>		Application to Dump Dredge Disposal at Sea		<b>Job number</b>		D6224.42	
<b>Document title</b>		Addendum to EPA Request for Additional Information dated 30 August 2010: Method Statement		<b>File reference</b>			
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		Name	Catherine Buckley	Joyanne Manning	Don Menzies		
		Signature					
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		Signature					
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		<b>Description</b>					
			Prepared by	Checked by	Approved by		
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Grain Size Analysis in Sea Bed Material

### Appendix B

## Screening Assessment

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# 1 Introduction

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Arup have been in consultation with the relevant statutory bodies regarding a licence to dispose of dredge material at sea on behalf of Arklow Harbour Commissioners (AHC) since 2009.

The application was originally submitted to the Department of Agriculture, Fisheries and Food for a licence under the Dumping at Sea Act in March 2009. However, the responsibility for these licence applications was transferred to the Environmental Protection Agency (EPA) in February 2010.

On 30 August 2010 the EPA wrote to Arklow Harbour Commissioners seeking additional information. A report entitled 'Response to EPA Request for Additional Information, 30<sup>th</sup> August 2010' was prepared by Arup in response to this request for additional information.

At a subsequent meeting, held in January 2011, the EPA requested further clarification on the proposed methods of working. Further information on the scientific evidence behind the assumptions made including anecdotal evidence and a review of international guidance was also requested.

This report outlines a Method Statement for the work to be undertaken, with further anecdotal, scientific and reference evidence provided where necessary. This information will sit as an Addendum to the report 'Response to EPA Request for Additional Information, 30<sup>th</sup> August 2010' and should be read in conjunction with that document.

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## 2 Description of Works

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The Contaminated Dredged Material (CDM) detected in Arklow Harbour will be excavated from its current location and will be disposed of at sea at Disposal site A, shown in Figure 1.

This section of the report outlines the method statement for how each stage of the work will be undertaken.

### 2.1 Sequencing

Following a meeting on Friday 3 July 2009, the Marine Licence Vetting Committee (MLVC) recommended that dredging of the port should be conducted in stages to contain adequately the most contaminated sediment material at the centre of the contaminated layer at the base of the disposal basin. Consequently, the following stages of dredging will be implemented at Arklow;

- [1] Disposal Basin Creation;
- [2] Dredging and disposal of the River Channel sediments;
- [3] Dredging and disposal of the Dock sediments;
- [4] Dredging and disposal of the Turning Basin sediments;
- [5] Dredging and disposal of the Harbour Mouth sediments; and
- [6] Capping.

### 2.2 Disposal Pit

#### 2.2.1 Excavation and Construction of the Disposal Pit

The disposal pit will be excavated using a conventional backhoe dredger. It must accommodate approximately 42,000 m<sup>3</sup> of sediment (39,275 m<sup>3</sup> of contaminated sediment and 2,725 m<sup>3</sup> of uncontaminated sediment) and have sufficient cap thickness to prevent contaminant infiltration upwards towards the benthic environment.

The proposed parameters of the pit are as follows:

- Surface – 150 m by 150 m (22,500 m<sup>2</sup>);
- Base – 50 m by 50 m (2,500 m<sup>2</sup>);
- Side slopes of 10° to accommodate sandy material;
- Minimum Depth of 8.8 m;
- Total Basin Volume of 95,530 m<sup>3</sup>;
- Excavated material will be removed and placed within the vicinity of the basin for ease of access for capping;
- Contaminated sediment when placed at the base of the pit will be approximately 5.5 m deep (*Contaminated Layer*) and will have an exposed surface area of approximately 114 m by 114 m (12,996 m<sup>2</sup>);

- Uncontaminated sediment will be placed above the contaminated material and will be approximately 0.2 m deep (*Uncontaminated Layer*) and will have an exposed surface area of approximately 116 m by 116 m (13,456 m<sup>2</sup>);
- Approximately 53,530 m<sup>3</sup> of the basin's previously excavated material will then be placed over the uncontaminated material to cap it (*Capping Layer*). From the Admiralty chart it is estimated that the water depth is approximately 15 m at the location of the disposal pit, and a back-hoe dredging can reach up to 22m deep (depending on seabed conditions). Based on this, a side-cast method would be most appropriate to move the capping material back to the disposal pit for use as capping;
- The remaining 42,000 m<sup>3</sup> of excavated material from the basin will be spread over the cap, and extend beyond its boundary edge. Surface area 175 m by 175 m (30,625 m<sup>2</sup>) to a depth of approximately 1.4 m (*Erodible Layer*).
- No loaded packing will be undertaken for placement of the capping material.

## 2.2.2 Stability of the Disposal Pit

As the disposal pit will be opened at the first stage of the project, the EPA expressed concern that the pit would not stay open for the full length of the project.

The following anecdotal evidence has been provided by J. Byrne from J.P Byrne Consulting Engineers who have extensive experience in Arklow Port. It contains information on an example in Arklow where a dredged pit did not backfill naturally.

*'Nitrogen Eireann Teo established a major fertilizer plant in Arklow in 1965. The factory developed to include acid plants, ammonia plants, carbon plants and plants that produced nitrogen fertiliser and NPH compound fertiliser. Over 1000 people were employed on the site during the early 1970's.*

*The harbour was vital to the operation of the factory. Fuel oil, ammonia, rock phosphate and other raw materials were imported in large quantities. Fertilizer was exported in bulk on a weekly basis.*

*There were constant problems with siltation at the harbour mouth and on many occasions vital imports could not gain access to the berths and the factory was threatened with closure. To ensure security of operations the company purchased its own dredger in or about 1970 and the crew were employees of the company. I personally became involved in the dredging works from 1972.*

*The dredger was a suction hopper dredger and maintained the necessary drafts in the harbour, channel, berths, turning basin and dock. The entrance channel outside the piers required a lot of maintenance dredging at that time. We subsequently discovered that by dredging a catchpit (large excavation) once a year in the sand immediately south of the entrance channel that far less maintenance was required. The excavation remained stable and served as a pit to catch the sand moving south to north (the littoral drift) which would otherwise have deposited in the entrance channel.*

*The catchpit was excavated annually at the start of the dredging season and the pit walls generally remained stable for the rest of the year.*

*Nitrogen Eireann Teo subsequently became Irish Fertiliser Ltd and in 1980 there were major redundancies. The company sold the dredger in about 1984.'*

### 2.2.3 Storage of Capping Material

The excavated material will be deposited in the vicinity of the disposal pit for subsequent re-use as capping material. The EPA expressed concern that ocean currents may move this material and it would not be available for use as a capping material when required.

Marcon undertook a modelling exercise to assess the long term stability of the cap over the CDM at Disposal Site A. This was presented in Appendix D of the report 'Response to EPA Request for Additional Information, 30<sup>th</sup> August 2010'.

The report modelled the shape of the cap mounding above the current sea bed level. It used data available on the hydrometrics of the disposal area and the grain size data of the capping material to assess whether the cap would stay in place on a long term basis.

Marcon concluded that *'the cap does have the potential to erode in the presence of large waves for a continuous period. However, the extreme conditions simulated would never occur continually for the duration of one year. It is likely that some erosion of the cap will occur during storm conditions but that over the long term the cap will remain in place, be subjected to consolidation and periodic erosion. Based on the results of the MDFATE model, it is not predicted that the cap will erode over the period of one year, even subject to excessive wave climates.'*

The same principals will apply to the mound of excavated material which is to be stored for capping. This material will be stored for a short period of time and based on Marcons assessment it will be subject to some erosion but that it will generally remain where it is placed. This indicates that the material will be available for use as capping material as required.

Further information is available on the grain size of the capping material at the capping site. Appendix A contains information on grain size distribution testing undertaken on samples collected from the sea bed in the bay around Arklow. The map shows that sample numbers 17 and 11 are closest to Disposal Site A. The analysis shows that the grain sizes at the sea bed are characteristic of a sand material. This grain size analysis is consistent with the grain size data used by Marcon in their modelling.

## 2.3 Dredging and Disposal of CDM

Two dredging methods were proposed to remove the CDM from Arklow Harbour: backhoe dredging or Trailing Suction Hopper Dredging (TSHD).

USAC guidance<sup>1</sup> recommends that backhoe dredging is more preferable to TSHD for dredging CDM. This technique allows the CDM to be retained in discrete solid blocks, particularly if the material is cohesive, and stay close to its in-situ density throughout the dredging and disposal processes. J Byrne has confirmed that the CDM at Arklow Harbour is cohesive in nature.

By combining this method with point dumping of the CDM from a barge, the waste will retain its mounded shape and there will be less stripping of the material as it moves through the water column during removal and placement.

In addition, material collected by this method will tend to mound rather than flow during placement. This will result in easier and faster capping as the material will maintain its cohesive nature and there will be little settlement.

If the material is pumped or gravity fed to the disposal pit through a pipe it would essentially flow on the sea bed. This would result in that over time it would settle and capping could not be undertaken as quickly as it can with the point dumping method.

These advantages for dredging and placement type were confirmed by CEFAS<sup>2</sup> during the first offshore experiment capping experiment in the UK in the Tyne Estuary.

Based on this review of international guidance it is proposed to proceed with the use of backhoe dredging for removing the CDM from Arklow Harbour. The waste will be placed by point dumping from a barge.

The method for dredging and placing the waste is outlined below:

- A backhoe will be used to dredge the area where CDM has been identified.
- A visor grab will be used to minimise the contact of the CDM with the water column.
- The excavated blocks of CDM will be lowered into split hopper barges and will be dropped from as low as possible onto the barge base (depending on the length of the grab arm) to ensure the integrity of the blocks is maintained as far as possible.
- The barges will not be filled above a certain level to ensure there will be no overflow of contaminated water
- The sediment will be transported to Disposal Site A by the split hopper barge.

---

<sup>1</sup> US Army Corps of Engineers (1998) Guidance for subaqueous dredged material capping. Technical Report DOER – 1, 295 pp.

<sup>2</sup> Blake, S (2009). The First UK Offshore Contaminated Dredge Material Capping Trial: Lessons Learnt. Produced by CEFAS for DEFRA and the Marine and Fisheries Agency.

- The blocks of CDM will be dropped from the base of the barge. Section 2.3.1 outlines justification that the CDM will land within the disposal pit once it is dropped from the barge
- When the CDM has been placed in the disposal pit, the pit will be backfilled to the sea level bed with the excavated capping material as outlined in section 2.2.1.
- The remaining capping material will be mounded above the disposal pit as outlined in the report 'Response to EPA Request for Additional Information, 30<sup>th</sup> August 2010'.
- No loaded packing will be undertaken for placement of the capping material.

### 2.3.1 Placement of CDM

An assessment was undertaken to ensure that the CDM would enter the disposal pit if it was placed by point load dumping from a split hopper barge.

The current in the vicinity of the disposal site has been estimated to be in the region of 0.5 m/s. The effect of such a current on placing the dredged material into the disposal pit has been calculated.

Our calculations for displacement of the material are based on a backhoe bucket size of 7 m<sup>3</sup>. The contaminated material will be placed in spoil heaps on the barge of 7 m<sup>3</sup> which may fall down to the seabed as one, or clump together to an even larger mass. Therefore the contaminated material will be dumped to the seabed as a coherent mass greater than 7 m<sup>3</sup>.

Based on a current of 0.5 m/s and a water-depth of 15 m, the displacement caused by the local current of a mass of 7 m<sup>3</sup> can be estimated to be in the region of half a metre. This should pose no specific problems for dumping the contaminated material accurately into the disposal pit.

### 2.3.2 Long-term Stability of the Cap

Marcon concluded that 'the cap does have the potential to erode in the presence of large waves for a continuous period'. However, the extreme conditions simulated would never occur continually for the duration of one year. It is likely that some erosion of the cap will occur during storm conditions but that over the long term the cap will remain in place, be subjected to consolidation and periodic erosion.

As the results of the modelling indicated that the cap would be relatively stable, if subject to some erosion, under continually heavy wave conditions for a one year period, it is reasonable to conclude that the cap will remain stable over a long term period.

## 2.4 Timeline

Dredging operations will commence in June 2011 to minimise the environmental impacts and to take advantage of the weather. The following is an indicative programme for the dredging operations.

- Dredging of the disposal pit: Approximately 5 weeks
- Dredging of harbour sediments, including transport to and disposal at the disposal site: Approximately 12 weeks. It should be noted that if a larger dredging vessel is used this can be reduced to approximately 5 weeks.
- Capping at disposal site: Approximately 5 weeks.

This programme will be dependent on the weather.

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## 3 Impacts

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### 3.1 Dredging and Disposal Impacts

As outlined in Section 0, dredging will occur in both Arklow Port and also at the disposal site.

#### 3.1.1 Dredging in Arklow Port

During dredging the following potential impacts could occur within Arklow Harbour, however with the mitigation measures outlined in Section 4, any impacts will be minimised to temporary minor negative impacts or effectively negated;

Potential Impacts:

- Sediment mobilisation could increase turbidity within the harbour that could potentially impact in situ ecology and water quality;
- Dredging of contaminated sediment could release toxicants into the water column of the harbour and increase overall bioavailability;
- Fine fractions of sediment could be available for migration out of the harbour area and into the coastal environment;
- Dredging sediments containing elevated nutrient concentrations could result in an increased nutrient availability during the dredging process and could potentially lead to short-term low level eutrophication. However in tidally affected waters such as the harbour this risk is considerably reduced;
- Impacts on water quality could include oxygen depletion. However, in tidally affected waters this risk is considerably reduced;
- Both pelagic and benthic organisms could be impacted from increased suspended sediment loading and its subsequent deposition. Impacts could be more significant at the disposal ground (covering with sediment) rather than the dredging location.

A summary of the impacts at the harbour relating to ecology, archaeology, water quality, human beings and amenity were outlined in the report 'Response to EPA Request for Additional Information 30<sup>th</sup> August 2010'.

### 3.1.2 Dredging and Disposal at the Disposal Site

The dredging and disposal at the disposal site may have the following potential impacts, however with the mitigation measures outlined in Section 4, any impacts will be minimised to temporary minor negative impacts or effectively negated;

Potential Impacts:

- The dredging process at the proposed offshore disposal site will disturb the bed sediment and have a negative temporary impact.
- While the site is not of ecological importance there will be a disruption to the local ecosystem from the dredging disposal process.
- During the deposition process the contaminated sediment will be exposed to the marine water column for a short time. Exposing the sediment to the more turbulent marine water present over the disposal site rather than the combination of freshwater and marine water in the sheltered estuary area will allow degradation of organic matter from the sediment. This in turn will release contamination into the marine water column where dilution and dispersion will be rapid. Chemical alteration of contaminants, notably metals, can occur when in contact with pure marine water, however as they are released from the sediment during the degradation of organic matter, the contaminants are not as concentrated or as bio-available as they are within the sediment. While a localised temporary negative impact will occur on marine water quality, the existing hydrodynamics of the area will rapidly negate the effects. The impact to the local benthic community is therefore considered negligible.
- The potential impact of marginally contaminated and uncontaminated spoil will be less than described above for contaminated soil.

## 4 Mitigation Measures

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### 4.1 Dredging

CIRIA best practice guidance (1997) and UK Environmental Agency Pollution Prevention Guidelines (2007) were used to identify a range of proposed mitigation for the dredging and disposal process. Dredging is often mistakenly perceived as an operation which will inevitably have an adverse impact on the environment. This is not true. Dredging using appropriate plant and methods can maintain or improve environmental habitats and features of particular interest. Indeed, dredging may be essential in order to preserve particular environmental conditions.

#### 4.1.1 Dredging at Arklow Port

When planning the timing of dredging operations common sense needs to be applied. In addition to ecological considerations, operational factors also need to be addressed such as peak recreational and commercial periods in ports and seasonal weather conditions. Therefore, a balance between nature conservation and operational interests needed to be found for planning the dredging at Arklow. Late summer / early autumn was considered to be the most suitable time to comply with guidance from the Eastern Regional Fisheries Board and to have the most favourable weather and in situ estuarine conditions to minimise environmental impact.

As it is necessary to remove contaminated sediments by dredging, it is important to limit contact between the dredged sediments and surrounding aquatic and land environment. It is inevitable that some sediment will be spilt, or suspended into the surrounding water, but subject to the use of an appropriate dredging method such as is proposed and good control, it is possible for the level of transfer of contamination to be contained to insignificant levels.

The spread of suspended material can be restricted by the use of silt curtains or air curtains. Silt curtains comprise a pervious fabric curtain, fine mesh geotextile, weighted at the bottom and suspended from floating booms. Individual curtains are arranged and anchored so as to completely surround the immediate working area of the dredger. The transportation barge will be located outside of the silt curtain area. While curtains to contain suspended solids and reduce turbidity increasing do not function at optimal efficiency in tidal environments or riverine environments, the harbour at Arklow offers the most favourable conditions in Ireland for such usage. The null tidal amphidromic point in the Irish Sea directly off Arklow significantly reduces the tidal range at Arklow. In conjunction with the river in summer low flow conditions, the summer period will offer the most suitable conditions to use this form of suspended load containment mechanism. Dredging during the summer months is also preferable for the salmonid fisheries of the Avoca River as mandated by the Eastern Regional Fisheries Board (ERFB, 2004).

During mobilisation of the dredge plant, the following mitigation methods have been proposed to be employed;

- The access area will require monitoring by the site Environmental Monitor to ensure that suspended solids are contained as much as possible. Turbidity readings will be taken immediately downstream of the launch area during the launching procedure.
- Spill prevention measures will be implemented during staging and use of the landside staging area. The staging area must be situated and designed to minimise the potential for spills of vehicle fuels and other materials to enter the harbour.
- Land-based activities that carry a risk of materials spills will take place within a bermed staging area. These activities include any vehicle fuelling and other maintenance that is required.

Prior to dredging operations commencing the Contractor will be required to:

- Prepare an Emergency Response Plan detailing the procedures to be undertaken in the event of a spill of chemical, fuel or other hazardous wastes, a fire, or noncompliance incident with any permit of license issues.
- Ensure staffs are trained in the implementation of the Emergency Response Plan and the use of any spill control equipment as necessary.
- Prepare method statements for the control, treatment and disposal of potentially contaminated surface water.

To mitigate potential environmental impacts during dredge plant operations, the following mitigation measures are proposed:

- Dredging will be undertaken using a backhoe excavator to limit, as far as practically possible, the disturbance and dispersion of sediments.
- Ensure that the most suitable dredging equipment, as is proposed, is used in order to minimise the suspension of any fine sediments and contaminants at the dredge site, where considered appropriate.
- A silt curtain will be installed where necessary around the dredging area once the dredge plant is in place, and prior to starting the dredge plant. The silt curtain will need to enclose the area and must be placed in areas upstream and downstream of the dredging area.
- The silt curtain will be placed where necessary in a manner to minimise release of total suspended solids into the harbour.
- A suitably qualified Environmental Monitoring Professional will be on site to collect water quality samples and to monitor general activities at the site. Specifically, the Environmental Monitoring Professional will be required to:
  - Be on site at all times during operation of the dredge plant;
  - Collect water quality samples and measure/record physical parameters within and outside the silt curtain;
  - Dredging will be discontinued if it be determined that work is adversely affecting water quality, as directed by the Environmental Monitoring Professional;

- If dredging is halted, dredging can only be restarted under instructions from the Environmental Monitoring Professional;
- Proposed monitoring is outlined below in Section 5.
- Once the dredging operation is finished, and the dredge plant removed from the work area, the silt curtain will be left in place for two days to allow sediment in the work area to settle. The silt curtain will then be removed slowly and carefully from the work area. Although the vast majority of the sediment will have settled out of suspension prior to removal of the silt curtain, it is however expected that a small plume of sediment will be released into the aquatic environment during removal of the silt curtain.
- The dredge plant will maintain a spill containment system that meets current best practice standards.

A spill contingency / prevention plan should also be implemented, as follows;

- The land-side area shall be graded so that it does not slope towards any surface waters;
- Any areas where vehicle fuels or other potentially deleterious substances are stored shall be equipped with impervious containment berms;
- Potentially deleterious substances such as fuels should be kept within a bunded storage area;
- Activities that carry a risk of materials spills should take place within the bermed section. These activities include mixing concrete or other materials and any vehicle fuelling and other maintenance that is done on site;
- The area should have a supply of spill clean-up and disposal equipment;
- Equipment and machinery should not be washed on roadways or at other locations from which runoff could enter a storm drain; and,
- Before beginning work, the construction crew should be instructed regarding acceptable practices for handling potentially deleterious substances, maintaining equipment and washing construction vehicles and equipment.

#### 4.1.2 Dredging and Disposal at the Disposal Site

The site will be restored after disposal is complete by covering heavily contaminated spoil material with the existing bed material. This will be followed by subsequent natural re-colonisation. As the contaminated sediment will be covered by the existing bed material recovery is expected to be rapid. The contaminants remaining in the sediment will stay locked in the sub-surface sedimentary layers after capping with the existing bed material.

No additional mitigation measures are required to be employed at the disposal site.

## 5 Monitoring

---

### 5.1 Dredging Operations

It is proposed that an Environmental Monitoring Professional will be part of the dredging / disposal team in situ to monitor water quality, ecology and archaeology during the dredging and disposal process. The environmental Monitoring Professional will conduct the following proposed in situ monitoring;

- Routine monitoring of water quality will be carried out by the Environmental Monitoring Professional at appropriate locations during the dredging process, upstream and downstream of the dredging and disposal areas. Parameters to be monitored by the Contractor shall include pH, conductivity, total suspended solids and dissolved oxygen on a daily basis while BOD and COD should be analysed by an appropriate laboratory on a weekly basis. In addition, biological monitoring (Q value assessment) will also be carried out where feasible.
- The quality of surface water discharge from the landside site will meet water quality targets to be agreed in consultation with Arklow Town Council prior to the commencement of works.
- Ongoing monitoring of dredge spoil for archaeological remains
- Daily monitoring of dredge spoil for macro-invertebrate species.

The Environmental Monitoring Professional shall also compile a plan to establish a post dredge monitoring programmes to verify the effect of dredging and disposal on marine ecology and sediment regimes if deemed necessary by the local authority.

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## 6 Residual impacts

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### 6.1 Dredging

The above potential negative effects to the harbour area will be temporary in nature (duration of the project). No negative residual impacts to water quality are anticipated, if all practicable mitigation measures as stated in Chapter 10 of the revised licence application report are implemented for the proposed project. The classification status of the harbour and dock sediments is likely to demonstrate gradual improvement over time with the removal of the contaminated sediments by the proposed dredging operation. Given the historical source of much of the contamination, sediment deposition post-dredging will be of clean sediments and associated background metals from the Avoca catchment. The likely improvement in the classification status will assist in the compliance of the objectives of the draft river basin management plans for transitional water bodies in the Eastern River Basin District.

### 6.2 Disposal Site

The impact of spoil disposal will be negative and temporary in nature. However re-colonisation will commence immediately after the spoil has been covered over and it is expected that the site will fully re-colonise and restore itself rapidly.

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## 7 Potential Alternatives

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The potential alternatives considered are described in full in the report 'Response to EPA Request for Additional Information dated 30 August 2010'. This section contains details on the potential for treatment of the CDM only.

### 7.1 Treatment of CDM

The main goal of treatment techniques is to alter the CDM so that it meets the criteria set by the EPA.

Contaminants in dredged material are usually adsorbed to the solid particles of the CDM and the strength of these adsorptive bonds makes treatment of the CDM difficult and very project specific<sup>3</sup>. Treatment techniques are available for different types of contaminants in dredged material, however many of these are still in the experimental or demonstration phase. Potential treatment techniques are physical, chemical, biological, and thermal decontamination, separation methods, immobilization techniques or any combination of these techniques.

CDM often contains various mixtures of different contaminants, as is seen in Arklow and these are generally difficult to treat and require two or more treatments in series. PIANC<sup>3</sup> describe a number of these treatments however due to the volume of material to be treated, the heterogeneity of the contamination and the relatively low level of contamination, it is not practical to treat the CDM present at Arklow.

The contaminated material at Arklow is generally of a natural rather than an anthropogenic origin due to the discharging of contaminated waters from the Avoca River to the harbour. Due to the proximity principal of waste management it is impractical to treat this material.

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<sup>3</sup> Permanent International Association of Navigation Congress (1996). Handling and treatment of contaminated dredged material from ports and inland waterways.

## 8 Updated Graphics

---

Figures 1 and 2 appended to this report has been updated in line with comments from the EPA. The following changes have been made:

Figure 1:

- The Northing and Easting for the centre and corners of Disposal Site A is illustrated on the map.
- The Northing and Easting for the centre and corners of the working area around the Disposal Site A is illustrated on the map.
- Disposal site B has been removed

Figure 2:

- The Admiralty map has been used as a background map

## 9 Screening Assessment

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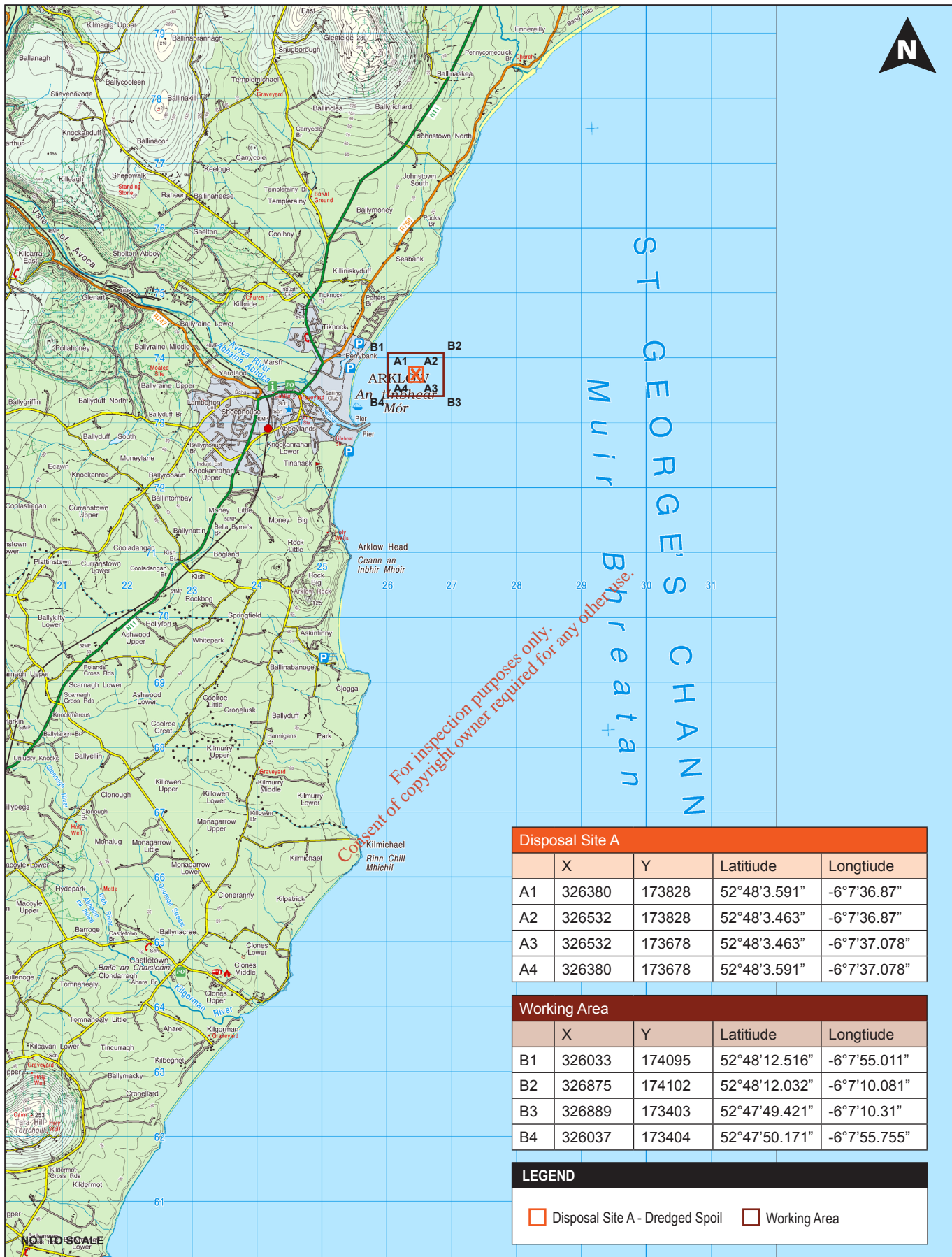
Arup commissioned Moore Group to undertake a Screening Assessment as required under article 6(3) of the Habitats Directive. This Assessment is included in Appendix B.

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## Figures

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**Disposal Site A**

	X	Y	Latitude	Longitude
A1	326380	173828	52°48'3.591"	-6°7'36.87"
A2	326532	173828	52°48'3.463"	-6°7'36.87"
A3	326532	173678	52°48'3.463"	-6°7'37.078"
A4	326380	173678	52°48'3.591"	-6°7'37.078"

**Working Area**

	X	Y	Latitude	Longitude
B1	326033	174095	52°48'12.516"	-6°7'55.011"
B2	326875	174102	52°48'12.032"	-6°7'10.081"
B3	326889	173403	52°47'49.421"	-6°7'10.31"
B4	326037	173404	52°47'50.171"	-6°7'55.755"

**LEGEND**

<span style="border: 1px solid red; display: inline-block; width: 15px; height: 10px;"></span> Disposal Site A - Dredged Spoil	<span style="border: 1px solid red; display: inline-block; width: 15px; height: 10px;"></span> Working Area
--	---

Drawing Title  
**Disposal Site Location**

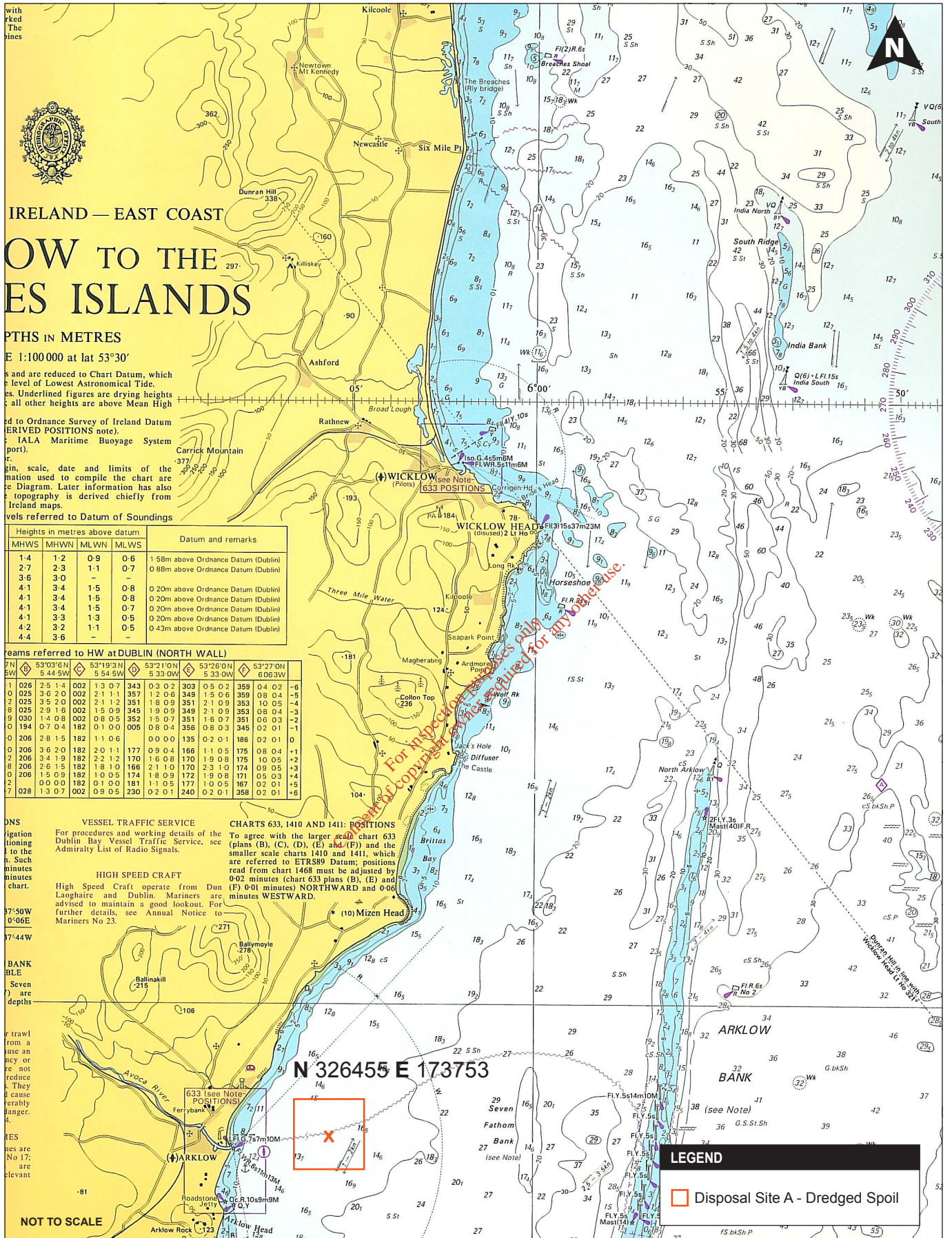
Job Title  
**Application to dump dredge disposal at sea**

Job No  
**D6224.42**

Date  
**02/2011**

Figure  
**1**





Drawing Title  
**Admiralty Map**

Job Title  
**Application to dump dredge disposal at sea**

Job No  
**D6224.42**

Date  
**02/2011**

Figure  
**2**

**ARUP**

## Appendix A

### Grain Size Analysis in Sea Bed Material

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### 3.1.6 Sea Bed Material

A total of 27 samples were taken along the north and south beaches during the site inspection in November 1990.

The samples characterise 5 different profiles and the area around the harbour entrance. The sample positions are depicted below in Fig. 3.7.

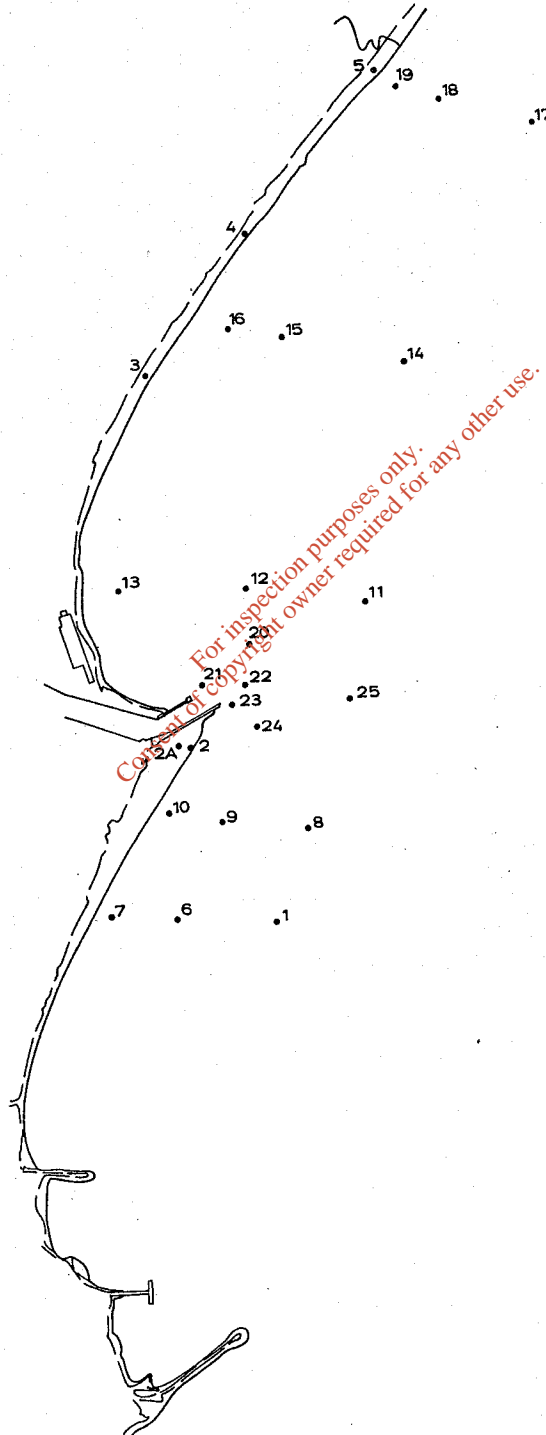


Fig. 3.7 Positions of sample tests.

Grain size distributions were subsequently determined by EOLAS. The main features of the samples based on  $D_{50}$  are schematised below

Depth (m)	Description	$D_{50}$ (mm)
8-12	fine sand	0.18-0.22
2-8	fine sand	0.18-0.30
0-2	fine sand	0.22-0.3
Beach	sand and shingle	0.22-1.0

Grain size distribution curves for samples associated with the bathymetry profiles used in model simulations are shown in Appendix II.

An 20% increase in  $D_{50}$  was assumed for large waves, i.e. greater than  $1.94 \text{ m } H_{\text{rms}}$ , in shallow water i.e. less than 3.0 m depth, since experience indicates that the larger sediments tend to move shorewards during storm events with a corresponding movement of finer sediments offshore. The phenomenon is associated with the coinciding of the undertow velocity profile to the sediment concentration profile.

The fall velocity of the sediment was calculated using the Rubey equation /7/.

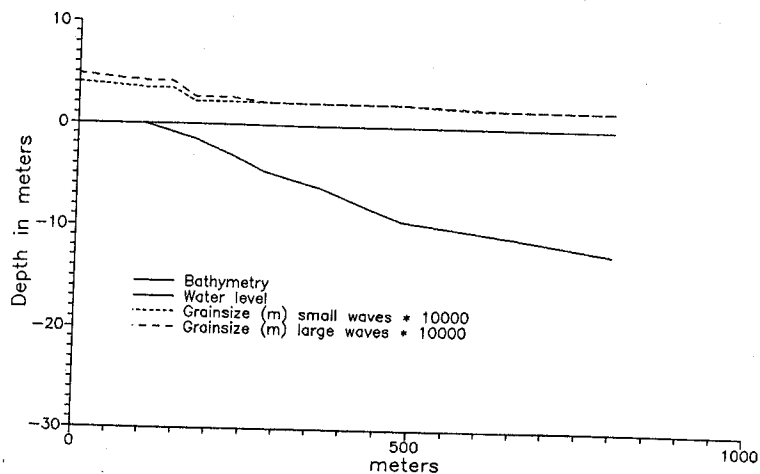


Fig. 3.8 Typical cross-shore bathymetry and sediment profile, Arklow south bay.

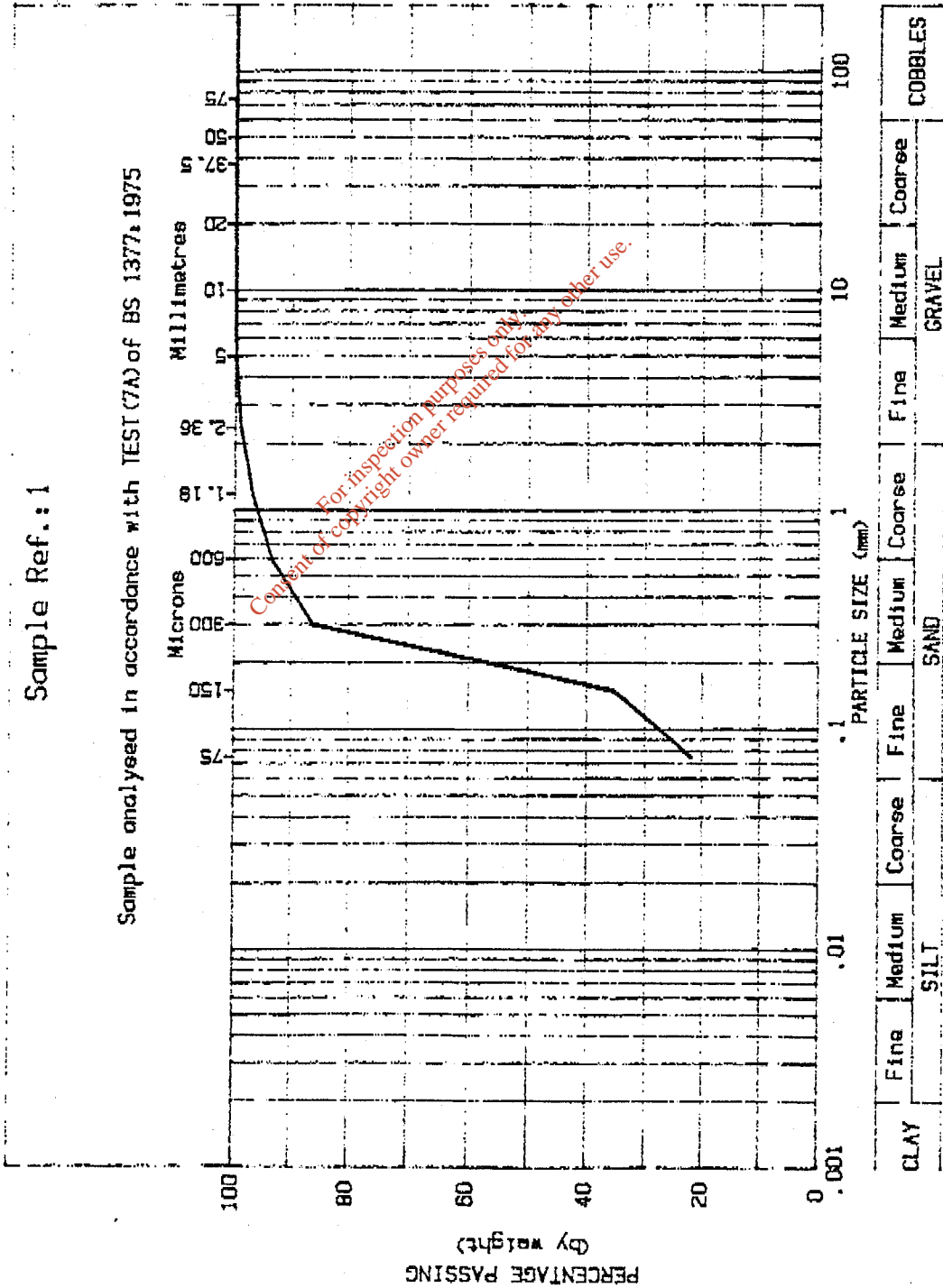
EOLAS - THIRISH SCIENCE and TECHNOLOGY AGENCY  
 GEOTECHNICAL ENGINEERING SECTION

Client: Wicklow Co. Council  
 Project: Arklow Coastal Study  
 Date: 23 Nov. 1990  
 Job No.

Sample Ref.: 1

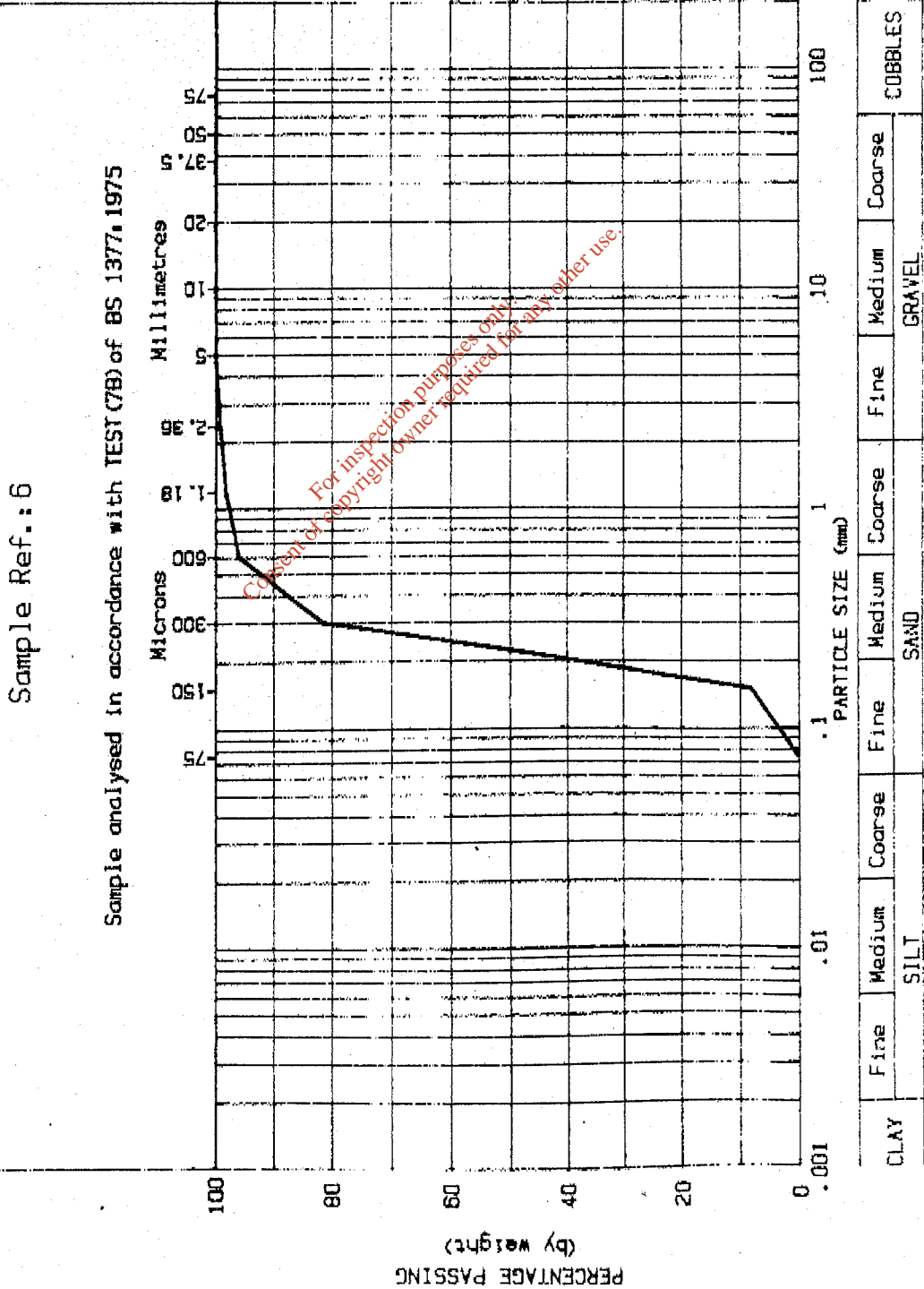
Sample analysed in accordance with TEST (7A) of BS 1377: 1975

B. S. SIEVE	SIZE (mm)	% PASSING (by weight)
100	100	100
75	75	100
50	50	100
37.5	37.5	100
20	20	100
10	10	100
5	5	100
2.36	2.36	99
1.18	1.18	97
.6	.6	93
.3	.3	86
.15	.15	35
.075	.075	22



MATERIAL DESCRIPTION: Grey fine silty sand

Client: Wicklow Co. Council Date: 23 Nov. 1990  
 Project: Arklow Coastal Study Job No.



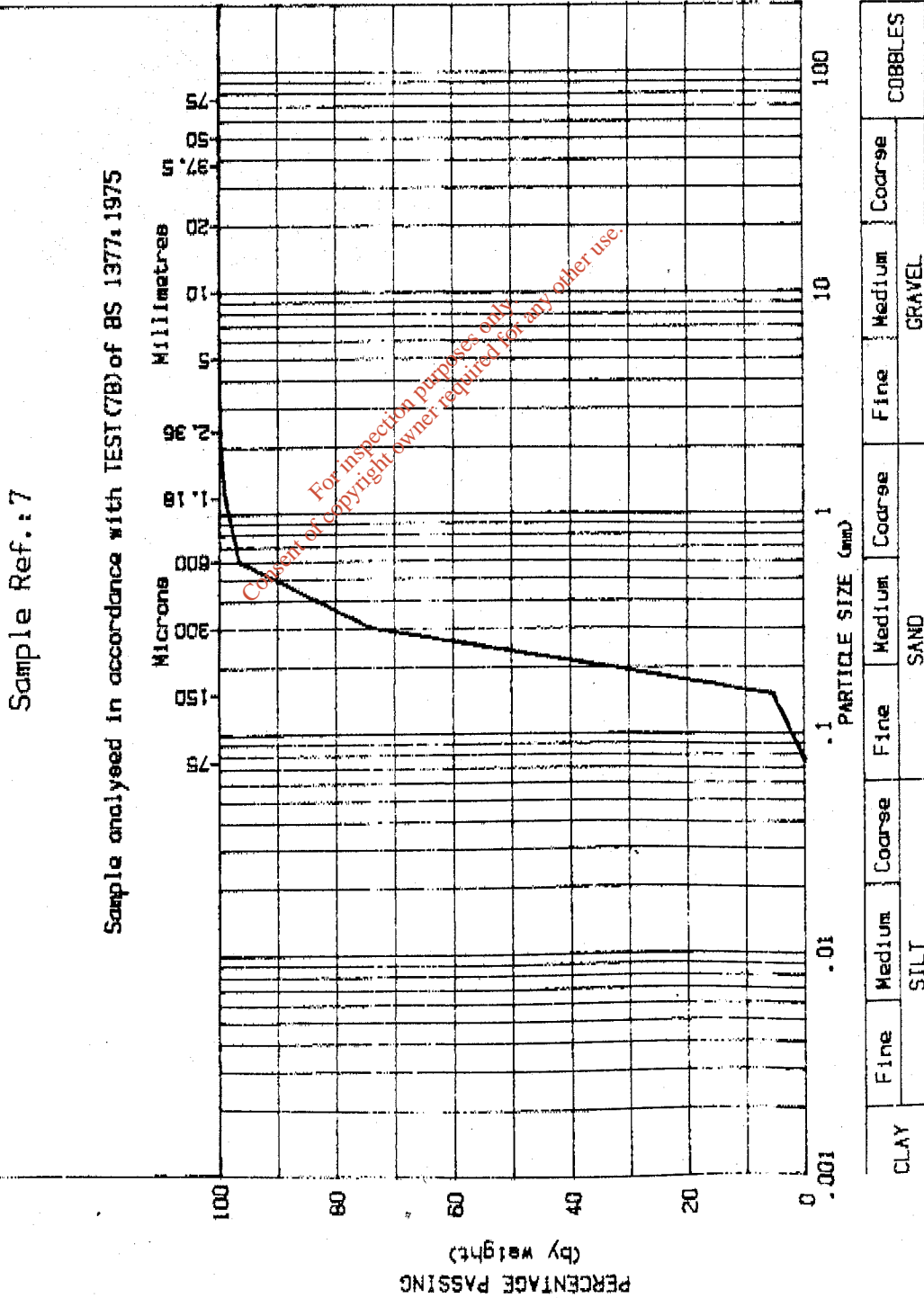
B. S. SIEVE SIZE (mm)	% PASSING (by weight)
100	100
75	100
50	100
37.5	100
20	100
10	100
5	100
2.36	100
1.18	100
.6	100
.3	100
.15	100
.075	100

MATERIAL DESCRIPTION: Light brown medium fine sand

EOLAS - The IRISH SCIENCE and TECHNOLOGY AGENCY  
 GEOTECHNICAL ENGINEERING SECTION

Client: Wicklow Co. Council  
 Project: Arklow Coastal Study  
 Date: 23 Nov. 1990  
 Job No.

B.S. SIEVE	SIZE (mm)	% PASSING (by weight)
100	100	
75	75	
50	50	
37.5	37.5	
20	20	
10	10	
5	5	100
2.36	2.36	100
1.18	1.18	99
.6	.6	96
.3	.3	74
.15	.15	5
.075	.075	0



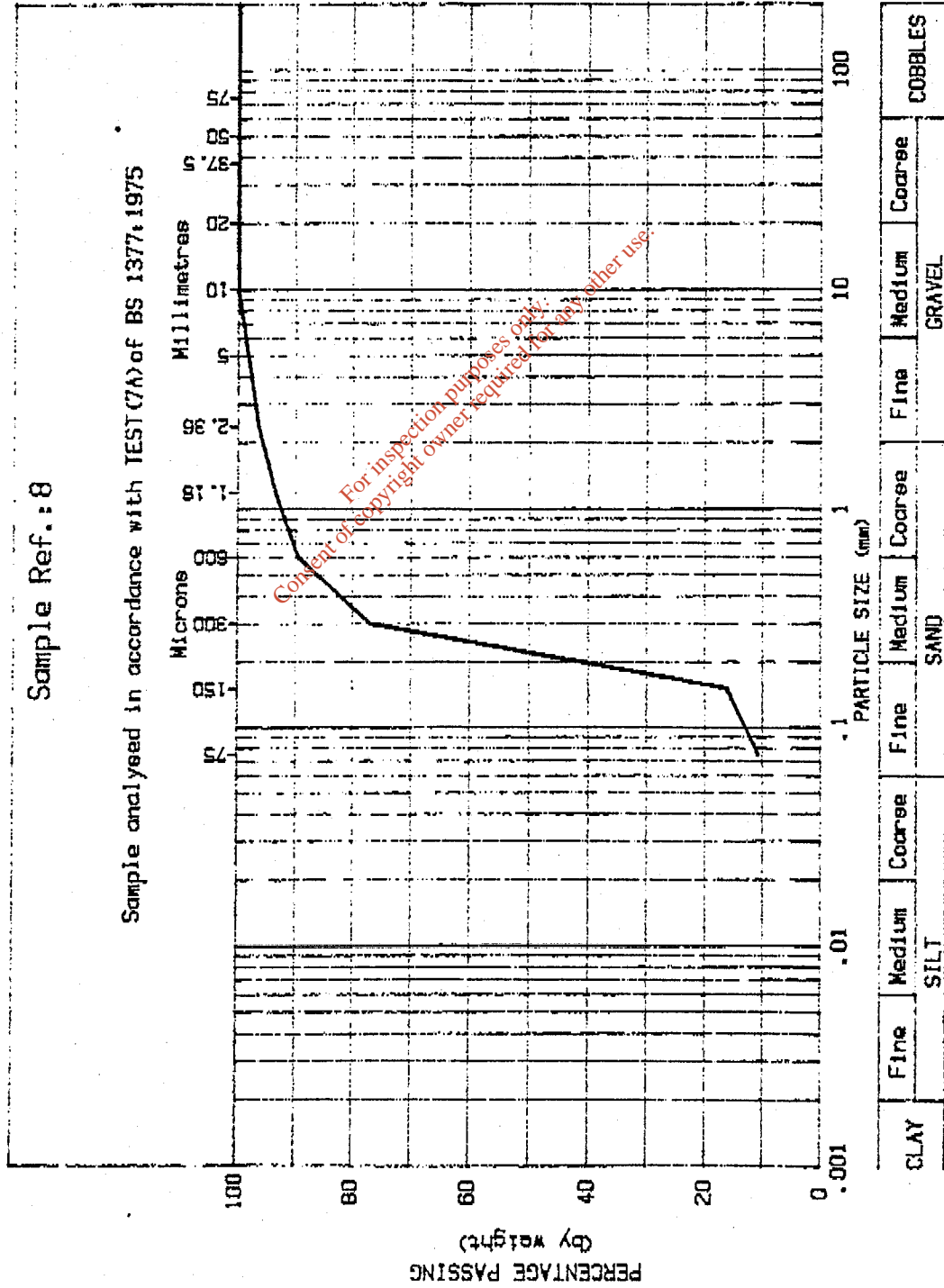
MATERIAL DESCRIPTION: Light brown medium fine sand

EOLAS - The IRISH SCIENCE and TECHNOLOGY AGENCY  
 GEOTECHNICAL ENGINEERING SECTION

Client: Wicklow Co. Council  
 Project: Arklow Coastal Study  
 Date: 23 Nov. 1990  
 Job No.

Sample Ref.: 8

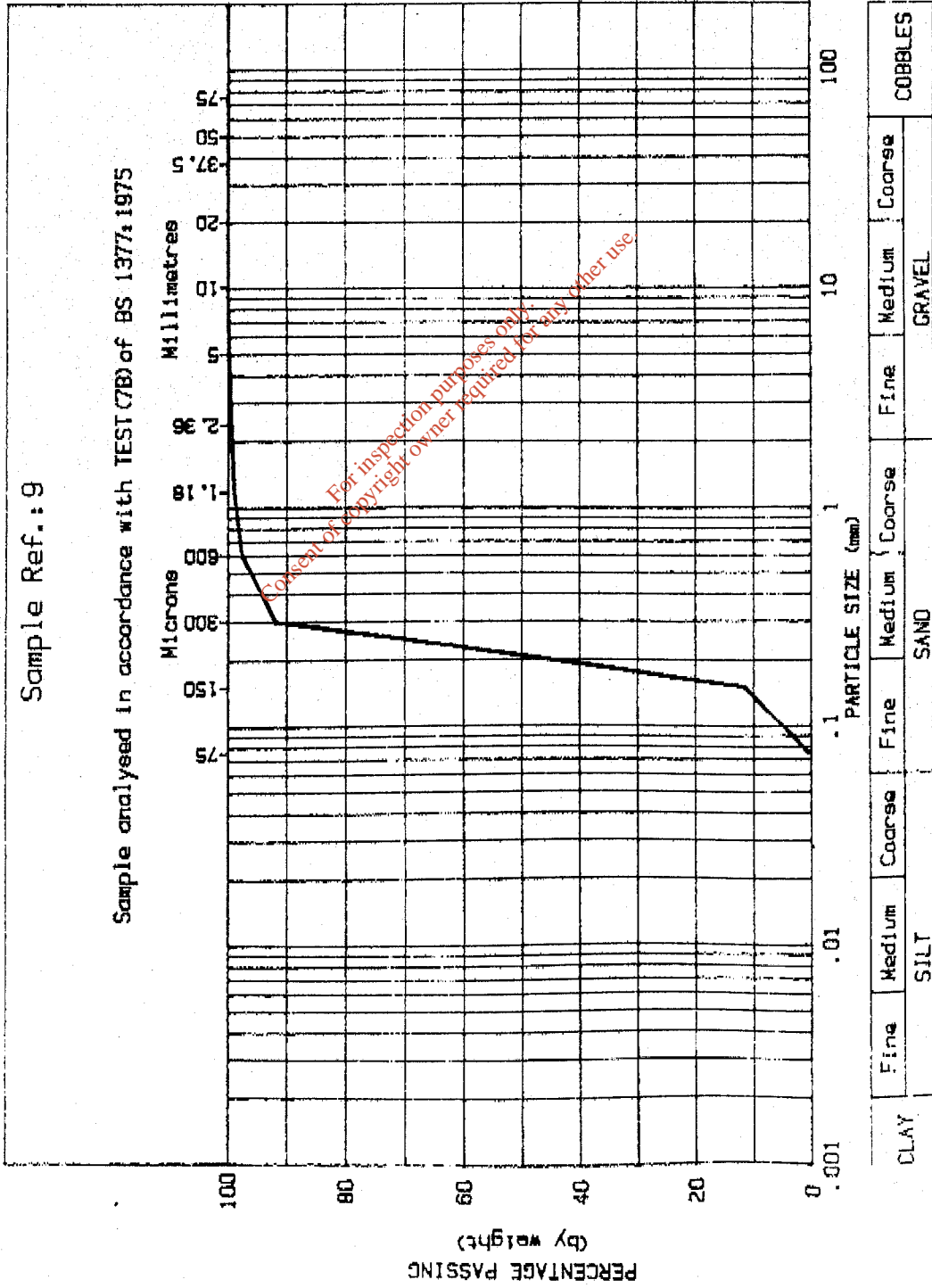
B. S. SIEVE SIZE (mm)	% PASSING (by weight)
100	
75	
50	
37.5	
20	
10	100
5	98
2.36	97
1.18	94
.6	90
.3	77
.15	16
.075	11



MATERIAL DESCRIPTION: Grey brown silty sand

Client: Wicklow Co. Council Date: 23 Nov. 1990  
 Project: Arklow Coastal Study Job No.

B. S. SIEVE SIZE (mm)	% PASSING (by weight)
100	
75	
50	
37.5	
20	
10	100
5	100
2.36	99
1.18	99
.6	97
.3	92
.15	11
.075	0

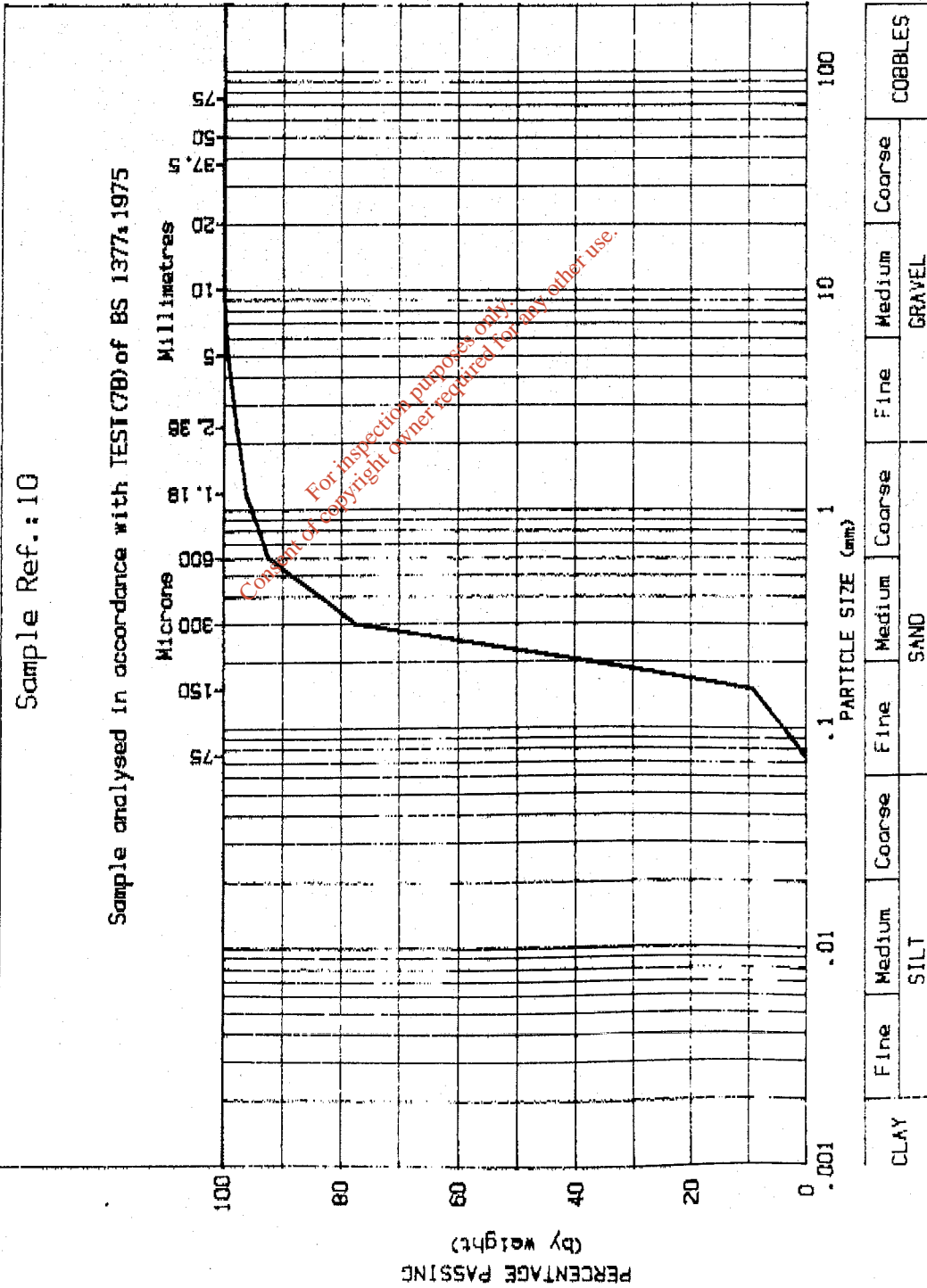


MATERIAL DESCRIPTION: Light brown medium fine sand

EOLAS - The IRISH SCIENCE and TECHNOLOGY AGENCY  
 GEOTECHNICAL ENGINEERING SECTION

Client: Wicklow Co. Council Date: 23 Nov. 1990  
 Project: Arklow Coastal Study Job No.

B. S. SIEVE SIZE (mm)	% PASSING (by weight)
100	
75	
50	
37.5	
20	
10	100
5	99
2.36	98
1.18	96
.6	92
.3	77
.15	9
.075	0

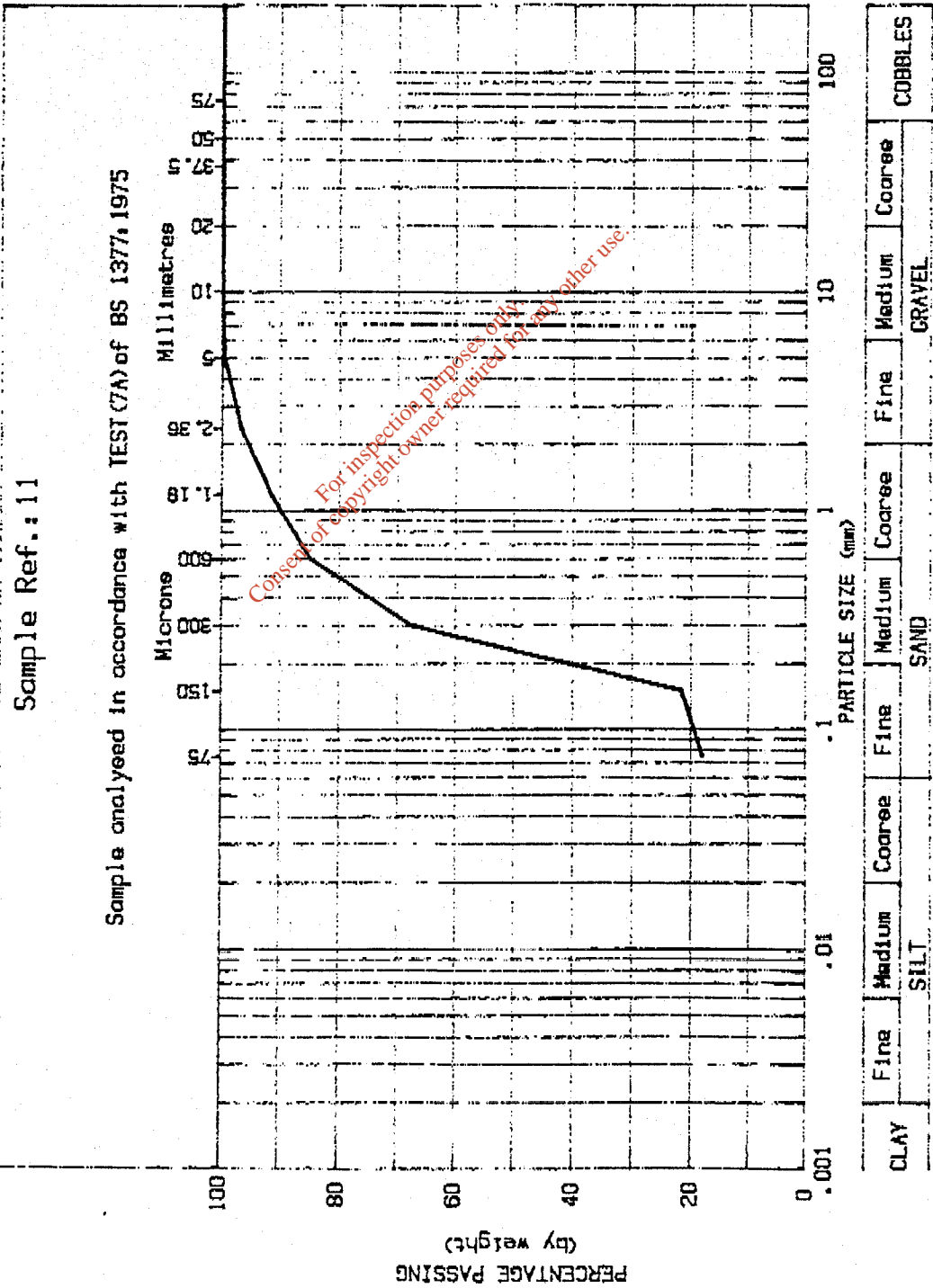


MATERIAL DESCRIPTION: Light brown medium fine sand

EOLAS - The IRISH SCIENCE and TECHNOLOGY AGENCY  
 GEOTECHNICAL ENGINEERING SECTION

Client: Wicklow Co. Council Date: 23 Nov. 1990  
 Project: Arklow Coastal Study Job No.

B. S. SIEVE SIZE (mm)	% PASSING (by weight)
100	
75	
50	
37.5	
20	
10	100
5	100
2.36	97
1.18	92
.6	85
.3	68
.15	22
.075	18

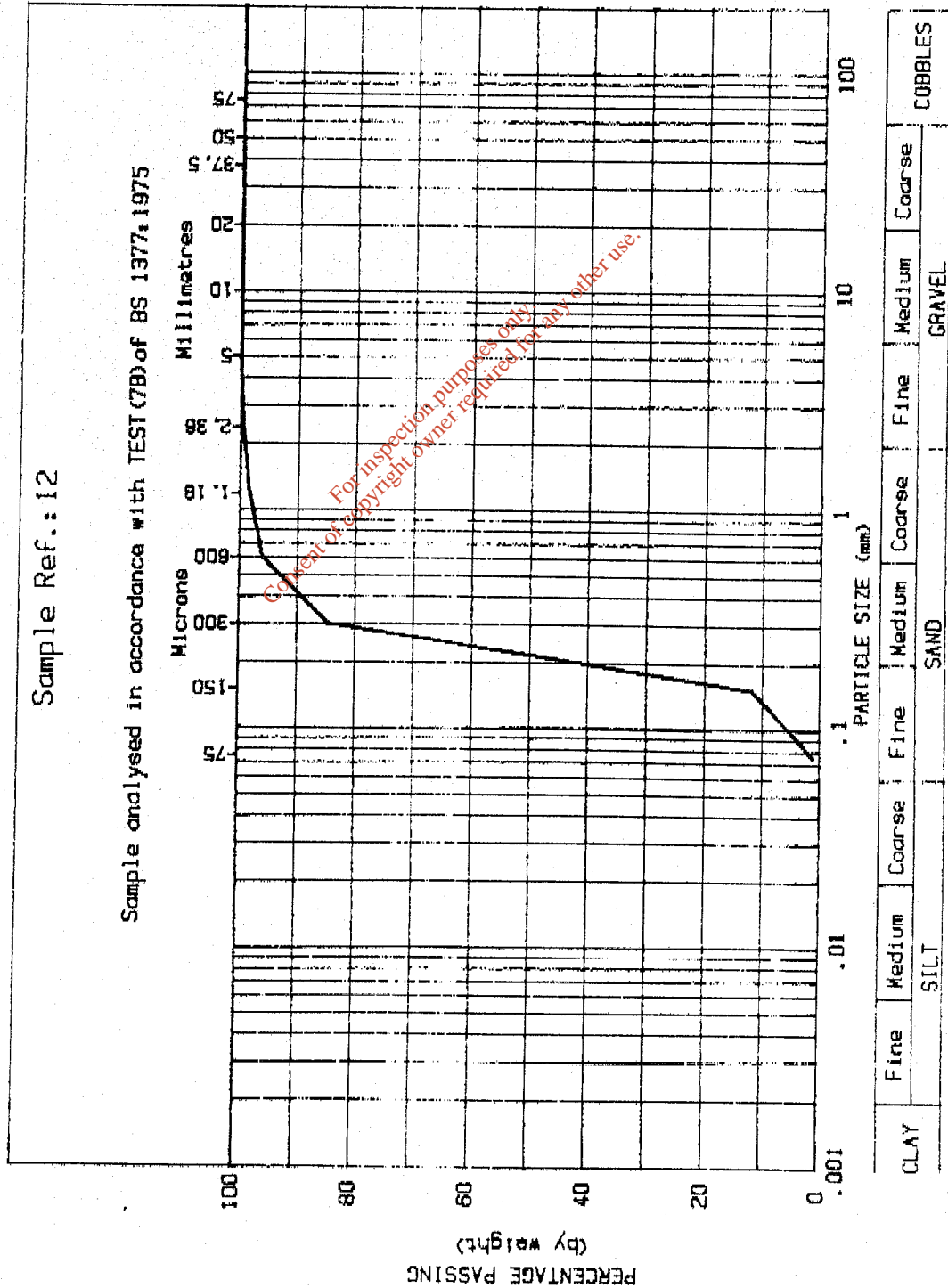


MATERIAL DESCRIPTION: Grey fine silty sand

EOLAS - THE IRISH SCIENCE and TECHNOLOGY AGENCY  
 GEOTECHNICAL ENGINEERING SECTION

Client: Wicklow Co. Council  
 Date: 23 Nov. 1990  
 Project: Arklow Coastal Study  
 Job No.

B. S. SIEVE SIZE (mm)	% PASSING (by weight)
100	
75	
50	
37.5	
20	
10	
5	100
2.36	99
1.18	98
.6	96
.3	85
.15	12
.075	1



MATERIAL DESCRIPTION: Light brown sand with shells

EDLAS - THE IRISH SCIENCE and TECHNOLOGY AGENCY  
 GEOTECHNICAL ENGINEERING SECTION

Client: Wicklow Co. Council

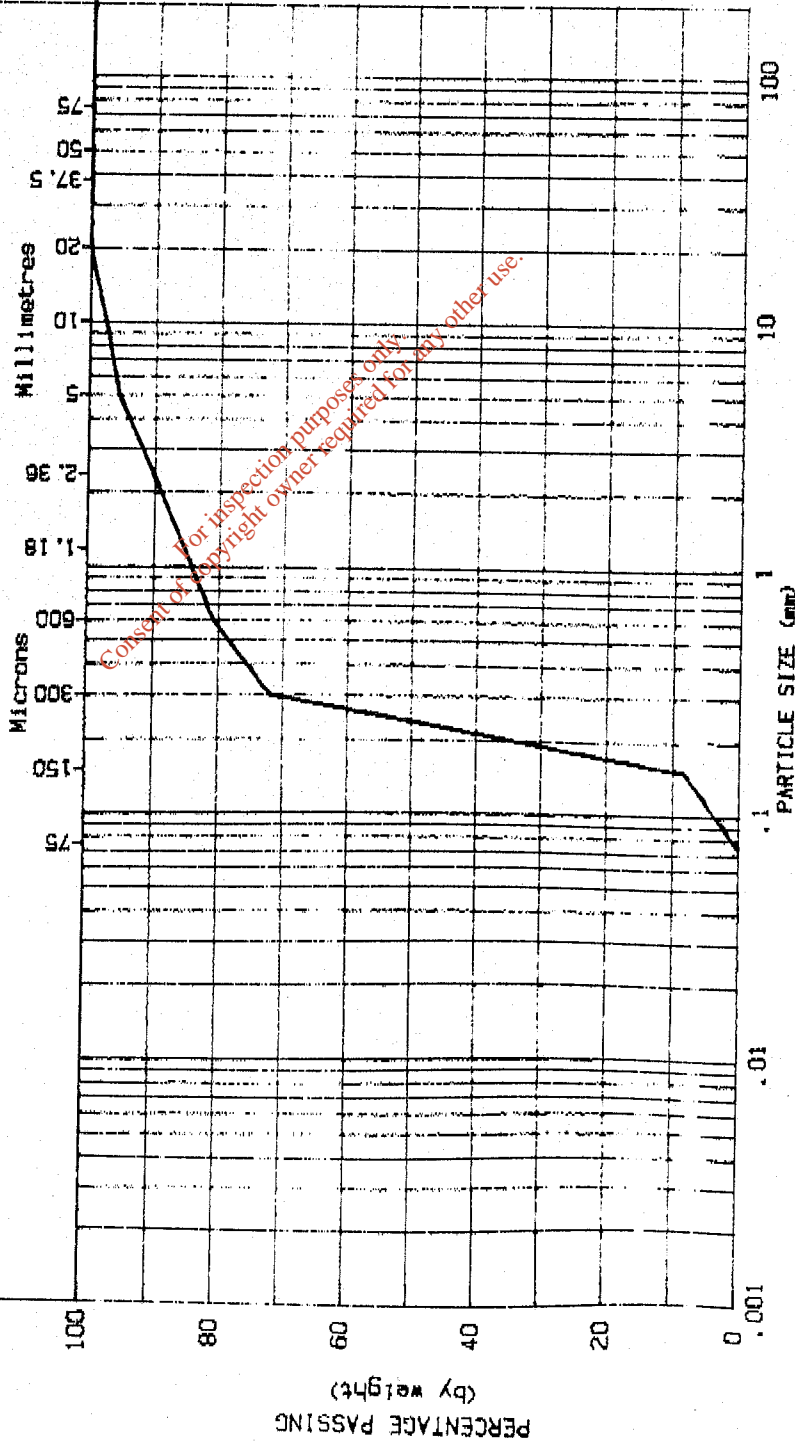
Date: 23 Nov. 1990

Project: Arklow Coastal Study

Job No.

Sample Ref.: 13

Sample analysed in accordance with TEST (78) of BS 1377: 1975



B. S. SIEVE SIZE (mm)	% PASSING (by weight)
100	
75	
50	
37.5	
20	100
10	98
5	95
2.36	90
1.18	85
.6	81
.3	72
.15	6
.075	0

CLAY			SILT			SAND			GRAVEL			COBBLES
Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

MATERIAL DESCRIPTION: Light brown sand with stones

EOLAS - The IRISH SCIENCE and TECHNOLOGY AGENCY  
 GEOTECHNICAL ENGINEERING SECTION

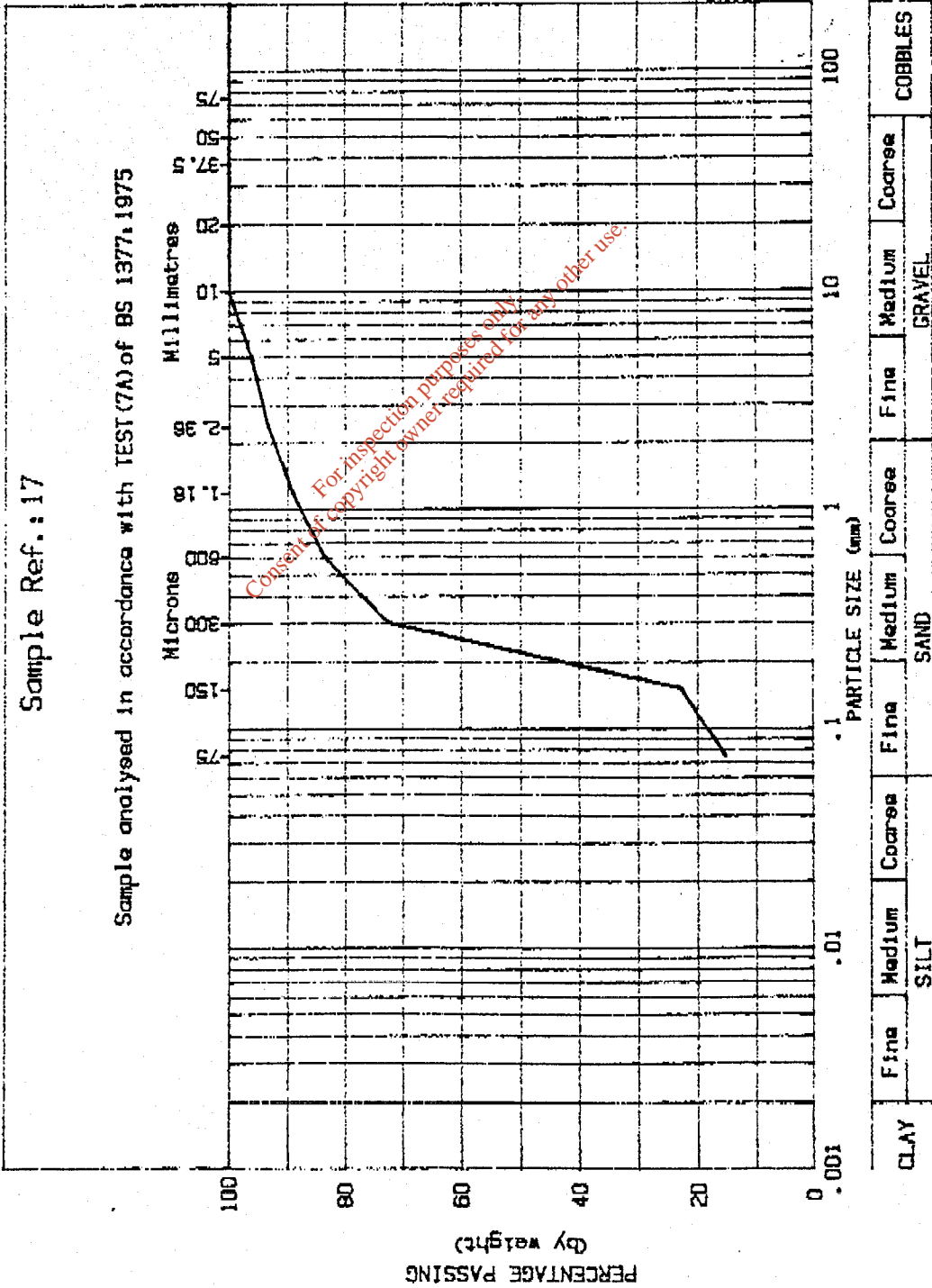
Client: Wicklow Co. Council

Date: 23 Nov. 1990

Project: Arklow Coastal Study

Job No.

Sample Ref.: 17



B. S. SIEVE SIZE (mm)	% PASSING (by weight)
100	15
75	23
50	72
37.5	84
20	89
10	96
5	99
2.36	99
1.18	99
0.6	99
0.3	99
0.15	99
0.075	99

MATERIAL DESCRIPTION: Gray clayey silty sand

Client: Wicklow Co. Council

Project: Arklow Coastal Study

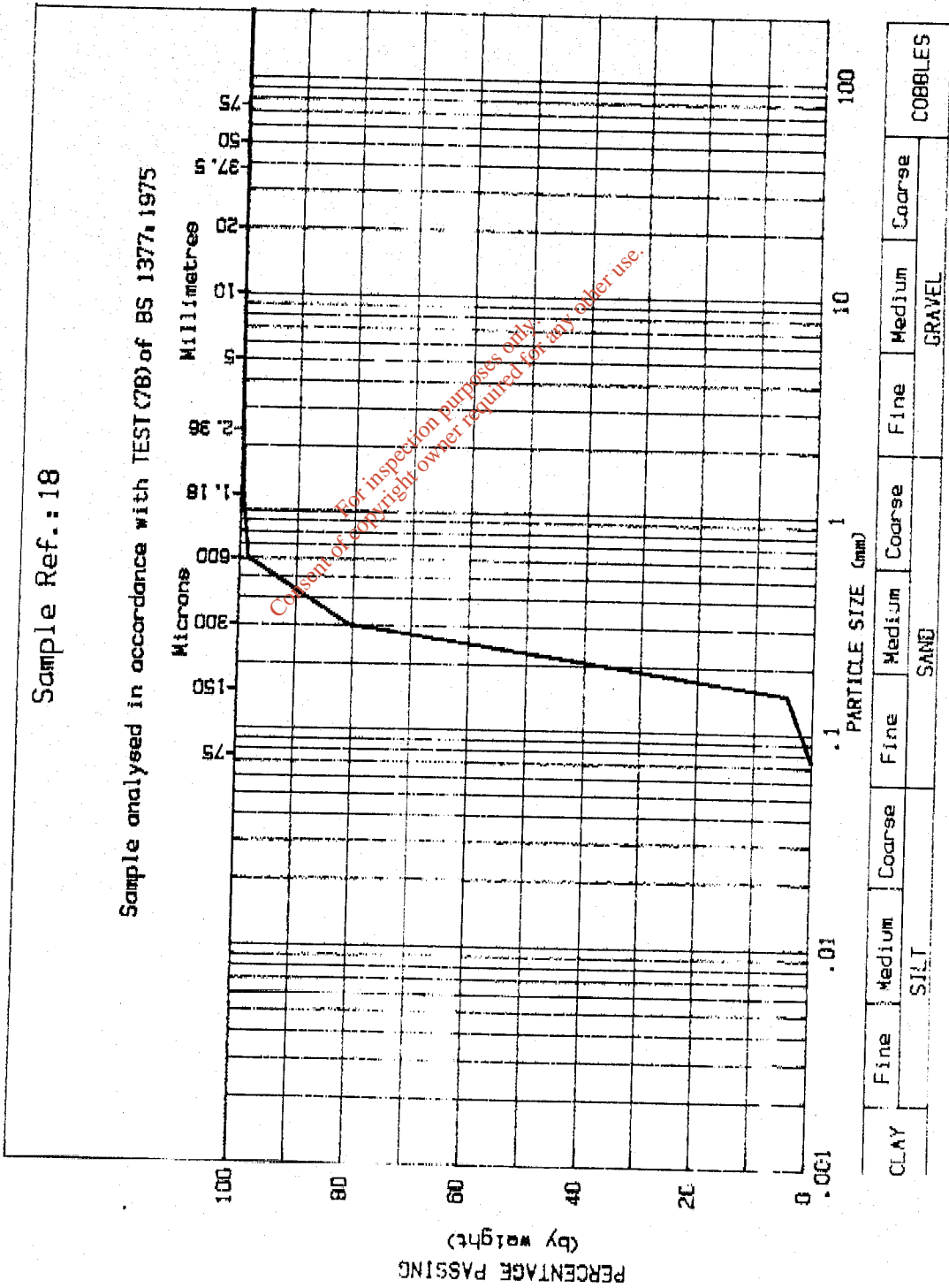
Date: 23 Nov. 1990

Job No.

Sample Ref.: 18

Sample analysed in accordance with TEST (7B) of BS 1377, 1975

B. S. SIEVE SIZE (mm)	% PASSING (by weight)
100	
75	
50	
37.5	
20	
10	
5	100
2.36	100
1.18	99
.6	98
.3	81
.15	4
.075	0



MATERIAL DESCRIPTION: Light brown medium fine sand



# Appendix B

## Screening Assessment

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## Arklow Port Dredge Spoil Disposal

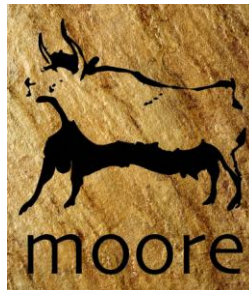
Screening Assessment as required under

Article 6(3) of the Habitats Directive

(Council Directive 92/43/EEC)

8<sup>th</sup> November 2010

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## 1. Introduction

The Habitats Directive (Council Directive 92/43/EEC) requires that all plans and projects must be screened for potential impact on Special Areas of Conservation (SACs) or Special Protection Areas (SPAs). This process aims to establish whether a full Appropriate Assessment as required by Article 6 of the Directive is required in any particular case.

This report presents a screening assessment for the disposal of dredge spoil at a disposal site off the coast of Arklow, Co. Wicklow. The disposal basin will accommodate approximately 39,275 m<sup>3</sup> of contaminated sediment and 2,725 m<sup>3</sup> of uncontaminated sediment to a suitable depth to be capped appropriately to prevent contaminant infiltration upwards to the benthic environment, see Figure 1 attached for site location.

This AA Screening Report has been prepared by Moore Group - Environmental Services with Arup on behalf of Arklow Harbour Commissioners in accordance with Articles 6(3) and 6(4) of the Habitats Directive. The report was compiled by Ger O'Donohoe M.Sc. who has 17 years experience in environmental impact assessment and has completed numerous Appropriate Assessment Screening Reports in both terrestrial and marine habitats.

This AA Screening Report should be read in conjunction with the Arklow Port Dredge Spoil Disposal Licence Application Revised Modeling and Monitoring Report (Arup, August 2009).

### 1.1 Background - The Habitats and Birds Directives

The Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) is the main legislative instrument for the protection and conservation of biodiversity in the EU. Under the Directive member States are obliged to designate Special Areas of Conservation (SACs) which contain habitats or species considered important for protection and conservation in a European Union context. The Birds Directive (Council Directive 79/409/EEC on the conservation of wild birds), is concerned with the long-term protection and management of all wild bird species and their habitats in the EU. Among other things, the Directive requires that Special Protection Areas (SPAs) be established to protect migratory species and species which are rare, vulnerable, in danger of extinction, or otherwise require special attention. Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas, designated under the Birds Directive, form a pan-European network of protected sites known as Natura 2000. The Habitats Directive sets out a unified system for the protection and management of SACs and SPAs. Article 6(3) and 6(4) of the Directive set out key elements of the system of protection including the requirement for Appropriate Assessment of plans and projects (see Appendix I). Article 6(3) of the Habitats Directive requires an appropriate assessment of any plan or project likely to have a significant effect on an SAC or SPA.

### 1.2 Screening for Appropriate Assessment

Screening has been undertaken in fulfillment of the requirements of the Habitats Directive and taking into account the Department of the Environment, Heritage and Local Government's Guidance on Appropriate Assessment of Plans and Projects in Ireland (as amended February 2010).

## 2. Methodology

Screening has been undertaken in accordance with the European Commission's Assessment of Plans and projects significantly affecting Natura 2000 sites (European Commission, 2001) and the Department of the Environment, Heritage & Local Governments Guidance on Appropriate Assessment of Plans and Projects in Ireland which comprises the following steps:

1. Description of the Project/Plan.
2. Identification of Natura 2000 sites potentially affected by the Project/Plan.
3. Identification and description of individual and cumulative impacts likely to result from the Project/Plan.
4. Assessment of the significance of the impacts identified on the conservation objectives of the site(s).
5. Exclusion of sites where it can be objectively concluded that there will be no significant impacts on conservation objectives.

Direct and indirect impacts on all coastal and marine Natura 2000 Sites within 15 km of the deposit area were considered.

## 3. Description of the Project

The disposal basin must accommodate approximately 39,275 m<sup>3</sup> of contaminated sediment and 2,725 m<sup>3</sup> of uncontaminated sediment to a suitable depth to be capped appropriately to prevent contaminant infiltration upwards to the benthic environment.

The disposal basin's hypothetical parameters are as follows;

- Surface – 150 m by 150 m (22,500 m<sup>2</sup>);
- Base – 50 m by 50 m (2,500 m<sup>2</sup>);
- Side slopes of 10° to accommodate sandy material;
- Minimum Depth of 8.8 m;
- Total Basin Volume of 95,530 m<sup>3</sup>;
- Excavated material will be removed and placed within the vicinity of the basin for ease of access for capping;
- Contaminated sediment when placed at the base of the pit will be approximately 5.5 m deep (Contaminated Layer) and will have an exposed surface area of approximately 114 m by 114 m (12,996 m<sup>2</sup>);
- Uncontaminated sediment will be placed above the contaminated material and will be approximately 0.2 m deep (Uncontaminated Layer) and will have an exposed surface area of approximately 116 m by 116 m (13,456 m<sup>2</sup>);
- Approximately 53,530 m<sup>3</sup> of the basin's previously excavated material will then be placed over the uncontaminated material to cap it (Capping Layer);
- The remaining 42,000 m<sup>3</sup> of excavated material from the basin will be spread over the cap, and extend beyond its boundary edge. Surface area 175 m by 175 m (30,625 m<sup>2</sup>) to a depth of approximately 1.4 m (Erodible Layer).

The Marine Licensing Vetting Committee (MLVC) have recommended that dredging of the port should be conducted in stages to adequately contain the most contaminated sediment material at the centre of the contaminated layer at the base of the disposal basin. Consequently, the following stages of dredging will be implemented at Arklow;

- 1) Disposal Basin Creation;
- 2) Dredging and disposal of the River Channel sediments;
- 3) Dredging and disposal of the Dock sediments;
- 4) Dredging and disposal of the Turning Basin sediments;
- 5) Dredging and disposal of the Harbour Mouth sediments; and
- 6) Capping.

The dredging contractors will prepare the methodology, timeline and environmental mitigation measures for the dredging and disposal operation, which will be submitted to the MLVC by the Arklow Harbour Commissioners.

The study area of the project showing the dredge and disposal areas are presented on Figure 1.

The site of the proposed development is located in the vicinity of the coastal Natura 2000 Sites listed in Table 1 below (see also Figure 1 attached).

Site Name	Site Code	Distance - Site A
Magherabeg Dunes SAC	001766	13.3 km north
Buckrone-y-Brittass Dunes and Fen SAC	000729	3.6 km north
Kilpatrick Sandhills SAC	001742	6.7 km south

**Table 1.** List of Natura 2000 Sites within 15 km of the disposal sites.

#### 4. Identification of Natura 2000 sites

There are no designated sites of National or International significance under the footprint of the proposed development.

The nearest Natura 2000 Site is the Buckrone-y-Brittass Dunes and Fen SAC. The edge of the Deposit Area is located 3.6 km to the south of the SAC at the nearest point.

Further details on the sites are included in the National Parks and Wildlife Service's Site Synopses in Appendix B. Extracts from the Site Synopses are presented below.

##### 4.1. Magherabeg Dunes SAC (Site Code 001766)

This sand dune system is situated at Ardmore Point, about 5 km south of Wicklow Head. The Three Mile Water River enters the sea through the dunes. The site is fairly intact, though some areas are being naturally eroded by wind and sea, in particular at the southern end, where bedrock has been exposed.

The site is of importance in that it is a fine example of a dune system which is fairly intact and which has a well-developed flora. The lack of easy public access to this site has undoubtedly been responsible in preventing damage and erosion from amenity activities. The presence of wetland vegetation on the site is of additional interest.

##### 4.2. Buckrone-y-Brittass Dunes and Fen SAC (Site Code 000729)

This site is a complex of coastal habitats located about 10 km south of Wicklow town. It comprises two main sand dune systems, Brittass Bay and Buckrone-y Dunes, connected on the coast by the rocky headland of Mizen Head. The dunes have cut off the outflow of a small river at Mizen Head and a fen, Buckrone-y Fen, has developed on the site. A further small sand dune system occurs south of Pennycomequick Bridge. Ten habitats listed on the EU Habitats Directive, including two priority habitats, occur within the site.

This site is important as an extensive sand dune/fen system with well developed plant communities. Several coastal habitats listed on the EU Habitats Directive, including two priority habitats - fixed dune and decalcified dune heath - are present. The area contains two legally protected plants, as well as a number of other rare or scarce plant species. The site provides habitat for some rare species of invertebrate and for the vulnerable Little Tern. A rich flora and fauna has persisted on this site despite extensive amenity use and adjacent farming. However, future land use practices will need to be managed to ensure the continued survival of this unique mosaic of coastal habitats.

#### **4.3. Kilpatrick Sandhills SAC (Site Code 001742)**

Kilpatrick Sandhills are located about 8km south of Arklow town, and just south of the Wicklow/Wexford county border. The site is comprised of a mosaic of coastal habitats but primarily a mature sand dune system which extends along 2 km of coastline.

The site is ecologically important as a good example of a mature and fairly intact sand dune system which shows the developmental stages of dunes from fore dunes to mature grey dunes. A good diversity of habitats and species are present. Fixed dunes and dune heath are priority habitats under Annex I of the European Habitats Directive.

## **5. Identification of potential impacts to Natura 2000 sites & assessment of Significance**

There would be no direct impact on the nearby Natura 2000 Sites. Given the predominant tidal currents of 1 – 2 knots (approx. 1 m/s at mean spring rate) and that the predominant current movement is parallel with the shore; there would be no indirect impact on the Buckronev-Brittis Dunes and Fen SAC.

Potential indirect impacts were considered with regard to sedimentation and sediment transport from the deposition area on to the coastal sites listed above.

Mathematical modeling carried out and presented in the Arklow Port Dredge Spoil Disposal Licence Application Revised Modeling and Monitoring Report (Arup, August 2009).

The MDFATE model predicted the shape and height of the post-disposal cap, subjected to continuously large wave conditions, one year after the dredging operation commenced. The MDFATE model showed that the cap does have the potential to erode in the presence of large waves for a continuous period. However, the extreme conditions simulated would never occur continually for the duration of one year. It is likely that some erosion of the cap will occur during storm conditions but that over the long term the cap will remain in place, be subjected to consolidation and periodic erosion. Based on the results of the MDFATE model, it is not predicted that the cap will erode over the period of one year, even subject to excessive wave climates.

Therefore there would be no transport of contaminated sediment and no indirect impacts on the nearby Natura 2000 sites.

As a precautionary mitigation measure, spoil disposal will not be carried out in periods of extended high velocity southeasterly wind.

## 6. Conclusion

Given that the dredge spoil will settle onto the seafloor within the proposed disposal area and that it is not predicted that the cap will erode over the period of one year, even subject to excessive wave climates there would be no indirect impact on the coastal Natura 2000 Sites within 15 km of the disposal sites.

A finding of no significant effects report is presented in Appendix C in accordance with the EU Commission's methodological guidance (European Commission, 2001).

## 7. References

European Commission (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC.

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## Appendix A

### Article 6(3) and (4) of the Habitats Directive

3. Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

4. If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.

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## Appendix B

### National Parks and Wildlife Service Site Synopses

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**SITE SYNOPSIS****SITE NAME: MAGHERABEG DUNES****SITE CODE: 001766**

This sand dune system is situated at Ardmore Point, about 5 km south of Wicklow Head. The Three Mile Water River enters the sea through the dunes. The site is fairly intact, though some areas are being naturally eroded by wind and sea, in particular at the southern end, where bedrock has been exposed.

The dunes are largely dominated by Marram (*Ammophila arenaria*). The dunes are backed by drift banks which support Bracken (*Pteridium aquilinum*) and scrub, including some Gorse (*Ulex europaeus*); the scrub is particularly dense along the river. Other species occurring on these drift banks include Hemp-agrimony (*Eupatorium cannabinum*), Yellow-wort (*Blackstonia perfoliata*) and the scarce, Wood Vetch (*Vicia sylvatica*). The drift banks extend to Ardmore Point, which forms the northern boundary of the site. The site includes several sand dune types that are listed on Annex II of the EU Habitats Directive: embryonic dunes, marram dunes, fixed dunes and decalcified dune heath. Two other habitats which are listed on this annex also occur on the site: petrifying springs and driftlines.

The Three Mile Water River, which flows through the dunes provides habitat for wetland species, in particular, sedges, including Bladder Sedge (*Carex vesicaria*), Fox Sedge (*C. otrubae*) and Grey Sedge (*C. divulsa*). The very rare hybrid sedge, *Carex x grossii* (*C. hirta* x *C. vesicaria*) has also been recorded. Common Reed (*Phragmites australis*) is also found along the river.

The site is of importance in that it is a fine example of a dune system which is fairly intact and which has a well-developed flora. The lack of easy public access to this site has undoubtedly been responsible in preventing damage and erosion from amenity activities. The presence of wetland vegetation on the site is of additional interest.

17.1.1997

Synopsis section from BES (11/4/00)

Despite its small size, the dune system shows most of the developmental stages of dunes, with embryonic dunes, white dunes, grey fixed dunes and decalcified fixed dunes all represented. The embryo dunes occur mainly in the northern sector, in association with a good example of driftline vegetation. Species present include Sea Couch (*Elymus farctus*), Marram (*Ammophila arenaria*) and Sea Sandwort (*Honkenya peploides*). A narrow band of shifting marram dunes then occur, these been largely washed away by erosion in the southern sector. Stable fixed dunes are well represented, with such species as Red Fescue (*Festuca rubra*), Rest Harrow (*Ononis repens*), Bird's-foot Trefoil (*Lotus corniculatus*), Sand Pansy (*Viola tricolor*), Thyme (*Thymus praecox*) and Clover (*Trifolium repens*). Burnet Rose (*Rosa pimpinellifolia*) is present on the older fixed dunes. The fixed dunes merge with dune heath, with species such as Gorse (*Ulex europaeus*) and Bracken (*Pteridium aquilinum*) present. The dune system is backed by drift banks, which are well covered by deciduous woodland and scrub.

Along the low cliffs at Ardmore Point there occurs a line of petrifying springs with tufa formations and a range of specialised moss species.

## SITE SYNOPSIS

SITE NAME: BUCKRONEY-BRITTAS DUNES AND FEN

SITE CODE: 000729

This site is a complex of coastal habitats located about 10 km south of Wicklow town. It comprises two main sand dune systems, Brittas Bay and Buckronev Dunes, connected on the coast by the rocky headland of Mizen Head. The dunes have cut off the outflow of a small river at Mizen Head and a fen, Buckronev Fen, has developed on the site. A further small sand dune system occurs south of Pennycomequick Bridge. Ten habitats listed on the EU Habitats Directive, including two priority habitats, occur within the site.

Along much of the higher parts of the beach, typical annual strandline vegetation occurs. Species such as Sea Rocket (*Cakile maritima*), Prickly Saltwort (*Salsola kali*) and Spear-leaved Orache (*Atriplex prostrata*) are frequent in this zone, with the scarcer Yellow-horned Poppy (*Glaucium flavum*) present in places. Embryonic dune development occurs at the southern part of Brittas and more widely at Buckronev and Pennycomequick. Typical species are Couch-grass (*Elymus* sp.), Sand Sedge (*Carex arenaria*) and Sea Sandwort (*Honkenya peploides*). The main dune ridges are dominated by Marram (*Ammophila arenaria*), with herbaceous species such as Sea Spurge (*Euphorbia paralias*), Sea Holly (*Eryngium maritimum*) and Rest Harrow (*Ononis repens*) occurring throughout. The main dune ridges are well developed reaching heights of 10 m at Brittas. The northern end of the Brittas system has fine examples of parabolic dunes.

Stable fixed dunes, a priority habitat on Annex I of the EU Habitats Directive, are well developed at Brittas and Buckronev. Marram is less frequent and is replaced by Red Fescue (*Festuca rubra*). A rich flora occurs, especially in the more open areas. Common species include Pyramidal Orchid (*Anacamptis pyramidalis*), Common Milkwort (*Polygala vulgaris*), Wild Pansy (*Viola tricolor* subsp. *curtisii*), Carlina Thistle (*Carlina vulgaris*), Biting Stonecrop (*Sedum acre*), Wild Thyme (*Thymus praecox*) and Common Bird's-foot-trefoil (*Lotus corniculatus*). The mature areas of fixed dune also contain Burnet Rose (*Rosa pimpinellifolia*), Bracken (*Pteridium aquilinum*), Wood Sage (*Teucrium scordonia*) and Common Sorrel (*Rumex acetosa*). Mosses such as *Tortula ruralis* subsp. *ruraliformis*, *Rhytidiadelphus triquetris*, and *Homalothecium lutescens* are frequent, along with lichens (*Cladonia* spp., *Peltigera canina*).

This is one of the few Irish east coast sites to possess good examples of wet dune slacks and dunes with Creeping Willow (*Salix repens*). These dunes have a rich and varied flora, including such species as Creeping Willow, Water Mint (*Mentha aquatica*), Silverweed (*Potentilla anserina*), Meadowsweet (*Filipendula ulmaria*) and Meadow Thistle (*Cirsium dissectum*). The slacks are notably rich in rushes and sedges. Of particular interest is the presence of Sharp Rush (*Juncus acutus*), a scarce species in eastern Ireland and one that is indicative of a saline influence.

The site is also notable for the presence, at the back of the dunes, of areas of decalcified dune heath, a rare habitat in Ireland and one that is also listed with priority status on the EU Habitats Directive. Heath species present include Ling (*Calluna vulgaris*), Bell Heath (*Erica cinerea*) and Gorse (*Ulex europaeus*).

Buckronev Fen lies west of Mizen Head. It is backed to the west by a dense swamp of Common Reed (*Phragmites australis*). The fen is dominated by Tussock Sedge (*Carex paniculata*), with Water Mint, Purple Loosestrife (*Lythrum salicaria*), Marsh Pennywort (*Hydrocotyle vulgaris*), Greater Bird's-foot-trefoil (*Lotus uliginosus*), Water Horsetail (*Equisetum fluviatile*), small sedges (*Carex* spp.) and other flowering plants. An extensive stand of *Juncus subnodulosus* is of note. Throughout this area the rare Marsh Fern (*Thelypteris palustris*) is frequent. There are also extensive areas

of Rusty Willow (*Salix cinerea* subsp. *oleifolia*) scrub.

This site contains two rare plant species protected under the Flora (Protection) Order, 1999: Wild Asparagus (*Asparagus officinalis* subsp. *prostratus*), in its most northerly Irish station, and Meadow Saxifrage (*Saxifraga granulata*). Other rare species which occur within the site include Green-flowered Helleborine (*Epipactis phyllanthes*), Bird's-foot (*Ornithopus perpusillus*) and Spring Vetch (*Vicia lathyroides*). All of these are Red Data Book species. The rare sedge hybrid, *Carex riparia* x *C. vesicaria* (*Carex* x *csomadensis*) is only known from Mizen Head.

The invertebrate fauna of Buckronef fen has been investigated and some notable species have been recorded, including the beetle *Eurynebria complanata* and the following flies: *Machimus cowini*, *Anasimyia lunulata*, *Parhelophilus consimilis* and *Lejogaster splendida*.

Little Tern, a species listed on Annex I of the EU Birds Directive, has bred or attempted to breed at Buckronef strand in recent years. In 1992 between 7 and 10 pairs were present and in 1993 up to 8 pairs. Teal are regular in winter (119), as are Curlew (46), Lapwing (515) and Snipe (87). All figures are average peaks for 1994/95 - 1995/96.

The dune systems and beaches are subject to high amenity usage from day-trippers and several areas around the site have been developed as caravan parks, car parks and golf courses. The marginal areas of the fen have been reclaimed, especially at the south end, though these areas still flood in winter and attract waterfowl.

This site is important as an extensive sand dune/fen system with well developed plant communities. Several coastal habitats listed on the EU Habitats Directive, including two priority habitats - fixed dune and decalcified dune heath - are present. The area contains two legally protected plants, as well as a number of other rare or scarce plant species. The site provides habitat for some rare species of invertebrate and for the vulnerable Little Tern. A rich flora and fauna has persisted on this site despite extensive amenity use and adjacent farming. However, future land use practices will need to be managed to ensure the continued survival of this unique mosaic of coastal habitats.

16.10.2001

## SITE SYNOPSIS

SITE NAME : KILPATRICK SANDHILLS

SITE CODE : 001742

Kilpatrick Sandhills are located about 8km south of Arklow town, and just south of the Wicklow/Wexford county border. The site is comprised of a mosaic of coastal habitats but primarily a mature sand dune system which extends along 2 km of coastline.

Various stages of sand dune formation can be seen, from small fore-dunes which are stabilized by Marram Grass (*Ammophila arenaria*) to mature fixed dunes colonised by a species-rich sward of grasses and herbaceous plants. Red Fescue (*Festuca rubra*) is the dominant grass among fixed dune vegetation. Other species present include Lady's Bedstraw (*Galium verum*), Kidney Vetch (*Anthyllis vulneraria*), Wild Thyme (*Thymus praecox*) and Sheep's-bit (*Jasione montana*). On the older dunes, there is an abundance of legumes (*Leguminosae*) including Bird's-foot Trefoil (*Lotus corniculatus*), White Clover (*Trifolium repens*), Hop Trefoil (*Trifolium campestre*) and Lesser Trefoil (*Trifolium dubium*). Further inland, on the more mature grey dunes, Burnet Rose (*Rosa pimpinellifolia*) is common. The scarce species, Lesser Meadow-rue (*Thalictrum minus*), occurs among the vegetation of the more mobile dunes.

On the landward side of the dunes, in the middle of the site, there is a low-lying marsh which is dominated by Bulrush (*Typha latifolia*), with Branched Bur-reed (*Sparganium erectum*), Yellow Iris (*Iris pseudacorus*), Tubular Water-dropwort (*Oenanthe fistulosa*), Wild Angelica (*Angelica sylvestris*) and Sedges (*Carex* spp.). To the west of the marsh is an area of wet scrub woodland. The canopy is formed of Alder (*Alnus glutinosa*) and Willow (*Salix* spp.), with Bramble (*Rubus fruticosus* agg.), Honeysuckle (*Lonicera periclymenum*), Great Horsetail (*Equisetum telmateia*), Wood Dock (*Rumex sanguineus*) and Narrow Buckler-fern (*Dryopteris carthusiana*) among the ground flora.

The sandhills give way on the south-western side to a heathy scrub dominated by Gorse (*Ulex europaeus*), Blackthorn (*Prunus spinosa*) and Bramble. At the northern end of the site is a rocky headland, Kilmichael Point, which affords fine views along the coastline. Rock outcrops occur where the overlying clay drift has eroded, exposing cliffs which rise in steps to about 10m. The headland supports a species-rich coastal grassland and cliff vegetation, including the scarce species, Rock Sea-lavender (*Limonium binervosum*).

The Red Data Book species, Sea Stock (*Matthiola sinuata*), has been observed among rocky crevices here in the past, but has not been recorded recently. The species is now regarded as extinct in Ireland.

At the southern end of the site, the sand dunes and beach are used by visitors for amenity purposes. Parts of the site are also used for grazing cattle. Grazing is a critical factor in coastal systems: the correct grazing pressure maintains species-rich open swards and curtails scrub encroachment. Over-exposure to grazing and amenity usage can cause damage to dune vegetation and exacerbate dune erosion.

The site is ecologically important as a good example of a mature and fairly intact sand dune system which shows the developmental stages of dunes from fore dunes to mature grey dunes. A good diversity of habitats and species are present. Fixed dunes and dune heath are priority habitats under Annex I of the European Habitats Directive.

18.2.1997

## Appendix C

### Finding of no significant effects report

#### Finding no significant effects report matrix

##### Name of project or plan

Arklow Port Dredge Spoil Disposal.

##### Name and location of the Natura 2000 site(s)

Site Name	Site Code	Distance to Disposal Site
Magherabeg Dunes SAC	001766	13.3 km north
Buckronev-Brittass Dunes and Fen SAC	000729	3.6 km north
Kilpatrick Sandhills SAC	001742	6.7 km south

##### Description of the project or plan

The project entails the disposal of dredge spoil at a deposition location off the coast of Arklow, Co. Wicklow. The Deposit Area will receive contaminated and uncontaminated spoil.

##### Is the project or plan directly connected with or necessary to the management of the site(s)

No

##### Are there other projects or plans that together with the projects or plan being assessed could affect the site

No

##### *The assessment of significance of effects*

##### Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site.

The project would not have a direct impact on the nearby Natura 2000 Sites. Indirect impacts were also considered in terms sediment transport.

##### Explain why these effects are not considered significant.

Potential indirect impacts were considered with regard to sedimentation and sediment transport from the deposition areas on to the coastal sites listed above.

There would be no direct impact on the nearby Natura 2000 Sites. Given the predominant tidal currents of 1 – 2 knots (approx. 1 m/s at mean spring rate) and that the predominant current movement is parallel with the shore; there would be no indirect impact on the Buckronev-Brittass Dunes and Fen SAC.

Potential indirect impacts were considered with regard to sedimentation and sediment transport from the deposition area on to the coastal sites listed above.

Mathematical modeling carried out and presented in the Arklow Port Dredge Spoil Disposal Licence Application Revised Modeling and Monitoring Report (Arup, August 2009).

The MDFATE model predicted the shape and height of the post-disposal cap, subjected to continuously large wave conditions, one year after the dredging operation commenced. The MDFATE model showed that the cap does have the potential to erode in the presence of large waves for a continuous period. However, the extreme conditions simulated would never occur continually for the duration of one year. It is likely that some erosion of the cap will occur during storm conditions but that over the long term the cap will remain in place, be subjected to consolidation and periodic erosion. Based on the results of the MDFATE model, it is not predicted that the cap will erode over the period of one year, even subject to excessive wave climates.

Therefore there would be no transport of contaminated sediment and no indirect impacts on the nearby Natura 2000 sites.

As a precautionary mitigation measure, spoil disposal will not be carried out in periods of extended high velocity southeasterly wind.

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**List of agencies consulted: provide contact name and telephone or e-mail address**

Department of the Environment, Heritage & Local Government during the planning application process.  
Marine Institute  
Eastern Regional Fisheries Board now Inland Fisheries Ireland  
EPA

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**Response to consultation**

The EPA requested an Appropriate Assessment of the project.

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**Data collected to carry out the assessment**

**Who carried out the assessment**

Ger O'Donohoe M.Sc. of Moore Group Environmental Services

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**Sources of data**

NPWS database of designated sites at [www.npws.ie](http://www.npws.ie)

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**Level of assessment completed**

Desk Study

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**Where can the full results of the assessment be accessed and viewed**

Contact: Arklow Harbour Commissioners.

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**Overall Conclusions**

There would be no direct impact on the nearby Natura 2000 Sites. Given the predominant tidal currents of 1 – 2 knots (approx. 1 m/s at mean spring rate) and that the predominant current movement is parallel with the shore; there would be no indirect impact on the Buckronev-Brittis Dunes and Fen SAC.

Potential indirect impacts were considered with regard to sedimentation and sediment transport from the deposition area on to the coastal sites listed above.

Mathematical modeling carried out and presented in the Arklow Port Dredge Spoil Disposal Licence Application Revised Modeling and Monitoring Report (Arup, August 2009).

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