

## **Appendix 15.2**

Dredge Material

Management Study

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# 1 Introduction

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As part of the Arklow Flood Relief Scheme (FRS) Wicklow County Council (WCC), funded by the Office of Public Works (OPW), plans to undertake engineering works in the Avoca River to mitigate the risk of flooding.

The proposed scheme is being designed by Byrne Looby (BLP) for WCC, with Arup appointed to prepare an Environmental Impact Assessment Report (EIAR) for submission with the planning application for the scheme to An Bord Pleanála (ABP).

The proposed works include the construction of floodwalls and embankments and deepening of the river channel. This will require lowering the floor of Arklow Bridge including bridge underpinning, bridge remedial works and scour protection works. Lowering of about 850m length of the riverbed will be achieved through dredging upstream and downstream of Arklow Bridge. The destination of the excess material generated by the dredging work is the subject of this report.

Arup has been commissioned by Wicklow County Council to undertake a Dredge Material Management Study in relation to the above-mentioned works. The study outlined in this report covers the assessment of the various dredge material management options taking into consideration relevant European and national guidance. The study included further site investigation works to inform an options assessment process, and from the study the preferred options for the material management are recommended.

This report will inform elements of the Environmental Impact Assessment Report (EIAR) and will be included as an appendix to the EIAR. The study includes technical input from BLP on further development and assessment of the various works options, primarily on dredging and materials handling methodologies, in order to identify the preferred dredge material management option(s).

This report details the following:

- Overview of the proposed works;
- Outline of dredge material management options;
- Summary of existing conditions;
- Stakeholder consultation;
- Dredge material management options appraisal;
- Recommended dredge material management options.

Relevant supporting documentation is provided in the Appendices.

## 2 Overview of proposed works

The proposed deepening of the river channel is to be achieved through the following work packages:

- WP 1: Lowering the floor of Arklow Bridge including Bridge underpinning, Bridge remedial works and scour protection works.
- WP 2: Channel dredging upstream and downstream of Arklow Bridge.

Both work packages will generate excavated material or dredge material, which will need to be managed through one or a combination of potential dredge material management options. In addition, a small amount of material will be excavated from the riverbed as part of WP 3: Construction of debris and gravel trap with associated maintenance access.

The material management options are outlined in Section 3. Refer to Figure 1 below for the plan extent of proposed dredging works.

This section describes the dredging design and relevant construction considerations.

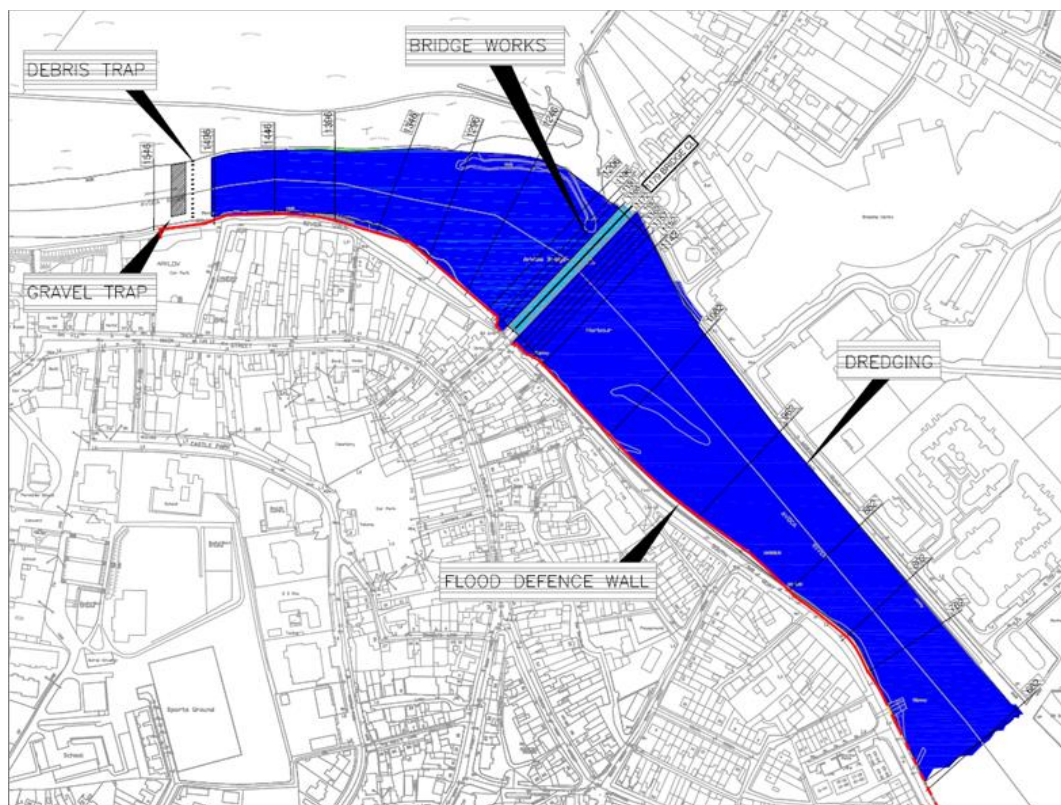


Figure 1: Extent of required dredging works shown in blue

## 2.1 Construction programme

Construction activities within the river channel, including dredging and excavation works, will be subject to seasonal restrictions and may only be undertaken during the fisheries open season (May to September inclusive), unless the consent of Inland Fisheries Ireland is obtained to work outside of this period.

Construction activity on the bridge is expected to commence in Quarter (Q) 1 of 2022 with WP 1 on the upstream and downstream sections of the southern half of Arklow Bridge and will run until the end of 2022. The works consists of half the bridge works and allows for continued in-channel flow through the northern half of Arklow bridge. The second phase of WP 1 would start in Q1 of 2023 and run until the end of 2023 with demobilisation following. Similarly, the third phase of WP1 would start in Q1 of 2024 and run until the end of 2024 with demobilisation following. River flows would be facilitated through the southern half of Arklow Bridge.

The main river dredging works WP2 is scheduled to commence in Q2 of 2025 with works to be completed by end Q3 2025.

Debris and gravel trap works WP3 will commence in Q2 of 2022 and continue from the North bank to the South bank, with completion by the end of Q3 in 2022.

## 2.2 Arklow bridge works design

It is proposed to lower the floor of Arklow Bridge by 1.0m which, along with associated upstream and downstream river dredging, will increase the conveyance through the bridge reducing flood levels upstream. See extent of proposed bridge lowering works in Figure 2.

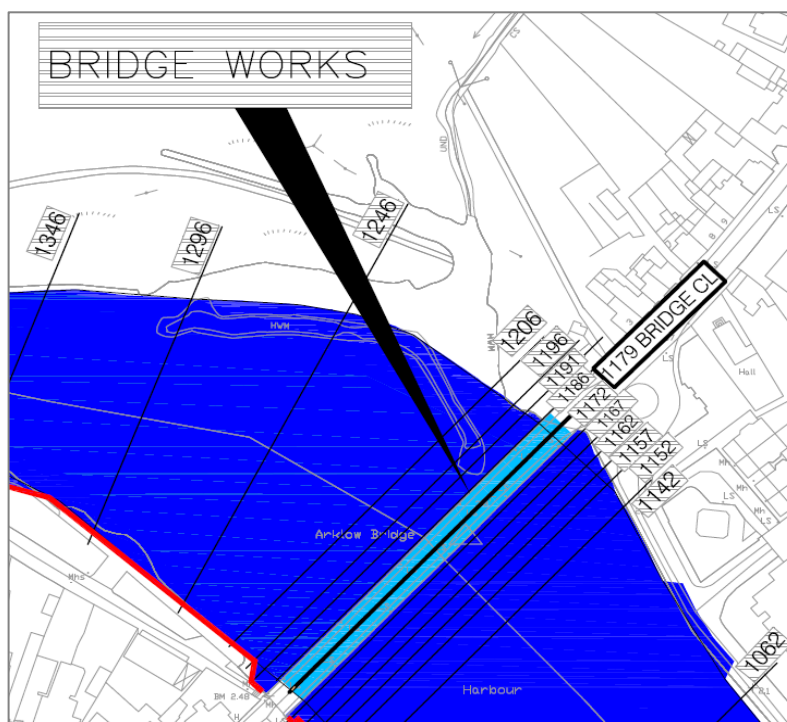


Figure 2: Extent of proposed bridge lowering works

The lowering of the floor of the bridge will require underpinning of the bridge abutments and piers and the reconstruction of the scour protection slab at the new riverbed level. Reconstruction of the scour protection slab and lowering of the bed level will comprise the demolition of the existing concrete slab and excavation of the underlying riverbed level to a depth of approximately 1.4m below the existing bed level. The new concrete scour protection slab will be approximately 350mm thick.

The concrete will be broken-out and removed separately from the underlying natural river-bed material, for appropriate re-use and/ or disposal. This material will have an approximate volume of 2,700m<sup>3</sup>.

The river-bed dredge material will be managed using the same dredge material management options as the overall dredge material. Approximately 5,800m<sup>3</sup> of material will be excavated during these bridge works (excluding the existing scour bed to be broken out).

For further details on the construction methodology relating to the bridge works refer to the EIAR.

## 2.3 Dredge design

The proposed dredging works include the following:

- Dredging the river channel to a depth of up to 1m for approximately 325m upstream of Arklow Bridge (from the bridge to the junction of River Lane and River Walk); and
- Dredging the river channel to a depth of up to 1m for approximately 525m downstream of Arklow Bridge (from the bridge to the junction of South Quay and Harbour Road).

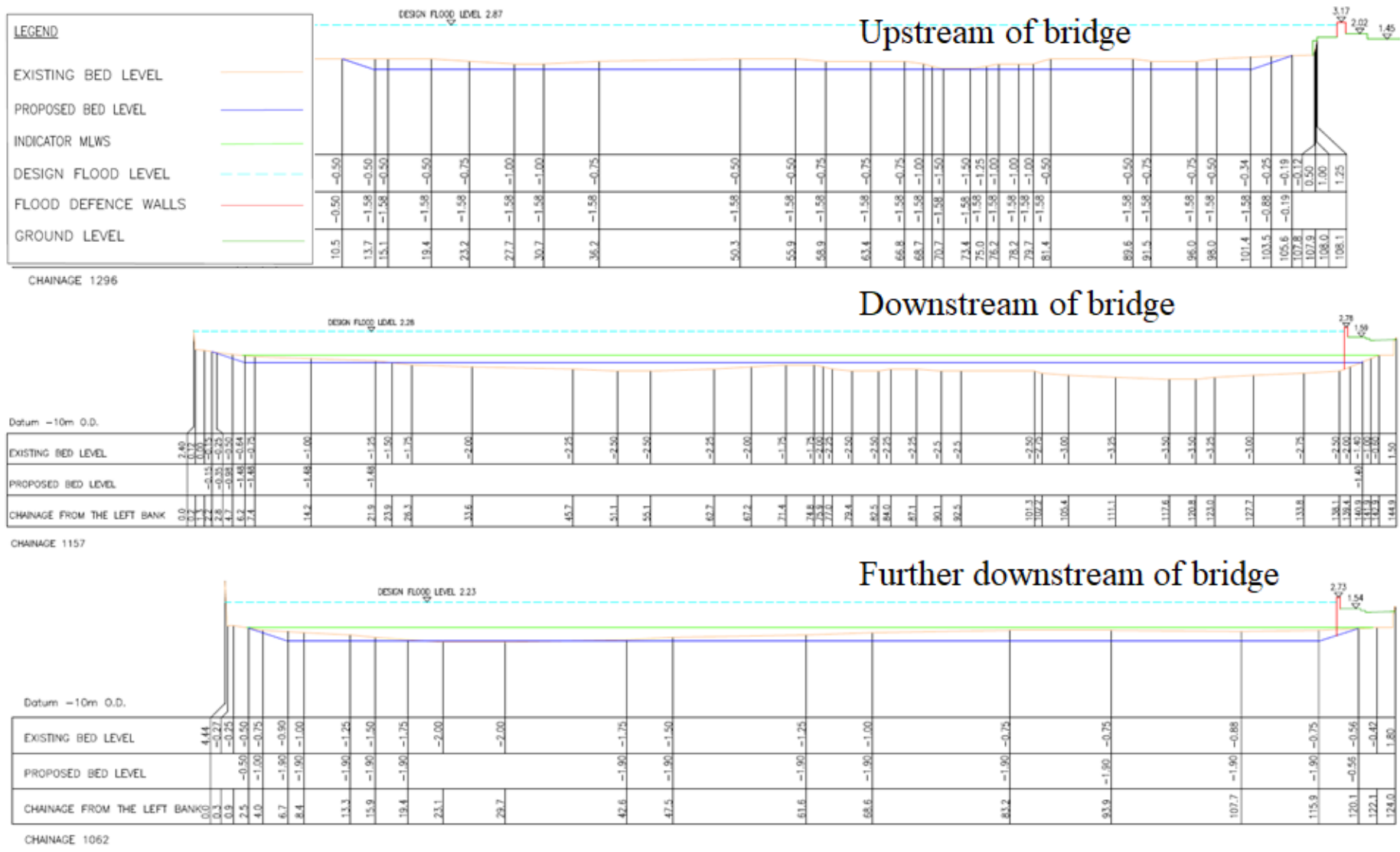
Note that proposed riverbed levels gradually fall between the upstream and downstream extents of the Avoca River and are detailed in the planning drawings. The exact dredge depths will vary locally depending on existing bed levels which may have altered since the most recent bathymetric survey due to erosion, deposition or any other river works that may have taken place.

Several sections downstream of Arklow Bridge are noted to have existing bed levels below the proposed deepened bed levels and as such dredging will not be required at these sections. Refer to Figure 3 overleaf for typical sections showing existing bed levels and proposed bed levels.

### 2.3.1 Dredge volume

Excluding the material excavated as part of WP1, a total of approximately 76,900m<sup>3</sup> of sediment is required to be dredged upstream and downstream of Arklow Bridge. The estimated dredge volume is Byrne Looby Partners' design estimate which is based on the 2006 bathymetric survey.

As mentioned above, this volume will vary as a result of erosion, deposition or any other river works that may have taken place since the bathymetric survey was carried out, and volumes will increase or decrease accordingly.





### 2.3.2 Dredge method

The material to be dredged mainly consists of sands and gravels and is further defined in Section 4.

Different dredge methods will likely be adopted for the upstream and downstream works owing to the access restrictions, dredge depths, water depths and vessel access.

The dredge methods outlined below have taken into account discussions between Byrne Looby Partners and dredging specialists.

#### Upstream works

Dredging upstream of Arklow Bridge will likely be carried out by long reach excavators, standard excavators and dump trucks. Due to the significant channel width it is considered likely that long-reach excavators will be used. Alternatively, dredging could be carried out by a drag line excavator.



Figure 4: Dredging by excavator from the river channel

Given the shallow water depths in this area, machine excavators can create temporary ‘causeways’ by excavating and relocating riverbed material within the river channel to gain access to all areas of dredge.

Excavators operate ‘in the dry’ and will load dump trucks on the temporary causeways. The machine excavators will likely start in mid-stream and work back towards the shore, removing the temporary causeways as they dredge.

Alternatively, larger ‘dragline’ excavators will operate from closer to the riverbanks, dredging the central channel areas to the river edges, for excavation there by standard machine excavators. The use of any floating plant or vessels upstream of the bridge is not anticipated due to area being inaccessible to dredging operation vessels.

Once full, dump trucks will stop either at SC3 or adjacent to RA4 (see section 2.6) to allow excess water to drain prior to transport to set down locations. Set down locations will be used for temporary storage of material as detailed in Section 2.4.

## Downstream works

Dredging downstream of Arklow Bridge is expected to be carried out by a dragline excavator for the wider sections of river channel and by a long reach backhoe excavator sitting on a jack-up or spud barge for other areas (see Figure 5 below). The barge is typically manoeuvred by means of a tugboat. Suction dredgers are not suitable owing to the low volume of material to be dredged, depth of water and cost.

The dredge material will be loaded onto an adjacent dump truck. The use of dump trucks will require the construction of a haul road along the north and south quays. Any material inspections required can be conducted at the transfer location.



Figure 5: Example of a barge equipped with excavator

If dredge material is to be dumped at sea it will be loaded directly to a barge and transferred to the disposal site offshore. Alternatively, the material will be transferred from a river barge to a larger ‘hopper’ barge for dumping at sea.

For further details on the construction methodology relating to the dredging works refer to the EIAR.

## 2.4 Debris and gravel traps

The debris trap will be located approximately 300m upstream of Arklow Bridge. It is designed to catch floating debris that would otherwise be caught in Arklow Bridge, causing blockage of flow through the bridge.

The gravel trap will be located approximately 10m upstream of the debris trap. It will generally comprise a trough extending across the width of the river.

Approximately 900m<sup>3</sup> of riverbed material will be excavated during the construction of the debris and gravel traps. This material will be managed using the same material management options as the overall dredge material.

## 2.5 Dredge material management

Dredge material arising from WP1, WP2 and WP3 will be subject to one or a combination of several dredge material management options. The total dredged volume to be managed will be approximately 83,600m<sup>3</sup>. Potential dredge material management options include the following:

- Beneficial reuse within the FRS;
- Beneficial reuse outside the FRS;
- Recovery on land;
- Disposal on land;
- Disposal at sea;
- Disposal overseas in a confined disposal facility (CDF).

These management options are described in further detail in Section 3.

Some of the above-mentioned management options may not be viable based on the chemical composition of the dredge material. Accordingly, material sampling and testing has been carried out to determine the chemical composition of the material as detailed in Section 4.

Dredge material may require inspection and further handling, or potential treatment prior to transfer to a final destination depending on the results of material testing. Any such works would likely be carried out at specified zones within site compounds. Refer to Section 2.6 for further details on proposed site compounds and working areas.

Based on archaeological investigation and consultation with the Department of Culture, Heritage and the Gaeltacht it is likely that, regardless of the management options selected, a portion of the dredge material will be subject to archaeological inspection as detail in Section 4.5. Set down areas will need to be provided in Site Compounds to accommodate these inspection works.

The transfer of dredge material between the point of excavation and the Site Compounds will need to be managed to minimise haulage distance and to reduce traffic impacts and potential material loss along the haulage route. Refer to the EIAR for further details on the proposed traffic management measures to be implemented.

## 2.6 Proposed site compounds and working areas

Dredge material will be transferred to site compounds for inspection, testing and further handling prior to transport to a final destination. Material arising from WP1, WP2 and WP3 will be transferred to site compounds as follows:

- Material arising from WP1 works at the bridge is likely to be transferred to SC2;
- Material arising from WP2 is likely to be transferred to SC1, SC2, SC5 and/ or SC6;
- Material arising from WP3 is likely to be transferred to SC6.

Site compound usage and construction programme associated with the various work packages is outlined in Table 1 below and shown in Figure 6 below.

Table 1: Summary of site compounds

WP Ref.	Contractor's Compound	Material Archaeological Testing	Material Temporary Storage	Time Frame
WP1	SC1	SC2	NA	Y1 - Y3
WP2	SC6	SC1, SC2, SC5 and SC6	SC1 and SC5	Y4
WP3	SC4	SC6	NA	Y1

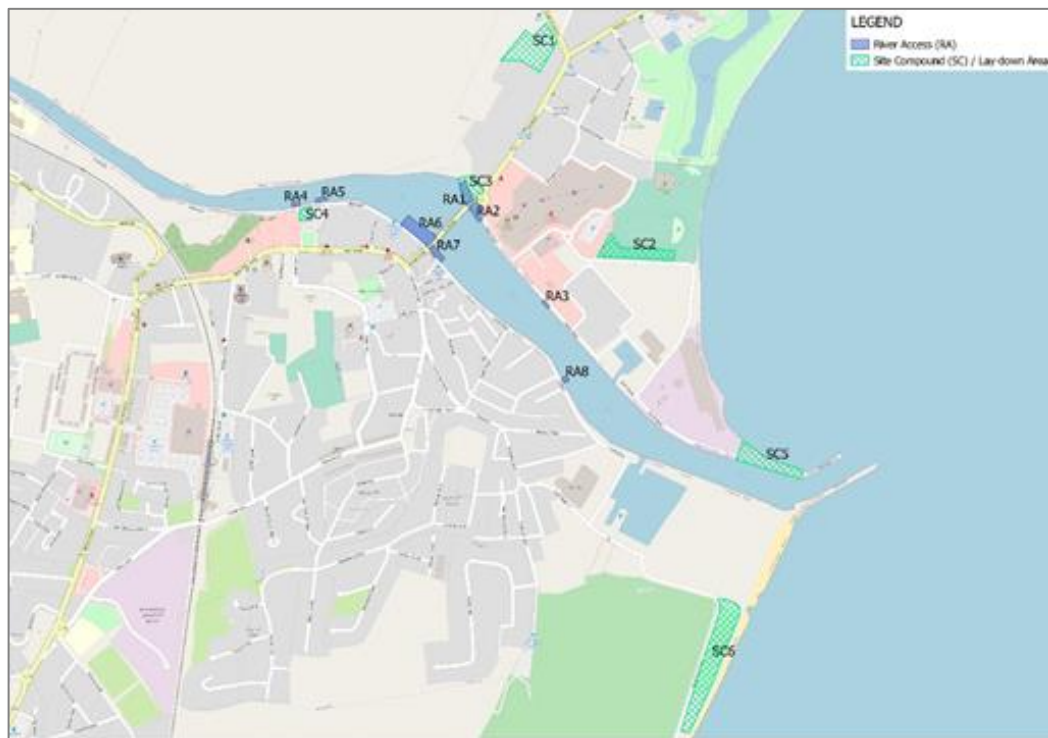


Figure 6: Site compounds and river access locations

The proposed works to the Bridge under WP1 will take place in Working Area 1 (WA1) as shown in Figure 7 below. River access will be through river accesses RA1, RA2, RA6 and RA7. Direct access to SC3 is provided and access to SC1 will be required by road.



Figure 7: Working Area 1 (WA1)

The proposed dredging works under WP2 will take place in Working Area 2 (WA2) as shown in Figure 8 below. River access will be through access locations RA1, RA2, RA3, RA4 and RA8 and will depend on the chosen dredge method. Construction access will be required to SC1, SC2 and SC5.



Figure 8: Working Area 2 (WA2)

The works under WP3 will take place in Working Area 3 (WA3) as shown in Figure 9 below. River access will be through access locations RA4 and RA5. Construction access will be required to SC4.



Figure 9: Working Area 3 (WA3)

### 3 Dredge material management options

As mentioned in previous sections, the works associated with WP1, WP2 and WP3 will generate a volume of material that will be subject to one or a combination of dredge material management options. Some material may be suitable for reuse on site with remainder requiring transfer off site.

In generating and investigating potential dredge material management options Arup has adhered to the Environmental Protection Agency's (EPA) Waste Management guidance and, in particular, the waste hierarchy defined under the European Union Waste Framework Directive (Directive 2008/98/EC on waste).

The waste hierarchy emphasises preventing/ reducing, reusing and recycling of waste where possible with recovery and disposal being the least preferred methods for management of waste. Refer to Figure 10 below for the hierarchy for prioritising dredge material management adapted from Waste Framework Directive.

Further details on the proposed waste management strategy for the FRS can be found in the EIAR.

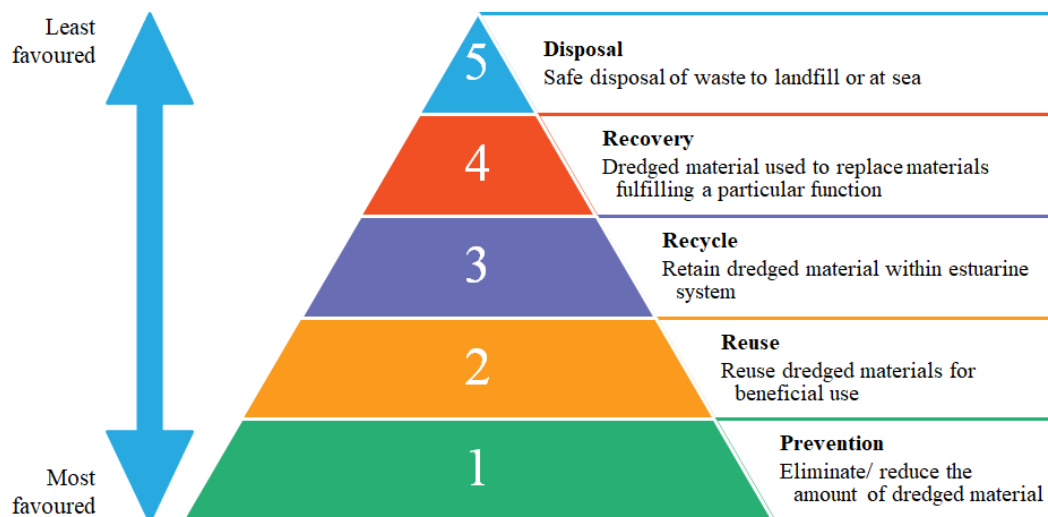


Figure 10: Hierarchy for prioritising dredge material management adapted from Waste Framework Directive, 2008

Taking this hierarchy into account, the following dredge material management options are deemed as possible for the scheme in order of priority:

- Beneficial reuse within the FRS;
- Beneficial reuse outside the FRS;
- Recovery on land;
- Disposal on land;
- Disposal at sea;
- Disposal overseas in a confined disposal facility (CDF).

Note that the proposed dredging works have been optimised so as to remove the minimum amount of material possible, but these works cannot be eliminated from the proposed FRS.

In order to assess the suitability of the various options it is necessary to analyse the chemical composition of the proposed dredge material by way of sediment sampling and testing. The composition of the proposed dredge material and the interpretation of the conditions is described in Section 4.

The flowchart shown in Figure 11 below outlines the available processes involved from the dredging activities to the implementation of the various dredge material management options. The management options are broken down into four stages or processes as follows:

- Excavation – the various likely methods of excavation suitable for the materials and river environment;
- Transfer – the available methods of transfer from point of excavation to treatment area, recovery site or disposal site;
- Treat/ Transport – any potential treatment or method of transport to final destination;
- Reuse/ Recycle/ Disposal – final destination classification and associated licencing/ permitting requirements.

The following sub sections briefly describe the various management options available and the requirements of each.



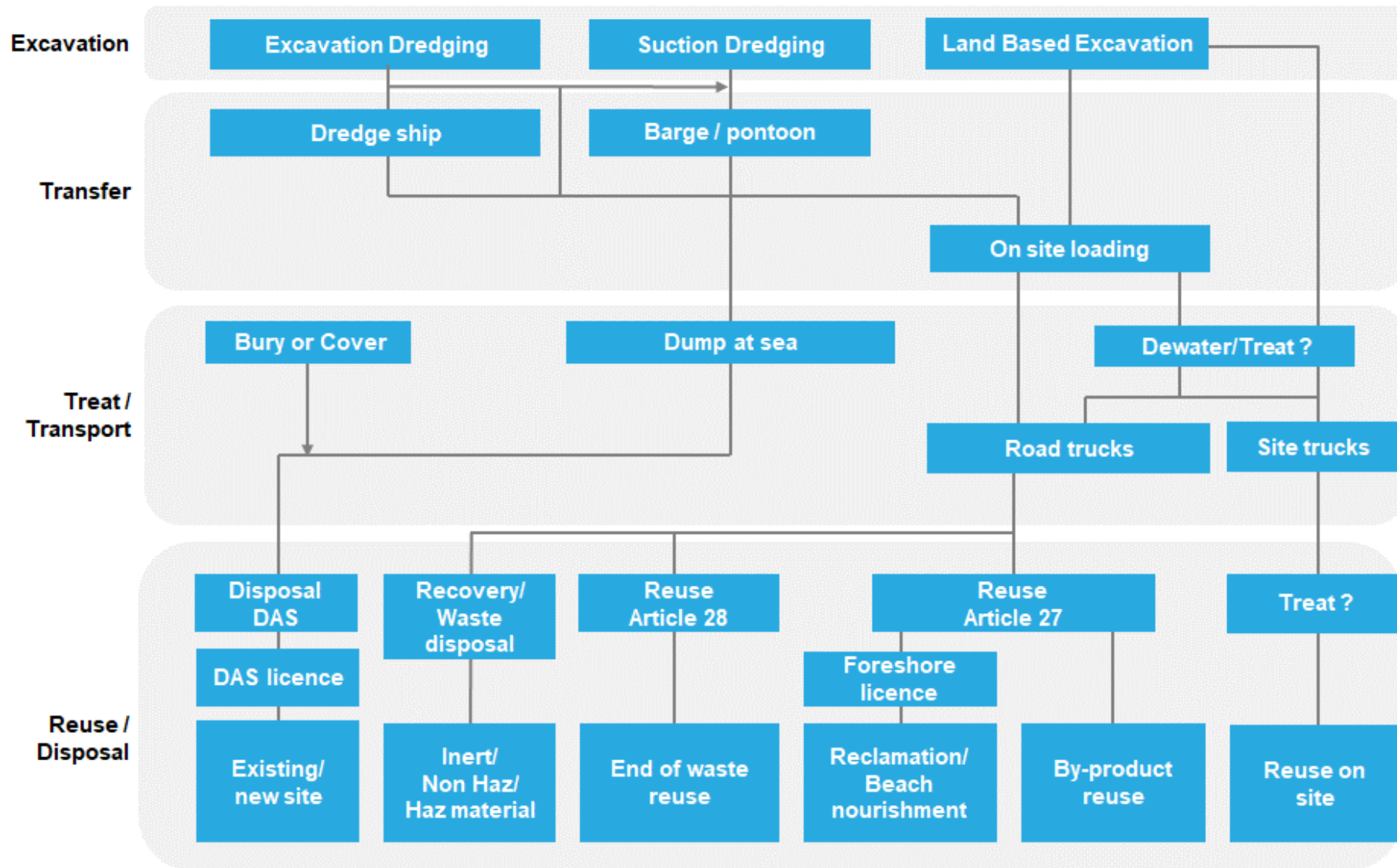


Figure 11: Flowchart showing potential options for dredge material

## 3.1 Material reuse

The dredge material may be reused within or outside the FRS depending on the physical and chemical properties of the material and compliance with material definitions that govern reuse, such as TII Earthworks Specifications and EPA waste exemptions.

The material reuse options are as follows:

- Reuse within the FRS
- Reuse outside the FRS – Article 27 onshore
- Reuse outside the FRS – Article 27 coastal
- Reuse outside the FRS – Article 28

### 3.1.1 Reuse within the FRS

There are several potential beneficial uses for the dredge material on site as part of the FRS including as flood embankment fill or backfill material for floodwalls or other excavations e.g. excavations for drainage.

In general, the reuse of dredge material, including details of any containment or treatment, is outlined in the appropriate Planning Application documentation. If treatment of dredge material is required to render it suitable for reuse, it may need to be carried out under appropriate Waste Facility Permit or EPA Licence. No treatment or containment of material is required for this FRS based on the assessment of site investigation results detailed in Section 4.

To avail of this reuse option within the Arklow FRS:

- Mechanical properties of the material would need to be suitable for use as a fill material as defined within the TII specification, including engineering fill and landscape fill; and
- A materials shortfall would need to be identified within the site to take this material.

Approximately 10,000m<sup>3</sup> of material could be reused as flood embankment fill and for backfill material for floodwalls and other excavations. The total available dredge material is estimated at about 83,600m<sup>3</sup>, therefore a balance of some 73,600m<sup>3</sup> of dredge material has to be taken off-site.

### 3.1.2 Reuse outside the FRS

Excess material that cannot be reused within the FRS may be suitable for reuse outside the FRS as a by-product of the FRS construction process. The suitability of the dredge material for reuse will depend on a variety of criteria as detailed in Section 4.

Beneficial reuse of materials as a by-product is governed by Article 27 of the European Communities (Waste Directive) Regulations, 2011, which sets out the mechanism for notification of by-products in Ireland and that transposes Section 5 of the EU Waste Framework Directive 2008. Processing of ‘waste’ materials to produce ‘end-of-waste’ status for off-site reuse is governed by Article 28 of the European Communities (Waste Directive) Regulations.

### **Article 27**

Soil and stone material may be classed as a by-product under Article 27 if it is uncontaminated and satisfies the following criteria:

- further use of the soil and stone is certain;
- the soil and stone can be used directly without any further processing other than normal industrial practice;
- the soil and stone are produced as an integral part of a production process; and
- further use is lawful in that the soil and stone fulfil all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.

Provided the dredge material satisfies the above criteria, there are a variety of potential opportunities for reuse outside of the FRS including the following:

- Coastal protection schemes – reuse as beach nourishment material onshore (e.g. Greystones North Beach nourishment arising from the Greystones Harbour project) or coastal protection offshore (e.g. Arklow South Beach or potential Irish Rail coastal protection schemes). Offshore works below the High-Water Mark (HWM) would require additional Foreshore Licencing.
- Flood relief schemes – reuse of material for construction of other FRSs structures including flood embankments and backfill for excavations e.g. Enniscorthy Flood Defence Scheme.
- Quarry infilling – reuse of material to restore old quarries by infilling e.g. Roadstone Huntstown South quarry, Co. Dublin.
- Site restoration – reuse for licenced site restoration works with planning permission (landfill capping, tailings dam cover, etc.).

Any proposed sites for reuse under Article 27 would be required to have appropriate planning permission in place as well as meeting the acceptance criteria above.

### **Article 28**

Certain specified waste can cease to be classed as a waste when it has undergone a recovery operation (including recycling) and complies with specific criteria to be developed in accordance with the following conditions:

- the substance or object is commonly used for specific purposes;
- a market or demand exists for such a substance or object;

- the substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; and
- the use of the substance or object will not lead to overall adverse environmental or human health impacts.

Article 28 determination is made on a material that arises from a process, rather than from a specific site, to cover long-term use of such materials from multiple sources. In Ireland to date it has been applied to some plastics and recycled concrete. It is not considered suitable for a single project such as this scheme where the materials arising are natural dredge materials.

## 3.2 Soil Recovery Facilities

Dredge material may be suitable for recovery depending on the physical and chemical properties of the material, within Soil Recovery Facilities (SRF). SRFs are operated under:

- (a) waste licences granted by the Environmental Protection Agency (EPA) (where the volumes of accepted materials are >100,000 tonnes per annum); or
- (b) Waste Facility Permits/Certificates of Registration granted by Local Authorities.

The EPA has published guidance on acceptance criteria at these facilities as outlined in the EPA document “*Guidance on waste acceptance criteria at authorised soil recovery facilities, 2020*”.

As detailed in that document:

*Authorised soil recovery facilities are often worked out quarries that are in the process of being restored. They may also be sites where soil and stone is being imported to raise natural ground levels. In all cases, soil recovery facilities are authorised to accept only uncontaminated soil and stone i.e., EU List of Waste Code (LoW) 17 05 04.*

SRFs are not engineered to protect groundwater from contamination that may be present in soil and stone. Accordingly, the facilities only accept suitable uncontaminated material with limitations on the annual quantities of material that can be accepted.

The EPA guidance makes specific reference to LoW 17 05 06 (dredging material) where:

*LoW 17 05 06 is outside the scope of this document and if an operator proposes to accept dredging material at their facility, they should submit details of the source material and the proposed waste acceptance procedures on a case by case basis to the Agency or Local Authority for their consideration.*

In the absence of any particular guidance in relation to limits for LoW 17 05 06 dredge material for recovery at SRF's, Arup has applied the values proposed for LoW 17 05 04 (Soil and Stones) published by the EPA in 2020.

### 3.3 Disposal on land

Dredge material that is not suitable for reuse or recovery due to its contamination may be disposed-of on land within licenced landfills (inert or non-hazardous), or if hazardous at a licenced facility abroad.

Landfills holding a licence from the EPA are able to accept dredge material, if the material's Waste Code (LoW) is included on the site's licence and the material passes the acceptance criteria for the site. In addition, hauliers must hold the relevant waste permits including reference to the appropriate LoW and the named landfill.

Dredge material is first assessed by waste code as hazardous or not, and if not then the material is also assessed using Waste Acceptance Criteria (WAC) to determine if it is suitable for delivery to inert waste, non-hazardous or hazardous facilities.

Dredge material has the following LoWs:

- 17 05 05\* - Dredging material containing hazardous substances; or
- 17 05 06 - Dredging material other than those described in 17 05 05\*.

The off-site disposal of dredged material requires determination of whether the material should be classified as 17 05 05\* or 17 05 06.

The Waste Acceptance Criteria (WAC) are defined in the Landfill Directive (2002). According to the WAC a material with the waste code 17 05 06 is defined as one of the following:

- Dredge material suitable for delivery to an inert licenced landfill;
- Dredge material suitable for disposal to a non-hazardous licenced landfill;

Should the dredge material have a waste code 17 05 05\*, or hold the waste code 17 05 06 but exceed the acceptance criteria for a non-hazardous licenced landfill, it is classed as dredge material suitable for disposal to a hazardous licenced landfill.

#### 3.3.1 Inert waste facilities

Waste that does not undergo any significant physical, chemical or biological transformations and fulfils the requirements of the WAC for inert licenced landfills can be classed as inert waste. The leachability and pollutant content must be below the limits for inert licenced landfills and in turn must not impact surface water or groundwater quality at or around the receiving site to be suitable for delivery to an inert licenced landfill.

### 3.3.2 Non-hazardous landfills

This option applies if the material is classified as a waste and exceeds the WAC for inert licenced landfills but does not exceed the limits for non-hazardous licenced landfills. The material that holds the ‘non-hazardous dredge material’ LoW 17 05 06, can be disposed-of at a non-hazardous licenced landfill.

### 3.3.3 Disposal abroad – hazardous waste

For heavily contaminated dredge material, facilities have been developed in Europe to accept and contain sediments that are deemed in excess of set limits for disposal at sea or on land. These Confined Disposal Facilities (CDFs) set acceptance criteria, based on particular contaminants. This is to ensure that the void space within the facility is reserved for the most contaminated sediments and cleaner materials are not sent here unnecessarily. Such facilities do not exist in Ireland.

Sampling and testing would need to comply with the CDF acceptance criteria and demonstrate that the material is sufficiently contaminated to be accepted. A trans-frontier shipment licence will need to be granted in order to transport the material from Ireland to continental Europe.

## 3.4 Disposal at sea

Dumping dredge material at sea in Ireland is regulated by the EPA and internationally by the OSPAR convention, to which Ireland is a signatory. Along with the Marine Institute, the EPA produce guidance on how the dredge material should be assessed prior to applying for a dumping at sea licence. In addition, disposal at sea requires foreshore licencing for the proposed disposal works as well as any investigations or surveys at the proposed dump site.

The Marine Institute, in line with the OSPAR guidelines, have developed a guidance note for the disposal of dredge material at sea, titled *Guidelines for the Assessment of Dredge Material for Disposal in Irish Waters*. This guidance defines the lower and upper level thresholds for individual contaminants, for the purposes of disposal at sea.

If the results show that the concentration of the contaminant in the sediment sample is:

- Below the lower level threshold — the material is deemed to be suitable to be disposed of at sea;
- Above the upper level threshold – the material is deemed to be contaminated and cannot be dumped at sea;
- Is between the upper and lower level threshold — further discussion with regulators (Marine Institute, EPA) is required, to determine if the material can be disposed of at sea.

Wicklow County Council has previously used a licenced dumpsite to the north of the entrance to Arklow Harbour in the past for disposal of harbour dredge material with capping. Disposal at sea with capping is generally for material that shows a level of contamination considered by the EPA to exceed the minimum threshold for dumping at sea (without capping).

## 4 Existing conditions

### 4.1 Bathymetric surveys

Bathymetric surveys of the proposed dredge area have been carried out in 2006 and 2017. The surveys have been used to determine the volumes of material to be dredged as detailed in Section 2.3.1. The surveys covered both upstream and downstream of Arklow Bridge. Refer to figure below showing long section through the river centreline.

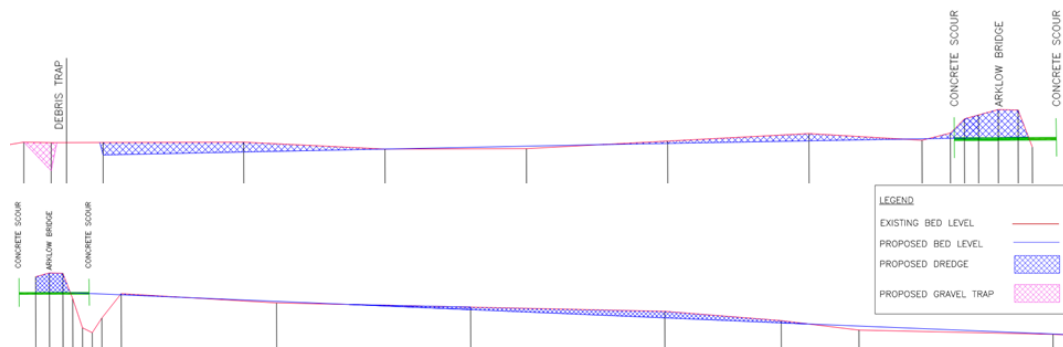


Figure 12: Long section through river

In relation to bed levels, the surveys show a steeply sloped bed (approximate slope of 1:250) from the downstream extent of the proposed works to just downstream of Arklow Bridge. The increased gradient is likely due in part to previous dredging of the harbour. The low flow channel is located on the left bank (North bank) at the downstream end and migrates to the right bank (South bank) just downstream of Arklow Bridge. This area is tidally dominated with water depths in the low flow channels varying from 3.7m at the downstream extent to 2.5m downstream of Arklow Bridge. Shallower sections of river along this stretch dry out at low tide.

Immediately downstream of Arklow Bridge there is a scour pocket extending approximately 30m downstream. The low flow channel is located along the right bank (South banks) at this section.

Upstream of Arklow Bridge the river slope is less steep (approximate slope of 1:450) with signs of deposition owing to reduced river velocities in this area. The low flow channel is on the left bank (North bank) in this area and transfers to the right bank (South bank) at Arklow Bridge. There are significant areas of deposition on the right bank (South bank) particularly immediately upstream of the bridge. Water depths upstream of the bridge vary with river flow but average depths in the low flow channels are circa 2.5m.

### 4.2 Site Investigations

Previous dredging works at Arklow Harbour have detected sediments in the river with elevated concentrations of copper and other metals as a result of historic mining of the Avoca mines, upstream of Arklow.



Given the above-mentioned history of elevated concentrations of metals and that the proposed FRS includes dredging works as well as other works in the Foreshore, several phases of site investigations and associated assessments have been carried out previously as detailed below.

#### 4.2.1 2008 Site Investigation

Arup were originally commissioned by the OPW in 2008 to assess potential environmental impacts arising from works proposed as part of the Arklow FRS. Under this commission Arup carried out a sediment contamination assessment for a section of the Avoca River from the harbour to upstream of Arklow town. The assessment focussed on the potential for the disposal of the dredge material under a Dumping at Sea license, as had been used for previous harbour dredge operations.

Sampling consisted of three different sampling methodologies with a view for classifying the material solely for Dumping at Sea as follows:

- 10 no. Sediment samples were collected from the riverbed, generally within the top 20mm;
- 6 no. Box core samples were collected from a depth of up to 1m below riverbed;
- 4 no. Bank Samples were collected which were grab samples collected from the exposed riverbank during low tide.

The samples were tested for a suite of parameters related to dumping at sea. The report found that the samples recovered were classified as Class 2 sediments for Dumping at Sea. This was defined within the report as having contaminant concentrations between the upper and lower limits outlined in the Marine Institute Dumping at Sea guidelines and therefore marginally contaminated.

#### 4.2.2 2017 Site Investigation

In 2017 additional site investigation was commissioned. The main purpose of this site investigation was to further assess possible alternative dredge material management options including various options for reuse, recovery and disposal on land for the river sediments likely to be dredged as part of the proposed FRS.

Furthermore, given the previous site investigation looking at Disposal at Sea was approximately 9 years old, it was decided to use the opportunity to gather additional information to further verify the previous investigation considering the estuary is a dynamic environment.

Based on the knowledge of historical contamination in the river, Arup scoped, and Wicklow County Council procured and managed, a detailed site investigation in 2017 within the proposed dredge area of the FRS. A summary of the results from the 2017 site investigation are provided below.

Site operations, which were conducted between 7 November and 10 November 2017, comprised of:

- 9 no. light cable percussion boreholes;
- Soil sampling for geotechnical and environmental analysis.

The locations of the exploratory holes are shown in the ground investigation report and were located across the proposed dredge area.

The material was tested against the criteria associated with the following dredge material management options:

- Disposal on land – beneficial reuse and licenced landfills;
- Disposal at CDF;
- Disposal at sea.

Physical composition of the material, including particle size distribution, was tested to assess the suitability of the material for reuse, as well as informing any future dredge methodologies.

### 4.2.3 2020 Site Investigation

The 2017 ground investigation described in Section 4.2.2 recovered 24 no. sediment samples from depths ranging from 0.1m below riverbed to 3.0m below riverbed.

When assessed it was noted that 9 of the 24 samples failed the inert WAC limits, therefore indicating disposal to a non-hazardous licenced facility. The parameters which exceeded the WAC Inert Limits were chlorides and total dissolved solids (TDS).

On account of the exceedances identified in the 2017 investigation it was proposed to re-examine these sediments and resample the river sediments to:

- Measure any reduction in chloride content through repeat leaching;
- Measure chloride content in the river and adjoining marsh groundwater;
- Measure standard disposal suite of testing on these additional samples.

Refer to Appendix A for further details of the 2020 site investigation and the associated assessment.

#### **Sampling**

On 1 July 2020, 6 no. samples of river sediment were recovered from the bed of the Avoca River. The sampling of the riverbed sediments was undertaken by machine excavator operating from the south bank of the river. The samples were taken at low tide through a shallow depth of river water.

Two samples (A and B) were obtained from each location (S1, S2 and S3). The first sample (A) was taken from the top of the riverbed, with the second sample (B) being taken approximately 200-300mm deeper than the first sample.

In addition to sediment sampling, three samples of river water were collected at the site over the course of the day, at three separate times; 10:45am, 1:00pm and 4:00pm to allow for tidal variance.

On the following day, 2 July, three groundwater samples were recovered from the wetland to the northwest of Arklow Bridge. Groundwater samples were taken from three standpipes previously constructed during an earlier hydrological study of the wetland. Samples were recovered from WS08, WS09 and WS13.

### Testing

The sediment samples were compared to two sets of criteria; the WAC criteria (to compare with previous data) and the SRF acceptance criteria.

The WAC criteria are the acceptance criteria for materials being disposed of to landfill.

The SRF criteria are the acceptance criteria for Soil Recovery Facilities or other waste permitted sites. These criteria are also used as initial screening values for materials being proposed for Article 27 applications, representing characteristic concentrations for parameters in line with the local baseline for natural soils. This assessment was based on the recently published *EPA Guidance on waste acceptance criteria at authorised soil recovery facilities (2020)*. Accordingly, the SRF criteria assessment had not been carried out on previous GI results.

## 4.3 Interpretation of ground conditions

### 4.3.1 Ground profile

Ground conditions have been interpreted based on the findings from the above 3 phases of site investigations.

The bulk of the proposed dredge material will comprise of natural sands and gravels, with the balance of the dredge material comprising of a surface layer of fill (silty riverbed with fill material containing anthropogenic material). An isolated clayey stratum was noted in BH01 from the 2017 site investigation, but this was limited in its extent from 1.7 to 2.2m below riverbed.

The sampling in 2020 revealed a thin surface layer of fill over the natural riverbed deposits on the right bank upstream of Arklow Bridge. This fill comprised a black silty sand and gravel with abundant anthropogenic material, including glass, metal, clay and concrete. The layer has likely accumulated over time from general dumping of materials along the south bank of the river. The area is located on the inside of a river bend where deposition of finer silts would be expected as a result of reduced water velocities, hence the silty matrix. The material showed visual signs of hydrocarbon product at Sample location 3, as shown in Figure 13 below. The depth of the fill layer looks to range from a thin deposit (<100mm) at locations 1 and 2, up to about 300 to 400mm at location 3. The area of this fill does not appear to extend out into the river as it is not recorded in nearby boreholes from earlier ground investigation, and the river flow would likely scour such deposits over time.



Figure 13: Sample 3 showing signs of hydrocarbons

Underlying the thin layer of fill, are the natural alluvial sand and gravel deposits found extensively throughout the area of river channel to be dredged. These natural sand and gravel deposits extend to a depth of at least 3m across the full area of river channel.

Some anthropogenic material was mixed in the shallow samples recovered from the riverbed, including glass and metal, as shown below in Figure 14.



Figure 14: Photos from Sampling (Location 2)

The recent trial pits clearly showed the visual distinction between the black silty fill and the underlying natural brown sands and gravels.

### 4.3.2 Physical properties

The sand and gravel samples recovered from the 2017 ground investigation were tested for moisture content, Atterberg Limits and Particle Size Distribution.

Moisture contents had an average value of 13.9% and a median value of 4.3%. One ‘outlying’ sample as noted above at 1.8m depth in BH01, located below proposed dredge levels, was clayey and organic with a moisture content of 190%.

Atterberg Limit tests for all samples (except for BH01 at 1.8m depth) were shown to be non-plastic.

The grading curves for the samples are presented below and show that all of the samples (except BH01 at 1.8m depth) were described as sands and gravels with very little silt or clay present. The samples tested for PSD ranged from 0.8m to 2.8m depth below riverbed.

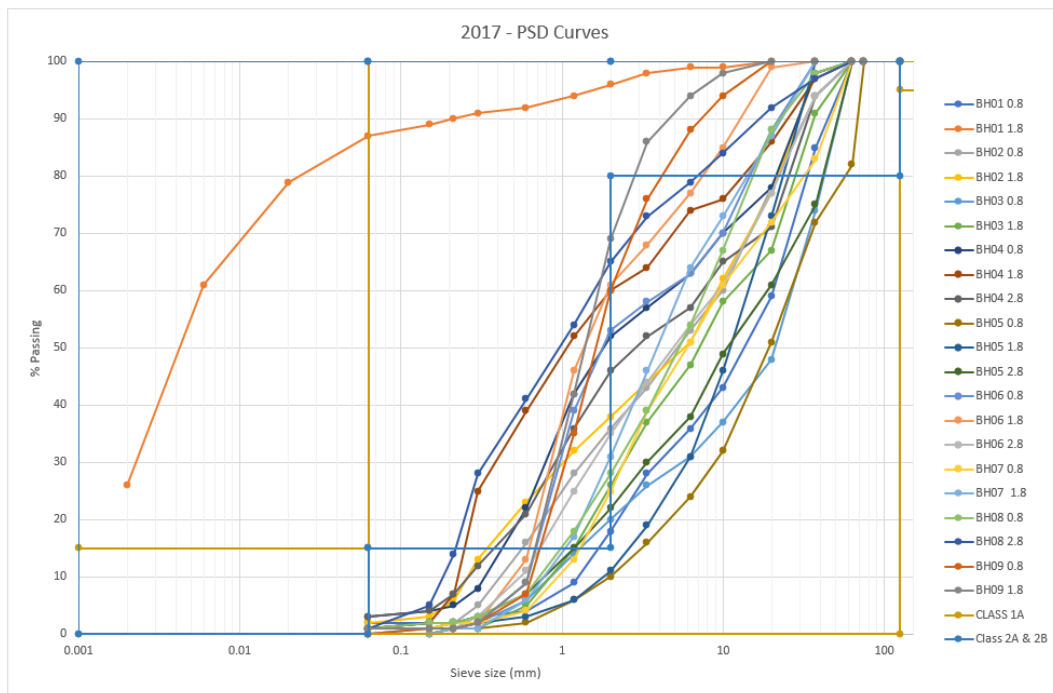


Figure 15: PSD Curves from 2017 Ground Investigation

The majority of the samples would fall within the Class 1A grading curve taken from the TII Specification for Roadworks, Series 600, Table 6/2, with the sole fine-grained sample from BH01 plotting within the Class 2A & 2B curve from the same table.

### 4.3.3 Chemical properties

The results of the chemical testing completed on all samples are described below, in relation to the relevant limits for dumping-at-sea, landfilling (WACs) and recovery (SRFs).

## Dumping-at-Sea

The results of the testing undertaken in 2008 are presented below, for those parameters where the concentrations exceeded the lower threshold level for dumping at sea.

Table 2: 2008 GI results

Metals	Units	BS4	BC4	SS2	SS3	SS4	SS5	BC5	SS6	BC6
Arsenic: Dry Wt	mg/k g	8.5	47.2	10.3	7.9	<1.00	<1.00	84.3	7.0	19.6
Cadmium: Dry Wt	mg/k g	0.5	0.8	0.3	0.7	0.2	0.2	2.8	0.8	1.7
Copper: Dry Wt	mg/k g	98.6	745.0	78.0	136.0	101.0	31.5	575.0	71.2	121.0
Lead: Dry Wt	mg/k g	126.0	142.0	64.9	69.9	57.9	30.1	309.0	79.1	153.0
Nickel: Dry Wt	mg/k g	16.8	14.6	23.1	21.9	18.0	17.7	17.5	15.5	21.8
Zinc: Dry Wt	mg/k g	215.0	367.0	241.0	306.0	218.0	132.0	807.0	254.0	372.0
<b>PAHs</b>										
Total PAHs	ug/kg	779	328	908	314	321	338	10124	335	3283

Using the DCMNR 2006 Guidelines, the Avoca's sediment within the study area for the Arklow Flood Relief Scheme was rated as a Class 2 sediment (marginally contaminated).

### Waste Acceptance Criteria (WACs)

Of the 24 no. samples tested in the 2017 ground investigation against the WAC for disposal, 15 no. were deemed to be suitable for delivery to inert waste facilities. A further 8 no. were deemed to require disposal to a non-hazardous licenced landfill, due to the presence of slightly elevated chloride (with three of those showing associated elevated total dissolved solids), and the remaining 1 no. sample contained identifiable but not quantifiable asbestos fibres and therefore classed as non-hazardous.

The proposed dredging required for the Arklow FRS scheme is limited to a maximum dredge depth of 1m of riverbed material, over the subject area. Given that the 2017 investigation included sampling to 3m below riverbed level, the upper nine samples were from the material which is being dredged from the river. The remaining 15 no. samples are from below the level of proposed dredge. These 15 no. samples of deeper riverbed are consistently clean sand and gravel deposits and generally classified as inert. These deeper samples below dredge level are not part of the works and therefore are not considered further. The WAC results for the 9 relevant samples are shown below.

Table 3: WAC Classifications - 2017

Location	Depth	Category based on WAC screening	Asbestos waste classification	Hazardous waste online tool	Final categorisation	Comment
BH01	0.1	Inert	No Asbestos Detected	Non-Hazardous	Inert	
BH02	0.5	Inert	No Asbestos Detected	Non-Hazardous	Inert	
BH03	0.5	Inert	No Asbestos Detected	Non-Hazardous	Inert	
BH04	0.5	Inert	No Asbestos Detected	Non-Hazardous	Inert	
BH05	0.5	Non-Haz	No Asbestos Detected	Non-Hazardous	Non-Haz	Chloride
BH06	0.5	Non-Haz	No Asbestos Detected	Non-Hazardous	Non-Haz	Chloride
BH07	1	Inert	No Asbestos Detected	Non-Hazardous	Inert	
BH08	1	Inert	No Asbestos Detected	Non-Hazardous	Inert	
BH09	0.5	Non-Haz	No Asbestos Detected	Non-Hazardous	Non-Haz	Chloride

As seen above the bulk of results are inert, and the non-hazardous results are due to slightly elevated chloride concentrations. As noted above in Section 4.2.3, the further sampling in 2020 was undertaken primarily to further assess and understand these slightly elevated chloride levels.

Of the 6 samples tested from the 2020 ground investigation, 3 no. samples were classed as inert (Samples 1A, 1B and 2B), 1 no. sample was classed as requiring disposal to a non-hazardous licenced landfill (Sample 2A (elevated antimony)). The remaining 2 no. samples requiring disposal to a hazardous licenced facility (Sample 3A and 3B).

The samples requiring disposal to a hazardous licenced landfill were classified as such based on the 17 05 05\* classification, but they also contained concentrations of mineral oil, antimony and molybdenum above the inert limits, as shown below.

Table 4: WAC Classifications - 2020

Sample Number	Category based on WAC screening	Asbestos waste classification	Hazardous waste online tool	Final categorisation	Comment
Sample 1A	Inert	No Asbestos Detected	Non-Hazardous	Inert	
Sample 1B	Inert	No Asbestos Detected	Non-Hazardous	Inert	

Sample Number	Category based on WAC screening	Asbestos waste classification	Hazardous waste online tool	Final categorisation	Comment
Sample 2A	Non-Haz	No Asbestos Detected	Non-Hazardous	Non-Haz	Antimony
Sample 2B	Inert	No Asbestos Detected	Non-Hazardous	Inert	
Sample 3A	Non-Haz	No Asbestos Detected	Hazardous	Hazardous	Mineral Oil, Copper and Zinc
Sample 3B	Non-Haz	No Asbestos Detected	Hazardous	Hazardous	Antimony, Molybdenum, Mineral Oil, Copper and Zinc

### Soil Recovery Facilities (SRFs)

Analysis of the results against SRF limit values is required for both soil recovery and Article 27 reuse options. A retrospective SRF comparison was carried out on the samples from the 2017 ground investigation, under the 2020 EPA guidance. One exceedance of the SRF limits was observed. Sample BH02 at 0.5m below riverbed showed a minor exceedance for mineral oil, as shown in the table below.

Table 5: 2017 Dredge Samples compared to SRF

Analytical Parameter	Units	Limit EPA Facilities	BH02 @ 0.50m
Arsenic	mg/kg	41.5	13.10
Cadmium	mg/kg	1.42	0.17
Total Chromium	mg/kg	73.2	17.00
Copper	mg/kg	77.6	40.90
Mercury	mg/kg	0.302	<0.015
Nickel	mg/kg	65.7	14.50
Lead	mg/kg	109	34.70
Zinc	mg/kg	224	108.1
Total Organic Carbon	%	3	0.13
Total BTEX	mg/kg	0.05	<0.055
Mineral Oil (>C10-C35)	mg/kg	50	58
Total Of 17 PAH's	mg/kg	1	<1.47
Total PCBs (7 Congeners)	mg/kg	0.05	<0.60
Asbestos	N/A	NAD	NAD



Within this sample, the detection limits for both BTEX and PAH were noted to exceed the limit for SRF, however given the absence of any other hydrocarbon compounds in the samples and given that these parameters are groupings (i.e. BTEX = Benzene, Toluene, Ethyl-Benzene and o, m and p Xylenes, PAH is the sum of 17 individual compounds) where none of the speciated constituents were noted above the detection limit they were accepted as passing the requirement.

The sediments recovered during the 2020 ground investigation were also compared to the SRF limits and the following table summarises the exceedances.

Table 6: SRF Exceedances 2020

Sample	Exceeding Parameter
S1A	Chromium, PAHs
S1B	Chromium (within 50% of the limit)
S2A	Chromium, Copper
S2B	Chromium
S3A	Arsenic, Cadmium, Chromium, Copper, Lead, Zinc, Mineral Oil
S3B	Arsenic, Cadmium, Chromium, Copper, Lead, Zinc, Mineral Oil, PAHs

As with the WAC analysis, the results from the ‘fill’ at Sample 3, and surface samples at locations 1 and 2 show exceedances for several parameters. The exceedances for the underlying natural sands and gravels are only for chromium and Sample 1B was within 50% of the prescribed limit.

**Chlorides**

As noted above the 2020 site investigation included further assessment of the slightly elevated chloride levels detected in some of the 2017 natural sand and gravel samples, to compare them with surface water and groundwater levels. Chlorides concentrations were tested from the 2020 sediment samples, Avoca River water samples, and groundwater samples from the standpipes in Arklow Marsh. From each dataset, the maximum, minimum and median values are presented below.

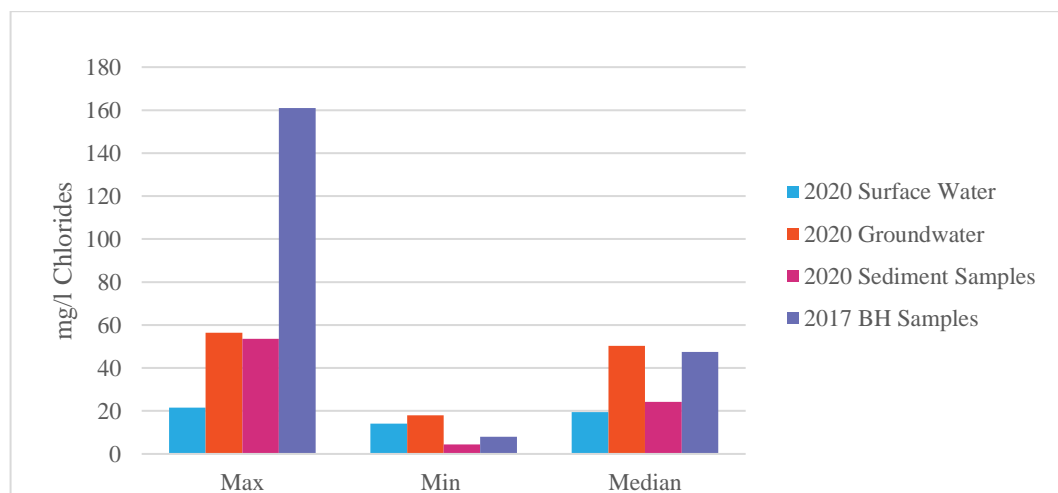


Figure 16: Chloride concentrations

The data shows a ‘peak’ maximum value of 161mg/l in the sediment that substantially higher than the values detected in surface water, groundwater and the samples from 2020.

However, the median value for the 2017 (24 no.) sediment result compares closely with the median value for the groundwater results, obtained from the pNHA to the north of the Avoca River.

Surface water values are generally lower than the results from the groundwater and sediment sampling (both in 2017 and 2020) values.

As noted above, the sediment samples were collected to further assess the slightly elevated chloride concentrations detected in sediments from the 2017 GI in samples BH05, BH06 and BH09 and examine their behaviour under repeated leaching. The samples were re-leached twice according to the CEN 10:1 leachate method as required for WAC testing. A further sample was re-tested after rinsing with ordinary water. This was to simulate the washing of materials over time and what would happen if these sediments were left to freely drain in the open, exposed to rainfall.

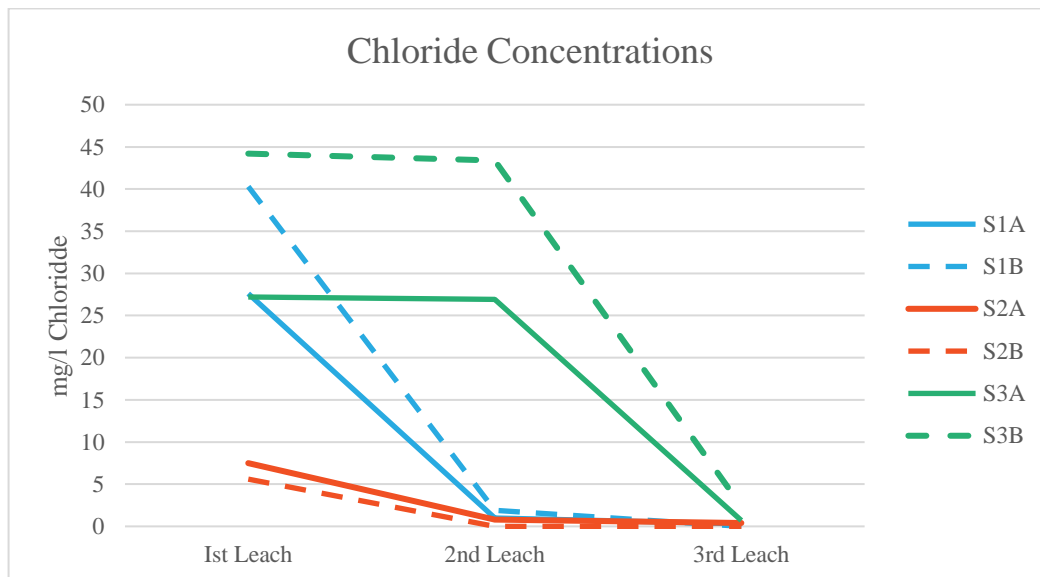


Figure 17: Chloride Concentrations in successive leachates

Figure 17 presents the chloride concentrations in successive leachates, and clearly shows removal of virtually all chlorides through leaching. This removal occurred in Samples 1A, 1B, 2A and 2B after the second test, and in Samples 3A & 3B after the third test, the slower response in 3A/3B likely due to the much finer-grained material being slower to leach. The rinsed sample also showed the same significant reduction in chloride levels.

The above analyses demonstrate that the slightly elevated chloride levels will fall once the material is dredged out of the river through natural drainage of the saline water, and while temporarily stockpiled/stored for inspection before removal off-site.

## 4.4 Material waste classification

The above screening of test data against the relevant limit values, is used to determine the relevant soil classifications for all dredged sediments. These classifications then determine what options are available for the reuse, recovery or disposal of each strata.

### 4.4.1 Reuse or disposal onshore

Based on the WAC assessment carried out on the samples, for both the 2017 GI and the 2020 sampling, the following can be stated.

The sediments at one location (Location 3 from the 2020 survey) are soils contaminated by anthropogenic fill at the river surface, and are classified as requiring disposal to a hazardous licenced landfill due to the following:

- Classified as LoW Code 17 05 05\*, implying they are hazardous, due to elevated concentrations of copper and zinc; and
- Exceedance of the WAC limits for inert licenced landfills in mineral oil, antimony and molybdenum;

A total of 4 no. samples were identified as requiring disposal to a non-hazardous licenced landfill. These can be split into two groups:

- One sample (Sample 2A from the 2020 GI) showed elevated antimony when compared to the inert licenced landfill limits. This sample is most likely also impacted by anthropogenic material at the riverbed surface and would require disposal to a non-hazardous licenced landfill; and
- Three samples from the 2017 GI (BH05 at 0.5m, BH06 at 0.5m and BH09 at, 0.5m) all had chloride concentrations in excess of the limits for an inert licenced landfill. These slightly elevated chloride levels are likely due to natural saline intrusion given the tidal influence on this section of river. Hence further sampling and testing was undertaken in 2020 for chloride levels following washing with fresh water, and more aggressive repeat leaching tests, to simulate temporarily stockpiled dredge material.
- Chloride concentrations detected in the 2020 samples were noted as decreasing significantly following washing and repeated leaching, indicating that concentrations would decrease naturally when excavated and allowed to drain. Accordingly, if the material is stockpiled on site for some time prior to removal offsite, the chloride concentrations are likely to reduce as the water drains out. This process would be accelerated through natural means such as rainfall, or due to common construction practices such as the wetting of soil stockpiles for dust suppression. Therefore, it would be prudent to carry out verification sampling and testing of the materials in advance of removal offsite, as it is expected that much of this material could be deemed to be inert.

The 2017 and 2020 test results were also compared to the SRF acceptance criteria indicating the following:

- The 2017 data indicates a small number of exceedances were present (three no. samples from 24 no.) and of the samples directly relevant to the proposed dredge material, only one no. sample showed an exceedance against these criteria (BH02, 0.5m, Mineral Oil);
- The 2020 data indicates that there are exceedances in all samples as detailed below, and therefore these materials would not be suitable for disposal to a permitted site:
  - Sample 1-A shows exceedances in PAHs with minor exceedances in Sample 1-A and 1-B in relation to Chromium;
  - Sample 2-A and Sample 2-B show major exceedances in relation to chromium and a major exceedance of copper in Sample 2-A.
  - Sample 3-A and Sample 3-B show minor exceedance of the chromium limits in both samples and major exceedances in arsenic, cadmium, copper, lead, zinc, and mineral oil. PAH's were located in Sample 3-B only.

Asbestos was detected at very low concentrations (<0.01%) in one sample (BH05, 1.0m below riverbed) from the 2017 ground investigation, however this is located below the proposed dredge level. None of the other samples from all site investigations detected any asbestos, including the samples taken above and below the affected sample at BH05.

In summary, the majority of the material to be dredged is clean inert sands and gravels with a small portion of hazardous and non-hazardous material, found primarily as a thin surface layer of fill material along the south bank of the river. In addition, some areas to be dredged have natural slightly elevated chloride concentrations. Temporary stockpiling this material is likely to allow natural reduction in chloride concentrations sufficiently so this material could be deemed to be inert.

The approximate breakdown of the material classification is shown in Table 7 below. Note that a conservative approach has been taken in the event that more of the higher contaminated materials are encountered during the works, and that actual quantities will be monitored with verification testing.

Table 7: Material classification

Material classification	Percentage of total dredge material	Approximate volume (m <sup>3</sup> )
Inert sands and gravels	70	58,500
Non-hazardous with slightly elevated chloride concentrations	20	16,700
Non-hazardous waste	7	5,900
Hazardous waste	3	2,500

#### 4.4.2 Dumping at sea

The results from the 2017 site investigation indicated that although no samples showed concentrations that exceeded the upper level threshold for disposal at sea, some samples showed concentrations of arsenic, cadmium, copper, lead and zinc that exceed the lower level threshold.

The 2017 results were consistent with the 2008 results and suggested that there were some areas in the river where the dredge material contained elevated concentrations of zinc and copper.

The identification of the dredged soils being between these thresholds means that a risk assessment of potential impacts on the receiving marine dumping site would be required for a dumping at sea licence.

The shallow layer of contaminated fill testing as non-hazardous and hazardous is not suitable for disposal at sea.

#### 4.4.3 Disposal at CDF options

CDFs are constructed to store heavily contaminated dredge material. There are currently no such facilities in Ireland, but there are a number of CDFs located across Europe, particularly in Germany, Belgium and the Netherlands. The facility in the Netherlands is called the Slufter and Arup specified the testing for the 2017 site investigation to comply with the acceptance criteria for the Slufter CDF.

CDFs generally have strict acceptance criteria, in that the material to be deposited must be heavily contaminated in order for it to be accepted. This is to minimise the amount of non-contaminated material filling the limited space. CDFs are operated privately, so there are no statutory limits as to what can or cannot be accepted; the levels are set by the facility and can fluctuate depending on remaining capacity and/or market conditions.

The results from the 2017 site investigation demonstrated that the copper concentration of the proposed dredge material slightly exceeded the minimum acceptance criteria for the Slufter CDF in the Netherlands at that time in just two locations. This would mean that the material could potentially be accepted at a CDF, however, the operators could argue that it demonstrates a small degree of contamination and that the suitable soils would require separation from the remainder of the material.

### 4.5 Material considerations

The available dredge material management options are dependent upon the contamination levels of the soils encountered. The EPA's materials assessment hierarchy is used for identifying the most appropriate option for each category of materials identified.

As mentioned above the material to be dredged can be divided into four classifications as follows:

- Inert sands and gravels;
- Non-hazardous with slightly elevated chloride concentrations;
- Non-hazardous waste;
- Hazardous waste.

Volumes of the various material classifications are detailed in Table 2 above.

Refer to Figure 18 and Figure 19 below for approximate plan extent of the above-classified areas and Appendix B for an overall plan view of the classified areas.

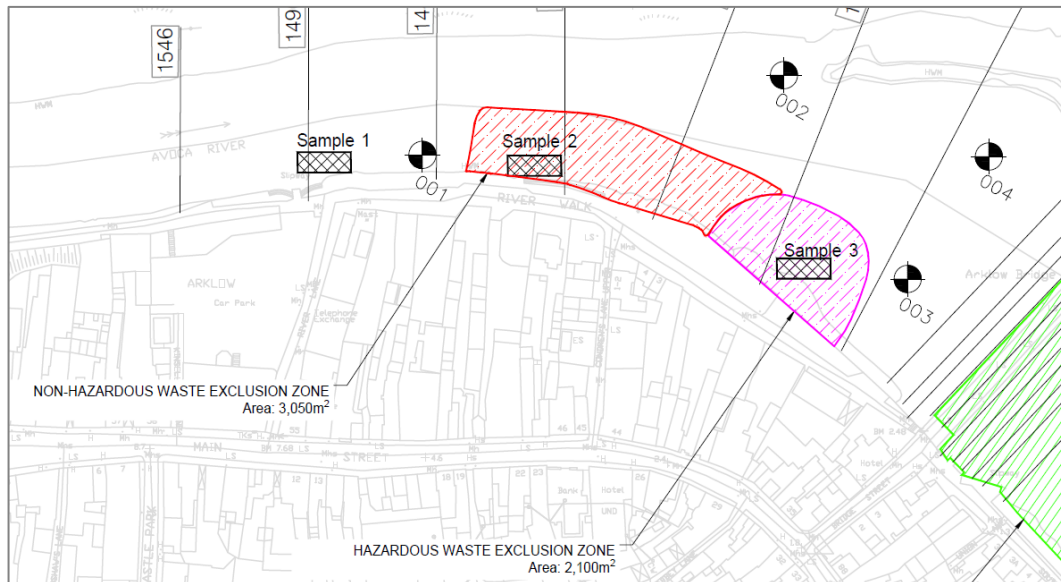


Figure 18: Hazardous and non-hazardous dredge zones

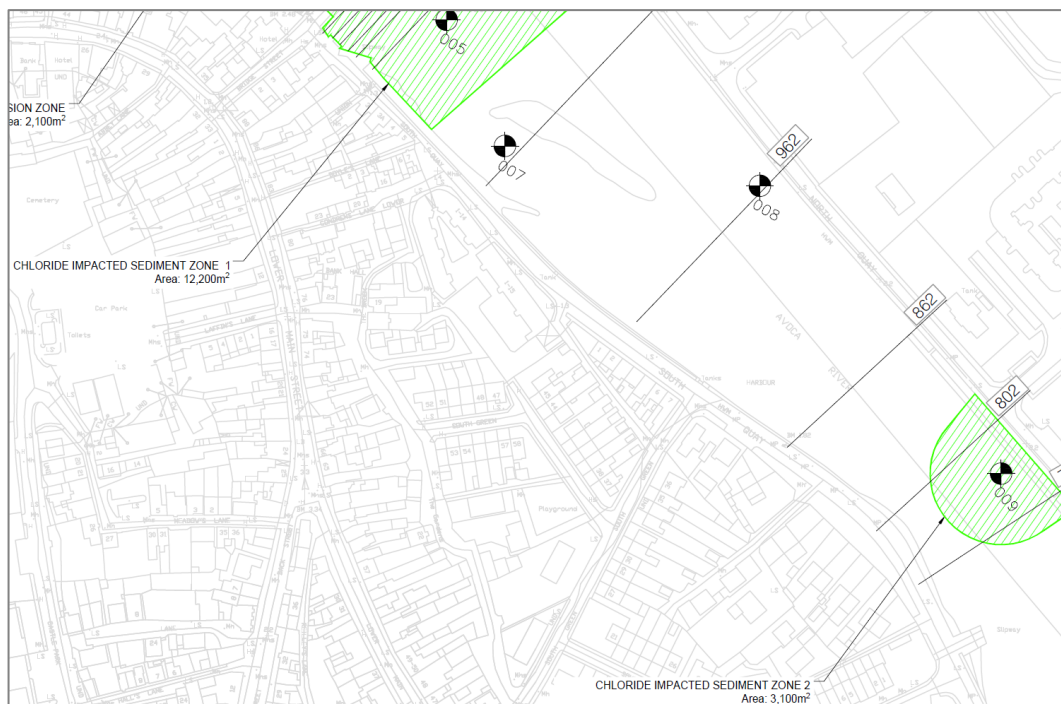


Figure 19: Chloride impacted dredge zones

### 4.5.1 Inert sands and gravels

This material is suitable for reuse within the FRS scheme for embankment construction and wall backfilling. It is also suitable for reuse as by-product (Art 27) if there are suitable destinations available at the time of construction. Should suitable Article 27 options not be available over the required period, this material could be sent for recovery to available Soil Recovery Facilities (SRFs).

The full volume of inert sands and gravels will be accommodated through one or a combination of several of these options.

### 4.5.2 Non-hazardous with slightly elevated chloride concentrations

The sands and gravels with slightly elevated chloride levels due to saline intrusion are suitable for reuse within the FRS scheme for embankment construction and wall backfilling. The sampling and testing of both the river water and groundwater in the adjoining marsh show similarly elevated chloride levels. Therefore, reuse of these materials directly for embankments along the edge of the marsh is appropriate.

For off-site reuse the material will undergo temporary storage on site to allow the material to drain, with exposure to the elements and dust suppression measures. As demonstrated through laboratory testing, this normal handling of the materials will effectively reduce chloride concentrations, that will be below WAC non-hazardous. This will enable these sands and gravels to be reused as Article 27 by-product, or for soil recovery. Further testing at the time of proposed removal off-site will be required to confirm the material's suitability for reuse or recovery.

The majority of this material is likely to be suitable for reuse under the EPA's Article 27 process. The material is also suitable for acceptance at Soil Recovery Facilities and inert waste facilities.

Any surface water runoff from the material during storage is suitable for discharge back into the surface or groundwater system in terms of chloride content, through standard control measures such as silt traps before discharge, under the permission of WCC.

### 4.5.3 Non-hazardous waste

This material is not suitable for reuse and must be disposed of at a non-hazardous licenced landfill. Additional sampling and testing will be required pre-dredging to further define the extent of this material.

In-situ treatment options are not feasible for this material. Temporary storage areas will be required to separate non-hazardous material from other material classifications.

#### 4.5.4 Hazardous waste

This material is not suitable for reuse and must be disposed of at an authorised hazardous treatment, recovery or disposal waste facility. Additional sampling and testing will be required pre-dredging to further define the extent of this material.

Temporary storage areas will be required to separate hazardous material from other material classifications.

### 4.6 Archaeological investigation

As part of the EIAR Arup scoped, procured and managed an underwater archaeological inspection of the proposed area of the bridge works and the dredging works. Following inspection, Arup liaised with the Department of Culture, Heritage and the Gaeltacht regarding the findings and the likely implications relating to archaeological inspection during construction works.

The findings and the implications are described below. For further details relating to archaeology refer to the EIAR.

#### 4.6.1 Downstream of Arklow Bridge

The area downstream of Arklow Bridge is of lesser heritage sensitivity overall compared with upstream of the bridge.

The Department indicated that dredge material will require inspection following dredging. This will involve metal detection and visual inspection post excavation facilitated by the laying out of the dredge material in 100-200mm layers. Inspection can take place adjacent to the works, at an intermediate location (having regard to drainage requirements) or at the final destination. The percentage requiring inspection would be reviewed as works progress, scaling up or down as agreed with the Department.

It may be possible to inspect the excavated material while reusing dredge material during embankment construction. The inspection of the dredge material is considered in the identification of potential construction areas as detailed in the EIAR. SC5 is currently considered to be an appropriate area for inspection of the material.

#### 4.6.2 Upstream of Arklow Bridge

The area upstream of Arklow Bridge is of greater heritage significance as the Arklow medieval town was located upstream. In addition, other finds identified in the records and surveys were mostly located in this area. It is assumed the medieval shoreline no longer exists and that the shoreline upstream is reclaimed.

The Department indicated that the dredge material from this area will require inspection as per the inspection method described above.

The percentage requiring inspection would be reviewed as works progress, scaling up or down as agreed with the Department. SC1, SC3 and SC4 are currently considered to be appropriate areas for inspection of the material.



## 5 Stakeholder consultation

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As part of the assessment of dredge material management options, key stakeholders were consulted as reported below.

### 5.1 WCC Waste Section

Arup liaised with WCC Waste Section as the statutory body for approval of potential options including reuse within the scheme, or potential off-site disposal at permitted sites. The WCC Waste Section is responsible for the granting of waste permits for sites/ facilities in the jurisdiction of WCC.

Arup held a meeting with WCC Waste Section on 2 July 2020 to discuss the details of the proposed dredging works and possible options for reuse and disposal of the dredge material.

In relation to material reuse WCC are a consultee of the EPA for Art 27 applications within their jurisdiction. WCC were not aware of any Article 27 'destination' facilities operating within the county at present.

WCC Waste Section provided updates on four no. sites that are currently authorised waste outlets. Details of the updates provided are as follows:

- Scratenagh – capacity of 80,000t (~40,000m<sup>3</sup>) total and is located circa 8km from Arklow;
- Templeraíne – capacity of 50,000t (~25,000m<sup>3</sup>) total over 3-year period and is located circa 4km from Arklow;
- Rathdrum (near cemetery) – capacity of 100,000t (~50,000m<sup>3</sup>) over 4 years period and is located circa 17km from Arklow;
- Donard (old quarry) – capacity of 100,000t (~50,000m<sup>3</sup>) up to 2024 and is located circa 42km from Arklow.

WCC Waste Section noted that in general, maximum allowance at each site is capped at 25,000t per year to keep below EIAR thresholds. To counteract this the dredge material management could spread between several sites.

### 5.2 Other LA Waste Section

Arup contacted Wexford County Council (WeCC) in relation to identification of existing authorised waste facilities in Co Wexford as well as potential future facilities. WeCC provided a list of current authorised facilities with the named facilities matching those obtained from the National Waste Collection Permit Office (NWCPO) website. Refer to Appendix C for a register of facilities accepting EWC Code 17 05 06 in Wexford. The register shows 5 no. sites located within circa 18km of Arklow.

### 5.3 EPA

The EPA were consulted relating to dumping at sea, and on-land reuse options.

## Dumping at Sea

In 2008 Arup consulted with the EPA's Dumping at Sea Section in relation to the potential dumping at sea application process. At that time this option was considered as Wicklow County Council had previously deposited dredged material from Arklow harbour into a licensed dumping-at-sea facility north of Arklow. During this consultation process the EPA detailed the application process and the elements required in a Dumping at Sea application, which included but are not limited to the following:

- Sediment dispersion modelling for dredging and dumping activities;
- Stakeholder consultation e.g. NPWS, Marine Institute, local fisheries etc.;
- Proposed dredging and disposal methodology;
- Management plan for the dump site;
- Benthic surveys of the dump site.

As noted above the slightly elevated levels of some contaminants above the lower DaS threshold means that further risk assessment of this potential option would be required. The EPA did indicate that a new license would most likely be required and that dredge material would require capping if this option were to be pursued.

The EPA guidance for dumping at sea applications also states:

*'In accordance with Section 5(2) of the Dumping at Sea Act 1996 as amended the dumping of substances or material at sea is only acceptable when the Agency is satisfied that there is no suitable alternative means of disposal. The First Schedule states that the Agency must take into consideration the practical availability of alternative land-based methods of treatment, disposal or elimination, or of treatment to render the substance or material less harmful for dumping at sea. Applicants must demonstrate that all alternative means of land-based disposal and/or beneficial reuse of the material have been investigated prior to applying for a dumping at sea permit. The applicant shall also demonstrate that all necessary steps have been taken to minimise the quantity of material to be dumped or to render the material less harmful for dumping at sea.'*

Following the above EPA consultation process further investigations of other more sustainable options were examined, including potential reuse as a by-product under Article 27.

### Article 27

In September 2020 Arup consulted the EPA waste licensing section (Article 27 section) in relation to the options for reuse of the dredge materials. The EPA confirmed that dredge material, if shown to be natural undisturbed soils, is suitable for consideration as a by-product under the Article 27 guidance. The EPA also confirmed the need for specific testing relating to dredge material listed in their guidance documentation.

## 5.4 Destination facility operators

Arup has liaised with the two largest quarry operators that have facilities within the general hinterland of Arklow, to identify any potential reuse, recovery or disposal destinations (permitted sites, inert waste facilities, etc.). The findings of this consultation process are detailed below.

### 5.4.1 Roadstone

Roadstone operate a number of quarry infill facilities including Article 27 by-product, licensed SRF and inert waste facilities. Details relating to these SRFs are outlined below and in Appendix D which has been generated using information from the EPA website.

#### **Calary, Co Wicklow**

Roadstone have a dis-used quarry at Calary, County Wicklow, that has recently been granted a Soil Recovery Facility (SRF) permit. It is anticipated that the site at Calary Quarry is due to open in the coming months as dewatering of the quarry continues. The Calary site will initially be operate as an SRF but Roadstone indicated they may submit for wider acceptance criteria to the EPA for approval in the future.

#### **Huntstown, Co Dublin**

Roadstone is currently operating two facilities at Huntstown:

- Huntstown North quarry is a permitted soil recovery facility. Updated acceptance criteria have recently been submitted to the EPA for approval, based on the recent guidance issued by the EPA.
- Huntstown South quarry is operated as an Article 27 by-product facility and has been accepting Article 27 by-product for the past 2 years.

Roadstone have other quarry facilities in the area, including SRF facilities with some capacity at Brownswood (Enniscorthy) and Milverton (Skerries), that may be expanded in the future. Roadstone also have a rock quarry at Arklow Rock, which will be designated for recovery/restoration in the coming years and may provide alternative options.

### 5.4.2 Kilsaran

Kilsaran own a quarry near Arklow at Ballinclare for which they intend to submit a planning application for restoration of the quarry at some stage in the future. We understand the facility classification has yet to be decided but anticipated to be a soil recovery facility.

## 6 Assessment of dredge material management options

Following investigation of the existing conditions at site and the stakeholder consultations, Arup has assessed the viability of the dredge material management options detailed in Section 3 for application to the Arklow FRS dredge material.

This assessment was undertaken in the context of the EC and National Waste Hierarchy illustrated in Figure 10 and indicates a ranking of dredge material management options given in Table 8 below.

Table 8: Dredge material management option ranking

Option Number	Dredge material management options	Ranking
1	Reuse within the FRS	1
2	Beneficial reuse outside the FRS – Art 27	2
3	Material recovery – Soil Recovery Facilities	3
4	Delivery to inert waste facilities	4
5	Disposal on land – Non-hazardous landfills	5
6	Disposal on land – Abroad	6
7	Disposal at sea	7

As described in Section 4.5 circa 70 to 90% of the dredge material can be accommodated through reuse or recovery with the remaining 10 to 30% to be disposed of at non-hazardous licenced landfill and hazardous disposal facilities.

### 6.1 Inert material management strategy

The dredge material management strategy for the dredge material is to follow the hierarchy of options to determine the most appropriate and sustainable solution for all dredge materials arising.

As stated in Section 4.4.1 approximately 70% of the dredge material comprises natural sands and gravels with no evidence of any contamination. In addition, approximately 20% of the natural sands and gravels have slightly elevated chloride concentrations due to the saline river environment. Testing has shown that these chloride levels will likely reduce following excavation and temporary storage on site. Retesting of these sands and gravels for chloride levels before removal will determine their destination, whether reuse, recovery or delivery to inert waste facilities.

Given that circa 70 to 90% of the dredge material will likely be inert sands and gravels the hierarchy of preferred dredge material management options are as follows:

1. Reuse within the Flood Relief Scheme where feasible.
2. Beneficial reuse outside the FRS as Article 27 by-product if suitable destination available.
3. Material recovery to appropriate Soil Recovery Facilities.
4. Delivery to inert waste facilities.

The actual destination of the dredge materials will somewhat depend on the availability of suitable facilities at the time of excavation. Specific suitable locations are identified below to provide confirmation that the management of all dredge materials will be in accordance with current best practice.

All dredge material may be subject to archaeological inspection prior to reuse, recovery or disposal. Any inspections could take place at the destination site or on site at an appropriately segregated area. Provisions are included within site compounds for the archaeological inspections to be undertaken within the working site areas before reuse or removal off-site.

### **6.1.1 Reuse within the FRS**

The dredged natural sand and gravel material, including the material with slightly elevated chloride levels, can be reused on site without any treatment or storage necessary. The primary reuse option is the flood embankment along the edge of Arklow marsh. Further smaller volume options include as fill material for regrading works, backfill behind new flood walls and around new buried utility installations.

It is estimated that approximately 10,000m<sup>3</sup> of material can be reused on site, with the remaining circa 73,600m<sup>3</sup> of dredge material required to go offsite.

Accordingly, this option should be utilised first, followed by the next preferred option on the dredge material management option hierarchy.

### **6.1.2 Beneficial reuse outside the FRS – Article 27**

Approximately 48,500m<sup>3</sup> of the remaining material is suitable for beneficial reuse outside the FRS. The most sustainable off-site reuse option would be as a by-product under the EPA's Article 27 process. This material is likely to comply with Article 27 requirements. The material with slightly elevated chloride concentrations with a volume of 16,700m<sup>3</sup> is also likely to be suitable for reuse under Article 27 provided chloride concentrations are reduced sufficiently through standard dredging operations.

The Article 27 process requires confirmation of an appropriate destination site with the capacity available when needed. There are potential Article 27 options including onshore for quarry infilling, coastal protection schemes, flood relief schemes, and for site restoration. For offshore options of reclamation or coastal protection schemes with works below the HWM, a foreshore license would also be required. Any option must have the required planning permission.

At present Roadstone's Huntstown South quarry Article 27 facility has an available capacity in excess of 10 million m<sup>3</sup>, and is a viable option, but is some distance from Arklow. It is anticipated that more Article 27 site options will be available in the coming years.

Note that validation testing would be necessary to confirm the concentration of chlorides in the samples is appropriate for the chosen receiving sites.

### 6.1.3 Material recovery – Soil Recovery Facilities

As an alternative to any Article 27 options, there may be more appropriate recovery options closer to the source. As noted earlier there are many soil recovery facilities open at any point in time in the hinterland of Arklow, both in Wicklow and Wexford counties. These facilities are generally limited in annual intake and total capacity below 50,000m<sup>3</sup>, and acceptance of dredge material (waste code 17 05 06) must be included in the permit. It is reasonable to anticipate that there will be sufficient available capacity at the time required, to accept the remaining 48,500m<sup>3</sup> plus 16,700m<sup>3</sup> of natural sands and gravels at soil recovery facilities (SRFs) within close distance of Arklow.

Larger capacity sites are available also. Currently Roadstone are operating Huntstown Quarry in Co. Dublin as a soil recovery facility, with Calary in Co. Wicklow due to come on-line in the near future. Kilsaran also have local quarry which they intend using as a soil recovery (or possible inert waste facility) facility. Both these local sites would have capacity for the full remaining quantity described above.

### 6.1.4 Delivery to inert licenced landfills

In the unlikely event that neither Article 27 nor soil recovery facilities are available, the 48,500 m<sup>3</sup> plus 16,700m<sup>3</sup> of natural sands and gravels could be deposited in appropriate inert licenced landfills. Currently there are options available including:

- IMS Ltd, Hollywood, the Naul, Co. Dublin;
- Murphy Concrete Manufacturing, Gormanstown, Co. Meath;
- Walshestown Restoration Ltd., Walshestown, Co. Kildare.

Note that some validation testing will be necessary to confirm the appropriate concentration of chlorides in the material to confirm suitability prior to leaving site.

### 6.1.5 Disposal at sea

As noted above disposal-at-sea was first considered in 2008 on the basis that Wicklow County Council had a licensed facility, where Arklow harbour dredge material had previously been deposited. Key stakeholder consultations confirmed that while an option, it would most likely require a new license and require burial of the dredge material, if acceptable, under suitable capping.

In accordance with the waste hierarchy defined under the EU Waste Framework Directive, and the EPA's own guidance for disposal of dredge material, disposal at sea is only to be considered if material cannot be reused, recycled or recovered.

As noted above the majority of dredge material is suitable for reuse, recovery or delivery to inert waste facilities. The hazardous material is not suitable for disposal at sea as a result of the material threshold exceedances.

For these reasons, while disposal at sea may be a viable disposal option for much of the dredge material, it is the least favoured option in this assessment.

## **6.2 Hazardous and non-hazardous material management strategy**

The hazardous and non-hazardous material identified at the proposed dredging site can only be disposed-of within hazardous and non-hazardous facilities respectively.

### **6.2.1 Disposal on land – Non-hazardous licenced landfills**

The circa 5,900m<sup>3</sup> of non-hazardous material identified upstream of Arklow bridge will have to be disposed-of at a non-hazardous licenced landfill.

The following sites are currently accepting non-hazardous material:

- Drehid Waste Management Facility (Bord Na Mona), Co. Kildare;
- Knockharley Landfill, Co. Meath;
- Ballynagran Residual Landfill (Greenstar), Co. Wicklow.

The availability of non-hazardous landfill capacity has reduced in recent years, and those available taking mostly municipal waste. There is currently limited capacity for non-hazardous excavated and dredged soils, and this may continue into the future. However, given the ongoing need for such facilities, capacity for the relatively small volume arising from this scheme is considered likely. In the unlikely event there is no available capacity, exporting of this material would have to be considered. The dumping-at-sea option for the small volume of non-hazardous material is not considered feasible within the current constraints on existing and potential dumping sites.

### **6.2.2 Disposal on land – Abroad**

The circa 2,500m<sup>3</sup> of hazardous material identified upstream of Arklow bridge must be disposed-of at a hazardous licenced landfill. As there are currently no hazardous licenced landfills in Ireland it is likely that the material will need to be disposed of abroad at a suitable licenced waste facility. The transport of these materials abroad will require a trans-frontier shipment licence (TFS).

The transfer of this material will be handled by a specialist waste contractor.

This material may be subject to archaeological inspection prior to disposal. Any inspections could take place at the disposal site or on site at an appropriately segregated area. Note that given the hazardous nature of the soils, precautions will need to be put in place to protect the safety of the archaeologists carrying out the inspection. Measures will also need to be put in place to prevent inadvertent cross contamination of other soils present in the proposed holding area.



## 7 Conclusions

The purpose of this report is to recommend the dredge material management options for the dredging works that will be undertaken as part of the Arklow FRS.

This report has detailed the proposed works, the existing conditions including site investigation results, and the potential dredge material management options.

The classification and conservatively estimated volumes of the material to be dredged is summarised in Table 9.

Table 9: Material classification

Material classification	Percentage of total dredge material	Approximate volume (m <sup>3</sup> )
Natural sands and gravels	70	58,500
Natural sands and gravels with slightly elevated chloride concentrations	20	16,700
Non-hazardous waste	7	5,900
Hazardous waste	3	2,500

The hazardous and non-hazardous waste material must be disposed of at hazardous and non-hazardous facilities respectively authorised under the Waste Management Act, 1996 as amended.

Chloride concentrations in sand and gravels with slightly elevated chloride levels are likely to reduce following temporary storage on site as a result of drainage and exposure to the weather. Subject to verification testing prior the material can be defined as inert material. These slightly elevated chloride levels are likely due to natural saline intrusion given the tidal influence on this section of river.

The inert sands and gravels are suitable for several viable material management options. In determining the preferred dredge material management options, the waste hierarchy defined under the EU Waste Framework Directive was applied. Accordingly, the preferred material management options are ranked as follows:

1. Reuse within the Flood Relief Scheme;
2. Beneficial reuse outside the FRS – Article 27;
3. Material recovery – Soil Recovery Facilities;
4. Delivery to inert waste facilities.

Note that the FRS will likely require a maximum of circa 10,000m<sup>3</sup> of material for reuse.

The majority of the remaining material excluding the hazardous and non-hazardous material is likely to be suitable for reuse under the EPA's Article 27 process. Approximately 48,500m<sup>3</sup> of the remaining material is suitable for beneficial reuse outside the FRS with an additional 16,700m<sup>3</sup> with slightly elevated chloride concentrations also likely to be suitable provided chloride concentrations have reduced sufficiently.

The material has been assessed against TII Specification for Road Works, Series 600, Table 6/1 and complies with condition (d) of Article 27 and the EPA guidelines. The majority of the material falls within the Class 1A envelope of the TII specification with a small amount of material at BH01 falling under the Class 2A & 2B envelope.

The material is also suitable for acceptance at Soil Recovery Facilities and inert waste facilities.

The dredge material will be subject to an archaeological inspection regime as determined by the Department of Culture, Heritage and the Gaeltacht following consultation. The proposed dredge material management method will need to account for these requirements and will need to accommodate any inspections as required.

Construction site compounds and working areas will need to have sufficient capacity to accommodate the volume of material to be dredged. The areas will also need to be suitable to accommodate temporary storage of material and to allow for the archaeological inspection as required.

## 8 Recommended strategy

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The dredge material should be managed according to the material classifications as detailed below:

1. Hazardous waste to be disposed of at an authorised hazardous treatment, recovery or disposal waste facility in Ireland or abroad;
2. Non-hazardous waste to be delivered to an authorised recovery or disposal waste facility in Ireland or abroad;
3. Material with slightly elevated chloride concentrations to be retained on site for reuse on site, the balance for beneficial reuse offsite (Article 27), delivery to SRFs or delivery to inert waste facilities subject to verification testing confirming chloride concentrations;
4. Inert sands and gravels to be reused within the FRS scheme, with the balance reused as by-product (Article 27), recovered at SRFs where feasible or delivered to inert waste facilities.

Hazardous wastes are likely to be disposed of abroad as there are no sites in Ireland currently accepting hazardous materials. There are limited sites currently accepting non-hazardous materials, and export would be a 'fall-back' option.

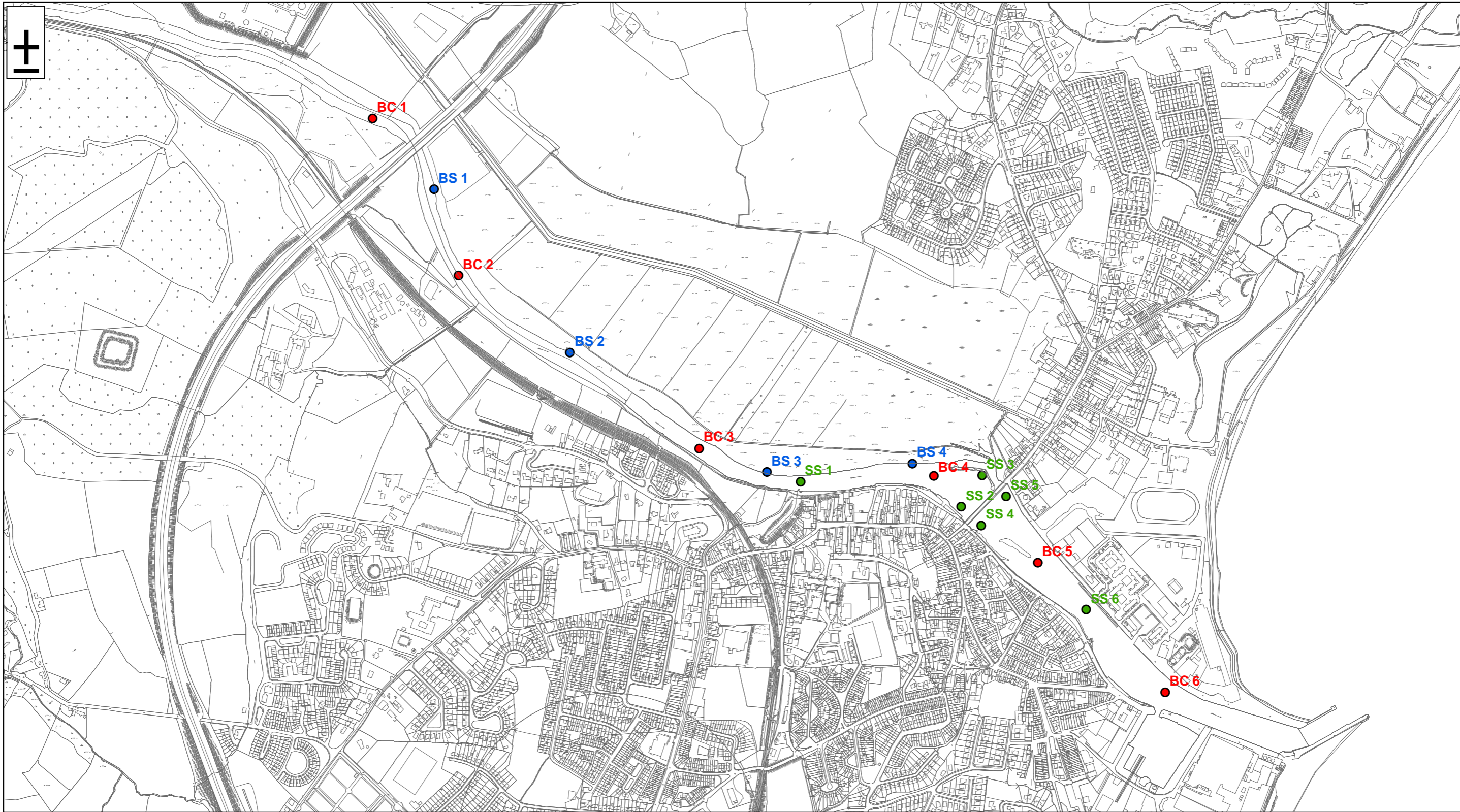
This strategy for dealing with the dredge materials forms the basis of the scheme to be submitted for planning permission, and for the associated Environmental Impact Assessment process. Note that final dredge material management options will be determined by the Contractor in accordance with the commitments made through the planning process and the viable options available at the time. This will follow consultation with the various stakeholders (i.e. EPA, WCC Waste Section, OPW), the Client (i.e. Wicklow County Council) and the Employer's Representative up to and including the tender process. This determination process will follow the waste hierarchy defined under the EU Waste Framework Directive as described in this report.

## Appendix A

### Ground Investigation data

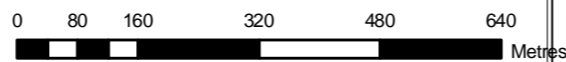
# **A1 2008 Ground Investigation**

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**Legend**

- BC1-6 Box Core Samples
- SS1-6 Surface Sediment Samples
- BS1-4 Bank Side Samples



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Job Title  
**Arklow Flood Relief**

Drawing Title  
**Avoca Sediment Contamination  
 Assessment Sampling Points**

Scale at A3  
**1:10,000**

Drawing No.

Revision  
**A**

Eoghan Kieran  
Moore Group  
Corporate House  
Ballybrit Business Park  
Galway  
Ireland

Dear Eoghan

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

Samples taken on: 21-May-2008

Samples Registered on: 27-May-2008

Results for Batch Number 20008182

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](mailto: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: Moore Group  
Folder No: 000666733  
Comments: BCA1 + BCA2

Project: Sediment Analysis  
Sampled on: 21-May-08 @ 00:00

	Result		MRV	Accred	Lab / TestCode
Grain Size Inclusive Kurtosis	0.46000000	mm	-12	UKAS	LI 994
Grain Size Inclusive Mean	4.05	mm	0	UKAS	LI 994
Inclusive Graphic Skewness :- {SKI}	-0.72000000	Unitless	-1	UKAS	LI 994
Grain Size Fraction : < 63 microns	0.00	%	0	UKAS	LI 994
Grain Size Fraction : < 20 microns	0.00	%	0	UKAS	LI 994
Grain Size Fraction : > 8000 microns	36.70	%	0	UKAS	LI 994
Grain Size Fraction : 1000 to 2000 microns	5.53	%	0	UKAS	LI 994
Grain Size Fraction : 125 to 249 microns	1.45	%	0	UKAS	LI 994
Grain Size Fraction : 2000 to 3999 microns	12.60	%	0	UKAS	LI 994
Grain Size Fraction : 250 to 499 microns	6.27	%	0	UKAS	LI 994
Grain Size : 4000 to 7999 microns	28.00	%	0	UKAS	LI 994
Grain Size Fraction : 500 to 999 microns	7.29	%	0	UKAS	LI 994
Grain Size Fraction : 63 to 125 microns	0.44	%	0	UKAS	LI 994
Kurtosis	-1.35000000	Unitless	-12	UKAS	LI 994
Particle Diameter : Mean	5.77	mm	0	UKAS	LI 994
Particle Diameter : Median	6.57	mm	0	UKAS	LI 994
Sorting Coefficient	1.48000000	Unitless	-3	UKAS	LI 994
Dry Solids @ 30°C	93.900	%	0.5	None	Le 924
Sample Preparation	1	Text		None	Le 924

Folder Number: 666733

The sample was received in a 1l plastic pot weighing approx. 764g in total.  
The sample appeared to be a multicoloured gravel of pebbles and stones.

162.59g of the sample was taken for drying at <30degC which gave 153.08g of dried sample.  
The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

27.04g of pebbles and stones was discarded after sieving at 10mm.  
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: Moore Group  
Folder No: 000666734  
Comments: BC1A + BC1B

Project: Sediment Analysis  
Sampled on: 21-May-08 @ 00:00

	Result		MRV	Accred	Lab / TestCode
Grain Size Inclusive Kurtosis	0.52000000	mm	-12	UKAS	LI 994
Grain Size Inclusive Mean	0.03	mm	0	UKAS	LI 994
Inclusive Graphic Skewness :- {SKI}	0.04000000	Unitless	-1	UKAS	LI 994
Grain Size Fraction : < 63 microns	65.60	%	0	UKAS	LI 994
Grain Size Fraction : < 20 microns	37.30	%	0	UKAS	LI 994
Grain Size Fraction : > 8000 microns	0.00	%	0	UKAS	LI 994
Grain Size Fraction : 1000 to 2000 microns	0.03	%	0	UKAS	LI 994
Grain Size Fraction : 125 to 249 microns	10.60	%	0	UKAS	LI 994
Grain Size Fraction : 2000 to 3999 microns	0.00	%	0	UKAS	LI 994
Grain Size Fraction : 250 to 499 microns	7.15	%	0	UKAS	LI 994
Grain Size : 4000 to 7999 microns	0.00	%	0	UKAS	LI 994
Grain Size Fraction : 500 to 999 microns	2.76	%	0	UKAS	LI 994
Grain Size Fraction : 63 to 125 microns	13.90	%	0	UKAS	LI 994
Kurtosis	-0.21000000	Unitless	-12	UKAS	LI 994
Particle Diameter : Mean	0.09	mm	0	UKAS	LI 994
Particle Diameter : Median	0.03	mm	0	UKAS	LI 994
Sorting Coefficient	2.15000000	Unitless	-3	UKAS	LI 994
Dry Solids @ 30°C	52.600	%	0.5	None	Le 924
Sample Preparation	1	Text		None	Le 924

Folder Number: 666734

The sample was received in a 1l plastic pot weighing approx. 353g in total.

The sample appeared to be a dark brown loamy clay with stones and roots present.

79.29g of the sample was taken for drying at <30degC which gave 44.41g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

No waste was discarded after sieving at 10mm.

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: Moore Group Project: Sediment Analysis  
Folder No: 000666735 Sampled on: 21-May-08 @ 00:00  
Comments: BC2A-ONLY ONE SAMPLE FROM STATION

	Result		MRV	Accred	Lab / TestCode
Grain Size Inclusive Kurtosis	0.61000000	mm	-12	UKAS	LI 994
Grain Size Inclusive Mean	3.65	mm	0	UKAS	LI 994
Inclusive Graphic Skewness :- {SKI}	-0.70000000	Unitless	-1	UKAS	LI 994
Grain Size Fraction : < 63 microns	0.63	%	0	UKAS	LI 994
Grain Size Fraction : < 20 microns	0.02	%	0	UKAS	LI 994
Grain Size Fraction : > 8000 microns	37.30	%	0	UKAS	LI 994
Grain Size Fraction : 1000 to 2000 microns	10.60	%	0	UKAS	LI 994
Grain Size Fraction : 125 to 249 microns	1.77	%	0	UKAS	LI 994
Grain Size Fraction : 2000 to 3999 microns	11.50	%	0	UKAS	LI 994
Grain Size Fraction : 250 to 499 microns	4.34	%	0	UKAS	LI 994
Grain Size : 4000 to 7999 microns	18.00	%	0	UKAS	LI 994
Grain Size Fraction : 500 to 999 microns	12.70	%	0	UKAS	LI 994
Grain Size Fraction : 63 to 125 microns	0.41	%	0	UKAS	LI 994
Kurtosis	-1.63000000	Unitless	-12	UKAS	LI 994
Particle Diameter : Mean	5.38	mm	0	UKAS	LI 994
Particle Diameter : Median	6.29	mm	0	UKAS	LI 994
Sorting Coefficient	1.59000000	Unitless	-3	UKAS	LI 994
Dry Solids @ 30°C	88.200	%	0.5	None	Le 924
Sample Preparation	1	Text		None	Le 924

Folder Number: 666735

The sample was received in a 1l plastic pot weighing approx. 764g in total.

The sample appeared to be a multi-coloured gravel consisting of stones and pebbles.

115.26g of the sample was taken for drying at <30degC which gave 102.33g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

No waste was discarded after sieving at 10mm.

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: Moore Group  
Folder No: 000666736  
Comments: BC3A + BC3B

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	Result		MRV	Accred	Lab / TestCode
Grain Size Inclusive Kurtosis	0.36000000	mm	-12	UKAS	LI 994
Grain Size Inclusive Mean	0.20	mm	0	UKAS	LI 994
Inclusive Graphic Skewness :- {SKI}	-0.25000000	Unitless	-1	UKAS	LI 994
Grain Size Fraction : < 63 microns	14.60	%	0	UKAS	LI 994
Grain Size Fraction : < 20 microns	6.96	%	0	UKAS	LI 994
Grain Size Fraction : > 8000 microns	0.00	%	0	UKAS	LI 994
Grain Size Fraction : 1000 to 2000 microns	3.53	%	0	UKAS	LI 994
Grain Size Fraction : 125 to 249 microns	29.40	%	0	UKAS	LI 994
Grain Size Fraction : 2000 to 3999 microns	0.00	%	0	UKAS	LI 994
Grain Size Fraction : 250 to 499 microns	28.50	%	0	UKAS	LI 994
Grain Size : 4000 to 7999 microns	0.00	%	0	UKAS	LI 994
Grain Size Fraction : 500 to 999 microns	11.90	%	0	UKAS	LI 994
Grain Size Fraction : 63 to 125 microns	12.00	%	0	UKAS	LI 994
Kurtosis	5.99000000	Unitless	-12	UKAS	LI 994
Particle Diameter : Mean	0.30	mm	0	UKAS	LI 994
Particle Diameter : Median	0.22	mm	0	UKAS	LI 994
Sorting Coefficient	1.59000000	Unitless	-3	UKAS	LI 994
Dry Solids @ 30°C	67.200	%	0.5	None	Le 924
Sample Preparation	1	Text		None	Le 924

Folder Number: 666736

The sample was received in a 1l plastic pot weighing approx. 335g in total.

The sample appeared to be a dark brown clay sand with stones and roots present.

56.41g of the sample was taken for drying at <30degC which gave 39.81g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

No waste was discarded after sieving at 10mm.

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: Moore Group  
Folder No: 000666737  
Comments: BC44 + BC4B

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	Result		MRV	Accred	Lab / TestCode
Grain Size Inclusive Kurtosis	0.69000000	mm	-12	UKAS	LI 994
Grain Size Inclusive Mean	2.28	mm	0	UKAS	LI 994
Inclusive Graphic Skewness :- {SKI}	-0.17000000	Unitless	-1	UKAS	LI 994
Grain Size Fraction : < 63 microns	0.01	%	0	UKAS	LI 994
Grain Size Fraction : < 20 microns	0.00	%	0	UKAS	LI 994
Grain Size Fraction : > 8000 microns	32.90	%	0	UKAS	LI 994
Grain Size Fraction : 1000 to 2000 microns	7.67	%	0	UKAS	LI 994
Grain Size Fraction : 125 to 249 microns	1.64	%	0	UKAS	LI 994
Grain Size Fraction : 2000 to 3999 microns	5.44	%	0	UKAS	LI 994
Grain Size Fraction : 250 to 499 microns	13.60	%	0	UKAS	LI 994
Grain Size : 4000 to 7999 microns	11.80	%	0	UKAS	LI 994
Grain Size Fraction : 500 to 999 microns	24.50	%	0	UKAS	LI 994
Grain Size Fraction : 63 to 125 microns	0.67	%	0	UKAS	LI 994
Kurtosis	-1.68000000	Unitless	-12	UKAS	LI 994
Particle Diameter : Mean	4.36	mm	0	UKAS	LI 994
Particle Diameter : Median	2.57	mm	0	UKAS	LI 994
Sorting Coefficient	1.80000000	Unitless	-3	UKAS	LI 994
Dry Solids @ 30°C	75.000	%	0.5	None	Le 924
Sample Preparation	1	Text		None	Le 924

Folder Number: 666737

The sample was received in a 1l plastic pot weighing approx. 626g in total.  
The sample appeared to be a dark brown, very wet, sand with grit present.

129.69g of the sample was taken for drying at <30degC which gave 96.37g of dried sample.  
The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

5.58g of stones was discarded after sieving at 10mm.  
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: Moore Group  
Folder No: 000666738  
Comments: BC5A + BC5B

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	Result		MRV	Accred	Lab / TestCode
Grain Size Inclusive Kurtosis	0.65000000	mm	-12	UKAS	LI 994
Grain Size Inclusive Mean	1.29	mm	0	UKAS	LI 994
Inclusive Graphic Skewness :- {SKI}	-0.05000000	Unitless	-1	UKAS	LI 994
Grain Size Fraction : < 63 microns	1.73	%	0	UKAS	LI 994
Grain Size Fraction : < 20 microns	0.25	%	0	UKAS	LI 994
Grain Size Fraction : > 8000 microns	20.20	%	0	UKAS	LI 994
Grain Size Fraction : 1000 to 2000 microns	8.17	%	0	UKAS	LI 994
Grain Size Fraction : 125 to 249 microns	13.50	%	0	UKAS	LI 994
Grain Size Fraction : 2000 to 3999 microns	9.69	%	0	UKAS	LI 994
Grain Size Fraction : 250 to 499 microns	12.00	%	0	UKAS	LI 994
Grain Size : 4000 to 7999 microns	14.60	%	0	UKAS	LI 994
Grain Size Fraction : 500 to 999 microns	13.70	%	0	UKAS	LI 994
Grain Size Fraction : 63 to 125 microns	5.82	%	0	UKAS	LI 994
Kurtosis	-1.12000000	Unitless	-12	UKAS	LI 994
Particle Diameter : Mean	3.34	mm	0	UKAS	LI 994
Particle Diameter : Median	1.26	mm	0	UKAS	LI 994
Sorting Coefficient	2.36000000	Unitless	-3	UKAS	LI 994
Dry Solids @ 30°C	52.600	%	0.5	None	Le 924
Sample Preparation	1	Text		None	Le 924

Folder Number: 666738

The sample was received in a 1l plastic pot weighing approx. 538g in total.  
The sample appeared to be a gritty, black sediment.

105.93g of the sample was taken for drying at <30degC which gave 58.47g of dried sample.  
The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

1.40g of stones was discarded after sieving at 10mm.  
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: Moore Group  
Folder No: 000666739  
Comments: BC6A + BC6B

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	Result		MRV	Accred	Lab / TestCode
Grain Size Inclusive Kurtosis	0.69000000	mm	-12	UKAS	LI 994
Grain Size Inclusive Mean	1.16	mm	0	UKAS	LI 994
Inclusive Graphic Skewness :- {SKI}	0.17000000	Unitless	-1	UKAS	LI 994
Grain Size Fraction : < 63 microns	2.80	%	0	UKAS	LI 994
Grain Size Fraction : < 20 microns	0.94	%	0	UKAS	LI 994
Grain Size Fraction : > 8000 microns	39.20	%	0	UKAS	LI 994
Grain Size Fraction : 1000 to 2000 microns	4.19	%	0	UKAS	LI 994
Grain Size Fraction : 125 to 249 microns	15.60	%	0	UKAS	LI 994
Grain Size Fraction : 2000 to 3999 microns	2.89	%	0	UKAS	LI 994
Grain Size Fraction : 250 to 499 microns	21.00	%	0	UKAS	LI 994
Grain Size : 4000 to 7999 microns	0.81	%	0	UKAS	LI 994
Grain Size Fraction : 500 to 999 microns	7.95	%	0	UKAS	LI 994
Grain Size Fraction : 63 to 125 microns	3.83	%	0	UKAS	LI 994
Kurtosis	-1.74000000	Unitless	-12	UKAS	LI 994
Particle Diameter : Mean	4.18	mm	0	UKAS	LI 994
Particle Diameter : Median	0.83	mm	0	UKAS	LI 994
Sorting Coefficient	2.39000000	Unitless	-3	UKAS	LI 994
Dry Solids @ 30°C	11.500	%	0.5	None	Le 924
Sample Preparation	1	Text		None	Le 924

Folder Number: 666739

The sample was received in a 1l plastic pot weighing approx. 727g in total.

The sample appeared to be oily, twigs, leaves and plant matter and a large quantity of water.

104.02g of the sample was taken for drying at <30degC which gave 17.07g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

No waste was discarded after sieving at 10mm.

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.

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 Code: Le = Leeds, LI = Llanelli, No = Nottingham, Sx = Starcross, SC = Sub-Contracted outside NLS

Eoghan Kieran  
Moore Marine  
Corporate House  
Ballybrit Business Park  
Galway  
Ireland

Dear Eoghan

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

Samples taken on: 21-May-2008

Samples Registered on: 28-May-2008

Results for Batch Number 20008207

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](mailto: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: Moore Marine Project: Sediment Analysis  
Folder No: 000666712 Sampled on: 21-May-08 @ 00:00  
Comments: Sand and Gravel - River Sample SSA

	Result		MRV	Accred	Lab / TestCode
Carbon : Dry Wt	3540.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	290.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	< 0.800	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	3.66	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	1.370	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	29.800	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	14.600	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	20.500	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	124.00	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	2640.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	26.300	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	400.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	208.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	< 10.0	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00300	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00300	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00200	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	< 0.100	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	< 1.00	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	< 6.00	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	< 3.00	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}		ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt		ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918



PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Equiv. Carbon No >10-12 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >10-12 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >12-16 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >12-16 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >16-21 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >16-21 Aromatic fraction : Dry Wt	< 400.	ug/kg	400	UKAS	Le	920
Equiv. Carbon No >21-35 Aliphatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv. Carbon No >21-35 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv. Carbon No >35-40 Aliphatic fraction : Dry Wt	< 900.	ug/kg	900	UKAS	Le	920
Equiv. Carbon No >35-40 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	< 4000.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	83.400	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number: 666712

The sample was received in a 1kg plastic pot weighing approx. 1808g in total.

The sample appeared to be a dark brown, very wet sediment with stones and shells present.

330.21g of the sample was taken for drying at <30degC which gave 276.35g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

No waste was discarded after sieving at 10mm.

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: Moore Marine Project: Sediment Analysis  
Folder No: 000666713 Sampled on: 21-May-08 @ 00:00  
Comments: Sand and Gravel - River Sample SSB

	Result		MRV	Accred	Lab / TestCode
Carbon : Dry Wt	4440.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	490.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	< 0.800	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	15.80	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	0.459	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	30.400	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	10.300	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	187.000	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	124.00	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	1580.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	22.700	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	454.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	163.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	< 10.0	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00200	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	< 0.100	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	< 1.00	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	< 6.00	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	< 3.00	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}		ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt		ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	< 400.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	< 900.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	< 4000.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	79.900	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number: 666713

The sample was received in a 1kg plastic pot weighing approx. 1555g in total.  
The sample appeared to be a medium brown, very wet sediment with stones and shells present.

263.57g of the sample was taken for drying at <30degC which gave 211.57g of dried sample.  
The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

No waste was discarded after sieving at 10mm.  
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: Moore Marine Project: Sediment Analysis  
Folder No: 000666714 Sampled on: 21-May-08 @ 00:00  
Comments: Sand and Gravel - River Sample SSC

	Result		MRV	Accred	Lab / TestCode
Carbon : Dry Wt	5380.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	470.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	< 0.800	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	< 1.00	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	0.236	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	17.800	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	11.600	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	12.000	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	15.80	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	1140.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	18.100	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	327.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	82.200	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	< 10.0	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00300	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	< 0.100	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	< 1.00	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	< 6.00	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	< 3.00	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}		ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt		ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Equiv. Carbon No >10-12 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >10-12 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >12-16 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >12-16 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >16-21 Aliphatic fraction : Dry Wt	415.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >16-21 Aromatic fraction : Dry Wt	621.	ug/kg	400	UKAS	Le	920
Equiv. Carbon No >21-35 Aliphatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv. Carbon No >21-35 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv. Carbon No >35-40 Aliphatic fraction : Dry Wt	< 900.	ug/kg	900	UKAS	Le	920
Equiv. Carbon No >35-40 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	< 4000.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	69.000	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number: 666714

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

The sample appeared to be a medium brown, very wet sediment with stones and shells present.

237.22g of the sample was taken for drying at <30degC which gave 165.55g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

No waste was discarded after sieving at 10mm.

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: Moore Marine Project: Sediment Analysis  
Folder No: 000666715 Sampled on: 21-May-08 @ 00:00  
Comments: Sand and Gravel - River Sample SSD

	Result		MRV	Accred	Lab / TestCode
Carbon : Dry Wt	24800.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	1650.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	2.390	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	24.30	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	1.030	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	21.800	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	13.500	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	252.000	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	137.00	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	1430.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	21.000	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	579.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	293.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	< 10.0	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00700	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00700	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00500	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	3.300	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	3.80	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	66.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	28.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	36.00	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	74.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	5.30	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	110.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}		ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt		ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	23.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	100.0	ug/kg	20	UKAS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	1190.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	1450.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	3220.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	18700.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	44000.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	< 900.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	17200.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	20900.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	65700.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	86600.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	40.600	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number: 666715

The sample was received in a 1kg plastic pot weighing approx. 1503g in total.

The sample appeared to be a medium brown, very wet sediment with stones and shells present.

210.43g of the sample was taken for drying at <30degC which gave 88.93g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

No waste was discarded after sieving at 10mm.

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: Moore Marine  
Folder No: 000666716  
Comments: SS1

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	<u>Result</u>		<u>MRV</u>	<u>Accred</u>	<u>Lab / TestCode</u>
Carbon : Dry Wt	2180.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	270.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	< 0.800	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	7.61	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	0.425	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	18.600	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	11.300	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	42.100	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	58.00	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	1300.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	19.800	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	321.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	199.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	< 10.0	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00300	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	< 0.100	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	< 1.00	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	< 6.00	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	< 3.00	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}	< 2.00	ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	< 400.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	< 900.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	< 4000.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	76.600	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number: 666716

The sample was received in a 1kg plastic pot weighing approx. 1085g in total.

The sample appeared to be a medium brown, very wet sediment with stones and sand present.

298.13g of the sample was taken for drying at <30degC which gave 229.57g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

No waste was discarded after sieving at 10mm.

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: Moore Marine  
Folder No: 000666717  
Comments: SS2

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	<u>Result</u>		<u>MRV</u>	<u>Accred</u>	<u>Lab / TestCode</u>
Carbon : Dry Wt	5450.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	520.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	< 0.800	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	10.30	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	0.325	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	24.100	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	8.840	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	78.000	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	64.90	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	1140.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	23.100	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	357.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	241.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	22.2	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00300	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00300	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00200	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	< 0.100	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	3.50	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	25.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	29.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	20.00	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	5.70	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}		ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt		ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	327.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	998.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	< 900.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	4440.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	5940.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	84.600	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924



Folder Number:666717

The sample was received in a 1l plastic pot weighing approx. 1695g in total.  
The sample appeared to be a dark brown sandy sediment.

311.17g of the sample was taken for drying at <30degC which gave 264.11g of dried sample.  
The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.  
115.23g of pebbles was discarded after sieving at 10mm.  
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: Moore Marine  
Folder No: 000666718  
Comments: SS3

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	Result		MRV	Accred	Lab / TestCode
Carbon : Dry Wt	4480.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	470.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	< 0.800	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	7.86	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	0.665	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	24.000	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	10.500	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	136.000	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	69.90	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	940.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	21.900	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	401.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	306.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	48.6	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00300	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	1.000	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	1.30	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	8.40	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	< 3.00	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}		ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt		ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	532.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	2310.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	10500.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	3860.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	11900.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	< 900.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	6790.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	6920.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	29900.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	36800.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	73.700	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number:666718

The sample was received in a 1l plastic pot weighing approx. 789g in total.  
The sample appeared to be a dark brown sandy sediment.

206.00g of the sample was taken for drying at <30degC which gave 153.33g of dried sample.  
The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

No waste was discarded after sieving at 10mm.  
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: Moore Marine  
Folder No: 000666719  
Comments: SS4

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	<u>Result</u>		<u>MRV</u>	<u>Accred</u>	<u>Lab / TestCode</u>
Carbon : Dry Wt	10500.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	970.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	0.940	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	< 1.00	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	0.153	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	17.300	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	6.110	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	101.000	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	57.90	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	702.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	18.000	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	405.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	218.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	81.1	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00300	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	1.400	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	2.90	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	11.00	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	< 3.00	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	23.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}		ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt		ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Equiv. Carbon No >10-12 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >10-12 Aromatic fraction : Dry Wt	367.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >12-16 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >12-16 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >16-21 Aliphatic fraction : Dry Wt	421.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >16-21 Aromatic fraction : Dry Wt	3840.	ug/kg	400	UKAS	Le	920
Equiv. Carbon No >21-35 Aliphatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv. Carbon No >21-35 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv. Carbon No >35-40 Aliphatic fraction : Dry Wt	< 900.	ug/kg	900	UKAS	Le	920
Equiv. Carbon No >35-40 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	7430.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	8930.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	83.900	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number:666719

The sample was received in a 1l plastic pot weighing approx. 981g in total.

The sample appeared to be a very wet dark brown sandy sediment lots of stones present.

268.75g of the sample was taken for drying at <30degC which gave 226.31g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

75.10g of pebbles was discarded after sieving at 10mm.

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: Moore Marine  
Folder No: 000666720  
Comments: SS5

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	<u>Result</u>		<u>MRV</u>	<u>Accred</u>	<u>Lab / TestCode</u>
Carbon : Dry Wt	2180.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	< 200.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	< 0.800	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	< 1.00	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	0.185	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	21.500	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	5.160	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	31.500	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	30.10	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	1020.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	17.700	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	382.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	132.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	1540.0	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00200	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	< 0.100	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	1.90	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	< 6.00	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	< 3.00	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	32.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}		ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt		ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918



PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	35.0	ug/kg	20	UKAS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	308.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	313.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	817.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	32200.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	7960.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	< 900.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	3070.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	41900.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	45000.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	85.300	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number:666720

The sample was received in a 1l plastic pot weighing approx. 634g in total.

The sample appeared to be a very wet dark brown sediment with stones present.

200.93g of the sample was taken for drying at <30degC which gave 172.26g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

No waste was discarded after sieving at 10mm.

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: Moore Marine  
Folder No: 000666721  
Comments: SS6

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	<u>Result</u>		<u>MRV</u>	<u>Accred</u>	<u>Lab / TestCode</u>
Carbon : Dry Wt	23900.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	1570.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	5.540	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	6.95	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	0.814	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	17.900	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	6.720	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	71.200	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	79.10	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	505.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	15.500	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	571.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	254.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	2340.0	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.01000	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.01000	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00900	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	2.200	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	3.60	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	10.00	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	< 3.00	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	25.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}		ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt		ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	19.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	22.0	ug/kg	20	UKAS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	767.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	1010.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	715.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	3360.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	26600.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	< 400.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	11600.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	68300.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	3420.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	7860.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	43000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	80600.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	124000.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	24.500	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number:666721

The sample was received in a 1l plastic pot weighing approx. 1198g in total.

The sample appeared to be a wet, black loam with lots of organic material present.

173.69g of the sample was taken for drying at <30degC which gave 46.93g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

13.43g of pebbles was discarded after sieving at 10mm.

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: Moore Marine  
Folder No: 000666722  
Comments: BS1

Project: Sediment Analysis  
Sampled on: 21-May-08 @ 00:00

	<u>Result</u>		<u>MRV</u>	<u>Accred</u>	<u>Lab / TestCode</u>
Carbon : Dry Wt	58600.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	3550.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	3.200	%	0.8	MCertS	Le 535
Arsenic : Dry Wt	7.05	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	1.520	mg/kg	0.1	MCertS	Le 914
Chromium : Dry Wt	25.300	mg/kg	0.1	MCertS	Le 914
Cobalt : Dry Wt	13.500	mg/kg	0.3	MCertS	Le 914
Copper : Dry Wt	118.000	mg/kg	0.1	MCertS	Le 914
Lead : Dry Wt	140.00	mg/kg	1	MCertS	Le 914
Manganese : Dry Wt	796.0000	mg/kg	0.05	MCertS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	MCertS	Le 914
Nickel : Dry Wt	26.500	mg/kg	0.3	MCertS	Le 914
Phosphorus : Dry Wt	699.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	360.000	mg/kg	0.5	MCertS	Le 914
Sulphur, Free : Dry Wt	70.5	mg/kg	10	MCertS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00700	mg/kg	0.003	MCertS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00700	mg/kg	0.003	MCertS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00500	mg/kg	0.002	MCertS	Le 897
Acenaphthene : Dry Wt	17.000	ug/kg	0.1	MCertS	Le 918
Acenaphthylene : Dry Wt	23.00	ug/kg	1	MCertS	Le 918
Anthracene : Dry Wt	53.0	ug/kg	20	MCertS	Le 918
Benzo(a)anthracene : Dry Wt	430.0	ug/kg	20	MCertS	Le 918
Benzo(a)pyrene : Dry Wt	340.0	ug/kg	20	MCertS	Le 918
Benzo(ghi)perylene : Dry Wt	190.00	ug/kg	6	MCertS	Le 918
Benzo(k)fluoranthene : Dry Wt	290.	ug/kg	100	MCertS	Le 918
Chrysene : Dry Wt	410.0	ug/kg	30	MCertS	Le 918
Dibenzo(ah)anthracene : Dry Wt	37.00	ug/kg	3	MCertS	Le 918
Fluoranthene : Dry Wt	810.0	ug/kg	20	MCertS	Le 918
Fluorene : Dry Wt	12.0	ug/kg	10	MCertS	Le 918
HCH -gamma : Dry Wt :- {Lindane}		ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt		ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	180.0	ug/kg	30	MCertS	Le 918
Naphthalene : Dry Wt	40.0	ug/kg	10	MCertS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	MCertS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	MCertS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
Phenanthrene : Dry Wt	140.0	ug/kg	20	MCertS	Le	918
Pyrene : Dry Wt	670.0	ug/kg	20	MCertS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	301.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	500.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	1180.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	6520.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	2400.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	27100.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	46200.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	229000.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	1450.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	88000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	51500.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	351000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	402000.	ug/kg	4000	MCertS	Le	920
Dry Solids @ 30°C	40.100	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number: 666722

The sample was received in a 1kg plastic pot weighing approx. 843g in total.

The sample appeared to be a medium brown, sandy loam with leaves and plant matter present.

160.26g of the sample was taken for drying at <30degC which gave 67.66g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

6.33g of leaves and plant matter was discarded after sieving at 10mm.

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: Moore Marine  
Folder No: 000666723  
Comments: BS2

Project: Sediment Analysis  
Sampled on: 21-May-08 @ 00:00

	<u>Result</u>		<u>MRV</u>	<u>Accred</u>	<u>Lab / TestCode</u>
Carbon : Dry Wt	23200.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	1560.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	2.170	%	0.8	MCertS	Le 535
Arsenic : Dry Wt	11.80	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	1.530	mg/kg	0.1	MCertS	Le 914
Chromium : Dry Wt	23.900	mg/kg	0.1	MCertS	Le 914
Cobalt : Dry Wt	17.200	mg/kg	0.3	MCertS	Le 914
Copper : Dry Wt	169.000	mg/kg	0.1	MCertS	Le 914
Lead : Dry Wt	173.00	mg/kg	1	MCertS	Le 914
Manganese : Dry Wt	1130.0000	mg/kg	0.05	MCertS	Le 914
Nickel : Dry Wt	24.800	mg/kg	0.3	MCertS	Le 914
Phosphorus : Dry Wt	628.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	411.000	mg/kg	0.5	MCertS	Le 914
Sulphur, Free : Dry Wt	58.6	mg/kg	10	MCertS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00600	mg/kg	0.003	MCertS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00600	mg/kg	0.003	MCertS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.002	MCertS	Le 897
Acenaphthene : Dry Wt	3.100	ug/kg	0.1	MCertS	Le 918
Acenaphthylene : Dry Wt	7.20	ug/kg	1	MCertS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	MCertS	Le 918
Benzo(a)anthracene : Dry Wt	73.0	ug/kg	20	MCertS	Le 918
Benzo(a)pyrene : Dry Wt	67.0	ug/kg	20	MCertS	Le 918
Benzo(ghi)perylene : Dry Wt	43.00	ug/kg	6	MCertS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	MCertS	Le 918
Chrysene : Dry Wt	73.0	ug/kg	30	MCertS	Le 918
Dibenzo(ah)anthracene : Dry Wt	7.50	ug/kg	3	MCertS	Le 918
Fluoranthene : Dry Wt	120.0	ug/kg	20	MCertS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	MCertS	Le 918
HCH -gamma : Dry Wt :- {Lindane}		ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt		ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	41.0	ug/kg	30	MCertS	Le 918
Naphthalene : Dry Wt	11.0	ug/kg	10	MCertS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le 918
PCB 28 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le 918

PCB - 035 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	MCertS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	MCertS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
Phenanthrene : Dry Wt	30.0	ug/kg	20	MCertS	Le	918
Pyrene : Dry Wt	110.0	ug/kg	20	MCertS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	479.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	304.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	654.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	5210.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	9000.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	12700.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	14200.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	2240.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	6050.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	21000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	30100.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	51100.	ug/kg	4000	MCertS	Le	920
Dry Solids @ 30°C	46.500	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number: 666723

The sample was received in a 1kg plastic pot weighing approx. 1503g in total.  
The sample appeared to be a medium brown, very wet loamy sand with leaves present.

223.45g of the sample was taken for drying at <30degC which gave 107.07g of dried sample.  
The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.  
No waste was discarded after sieving at 10mm.  
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: Moore Marine  
Folder No: 000666724  
Comments: BS3

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	<u>Result</u>		<u>MRV</u>	<u>Accred</u>	<u>Lab / TestCode</u>
Carbon : Dry Wt	82700.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	4490.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	4.750	%	0.8	MCertS	Le 535
Arsenic : Dry Wt	16.40	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	3.100	mg/kg	0.1	MCertS	Le 914
Chromium : Dry Wt	24.500	mg/kg	0.1	MCertS	Le 914
Cobalt : Dry Wt	20.300	mg/kg	0.3	MCertS	Le 914
Copper : Dry Wt	158.000	mg/kg	0.1	MCertS	Le 914
Lead : Dry Wt	235.00	mg/kg	1	MCertS	Le 914
Manganese : Dry Wt	1010.0000	mg/kg	0.05	MCertS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	MCertS	Le 914
Nickel : Dry Wt	26.400	mg/kg	0.3	MCertS	Le 914
Phosphorus : Dry Wt	890.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	567.000	mg/kg	0.5	MCertS	Le 914
Sulphur, Free : Dry Wt	1080.0	mg/kg	10	MCertS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.01000	mg/kg	0.003	MCertS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.01000	mg/kg	0.003	MCertS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00700	mg/kg	0.002	MCertS	Le 897
Acenaphthene : Dry Wt	32.000	ug/kg	0.1	MCertS	Le 918
Acenaphthylene : Dry Wt	16.00	ug/kg	1	MCertS	Le 918
Anthracene : Dry Wt	75.0	ug/kg	20	MCertS	Le 918
Benzo(a)anthracene : Dry Wt	240.0	ug/kg	20	MCertS	Le 918
Benzo(a)pyrene : Dry Wt	200.0	ug/kg	20	MCertS	Le 918
Benzo(ghi)perylene : Dry Wt	110.00	ug/kg	6	MCertS	Le 918
Benzo(k)fluoranthene : Dry Wt	160.	ug/kg	100	MCertS	Le 918
Chrysene : Dry Wt	240.0	ug/kg	30	MCertS	Le 918
Dibenzo(ah)anthracene : Dry Wt	22.00	ug/kg	3	MCertS	Le 918
Fluoranthene : Dry Wt	530.0	ug/kg	20	MCertS	Le 918
Fluorene : Dry Wt	18.0	ug/kg	10	MCertS	Le 918
HCH -gamma : Dry Wt :- {Lindane}		ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt		ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	94.0	ug/kg	30	MCertS	Le 918
Naphthalene : Dry Wt	39.0	ug/kg	10	MCertS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	MCertS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	MCertS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
Phenanthrene : Dry Wt	230.0	ug/kg	20	MCertS	Le	918
Pyrene : Dry Wt	420.0	ug/kg	20	MCertS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	337.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	5700.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	566.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	6120.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	2930.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	177000.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	15800.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	202000.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	1580.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	54100.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	21300.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	445000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	466000.	ug/kg	4000	MCertS	Le	920
Dry Solids @ 30°C	30.200	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number: 666724

The sample was received in a 1kg plastic pot weighing approx. 746g in total.  
The sample appeared to be a dark brown, very wet loamy sand with leaves present.

124.80g of the sample was taken for drying at <30degC which gave 41.72g of dried sample.  
The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.  
No waste was discarded after sieving at 10mm.  
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: Moore Marine  
Folder No: 000666725  
Comments: BS4

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	<u>Result</u>		<u>MRV</u>	<u>Accred</u>	<u>Lab / TestCode</u>
Carbon : Dry Wt	15000.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	970.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	1.660	%	0.8	MCertS	Le 535
Arsenic : Dry Wt	8.46	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	0.528	mg/kg	0.1	MCertS	Le 914
Chromium : Dry Wt	20.800	mg/kg	0.1	MCertS	Le 914
Cobalt : Dry Wt	6.330	mg/kg	0.3	MCertS	Le 914
Copper : Dry Wt	98.600	mg/kg	0.1	MCertS	Le 914
Lead : Dry Wt	126.00	mg/kg	1	MCertS	Le 914
Manganese : Dry Wt	777.0000	mg/kg	0.05	MCertS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	MCertS	Le 914
Nickel : Dry Wt	16.800	mg/kg	0.3	MCertS	Le 914
Phosphorus : Dry Wt	421.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	215.000	mg/kg	0.5	MCertS	Le 914
Sulphur, Free : Dry Wt	69.4	mg/kg	10	MCertS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00500	mg/kg	0.003	MCertS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00500	mg/kg	0.003	MCertS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.002	MCertS	Le 897
Acenaphthene : Dry Wt	2.700	ug/kg	0.1	MCertS	Le 918
Acenaphthylene : Dry Wt	9.20	ug/kg	1	MCertS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	MCertS	Le 918
Benzo(a)anthracene : Dry Wt	83.0	ug/kg	20	MCertS	Le 918
Benzo(a)pyrene : Dry Wt	68.0	ug/kg	20	MCertS	Le 918
Benzo(ghi)perylene : Dry Wt	39.00	ug/kg	6	MCertS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	MCertS	Le 918
Chrysene : Dry Wt	85.0	ug/kg	30	MCertS	Le 918
Dibenzo(ah)anthracene : Dry Wt	8.40	ug/kg	3	MCertS	Le 918
Fluoranthene : Dry Wt	140.0	ug/kg	20	MCertS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	MCertS	Le 918
HCH -epsilon : Dry Wt		ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt		ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	37.0	ug/kg	30	MCertS	Le 918
Naphthalene : Dry Wt	< 10.0	ug/kg	10	MCertS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	MCertS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	MCertS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	MCertS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	MCertS	Le	918
Phenanthrene : Dry Wt	57.0	ug/kg	20	MCertS	Le	918
Pyrene : Dry Wt	110.0	ug/kg	20	MCertS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	354.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	503.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	757.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	2210.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	11400.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	8090.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	18700.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	1240.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	5440.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	12200.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	36600.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	48800.	ug/kg	4000	MCertS	Le	920
Dry Solids @ 30°C	56.900	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924



Folder Number: 666725

The sample was received in a 1kg plastic pot weighing approx. 1933g in total.  
The sample appeared to be a medium brown, very wet sediment with small stones present.

279.61g of the sample was taken for drying at <30degC which gave 161.69g of dried sample.  
The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.  
No waste was discarded after sieving at 10mm.  
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.

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 Code: Le = Leeds, Ll = Llanelli, No = Nottingham, Sx = Starcross, SC = Sub-Contracted outside NLS

Eoghan Kieran  
Moore Marine  
Corporate House  
Ballybrit Business Park  
Galway  
Ireland

Dear Eoghan

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

Samples taken on: 21-May-2008

Samples Registered on: 03-Jun-2008

Results for Batch Number 20008325

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](mailto: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: Moore Marine  
Folder No: 000688321  
Comments: BCA1 and BCA2

Project: Sediment Analysis  
Sampled on: 21-May-08 @ 00:00

	<u>Result</u>		<u>MRV</u>	<u>Accred</u>	<u>Lab / TestCode</u>
Carbon : Dry Wt	4400.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	290.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	< 0.800	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	40.10	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	0.762	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	25.700	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	11.100	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	71.500	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	105.00	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	1950.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	18.600	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	427.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	168.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	15.1	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00300	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00300	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00200	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	1.800	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	3.70	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	46.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	31.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	23.00	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	40.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	8.40	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}	< 2.00	ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	23.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	70.0	ug/kg	20	UKAS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	332.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	618.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	4740.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	< 900.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	6890.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	8390.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	93.900	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number: 688321

The sample was received in a 1l plastic pot weighing approx. 764g in total.  
The sample appeared to be a multicoloured gravel of pebbles and stones.

162.59g of the sample was taken for drying at <30degC which gave 153.08g of dried sample.  
The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.  
27.04g of pebbles and stones was discarded after sieving at 10mm.  
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: Moore Marine  
Folder No: 000688322  
Comments: BC1A and BC1B

Project: Sediment Analysis  
Sampled on: 21-May-08 @ 00:00

	<u>Result</u>		<u>MRV</u>	<u>Accred</u>	<u>Lab / TestCode</u>
Carbon : Dry Wt	79000.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	559.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	7.580	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	22.50	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	0.351	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	36.000	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	12.800	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	33.100	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	38.10	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	1210.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	25.000	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	941.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	101.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	30.0	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00600	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00600	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	15.000	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	8.40	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	28.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	49.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	52.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	15.00	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	68.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	7.80	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}	< 2.00	ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	10.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	933.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	17600.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	< 900.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	21300.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	40100.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	41600.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	52.600	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number: 688322

The sample was received in a 1l plastic pot weighing approx. 353g in total.

The sample appeared to be a dark brown loamy clay with stones and roots present.

79.29g of the sample was taken for drying at <30degC which gave 44.41g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

No waste was discarded after sieving at 10mm.

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: Moore Marine  
Folder No: 000688323  
Comments: BC2A

Project: Sediment Analysis  
Sampled on: 21-May-08 @ 00:00

	Result		MRV	Accred	Lab / TestCode
Carbon : Dry Wt	4290.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	350.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	< 0.800	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	24.70	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	0.544	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	20.400	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	8.740	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	89.000	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	164.00	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	965.0000	mg/kg	0.05	UKAS	Le 914
Nickel : Dry Wt	19.600	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	341.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	173.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	22.3	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00300	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00300	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00200	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	5.400	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	4.10	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	15.00	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	5.10	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	33.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}	2.80	ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918

PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	21.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	34.0	ug/kg	20	UKAS	Le	918
Equiv. Carbon No >10-12 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >10-12 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >12-16 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >12-16 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >16-21 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv. Carbon No >16-21 Aromatic fraction : Dry Wt	< 400.	ug/kg	400	UKAS	Le	920
Equiv. Carbon No >21-35 Aliphatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv. Carbon No >21-35 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Equiv. Carbon No >35-40 Aliphatic fraction : Dry Wt	< 900.	ug/kg	900	UKAS	Le	920
Equiv. Carbon No >35-40 Aromatic fraction : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	< 3000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	< 4000.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	88.200	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number: 688323

The sample was received in a 1l plastic pot weighing approx. 764g in total.

The sample appeared to be a multi-coloured gravel consisting of stones and pebbles.

115.26g of the sample was taken for drying at <30degC which gave 102.33g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

No waste was discarded after sieving at 10mm.

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: Moore Marine  
Folder No: 000688324  
Comments: BC3A and BC3B

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	<u>Result</u>		<u>MRV</u>	<u>Accred</u>	<u>Lab / TestCode</u>
Carbon : Dry Wt	15500.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	1120.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	1.800	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	48.70	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	1.540	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	24.200	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	14.100	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	375.000	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	163.00	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	906.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	20.200	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	491.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	513.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	249.0	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00300	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	5.300	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	7.90	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	59.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	76.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	53.00	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	51.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	15.00	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	110.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	12.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}	< 2.00	ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	53.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	52.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	100.0	ug/kg	20	UKAS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	878.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	828.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	6940.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	37900.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	40900.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	141000.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	6290.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	35100.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	55200.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	215000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	270000.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	67.200	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number: 688324

The sample was received in a 1l plastic pot weighing approx. 335g in total.

The sample appeared to be a dark brown clay sand with stones and roots present.

56.41g of the sample was taken for drying at <30degC which gave 39.81g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

No waste was discarded after sieving at 10mm.

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: Moore Marine  
Folder No: 000688325  
Comments: BC4A and BC4B

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	<u>Result</u>		<u>MRV</u>	<u>Accred</u>	<u>Lab / TestCode</u>
Carbon : Dry Wt	3290.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	440.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	< 0.800	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	47.20	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	0.803	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	23.000	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	9.060	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	745.000	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	142.00	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	941.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	14.600	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	334.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	367.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	374.0	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00300	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	2.800	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	3.70	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	7.60	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	< 100.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	< 3.00	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	23.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}	< 2.00	ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	< 30.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	< 10.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	< 20.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	27.0	ug/kg	20	UKAS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	< 300.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	330.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	388.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	5070.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	32100.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	5480.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	11400.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	1450.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	3010.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	12500.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	47000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	59500.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	75.000	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924



Folder Number: 688325

The sample was received in a 1l plastic pot weighing approx. 626g in total.

The sample appeared to be a dark brown, very wet, sand with grit present.

129.69g of the sample was taken for drying at <30degC which gave 96.37g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

5.58g of stones was discarded after sieving at 10mm.

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: Moore Marine  
Folder No: 000688326  
Comments: BC5A and BC5B

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	<u>Result</u>		<u>MRV</u>	<u>Accred</u>	<u>Lab / TestCode</u>
Carbon : Dry Wt	29100.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	1560.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	1.980	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	84.30	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	2.800	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	29.100	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	13.700	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	575.000	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	309.00	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	923.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	17.500	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	2260.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	807.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	1250.0	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.00500	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.00500	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.00400	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	44.000	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	51.00	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	350.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	820.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	720.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	490.00	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	860.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	1100.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	170.00	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	2400.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	88.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}	< 2.00	ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	520.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	120.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	590.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	1800.0	ug/kg	20	UKAS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	4640.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	3660.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	25600.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	38800.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	56900.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	257000.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	112000.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	368000.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	29400.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	98800.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	228000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	766000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	994000.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	52.600	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number: 688326

The sample was received in a 1l plastic pot weighing approx. 538g in total.

The sample appeared to be a gritty, black sediment.

105.93g of the sample was taken for drying at <30degC which gave 58.47g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

1.40g of stones was discarded after sieving at 10mm.

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: Moore Marine  
Folder No: 000688327  
Comments: BC6A and BC6B

Project: Sediment Analysis  
Sampled on: 22-May-08 @ 00:00

	<u>Result</u>		<u>MRV</u>	<u>Accred</u>	<u>Lab / TestCode</u>
Carbon : Dry Wt	180000.	mg/kg	1000	None	Le 606
Nitrogen : Dry Wt as N	7120.	mg/kg	200	None	Le 606
Total Organic Carbon (TOC) : Dry Wt as C	14.400	%	0.8	UKAS	Le 535
Arsenic : Dry Wt	19.60	mg/kg	1	UKAS	Le 914
Cadmium : Dry Wt	1.660	mg/kg	0.1	UKAS	Le 914
Chromium : Dry Wt	23.500	mg/kg	0.1	UKAS	Le 914
Cobalt : Dry Wt	12.500	mg/kg	0.3	UKAS	Le 914
Copper : Dry Wt	121.000	mg/kg	0.1	UKAS	Le 914
Lead : Dry Wt	153.00	mg/kg	1	UKAS	Le 914
Manganese : Dry Wt	529.0000	mg/kg	0.05	UKAS	Le 914
Mercury : Dry Wt	< 2.00	mg/kg	2	UKAS	Le 914
Nickel : Dry Wt	21.800	mg/kg	0.3	UKAS	Le 914
Phosphorus : Dry Wt	1040.0	mg/kg	60	UKAS	Le 914
Zinc : Dry Wt	372.000	mg/kg	0.5	UKAS	Le 914
Sulphur, Free : Dry Wt	3970.0	mg/kg	10	UKAS	Le 912
Dibutyl Tin : Dry Wt as cation	< 0.02000	mg/kg	0.003	UKAS	Le 897
Tributyl Tin : Dry Wt as cation	< 0.02000	mg/kg	0.003	UKAS	Le 897
Triphenyl Tin : Dry Wt as cation	< 0.02000	mg/kg	0.002	UKAS	Le 897
Acenaphthene : Dry Wt	13.000	ug/kg	0.1	UKAS	Le 918
Acenaphthylene : Dry Wt	11.00	ug/kg	1	UKAS	Le 918
Anthracene : Dry Wt	70.0	ug/kg	20	UKAS	Le 918
Benzo(a)anthracene : Dry Wt	290.0	ug/kg	20	UKAS	Le 918
Benzo(a)pyrene : Dry Wt	330.0	ug/kg	20	UKAS	Le 918
Benzo(ghi)perylene : Dry Wt	180.00	ug/kg	6	UKAS	Le 918
Benzo(k)fluoranthene : Dry Wt	310.	ug/kg	100	UKAS	Le 918
Chrysene : Dry Wt	340.0	ug/kg	30	UKAS	Le 918
Dibenzo(ah)anthracene : Dry Wt	63.00	ug/kg	3	UKAS	Le 918
Fluoranthene : Dry Wt	660.0	ug/kg	20	UKAS	Le 918
Fluorene : Dry Wt	22.0	ug/kg	10	UKAS	Le 918
HCH -gamma : Dry Wt :- {Lindane}	< 2.00	ug/kg	2	UKAS	Le 918
Hexachlorobenzene : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le 918
Indeno(1,2,3cd)pyrene : Dry Wt	180.0	ug/kg	30	UKAS	Le 918
Naphthalene : Dry Wt	33.0	ug/kg	10	UKAS	Le 918
PCB - 008 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918
PCB - 020 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le 918

PCB 28 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 035 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 52 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 077 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 101 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB - 105 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 118 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 126 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 128 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 138 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 149 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB 153 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
PCB - 156 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 169 : Dry Wt	< 0.900	ug/kg	0.9	UKAS	Le	918
PCB - 170 : Dry Wt	< 2.00	ug/kg	2	UKAS	Le	918
PCB 180 : Dry Wt	< 1.00	ug/kg	1	UKAS	Le	918
Phenanthrene : Dry Wt	120.0	ug/kg	20	UKAS	Le	918
Pyrene : Dry Wt	660.0	ug/kg	20	UKAS	Le	918
Equiv.Carbon No >10-12 Aliphatic fraction : Dry Wt	1470.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >10-12 Aromatic fraction : Dry Wt	988.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aliphatic fraction : Dry Wt	1560.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >12-16 Aromatic fraction : Dry Wt	5720.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aliphatic fraction : Dry Wt	24600.	ug/kg	300	UKAS	Le	920
Equiv.Carbon No >16-21 Aromatic fraction : Dry Wt	286000.	ug/kg	400	UKAS	Le	920
Equiv.Carbon No >21-35 Aliphatic fraction : Dry Wt	39500.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >21-35 Aromatic fraction : Dry Wt	96100.	ug/kg	3000	UKAS	Le	920
Equiv.Carbon No >35-40 Aliphatic fraction : Dry Wt	16600.	ug/kg	900	UKAS	Le	920
Equiv.Carbon No >35-40 Aromatic fraction : Dry Wt	20700.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aliphatic extractable C10 - C40 : Dry Wt	83800.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Aromatic extractable C10 - C40 : Dry Wt	410000.	ug/kg	3000	UKAS	Le	920
Hydrocarbons, Total extractable C10 - C40 : Dry Wt {EPH}	493000.	ug/kg	4000	UKAS	Le	920
Dry Solids @ 30°C	11.500	%	0.5	None	Le	924
Sample Preparation	Report	Text		None	Le	924

Folder Number: 688327

The sample was received in a 1l plastic pot weighing approx. 727g in total.

The sample appeared to be oily, twigs, leaves and plant matter and a large quantity of water.

104.02g of the sample was taken for drying at <30degC which gave 17.07g of dried sample.

The sample was sieved to <10mm before being crushed using a pestle and mortar and then sieved to <2mm.

No waste was discarded after sieving at 10mm.

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.

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 Code: Le = Leeds, Ll = Llanelli, No = Nottingham, Sx = Starcross, SC = Sub-Contracted outside NLS

## A2 2017 Ground Investigation

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**CAUSEWAY**  
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## Avoca River – Marine Sediment Sampling and Analysis

Client: Wicklow County Council

Client's Representative: ARUP

Report No.: 17-0906

Date: January 2018

Status: *Draft for Review*

**CONTENTS**

Document Control Sheet




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**APPENDICES**

Appendix A	Site and exploratory hole location plans
Appendix B	Borehole logs
Appendix C	Geotechnical laboratory test results
Appendix D	Environmental laboratory test results

## Document Control Sheet

<b>Report No.:</b>		17-0906			
<b>Project Title:</b>		Avoca River – Marine Sediment Sampling and Analysis			
<b>Client:</b>		Wicklow County Council			
<b>Client's Representative:</b>		ARUP			
<b>Revision:</b>	A00	<b>Status:</b>	Draft for review	<b>Issue Date:</b>	17 January 2018
<b>Prepared by:</b>		<b>Reviewed by:</b>		<b>Approved by:</b>	
 Lucy Newland BSc (Hons)		 Neil Haggan BSc(Hons) MSc FGS		 Darren O'Mahony BSc MSc MIEI	

The works were conducted in accordance with:

UK Specification for Ground Investigation 2<sup>nd</sup> Edition, published by ICE Publishing (2012)

British Standards Institute (2015) BS 5930:2015, Code of practice for site investigations.

IS EN 1997-2:2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing.

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

Laboratory testing was conducted in accordance with:

British Standards Institute BS 1377-2:1990, BS EN ISO 17892-1:2014, and BS EN ISO 17892-2:2014

## METHODS OF DESCRIBING SOILS AND ROCKS

Soil and rock descriptions are based on the guidance in BS5930:2015, The Code of Practice for Site Investigation.

Abbreviations used on exploratory hole logs	
U	Nominal 100mm diameter undisturbed open tube sample (thick walled sampler)
UT	Nominal 100mm diameter undisturbed open tube sample (thin walled sampler)
P	Nominal 100mm diameter undisturbed piston sample
B	Bulk disturbed sample
LB	Large bulk disturbed sample
D	Small disturbed sample
C	Core sub-sample (displayed in the Field Records column on the logs)
L	Liner sample from dynamic sampled borehole
W	Water sample
ES / EW	Soil sample for environmental testing / Water sample for environmental testing
SPT (s)	Standard penetration test using a split spoon sampler (small disturbed sample obtained)
SPT (c)	Standard penetration test using 60 degree solid cone
x,x/x,x,x,x	Blows per increment during the standard penetration test. The initial two values relate to the seating drive (150mm) and the remaining four to the 75mm increments of the test length. The length achieved is stated (mm) for any test increment less than 75mm
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm)
N=X/Z	Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given test length 'Z' (mm)
V VR	Shear vane test (borehole)      Hand vane test (trial pit)      Shear strength stated in kPa V: undisturbed vane shear strength      VR: remoulded vane shear strength
dd/mm/yy: 1.0 dd/mm/yy: dry	Date & water level at the borehole depth at the end of shift and the start of the following shift
Abbreviations relating to rock core – reference Clause 44.4.4 of BS 5930: 2015	
TCR (%)	Total Core Recovery: Ratio of rock/soil core recovered (both solid and non-intact) to the total length of core run.
SCR (%)	Solid Core Recovery: Ratio of solid core to the total length of core run. Solid core has a full diameter, uninterrupted by natural discontinuities, but not necessarily a full circumference and is measured along the core axis between natural fractures.
RQD (%)	Rock Quality Designation: Ratio of total length of solid core pieces greater than 100mm to the total length of core run.
FI	Fracture Index: Number of natural discontinuities per metre over an indicated length of core of similar intensity of fracturing.
NI	Non Intact: Used where the rock material was recovered fragmented, for example as fine to coarse gravel size particles.
AZCL	Assessed zone of core loss: The estimated depth range where core was not recovered.
DIF	Drilling induced fracture: A fracture of non-geological origin brought about by the rock coring.

## **Avoca River – Marine Sediment Sampling and Analysis**

### **1 AUTHORITY**

On the instructions of ARUP Consulting Engineers, (“the Client’s Representative”), acting on the behalf of Wicklow County Council (“the Client”), a ground investigation was undertaken at the above location to provide geotechnical and environmental information to support dredging contractors in examining options for the appropriate disposal of the dredged sediment.

This report details the work carried out both on site and in the geotechnical and chemical testing laboratories; it contains a description of the site and the works undertaken, the exploratory hole logs and the laboratory test results.

All information given in this report is based upon the ground conditions encountered during the site investigation works, and on the results of the laboratory and field tests performed. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations, and water conditions between or below exploratory holes. It should be noted that groundwater levels usually vary due to seasonal and/or other effects and may at times differ to those recorded during the investigation. No responsibility can be taken for conditions not encountered through the scope of work commissioned, for example between exploratory hole points, or beneath the termination depths achieved.

This report was prepared by Causeway Geotech Ltd for the use of the Client and the Client’s Representative in response to a particular set of instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

### **2 SCOPE**

The extent of the investigation, as instructed by the Client’s Representative, included boreholes, soil sampling, in-situ and laboratory testing, and the preparation of a factual report on the findings.

### **3 DESCRIPTION OF SITE**

As shown on the site location plan in Appendix A, the siteworks were conducted on the Avoca River. The exploratory hole locations were positioned both upstream and downstream of the 19 Arches Bridge in the town of Arklow, County Wicklow.

## **4 SITE OPERATIONS**

### **4.1 Summary of site works**

Site operations, which were conducted between 7<sup>th</sup> November and 10<sup>th</sup> November 2017, comprised:

- nine light cable percussion boreholes
- soil sampling for geotechnical and environmental analysis

The exploratory holes and in-situ tests were located as instructed by the Client's Representative, as shown on the exploratory hole location plan in Appendix A.

### **4.2 Marine Plant**

The OCM Baby Blue spud leg barge was deployed for the duration of the site works. It is a small modular spud leg barge in a 4 pontoon configuration joined and secured with a simple pinning system. The two 10m hydraulic spud legs were raised and lowered as required for transit underneath the 19 Arches Bridge.

The barge was contracted and operated through Ocean Crest Marine for the duration of the site works. Boreholes were sunk through an integral moonpool through one of the pontoons which make up the main deck of the jack-up barge.

Ocean Crest Marine also provided the marine support vessel OCM Supporter to assist with crew transfers and barge movements respectively.

### **4.3 Boreholes**

Nine boreholes (BH01-BH09) were put down to completion in minimum 200mm diameter using a Dando 3000 light cable percussion boring rig mounted on a floating barge. All boreholes were terminated at their scheduled completion depths.

Disturbed (bulk bag) samples were taken within the encountered strata. Environmental samples were taken at standard intervals, as directed by the Client's Representative.

No ground water was encountered during excavations.

Appendix B presents the borehole logs.

#### 4.4 Surveying

The as-built exploratory hole positions were surveyed following completion of site operations by a Site Engineer from Causeway Geotech. Surveying was carried out using a Trimble R6 GPS system employing VRS and real time kinetic (RTK) techniques.

The plan coordinates (Irish National Grid) and ground elevation (mOD Malin) at each location are recorded on the individual exploratory hole logs. The exploratory hole plan presented in Appendix A shows these as-built positions.

### 5 LABORATORY WORK

Upon their receipt in the laboratory, all disturbed samples were carefully examined and accurately described and their descriptions incorporated into the borehole logs.

#### 5.1 Geotechnical laboratory testing of soils

Laboratory testing of soils comprised:

- **soil classification:** moisture content measurement, Atterberg Limit tests and particle size distribution analysis.

Laboratory testing of soils samples was carried out in accordance with British Standards Institute (1990) *BS 1377:1990, Methods of test for soils for civil engineering purposes. Parts 1 to 9.*

The test results are presented in Appendix C.

#### 5.2 Environmental laboratory testing of soils

Environmental testing, was conducted on selected environmental soil samples by Socotec at its laboratory in Burton-on-Trent, Staffordshire.

Testing was carried out for a range of determinants, including:

- Waste acceptance criteria (WAC) Suite
- Disposal at sea Suite
- Slufter Suite

Results of environmental laboratory testing are presented in Appendix D.

## 6 GROUND CONDITIONS

### 6.1 General geology of the area

Published geological mapping indicate the superficial deposits underlying the site comprise Alluvium. These deposits are underlain by slate and sandstone of the Kilmacrea Formation.

### 6.2 Ground types encountered during investigation of the site

A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- **Alluvium deposits:** typically sandy subangular to subrounded fine to coarse gravel with low cobble content. Occasional gravelly sands with low to medium cobble content encountered down river of the 19 Arches Bridge. A soft grey sandy silty clay was also encountered in BH01 at a depth of 1.7m bgl.

### 6.3 Groundwater

Groundwater was not noted during drilling at any of the borehole locations. However, it should be noted that the casing used in supporting the borehole walls during drilling may have sealed out any groundwater strikes encountered and the possibility of encountering groundwater during excavation works should not be ruled out. Seasonal variation in groundwater levels should also be factored into design considerations.

## 7 REFERENCES

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

IS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing.

BS 1377: 1990: Methods of test for soils for civil engineering purposes. British Standards Institution.

BS 5930: 2015: Code of practice for ground investigations. British Standards Institution.

BS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. British Standards Institution.

BS EN ISO 14688-1: 2002: Geotechnical investigation and testing - Identification and classification of soil - Part 1 Identification and description. British Standards Institution.

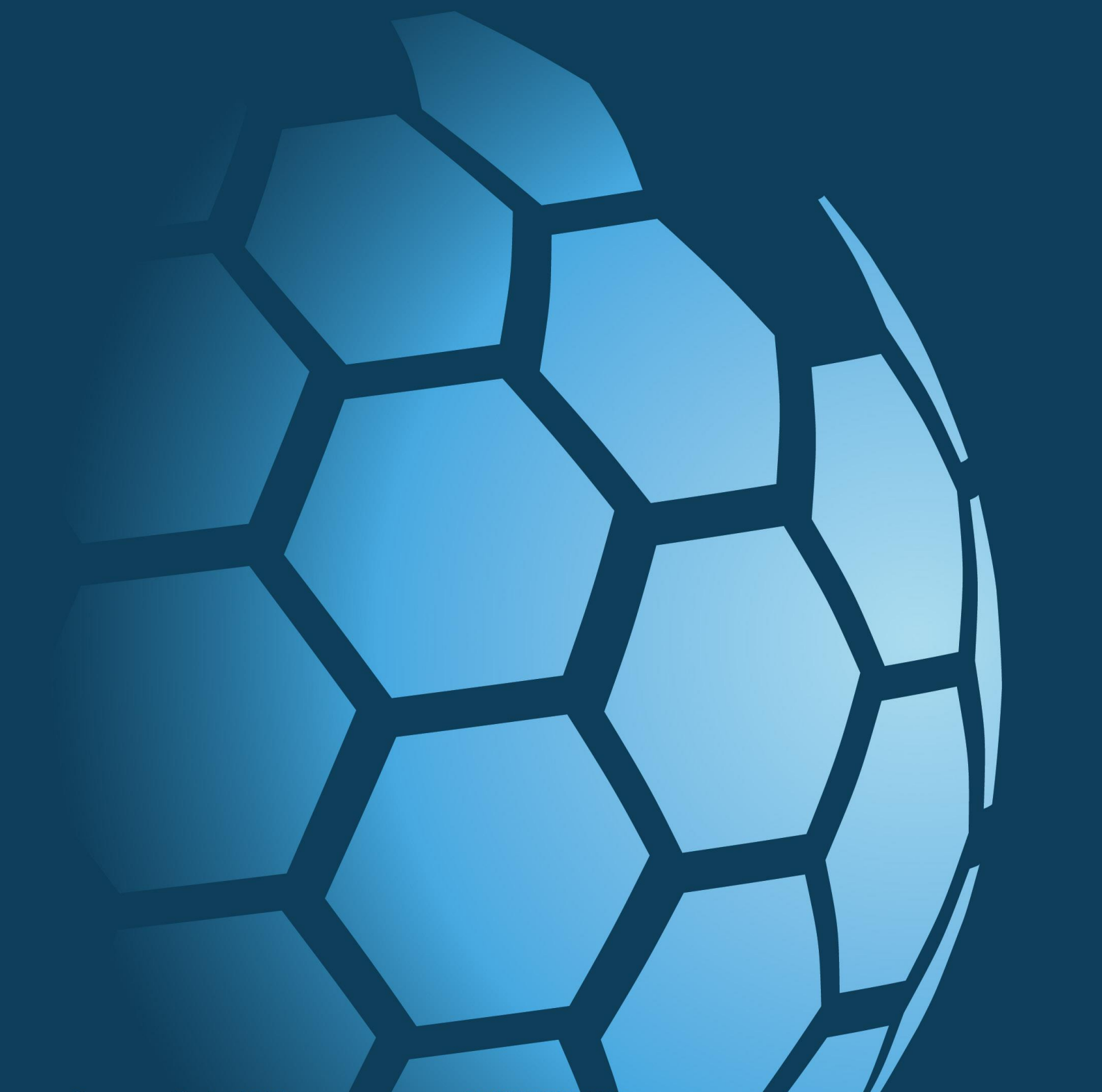




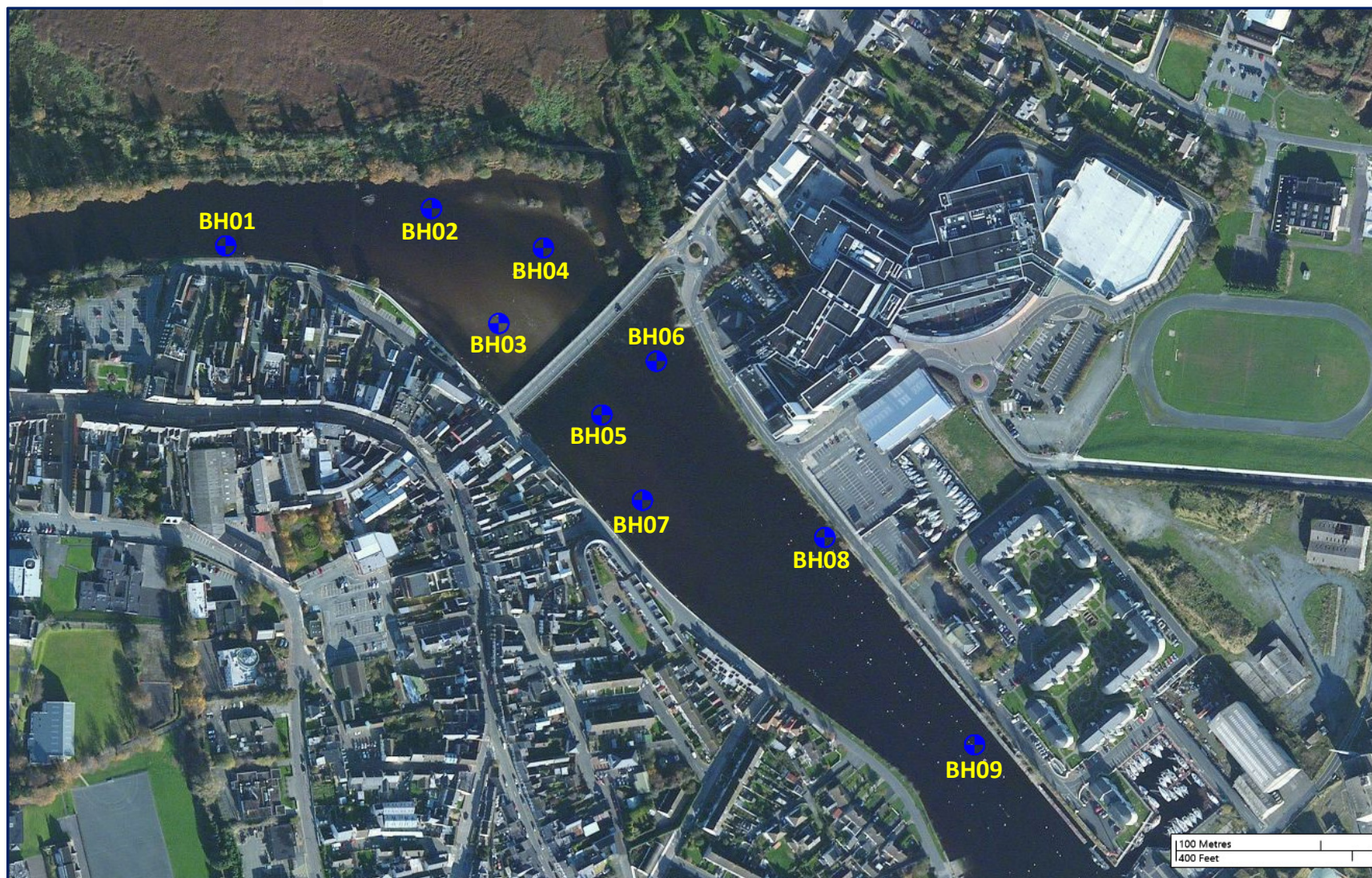
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**APPENDIX A**

**Site and exploratory hole location plans**



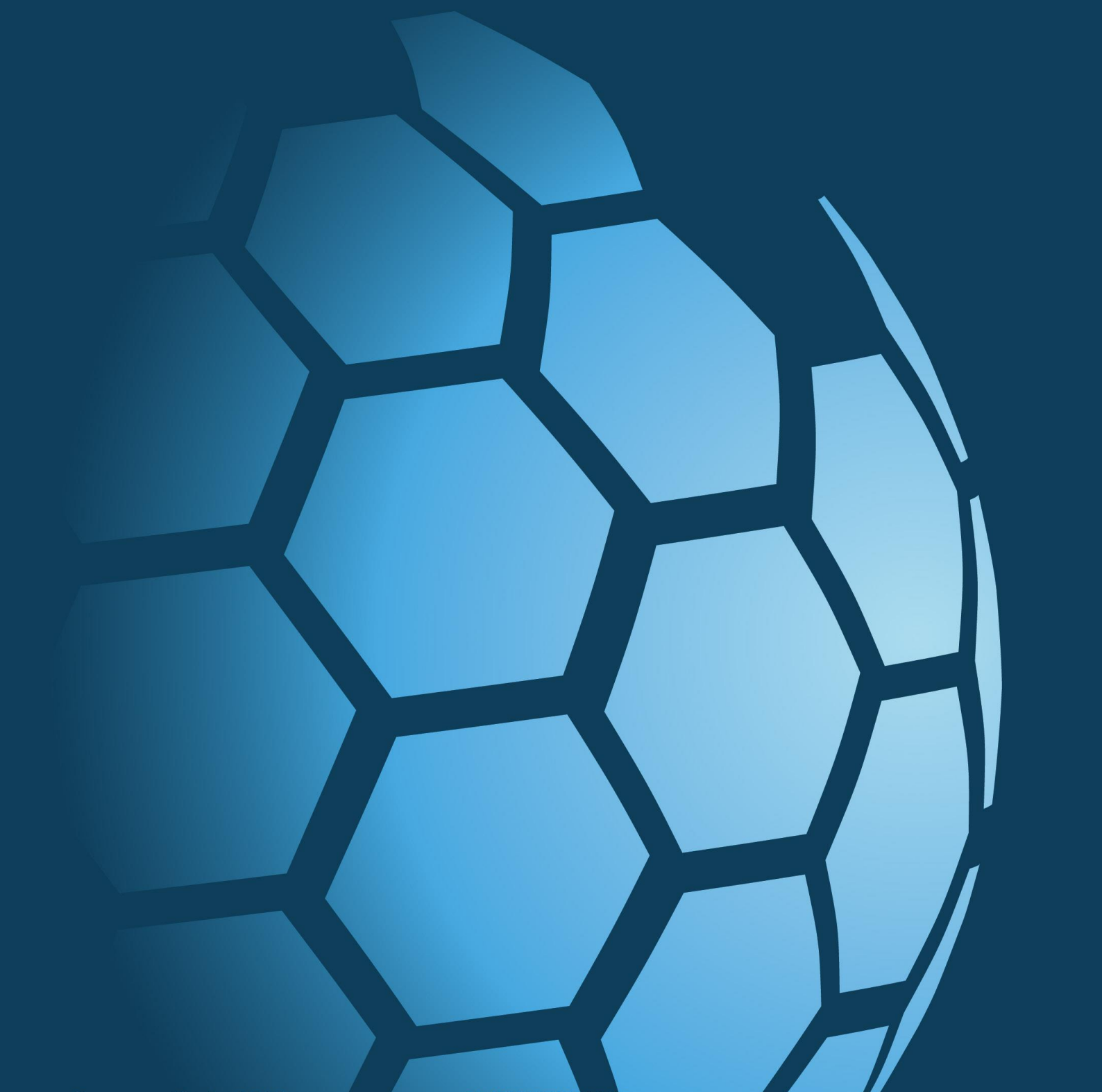






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**APPENDIX B**  
**Borehole logs**





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**Project No.:**  
17-0906

**Project Name:**  
Avoca River - Marine Sediment Sampling and Analysis

**Borehole No.:**  
BH01

**Coordinates:**  
324491.98 E

**Client:**  
Wicklow County Council

Sheet 1 of 1

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	2.20

173588.24 N

**Client's Representative:**  
ARUP

**Scale:** 1:50

**Ground Level:**  
-1.34 mOD

**Dates:**  
07/11/2017

**Driller:** AH

**Logger:** NH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.10	ES3							Grey slightly silty sandy subangular to subrounded fine to coarse GRAVEL with medium cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		
0.50	ES4									
0.80 - 1.20	B1					(1.70)				
1.00	ES5									
1.80 - 2.20	B2				-3.04	1.70		Soft grey slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
2.00	ES6				-3.54	(0.50)				
						2.20		End of Borehole at 2.20m		

**Remarks**  
Deck to Bed = 1.70m

Terminated at scheduled depth

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hr:mm)
Water Added		Casing Details				
From (m)	To (m)	To (m)	Diam (mm)			
		2.20	200			



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0906	<b>Project Name:</b> Avoca River - Marine Sediment Sampling and Analysis	<b>Borehole No.:</b> BH02
<b>Coordinates:</b> 324634.16 E	<b>Client:</b> Wicklow County Council	Sheet 1 of 1
<b>Method</b> Cable Percussion	<b>Plant Used</b> Dando 3000	<b>Top</b> 0.00
<b>Base</b> 2.20	<b>Client's Representative:</b> ARUP	<b>Scale:</b> 1:50
<b>Ground Level:</b> -1.06 mOD	<b>Dates:</b> 08/11/2017	<b>Driller:</b> AH
		<b>Logger:</b> NH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.50	ES3							Grey slightly silty very sandy subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		
0.80 - 1.20	B1					(2.20)				
1.50	ES4									
1.80 - 2.20	B2									
					-3.26	2.20		End of Borehole at 2.20m		

<b>Remarks</b> Deck to Bed = 1.40m  Terminated at scheduled depth	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	<b>Water Added</b>		<b>Casing Details</b>				
From (m)	To (m)	To (m)	Diam (mm)				
		2.20	200				



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0906	<b>Project Name:</b> Avoca River - Marine Sediment Sampling and Analysis	<b>Borehole No.:</b> BH03
<b>Coordinates:</b> 324683.01 E	<b>Client:</b> Wicklow County Council	Sheet 1 of 1
<b>Method</b> Cable Percussion	<b>Plant Used</b> Dando 3000	<b>Top</b> 0.00
<b>Base</b> 3.20	<b>Client's Representative:</b> ARUP	<b>Scale:</b> 1:50
<b>Ground Level:</b> -1.08 mOD	<b>Dates:</b> 08/11/2017	<b>Driller:</b> AH
		<b>Logger:</b> NH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.50	ES4							Grey slightly silty sandy subangular to subrounded GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		
0.80 - 1.20	B1					(1.80)				
1.50	ES5							Grey sandy subangular to subrounded GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		
1.80 - 2.20	B2				-2.88	1.80				
2.50	ES6							End of Borehole at 3.20m		
2.80 - 3.20	B3				-4.28	3.20				

<b>Remarks</b> Deck to Bed = 1.70m  Terminated at scheduled depth	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	<b>Water Added</b>		<b>Casing Details</b>				
From (m)	To (m)	To (m)	Diam (mm)				
		3.20	200				



**CAUSEWAY**  
GEOTECH

**Project No.:**  
17-0906

**Project Name:**  
Avoca River - Marine Sediment Sampling and Analysis

**Borehole No.:**  
BH04

**Coordinates:**  
324712.61 E

**Client:**  
Wicklow County Council

Sheet 1 of 1

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	3.20

173592.49 N

**Client's Representative:**  
ARUP

**Scale:** 1:50

**Ground Level:**  
-0.45 mOD

**Dates:**  
08/11/2017

**Driller:** AH

**Logger:** NH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.50	ES4							Grey slightly silty very gravelly fine to coarse SAND with medium cobble content. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded.		
0.80 - 1.20	B1					(2.50)				
1.50	ES5									
1.80 - 2.20	B2									
2.50	ES6				-2.95	2.50		Grey slightly silty very sandy subangular to subrounded fine to coarse GRAVEL with medium cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		
2.80 - 3.20	B3				-3.65	3.20				
								End of Borehole at 3.20m		

**Remarks**  
Deck to Bed = 0.90m

Terminated at scheduled depth

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hr:mm)

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)





**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0906	<b>Project Name:</b> Avoca River - Marine Sediment Sampling and Analysis	<b>Borehole No.:</b> BH05
<b>Coordinates:</b> 324756.22 E	<b>Client:</b> Wicklow County Council	Sheet 1 of 1
<b>Method</b> Cable Percussion	<b>Plant Used</b> Dando 3000	<b>Top</b> 0.00
<b>Base</b> 3.20	<b>Client's Representative:</b> ARUP	<b>Scale:</b> 1:50
<b>Ground Level:</b> -1.04 mOD	<b>Dates:</b> 09/11/2017	<b>Driller:</b> AH
		<b>Logger:</b> NH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.50	ES4							Grey sandy subangular to subrounded fine to coarse GRAVEL with medium cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		
0.80 - 1.20	B1					(2.60)				
1.00	ES5							Grey slightly silty very sandy subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		
1.80 - 2.20	B2									
2.00	ES6							End of Borehole at 3.20m		
2.80 - 3.20	B3				-3.64	2.60				
3.00	ES7				-4.24	3.20				

<b>Remarks</b> Deck to Bed = 1.50m  Terminated at scheduled depth	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hr:mm)
	<b>Water Added</b>		<b>Casing Details</b>				
From (m)	To (m)	To (m)	Diam (mm)				
		3.20	200				



**CAUSEWAY**  
GEOTECH

**Project No.:**  
17-0906

**Project Name:**  
Avoca River - Marine Sediment Sampling and Analysis

**Borehole No.:**  
BH06

**Coordinates:**  
324793.11 E

**Client:**  
Wicklow County Council

Sheet 1 of 1

Method	Plant Used	Top	Base
Cable Percussion	Dando 3000	0.00	3.20

173516.15 N

**Client's Representative:**  
ARUP

**Scale:** 1:50

**Ground Level:**  
-1.14 mOD

**Dates:**  
09/11/2017

**Driller:** AH

**Logger:** NH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.50	ES4					(1.30)		Grey very gravelly fine to coarse SAND with medium cobble content. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded.		
0.80 - 1.20	B1									
1.00	ES5				-2.44	1.30		Grey slightly silty very gravelly fine to coarse SAND with medium cobble content. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded.		
1.80 - 2.20	B2					(1.10)				
2.00	ES6				-3.54	2.40		Grey slightly silty very sandy subangular to subrounded fine to coarse GRAVEL with medium cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		
2.80 - 3.20	B3					(0.80)				
3.00	ES7				-4.34	3.20		End of Borehole at 3.20m		

**Remarks**  
Deck to Bed = 1.60m

Terminated at scheduled depth

**Water Strikes**

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

**Chiselling Details**

From (m)	To (m)	Time (hr:mm)

**Water Added**

From (m)	To (m)

**Casing Details**

To (m)	Diam (mm)
3.20	200



**CAUSEWAY**  
GEOTECH

**Project No.:**

17-0906

**Project Name:**

Avoca River - Marine Sediment Sampling and Analysis

**Borehole No.:**

BH07

**Coordinates:**

324785.93 E

**Client:**

Wicklow County Council

Sheet 1 of 1

**Method**

Cable Percussion

**Plant Used**

Dando 3000

**Top**

0.00

**Base**

3.20

173419.18 N

**Client's Representative:**

ARUP

**Scale:** 1:50

**Driller:** AH

**Ground Level:**

-0.69 mOD

**Dates:**

09/11/2017

**Logger:** NH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.80 - 1.20	B1					(1.70)		Grey slightly silty very sandy subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		
1.00	ES4									
1.80 - 2.20	B2				-2.39	1.70		Grey very sandy subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		
2.00	ES5					(1.50)				
2.80 - 3.20	B3				-3.89	3.20				
								End of Borehole at 3.20m		

**Remarks**

Deck to Bed = 1.10m

Terminated at scheduled depth

**Water Strikes**

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

**Chiselling Details**

From (m)	To (m)	Time (hr:mm)

**Water Added**

From (m)	To (m)

**Casing Details**

To (m)	Diam (mm)
3.20	200



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0906	<b>Project Name:</b> Avoca River - Marine Sediment Sampling and Analysis	<b>Borehole No.:</b> BH08
<b>Coordinates:</b> 324913.24 E	<b>Client:</b> Wicklow County Council	Sheet 1 of 1
<b>Method</b> Cable Percussion	<b>Plant Used</b> Dando 3000	<b>Top</b> 0.00
<b>Base</b> 3.20	<b>Client's Representative:</b> ARUP	<b>Scale:</b> 1:50
<b>Ground Level:</b> -2.12 mOD	<b>Dates:</b> 10/11/2017	<b>Driller:</b> AH
		<b>Logger:</b> NH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.80 - 1.20	B1					(1.70)		Black slightly silty very sandy subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded.		
1.00	ES4									
1.80 - 2.20	B2				-3.82	1.70		Grey slightly silty very gravelly fine to coarse SAND with low cobble content. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded.		
2.00	ES5					(1.50)				
2.80 - 3.20	B3				-5.32	3.20		End of Borehole at 3.20m		

<b>Remarks</b> Deck to Bed = 2.60m  Terminated at scheduled depth	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	<b>Water Added</b>		<b>Casing Details</b>				
From (m)	To (m)	To (m)	Diam (mm)				
		3.20	200				



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0906	<b>Project Name:</b> Avoca River - Marine Sediment Sampling and Analysis	<b>Borehole No.:</b> BH09
<b>Coordinates:</b> 325020.97 E	<b>Client:</b> Wicklow County Council	Sheet 1 of 1
<b>Method</b> Cable Percussion	<b>Plant Used</b> Dando 3000	<b>Top</b> 0.00
<b>Base</b> 3.20	<b>Client's Representative:</b> ARUP	<b>Scale:</b> 1:50
<b>Ground Level:</b> -2.95 mOD	<b>Dates:</b> 10/11/2017	<b>Driller:</b> AH
		<b>Logger:</b> NH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.50	ES4							Black very gravelly fine to coarse SAND with low cobble and boulder content. Gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subangular to subrounded.		
0.80 - 1.20	B1					(1.70)				
1.00	ES5									
1.80 - 2.20	B2				-4.65	1.70		Grey slightly silty very gravelly fine to coarse SAND with low cobble content. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded.		
2.00	ES6					(1.50)				
2.80 - 3.20	B3									
3.00	ES7				-6.15	3.20		End of Borehole at 3.20m		

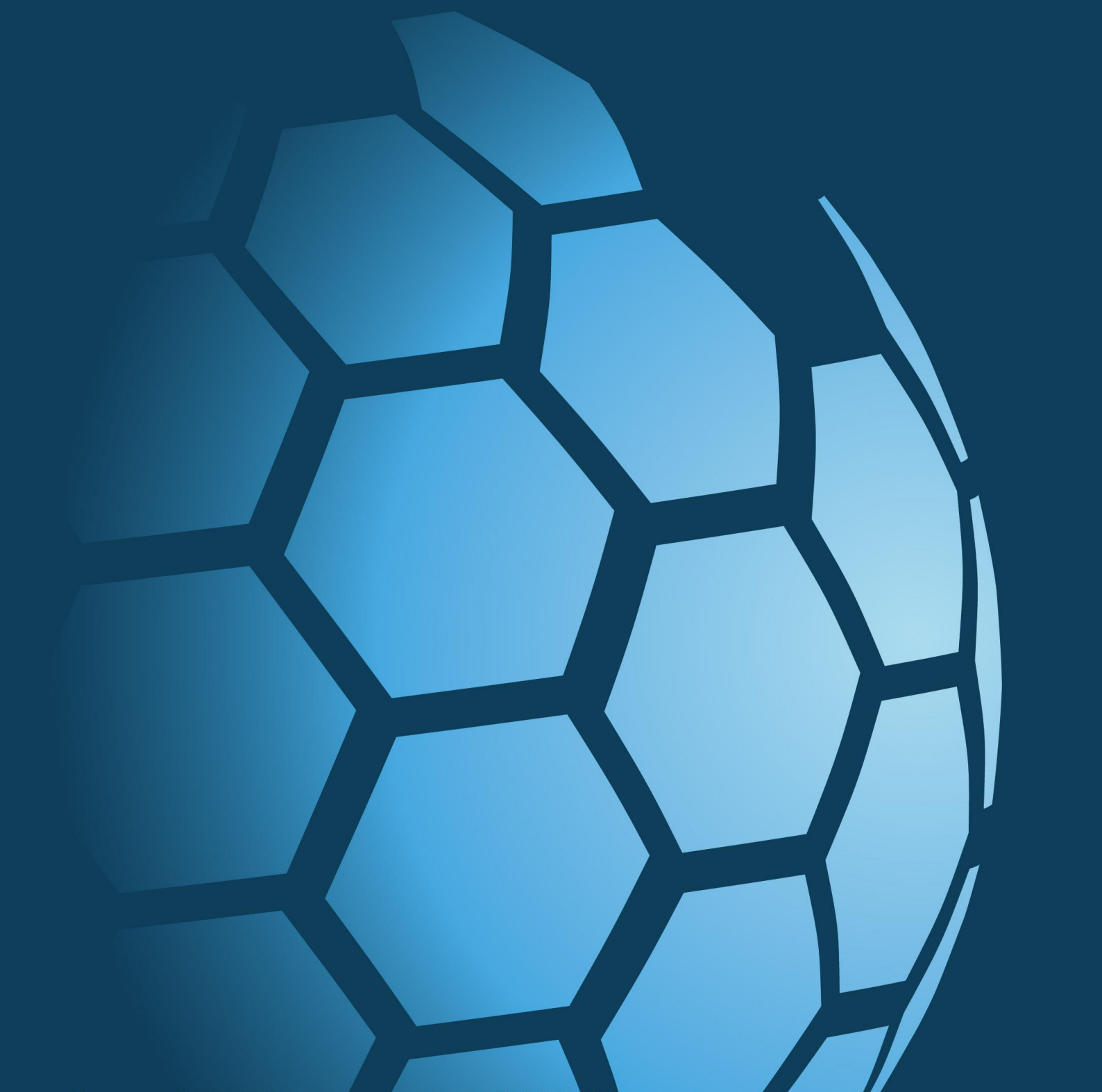
<b>Remarks</b> Deck to Bed = 3.30m  Terminated at scheduled depth	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	<b>Water Added</b>		<b>Casing Details</b>				
	From (m)	To (m)	To (m)	Diam (mm)			



**CAUSEWAY**  
— GEOTECH

**APPENDIX C**

**Geotechnical laboratory test results**





# LABORATORY REPORT REPORT



4043

**Contract Number: PSL17/6099**

Report Date: 11 January 2018  
Client's Reference: 17-0906  
Client Name: Causeway Geotech  
8 Drumahiskey Road  
Ballymoney  
Co. Antrim  
BT53 7QL

**For the attention of: Stephen Watson**


Contract Title: Avoca River, Marine Sediment Sampling and Analysis  
Date Received: 14/12/2017  
Date Commenced: 14/12/2017  
Date Completed: 11/1/2018

**Notes: Opinions and Interpretations are outside the UKAS Accreditation**

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson  
(Director)

  
A Watkins  
(Director)

R Berriman  
(Quality Manager)

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(Senior Technician)

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Page 1 of

# SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH01	1	B	0.80	1.20	Brown sandy slightly silty GRAVEL.
BH01	2	B	1.80	2.20	Dark brown slightly gravelly slightly sandy very clayey PEAT.
BH02	1	B	0.80	1.20	Brown very sandy slightly silty GRAVEL.
BH02	2	B	1.80	2.20	Brown very sandy slightly silty GRAVEL.
BH03	1	B	0.80	1.20	Brown sandy slightly silty GRAVEL.
BH03	2	B	1.80	2.20	Brown very sandy GRAVEL.
BH03	3	B	2.80	3.20	Brown very sandy slightly silty GRAVEL.
BH04	1	B	0.80	1.20	Brown slightly silty SAND & GRAVEL.
BH04	2	B	1.80	2.20	Brown very gravelly slightly silty SAND.
BH04	3	B	2.80	3.20	Brown very sandy slightly silty GRAVEL.
BH05	1	B	0.80	1.20	Brown sandy GRAVEL with some cobbles.
BH05	2	B	1.80	2.20	Brown sandy slightly silty GRAVEL.
BH05	3	B	2.80	3.20	Brown very sandy slightly silty GRAVEL.
BH06	1	B	0.80	1.20	Brown very gravelly SAND.
BH06	2	B	1.80	2.20	Brown very gravelly slightly silty SAND.
BH06	3	B	2.80	3.20	Brown very sandy slightly silty GRAVEL.
BH07	1	B	0.80	1.20	Brown very sandy slightly silty GRAVEL.
BH07	2	B	1.80	2.20	Brown very sandy GRAVEL.
BH08	1	B	0.80	1.20	Brown very sandy slightly silty GRAVEL.



Avoca River - Marine Sediment Sampling and Analysis

**Contract No:**

**PSL17/6099**

**Client Ref:**

**17-0906**





# SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m <sup>3</sup> Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
BH01	1	B	0.80	1.20	4.2				NP			
BH01	2	B	1.80	2.20	190			194	95	99	92	Extremely high plasticity CE.
BH02	1	B	0.80	1.20	3.1				NP			
BH02	2	B	1.80	2.20	5.2				NP			
BH03	1	B	0.80	1.20	4.8				NP			
BH03	2	B	1.80	2.20	3.1				NP			
BH03	3	B	2.80	3.20	3.9				NP			
BH04	1	B	0.80	1.20	6.9				NP			
BH04	2	B	1.80	2.20	10				NP			
BH04	3	B	2.80	3.20	6				NP			
BH05	1	B	0.80	1.20	2.7				NP			
BH05	2	B	1.80	2.20	2.5				NP			
BH05	3	B	2.80	3.20	2.2				NP			
BH06	1	B	0.80	1.20	4.4				NP			
BH06	2	B	1.80	2.20	6.7				NP			
BH06	3	B	2.80	3.20	5.1				NP			
BH07	1	B	0.80	1.20	3.5				NP			
BH07	2	B	1.80	2.20	4.1				NP			
BH08	1	B	0.80	1.20	3.6				NP			

SYMBOLS : NP : Non Plastic

\* : Liquid Limit and Plastic Limit Wet Sieved.



**PSL**  
Professional Soils Laboratory

Avoca River - Marine Sediment Sampling and Analysis

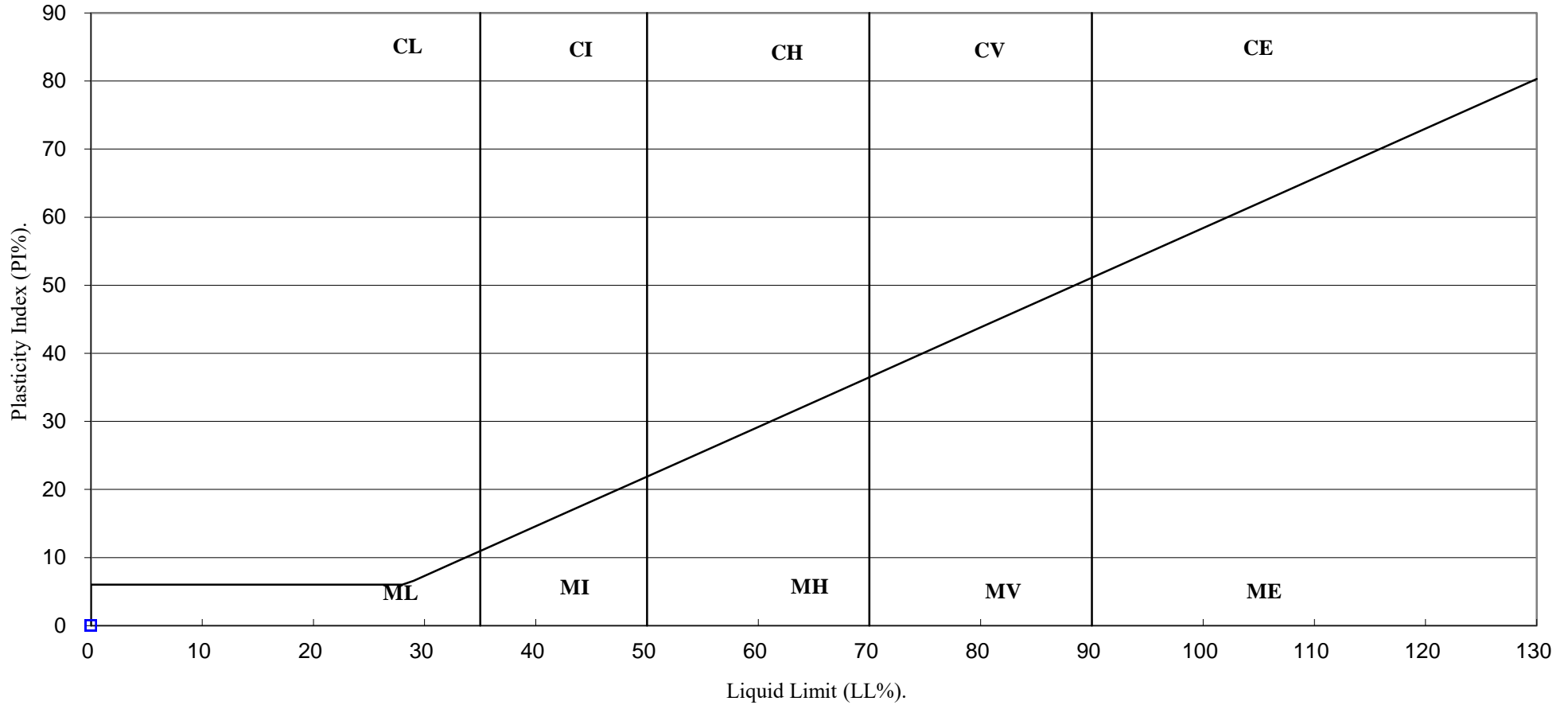
Contract No:

PSL17/6009

Client Ref:

17-0906

# PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



Avoca River - Marine Sediment Sampling and Analysis

Contract No:

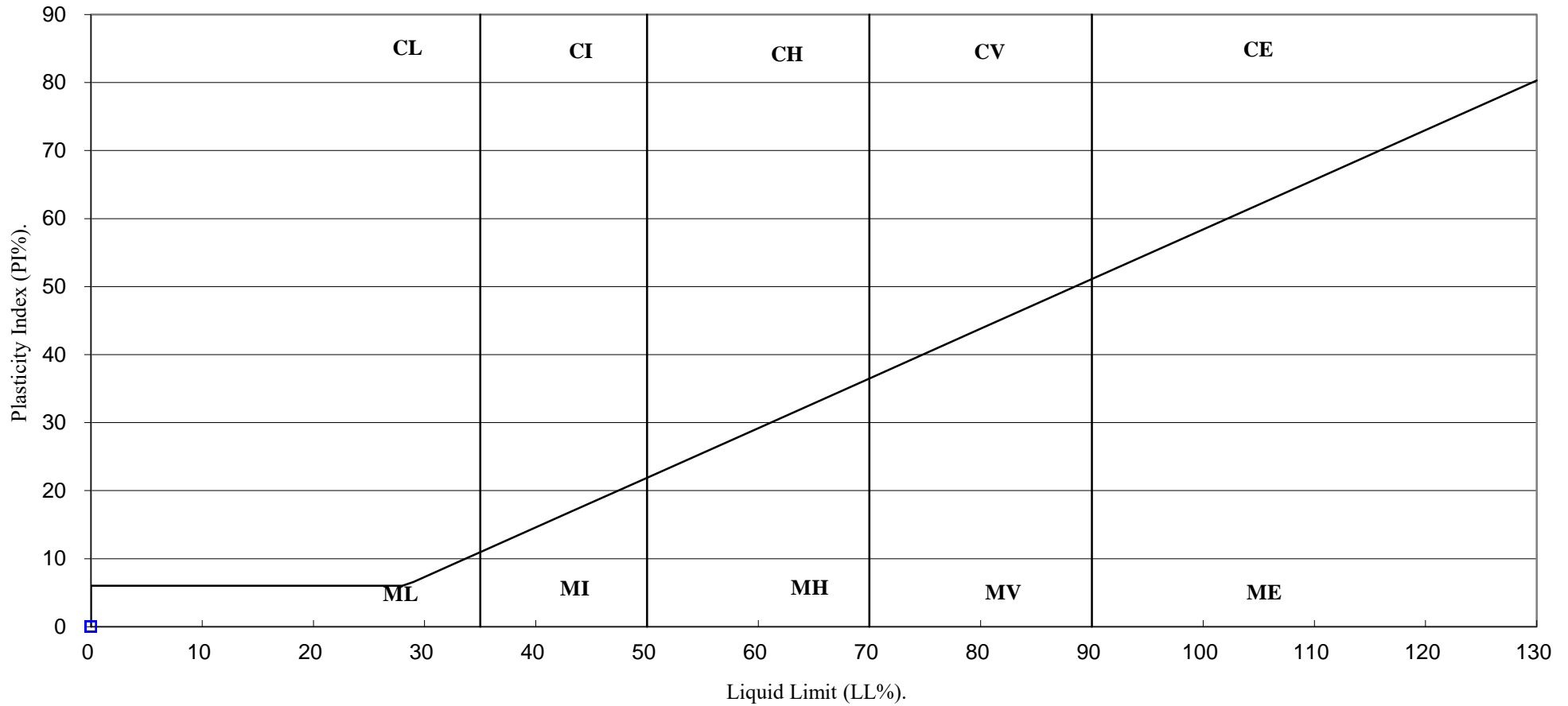
PSL17/6009

Client Ref:

17-0906



# PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



Avoca River - Marine Sediment Sampling and Analysis

Contract No:

PSL17/6009

Client Ref:

17-0906



# PARTICLE SIZE DISTRIBUTION TEST

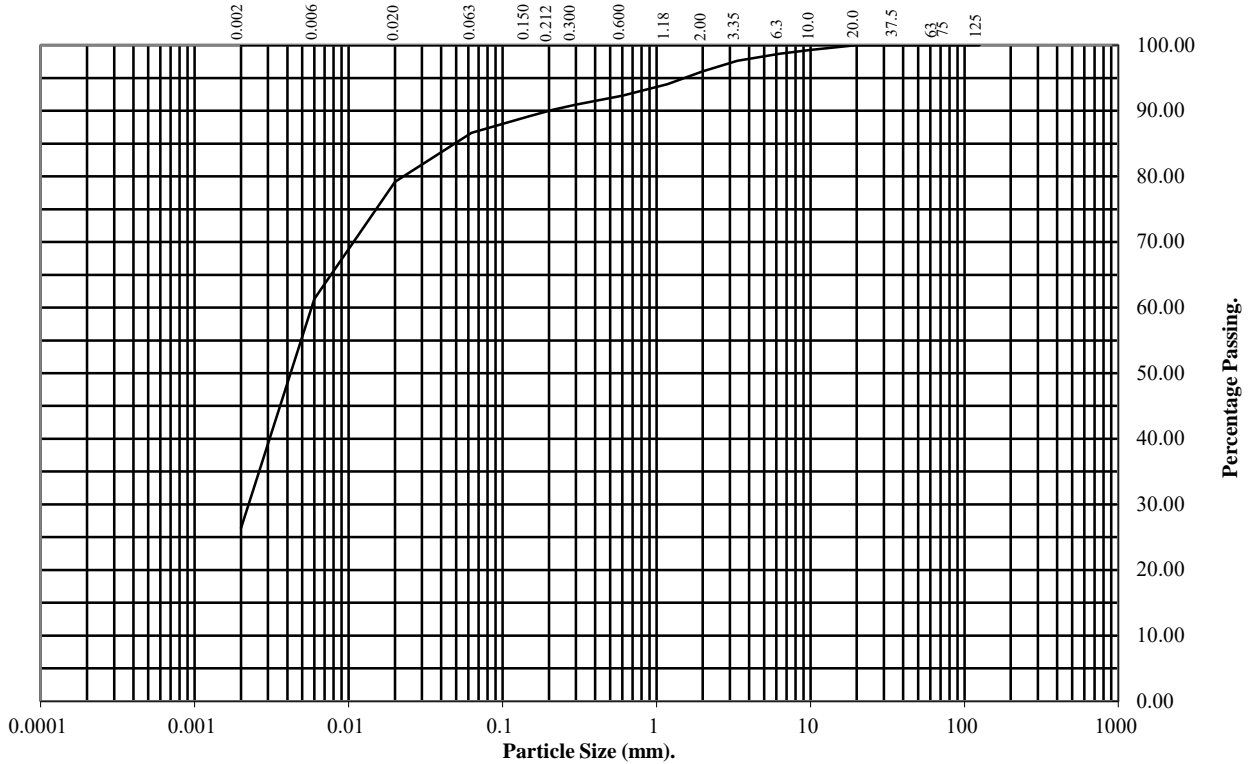
**BS1377 : Part 2 : 1990**

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

**Hole Number:** BH01 **Top Depth (m):** 1.80

**Sample Number:** 2 **Base Depth(m):** 2.20

**Sample Type:** B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	99
6.3	99
3.35	98
2	96
1.18	94
0.6	92
0.3	91
0.212	90
0.15	89
0.063	87

Particle Diameter	Percentage Passing
0.02	79
0.006	61
0.002	26

Soil Fraction	Total Percentage
Cobbles	0
Gravel	4
Sand	9
Silt	61
Clay	26

**Remarks:**  
See Summary of Soil Descriptions



**Avoca River - Marine Sediment  
Sampling and Analysis**

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>

# PARTICLE SIZE DISTRIBUTION TEST

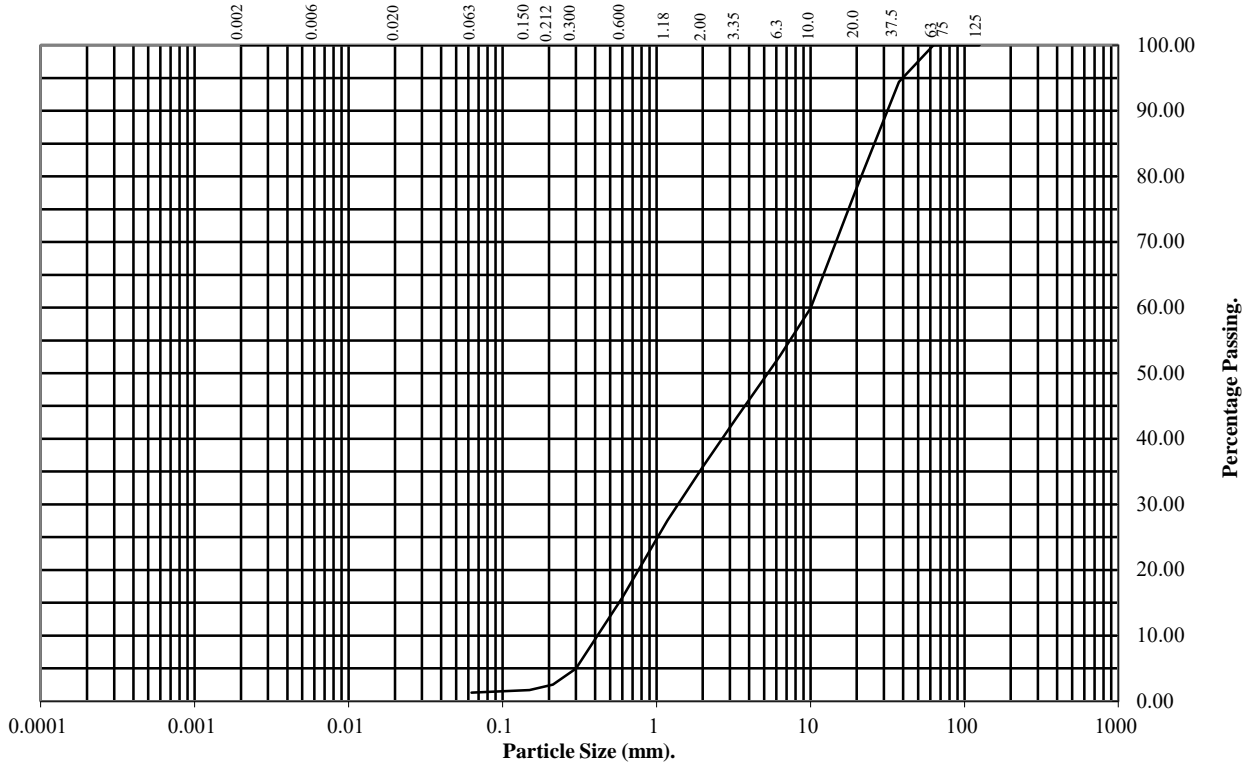
**BS1377 : Part 2 : 1990**

Wet Sieve, Clause 9.2

**Hole Number:** BH02 **Top Depth (m):** 0.80

**Sample Number:** 1 **Base Depth(m):** 1.20

**Sample Type:** B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	94
20	78
10	60
6.3	53
3.35	43
2	36
1.18	28
0.6	16
0.3	5
0.212	2
0.15	2
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	64
Sand	35
Silt/Clay	1

**Remarks:**  
See Summary of Soil Descriptions



**Avoca River - Marine Sediment  
Sampling and Analysis**

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>



# PARTICLE SIZE DISTRIBUTION TEST

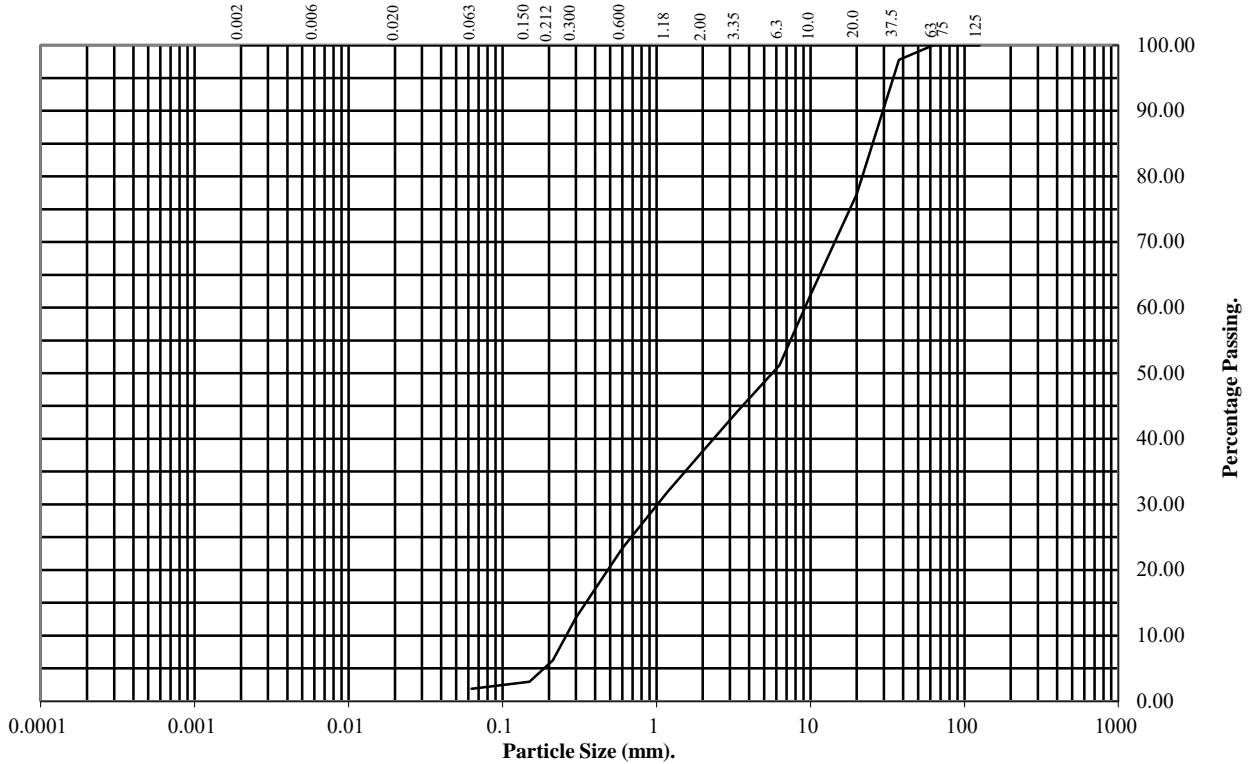
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH02** Top Depth (m): **1.80**

Sample Number: **2** Base Depth(m): **2.20**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	98
20	77
10	62
6.3	51
3.35	44
2	38
1.18	32
0.6	23
0.3	13
0.212	6
0.15	3
0.063	2

Soil Fraction	Total Percentage
Cobbles	0
Gravel	62
Sand	36
Silt/Clay	2

**Remarks:**  
See Summary of Soil Descriptions



Avoca River - Marine Sediment  
Sampling and Analysis

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>



# PARTICLE SIZE DISTRIBUTION TEST

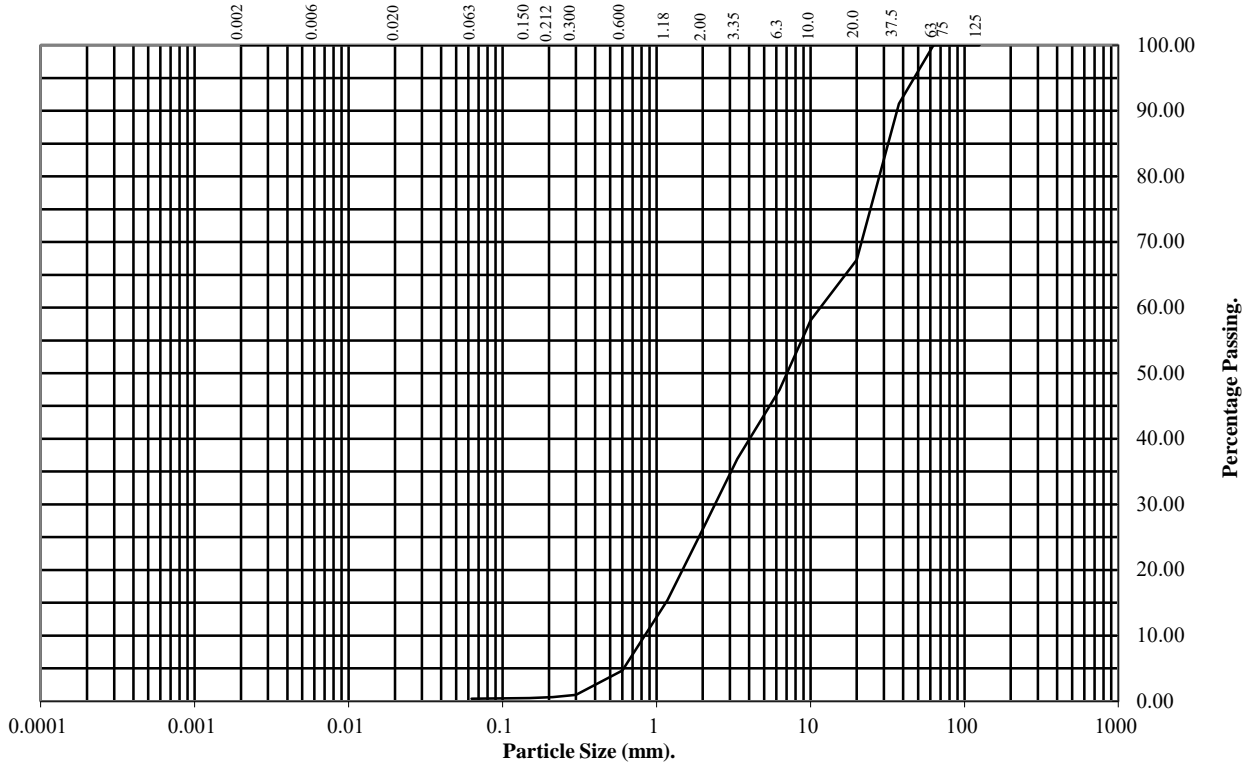
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH03** Top Depth (m): **1.80**

Sample Number: **2** Base Depth(m): **2.20**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	91
20	67
10	58
6.3	47
3.35	37
2	26
1.18	15
0.6	5
0.3	1
0.212	1
0.15	0
0.063	0

Soil Fraction	Total Percentage
Cobbles	0
Gravel	74
Sand	26
Silt/Clay	0

**Remarks:**  
See Summary of Soil Descriptions



Avoca River - Marine Sediment  
Sampling and Analysis

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>

# PARTICLE SIZE DISTRIBUTION TEST

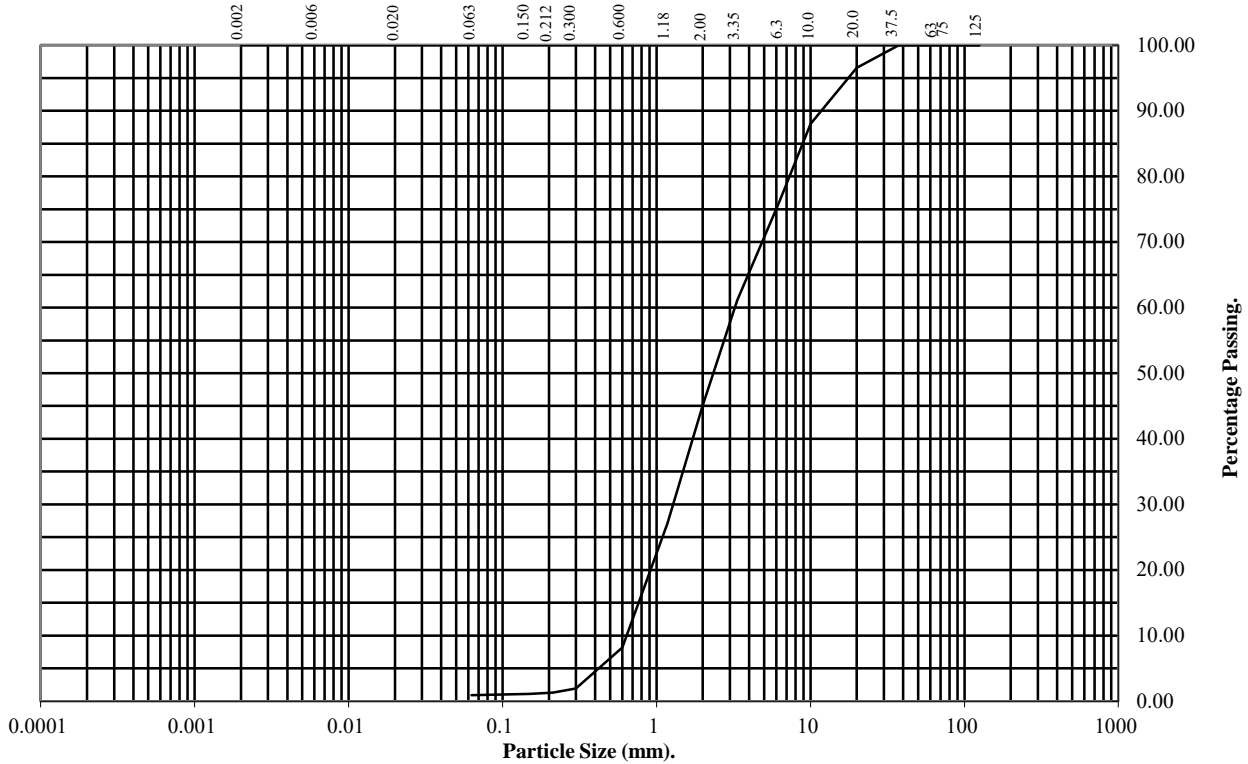
**BS1377 : Part 2 : 1990**

Wet Sieve, Clause 9.2

**Hole Number:**                      **BH03**                                      **Top Depth (m):**                      **2.80**

**Sample Number:**                      **3**    **Base Depth(m):**                      **3.20**

**Sample Type:**                      **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	97
10	88
6.3	76
3.35	61
2	45
1.18	27
0.6	8
0.3	2
0.212	1
0.15	1
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	55
Sand	44
Silt/Clay	1

**Remarks:**  
See Summary of Soil Descriptions



**Avoca River - Marine Sediment  
Sampling and Analysis**

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>

# PARTICLE SIZE DISTRIBUTION TEST

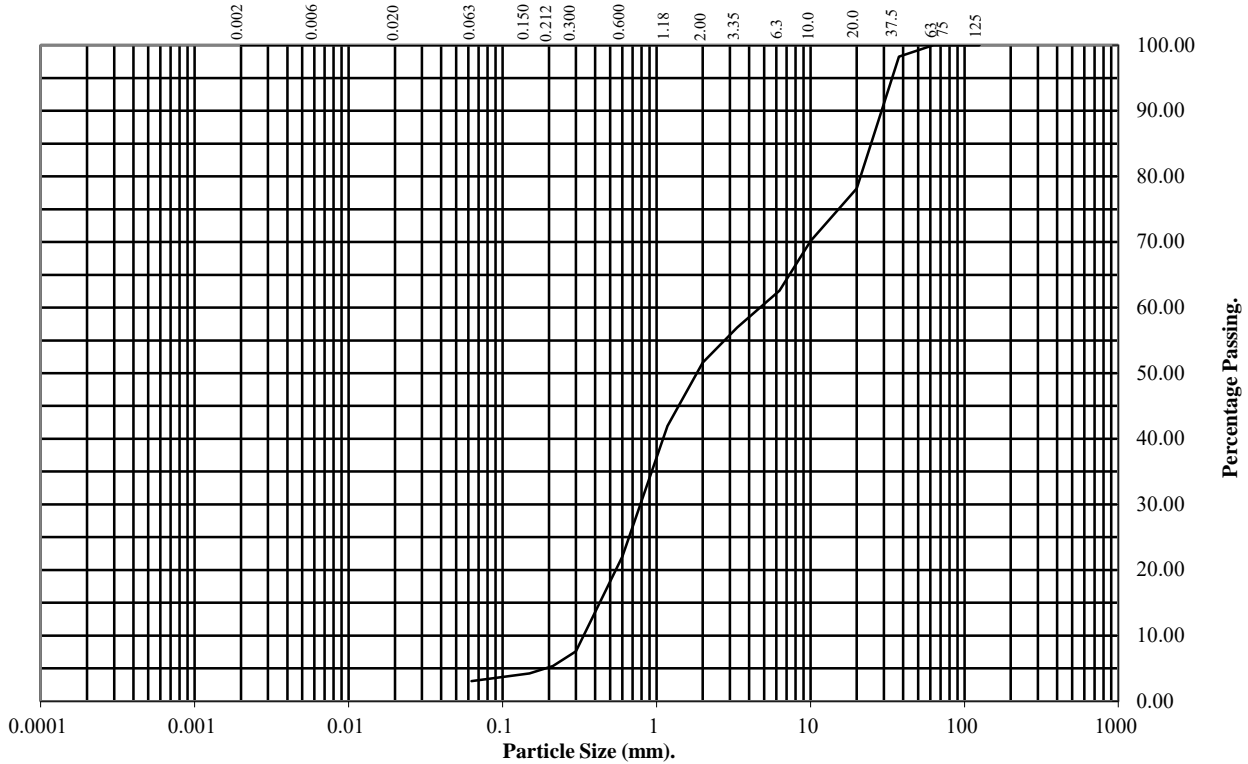
**BS1377 : Part 2 : 1990**

Wet Sieve, Clause 9.2

**Hole Number:** BH04 **Top Depth (m):** 0.80

**Sample Number:** 1 **Base Depth(m):** 1.20

**Sample Type:** B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	98
20	78
10	70
6.3	63
3.35	57
2	52
1.18	42
0.6	22
0.3	8
0.212	5
0.15	4
0.063	3

Soil Fraction	Total Percentage
Cobbles	0
Gravel	48
Sand	49
Silt/Clay	3

**Remarks:**  
See Summary of Soil Descriptions



**Avoca River - Marine Sediment  
Sampling and Analysis**

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>

# PARTICLE SIZE DISTRIBUTION TEST

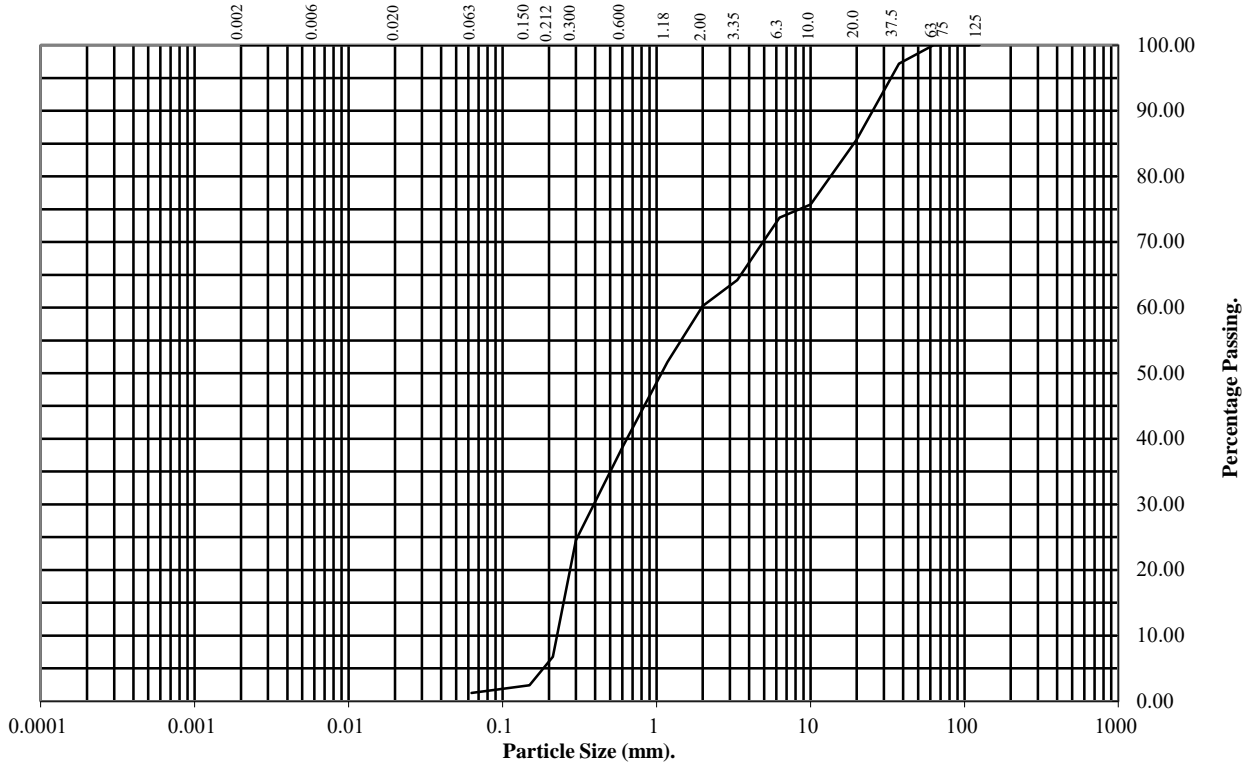
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH04** Top Depth (m): **1.80**

Sample Number: **2** Base Depth(m): **2.20**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	97
20	86
10	76
6.3	74
3.35	64
2	60
1.18	52
0.6	39
0.3	25
0.212	7
0.15	2
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	40
Sand	59
Silt/Clay	1

**Remarks:**  
See Summary of Soil Descriptions



Avoca River - Marine Sediment  
Sampling and Analysis

Contract No:  
**PSL17/6099**  
Client Ref:  
**17-0906**

# PARTICLE SIZE DISTRIBUTION TEST

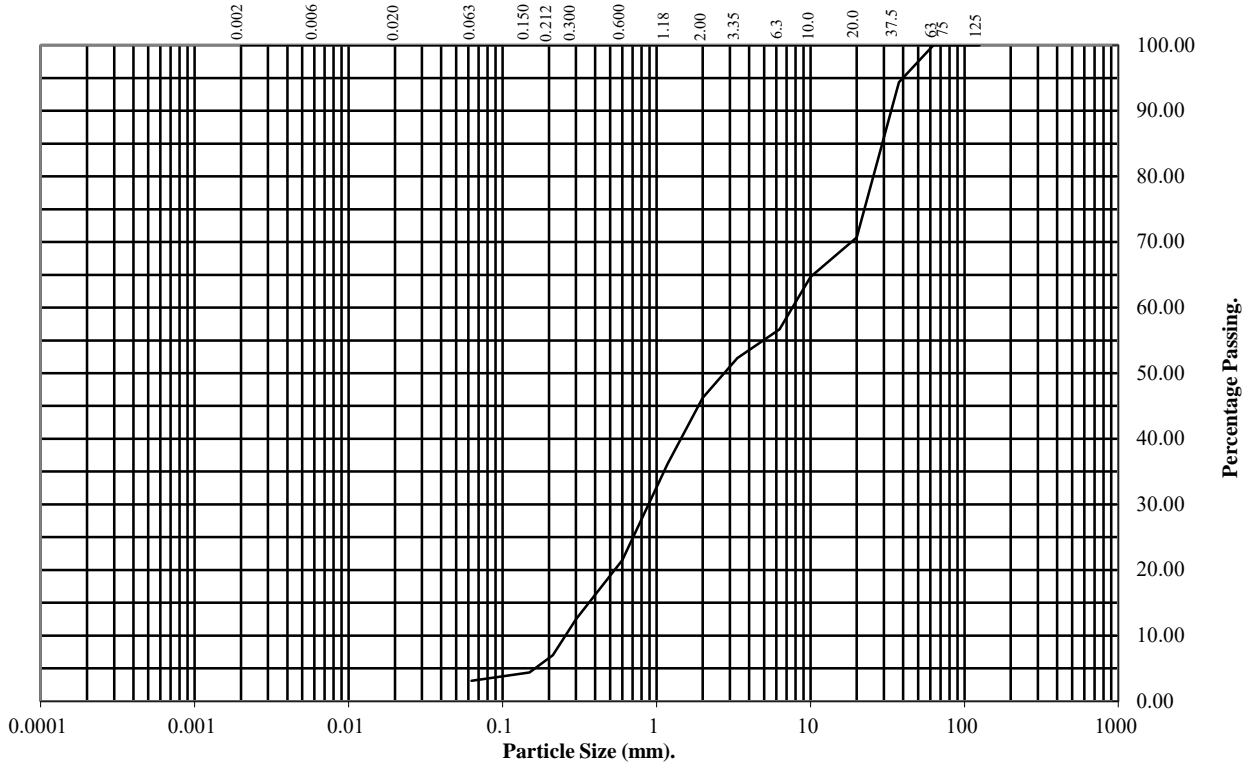
**BS1377 : Part 2 : 1990**

Wet Sieve, Clause 9.2

**Hole Number:**                      **BH04**                                      **Top Depth (m):**                      **2.80**

**Sample Number:**                      **3**    **Base Depth(m):**                      **3.20**

**Sample Type:**                      **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	94
20	71
10	65
6.3	57
3.35	52
2	46
1.18	36
0.6	21
0.3	12
0.212	7
0.15	4
0.063	3

Soil Fraction	Total Percentage
Cobbles	0
Gravel	54
Sand	43
Silt/Clay	3

**Remarks:**  
See Summary of Soil Descriptions



**Avoca River - Marine Sediment  
Sampling and Analysis**

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>

# PARTICLE SIZE DISTRIBUTION TEST

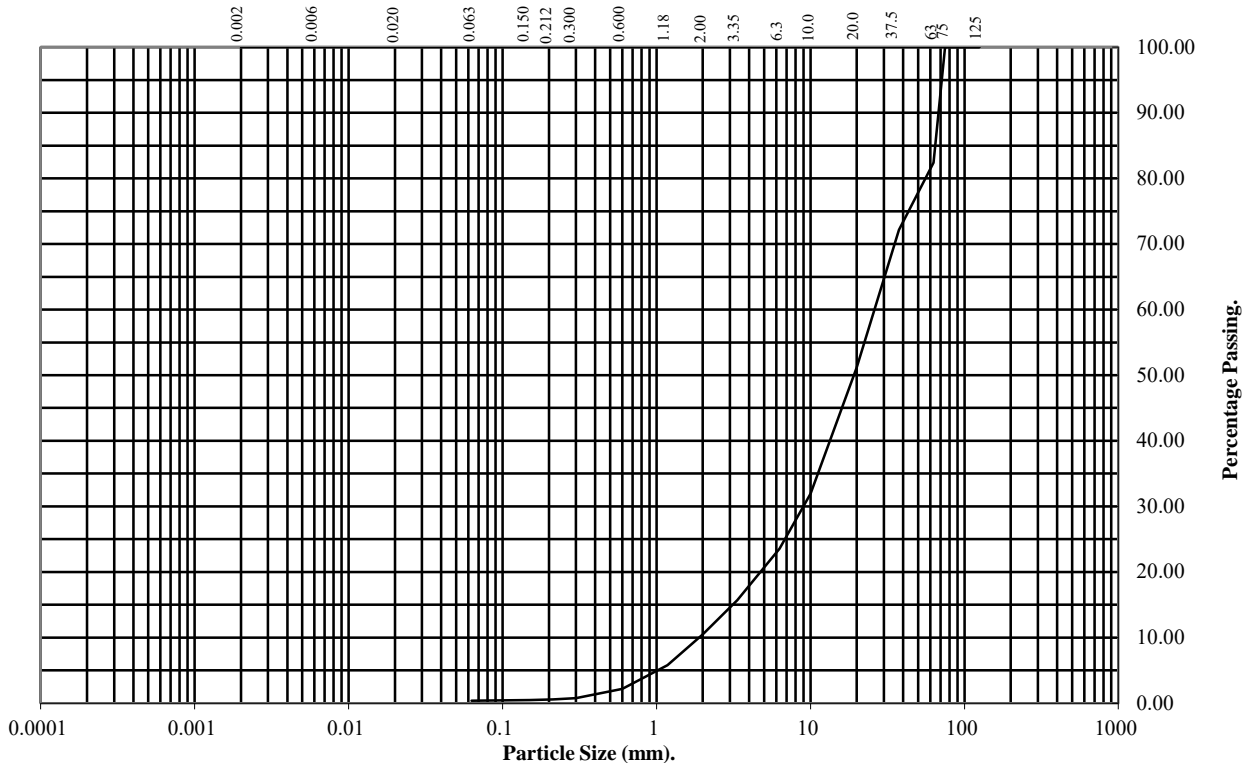
**BS1377 : Part 2 : 1990**

Wet Sieve, Clause 9.2

**Hole Number:**                      **BH05**                                      **Top Depth (m):**                      **0.80**

**Sample Number:**                      **1**    **Base Depth(m):**                      **1.20**

**Sample Type:**                      **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	82
37.5	72
20	51
10	32
6.3	24
3.35	16
2	10
1.18	6
0.6	2
0.3	1
0.212	1
0.15	0
0.063	0

Soil Fraction	Total Percentage
Cobbles	18
Gravel	72
Sand	10
Silt/Clay	0

**Remarks:**  
See Summary of Soil Descriptions



**Avoca River - Marine Sediment  
Sampling and Analysis**

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>





# PARTICLE SIZE DISTRIBUTION TEST

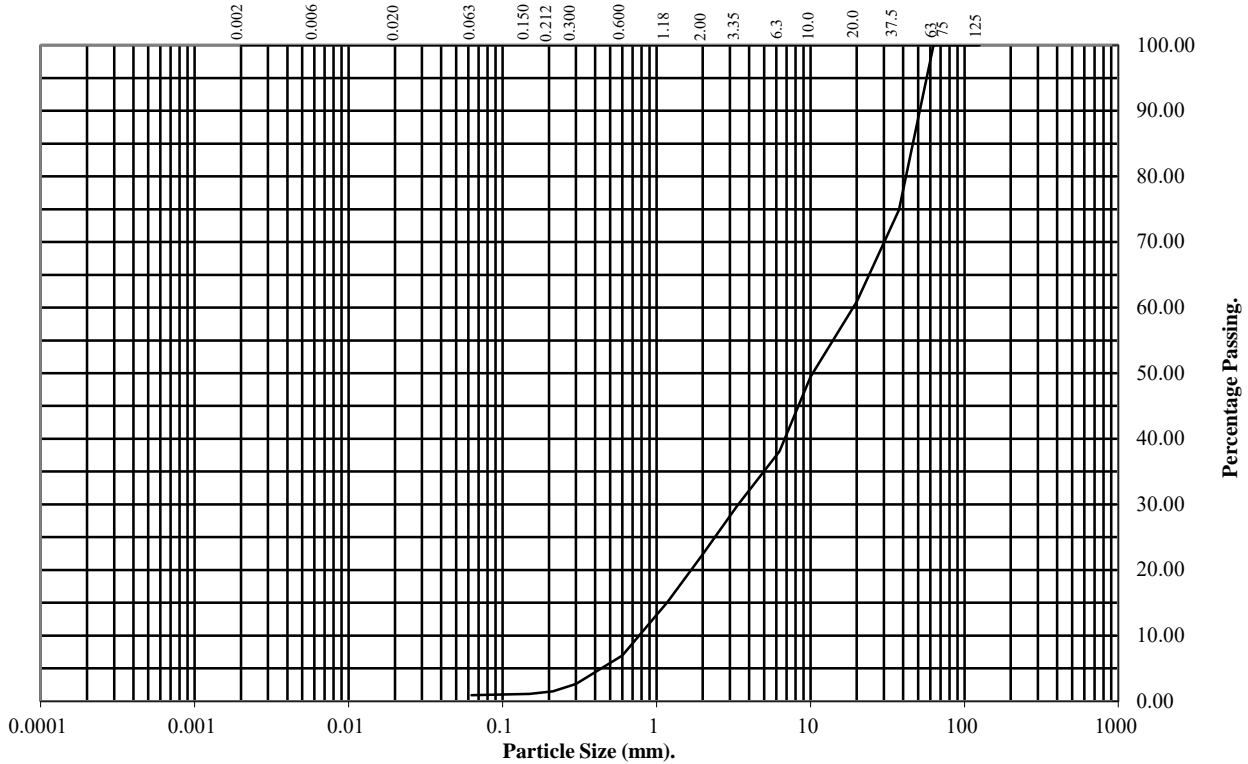
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH05** Top Depth (m): **2.80**

Sample Number: **3** Base Depth(m): **3.20**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	75
20	61
10	49
6.3	38
3.35	30
2	22
1.18	15
0.6	7
0.3	3
0.212	2
0.15	1
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	78
Sand	21
Silt/Clay	1

**Remarks:**  
See Summary of Soil Descriptions



Avoca River - Marine Sediment  
Sampling and Analysis

Contract No:  
**PSL17/6099**  
Client Ref:  
**17-0906**

# PARTICLE SIZE DISTRIBUTION TEST

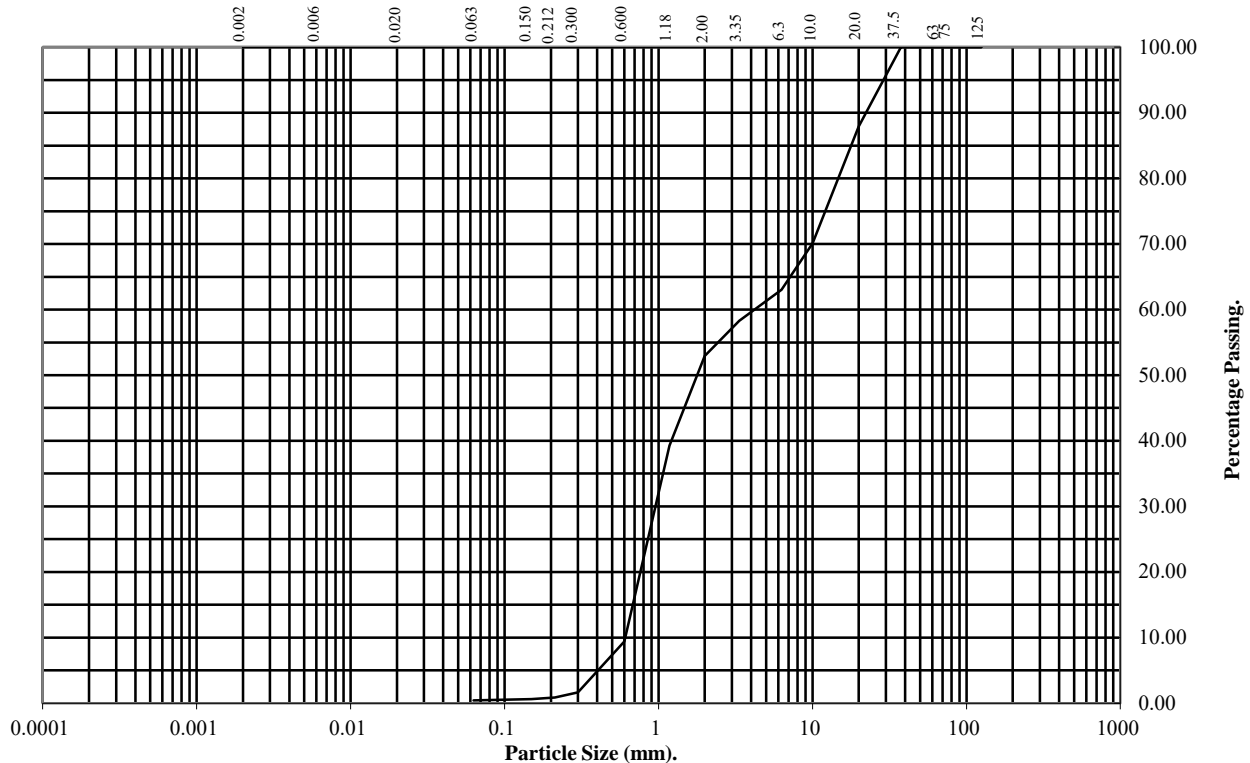
**BS1377 : Part 2 : 1990**

Wet Sieve, Clause 9.2

**Hole Number:** BH06 **Top Depth (m):** 0.80

**Sample Number:** 1 **Base Depth(m):** 1.20

**Sample Type:** B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	88
10	70
6.3	63
3.35	58
2	53
1.18	39
0.6	9
0.3	2
0.212	1
0.15	1
0.063	0

Soil Fraction	Total Percentage
Cobbles	0
Gravel	47
Sand	53
Silt/Clay	0

**Remarks:**  
See Summary of Soil Descriptions



**Avoca River - Marine Sediment  
Sampling and Analysis**

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>

# PARTICLE SIZE DISTRIBUTION TEST

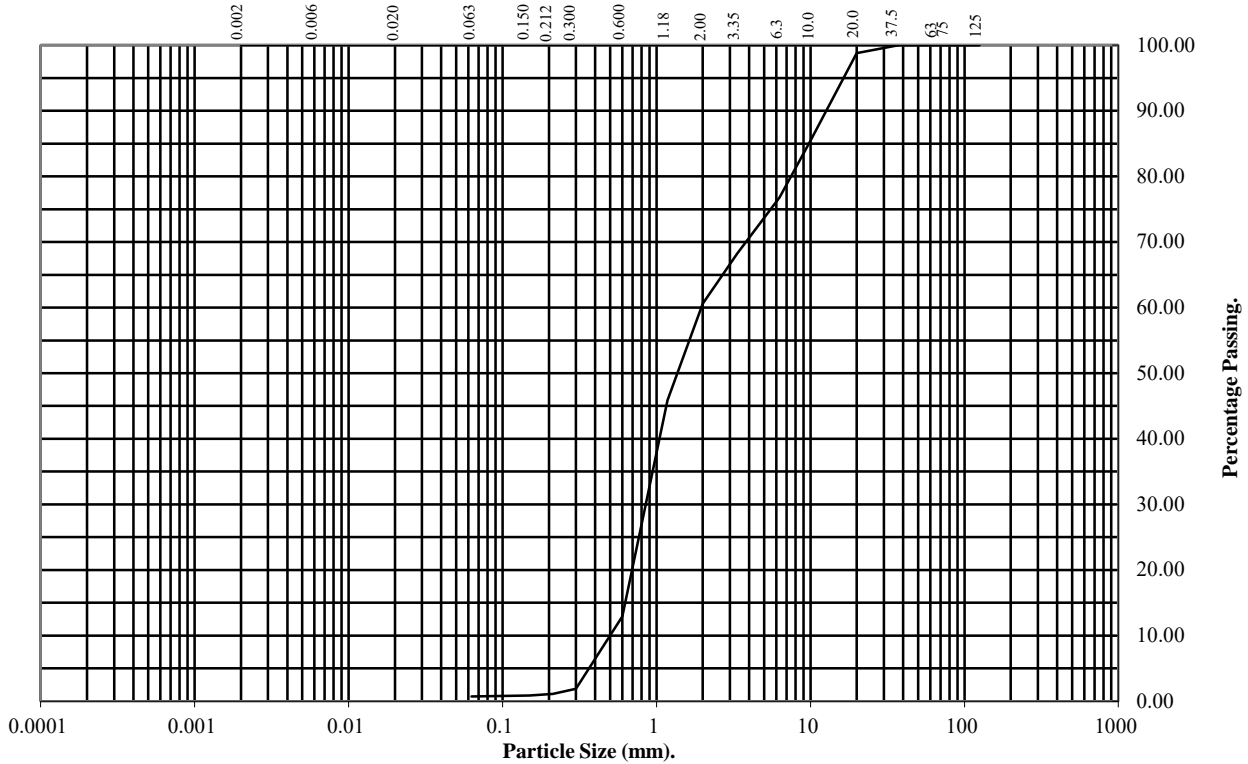
**BS1377 : Part 2 : 1990**

Wet Sieve, Clause 9.2

**Hole Number:**                      **BH06**                                      **Top Depth (m):**                      **1.80**

**Sample Number:**                      **2**    **Base Depth(m):**                      **2.20**

**Sample Type:**                      **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	99
10	85
6.3	77
3.35	68
2	61
1.18	46
0.6	13
0.3	2
0.212	1
0.15	1
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	39
Sand	60
Silt/Clay	1

**Remarks:**  
See Summary of Soil Descriptions



**Avoca River - Marine Sediment  
Sampling and Analysis**

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>

# PARTICLE SIZE DISTRIBUTION TEST

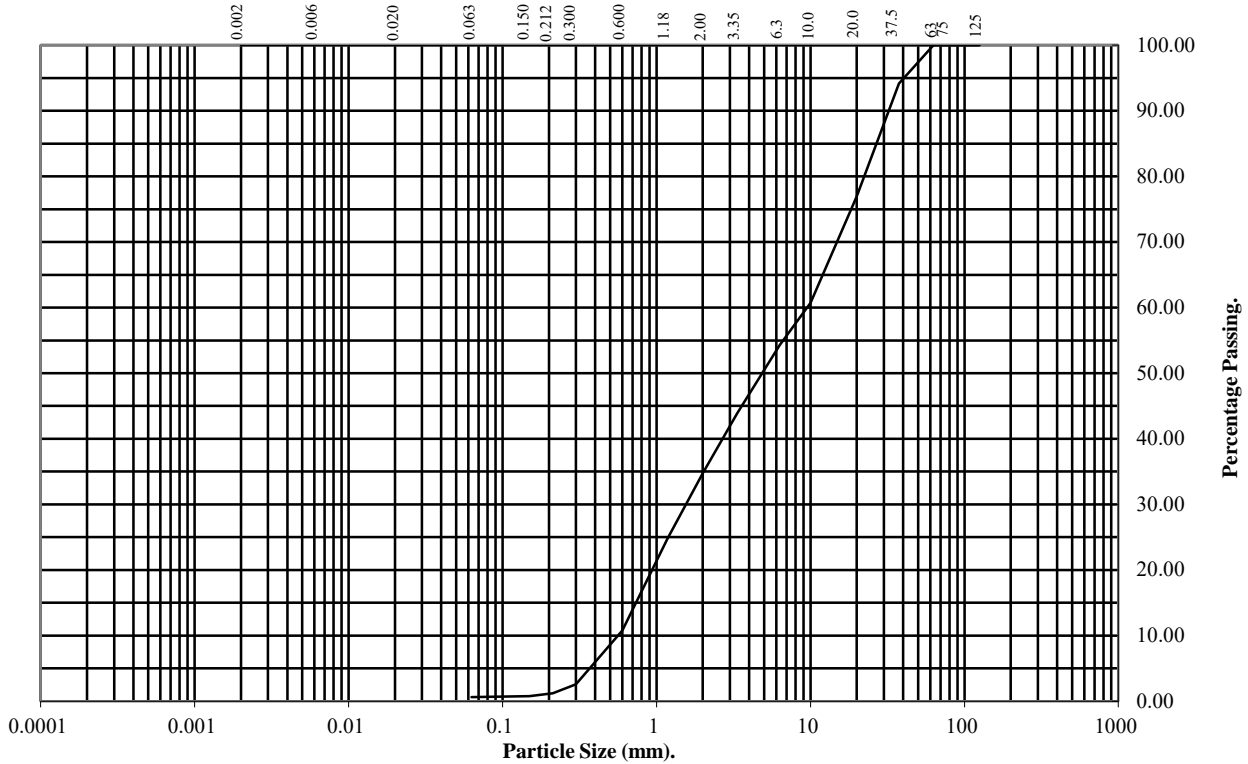
**BS1377 : Part 2 : 1990**

Wet Sieve, Clause 9.2

**Hole Number:**                      **BH06**                                      **Top Depth (m):**                      **2.80**

**Sample Number:**                      **3**    **Base Depth(m):**                      **3.20**

**Sample Type:**                                      **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	94
20	77
10	61
6.3	54
3.35	44
2	35
1.18	25
0.6	11
0.3	3
0.212	1
0.15	1
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	65
Sand	34
Silt/Clay	1

**Remarks:**  
See Summary of Soil Descriptions



**Avoca River - Marine Sediment  
Sampling and Analysis**

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>

# PARTICLE SIZE DISTRIBUTION TEST

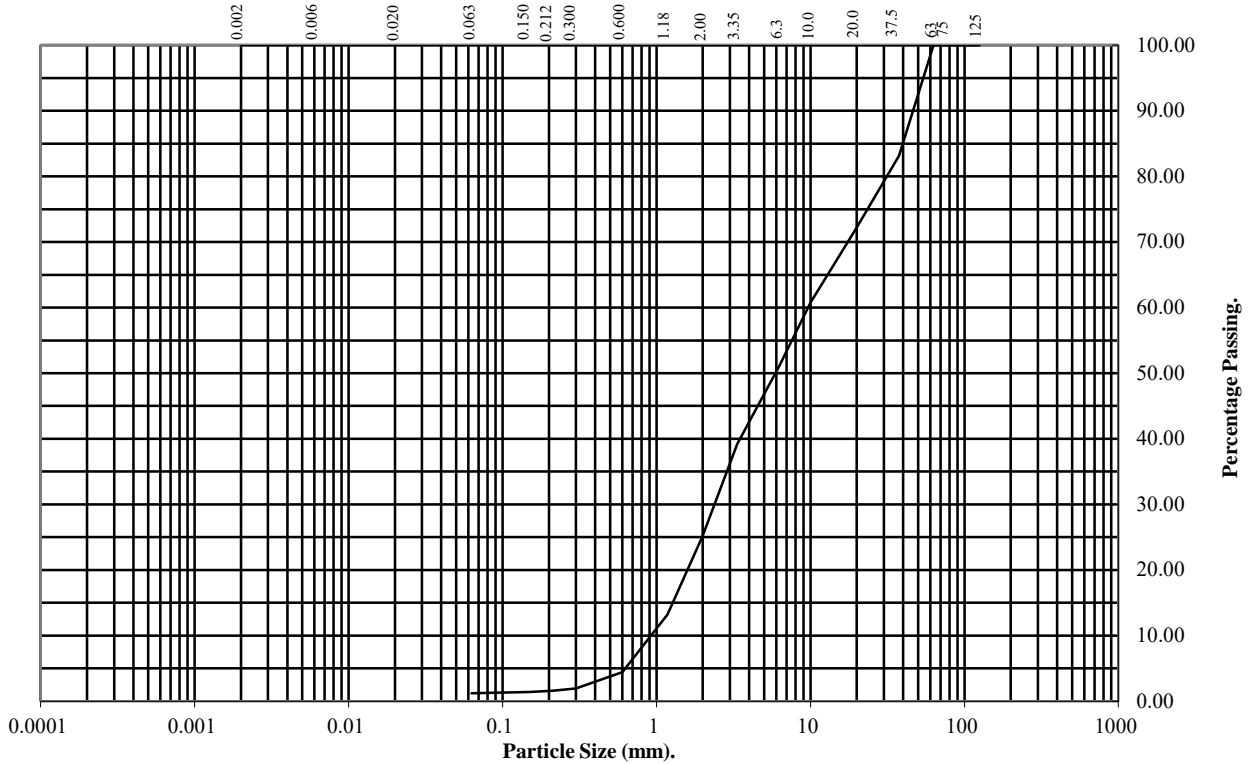
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH07** Top Depth (m): **0.80**

Sample Number: **1** Base Depth(m): **1.20**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	83
20	72
10	61
6.3	51
3.35	39
2	25
1.18	13
0.6	4
0.3	2
0.212	2
0.15	1
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	75
Sand	24
Silt/Clay	1

**Remarks:**  
See Summary of Soil Descriptions



Avoca River - Marine Sediment  
Sampling and Analysis

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>

# PARTICLE SIZE DISTRIBUTION TEST

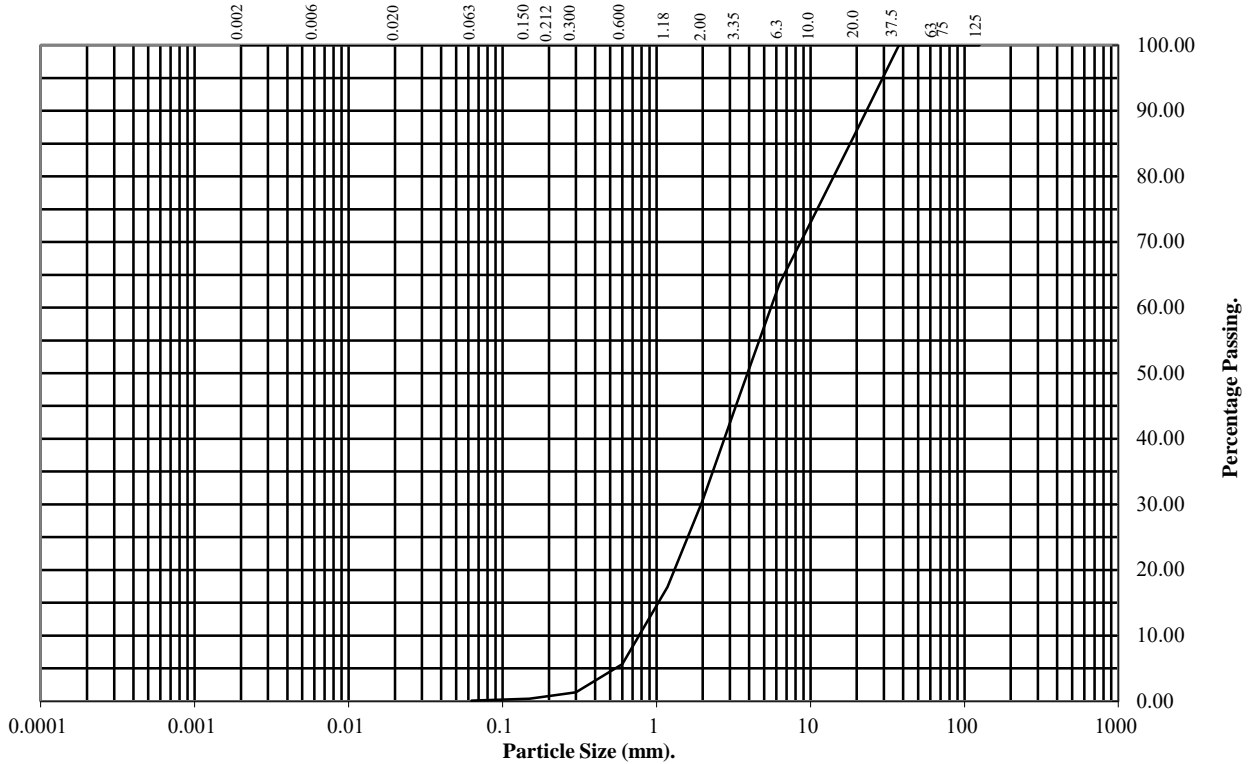
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH07** Top Depth (m): **1.80**

Sample Number: **2** Base Depth(m): **2.20**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	87
10	73
6.3	64
3.35	46
2	31
1.18	17
0.6	6
0.3	1
0.212	1
0.15	0
0.063	0

Soil Fraction	Total Percentage
Cobbles	0
Gravel	69
Sand	31
Silt/Clay	0

**Remarks:**  
See Summary of Soil Descriptions



Avoca River - Marine Sediment  
Sampling and Analysis

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>

# PARTICLE SIZE DISTRIBUTION TEST

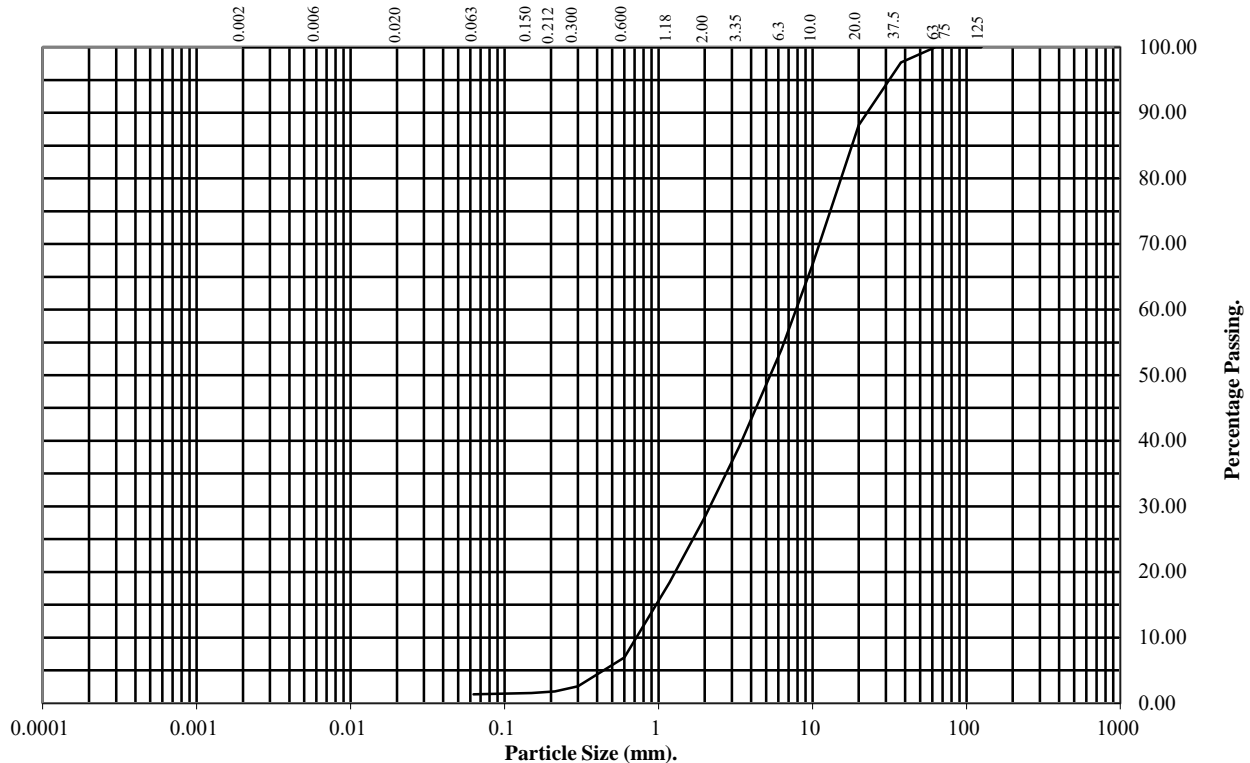
**BS1377 : Part 2 : 1990**

Wet Sieve, Clause 9.2

**Hole Number:** BH08 **Top Depth (m):** 0.80

**Sample Number:** 1 **Base Depth(m):** 1.20

**Sample Type:** B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	98
20	88
10	67
6.3	54
3.35	39
2	28
1.18	18
0.6	7
0.3	3
0.212	2
0.15	2
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	72
Sand	27
Silt/Clay	1

**Remarks:**  
See Summary of Soil Descriptions



**Avoca River - Marine Sediment  
Sampling and Analysis**

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>



# PARTICLE SIZE DISTRIBUTION TEST

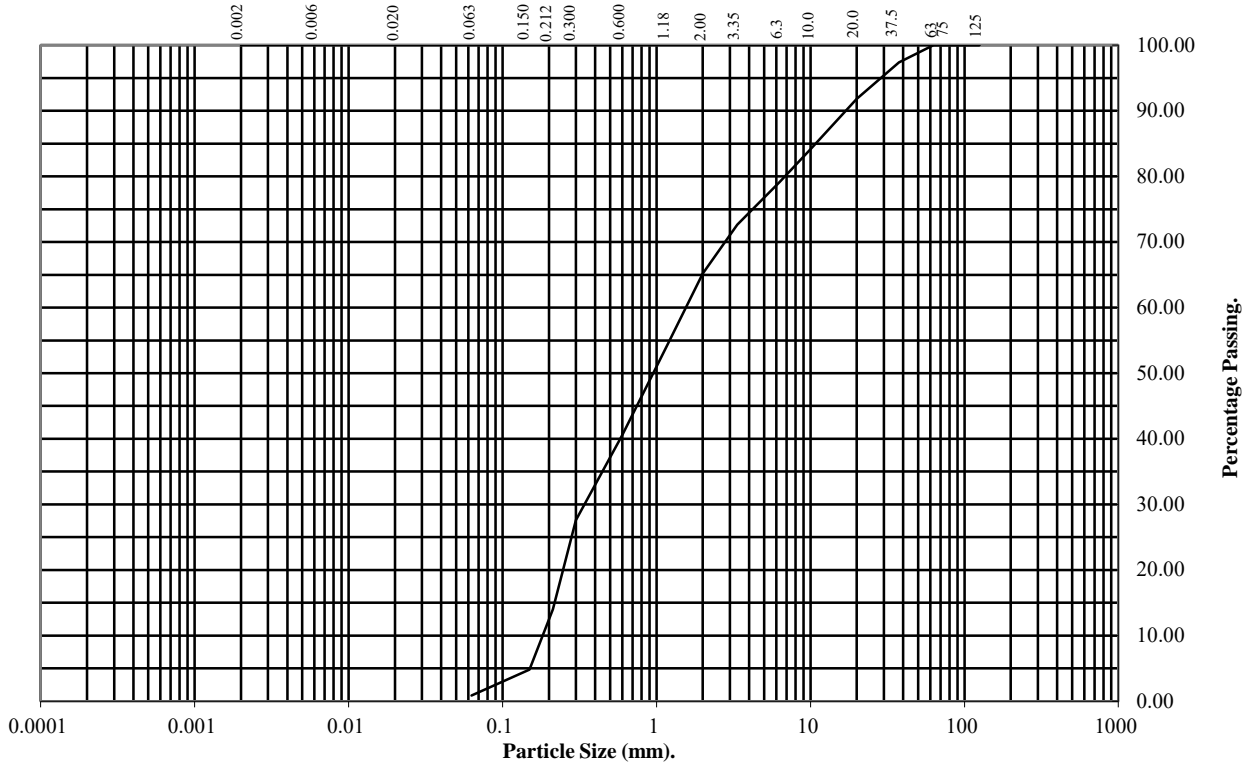
**BS1377 : Part 2 : 1990**

Wet Sieve, Clause 9.2

**Hole Number:**                      **BH08**                                      **Top Depth (m):**                      **2.80**

**Sample Number:**                      **3**    **Base Depth(m):**                      **3.20**

**Sample Type:**                      **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	97
20	92
10	84
6.3	79
3.35	73
2	65
1.18	54
0.6	41
0.3	28
0.212	14
0.15	5
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	35
Sand	64
Silt/Clay	1

**Remarks:**  
See Summary of Soil Descriptions



**Avoca River - Marine Sediment  
Sampling and Analysis**

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>

# PARTICLE SIZE DISTRIBUTION TEST

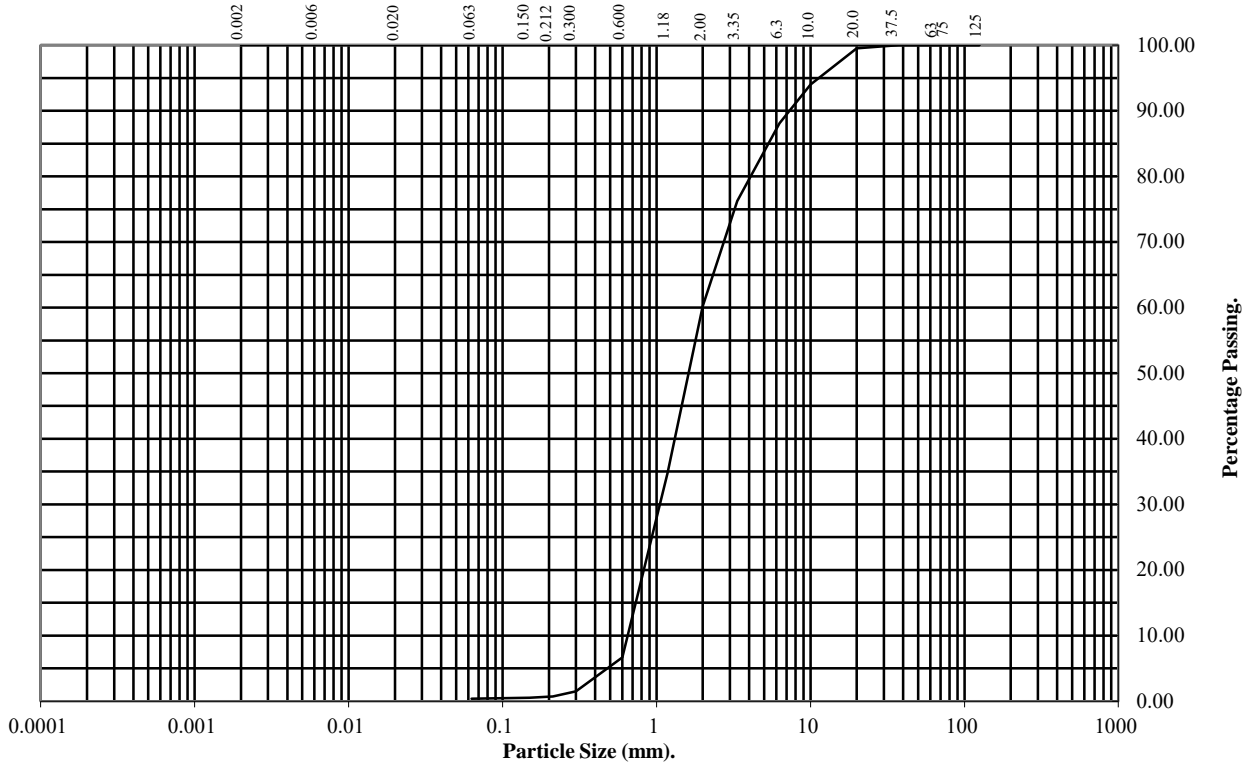
**BS1377 : Part 2 : 1990**

Wet Sieve, Clause 9.2

**Hole Number:** BH09 **Top Depth (m):** 0.80

**Sample Number:** 1 **Base Depth(m):** 1.20

**Sample Type:** B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	94
6.3	88
3.35	76
2	60
1.18	35
0.6	7
0.3	2
0.212	1
0.15	1
0.063	0

Soil Fraction	Total Percentage
Cobbles	0
Gravel	40
Sand	60
Silt/Clay	0

**Remarks:**  
See Summary of Soil Descriptions



**Avoca River - Marine Sediment  
Sampling and Analysis**

<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>

# PARTICLE SIZE DISTRIBUTION TEST

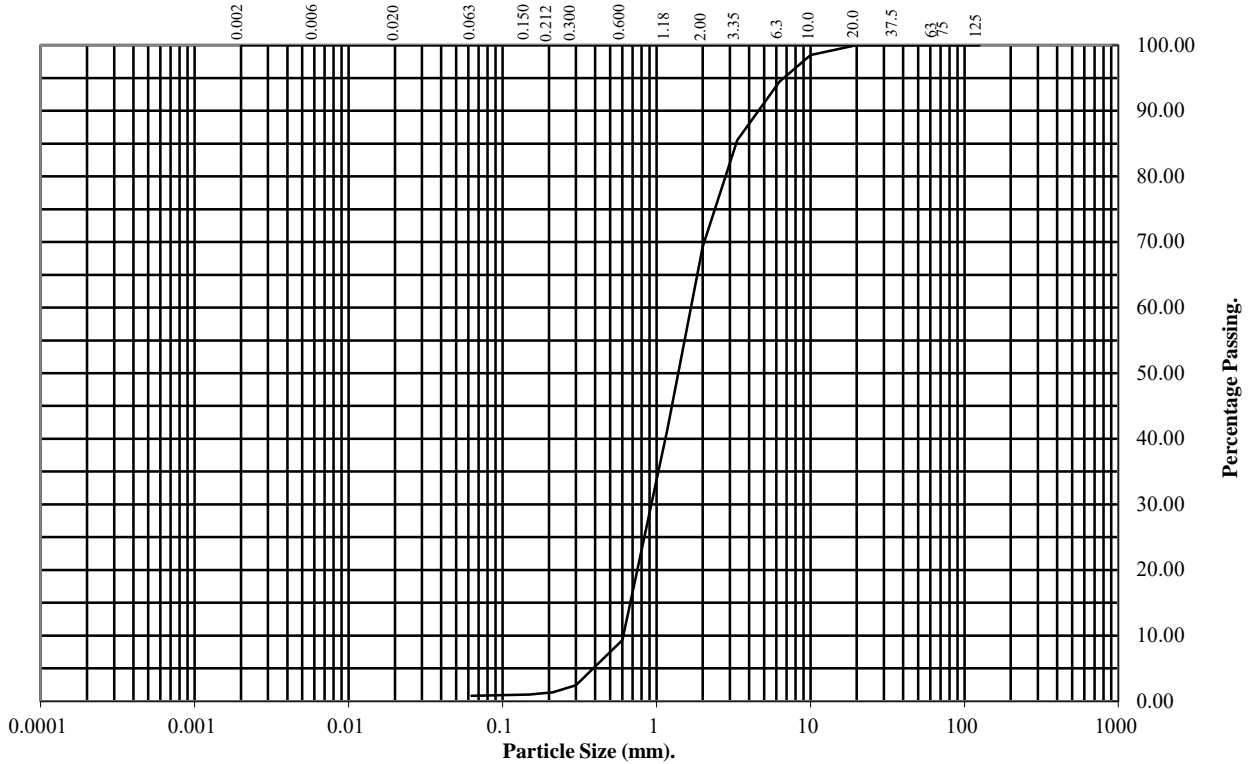
**BS1377 : Part 2 : 1990**

Wet Sieve, Clause 9.2

**Hole Number:**                      **BH09**                                      **Top Depth (m):**                      **1.80**

**Sample Number:**                      **2**    **Base Depth(m):**                      **2.20**

**Sample Type:**                      **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	98
6.3	94
3.35	86
2	69
1.18	42
0.6	9
0.3	2
0.212	1
0.15	1
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	31
Sand	68
Silt/Clay	1

**Remarks:**  
See Summary of Soil Descriptions



**Avoca River - Marine Sediment  
Sampling and Analysis**

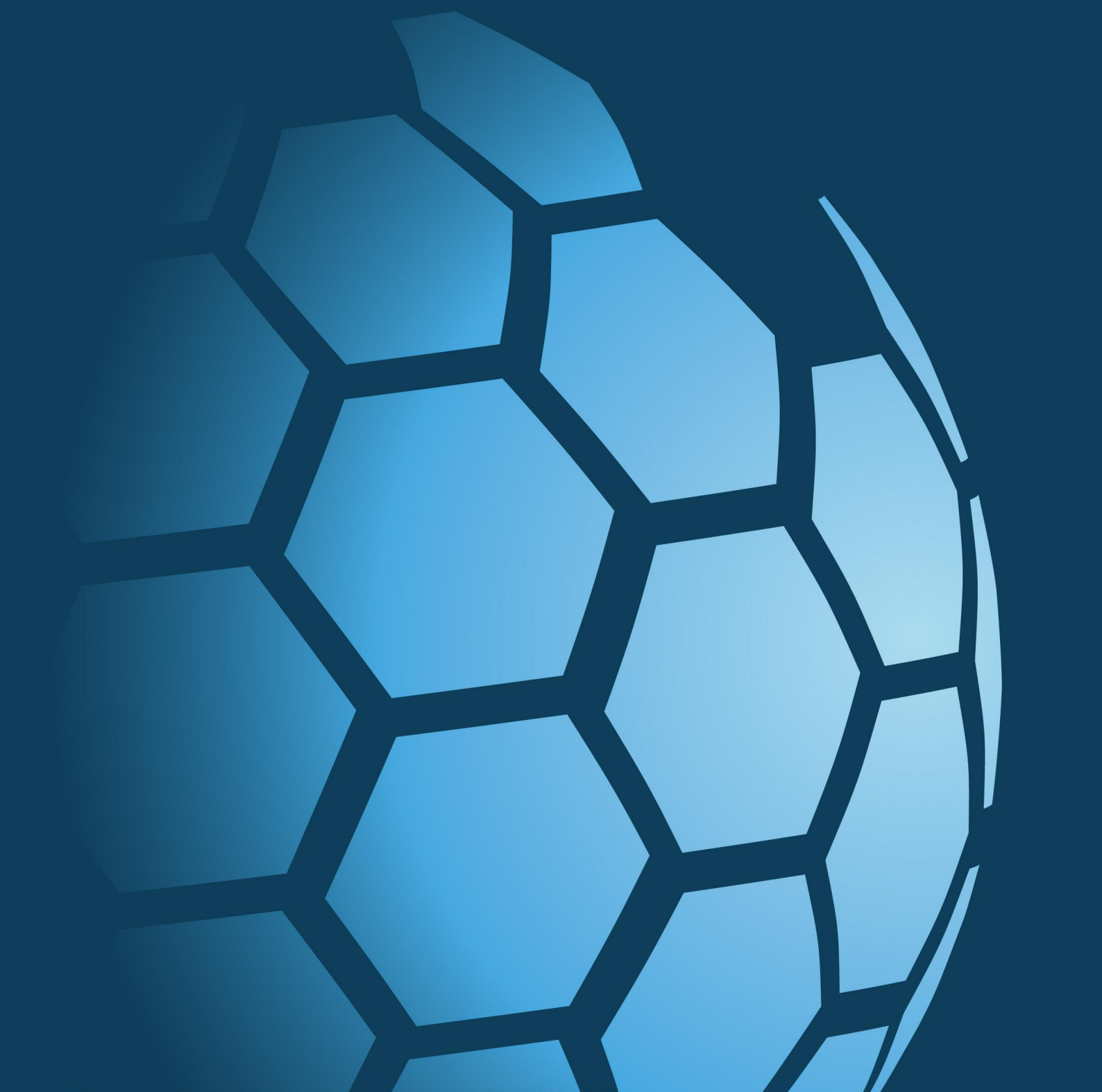
<b>Contract No:</b>
<b>PSL17/6099</b>
<b>Client Ref:</b>
<b>17-0906</b>



**CAUSEWAY**  
— GEOTECH

**APPENDIX D**

**Environmental laboratory test results**



Our Ref: EFS/181258 (Ver. 1)

Your Ref: 17-0906

January 11, 2018



Environmental Chemistry

SOCOTEC UK Limited

Bretby Business Park

Ashby Road

Burton-on-Trent

Staffordshire

DE15 0YZ

Telephone: 01283 554400

Facsimile: 01283 554422

Neil Haggan  
Causeway Geotech Ltd  
8 Drumahiskey Road  
Ballymoney  
United Kingdom  
BT53 7QL

For the attention of Neil Haggan

Dear Neil Haggan

**Sample Analysis - Avoca River Sediment Sampling**

Samples from the above site have been analysed in accordance with the schedule supplied.

The sample details and the results of analyses for these samples are given in the appended report.

An invoice for this work will follow under a separate cover.

Where appropriate the samples will be kept until 16/01/18 when they will be discarded. Please call 01283 554547 for an extension of this date.

Please be aware that our policy for the retention of paper based laboratory records and analysis reports is 6 years.

The work was carried out in accordance with SOCOTEC UK Limited (Multi-Sector Services) Standard Terms and Conditions of Contract.

If I can be of any further assistance please do not hesitate to contact me.

Yours sincerely

for SOCOTEC UK Limited

A handwritten signature in black ink, appearing to read 'J Colbourne', written in a cursive style.

J Colbourne  
Project Co-ordinator  
01283 554547

# TEST REPORT



1252

Report No. EFS/181258 (Ver. 1)

Causeway Geotech Ltd  
8 Drumahiskey Road  
Ballymoney  
United Kingdom  
BT53 7QL

## **Site: Avoca River Sediment Sampling**

The 27 samples described in this report were registered for analysis by SOCOTEC UK Limited on 05-Dec-2017. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 11-Jan-2018

Tests where the accreditation is set to N or No, and any individual data items marked with a \* are not UKAS accredited. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

The following tables are contained in this report:

Table 1 Main Analysis Results (Pages 2 to 5)  
Table of PCB Congener Results (Pages 6 to 13)  
Table of GRO Results (Page 14)  
Table of TPH (Si) banding (std) (Pages 15 to 16)  
Table of PAH Analysis (Pages 17 to 22)  
Analytical and Deviating Sample Overview (Pages 23 to 24)  
Table of Additional Report Notes (Page 25)  
Table of Method Descriptions (Page 26)  
Table of Report Notes (Page 27)  
Table of Sample Descriptions (Appendix A Page 1 of 1)

On behalf of  
SOCOTEC UK Lim

Tim Barnes

Operations Director  
Energy & Waste Services

Date of Issue: 11-Jan-2018


Tests marked 'N' have been subcontracted to another laboratory.

Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected.

SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.


			Units :	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	mg/kg	% M/M	%	ug Sn/kg		
			Method Codes :	GROHSA	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPSOIL	PAHSED	TPHUSSI	WSLM59	ANC	OGNSSED	
			Method Reporting Limits :	0.2	0.5	0.5	0.04	0.5	0.5	0.5	0.5	0.015	0.5	2	36	1	20	0.02	0.12	1
			UKAS Accredited :	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
LAB ID Number	Client Sample Description	Sample Date	GRO (AA) by HSA GC-FID	Copper (MS) Sediment	Arsenic (MS) Sediments	Cadmium (MS) Sediments	Chromium (MS) Sediments	Lead (MS) Sediments	Manganese (MS) Sediments	Mercury (MS) Sediments	Nickel (MS) Sediments	Zinc (MS) Sediments	Iron (Sediments)	PAH by MS DiI	TPH by GC/FID (AR/SI)	Total Organic Carbon (Sediment)	Carbonate %	Dibutyl Tin (Sediments)		
1786201	BH01 0.10	07-Nov-17	Req §	27.9	18.8	0.13	30.3	30.9	683.8	0.02	19.5	103.3	33600 §	Req	Req §	0.21	5.28	<1		
1786202	BH01 1.00	07-Nov-17	Req §	21	10.3	0.12	19	17.2	588.2	<0.015	16.5	88.6	29800 §	Req	Req §	0.33	1.68	<1		
1786203	BH02 0.50	08-Nov-17	Req §	46	14.5	0.16	19.2	38.7	897.2	<0.015	16.3	122.2	35100 §	Req	Req §	0.13	1.44	<1		
1786204	BH02 1.50	08-Nov-17	Req §	49.2	16.5	0.18	17.6	36.7	659.1	<0.015	14.3	102.7	30500 §	Req	Req §	0.16	4.56	<1		
1786205	BH03 0.50	08-Nov-17	Req §	45.1	20.8	0.11	25	47.5	674.8	<0.015	21	117.3	42500 §	Req	Req §	0.18	4.32	<1		
1786206	BH03 1.50	08-Nov-17	Req §	55.1	18.7	0.1	23.4	46.9	747.9	<0.015	19.8	122.5	38400 §	Req	Req §	0.30	<0.12	<1		
1786207	BH03 2.50	08-Nov-17	Req §	39.4	14.5	0.1	21.1	38.7	731.2	<0.015	18	102.7	36100 §	Req	Req §	0.12	2.40	<1		
1786208	BH04 0.50	08-Nov-17	Req §	47.4	15.2	0.22	24.7	42.9	744	<0.015	19.1	103.5	34200 §	Req	Req §	0.16	1.20	<1		
1786209	BH04 1.50	08-Nov-17	Req §	33.2	20	0.49	25.3	23.5	839.9	<0.015	19.4	146.4	37200 §	Req	Req §	0.16	6.24	<1		
1786210	BH04 2.50	08-Nov-17	Req §	20.7	8.6	0.33	13.1	14.1	443.8	<0.015	12.6	93.4	21200 §	Req	Req §	0.09	8.64	<1		
1786211	BH05 0.50	09-Nov-17	Req §	36	14.2	0.1	19.9	27.6	824.9	<0.015	15.3	114.5	36100 §	Req	Req §	0.48	5.04	<1		
1786212	BH05 1.00	09-Nov-17	Req §	27.8	17.3	0.11	15.6	20.8	580.6	0.04	14.2	126	31000 §	Req	Req §	0.15	2.88	<1		
1786213	BH05 2.00	09-Nov-17	Req §	40.1	20.4	0.06	17.1	16.8	619.4	<0.015	14.3	129.1	32300 §	Req	Req §	0.15	2.64	<1		
1786214	BH05 3.00	09-Nov-17	Req §	18.3	11.3	0.2	19.9	9.8	620.8	<0.015	17.6	145.7	32800 §	Req	Req §	0.12	6.96	<1		
1786215	BH06 0.50	09-Nov-17	Req §	30.1	16.8	0.11	19.2	18.4	755.9	<0.015	15.5	130.7	32000 §	Req	Req §	0.14	7.20	<1		
1786216	BH06 1.00	09-Nov-17	Req §	23.6	15.8	0.1	17.4	12.8	723.9	<0.015	14.3	117.1	30400 §	Req	Req §	0.13	1.44	<1		
1786217	BH06 2.00	09-Nov-17	Req §	25.7	19.1	0.13	13.4	13.3	628.2	0.03	11.7	107.2	30700 §	Req	Req §	0.15	3.12	<1		
1786218	BH06 3.00	09-Nov-17	Req §	92.5	20.2	0.61	20	18.3	688.4	<0.015	16.3	119.7	36400 §	Req	Req §	0.11	<0.12	<1		
1786219	BH07 1.00	09-Nov-17	Req §	28.4	18	0.07	19.6	17.8	731.7	<0.015	17.4	121	32000 §	Req	Req §	0.12	5.28	<1		
1786220	BH07 2.00	09-Nov-17	Req §	26.3	22.7	0.1	18.6	24.7	626	<0.015	15.8	115.4	29500 §	Req	Req §	0.11	0.24	<1		

 <p>Bretby Business Park, Ashby Road Burton-on-Trent, Staffordshire, DE15 0YZ Tel +44 (0) 1283 554400 Fax +44 (0) 1283 554422</p>	Client Name	Causeway Geotech Ltd	<h2>Avoca River Sediment Sampling</h2>		<h3>Sample Analysis</h3>	
	Contact	Neil Haggan				
				Date Printed	21-Dec-2017	
				Report Number	EFS/181258	
			Table Number	1		

Units :		ug Sn/kg	µg/kg	µg/kg													
Method Codes :		OGNSSED	PCBMS3Q	PCBMS3Q													
Method Reporting Limits :		1	0.08	0.08													
UKAS Accredited :		No	No	No													
LAB ID Number	Client Sample Description	Sample Date	Tributyl Tin (Sediments)	Organochlorine Pesticides (Marine Sediments)	PCB- 7 Congeners (Marine Sediments)												
1786201	BH01 0.10	07-Nov-17	<1	Req	Req												
1786202	BH01 1.00	07-Nov-17	<1	Req	Req												
1786203	BH02 0.50	08-Nov-17	<1	Req	Req												
1786204	BH02 1.50	08-Nov-17	<1	Req	Req												
1786205	BH03 0.50	08-Nov-17	<1	Req	Req												
1786206	BH03 1.50	08-Nov-17	<1	Req	Req												
1786207	BH03 2.50	08-Nov-17	<1	Req	Req												
1786208	BH04 0.50	08-Nov-17	<1	Req	Req												
1786209	BH04 1.50	08-Nov-17	<1	Req	Req												
1786210	BH04 2.50	08-Nov-17	<1	Req	Req												
1786211	BH05 0.50	09-Nov-17	<1	Req	Req												
1786212	BH05 1.00	09-Nov-17	<1	Req	Req												
1786213	BH05 2.00	09-Nov-17	<1	Req	Req												
1786214	BH05 3.00	09-Nov-17	<1	Req	Req												
1786215	BH06 0.50	09-Nov-17	<1	Req	Req												
1786216	BH06 1.00	09-Nov-17	<1	Req	Req												
1786217	BH06 2.00	09-Nov-17	<1	Req	Req												
1786218	BH06 3.00	09-Nov-17	<1	Req	Req												
1786219	BH07 1.00	09-Nov-17	<1	Req	Req												
1786220	BH07 2.00	09-Nov-17	<1	Req	Req												

 <p>Bretby Business Park, Ashby Road Burton-on-Trent, Staffordshire, DE15 0YZ Tel +44 (0) 1283 554400 Fax +44 (0) 1283 554422</p>	<b>Client Name</b> Causeway Geotech Ltd	<b>Sample Analysis</b>	
	<b>Contact</b> Neil Haggan		
	<b>Avoca River Sediment Sampling</b>		<b>Date Printed</b> 21-Dec-2017
			<b>Report Number</b> EFS/181258
<b>Table Number</b> 1			







# Organochlorine Pesticides

**Customer and Site Details:** Causeway Geotech Ltd: Avoca River Sediment Sampling  
**Job Number:** S18\_1258  
**QC Batch Number:** 170019  
**Directory:** 181217.TQ1  
**Method:** Ultrasonic

**Matrix:** Sediment  
**Date Booked in:** 05-Dec-17  
**Date Extracted:** 16-Dec-17  
**Date Analysed:** 18-Dec-17  
**UKAS Accredited:** No

Compounds marked \* are not UKAS or MCerts accredited

<b>Sample ID :</b>	CL1786201	CL1786202	CL1786203	CL1786204	CL1786205
<b>Client ID :</b>	BH01 0.10	BH01 1.00	BH02 0.50	BH02 1.50	BH03 0.50

Compound	Concentration (µg/kg)				
alpha-HCH	<0.10	<0.10	<0.10	<0.10	<0.10
Hexachlorobenzene	<0.10	<0.10	<0.10	<0.10	<0.10
gamma-HCH	<0.10	<0.10	<0.10	<0.10	<0.10
p,p'-DDE	<0.10	<0.10	<0.10	<0.10	<0.10
Dieldrin	<0.10	<0.10	<0.10	<0.10	<0.10
p,p'-DDD	<0.10	<0.10	<0.10	<0.10	<0.10
p,p'-DDT	<0.10	<0.10	<0.10	<0.10	<0.10

# Organochlorine Pesticides

**Customer and Site Details:** Causeway Geotech Ltd: Avoca River Sediment Sampling  
**Job Number:** S18\_1258  
**QC Batch Number:** 170019  
**Directory:** 181217.TQ1  
**Method:** Ultrasonic

**Matrix:** Sediment  
**Date Booked in:** 05-Dec-17  
**Date Extracted:** 16-Dec-17  
**Date Analysed:** 18-Dec-17  
**UKAS Accredited:** No

Compounds marked \* are not UKAS or MCerts accredited

<b>Sample ID :</b>	CL1786206	CL1786207	CL1786208	CL1786209	CL1786210
<b>Client ID :</b>	BH03 1.50	BH03 2.50	BH04 0.50	BH04 1.50	BH04 2.50

Compound	Concentration (µg/kg)				
alpha-HCH	<0.10	<0.10	<0.10	<0.10	<0.10
Hexachlorobenzene	<0.10	<0.10	<0.10	<0.10	<0.10
gamma-HCH	<0.10	<0.10	<0.10	<0.10	<0.10
p,p'-DDE	<0.10	<0.10	<0.10	<0.10	<0.10
Dieldrin	<0.10	<0.10	<0.10	<0.10	<0.10
p,p'-DDD	<0.10	<0.10	<0.10	<0.10	<0.10
p,p'-DDT	<0.10	<0.10	<0.10	<0.10	<0.10

# Organochlorine Pesticides

**Customer and Site Details:** Causeway Geotech Ltd: Avoca River Sediment Sampling  
**Job Number:** S18\_1258  
**QC Batch Number:** 170019  
**Directory:** 181217.TQ1  
**Method:** Ultrasonic

**Matrix:** Sediment  
**Date Booked in:** 05-Dec-17  
**Date Extracted:** 16-Dec-17  
**Date Analysed:** 18-Dec-17  
**UKAS Accredited:** No

Compounds marked \* are not UKAS or MCerts accredited

<b>Sample ID :</b>	CL1786211	CL1786212	CL1786213	CL1786214	CL1786215
<b>Client ID :</b>	BH05 0.50	BH05 1.00	BH05 2.00	BH05 3.00	BH06 0.50

Compound	Concentration (µg/kg)				
alpha-HCH	<0.10	<0.10	<0.10	<0.10	<0.10
Hexachlorobenzene	<0.10	<0.10	<0.10	<0.10	<0.10
gamma-HCH	<0.10	<0.10	<0.10	<0.10	<0.10
p,p'-DDE	<0.10	<0.10	<0.10	<0.10	<0.10
Dieldrin	<0.10	<0.10	<0.10	<0.10	<0.10
p,p'-DDD	<0.10	<0.10	<0.10	<0.10	<0.10
p,p'-DDT	<0.10	<0.10	<0.10	<0.10	<0.10

# Organochlorine Pesticides

**Customer and Site Details:** Causeway Geotech Ltd: Avoca River Sediment Sampling  
**Job Number:** S18\_1258  
**QC Batch Number:** 170019  
**Directory:** 181217.TQ1  
**Method:** Ultrasonic

**Matrix:** Sediment  
**Date Booked in:** 05-Dec-17  
**Date Extracted:** 16-Dec-17  
**Date Analysed:** 18-Dec-17  
**UKAS Accredited:** No

Compounds marked \* are not UKAS or MCerts accredited

<b>Sample ID :</b>	CL1786216	CL1786217	CL1786218	CL1786219	CL1786220
<b>Client ID :</b>	BH06 1.00	BH06 2.00	BH06 3.00	BH07 1.00	BH07 2.00

Compound	Concentration (µg/kg)				
alpha-HCH	<0.10	<0.10	<0.10	<0.10	<0.10
Hexachlorobenzene	<0.10	<0.10	<0.10	<0.10	<0.10
gamma-HCH	<0.10	<0.10	<0.10	<0.10	<0.10
p,p'-DDE	<0.10	<0.10	<0.10	<0.10	<0.10
Dieldrin	<0.10	<0.10	<0.10	<0.10	<0.10
p,p'-DDD	<0.10	<0.10	<0.10	<0.10	<0.10
p,p'-DDT	<0.10	<0.10	<0.10	<0.10	<0.10

# Organochlorine Pesticides

**Customer and Site Details:** Causeway Geotech Ltd: Avoca River Sediment Sampling  
**Job Number:** S18\_1258  
**QC Batch Number:** 170020  
**Directory:** 181217.TQ1  
**Method:** Ultrasonic

**Matrix:** Sediment  
**Date Booked in:** 05-Dec-17  
**Date Extracted:** 16-Dec-17  
**Date Analysed:** 18-Dec-17  
**UKAS Accredited:** No

Compounds marked \* are not UKAS or MCerts accredited

<b>Sample ID :</b>	CL1786221	CL1786222	CL1786223	CL1786224	CL1786225
<b>Client ID :</b>	BH08 1.00	BH08 2.00	BH09 0.50	BH09 2.00	CRM

Compound	Concentration (µg/kg)				
alpha-HCH	<0.10	<0.10	<0.10	<0.10	<0.10
Hexachlorobenzene	<0.10	<0.10	<0.10	<0.10	8.85
gamma-HCH	<0.10	<0.10	<0.10	<0.10	<0.10
p,p'-DDE	<0.10	<0.10	<0.10	<0.10	2.50
Dieldrin	<0.10	<0.10	<0.10	<0.10	0.35
p,p'-DDD	<0.10	<0.10	<0.10	<0.10	3.73
p,p'-DDT	<0.10	<0.10	<0.10	<0.10	0.19

Where individual results are flagged see report notes for status.

# Organochlorine Pesticides

**Customer and Site Details:** Causeway Geotech Ltd: Avoca River Sediment Sampling  
**Job Number:** S18\_1258  
**QC Batch Number:** 170020  
**Directory:** 181217.TQ1  
**Method:** Ultrasonic

**Matrix:** Sediment  
**Date Booked in:** 05-Dec-17  
**Date Extracted:** 16-Dec-17  
**Date Analysed:** 18-Dec-17  
**UKAS Accredited:** No

Compounds marked \* are not UKAS or MCerts accredited

<b>Sample ID :</b>	CL1786226	CL1786227			
<b>Client ID :</b>	QC Blank	Reference Material (% Recovery)			

Compound	Concentration (µg/kg)				
alpha-HCH	<0.10	89			
Hexachlorobenzene	<0.10	98			
gamma-HCH	<0.10	92			
p,p'-DDE	<0.10	83			
Dieldrin	<0.10	89			
p,p'-DDD	<0.10	90			
p,p'-DDT	<0.10	99			



# Polychlorinated Biphenyls (congeners)

**Customer and Site Details:** Causeway Geotech Ltd: Avoca River Sediment Sampling  
**Job Number:** S18\_1258  
**QC Batch Number:** 170019  
**Directory:** 181217PCB.TQ1  
**Method:** Ultrasonic

**Matrix:** Soil  
**Date Booked in:** 05-Dec-17  
**Date Extracted:** 16-Dec-17  
**Date Analysed:** 18-Dec-17

*Compounds marked \* are not UKAS or MCerts accredited*

Sample ID	Customer ID	Concentration, (µg/kg)						
		PCB28*	PCB52*	PCB101*	PCB118*	PCB153*	PCB138*	PCB180*
CL1786201	BH01 0.10	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786202	BH01 1.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786203	BH02 0.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786204	BH02 1.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786205	BH03 0.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786206	BH03 1.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786207	BH03 2.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786208	BH04 0.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786209	BH04 1.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786210	BH04 2.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786211	BH05 0.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786212	BH05 1.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786213	BH05 2.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786214	BH05 3.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786215	BH06 0.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786216	BH06 1.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786217	BH06 2.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786218	BH06 3.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786219	BH07 1.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786220	BH07 2.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

# Polychlorinated Biphenyls (congeners)

**Customer and Site Details:** Causeway Geotech Ltd: Avoca River Sediment Sampling  
**Job Number:** S18\_1258  
**QC Batch Number:** 170020  
**Directory:** 181217PCB.TQ1  
**Method:** Ultrasonic

**Matrix:** Soil  
**Date Booked in:** 05-Dec-17  
**Date Extracted:** 16-Dec-17  
**Date Analysed:** 18-Dec-17

*Compounds marked \* are not UKAS or MCerts accredited*

Sample ID	Customer ID	Concentration, (µg/kg)						
		PCB28*	PCB52*	PCB101*	PCB118*	PCB153*	PCB138*	PCB180*
CL1786221	BH08 1.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786222	BH08 2.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786223	BH09 0.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786224	BH09 2.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786225	CRM	2.87	4.60	4.87	3.34	4.10	4.22	2.48
CL1786226	QC Blank	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786227	Reference Material (% Recovery)	73	117	104	106	105	109	106

# Gasoline Range Organics (BTEX and Aliphatic Carbon Ranges)

**Customer and Site Details:** Causeway Geotech Ltd : Avoca River Sediment Sampling  
**Job Number:** S18\_1258  
**Directory:** D:\TES\DATA\2017\1215HSA\_GC9\121517 2017-12-15 16-39-29\133B3301.D  
**Method:** Headspace GCFID

**Matrix:** Soil  
**Date Booked in:** 05-Dec-17  
**Date extracted:** 15-Dec-17  
**Date Analysed:** 16-Dec-17, 02:05:56

\* Sample data with an asterisk are not UKAS accredited.

Sample ID	Client ID	Concentration, (mg/kg) - as wet weight					Aliphatics				Total GRO
		Benzene	Toluene	Ethyl benzene	m/p-Xylene	o-Xylene	C5 - C6	>C6 - C7	>C7 - C8	>C8 - C10	
* CL1786201	BH01 0.10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786202	BH01 1.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786203	BH02 0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786204	BH02 1.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786205	BH03 0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786206	BH03 1.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786207	BH03 2.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786208	BH04 0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786209	BH04 1.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786210	BH04 2.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786211	BH05 0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786212	BH05 1.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786213	BH05 2.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786214	BH05 3.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786215	BH06 0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786216	BH06 1.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786217	BH06 2.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786218	BH06 3.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786219	BH07 1.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786220	BH07 2.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786221	BH08 1.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786222	BH08 2.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786223	BH09 0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
CL1786224	BH09 2.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
CL1786226	QC Blank	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
CL1786227	Reference Material (% Recovery)	92	92	96	97	92	100	109	112	107	106

Note: Benzene elutes between C6 and C7, toluene elutes between C7 and C8, ethyl benzene and the xylenes elute between C8 and C9.

Each BTEX compound is deducted from the appropriate band to give the aliphatic fractions, however aromatic compounds may still be contributing to these fractions

## ALIPHATIC / AROMATIC FRACTION BY GC/FID

**Customer and Site Details:** Causeway Geotech Ltd : Avoca River Sediment Sampling  
**Job Number:** S18\_1258  
**QC Batch Number:** 171347  
**Directory:** C:\CHEM32\1\DATA\121917TPH\_GC15\121917 2017-12-19 09-54-58\OnlineEdited--046B.D  
**Method:** Ultra Sonic

**Matrix:** Soil  
**Date Booked in:** 05-Dec-17  
**Date Extracted:** 15-Dec-17  
**Date Analysed:** 19-Dec-17, 19:14:33

* This sample data is not UKAS accredited.		Concentration, (mg/kg) - as wet weight											
		>C8 - C10		>C10 - C12		>C12 - C16		>C16 - C21		>C21 - C35		>C35 - C40	
Sample ID	Client ID	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics
* CL1786213	BH05 2.00	<4.08	<4	<4.08	<4	<4.08	<4	<4.08	<4	<8.94	<8.76	<20.4	<20
* CL1786214	BH05 3.00	<4.04	<4	<4.04	<4	<4.04	5.24	<4.04	<4	<8.85	<8.76	<20.2	<20
* CL1786215	BH06 0.50	<4.04	<4	<4.04	<4	<4.04	<4	<4.04	<4	<8.85	<8.76	<20.2	<20
* CL1786216	BH06 1.00	<4.08	<4	<4.08	<4	<4.08	<4	<4.08	<4	<8.94	<8.76	<20.4	<20
* CL1786217	BH06 2.00	<4.12	<4	<4.12	<4	<4.12	<4	<4.12	<4	<9	<8.76	<20.6	<20
* CL1786218	BH06 3.00	<4.08	<4	<4.08	<4	<4.08	5.53	4.93	<4	25.3	12.8	33.2	21.9
* CL1786219	BH07 1.00	<4.12	<4	<4.12	<4	<4.12	7.65	<4.12	<4	<9	<8.76	<20.6	<20
* CL1786220	BH07 2.00	<4.12	<4	<4.12	<4	<4.12	<4	<4.12	<4	<9	<8.76	<20.6	<20
* CL1786221	BH08 1.00	<4.12	<4	<4.12	<4	<4.12	5.2	<4.12	<4	<9	<8.76	<20.6	<20
* CL1786222	BH08 2.00	<4.04	<4	<4.04	<4	<4.04	<4	<4.04	<4	11.2	<8.76	<20.2	<20
* CL1786223	BH09 0.50	<4.08	<4	<4.08	<4	<4.08	4.96	<4.08	<4	11.2	<8.76	<20.4	<20
* CL1786224	BH09 2.00	<4.08	<4	<4.08	<4	<4.08	7.11	<4.08	<4	<8.94	<8.76	<20.4	<20
* CL1786226	QC Blank	<4.04	<4	<4.04	<4	<4.04	<4	<4.04	<4	<8.85	<8.76	<20.2	<20
* CL1786227	Reference Material (% Recovery)	95%	102%	90%	132%*	88%	102%	90%	94%	95%	100%	90%	100%



**Polyaromatic Hydrocarbon Concentrations (ng/g dry weight basis)**

UKAS accredited?: Yes

		<b>Sample ID :</b>	CL1786226a	CL1786227a	CL1786226b	CL1786227b	CL1786225	CL1786201	CL1786202	CL1786203	CL1786204
		<b>Station :</b>	QC Blank	Reference Material (% Recovery)	QC Blank	Reference Material (% Recovery)	1941b	BH01 0.10	BH01 1.00	BH02 0.50	BH02 1.50
<b>PAH Fraction</b>	<b># PAH</b>	<b>Mass</b>									
Naphthalene	1	128	<1	105.8	<1	100.1	563.5	1.7	<1	2.7	77.6
C1 Naphthalenes *	2	142	<1	105.1	<1	97.3	302.9	1.6	1.2	1.7	48.9
C2 Naphthalenes *		156	<1	N.D	<1	N.D	208.8	1.4	<1	1.5	29.3
C3 Naphthalenes *		170	<1	N.D	<1	N.D	168.0	1.3	<1	1.6	18.9
C4 Naphthalenes *		184	<1	N.D	<1	N.D	111.8	1.1	<1	2.2	11.2
Sum Naphthalenes *		0	0	105	0	99	1355	7	1	10	186
Phenanthrene / Anthracene	2	178	<1	111.0	<1	108.9	498.7	20.4	1.4	8.7	204.8
C1 178 *		192	<1	N.D	<1	N.D	301.6	7.9	1.2	4.1	60.4
C2 178 *		206	<1	N.D	<1	N.D	245.5	4.8	1.3	3.8	31.7
C3 178 *		220	<1	N.D	<1	N.D	180.1	2.6	<1	3.0	21.0
Sum 178 *		0	0	111	0.0	108.9	1225.9	35.6	3.9	19.7	317.9
Dibenzothiophene		184	<1	112	<1	105.2	45.0	1.4	<1	<1	12.0
C1 Dibenzothiophenes *		198	<1	N.D	<1	N.D	68.1	1.1	<1	1.1	8.2
C2 Dibenzothiophenes *		212	<1	N.D	<1	N.D	108.0	1.4	<1	2.0	9.2
C3 Dibenzothiophenes *		226	<1	N.D	<1	N.D	66.5	<1	<1	1.6	6.8
Sum Dibenzothiophenes *		0	0	112	0.0	105.2	287.6	3.9	0.0	4.6	36.2
Fluoranthene / pyrene	2	202	<1	108	<1	104.9	1025.5	53.0	9.1	19.3	281.3
C1 202 *		216	<1	N.D	<1	N.D	289.6	9.3	1.9	5.3	71.9
C2 202 *		230	<1	N.D	<1	N.D	204.5	7.5	1.9	3.6	35.6
C3 202 *		244	<1	N.D	<1	N.D	124.2	2.9	<1	1.6	15.6
Sum 202 *		0	0	108	0.0	104.9	1643.8	72.8	12.8	29.9	404.3
Benzoanthracene / Chrysene	2	228	<1	108	<1	104.3	641.5	25.6	3.4	8.5	122.3
C1 228 *		242	<1	N.D	<1	N.D	291.0	6.9	1.7	3.9	42.0
C2 228 *		256	<1	N.D	<1	N.D	163.9	3.2	1.1	2.9	18.2
Sum 228 *		0	0	108	0.0	104.3	1096.3	35.6	6.2	15.3	182.5
Benzofluoranthenes / benzopyrenes	4	252	<1	104	<1	101.7	1192.8	34.5	4.8	11.7	148.2
C1 252 *		266	<1	N.D	<1	N.D	321.3	8.5	2.1	4.6	44.1
C2 252 *		280	<1	N.D	<1	N.D	167.7	3.2	<1	1.4	19.4
Sum 252 *		0	0	104	0.0	101.7	1681.7	46.2	6.9	17.7	211.7
Dibenzoanthracene / Indenopyrene / Benzoperylene	3	276	<1	93	<1	92.0	553.4	14.1	2.4	4.2	57.0
C1 276 *		290	<1	N.D	<1	N.D	77.2	1.7	<1	<1	20.1
C2 276 *		304	<1	N.D	<1	N.D	38.0	<1	<1	<1	5.1
Sum 276 *		0	0	93	0.0	92.0	668.6	15.8	2.4	4.2	82.2
Sum of all fractions *			0	106	0.0	102.2	7958.9	217.1	33.5	101.0	1420.7
Sum of NPD fraction *			0	109	0.0	104.3	2868.5	46.7	5.2	34.0	540.0
NPD / 4-6 ring PAH ratio *			N.D	0.27	N.D	0.26	0.56	0.27	0.18	0.51	0.61

N.D = Not Determined as these compounds are not in the reference material spike.

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

\* Denotes not UKAS accredited

**Polyaromatic Hydrocarbon Concentrations (ng/g dry weight basis)**

UKAS accredited?: Yes

		Sample ID : Station :	CL1786205 BH03 0.50	CL1786206 BH03 1.50	CL1786207 BH03 2.50	CL1786208 BH04 0.50	CL1786209 BH04 1.50	CL1786210 BH04 2.50	CL1786211 BH05 0.50	CL1786212 BH05 1.00	CL1786213 BH05 2.00	CL1786214 BH05 3.00
PAH Fraction	# PAH	Mass										
Naphthalene	1	128	<1	<1	<1	<1	<1	<1	<1	12.1	<1	<1
C1 Naphthalenes *	2	142	<1	<1	1.3	1.1	<1	<1	<1	21.4	<1	<1
C2 Naphthalenes *		156	<1	<1	8.4	1.3	1.1	<1	<1	11.4	<1	<1
C3 Naphthalenes *		170	1.2	<1	16.6	1.4	<1	<1	<1	7.5	<1	<1
C4 Naphthalenes *		184	1.1	<1	10.6	1.3	<1	2.7	<1	4.5	<1	<1
Sum Naphthalenes *			2	0	37	5	1	3	0	57	0	0
Phenanthrene / Anthracene	2	178	2.6	<1	64.7	2.0	<1	<1	<1	4.7	<1	<1
C1 178 *		192	2.8	<1	38.2	3.0	1.1	1.0	1.1	5.7	<1	<1
C2 178 *		206	2.2	<1	27.3	4.4	1.2	1.3	<1	5.6	<1	<1
C3 178 *		220	1.5	<1	13.3	3.2	<1	1.1	<1	3.5	<1	<1
Sum 178 *			9.0	0.0	143.5	12.5	2.3	3.4	1.1	19.6	0.0	0.0
Dibenzothiophene		184	<1	<1	4.3	<1	<1	<1	<1	<1	<1	<1
C1 Dibenzothiophenes *		198	<1	<1	8.8	<1	<1	<1	<1	1.1	<1	<1
C2 Dibenzothiophenes *		212	<1	<1	8.2	1.3	<1	1.1	<1	1.4	<1	<1
C3 Dibenzothiophenes *		226	<1	<1	3.8	1.6	<1	1.3	<1	<1	<1	<1
Sum Dibenzothiophenes *			0.0	0.0	25.1	2.9	0.0	2.5	0.0	2.5	0.0	0.0
Fluoranthene / pyrene	2	202	11.5	1.5	124.0	21.7	3.4	<1	5.9	13.7	2.3	2.9
C1 202 *		216	3.2	<1	30.8	6.0	1.1	<1	1.5	4.5	<1	<1
C2 202 *		230	2.0	<1	17.9	6.2	1.1	<1	1.2	4.5	<1	<1
C3 202 *		244	<1	<1	8.2	3.8	<1	<1	<1	2.9	<1	<1
Sum 202 *			16.7	1.5	180.9	37.7	5.6	0.0	8.5	25.7	2.3	2.9
Benzoanthracene / Chrysene	2	228	5.3	<1	47.4	14.0	<1	<1	3.1	7.7	<1	<1
C1 228 *		242	2.2	<1	18.0	5.9	<1	<1	1.4	4.4	<1	<1
C2 228 *		256	1.4	<1	9.9	3.9	<1	<1	<1	3.1	<1	<1
Sum 228 *			8.9	0.0	75.3	23.8	0.0	0.0	4.5	15.2	0.0	0.0
Benzofluoranthenes / benzopyrenes	4	252	6.5	<1	53.7	23.5	<1	<1	4.4	13.4	<1	<1
C1 252 *		266	1.9	<1	19.4	7.0	1.2	<1	1.6	5.5	<1	<1
C2 252 *		280	<1	<1	9.4	3.7	<1	<1	<1	2.9	<1	<1
Sum 252 *			8.3	0.0	82.5	34.3	1.2	0.0	6.0	21.7	0.0	0.0
Dibenzoanthracene / Indenopyrene / Benzoperylene	3	276	2.3	<1	22.1	9.0	<1	<1	<1	6.0	<1	<1
C1 276 *		290	<1	<1	5.0	2.2	<1	<1	<1	1.3	<1	<1
C2 276 *		304	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sum 276 *			2.3	0.0	27.1	11.2	0.0	0.0	0.0	7.3	0.0	0.0
Sum of all fractions *			47.5	1.5	571.4	127.3	10.2	8.6	20.1	148.9	2.3	2.9
Sum of NPD fraction *			11.2	0.0	205.6	20.5	3.4	8.6	1.1	79.0	0.0	0.0
NPD / 4-6 ring PAH ratio *			0.31	0.00	0.56	0.19	0.50	N.D	0.06	1.13	0.00	0.00

N.D = Not Determined as these compounds are not in the reference material spike.

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

\* Denotes not UKAS accredited

**Polyaromatic Hydrocarbon Concentrations (ng/g dry weight basis)**

UKAS accredited?: Yes

		<b>Sample ID :</b>	CL1786215	CL1786216	CL1786217	CL1786218	CL1786219	CL1786220	CL1786221	CL1786222	CL1786223	CL1786224
		<b>Station :</b>	BH06 0.50	BH06 1.00	BH06 2.00	BH06 3.00	BH07 1.00	BH07 2.00	BH08 1.00	BH08 2.00	BH09 0.50	BH09 2.00
<b>PAH Fraction</b>	<b># PAH</b>	<b>Mass</b>										
Naphthalene	1	128	<1	<1	<1	<1	<1	<1	1.3	1.0	28.7	<1
C1 Naphthalenes *	2	142	<1	<1	<1	<1	<1	<1	1.1	1.3	10.4	1.1
C2 Naphthalenes *		156	<1	<1	<1	<1	1.3	<1	<1	1.7	7.5	<1
C3 Naphthalenes *		170	<1	<1	<1	<1	2.0	1.3	1.1	3.9	3.8	1.3
C4 Naphthalenes *		184	<1	<1	<1	1.0	1.6	1.7	1.0	13.6	3.3	2.2
Sum Naphthalenes *		0	0	0	0	1	5	3	5	22	54	5
Phenanthrene / Anthracene	2	178	<1	<1	<1	<1	1.8	2.2	9.8	10.3	20.8	8.5
C1 178 *		192	<1	<1	<1	<1	1.8	1.3	4.6	9.3	9.7	6.5
C2 178 *		206	<1	<1	<1	<1	1.6	1.3	3.5	17.6	8.7	8.7
C3 178 *		220	<1	<1	<1	<1	1.1	1.0	3.1	16.8	9.8	7.5
Sum 178 *		0.0	0.0	0.0	0.0	0.0	6.3	5.9	20.9	54.0	48.9	31.3
Dibenzothiophene		184	<1	<1	<1	<1	<1	<1	<1	1.2	3.5	<1
C1 Dibenzothiophenes *		198	<1	<1	<1	<1	<1	<1	<1	4.3	9.0	1.4
C2 Dibenzothiophenes *		212	<1	<1	<1	<1	<1	<1	1.8	14.5	3.7	3.1
C3 Dibenzothiophenes *		226	<1	<1	<1	<1	<1	<1	1.5	17.3	2.8	2.6
Sum Dibenzothiophenes *		0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	37.3	19.0	7.0
Fluoranthene / pyrene	2	202	<1	<1	<1	<1	4.3	9.2	34.0	41.9	44.7	47.6
C1 202 *		216	<1	<1	<1	<1	1.4	2.0	9.6	11.5	14.1	11.7
C2 202 *		230	<1	<1	<1	<1	1.3	1.2	5.1	9.0	13.6	10.1
C3 202 *		244	<1	<1	<1	<1	<1	<1	2.8	5.2	9.5	6.5
Sum 202 *		0.0	0.0	0.0	0.0	0.0	7.0	12.4	51.6	67.5	81.9	75.9
Benzoanthracene / Chrysene	2	228	<1	<1	<1	<1	1.1	2.4	10.2	13.6	23.9	23.4
C1 228 *		242	<1	<1	<1	<1	1.0	1.2	4.2	6.4	15.1	10.0
C2 228 *		256	<1	<1	<1	<1	<1	<1	3.4	3.5	9.5	7.4
Sum 228 *		0.0	0.0	0.0	0.0	0.0	2.1	3.6	17.9	23.5	48.6	40.7
Benzofluoranthenes / benzopyrenes	4	252	<1	<1	<1	<1	<1	<1	16.0	25.5	47.8	40.2
C1 252 *		266	<1	<1	<1	<1	1.3	<1	3.9	6.7	16.9	10.9
C2 252 *		280	<1	<1	<1	<1	<1	<1	1.5	3.0	9.1	5.7
Sum 252 *		0.0	0.0	0.0	0.0	0.0	1.3	0.0	21.4	35.2	73.8	56.7
Dibenzoanthracene / Indenopyrene / Benzoperylene	3	276	<1	<1	<1	<1	<1	<1	4.0	7.4	20.9	10.7
C1 276 *		290	<1	<1	<1	<1	<1	<1	<1	1.3	4.4	1.7
C2 276 *		304	<1	<1	<1	<1	<1	<1	<1	<1	1.1	<1
Sum 276 *		0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	8.6	26.4	12.4
Sum of all fractions *			0.0	0.0	0.0	1.0	21.6	24.9	123.5	247.7	352.1	228.6
Sum of NPD fraction *			0.0	0.0	0.0	1.0	11.2	8.9	28.7	112.9	121.5	42.8
NPD / 4-6 ring PAH ratio *			N.D	N.D	N.D	N.D	1.07	0.55	0.30	0.84	0.53	0.23

N.D = Not Determined as these compounds are not in the reference material spike.

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

\* Denotes not UKAS accredited



**Polyaromatic Hydrocarbon Concentrations (ng/g dry weight basis)**

UKAS accredited?: Yes

**EPA 16 PAHs**

Compounds marked with a \* are reported not UKAS.

	<b>Sample ID :</b>	CL1786226a	CL1786227a	CL1786226b	CL1786227b	CL1786225	CL1786201	CL1786202	CL1786203	CL1786204
	<b>Station :</b>	QC Blank	Reference Material (% Recovery)	QC Blank	Reference Material (% Recovery)	1941b	BH01 0.10	BH01 1.00	BH02 0.50	BH02 1.50
<b>PAH</b>	<b>Mass</b>									
Naphthalene	128	<1	105.8	<1	100.1	563.5	1.7	<1	2.7	77.6
Acenaphthylene	152	<1	108.4	<1	101.5	56.2	1.0	<1	<1	3.1
Acenaphthene	154	<1	106.7	<1	101.1	35.7	<1	<1	1.1	35.0
Fluorene	166	<1	106.8	<1	101.7	48.6	1.1	<1	1.5	38.0
Phenanthrene	178	<1	113.2	<1	114.8	359.6	15.8	1.4	6.6	160.7
Dibenzothiophene	184	<1	111.7	<1	105.2	45.0	1.4	<1	<1	12.0
Anthracene	178	<1	108.9	<1	103.0	139.1	4.6	<1	2.2	44.1
Fluoranthene	202	<1	109.1	<1	104.2	571.0	28.3	4.9	10.5	154.2
Pyrene	202	<1	106.6	<1	105.5	454.5	24.7	4.2	8.8	127.1
Benzo[a]anthracene	228	<1	104.5	<1	101.8	251.3	12.1	1.5	4.0	60.5
Chrysene	228	<1	110.7	<1	106.9	390.2	13.5	1.9	4.5	61.8
Benzo[b]fluoranthene	252	<1	96.6	<1	93.4	443.5	9.6	1.7	3.6	44.4
Benzo[k]fluoranthene	252	<1	108.5	<1	107.4	219.3	5.8	<1	2.0	23.8
Benzo[e]pyrene	252	<1	109.8	<1	106.0	318.9	8.5	1.5	2.7	33.2
Benzo[a]pyrene	252	<1	103.1	<1	100.0	211.1	10.7	1.6	3.4	46.8
Perylene *	252	<1	110.7	<1	106.0	263.7	7.6	3.1	2.6	16.1
Indeno[123,cd]pyrene	276	<1	92.5	<1	92.0	264.4	6.3	1.2	2.1	27.0
Dibenzo[a,h]anthracene	278	<1	86.2	<1	88.2	54.2	1.2	<1	<1	5.0
Benzo[ghi]perylene	276	<1	99.4	<1	95.9	234.8	6.7	1.2	2.1	24.9

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

**Polyaromatic Hydrocarbon Concentrations (ng/g dry weight basis)**

UKAS accredited?: Yes

**EPA 16 PAHs**

Compounds marked with a \* are reported not UKAS.

	<b>Sample ID :</b>	CL1786205	CL1786206	CL1786207	CL1786208	CL1786209	CL1786210	CL1786211	CL1786212	CL1786213
	<b>Station :</b>	BH03 0.50	BH03 1.50	BH03 2.50	BH04 0.50	BH04 1.50	BH04 2.50	BH05 0.50	BH05 1.00	BH05 2.00
<b>PAH</b>	<b>Mass</b>									
Naphthalene	128	<1	<1	<1	<1	<1	<1	<1	12.1	<1
Acenaphthylene	152	<1	<1	<1	<1	<1	<1	<1	<1	<1
Acenaphthene	154	<1	<1	9.4	<1	<1	<1	<1	<1	<1
Fluorene	166	<1	<1	6.5	<1	<1	<1	<1	<1	<1
Phenanthrene	178	2.6	<1	46.4	2.0	<1	<1	<1	4.7	<1
Dibenzothiophene	184	<1	<1	4.3	<1	<1	<1	<1	<1	<1
Anthracene	178	<1	<1	18.3	<1	<1	<1	<1	<1	<1
Fluoranthene	202	6.4	1.5	69.3	11.4	1.8	<1	2.9	7.1	1.2
Pyrene	202	5.1	<1	54.7	10.2	1.6	<1	2.9	6.6	1.1
Benzo[a]anthracene	228	2.5	<1	23.9	5.8	<1	<1	1.4	3.3	<1
Chrysene	228	2.8	<1	23.5	8.2	<1	<1	1.7	4.5	<1
Benzo[b]fluoranthene	252	1.9	<1	16.2	7.7	<1	<1	1.6	3.6	<1
Benzo[k]fluoranthene	252	1.0	<1	7.5	3.6	<1	<1	<1	1.9	<1
Benzo[e]pyrene	252	1.5	<1	12.2	5.8	<1	<1	1.3	3.8	<1
Benzo[a]pyrene	252	2.0	<1	17.8	6.5	<1	<1	1.4	4.1	<1
Perylene *	252	<1	<1	5.0	2.5	1.9	<1	<1	2.7	<1
Indeno[123,cd]pyrene	276	1.1	<1	10.6	4.4	<1	<1	<1	3.0	<1
Dibenzo[a,h]anthracene	278	<1	<1	1.8	<1	<1	<1	<1	<1	<1
Benzo[ghi]perylene	276	1.1	<1	9.7	4.5	<1	<1	<1	3.0	<1

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

**Polyaromatic Hydrocarbon Concentrations (ng/g dry weight basis)**

UKAS accredited?: Yes

**EPA 16 PAHs**

Compounds marked with a \* are reported not UKAS.

	<b>Sample ID :</b>	CL1786214	CL1786215	CL1786216	CL1786217	CL1786218	CL1786219	CL1786220	CL1786221	CL1786222	CL1786223	CL1786224
	<b>Station :</b>	BH05 3.00	BH06 0.50	BH06 1.00	BH06 2.00	BH06 3.00	BH07 1.00	BH07 2.00	BH08 1.00	BH08 2.00	BH09 0.50	BH09 2.00
<b>PAH</b>	<b>Mass</b>											
Naphthalene	128	<1	<1	<1	<1	<1	<1	<1	1.3	1.0	28.7	<1
Acenaphthylene	152	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.9	<1
Acenaphthene	154	<1	<1	<1	<1	<1	<1	<1	<1	1.5	2.0	<1
Fluorene	166	<1	<1	<1	<1	<1	<1	<1	1.8	2.2	8.6	<1
Phenanthrene	178	<1	<1	<1	<1	<1	1.8	1.2	6.1	6.9	12.7	6.1
Dibenzothiophene	184	<1	<1	<1	<1	<1	<1	<1	<1	1.2	3.5	<1
Anthracene	178	<1	<1	<1	<1	<1	<1	1.0	3.6	3.4	8.0	2.5
Fluoranthene	202	1.3	<1	<1	<1	<1	2.2	4.9	12.7	18.2	19.3	23.7
Pyrene	202	1.6	<1	<1	<1	<1	2.1	4.3	21.2	23.8	25.4	23.9
Benzo[a]anthracene	228	<1	<1	<1	<1	<1	<1	1.1	5.0	6.2	11.0	11.0
Chrysene	228	<1	<1	<1	<1	<1	1.1	1.3	5.2	7.4	13.0	12.4
Benzo[b]fluoranthene	252	<1	<1	<1	<1	<1	<1	<1	4.6	8.2	15.3	13.0
Benzo[k]fluoranthene	252	<1	<1	<1	<1	<1	<1	<1	2.9	4.3	7.0	6.2
Benzo[e]pyrene	252	<1	<1	<1	<1	<1	<1	<1	3.8	5.8	11.0	10.1
Benzo[a]pyrene	252	<1	<1	<1	<1	<1	<1	<1	4.7	7.2	14.4	10.9
Perylene *	252	<1	<1	<1	<1	<1	<1	<1	1.7	2.6	5.0	5.4
Indeno[123,cd]pyrene	276	<1	<1	<1	<1	<1	<1	<1	2.1	4.1	10.2	5.4
Dibenzo[a,h]anthracene	278	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.4	<1
Benzo[ghi]perylene	276	<1	<1	<1	<1	<1	<1	<1	1.9	3.3	9.4	5.3

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

Customer Causeway Geotech Ltd  
Site Avoca River Sediment Sampling  
Report No S181258

Consignment No S70508  
Date Logged 05-Dec-2017  
In-House Report Due 27-Dec-2017

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	MethodID	ANC	CustServ	GRHSA	ICPMSS	ICPSOIL	OESISED	PAHSED	PCMS20	TPHUSI	WLSM59								
		Sampled	Carbonate %	Report C	GRO (AA) by HSA GC-FID	Copper (MS) Sediment							Arsenic (MS) Sediments	Cadmium (MS) Sediments	Chromium (MS) Sediments	Lead (MS) Sediments	Manganese (MS) Sediments	Mercury (MS) Sediments	Nickel (MS) Sediments	Zinc (MS) Sediments
CL/1786201	BH01 0.10	07/11/17																		
CL/1786202	BH01 1.00	07/11/17																		
CL/1786203	BH02 0.50	08/11/17																		
CL/1786204	BH02 1.50	08/11/17																		
CL/1786205	BH03 0.50	08/11/17																		
CL/1786206	BH03 1.50	08/11/17																		
CL/1786207	BH03 2.50	08/11/17																		
CL/1786208	BH04 0.50	08/11/17																		
CL/1786209	BH04 1.50	08/11/17																		
CL/1786210	BH04 2.50	08/11/17																		
CL/1786211	BH05 0.50	09/11/17																		
CL/1786212	BH05 1.00	09/11/17																		
CL/1786213	BH05 2.00	09/11/17																		
CL/1786214	BH05 3.00	09/11/17																		
CL/1786215	BH06 0.50	09/11/17																		

**Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.**

**If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.**

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time
Requested Analysis Key	
■	Analysis Required
■	Analysis dependant upon trigger result - <b>Note: due date may be affected if triggered</b>
□	No analysis scheduled
^	Analysis Subcontracted - <b>Note: due date may vary</b>

Where individual results are flagged see report notes for status.

Customer Causeway Geotech Ltd  
Site Avoca River Sediment Sampling  
Report No S181258

Consignment No S70508  
Date Logged 05-Dec-2017  
In-House Report Due 27-Dec-2017

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	MethodID	ANC	CustServ	GRHSA	ICPMSS	ICPSOIL	OGSISED	PAHSED	PCMS20	TPHUSI	WLSMS9								
		Sampled	Carbonate %	Report C	GRO (AA) by HSA GC-FID	Copper (MS) Sediment		Arsenic (MS) Sediments	Cadmium (MS) Sediments	Chromium (MS) Sediments	Lead (MS) Sediments	Manganese (MS) Sediments	Mercury (MS) Sediments	Nickel (MS) Sediments	Zinc (MS) Sediments	Iron (Sediments)	Dibutyl Tin (Sediments)	Tributyl Tin (Sediments)	PAH by MS Dti	Organochlorine Pesticides (Marine Sediments)
CL/1786216	BH06 1.00	09/11/17																		
CL/1786217	BH06 2.00	09/11/17																		
CL/1786218	BH06 3.00	09/11/17																		
CL/1786219	BH07 1.00	09/11/17																		
CL/1786220	BH07 2.00	09/11/17																		
CL/1786221	BH08 1.00	10/11/17																		
CL/1786222	BH08 2.00	10/11/17																		
CL/1786223	BH09 0.50	10/11/17																		
CL/1786224	BH09 2.00	10/11/17																		
CL/1786225	CRM	10/11/17																		
CL/1786226	QC Blank																			
CL/1786227	Reference Material (% Recovery)																			

**Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.**

**If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.**

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
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Requested Analysis Key	
■	Analysis Required
■	Analysis dependant upon trigger result - <b>Note: due date may be affected if triggered</b>
□	No analysis scheduled
^	Analysis Subcontracted - <b>Note: due date may vary</b>

Where individual results are flagged see report notes for status.



# Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	ANC	Oven Dried @ < 35°C	Quantitative digestion with Hydrochloric Acid back titration with 1M Sodium Hydroxide to pH 7
Soil	GROHSA	As Received	Determination of Total Gasoline Range Organics Hydrocarbons (GRO) by Headspace GCFID
Soil	ICPMSS	Oven Dried @ < 35°C	Determination of Metals in Marine Sediments and Soil samples by aqua regia digestion followed by ICPMS detection
Soil	ICPSOIL	Oven Dried @ < 35°C	Determination of Metals in soil samples by aqua regia digestion followed by ICPOES detection
Soil	OGSNESED	As Received	Determination of Organo-tin compounds using sonic extraction in methanol , derivatisation with Sodium Tetraethylborate and GCMS quantitation (SIM mode).
Soil	PAHSED	As Received	Determination of Polyaromatic Hydrocarbons in Sediments by Methanol/Dichloromethane ultrasonic extraction GC-MS quantification
Soil	PCBMS3Q	As Received	Determination of Polychlorinated Biphenyl (PCB) congeners by hexane/acetone extraction followed by GCECD detection
Soil	TPHUSSI	As Received	Determination of hexane/acetone extractable Hydrocarbons in soil with GCFID detection including quantitation of Aromatic and Aliphatic fractions.
Soil	WSLM59	Oven Dried @ < 35°C	Determination of Organic Carbon in soil using sulphurous Acid digestion followed by high temperature combustion and IR detection

Where individual results are flagged see report notes for status.

# Report Notes

## Generic Notes

### Soil/Solid Analysis

Unless stated otherwise,

- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.  
All results on MCERTS reports are reported on a 105°C dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

### Waters Analysis

Unless stated otherwise results are expressed as mg/l

**Nil:** Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

### Oil analysis specific

Unless stated otherwise,

- Results are expressed as mg/kg
- SG is expressed as g/cm<sup>3</sup>@ 15°C

### Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

### Asbestos Analysis

**CH** Denotes Chrysotile

**TR** Denotes Tremolite

**CR** Denotes Crocidolite

**AC** Denotes Actinolite

**AM** Denotes Amosite

**AN** Denotes Anthophyllite

**NAIIS** No Asbestos Identified in Sample

**NADIS** No Asbestos Detected In Sample

## Symbol Reference

^ Sub-contracted analysis.

\$\$ Unable to analyse due to the nature of the sample

¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols.

This may have resulted in deterioration of the sample(s) during transit to the laboratory.

Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling

¥ Results for guidance only due to possible interference

& Blank corrected result

I.S Insufficient sample to complete requested analysis

I.S(g) Insufficient sample to re-analyse, results for guidance only

Intf Unable to analyse due to interferences

N.D Not determined

N.Det Not detected

N.F No Flow

NS Information Not Supplied

Req Analysis requested, see attached sheets for results

P Raised detection limit due to nature of the sample

\* All accreditation has been removed by the laboratory for this result

‡ MCERTS accreditation has been removed for this result

§ accreditation has been removed for this result as it is a non-accredited matrix

**Note:** The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.





Our Ref: EFS/181264 (Ver. 2)

Your Ref: 17-0906

January 11, 2018



Environmental Chemistry

SOCOTEC UK Limited

Bretby Business Park

Ashby Road

Burton-on-Trent

Staffordshire

DE15 0YZ

Telephone: 01283 554400

Facsimile: 01283 554422

Neil Haggan  
Causeway Geotech Ltd  
8 Drumahiskey Road  
Ballymoney  
United Kingdom  
BT53 7QL

For the attention of Neil Haggan

Dear Neil Haggan

**Sample Analysis - Avoca River Sediment Sampling**

Samples from the above site have been analysed in accordance with the schedule supplied.

The sample details and the results of analyses for these samples are given in the appended report.

An invoice for this work will follow under a separate cover.

Where appropriate the samples will be kept until 16/01/18 when they will be discarded. Please call 01283 554547 for an extension of this date.

Please be aware that our policy for the retention of paper based laboratory records and analysis reports is 6 years.

The work was carried out in accordance with SOCOTEC UK Limited (Multi-Sector Services) Standard Terms and Conditions of Contract.

If I can be of any further assistance please do not hesitate to contact me.

Yours sincerely

for SOCOTEC UK Limited

A handwritten signature in black ink, appearing to read 'J Colbourne'.

J Colbourne

Project Co-ordinator

01283 554547

# TEST REPORT



1252

Report No. EFS/181264 (Ver. 2)

Causeway Geotech Ltd  
8 Drumahiskey Road  
Ballymoney  
United Kingdom  
BT53 7QL

## **Site: Avoca River Sediment Sampling**

The 27 samples described in this report were registered for analysis by SOCOTEC UK Limited on 05-Dec-2017. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 11-Jan-2018

Tests where the accreditation is set to N or No, and any individual data items marked with a \* are not UKAS accredited. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

The following tables are contained in this report:

Table 1 Main Analysis Results (Pages 2 to 5)  
Table of PAH (MS-SIM) (80) Results (Pages 6 to 31)  
Table of PCB Congener Results (Pages 32 to 33)  
Table of GRO Results (Page 34)  
Table of TPH (Si) banding (std) (Pages 35 to 36)  
Table of WAC Analysis Results (Pages 37 to 60)  
Table of Asbestos Screening Results (Pages 61 to 62)  
Analytical and Deviating Sample Overview (Pages 63 to 66)  
Table of Additional Report Notes (Page 67)  
Table of Method Descriptions (Pages 68 to 69)  
Table of Report Notes (Page 70)  
Table of Sample Descriptions (Appendix A Page 1 of 1)

On behalf of  
SOCOTEC UK Lim


Operations Director  
Energy & Waste Services

Date of Issue: 11-Jan-2018

Tests marked '^' have been subcontracted to another laboratory.

Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected.

SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.

		Units :	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	pH Units	%	%	mg/kg	mg/kg		
		Method Codes :	GROHSA	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	PHSOIL	Sub002	TMSS	TPHFIDUS	TPHFIDUS		
		Method Reporting Limits :	0.2	0.5	0.5	0.04	0.5	0.5	0.015	0.5	2			0.1	10	10		
		UKAS Accredited :	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
LAB ID Number	Client Sample Description	Sample Date	GRO (AA) by HSA GC-FID	Copper (MS) Sediment	Arsenic (MS) Sediments	Cadmium (MS) Sediments	Chromium (MS) Sediments	Lead (MS) Sediments	Mercury (MS) Sediments	Nickel (MS) Sediments	Zinc (MS) Sediments	pH units (AR)	Asbestos Screen & ID (Stage 1)	Tot.Moisture @ 105C	TPH Band (>C10-C40)	TPH by GC/FID (AR)		
1786240	BH01 0.10	07-Nov-17	Req §	24.4	16.7	0.13	26.5	27.6	<0.015	17.3	91.6	4.7 §	NAIIS	7.9 §	27 §	27 §		
1786241	BH01 1.00	07-Nov-17	Req §	18.9	9.4	0.12	17.2	15.5	<0.015	15.1	81.4	4.6 §	NAIIS	13.2 §	30 §	31 §		
1786242	BH02 0.50	08-Nov-17	Req §	40.9	13.1	0.17	17	34.7	<0.015	14.5	108.1	7.3 §	NAIIS	6.0 §	54 §	54 §		
1786243	BH02 1.50	08-Nov-17	Req §	45.5	14.8	0.18	16.1	33.6	<0.015	13.2	93.6	8.5 §	NAIIS	8.7 §	17 §	17 §		
1786244	BH03 0.50	08-Nov-17	Req §	39.6	18.3	0.14	21.8	42.3	<0.015	18.6	104.9	7.2 §	NAIIS	8.1 §	25 §	25 §		
1786245	BH03 1.50	08-Nov-17	Req §	48.8	16.9	0.13	20.5	41.4	<0.015	17.4	109.3	6.9 §	NAIIS	12.9 §	15 §	15 §		
1786246	BH03 2.50	08-Nov-17	Req §	34.1	12.6	0.11	18.6	34	<0.015	15.6	90.3	6.9 §	NAIIS	10.3 §	15 §	16 §		
1786247	BH04 0.50	08-Nov-17	Req §	44.1	14.3	0.2	23.1	40.6	<0.015	18	97.3	6.9 §	NAIIS	6.3 §	10 §	10 §		
1786248	BH04 1.50	08-Nov-17	Req §	29.3	17.7	0.5	22.6	20.7	<0.015	17.5	129.9	7.4 §	NAIIS	9.4 §	13 §	13 §		
1786249	BH04 2.50	08-Nov-17	Req §	19.5	7.9	0.3	12.3	13.4	<0.015	11.8	87.9	8.6 §	NAIIS	14.1 §	33 §	33 §		
1786250	BH05 0.50	09-Nov-17	Req §	33.9	13.6	0.1	18.7	26.2	<0.015	14.7	107.5	7.5 §	NAIIS	4.4 §	<10 §	<10 §		
1786251	BH05 1.00	09-Nov-17	Req §	25.5	16.1	0.11	14.4	19.3	0.02	13.4	117.2	7.1 §	CH	5.4 §	24 §	24 §		
1786252	BH05 2.00	09-Nov-17	Req §	37.1	19.1	0.1	15.6	15.7	<0.015	13.2	120.9	7.4 §	NAIIS	4.7 §	11 §	11 §		
1786253	BH05 3.00	09-Nov-17	Req §	17.5	11	0.22	18.7	9.2	<0.015	16.9	135.9	7.4 §	NAIIS	8.4 §	<10 §	<10 §		
1786254	BH06 0.50	09-Nov-17	Req §	27.8	15.2	0.11	17.3	16.5	<0.015	14.3	118.1	7.4 §	NAIIS	6.0 §	<10 §	<10 §		
1786255	BH06 1.00	09-Nov-17	Req §	23.1	15.9	0.11	17	12.2	<0.015	14.3	113.1	7.4 §	NAIIS	12.8 §	<10 §	<10 §		
1786256	BH06 2.00	09-Nov-17	Req §	25.1	18.5	0.16	12.9	12.8	0.02	11.5	104.1	7.5 §	NAIIS	8.7 §	14 §	15 §		
1786257	BH06 3.00	09-Nov-17	Req §	90.5	19.8	0.6	19.3	18.2	<0.015	16.1	115.7	7.6 §	NAIIS	9.3 §	35 §	36 §		
1786258	BH07 1.00	09-Nov-17	Req §	26.1	16.5	0.11	17.8	16.2	<0.015	16.1	109	7.6 §	NAIIS	5.6 §	<10 §	<10 §		
1786259	BH07 2.00	09-Nov-17	Req §	23.6	20.6	0.07	16.3	22.1	<0.015	13.9	103.3	7.6 §	NAIIS	8.6 §	<10 §	<10 §		
 <p>Bretby Business Park, Ashby Road Burton-on-Trent, Staffordshire, DE15 0YZ Tel +44 (0) 1283 554400 Fax +44 (0) 1283 554422</p>			Client Name	Causeway Geotech Ltd								Sample Analysis						
			Contact	Neil Haggan														
			Avoca River Sediment Sampling										Date Printed	22-Dec-2017				
													Report Number	EFS/181264				
Table Number	1																	

		Units :	mg/kg	% M/M	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	µg/kg	mg/kg						
		Method Codes :	TPHUSSI	WSLM59	CALC_CR3	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPSOIL	KONECR	LOI(%MM)	PCBECD	PAHMSUS						
		Method Reporting Limits :	20	0.02	0.5	0.1	0.5	0.5	0.5	0.5	0.1	0.2	0.08							
		UKAS Accredited :	Yes	Yes	No	No	No	No	No	No	No	No	No	Yes						
LAB ID Number	Client Sample Description	Sample Date	TPH by GC/FID (AR/SI)	Total Organic Carbon	Chromium (III)	Antimony (MS) Sediments	Molybdenum (MS) Sediments	Selenium (MS) Sediments	Barium, Sediment	Chromium vi:	L.O.I. % @ 450C	PCB-7 Congeners Analysis	PAH (17) by GC/MS							
1786240	BH01 0.10	07-Nov-17	Req §	0.21	<26.5	0.6	1.7	<1	15.7	<0.1	0.7	Req	Req §							
1786241	BH01 1.00	07-Nov-17	Req §	0.33	<17.2	0.4	2.4	<1	15	<0.1	1.2	Req	Req §							
1786242	BH02 0.50	08-Nov-17	Req §	0.13	<17.0	0.6	0.6	<1	14.9	<0.1	0.5	Req	Req §							
1786243	BH02 1.50	08-Nov-17	Req §	0.16	<16.1	0.6	1	<1	13	<0.1	0.5	Req	Req §							
1786244	BH03 0.50	08-Nov-17	Req §	0.18	<21.8	0.7	0.9	<1	14.7	<0.1	0.7	Req	Req §							
1786245	BH03 1.50	08-Nov-17	Req §	0.30	<20.5	0.6	0.7	<1	17.2	<0.1	1.0	Req	Req §							
1786246	BH03 2.50	08-Nov-17	Req §	0.11	<18.6	0.6	0.7	<1	13.9	<0.1	0.6	Req	Req §							
1786247	BH04 0.50	08-Nov-17	Req §	0.16	22.9	0.6	0.6	<1	10.5	0.2	0.6	Req	Req §							
1786248	BH04 1.50	08-Nov-17	Req §	0.16	<22.6	0.4	0.7	<1	12.5	<0.1	0.5	Req	Req §							
1786249	BH04 2.50	08-Nov-17	Req §	0.09	<12.3	0.4	0.5	<1	11.4	<0.1	0.4	Req	Req §							
1786250	BH05 0.50	09-Nov-17	Req §	0.48	18.6	0.6	0.7	<1	14.5	0.1	0.6	Req	Req §							
1786251	BH05 1.00	09-Nov-17	Req §	0.15	<14.4	0.6	0.8	<1	13.5	<0.1	0.6	Req	Req §							
1786252	BH05 2.00	09-Nov-17	Req §	0.15	<15.6	0.8	0.8	<1	11.5	<0.1	0.6	Req	Req §							
1786253	BH05 3.00	09-Nov-17	Req §	0.12	<18.7	0.3	0.6	<1	14.2	<0.1	0.5	Req	Req §							
1786254	BH06 0.50	09-Nov-17	Req §	0.14	<17.3	0.5	0.8	<1	18	<0.1	0.7	Req	Req §							
1786255	BH06 1.00	09-Nov-17	Req §	0.13	<17.0	0.5	0.8	<1	14.6	<0.1	0.7	Req	Req §							
1786256	BH06 2.00	09-Nov-17	Req §	0.15	<12.9	0.5	0.8	<1	13.8	<0.1	0.7	Req	Req §							
1786257	BH06 3.00	09-Nov-17	Req §	0.11	<19.3	0.6	1.8	<1	28.3	<0.1	0.5	Req	Req §							
1786258	BH07 1.00	09-Nov-17	Req §	0.12	<17.8	0.4	0.8	<1	12.1	<0.1	0.5	Req	Req §							
1786259	BH07 2.00	09-Nov-17	Req §	0.11	16.2	0.4	0.7	<1	22.8	0.1	0.5	Req	Req §							

 <p>Bretby Business Park, Ashby Road Burton-on-Trent, Staffordshire, DE15 0YZ Tel +44 (0) 1283 554400 Fax +44 (0) 1283 554422</p>	Client Name	Causeway Geotech Ltd	<h2>Avoca River Sediment Sampling</h2>		<h3>Sample Analysis</h3>	
	Contact	Neil Haggan				
				Date Printed	22-Dec-2017	
				Report Number	EFS/181264	
			Table Number	1		





# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH01 0.10	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786240	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171346	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	6.56	0.08	81
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	8.48	0.09	92
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	10.00	0.08	74
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.29	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	111
Acenaphthene-d10	113
Phenanthrene-d10	115
Chrysene-d12	124
Perylene-d12	118

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	93
Terphenyl-d14	78

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.



# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH01 1.00	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786241	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171346	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	108
Acenaphthene-d10	109
Phenanthrene-d10	108
Chrysene-d12	108
Perylene-d12	99

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	101
Terphenyl-d14	82

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH02 0.50	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786242	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171346	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	110
Acenaphthene-d10	111
Phenanthrene-d10	111
Chrysene-d12	114
Perylene-d12	109

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	97
Terphenyl-d14	80

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

**Customer and Site Details:** Causeway Geotech Ltd: Avoca River Sediment Sampling  
**Sample Details:** BH02 1.50 **Job Number:** s18\_1264  
**LIMS ID Number:** CL1786243 **Date Booked in:** 05-Dec-17  
**QC Batch Number:** 171346 **Date Extracted:** 15-Dec-17  
**Quantitation File:** Initial Calibration **Date Analysed:** 15-Dec-17  
**Directory:** 121517.MS17\ **Matrix:** Soil  
**Dilution:** 1.0 **Ext Method:** Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	110
Acenaphthene-d10	111
Phenanthrene-d10	113
Chrysene-d12	118
Perylene-d12	112

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	96
Terphenyl-d14	79

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH03 0.50	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786244	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171346	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	108
Acenaphthene-d10	110
Phenanthrene-d10	110
Chrysene-d12	111
Perylene-d12	104

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	100
Terphenyl-d14	82

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH03 1.50	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786245	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171346	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	106
Acenaphthene-d10	106
Phenanthrene-d10	107
Chrysene-d12	103
Perylene-d12	95

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	95
Terphenyl-d14	77

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH03 2.50	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786246	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171346	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	106
Acenaphthene-d10	106
Phenanthrene-d10	108
Chrysene-d12	112
Perylene-d12	106

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	93
Terphenyl-d14	76

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH04 0.50	<b>Job Number:</b>	S18_1264
<b>LIMS ID Number:</b>	CL1786247	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171346	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	105
Acenaphthene-d10	106
Phenanthrene-d10	104
Chrysene-d12	99
Perylene-d12	92

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	91
Terphenyl-d14	73

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH04 1.50	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786248	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171346	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	106
Acenaphthene-d10	107
Phenanthrene-d10	106
Chrysene-d12	105
Perylene-d12	96

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	101
Terphenyl-d14	82

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.



# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH04 2.50	<b>Job Number:</b>	S18_1264
<b>LIMS ID Number:</b>	CL1786249	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171346	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	108
Acenaphthene-d10	109
Phenanthrene-d10	109
Chrysene-d12	113
Perylene-d12	109

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	90
Terphenyl-d14	74

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

**Customer and Site Details:** Causeway Geotech Ltd: Avoca River Sediment Sampling  
**Sample Details:** BH05 0.50 **Job Number:** s18\_1264  
**LIMS ID Number:** CL1786250 **Date Booked in:** 05-Dec-17  
**QC Batch Number:** 171346 **Date Extracted:** 15-Dec-17  
**Quantitation File:** Initial Calibration **Date Analysed:** 15-Dec-17  
**Directory:** 121517.MS17\ **Matrix:** Soil  
**Dilution:** 1.0 **Ext Method:** Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	109
Acenaphthene-d10	110
Phenanthrene-d10	112
Chrysene-d12	118
Perylene-d12	110

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	94
Terphenyl-d14	78

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH05 1.00	<b>Job Number:</b>	S18_1264
<b>LIMS ID Number:</b>	CL1786251	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171346	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	105
Acenaphthene-d10	105
Phenanthrene-d10	105
Chrysene-d12	108
Perylene-d12	103

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	99
Terphenyl-d14	80

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH05 2.00	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786252	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	109
Acenaphthene-d10	110
Phenanthrene-d10	110
Chrysene-d12	112
Perylene-d12	101

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	93
Terphenyl-d14	77

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH05 3.00	<b>Job Number:</b>	S18_1264
<b>LIMS ID Number:</b>	CL1786253	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	16-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	109
Acenaphthene-d10	110
Phenanthrene-d10	110
Chrysene-d12	110
Perylene-d12	100

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	90
Terphenyl-d14	74

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH06 0.50	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786254	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	16-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	109
Acenaphthene-d10	110
Phenanthrene-d10	110
Chrysene-d12	108
Perylene-d12	98

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	92
Terphenyl-d14	76

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH06 1.00	<b>Job Number:</b>	S18_1264
<b>LIMS ID Number:</b>	CL1786255	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	16-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	109
Acenaphthene-d10	110
Phenanthrene-d10	110
Chrysene-d12	108
Perylene-d12	97

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	94
Terphenyl-d14	77

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH06 2.00	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786256	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	16-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	107
Acenaphthene-d10	108
Phenanthrene-d10	108
Chrysene-d12	107
Perylene-d12	98

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	103
Terphenyl-d14	84

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.



# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH06 3.00	<b>Job Number:</b>	S18_1264
<b>LIMS ID Number:</b>	CL1786257	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	16-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	108
Acenaphthene-d10	107
Phenanthrene-d10	107
Chrysene-d12	103
Perylene-d12	95

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	93
Terphenyl-d14	75

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH07 1.00	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786258	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	16-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	109
Acenaphthene-d10	110
Phenanthrene-d10	111
Chrysene-d12	115
Perylene-d12	107

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	95
Terphenyl-d14	78

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH07 2.00	<b>Job Number:</b>	S18_1264
<b>LIMS ID Number:</b>	CL1786259	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	16-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	108
Acenaphthene-d10	108
Phenanthrene-d10	107
Chrysene-d12	107
Perylene-d12	95

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	92
Terphenyl-d14	75

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH08 1.00	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786260	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	16-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	107
Acenaphthene-d10	107
Phenanthrene-d10	109
Chrysene-d12	115
Perylene-d12	106

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	93
Terphenyl-d14	78

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH08 2.00	<b>Job Number:</b>	S18_1264
<b>LIMS ID Number:</b>	CL1786261	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	16-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	103
Acenaphthene-d10	104
Phenanthrene-d10	102
Chrysene-d12	95
Perylene-d12	86

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	94
Terphenyl-d14	75

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH09 0.50	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786262	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	16-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	107
Acenaphthene-d10	107
Phenanthrene-d10	107
Chrysene-d12	103
Perylene-d12	93

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	92
Terphenyl-d14	74

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH09 2.00	<b>Job Number:</b>	S18_1264
<b>LIMS ID Number:</b>	CL1786263	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	16-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	104
Acenaphthene-d10	104
Phenanthrene-d10	104
Chrysene-d12	106
Perylene-d12	97

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	104
Terphenyl-d14	85

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	QC Blank	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786265	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	106
Acenaphthene-d10	108
Phenanthrene-d10	108
Chrysene-d12	111
Perylene-d12	104

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	106
Terphenyl-d14	86

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.



# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	Reference Material (% Recovery)	<b>Job Number:</b>	S18_1264
<b>LIMS ID Number:</b>	CL1786266	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Recovery %	% Fit
Naphthalene	91-20-3	2.99	99	99
Acenaphthylene	208-96-8	4.03	99	99
Acenaphthene	83-32-9	4.14	101	96
Fluorene	86-73-7	4.50	99	95
Phenanthrene	85-01-8	5.28	98	99
Anthracene	120-12-7	5.33	98	99
Fluoranthene	206-44-0	6.56	99	91
Pyrene	129-00-0	6.83	99	90
Benzo[a]anthracene	56-55-3	8.48	95	99
Chrysene	218-01-9	8.53	101	99
Benzo[b]fluoranthene	205-99-2	9.99	91	96
Benzo[k]fluoranthene	207-08-9	10.02	96	97
Benzo[a]pyrene	50-32-8	10.41	98	96
Indeno[1,2,3-cd]pyrene	193-39-5	11.78	97	89
Dibenzo[a,h]anthracene	53-70-3	11.81	104	96
Benzo[g,h,i]perylene	191-24-2	12.06	97	94
Coronene	191-07-1	13.90	80	77
Total (USEPA16) PAHs	-	-	103	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	-
Acenaphthene-d10	-
Phenanthrene-d10	-
Chrysene-d12	-
Perylene-d12	-

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	-
Terphenyl-d14	-

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polychlorinated Biphenyls (congeners)

**Customer and Site Details:** Causeway Geotech Ltd: Avoca River Sediment Sampling  
**Job Number:** S18\_1264  
**QC Batch Number:** 170019  
**Directory:** 181217PCB.TQ1  
**Method:** Ultrasonic

**Matrix:** Soil  
**Date Booked in:** 05-Dec-17  
**Date Extracted:** 16-Dec-17  
**Date Analysed:** 18-Dec-17

*Compounds marked \* are not UKAS or MCerts accredited*

Sample ID	Customer ID	Concentration, (µg/kg)						
		PCB28*	PCB52*	PCB101*	PCB118*	PCB153*	PCB138*	PCB180*
CL1786240	BH01 0.10	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786241	BH01 1.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786242	BH02 0.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786243	BH02 1.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786244	BH03 0.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786245	BH03 1.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786246	BH03 2.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786247	BH04 0.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786248	BH04 1.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786249	BH04 2.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786250	BH05 0.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786251	BH05 1.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786252	BH05 2.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786253	BH05 3.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786254	BH06 0.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786255	BH06 1.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786256	BH06 2.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786257	BH06 3.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786258	BH07 1.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786259	BH07 2.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08



# Gasoline Range Organics (BTEX and Aliphatic Carbon Ranges)

**Customer and Site Details:** Causeway Geotech Ltd : Avoca River Sediment Sampling  
**Job Number:** S18\_1264  
**Directory:** D:\TES\DATA\2017\1215HSA\_GC9\121517 2017-12-15 16-39-29\133B3301.D  
**Method:** Headspace GCFID

**Matrix:** Soil  
**Date Booked in:** 05-Dec-17  
**Date extracted:** 15-Dec-17  
**Date Analysed:** 16-Dec-17, 02:05:56

\* Sample data with an asterisk are not UKAS accredited.

Sample ID	Client ID	Concentration, (mg/kg) - as wet weight					Aliphatics				
		Benzene	Toluene	Ethyl benzene	m/p-Xylene	o-Xylene	C5 - C6	>C6 - C7	>C7 - C8	>C8 - C10	Total GRO
* CL1786240	BH01 0.10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786241	BH01 1.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786242	BH02 0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786243	BH02 1.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786244	BH03 0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786245	BH03 1.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786246	BH03 2.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786247	BH04 0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786248	BH04 1.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786249	BH04 2.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786250	BH05 0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786251	BH05 1.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786252	BH05 2.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786253	BH05 3.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786254	BH06 0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786255	BH06 1.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786256	BH06 2.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786257	BH06 3.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786258	BH07 1.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786259	BH07 2.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786260	BH08 1.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786261	BH08 2.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
* CL1786262	BH09 0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
CL1786263	BH09 2.00	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
CL1786265	QC Blank	<0.010	<0.010	<0.010	<0.010	<0.010	<0.2	<0.2	<0.2	<0.2	<0.2
CL1786266	Reference Material (% Recovery)	92	92	96	97	92	100	109	112	107	106

Note: Benzene elutes between C6 and C7, toluene elutes between C7 and C8, ethyl benzene and the xylenes elute between C8 and C9.

Each BTEX compound is deducted from the appropriate band to give the aliphatic fractions, however aromatic compounds may still be contributing to these fractions

Where individual results are flagged see report notes for status.

## ALIPHATIC / AROMATIC FRACTION BY GC/FID

**Customer and Site Details:** Causeway Geotech Ltd : Avoca River Sediment Sampling  
**Job Number:** S18\_1264  
**QC Batch Number:** 171347  
**Directory:** C:\CHEM32\1\DATA\121917TPH\_GC15\121917 2017-12-19 09-54-58\OnlineEdited--046B.D  
**Method:** Ultra Sonic

**Matrix:** Soil  
**Date Booked in:** 05-Dec-17  
**Date Extracted:** 15-Dec-17  
**Date Analysed:** 19-Dec-17, 19:14:33

		Concentration, (mg/kg) - as wet weight													
* This sample data is not UKAS accredited.		>C8 - C10		>C10 - C12		>C12 - C16		>C16 - C21		>C21 - C35		>C8 - C40			
Sample ID	Client ID	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics		
* CL1786252	BH05 2.00	<4.08	<4	<4.08	<4	<4.08	<4	<4.08	<4	<4.08	<4	<8.94	<8.76	<20.4	<20
* CL1786253	BH05 3.00	<4.04	<4	<4.04	<4	<4.04	5.24	<4.04	<4	<4.04	<4	<8.85	<8.76	<20.2	<20
* CL1786254	BH06 0.50	<4.04	<4	<4.04	<4	<4.04	<4	<4.04	<4	<4.04	<4	<8.85	<8.76	<20.2	<20
* CL1786255	BH06 1.00	<4.08	<4	<4.08	<4	<4.08	<4	<4.08	<4	<4.08	<4	<8.94	<8.76	<20.4	<20
* CL1786256	BH06 2.00	<4.12	<4	<4.12	<4	<4.12	<4	<4.12	<4	<4.12	<4	<9	<8.76	<20.6	<20
* CL1786257	BH06 3.00	<4.08	<4	<4.08	<4	<4.08	5.53	4.93	<4	25.3	12.8	33.2	21.9		
* CL1786258	BH07 1.00	<4.12	<4	<4.12	<4	<4.12	7.65	<4.12	<4	<9	<8.76	<20.6	<20		
* CL1786259	BH07 2.00	<4.12	<4	<4.12	<4	<4.12	<4	<4.12	<4	<9	<8.76	<20.6	<20		
* CL1786260	BH08 1.00	<4.12	<4	<4.12	<4	<4.12	5.2	<4.12	<4	<9	<8.76	<20.6	<20		
* CL1786261	BH08 2.00	<4.04	<4	<4.04	<4	<4.04	<4	<4.04	<4	11.2	<8.76	<20.2	<20		
* CL1786262	BH09 0.50	<4.08	<4	<4.08	<4	<4.08	4.96	<4.08	<4	11.2	<8.76	<20.4	<20		
* CL1786263	BH09 2.00	<4.08	<4	<4.08	<4	<4.08	7.11	<4.08	<4	<8.94	<8.76	<20.4	<20		
* CL1786265	QC Blank	<4.04	<4	<4.04	<4	<4.04	<4	<4.04	<4	<8.85	<8.76	<20.2	<20		
* CL1786266	Reference Material (% Recovery)	95%	102%	90%	132%*	88%	102%	90%	94%	95%	100%	90%	100%		

Where individual results are flagged see report notes for status.

## ALIPHATIC / AROMATIC FRACTION BY GC/FID

**Customer and Site Details:**

Causeway Geotech Ltd : Avoca River Sediment Sampling

**Job Number:**

S18\_1264

**QC Batch Number:**

171346

**Directory:**

C:\CHEM32\1\DATA\121917TPH\_GC15\121917 2017-12-19 09-54-58\OnlineEdited--042B.D

**Method:**

Ultra Sonic

**Matrix:**

Soil

**Date Booked in:**

05-Dec-17

**Date Extracted:**

15-Dec-17

**Date Analysed:**

19-Dec-17, 18:24:50

### Concentration, (mg/kg) - as wet weight

\* This sample data is not UKAS accredited.

Sample ID	Client ID	>C8 - C10		>C10 - C12		>C12 - C16		>C16 - C21		>C21 - C35		>C8 - C40	
		Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics	Aliphatics	Aromatics
* CL1786240	BH01 0.10	<4.12	<4	<4.12	<4*	<4.12	<4	<4.12	<4	<9	<8.76	<20.6	<20
* CL1786241	BH01 1.00	<4.12	<4	<4.12	<4*	<4.12	<4	<4.12	<4	<9	<8.76	<20.6	<20
* CL1786242	BH02 0.50	<4.08	<4	<4.08	<4*	<4.08	7.4	<4.08	<4	18.9	<8.76	21.6	<20
* CL1786243	BH02 1.50	<4.12	<4	<4.12	<4*	<4.12	5.76	<4.12	<4	<9	<8.76	<20.6	<20
* CL1786244	BH03 0.50	<4.08	<4	<4.08	<4*	<4.08	<4	<4.08	<4	<8.94	<8.76	<20.4	<20
* CL1786245	BH03 1.50	<4.12	<4	<4.12	<4*	<4.12	4.59	<4.12	<4	<9	<8.76	<20.6	<20
* CL1786246	BH03 2.50	<4.12	<4	<4.12	<4*	<4.12	5.33	<4.12	<4	<9	<8.76	<20.6	<20
* CL1786247	BH04 0.50	<4	<4	<4	<4*	<4	6.26	<4	<4	<8.76	<8.76	<20	<20
* CL1786248	BH04 1.50	<4.12	<4	<4.12	<4*	<4.12	<4	<4.12	<4	<9	<8.76	<20.6	<20
* CL1786249	BH04 2.50	<4.08	<4	<4.08	<4*	<4.08	5.88	<4.08	<4	20.3	<8.76	25.1	<20
* CL1786250	BH05 0.50	<4.08	<4	<4.08	<4*	<4.08	<4	<4.08	<4	<8.94	<8.76	<20.4	<20
* CL1786251	BH05 1.00	<4	<4	<4	<4*	<4	6.31	<4	<4	<8.76	<8.76	<20	<20

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.098
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	7.9
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.892
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of non-crushable material %	
BH01 0.10		s18_1264	CL/1786240	22-Dec-17		

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.21	3	5	6
N	LOI450	Loss on Ignition (%)	0.7			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	29§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.49	100		
N	PHSOIL	pH (pH units)	4.7 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	<0.001	<0.01	0.5	2	25
U	ICPWATVAR	Barium	0.02	0.2	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	0.001	0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.01	0.1	0.5	10	30
U	ICPMSW	Nickel	0.001	0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.01	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.005	0.05	4	50	200
U	KONENS	Chloride	24	240	800	15000	25000
U	ISEF	Fluoride	0.2	2	10	150	500
U	ICPWATVAR	Sulphate as SO4	76	760	1000	20000	50000
N	WSLM27	Total Dissolved Solids	223	2230	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	1.6	16	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.106
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	13.2
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.884
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	
BH01 1.00		s18_1264	CL/1786241	22-Dec-17	14.600	
					Fraction of non-crushable material %	
					0.000	

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.35	3	5	6
N	LOI450	Loss on Ignition (%)	1.3			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.06	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	35§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.57	100		
N	PHSOIL	pH (pH units)	4.6 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.003	0.03	0.5	2	25
U	ICPWATVAR	Barium	0.01	0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	0.003	0.03	0.5	10	70
U	ICPMSW	Copper	0.003	0.03	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.006	0.06	0.5	10	30
U	ICPMSW	Nickel	0.001	0.01	0.4	10	40
U	ICPMSW	Lead	0.03	0.3	0.5	10	50
U	ICPMSW	Antimony	0.002	0.02	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.026	0.26	4	50	200
U	KONENS	Chloride	113	1130	800	15000	25000
U	ISEF	Fluoride	0.1	1	10	150	500
U	ICPWATVAR	Sulphate as SO4	52	520	1000	20000	50000
N	WSLM27	Total Dissolved Solids	377	3770	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	2.8	28	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited



## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.095
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	7.3
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.895
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	73.000
BH02 0.50		s18_1264	CL/1786242	22-Dec-17	Fraction of non-crushable material %	0.000

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.13	3	5	6
N	LOI450	Loss on Ignition (%)	0.5			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	58§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.47	100		
N	PHSOIL	pH (pH units)	7.3 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.002	0.02	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	0.003	0.03	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.002	0.02	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	0.007	0.07	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.012	0.12	4	50	200
U	KONENS	Chloride	27	270	800	15000	25000
U	ISEF	Fluoride	0.2	2	10	150	500
U	ICPWATVAR	Sulphate as SO4	17	170	1000	20000	50000
N	WSLM27	Total Dissolved Solids	121	1210	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	0.92	9.2	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.099
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	8.7
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.891
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	3.000
BH02 1.50		s18_1264	CL/1786243	22-Dec-17	Fraction of non-crushable material %	0.000

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.16	3	5	6
N	LOI450	Loss on Ignition (%)	0.5			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	19§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.49	100		
N	PHSOIL	pH (pH units)	8.5 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.003	0.03	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	0.003	0.03	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.003	0.03	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	0.004	0.04	0.5	10	50
U	ICPMSW	Antimony	0.002	0.02	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.007	0.07	4	50	200
U	KONENS	Chloride	42	420	800	15000	25000
U	ISEF	Fluoride	0.2	2	10	150	500
U	ICPWATVAR	Sulphate as SO4	14	140	1000	20000	50000
N	WSLM27	Total Dissolved Solids	173	1730	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	1	10	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.096
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	9.3
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.894
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	3.800
BH03 0.50		s18_1264	CL/1786244	22-Dec-17	Fraction of non-crushable material %	0.000

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.18	3	5	6
N	LOI450	Loss on Ignition (%)	0.7			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	28§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.50	100		
N	PHSOIL	pH (pH units)	7.2 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>00</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>00</sup>					
	WSLM2	Conductivity (µs/cm) <sup>00</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.006	0.06	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	0.002	0.02	0.5	10	70
U	ICPMSW	Copper	0.011	0.11	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.003	0.03	0.5	10	30
U	ICPMSW	Nickel	0.001	0.01	0.4	10	40
U	ICPMSW	Lead	0.023	0.23	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.027	0.27	4	50	200
U	KONENS	Chloride	30	300	800	15000	25000
U	ISEF	Fluoride	0.3	3	10	150	500
U	ICPWATVAR	Sulphate as SO4	8	80	1000	20000	50000
N	WSLM27	Total Dissolved Solids	113	1130	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	1.2	12	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

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## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.097
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	12.9
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.893
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	4.800
BH03 1.50		s18_1264	CL/1786245	22-Dec-17	Fraction of non-crushable material %	0.000

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.31	3	5	6
N	LOI450	Loss on Ignition (%)	1			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	17§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.56	100		
N	PHSOIL	pH (pH units)	6.9 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.003	0.03	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	0.004	0.04	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.001	0.01	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	0.01	0.1	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.012	0.12	4	50	200
U	KONENS	Chloride	34	340	800	15000	25000
U	ISEF	Fluoride	0.3	3	10	150	500
U	ICPWATVAR	Sulphate as SO4	12	120	1000	20000	50000
N	WSLM27	Total Dissolved Solids	128	1280	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	1.2	12	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.094
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	10.3
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.896
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	7.200
BH03 2.50		s18_1264	CL/1786246	22-Dec-17	Fraction of non-crushable material %	0.000

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.11	3	5	6
N	LOI450	Loss on Ignition (%)	0.6			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	17§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.52	100		
N	PHSOIL	pH (pH units)	6.9 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.003	0.03	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	0.007	0.07	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.002	0.02	0.5	10	30
U	ICPMSW	Nickel	0.002	0.02	0.4	10	40
U	ICPMSW	Lead	0.017	0.17	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.015	0.15	4	50	200
U	KONENS	Chloride	32	320	800	15000	25000
U	ISEF	Fluoride	0.2	2	10	150	500
U	ICPWATVAR	Sulphate as SO4	11	110	1000	20000	50000
N	WSLM27	Total Dissolved Solids	114	1140	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	0.98	9.8	500	800	1000

Template Ver. 1 Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.  
Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.095
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	7.2
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.895
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	
BH04 0.50		s18_1264	CL/1786247	22-Dec-17	17.800	
					Fraction of non-crushable material %	
					0.000	

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.16	3	5	6
N	LOI450	Loss on Ignition (%)	0.6			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	11§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.47	100		
N	PHSOIL	pH (pH units)	6.9 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.003	0.03	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	0.006	0.06	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	<0.001	<0.01	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	0.011	0.11	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.017	0.17	4	50	200
U	KONENS	Chloride	8	80	800	15000	25000
U	ISEF	Fluoride	0.2	2	10	150	500
U	ICPWATVAR	Sulphate as SO4	7	70	1000	20000	50000
N	WSLM27	Total Dissolved Solids	<60	<600	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	1	10	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.096
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	9.4
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.894
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	
BH04 1.50		s18_1264	CL/1786248	22-Dec-17	17.800	
					Fraction of non-crushable material %	
					0.000	

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.17	3	5	6
N	LOI450	Loss on Ignition (%)	0.5			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	14§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.50	100		
N	PHSOIL	pH (pH units)	7.4 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>00</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>00</sup>					
	WSLM2	Conductivity (µs/cm) <sup>00</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.004	0.04	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	0.0002	0.002	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	0.005	0.05	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.005	0.05	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	0.003	0.03	0.5	10	50
U	ICPMSW	Antimony	0.001	0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.013	0.13	4	50	200
U	KONENS	Chloride	31	310	800	15000	25000
U	ISEF	Fluoride	0.3	3	10	150	500
U	ICPWATVAR	Sulphate as SO4	20	200	1000	20000	50000
N	WSLM27	Total Dissolved Solids	151	1510	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	1	10	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.100
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	14.1
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.890
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	15.700
BH04 2.50		s18_1264	CL/1786249	22-Dec-17	Fraction of non-crushable material %	0.000

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.09	3	5	6
N	LOI450	Loss on Ignition (%)	0.4			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.06	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	38§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.58	100		
N	PHSOIL	pH (pH units)	8.6 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>00</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>00</sup>					
	WSLM2	Conductivity (µs/cm) <sup>00</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.002	0.02	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	0.001	0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.002	0.02	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.002	0.02	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.006	0.06	4	50	200
U	KONENS	Chloride	53	530	800	15000	25000
U	ISEF	Fluoride	0.1	1	10	150	500
U	ICPWATVAR	Sulphate as SO4	18	180	1000	20000	50000
N	WSLM27	Total Dissolved Solids	203	2030	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	0.85	8.5	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited



## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.093
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	4.4
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.897
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	
BH05 0.50		s18_1264	CL/1786250	22-Dec-17	18.700	
					Fraction of non-crushable material %	
					0.000	

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.5	3	5	6
N	LOI450	Loss on Ignition (%)	0.6			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.05	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	<10§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.42	100		
N	PHSOIL	pH (pH units)	7.5 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.002	0.02	0.5	2	25
U	ICPWATVAR	Barium	0.01	0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	0.001	0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.002	0.02	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.001	0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.002	0.02	4	50	200
U	KONENS	Chloride	82	820	800	15000	25000
U	ISEF	Fluoride	0.3	3	10	150	500
U	ICPWATVAR	Sulphate as SO4	37	370	1000	20000	50000
N	WSLM27	Total Dissolved Solids	320	3200	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	0.7	7	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.094
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	5.4
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.896
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	49.000
BH05 1.00		s18_1264	CL/1786251	22-Dec-17	Fraction of non-crushable material %	0.000

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.15	3	5	6
N	LOI450	Loss on Ignition (%)	0.6			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	25§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.44	100		
N	PHSOIL	pH (pH units)	7.1 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.002	0.02	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.003	0.03	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.001	0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.006	0.06	4	50	200
U	KONENS	Chloride	62	620	800	15000	25000
U	ISEF	Fluoride	0.5	5	10	150	500
U	ICPWATVAR	Sulphate as SO4	33	330	1000	20000	50000
N	WSLM27	Total Dissolved Solids	271	2710	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	0.74	7.4	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.091
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	4.7
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.899
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	
BH05 2.00		s18_1264	CL/1786252	22-Dec-17	100.000	
					Fraction of non-crushable material %	
					0.000	

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.15	3	5	6
N	LOI450	Loss on Ignition (%)	0.6			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.05	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	12§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.43	100		
N	PHSOIL	pH (pH units)	7.4 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>00</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>00</sup>					
	WSLM2	Conductivity (µs/cm) <sup>00</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.002	0.02	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	0.002	0.02	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.002	0.02	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	0.002	0.02	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.013	0.13	4	50	200
U	KONENS	Chloride	26	260	800	15000	25000
U	ISEF	Fluoride	0.2	2	10	150	500
U	ICPWATVAR	Sulphate as SO4	7	70	1000	20000	50000
N	WSLM27	Total Dissolved Solids	92.7	927	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	0.63	6.3	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.098
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	8.4
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.892
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of non-crushable material %	
BH05 3.00		s18_1264	CL/1786253	22-Dec-17	0.000	

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.12	3	5	6
N	LOI450	Loss on Ignition (%)	0.5			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	<11§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.48	100		
N	PHSOIL	pH (pH units)	7.4 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.002	0.02	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.003	0.03	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.01	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.003	0.03	4	50	200
U	KONENS	Chloride	64	640	800	15000	25000
U	ISEF	Fluoride	0.3	3	10	150	500
U	ICPWATVAR	Sulphate as SO4	28	280	1000	20000	50000
N	WSLM27	Total Dissolved Solids	240	2400	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	0.54	5.4	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.095
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	6.0
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.895
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	22.600
BH06 0.50		s18_1264	CL/1786254	22-Dec-17	Fraction of non-crushable material %	0.000

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.14	3	5	6
N	LOI450	Loss on Ignition (%)	0.7			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	<11§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.45	100		
N	PHSOIL	pH (pH units)	7.4 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.002	0.02	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.003	0.03	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.01	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.003	0.03	4	50	200
U	KONENS	Chloride	85	850	800	15000	25000
U	ISEF	Fluoride	0.5	5	10	150	500
U	ICPWATVAR	Sulphate as SO4	24	240	1000	20000	50000
N	WSLM27	Total Dissolved Solids	288	2880	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	0.65	6.5	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.099
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	12.8
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.891
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	7.600
BH06 1.00		s18_1264	CL/1786255	22-Dec-17	Fraction of non-crushable material %	0.000

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.13	3	5	6
N	LOI450	Loss on Ignition (%)	0.7			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	<11§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.56	100		
N	PHSOIL	pH (pH units)	7.4 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	<0.001	<0.01	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.003	0.03	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.01	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.003	0.03	4	50	200
U	KONENS	Chloride	161	1610	800	15000	25000
U	ISEF	Fluoride	0.5	5	10	150	500
U	ICPWATVAR	Sulphate as SO4	28	280	1000	20000	50000
N	WSLM27	Total Dissolved Solids	506	5060	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	0.54	5.4	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.093
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	8.7
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.897
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of non-crushable material %	
BH06 2.00		s18_1264	CL/1786256	22-Dec-17		

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.15	3	5	6
N	LOI450	Loss on Ignition (%)	0.7			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	15§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.49	100		
N	PHSOIL	pH (pH units)	7.5 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	<0.001	<0.01	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.004	0.04	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.01	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.004	0.04	4	50	200
U	KONENS	Chloride	117	1170	800	15000	25000
U	ISEF	Fluoride	0.5	5	10	150	500
U	ICPWATVAR	Sulphate as SO4	20	200	1000	20000	50000
N	WSLM27	Total Dissolved Solids	358	3580	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	0.52	5.2	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd	<b>Leaching Data</b>		
<b>Contact</b>	Neil Haggan	Weight of sample (kg)		0.098
		Moisture content @ 105°C (% of Wet Weight)		9.3
		Equivalent Weight based on drying at 105°C (kg)		0.090
<b>Site</b>	Avoca River Sediment Sampling	Volume of water required to carry out 10:1 stage (litres)		0.892
		Fraction of sample above 4 mm %		25.000
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>
BH06 3.00		s18_1264	CL/1786257	22-Dec-17
		Fraction of non-crushable material %		0.000

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.12	3	5	6
N	LOI450	Loss on Ignition (%)	0.5			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	39§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.50	100		
N	PHSOIL	pH (pH units)	7.6 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	<0.001	<0.01	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.005	0.05	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.01	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.003	0.03	4	50	200
U	KONENS	Chloride	146	1460	800	15000	25000
U	ISEF	Fluoride	0.4	4	10	150	500
U	ICPWATVAR	Sulphate as SO4	30	300	1000	20000	50000
N	WSLM27	Total Dissolved Solids	465	4650	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	0.4	4	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited



## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.094
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	5.6
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.896
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	41.000
BH07 1.00		s18_1264	CL/1786258	22-Dec-17	Fraction of non-crushable material %	0.000

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.12	3	5	6
N	LOI450	Loss on Ignition (%)	0.5			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	<11§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.44	100		
N	PHSOIL	pH (pH units)	7.6 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.006	0.06	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	0.001	0.01	0.5	10	70
U	ICPMSW	Copper	0.008	0.08	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.001	0.01	0.5	10	30
U	ICPMSW	Nickel	0.001	0.01	0.4	10	40
U	ICPMSW	Lead	0.008	0.08	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.029	0.29	4	50	200
U	KONENS	Chloride	64	640	800	15000	25000
U	ISEF	Fluoride	0.4	4	10	150	500
U	ICPWATVAR	Sulphate as SO4	14	140	1000	20000	50000
N	WSLM27	Total Dissolved Solids	212	2120	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	1.3	13	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
					Weight of sample (kg)	0.098
<b>Contact</b>	Neil Haggan				Moisture content @ 105°C (% of Wet Weight)	8.6
					Equivalent Weight based on drying at 105°C (kg)	0.090
<b>Site</b>	Avoca River Sediment Sampling				Volume of water required to carry out 10:1 stage (litres)	0.892
					Fraction of sample above 4 mm %	42.800
		<b>Sample Description</b>	<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of non-crushable material %
		BH07 2.00	s18_1264	CL/1786259	22-Dec-17	0.000

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.11	3	5	6
N	LOI450	Loss on Ignition (%)	0.5			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	<11§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.49	100		
N	PHSOIL	pH (pH units)	7.6 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.009	0.09	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	0.002	0.02	0.5	10	70
U	ICPMSW	Copper	0.013	0.13	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.001	0.01	0.5	10	30
U	ICPMSW	Nickel	0.002	0.02	0.4	10	40
U	ICPMSW	Lead	0.021	0.21	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.049	0.49	4	50	200
U	KONENS	Chloride	34	340	800	15000	25000
U	ISEF	Fluoride	0.4	4	10	150	500
U	ICPWATVAR	Sulphate as SO4	9	90	1000	20000	50000
N	WSLM27	Total Dissolved Solids	123	1230	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	1.5	15	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.094
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	2.8
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.896
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	22.200
BH08 1.00		s18_1264	CL/1786260	22-Dec-17	Fraction of non-crushable material %	0.000

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.12	3	5	6
N	LOI450	Loss on Ignition (%)	0.5			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.05	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	<10§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.40	100		
N	PHSOIL	pH (pH units)	7.3 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.003	0.03	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	0.002	0.02	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.002	0.02	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	0.004	0.04	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.009	0.09	4	50	200
U	KONENS	Chloride	18	180	800	15000	25000
U	ISEF	Fluoride	0.3	3	10	150	500
U	ICPWATVAR	Sulphate as SO4	8	80	1000	20000	50000
N	WSLM27	Total Dissolved Solids	101	1010	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	0.82	8.2	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.093
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	3.9
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.897
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	
BH08 2.00		s18_1264	CL/1786261	22-Dec-17	6.000	
					Fraction of non-crushable material %	
					0.000	

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.16	3	5	6
N	LOI450	Loss on Ignition (%)	0.6			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.05	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	20§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.42	100		
N	PHSOIL	pH (pH units)	7.3 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.009	0.09	0.5	2	25
U	ICPWATVAR	Barium	0.04	0.4	20	100	300
U	ICPMSW	Cadmium	0.0001	0.001	0.04	1	5
U	ICPMSW	Chromium	0.003	0.03	0.5	10	70
U	ICPMSW	Copper	0.025	0.25	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	<0.001	<0.01	0.5	10	30
U	ICPMSW	Nickel	0.004	0.04	0.4	10	40
U	ICPMSW	Lead	0.031	0.31	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.106	1.06	4	50	200
U	KONENS	Chloride	26	260	800	15000	25000
U	ISEF	Fluoride	0.3	3	10	150	500
U	ICPWATVAR	Sulphate as SO4	14	140	1000	20000	50000
N	WSLM27	Total Dissolved Solids	103	1030	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	1.7	17	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.094
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	8.9
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.896
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of non-crushable material %	
BH09 0.50		s18_1264	CL/1786262	22-Dec-17		

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.23	3	5	6
N	LOI450	Loss on Ignition (%)	0.9			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	25§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.49	100		
N	PHSOIL	pH (pH units)	8.6 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.002	0.02	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.003	0.03	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.01	0.5	10	50
U	ICPMSW	Antimony	<0.001	<0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.002	0.02	4	50	200
U	KONENS	Chloride	103	1030	800	15000	25000
U	ISEF	Fluoride	0.4	4	10	150	500
U	ICPWATVAR	Sulphate as SO4	32	320	1000	20000	50000
N	WSLM27	Total Dissolved Solids	365	3650	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	1.1	11	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## WASTE ACCEPTANCE CRITERIA TESTING BSEN 12457/2

<b>Client</b>	Causeway Geotech Ltd				<b>Leaching Data</b>	
<b>Contact</b>	Neil Haggan				Weight of sample (kg)	0.097
<b>Site</b>	Avoca River Sediment Sampling				Moisture content @ 105°C (% of Wet Weight)	7.4
					Equivalent Weight based on drying at 105°C (kg)	0.090
					Volume of water required to carry out 10:1 stage (litres)	0.893
<b>Sample Description</b>		<b>Report No</b>	<b>Sample No</b>	<b>Issue Date</b>	Fraction of sample above 4 mm %	
BH09 2.00		s18_1264	CL/1786263	22-Dec-17	0.000	

Note: The >4mm fraction is crushed using a disc mill

Accreditation	Method Code	Solid Waste Analysis (Dry Basis)	Concentration in Solid (Dry Weight Basis)	Landfill Waste Acceptance Criteria Limit Values		
				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
U	WSLM59	Total Organic Carbon (% M/M)	0.16	3	5	6
N	LOI450	Loss on Ignition (%)	0.9			10
N	BTEXHSA	Sum of BTEX (mg/kg)	<0.055	6		
	PCBUSECD	Sum of 7 Congener PCB's (mg/kg)	<0.60	1		
N	TPHFIDUS	Mineral Oil (mg/kg)	13§	500		
N	PAHMSUS	PAH Sum of 17 (mg/kg)	<1.47	100		
N	PHSOIL	pH (pH units)	7.8 §		>6	
	ANC	Acid Neutralisation Capacity (mol/kg) @pH 7			To be evaluated	To be evaluated

Accreditation	Method Code	Leachate Analysis	10:1 Single Stage Leachate	Calculated cumulative amount leached @ 10:1	Landfill Waste Acceptance Criteria Limit Values for BSEN 12457/2 @ L/S 10 litre kg-1		
			mg/l except <sup>oo</sup>	mg/kg (dry weight)	mg/kg (dry weight)		
	WSLM3	pH (pH units) <sup>oo</sup>					
	WSLM2	Conductivity (µs/cm) <sup>oo</sup>		Calculated data not UKAS Accredited			
U	ICPMSW	Arsenic	0.002	0.02	0.5	2	25
U	ICPWATVAR	Barium	<0.01	<0.1	20	100	300
U	ICPMSW	Cadmium	<0.0001	<0.001	0.04	1	5
U	ICPMSW	Chromium	<0.001	<0.01	0.5	10	70
U	ICPMSW	Copper	<0.001	<0.01	2	50	100
U	ICPMSW	Mercury	<0.0001	<0.001	0.01	0.2	2
U	ICPMSW	Molybdenum	0.004	0.04	0.5	10	30
U	ICPMSW	Nickel	<0.001	<0.01	0.4	10	40
U	ICPMSW	Lead	<0.001	<0.01	0.5	10	50
U	ICPMSW	Antimony	0.001	0.01	0.06	0.7	5
U	ICPMSW	Selenium	<0.001	<0.01	0.1	0.5	7
U	ICPMSW	Zinc	0.002	0.02	4	50	200
U	KONENS	Chloride	137	1370	800	15000	25000
U	ISEF	Fluoride	0.4	4	10	150	500
U	ICPWATVAR	Sulphate as SO4	54	540	1000	20000	50000
N	WSLM27	Total Dissolved Solids	517	5170	4000	60000	100000
	SFAPI	Phenol Index			1		
N	WSLM13	Dissolved Organic Carbon	1	10	500	800	1000

Template Ver. 1

Landfill Waste Acceptance Criteria limit values correct as of 11th March 2009.

Tests where the accreditation is set to U are UKAS accredited, those where the accreditation is set to N are not UKAS accredited

## ASBESTOS ANALYSIS RESULTS

SOCOTEC Asbestos Limited Certificate of Analysis for Asbestos in Soils, Sediments and Aggregates



Detection limit of Method SCI-ASB-020 is 0.001%

Sampling has been carried out by a third party



<b>Client:</b>	SOCOTEC Environmental Chemistry	<b>Page 1 of 2</b>	
<b>Address:</b>	Etwall House, Bretby Business Park, Ashby Road, Burton upon Trent	<b>Report No:</b>	ANO-0503-17264
<b>For the attention of:</b>	Causeway Geotech Ltd	<b>Report Date:</b>	21/12/2017
<b>Site Address:</b>	Avoca River Sediment Sampling	<b>Project Number:</b>	S181264

Sample Number	Sample Date	Sample Location & Matrix	Test Date	Total Sample Dry Weight (g)	Weight of <10mm Fraction (g)	Asbestos(g) in >10mm	Asbestos(g) in < 10mm	% Asbestos by weight of Total Dried Sample	Moisture Content	Asbestos Fibre Types Identified
CL/1786240	07/11/17	BH01 0.10 Soils	20/12/2017	416.8	416.0			Identification		NAIS
CL/1786241	07/11/17	BH01 1.00 Soils	20/12/2017	302.0	293.4			Identification		NAIS
CL/1786242	08/11/17	BH02 0.50 Soils	20/12/2017	1745.0	651.0			Identification		NAIS
CL/1786243	08/11/17	BH02 1.50 Soils	20/12/2017	898.6	340.3			Identification		NAIS
CL/1786244	08/11/17	BH03 0.50 Soils	20/12/2017	1585.0	1092.6			Identification		NAIS
CL/1786245	08/11/17	BH03 1.50 Soils	20/12/2017	487.7	376.5			Identification		NAIS
CL/1786246	08/11/17	BH03 2.50 Soils	20/12/2017	467.1	220.6			Identification		NAIS
CL/1786247	08/11/17	BH04 0.50 Soils	20/12/2017	731.9	352.0			Identification		NAIS
CL/1786248	08/11/17	BH04 1.50 Soils	20/12/2017	948.5	374.4			Identification		NAIS
CL/1786249	08/11/17	BH04 2.50 Soils	20/12/2017	781.5	485.6			Identification		NAIS
CL/1786250	09/11/17	BH05 0.50 Soils	20/12/2017	1653.0	922.6			Identification		NAIS
CL/1786251	09/11/17	BH05 1.00 Soils	20/12/2017	377.6	288.7			Identification		Chrysotile(Free Fibres)
CL/1786252	09/11/17	BH05 2.00 Soils	20/12/2017	271.0	216.0			Identification		NAIS
CL/1786253	09/11/17	BH05 3.00 Soils	21/12/2017	669.4	506.1			Identification		NAIS
CL/1786254	09/11/17	BH06 0.50 Soils	20/12/2017	389.4	250.6			Identification		NAIS
CL/1786255	09/11/17	BH06 1.00 Soils	20/12/2017	506.3	434.2			Identification		NAIS
CL/1786256	09/11/17	BH06 2.00 Soils	20/12/2017	626.0	502.9			Identification		NAIS
CL/1786257	09/11/17	BH06 3.00 Soils	20/12/2017	357.9	277.4			Identification		NAIS
CL/1786258	09/11/17	BH07 1.00 Soils	20/12/2017	345.2	282.0			Identification		NAIS
CL/1786259	09/11/17	BH07 2.00 Soils	21/12/2017	600.5	517.9			Identification		NAIS

<b>Keys</b>	NAACR = Not Analysed at Clients Request	NAIS = No Asbestos Identified in Sample (Identification Only)	Name:	Tom Pratt	Authorised Signatory:
	* visible to naked eye	NADIS = No Asbestos Detected in Sample (ID & Quant Only)	Position:	Lab Supervisor	

The sample analysis for the above results was carried out using the procedures detailed in SOCOTEC Asbestos Limited in house method (SCI-ASB-020) based on EA document Quantification of asbestos in soil and associated materials - Draft 12 - February 2016. Fibre identification was carried out using SOCOTEC Asbestos Limited in house method of transmitted/polarised light microscopy and centre stop dispersion staining (SCI-ASB-007), based on HSE's HSG 248. The analysis of the < 10mm fraction for asbestos content only includes ACMs and fibres and does not discriminate non-asbestos fibres. All fibres are assumed, unless specified, to be amphiboles. All tests were carried out at SOCOTEC Asbestos Laboratory, Ashbourne House, Bretby Business Park, Ashby Road, Burton-upon-Trent, Staffordshire. DE15 0YZ, UKAS Laboratory Number 1089.





Customer Causeway Geotech Ltd  
Site Avoca River Sediment Sampling  
Report No S181264

Consignment No S\_NonCon  
Date Logged 05-Dec-2017  
In-House Report Due 27-Dec-2017

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	MethodID	ANC	CALC.CRS	GEN.Leaching	DistServ	GRO.HSA	ICP.MSS	Antimony (MS) Sediments	Copper (MS) Sediment	Molybdenum (MS) Sediments	Selenium (MS) Sediments	Tin (MS) Sediment	Arsenic (MS) Sediments	Cadmium (MS) Sediments	Chromium (MS) Sediments	Lead (MS) Sediments	Mercury (MS) Sediments	Nickel (MS) Sediments	Zinc (MS) Sediments	Barium. Sediment	KONECR	LOI(%MM)	OGNSSED	Dibutyl Tin (Sediments)	Tributyl Tin (Sediments)	Triphenyl Tin(Sediments)	PAH(SUS)	PAH (17) by GCMS	PCMS3a	Organochlorine Pesticides (Marine Sediments)		
																																GRO.AA) by HSA GC-FID	Report C
CL/1786240	BH01 0.10	07/11/17																															
CL/1786241	BH01 1.00	07/11/17																															
CL/1786242	BH02 0.50	08/11/17																															
CL/1786243	BH02 1.50	08/11/17																															
CL/1786244	BH03 0.50	08/11/17																															
CL/1786245	BH03 1.50	08/11/17																															
CL/1786246	BH03 2.50	08/11/17																															
CL/1786247	BH04 0.50	08/11/17																															
CL/1786248	BH04 1.50	08/11/17																															
CL/1786249	BH04 2.50	08/11/17																															
CL/1786250	BH05 0.50	09/11/17																															
CL/1786251	BH05 1.00	09/11/17																															
CL/1786252	BH05 2.00	09/11/17																															
CL/1786253	BH05 3.00	09/11/17																															
CL/1786254	BH06 0.50	09/11/17																															

**Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.**

**If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.**

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time
Requested Analysis Key	
■	Analysis Required
■	Analysis dependant upon trigger result - <b>Note: due date may be affected if triggered</b>
□	No analysis scheduled
^	Analysis Subcontracted - <b>Note: due date may vary</b>

Where individual results are flagged see report notes for status.

Customer Causeway Geotech Ltd  
Site Avoca River Sediment Sampling  
Report No S181264

Consignment No S\_NonCon  
Date Logged 05-Dec-2017  
In-House Report Due 27-Dec-2017

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	MethodID	PCBMS30	PHSOIL	Sub002	Sub061	SVOCMS30	TMSS	TMSSCALC	TPH005	TPH005SI	WGLM59
			PCB- 7 Congeners (Marine Sediments)	pH units (AR)	Asbestos Screen & ID (Stage 1)	Particle Size Analysis (Sediment)	SVOC by GCMS (AR)	Hexachlorobutadiene	Tot.Moisture @ 105C	Dry Matter %	TPH Band (>C10-C40)	TPH by GC/FID (AR)
CL/1786240	BH01 0.10	07/11/17										
CL/1786241	BH01 1.00	07/11/17										
CL/1786242	BH02 0.50	08/11/17										
CL/1786243	BH02 1.50	08/11/17										
CL/1786244	BH03 0.50	08/11/17										
CL/1786245	BH03 1.50	08/11/17										
CL/1786246	BH03 2.50	08/11/17										
CL/1786247	BH04 0.50	08/11/17										
CL/1786248	BH04 1.50	08/11/17										
CL/1786249	BH04 2.50	08/11/17										
CL/1786250	BH05 0.50	09/11/17										
CL/1786251	BH05 1.00	09/11/17										
CL/1786252	BH05 2.00	09/11/17										
CL/1786253	BH05 3.00	09/11/17										
CL/1786254	BH06 0.50	09/11/17										

**Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.**

**If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.**

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
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E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time
Requested Analysis Key	
■	Analysis Required
■	Analysis dependant upon trigger result - <b>Note: due date may be affected if triggered</b>
□	No analysis scheduled
^	Analysis Subcontracted - <b>Note: due date may vary</b>

Where individual results are flagged see report notes for status.



Customer Causeway Geotech Ltd  
Site Avoca River Sediment Sampling  
Report No S181264

Consignment No S\_NonCon  
Date Logged 05-Dec-2017  
In-House Report Due 27-Dec-2017

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	MethodID	PCBMS30	PHSOIL	Sub002	Sub061	SVOCMS	TMSS	TMSSCALC	TPHROUS	TPHUSI	WGLMS9
			PCB- 7 Congeners (Marine Sediments)	pH units (AR)	Asbestos Screen & ID (Stage 1)	Particle Size Analysis (Sediment)	SVOC by GCMS (AR)	Hexachlorobutadiene	Tot.Moisture @ 105C	Dry Matter %	TPH Band (>C10-C40)	TPH by GC/FID (AR)
CL/1786255	BH06 1.00	09/11/17										
CL/1786256	BH06 2.00	09/11/17										
CL/1786257	BH06 3.00	09/11/17										
CL/1786258	BH07 1.00	09/11/17										
CL/1786259	BH07 2.00	09/11/17										
CL/1786260	BH08 1.00	10/11/17										
CL/1786261	BH08 2.00	10/11/17										
CL/1786262	BH09 0.50	10/11/17										
CL/1786263	BH09 2.00	10/11/17										
CL/1786264	CRM	10/11/17										
CL/1786265	QC Blank											
CL/1786266	Reference Material (% Recovery)											

**Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.**

**If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.**

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time
Requested Analysis Key	
■	Analysis Required
■	Analysis dependant upon trigger result - <b>Note: due date may be affected if triggered</b>
□	No analysis scheduled
^	Analysis Subcontracted - <b>Note: due date may vary</b>

Where individual results are flagged see report notes for status.



# Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	ANC	Oven Dried @ < 35°C	Quantitative digestion with Hydrochloric Acid back titration with 1M Sodium Hydroxide to pH 7
Soil	CALC_CR3	Oven Dried @ < 35°C	Calculated from the difference between Total Chromium and Hexavalent Chromium
Soil	GROHSA	As Received	Determination of Total Gasoline Range Organics Hydrocarbons (GRO) by Headspace GCFID
Soil	ICPMSS	Oven Dried @ < 35°C	Determination of Metals in Marine Sediments and Soil samples by aqua regia digestion followed by ICPMS detection
Soil	ICPSOIL	Oven Dried @ < 35°C	Determination of Metals in soil samples by aqua regia digestion followed by ICPOES detection
Soil	KONECR	Oven Dried @ < 35°C	Determination of Chromium vi in soil samples by water extraction followed by colorimetric detection
Soil	LOI(%MM)	Oven Dried @ < 35°C	Determination of loss on ignition for soil samples at specified temperature by gravimetry
Soil	OGSNESED	As Received	Determination of Organo-tin compounds using sonic extraction in methanol , derivatisation with Sodium Tetraethylborate and GCMS quantitation (SIM mode).
Soil	PAHMSUS	As Received	Determination of Polycyclic Aromatic Hydrocarbons (PAH) by hexane/acetone extraction followed by GCMS detection
Soil	PCBMS3Q	As Received	Determination of Polychlorinated Biphenyl (PCB) congeners by hexane/acetone extraction followed by GCECD detection
Soil	PHSOIL	As Received	Determination of pH of 2.5:1 deionised water to soil extracts using pH probe.
Soil	SubCon*	*	Contact Laboratory for details of the methodology used by the sub-contractor.
Soil	SVOCMSUS	As Received	Determination of Semi Volatile Organic Compounds in soil samples by Dichloromethane/Acetone extraction followed by GCMS detection
Soil	TMSS	As Received	Determination of the Total Moisture content at 105°C by loss on oven drying gravimetric analysis (% based upon wet weight)
Soil	TMSSCALC	As Received	Calculated from the 100 - Total Moisture Content @ 100°C
Soil	TPHFIDUS	As Received	Determination of hexane/acetone extractable Hydrocarbons in soil with GCFID detection.
Soil	TPHUSSI	As Received	Determination of hexane/acetone extractable Hydrocarbons in soil with GCFID detection including quantitation of Aromatic and Aliphatic fractions.
Soil	WSLM59	Oven Dried @ < 35°C	Determination of Organic Carbon in soil using sulphurous Acid digestion followed by high temperature combustion and IR detection
Water	ICPMSW	As Received	Direct quantitative determination of Metals in water samples using ICPMS

Where individual results are flagged see report notes for status.

# Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Water	ICPWATVAR	As Received	Direct determination of Metals and Sulphate in water samples using ICPOES
Water	ISEF	As Received	Determination of Fluoride in water samples by Ion Selective Electrode (ISE)
Water	KONENS	As Received	Direct analysis using discrete colorimetric analysis
Water	SFAPI	As Received	Segmented flow analysis with colorimetric detection
Water	WSLM13	As Received	Instrumental analysis using acid/persulphate digestion and non-dispersive IR detection
Water	WSLM2	As Received	Determination of the Electrical Conductivity ( $\mu\text{S}/\text{cm}$ ) by electrical conductivity probe.
Water	WSLM27	As Received	Gravimetric Determination
Water	WSLM3	As Received	Determination of the pH of water samples by pH probe

Where individual results are flagged see report notes for status.

# Report Notes

## Generic Notes

### Soil/Solid Analysis

Unless stated otherwise,

- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.  
All results on MCERTS reports are reported on a 105°C dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

### Waters Analysis

Unless stated otherwise results are expressed as mg/l

**Nil:** Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

### Oil analysis specific

Unless stated otherwise,

- Results are expressed as mg/kg
- SG is expressed as g/cm<sup>3</sup>@ 15°C

### Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

### Asbestos Analysis

**CH** Denotes Chrysotile

**TR** Denotes Tremolite

**CR** Denotes Crocidolite

**AC** Denotes Actinolite

**AM** Denotes Amosite

**AN** Denotes Anthophyllite

**NAIIS** No Asbestos Identified in Sample

**NADIS** No Asbestos Detected In Sample

## Symbol Reference

^ Sub-contracted analysis.

\$\$ Unable to analyse due to the nature of the sample

¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols.

This may have resulted in deterioration of the sample(s) during transit to the laboratory.

Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling

¥ Results for guidance only due to possible interference

& Blank corrected result

I.S Insufficient sample to complete requested analysis

I.S(g) Insufficient sample to re-analyse, results for guidance only

Intf Unable to analyse due to interferences

N.D Not determined

N.Det Not detected

N.F No Flow

NS Information Not Supplied

Req Analysis requested, see attached sheets for results

P Raised detection limit due to nature of the sample

\* All accreditation has been removed by the laboratory for this result

‡ MCERTS accreditation has been removed for this result

§ accreditation has been removed for this result as it is a non-accredited matrix

**Note:** The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.





Our Ref: EFS/181264 (Ver. 3)

Your Ref: 17-0906

January 11, 2018



Environmental Chemistry

SOCOTEC UK Limited

Bretby Business Park

Ashby Road

Burton-on-Trent

Staffordshire

DE15 0YZ

Telephone: 01283 554400

Facsimile: 01283 554422

Neil Haggan  
Causeway Geotech Ltd  
8 Drumahiskey Road  
Ballymoney  
United Kingdom  
BT53 7QL

For the attention of Neil Haggan

Dear Neil Haggan

**Sample Analysis - Avoca River Sediment Sampling**

Samples from the above site have been analysed in accordance with the schedule supplied.

The sample details and the results of analyses for these samples are given in the appended report.

An invoice for this work will follow under a separate cover.

Where appropriate the samples will be kept until 16/01/18 when they will be discarded. Please call 01283 554547 for an extension of this date.

Please be aware that our policy for the retention of paper based laboratory records and analysis reports is 6 years.

The work was carried out in accordance with SOCOTEC UK Limited (Multi-Sector Services) Standard Terms and Conditions of Contract.

If I can be of any further assistance please do not hesitate to contact me.

Yours sincerely

for SOCOTEC UK Limited

A handwritten signature in black ink, appearing to read 'J Colbourne'.

J Colbourne

Project Co-ordinator

01283 554547

# TEST REPORT



1252

Report No. EFS/181264 (Ver. 3)

Causeway Geotech Ltd  
8 Drumahiskey Road  
Ballymoney  
United Kingdom  
BT53 7QL

## Site: Avoca River Sediment Sampling

The 7 samples described in this report were registered for analysis by SOCOTEC UK Limited on 05-Dec-2017. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 11-Jan-2018

Tests where the accreditation is set to N or No, and any individual data items marked with a \* are not UKAS accredited. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

The following tables are contained in this report:

Table 1 Main Analysis Results (Pages 2 to 3)  
Table of PAH (MS-SIM) (80) Results (Pages 4 to 9)  
Table of PCB Congener Results (Pages 10 to 13)  
Subcontracted Analysis Reports (Pages 14 to 15)  
*The accreditation status of subcontracted analysis is displayed on the appended subcontracted analysis reports.*  
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On behalf of  
SOCOTEC UK Lim

Operations Director  
Energy & Waste Services


Date of Issue: 11-Jan-2018

Tests marked '^' have been subcontracted to another laboratory.

Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected.

SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.



		Units :	%	mg/kg	ug Sn/kg	ug Sn/kg	ug Sn/kg	µg/kg	µg/kg	%	mg/kg	mg/kg								
		Method Codes :	ANC	ICPMSS	OGSNESED	OGSNESED	OGSNESED	PCBMS3Q	PCBECD	Sub061	SVOCMSUS	PAHMSUS								
		Method Reporting Limits :	0.12	0.5	1	1	1	0.08	0.08		0.1									
		UKAS Accredited :	No	No	No	No	No	No	No		No	Yes								
LAB ID Number	Client Sample Description	Sample Date	Carbonate %	Tin (MS) Sediment	Diburyl Tin (Sediments)	Triburyl Tin (Sediments)	Triphenyl Tin(Sediments)	Organochlorine Pesticides (Marine Sediments)	PCB-7 Congeners Analysis	Particle Size Analysis (Sediment)	Hexachlorobutadiene	PAH (17) by GCMS								
1786242	BH02 0.50	08-Nov-17	2.16	<0.5	<1	<1	<1	Req	Req	Req	Req	Req §								
1786244	BH03 0.50	08-Nov-17	1.20	<0.5	<1	<1	<1	Req	Req	Req	Req	Req §								
1786250	BH05 0.50	09-Nov-17	2.64	<0.5	<1	<1	<1	Req	Req	Req	Req	Req §								
1786262	BH09 0.50	10-Nov-17	2.40	<0.5	<1	<1	<1	Req	Req	Req	Req	Req §								
1786264	CRM	10-Nov-17			93	71	81	Req	Req	Req										
1786265	QC Blank			<0.5	<1	<1	<1	Req	Req		Req	Req §								
1786266	Reference Material (% Recovery)		102.6		78	82	98	Req	Req		Req	Req §								
 <p>Bretby Business Park, Ashby Road Burton-on-Trent, Staffordshire, DE15 0YZ Tel +44 (0) 1283 554400 Fax +44 (0) 1283 554422</p>			<b>Client Name</b> Causeway Geotech Ltd <b>Contact</b> Neil Haggan				<b>Avoca River Sediment Sampling</b>						<b>Sample Analysis</b>							
							<b>Date Printed</b> 22-Dec-2017													
							<b>Report Number</b> EFS/181264													
							<b>Table Number</b> 1													

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH02 0.50	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786242	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171346	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	110
Acenaphthene-d10	111
Phenanthrene-d10	111
Chrysene-d12	114
Perylene-d12	109

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	97
Terphenyl-d14	80

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH03 0.50	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786244	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171346	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	108
Acenaphthene-d10	110
Phenanthrene-d10	110
Chrysene-d12	111
Perylene-d12	104

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	100
Terphenyl-d14	82

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH05 0.50	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786250	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171346	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	109
Acenaphthene-d10	110
Phenanthrene-d10	112
Chrysene-d12	118
Perylene-d12	110

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	94
Terphenyl-d14	78

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.



# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	BH09 0.50	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786262	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	16-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	107
Acenaphthene-d10	107
Phenanthrene-d10	107
Chrysene-d12	103
Perylene-d12	93

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	92
Terphenyl-d14	74

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	QC Blank	<b>Job Number:</b>	s18_1264
<b>LIMS ID Number:</b>	CL1786265	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit
Naphthalene	91-20-3	-	< 0.08	-
Acenaphthylene	208-96-8	-	< 0.08	-
Acenaphthene	83-32-9	-	< 0.08	-
Fluorene	86-73-7	-	< 0.08	-
Phenanthrene	85-01-8	-	< 0.08	-
Anthracene	120-12-7	-	< 0.08	-
Fluoranthene	206-44-0	-	< 0.08	-
Pyrene	129-00-0	-	< 0.08	-
Benzo[a]anthracene	56-55-3	-	< 0.08	-
Chrysene	218-01-9	-	< 0.08	-
Benzo[b]fluoranthene	205-99-2	-	< 0.08	-
Benzo[k]fluoranthene	207-08-9	-	< 0.08	-
Benzo[a]pyrene	50-32-8	-	< 0.08	-
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.08	-
Dibenzo[a,h]anthracene	53-70-3	-	< 0.08	-
Benzo[g,h,i]perylene	191-24-2	-	< 0.08	-
Coronene	191-07-1	-	< 0.08	-
Total (USEPA16) PAHs	-	-	< 1.28	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	106
Acenaphthene-d10	108
Phenanthrene-d10	108
Chrysene-d12	111
Perylene-d12	104

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	106
Terphenyl-d14	86

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polycyclic Aromatic Hydrocarbons GC/MS (SIM)

<b>Customer and Site Details:</b>	Causeway Geotech Ltd: Avoca River Sediment Sampling		
<b>Sample Details:</b>	Reference Material (% Recovery)	<b>Job Number:</b>	S18_1264
<b>LIMS ID Number:</b>	CL1786266	<b>Date Booked in:</b>	05-Dec-17
<b>QC Batch Number:</b>	171347	<b>Date Extracted:</b>	15-Dec-17
<b>Quantitation File:</b>	Initial Calibration	<b>Date Analysed:</b>	15-Dec-17
<b>Directory:</b>	121517.MS17\	<b>Matrix:</b>	Soil
<b>Dilution:</b>	1.0	<b>Ext Method:</b>	Ultrasonic

UKAS accredited?: No

Target Compounds	CAS #	R.T. (min)	Recovery %	% Fit
Naphthalene	91-20-3	2.99	99	99
Acenaphthylene	208-96-8	4.03	99	99
Acenaphthene	83-32-9	4.14	101	96
Fluorene	86-73-7	4.50	99	95
Phenanthrene	85-01-8	5.28	98	99
Anthracene	120-12-7	5.33	98	99
Fluoranthene	206-44-0	6.56	99	91
Pyrene	129-00-0	6.83	99	90
Benzo[a]anthracene	56-55-3	8.48	95	99
Chrysene	218-01-9	8.53	101	99
Benzo[b]fluoranthene	205-99-2	9.99	91	96
Benzo[k]fluoranthene	207-08-9	10.02	96	97
Benzo[a]pyrene	50-32-8	10.41	98	96
Indeno[1,2,3-cd]pyrene	193-39-5	11.78	97	89
Dibenzo[a,h]anthracene	53-70-3	11.81	104	96
Benzo[g,h,i]perylene	191-24-2	12.06	97	94
Coronene	191-07-1	13.90	80	77
Total (USEPA16) PAHs	-	-	103	-

\* Denotes compound is not UKAS accredited

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	-
Acenaphthene-d10	-
Phenanthrene-d10	-
Chrysene-d12	-
Perylene-d12	-

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	-
Terphenyl-d14	-

Concentrations are reported on a wet weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

# Polychlorinated Biphenyls (congeners)

**Customer and Site Details:** Causeway Geotech Ltd: Avoca River Sediment Sampling  
**Job Number:** S18\_1264  
**QC Batch Number:** 170019  
**Directory:** 181217PCB.TQ1  
**Method:** Ultrasonic

**Matrix:** Soil  
**Date Booked in:** 05-Dec-17  
**Date Extracted:** 16-Dec-17  
**Date Analysed:** 18-Dec-17

*Compounds marked \* are not UKAS or MCerts accredited*

Sample ID	Customer ID	Concentration, (µg/kg)						
		PCB28*	PCB52*	PCB101*	PCB118*	PCB153*	PCB138*	PCB180*
CL1786242	BH02 0.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786244	BH03 0.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786250	BH05 0.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

# Polychlorinated Biphenyls (congeners)

**Customer and Site Details:** Causeway Geotech Ltd: Avoca River Sediment Sampling  
**Job Number:** S18\_1264  
**QC Batch Number:** 170020  
**Directory:** 181217PCB.TQ1  
**Method:** Ultrasonic

**Matrix:** Soil  
**Date Booked in:** 05-Dec-17  
**Date Extracted:** 16-Dec-17  
**Date Analysed:** 18-Dec-17

*Compounds marked \* are not UKAS or MCerts accredited*

Sample ID	Customer ID	Concentration, (µg/kg)						
		PCB28*	PCB52*	PCB101*	PCB118*	PCB153*	PCB138*	PCB180*
CL1786262	BH09 0.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786264	CRM	2.87	4.60	4.87	3.34	4.10	4.22	2.48
CL1786265	QC Blank	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
CL1786266	Reference Material (% Recovery)	73	117	104	106	105	109	106

# Organochlorine Pesticides

**Customer and Site Details:** Causeway Geotech Ltd: Avoca River Sediment Sampling  
**Job Number:** S18\_1264  
**QC Batch Number:** 170020  
**Directory:** 181217.TQ1  
**Method:** Ultrasonic

**Matrix:** Sediment  
**Date Booked in:** 05-Dec-17  
**Date Extracted:** 16-Dec-17  
**Date Analysed:** 18-Dec-17  
**UKAS Accredited:** No

Compounds marked \* are not UKAS or MCerts accredited

<b>Sample ID :</b>	CL1786242	CL1786244	CL1786262	CL1786264	CL1786265
<b>Client ID :</b>	BH02 0.50	BH03 0.50	BH09 0.50	CRM	QC Blank

Compound	Concentration (µg/kg)				
alpha-HCH	<0.10	<0.10	<0.10	<0.10	<0.10
Hexachlorobenzene	<0.10	<0.10	<0.10	8.85	<0.10
gamma-HCH	<0.10	<0.10	<0.10	<0.10	<0.10
p,p'-DDE	<0.10	<0.10	<0.10	2.50	<0.10
Dieldrin	<0.10	<0.10	<0.10	0.35	<0.10
p,p'-DDD	<0.10	<0.10	<0.10	3.73	<0.10
p,p'-DDT	<0.10	<0.10	<0.10	0.19	<0.10

Where individual results are flagged see report notes for status.

# Organochlorine Pesticides

**Customer and Site Details:** Causeway Geotech Ltd: Avoca River Sediment Sampling  
**Job Number:** S18\_1264  
**QC Batch Number:** 170020  
**Directory:** 181217.TQ1  
**Method:** Ultrasonic

**Matrix:** Sediment  
**Date Booked in:** 05-Dec-17  
**Date Extracted:** 16-Dec-17  
**Date Analysed:** 18-Dec-17  
**UKAS Accredited:** No

Compounds marked \* are not UKAS or MCerts accredited

<b>Sample ID :</b>	CL1786266	CL1786250		
<b>Client ID :</b>	Reference Material (% Recovery)	BH05 0.50		

Compound	Concentration (µg/kg)				
alpha-HCH	89	<0.10			
Hexachlorobenzene	98	<0.10			
gamma-HCH	92	<0.10			
p,p'-DDE	83	<0.10			
Dieldrin	89	<0.10			
p,p'-DDD	90	<0.10			
p,p'-DDT	99	<0.10			

Size (µm)	Particle size distribution (%)			
	S1786262	S1786242	S1786244	S1786250
16000.000	0.000	27.946	0.000	0.000
11200.000	0.000	15.695	0.000	11.809
8000.000	0.000	8.207	6.776	9.961
5600.000	0.000	9.907	9.350	12.561
4000.000	0.000	4.411	9.578	9.335
2800.000	0.000	2.374	10.762	6.265
2000.000	0.000	1.656	10.675	7.382
1400.000	0.000	2.052	11.859	8.447
1000.000	0.000	2.081	9.079	6.536
707.000	0.000	3.908	9.881	7.647
500.000	0.252	5.188	10.523	8.499
354.000	1.756	5.037	5.970	5.268
250.000	3.142	5.012	2.943	3.101
177.000	3.848	3.126	1.441	1.699
125.000	4.936	1.934	0.565	0.835
88.400	5.764	1.086	0.371	0.425
62.500	6.304	0.381	0.228	0.230
44.200	7.166	0.000	0.000	0.000
31.200	8.254	0.000	0.000	0.000
22.100	8.806	0.000	0.000	0.000
15.600	8.856	0.000	0.000	0.000
11.000	8.528	0.000	0.000	0.000
7.810	7.864	0.000	0.000	0.000
5.520	7.172	0.000	0.000	0.000
3.910	6.006	0.000	0.000	0.000
2.760	4.654	0.000	0.000	0.000
1.950	2.792	0.000	0.000	0.000
1.380	1.208	0.000	0.000	0.000
0.977	0.754	0.000	0.000	0.000
0.691	1.026	0.000	0.000	0.000
0.488	0.762	0.000	0.000	0.000
0.345	0.150	0.000	0.000	0.000
0.244	0.000	0.000	0.000	0.000
0.173	0.000	0.000	0.000	0.000
0.122	0.000	0.000	0.000	0.000
0.086	0.000	0.000	0.000	0.000



Station	Client Sample Description	Treatment	Textural Group Classification	Folk and Ward Description	Folk and Ward Sorting	Mean $\mu\text{m}$	Mean $\phi$	Sorting Coefficient	Skewness	Kurtosis	Major Sediment Fractions		
											% Gravel	% Sand	% Mud
S1786242	BH02 0.50	Sediment	Gravel	Very Fine Gravel	Moderately Sorted	3822.3	-1.934	0.753	3.197	0.914	80.8%	19.2%	0.0%
S1786244	BH03 0.50	Sediment	Sandy Gravel	Very Fine Gravel	Poorly Sorted	2416.9	-1.273	1.316	0.037	0.886	57.3%	42.7%	0.0%
S1786250	BH05 0.50	Sediment	Sandy Gravel	Very Fine Gravel	Poorly Sorted	3587.6	-1.843	1.560	0.234	0.815	67.5%	32.5%	0.0%
S1786262	BH09 0.50	Sediment	Sandy Mud	Coarse Silt	Very Poorly Sorted	23.25	5.426	2.143	-0.035	0.918	0.0%	26.0%	74.0%







Customer Causeway Geotech Ltd  
Site Avoca River Sediment Sampling  
Report No S181264

Consignment No S\_NonCon  
Date Logged 05-Dec-2017  
In-House Report Due 27-Dec-2017

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	MethodID	PCBMS30	PHSOIL	Sub002	Sub061	SVOCMS	TMSS	TMSSCALC	TPHROUS	TPHUSI	WGLM59
			PCB- 7 Congeners (Marine Sediments)	pH units (AR)	Asbestos Screen & ID (Stage 1)	Particle Size Analysis (Sediment)	SVOC by GCMS (AR)	Hexachlorobutadiene	Tot.Moisture @ 105C	Dry Matter %	TPH Band (>C10-C40)	TPH by GC/FID (AR)
CL/1786240	BH01 0.10	07/11/17										
CL/1786241	BH01 1.00	07/11/17										
CL/1786242	BH02 0.50	08/11/17										
CL/1786243	BH02 1.50	08/11/17										
CL/1786244	BH03 0.50	08/11/17										
CL/1786245	BH03 1.50	08/11/17										
CL/1786246	BH03 2.50	08/11/17										
CL/1786247	BH04 0.50	08/11/17										
CL/1786248	BH04 1.50	08/11/17										
CL/1786249	BH04 2.50	08/11/17										
CL/1786250	BH05 0.50	09/11/17										
CL/1786251	BH05 1.00	09/11/17										
CL/1786252	BH05 2.00	09/11/17										
CL/1786253	BH05 3.00	09/11/17										
CL/1786254	BH06 0.50	09/11/17										

**Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.**

**If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.**

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time
Requested Analysis Key	
■	Analysis Required
■	Analysis dependant upon trigger result - <b>Note: due date may be affected if triggered</b>
□	No analysis scheduled
^	Analysis Subcontracted - <b>Note: due date may vary</b>

Where individual results are flagged see report notes for status.

Customer Causeway Geotech Ltd  
Site Avoca River Sediment Sampling  
Report No S181264

Consignment No S\_NonCon  
Date Logged 05-Dec-2017  
In-House Report Due 27-Dec-2017

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	MethodID	ANC	CALC.CRS	GEN.Leaching	DistServ	GRO.HSA	ICP.MSS	Antimony (MS) Sediments	Copper (MS) Sediment	Molybdenum (MS) Sediments	Selenium (MS) Sediments	Tin (MS) Sediment	Arsenic (MS) Sediments	Cadmium (MS) Sediments	Chromium (MS) Sediments	Lead (MS) Sediments	Mercury (MS) Sediments	Nickel (MS) Sediments	Zinc (MS) Sediments	Barium. Sediment	ICP.SOIL	KONECR	LOI(%MM)	OGNSSED	Dibutyl Tin (Sediments)	Tributyl Tin (Sediments)	Triphenyl Tin(Sediments)	PAH (17) by GCMS	PAM.SUS	PCMS.Sq	Organochlorine Pesticides (Marine Sediments)	
																																	GRO (AA) by HSA GC-FID
CL/1786255	BH06 1.00	09/11/17																															
CL/1786256	BH06 2.00	09/11/17																															
CL/1786257	BH06 3.00	09/11/17																															
CL/1786258	BH07 1.00	09/11/17																															
CL/1786259	BH07 2.00	09/11/17																															
CL/1786260	BH08 1.00	10/11/17																															
CL/1786261	BH08 2.00	10/11/17																															
CL/1786262	BH09 0.50	10/11/17																															
CL/1786263	BH09 2.00	10/11/17																															
CL/1786264	CRM	10/11/17																															
CL/1786265	QC Blank																																
CL/1786266	Reference Material (% Recovery)																																

**Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.**

**If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.**

Deviating Sample Key	
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C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time
Requested Analysis Key	
<span style="background-color: #90EE90;"> </span>	Analysis Required
<span style="background-color: #FFFF00;"> </span>	Analysis dependant upon trigger result - <b>Note: due date may be affected if triggered</b>
<span style="background-color: #FFFFFF;"> </span>	No analysis scheduled
^	Analysis Subcontracted - <b>Note: due date may vary</b>

Where individual results are flagged see report notes for status.

Customer Causeway Geotech Ltd  
Site Avoca River Sediment Sampling  
Report No S181264

Consignment No S\_NonCon  
Date Logged 05-Dec-2017  
In-House Report Due 27-Dec-2017

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	MethodID	PCBMS30	PHSOIL	Sub002	Sub061	SVOCMS30	TMSS	TMSSALC	TPHMS30	TPHUSI	WGLMS9
			PCB- 7 Congeners (Marine Sediments)	pH units (AR)	Asbestos Screen & ID (Stage 1)	Asbestos Screen & ID (Stage 1)	SVOC by GCMS (AR)	Hexachlorobutadiene	Tot.Moisture @ 105C	Dry Matter %	TPH Band (>C10-C40)	TPH by GC/FID (AR)
CL/1786255	BH06 1.00	09/11/17										
CL/1786256	BH06 2.00	09/11/17										
CL/1786257	BH06 3.00	09/11/17										
CL/1786258	BH07 1.00	09/11/17										
CL/1786259	BH07 2.00	09/11/17										
CL/1786260	BH08 1.00	10/11/17										
CL/1786261	BH08 2.00	10/11/17										
CL/1786262	BH09 0.50	10/11/17										
CL/1786263	BH09 2.00	10/11/17										
CL/1786264	CRM	10/11/17										
CL/1786265	QC Blank											
CL/1786266	Reference Material (% Recovery)											

**Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.**

**If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.**

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time
Requested Analysis Key	
■	Analysis Required
■	Analysis dependant upon trigger result - <b>Note: due date may be affected if triggered</b>
□	No analysis scheduled
^	Analysis Subcontracted - <b>Note: due date may vary</b>

Where individual results are flagged see report notes for status.





# Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	ANC	Oven Dried @ < 35°C	Quantitative digestion with Hydrochloric Acid back titration with 1M Sodium Hydroxide to pH 7
Soil	CALC_CR3	Oven Dried @ < 35°C	Calculated from the difference between Total Chromium and Hexavalent Chromium
Soil	GROHSA	As Received	Determination of Total Gasoline Range Organics Hydrocarbons (GRO) by Headspace GCFID
Soil	ICPMSS	Oven Dried @ < 35°C	Determination of Metals in Marine Sediments and Soil samples by aqua regia digestion followed by ICPMS detection
Soil	ICPSOIL	Oven Dried @ < 35°C	Determination of Metals in soil samples by aqua regia digestion followed by ICPOES detection
Soil	KONECR	Oven Dried @ < 35°C	Determination of Chromium vi in soil samples by water extraction followed by colorimetric detection
Soil	LOI(%MM)	Oven Dried @ < 35°C	Determination of loss on ignition for soil samples at specified temperature by gravimetry
Soil	OGSNESED	As Received	Determination of Organo-tin compounds using sonic extraction in methanol , derivatisation with Sodium Tetraethylborate and GCMS quantitation (SIM mode).
Soil	PAHMSUS	As Received	Determination of Polycyclic Aromatic Hydrocarbons (PAH) by hexane/acetone extraction followed by GCMS detection
Soil	PCBMS3Q	As Received	Determination of Polychlorinated Biphenyl (PCB) congeners by hexane/acetone extraction followed by GCECD detection
Soil	PHSOIL	As Received	Determination of pH of 2.5:1 deionised water to soil extracts using pH probe.
Soil	SubCon*	*	Contact Laboratory for details of the methodology used by the sub-contractor.
Soil	SVOCMSUS	As Received	Determination of Semi Volatile Organic Compounds in soil samples by Dichloromethane/Acetone extraction followed by GCMS detection
Soil	TMSS	As Received	Determination of the Total Moisture content at 105°C by loss on oven drying gravimetric analysis (% based upon wet weight)
Soil	TMSSCALC	As Received	Calculated from the 100 - Total Moisture Content @ 100°C
Soil	TPHFIDUS	As Received	Determination of hexane/acetone extractable Hydrocarbons in soil with GCFID detection.
Soil	TPHUSSI	As Received	Determination of hexane/acetone extractable Hydrocarbons in soil with GCFID detection including quantitation of Aromatic and Aliphatic fractions.
Soil	WSLM59	Oven Dried @ < 35°C	Determination of Organic Carbon in soil using sulphurous Acid digestion followed by high temperature combustion and IR detection

Where individual results are flagged see report notes for status.

# Report Notes

## Generic Notes

### Soil/Solid Analysis

Unless stated otherwise,

- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.  
All results on MCERTS reports are reported on a 105°C dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

### Waters Analysis

Unless stated otherwise results are expressed as mg/l

**Nil:** Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

### Oil analysis specific

Unless stated otherwise,

- Results are expressed as mg/kg
- SG is expressed as g/cm<sup>3</sup>@ 15°C

### Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

### Asbestos Analysis

**CH** Denotes Chrysotile

**TR** Denotes Tremolite

**CR** Denotes Crocidolite

**AC** Denotes Actinolite

**AM** Denotes Amosite

**AN** Denotes Anthophyllite

**NAIIS** No Asbestos Identified in Sample

**NADIS** No Asbestos Detected In Sample

## Symbol Reference

^ Sub-contracted analysis.

\$\$ Unable to analyse due to the nature of the sample

¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols.

This may have resulted in deterioration of the sample(s) during transit to the laboratory.

Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling

¥ Results for guidance only due to possible interference

& Blank corrected result

I.S Insufficient sample to complete requested analysis

I.S(g) Insufficient sample to re-analyse, results for guidance only

Intf Unable to analyse due to interferences

N.D Not determined

N.Det Not detected

N.F No Flow

NS Information Not Supplied

Req Analysis requested, see attached sheets for results

P Raised detection limit due to nature of the sample

\* All accreditation has been removed by the laboratory for this result

‡ MCERTS accreditation has been removed for this result

§ accreditation has been removed for this result as it is a non-accredited matrix

**Note:** The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.



## **A3 2020 Ground Investigation**

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**GROUND INVESTIGATIONS IRELAND**  
Geotechnical & Environmental

Catherinestown House,  
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D22 YD52

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18<sup>th</sup> September 2020

### **Re Sampling and Laboratory Analysis Avoca River and Arklow Marsh - July 2020**

To whom it may concern,

Ground Investigations Ireland were retained by Wicklow County Council to carry out groundwater, surface water and sediment sampling and analysis in Arklow, County Wicklow. The sampling was completed in July 2020 under the supervision and direction of Arup consulting engineers.

The works included:

- The collection of six sediment samples at three location from the bed of the Avoca River;
- The collection of three surface water samples from the Avoca River;
- The collection of groundwater sample from groundwater wells in the Arklow Marsh;
- The soaking of sediment samples in a controlled environment.

The sediment and surface water sampling was completed on 1<sup>st</sup> July 2020 with the groundwater samples collected on 2<sup>nd</sup> July 2020. The sampling locations are presented in the applicable Arup drawings. All analysis was completed by Element Materials Technology (EMT) in the UK; EMT is a UKAS accredited laboratory.

The sediment samples were labelled S1A, S1B, S2A, S2B, S3A and S3B. The groundwater samples were labelled GW WS-08, GW WS-09 and GW WS-13.

The sediment samples were scheduled for total pollutant content and waste acceptance criteria (WAC) analysis.

Each sample, which was prepared by the laboratory for leachate generation, was used to produce three separate leachates for each sample. The first leachate was analysed for the full suite of WAC analysis parameters as specified in the EU Council Decision establishing criteria for the acceptance of waste at Landfills (Council Decision 2003/33/EC).

Due to exceedances of the inert criteria for several parameters the two remaining leachates for each sample were analysed for antimony, molybdenum, selenium, chloride and total dissolved solids only.

Duplicates of all samples were retained in the GII sample storage facility in individual free draining hessian sacks. The samples were soaked daily with clean potable water which allowed water to percolate through the sediment for a period of twelve days before being placed in laboratory prepared containers and dispatched to the laboratory. Each of the samples had a leachate generated for analysis. The resultant leachates were analysed for the individual parameters which had exceeded the inert WAC in the original samples tested i.e. antimony, molybdenum, selenium, chloride and total dissolved solids.

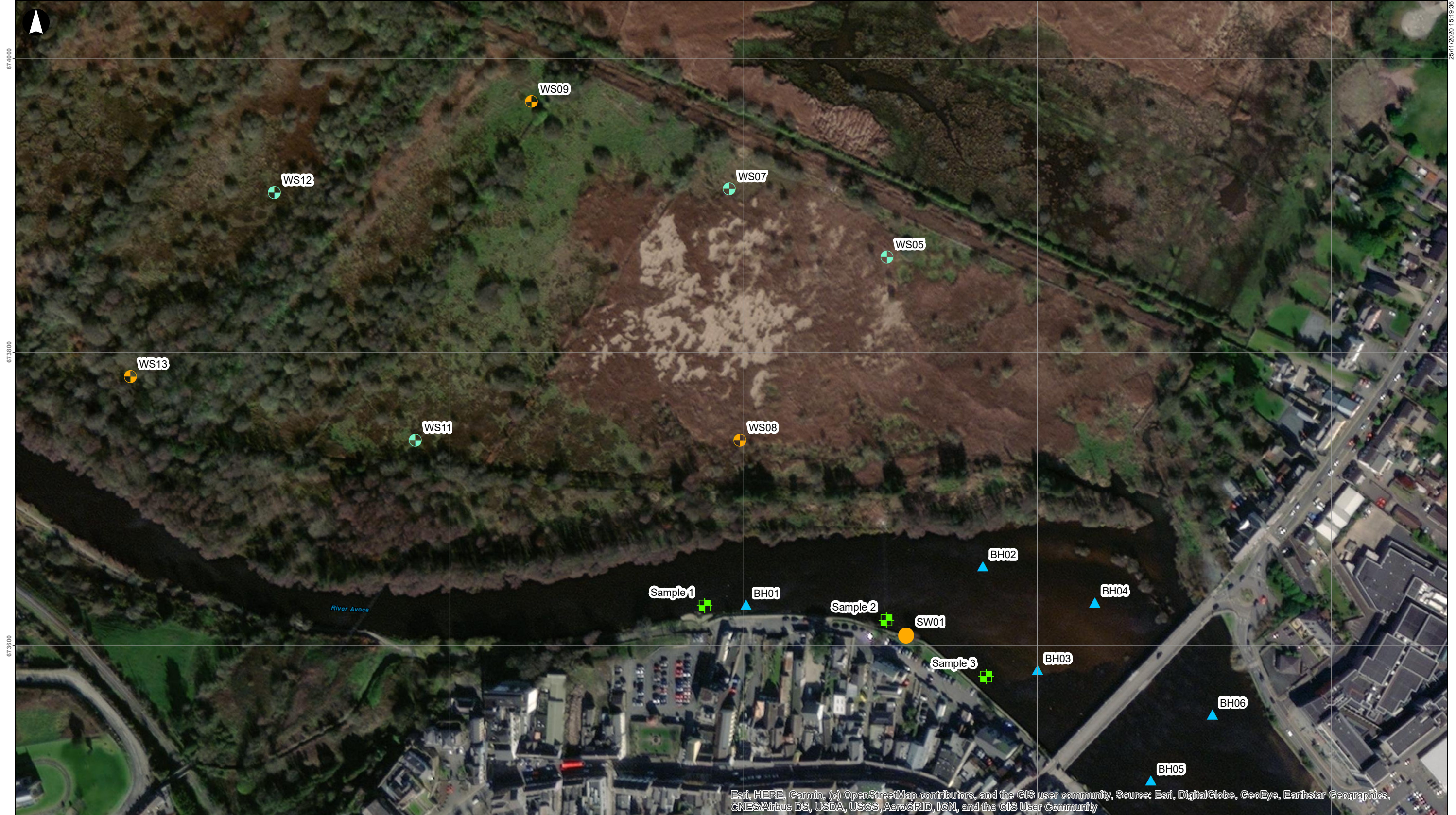
All analytical data was forward to Arup for interpretation.

Best Regards,

A handwritten signature in black ink, appearing to read "Barry Sexton". The signature is written in a cursive, flowing style.

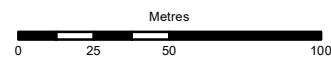
Barry Sexton

Director



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Grab Samples
- Surface Water Sample
- Existing Well (Sampled)
- Existing Well
- Previous Sediment Sample



Coordinate System: IREN95 Irish Transverse Mercator

Rev	Date	By	Chkd	Appd
F1	2020-11-25	CF	EW	SM

# ARUP

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 t +353 1 233 4056 | m +353 83 071 5271  
 www.arup.com

Client  
**Wicklow County Council**

Project Title  
**Arklow Flood Relief Scheme**

Drawing Title  
**Site Location and Sample Locations**

Scale at A3  
**1:2,500**

Role

Suitability

**For Issue**

Arup Job No  
**253019-00**

Rev  
**F1**

Number  
**001**

Ground Investigations Ireland

Catherinestown House □

Hazelhatch Road □

Newcastle □

Co. Dublin □

Ireland □



**Attention :** Barry Sexton

**Date :** 16th July, 2020

**Your reference :** 9717-06-20

**Our reference :** Test Report 20/8722 Batch 1 Schedule A

**Location :** Avoca River

**Date samples received :** 6th July, 2020

**Status :** Final report

**Issue :** 1

Six samples were received for analysis on 6th July, 2020 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. □

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**Authorised By:**



**Bruce Leslie**

Project Manager

Please include all sections of this report if it is reproduced





# Element Materials Technology

**Client Name:** Ground Investigations Ireland  
**Reference:** 9717-06-20  
**Location:** Avoca River  
**Contact:** Barry Sexton  
**EMT Job No:** 20/8722

**Report : Solid**

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18																			
Sample ID	S1A	S1B	S2A	S2B	S3A	S3B																			
Depth																									
COC No / misc																									
Containers	V J T	V J T	V J T	V J T	V J T	V J T																			
Sample Date	01/07/2020	01/07/2020	01/07/2020	01/07/2020	01/07/2020	01/07/2020																			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil																			
Batch Number	1	1	1	1	1	1																			
Date of Receipt	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020																			
																							LOD/LOR	Units	Method No.
TPH CWG																									
<b>Aliphatics</b>																									
>C5-C6 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2	11.8	12.0																	<0.2	mg/kg	TMS/IPM8/PM16
>C12-C16 #	<4	<4	<4	<4	75	84																	<4	mg/kg	TMS/IPM8/PM16
>C16-C21 #	<7	<7	<7	<7	125	138																	<7	mg/kg	TMS/IPM8/PM16
>C21-C35 #	<7	<7	<7	<7	308	339																	<7	mg/kg	TMS/IPM8/PM16
>C35-C40	<7	<7	<7	<7	37	39																	<7	mg/kg	TMS/IPM8/PM16
Total aliphatics C5-40	<26	<26	<26	<26	557	612																	<26	mg/kg	TMS/IPM8/PM16/PM12/PM15
>C6-C10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	<0.1	mg/kg	TM36/PM12
>C10-C25	<10	<10	<10	<10	309	352																	<10	mg/kg	TMS/IPM8/PM16
>C25-C35	<10	<10	<10	<10	198	219																	<10	mg/kg	TMS/IPM8/PM16
<b>Aromatics</b>																									
>C5-EC7 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2	<0.2	3.0																	<0.2	mg/kg	TMS/IPM8/PM16
>EC12-EC16 #	<4	<4	<4	<4	26	37																	<4	mg/kg	TMS/IPM8/PM16
>EC16-EC21 #	<7	<7	<7	<7	95	120																	<7	mg/kg	TMS/IPM8/PM16
>EC21-EC35 #	<7	<7	<7	<7	232	294																	<7	mg/kg	TMS/IPM8/PM16
>EC35-EC40	<7	<7	<7	<7	41	58																	<7	mg/kg	TMS/IPM8/PM16
Total aromatics C5-40	<26	<26	<26	<26	394	512																	<26	mg/kg	TMS/IPM8/PM16/PM12/PM15
Total aliphatics and aromatics(C5-40)	<52	<52	<52	<52	951	1124																	<52	mg/kg	TMS/IPM8/PM16/PM12/PM15
>EC6-EC10 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	<0.1	mg/kg	TM36/PM12
>EC10-EC25	<10	<10	<10	<10	204	272																	<10	mg/kg	TMS/IPM8/PM16
>EC25-EC35	<10	<10	<10	<10	161	195																	<10	mg/kg	TMS/IPM8/PM16
MTBE #	<5	<5	<5	<5	<5	<5																	<5	ug/kg	TM36/PM12
Benzene #	<5	<5	<5	<5	<5	<5																	<5	ug/kg	TM36/PM12
Toluene #	<5	<5	<5	<5	<5	14																	<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5	<5	<5																	<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5	<5	<5																	<5	ug/kg	TM36/PM12
o-Xylene #	<5	<5	<5	<5	<5	<5																	<5	ug/kg	TM36/PM12
PCB 28 #	<5	<5	<5	<5	<5	<5																	<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5	<5																	<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	<5																	<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	<5																	<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	<5																	<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	<5																	<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	<5																	<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	<35																	<35	ug/kg	TM17/PM8

Please see attached notes for all abbreviations and acronyms



# Element Materials Technology

**Client Name:** Ground Investigations Ireland  
**Reference:** 9717-06-20  
**Location:** Avoca River  
**Contact:** Barry Sexton  
**EMT Job No:** 20/8722

**Report :** CEN 10:1 1 Batch

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18																		
Sample ID	S1A	S1B	S2A	S2B	S3A	S3B																		
Depth																								
COC No / misc																								
Containers	V J T	V J T	V J T	V J T	V J T	V J T																		
Sample Date	01/07/2020	01/07/2020	01/07/2020	01/07/2020	01/07/2020	01/07/2020																		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil																		
Batch Number	1	1	1	1	1	1																		
Date of Receipt	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020																		
																						LOD/LOR	Units	Method No.
Dissolved Antimony <sup>#</sup>	0.005	0.002	0.011	<0.002	0.006	0.008																<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) <sup>#</sup>	0.05	0.02	0.11	<0.02	0.06	0.08																<0.02	mg/kg	TM30/PM17
Dissolved Arsenic <sup>#</sup>	0.0060	<0.0025	0.0116	<0.0025	0.0049	0.0377																<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) <sup>#</sup>	0.060	<0.025	0.116	<0.025	0.049	0.377																<0.025	mg/kg	TM30/PM17
Dissolved Barium <sup>#</sup>	<0.003	<0.003	<0.003	0.005	0.003	0.004																<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) <sup>#</sup>	<0.03	<0.03	<0.03	0.05	0.03	0.04																<0.03	mg/kg	TM30/PM17
Dissolved Cadmium <sup>#</sup>	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005																<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) <sup>#</sup>	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005																<0.005	mg/kg	TM30/PM17
Dissolved Chromium <sup>#</sup>	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	0.0018																<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) <sup>#</sup>	<0.015	<0.015	<0.015	<0.015	<0.015	0.018																<0.015	mg/kg	TM30/PM17
Dissolved Copper <sup>#</sup>	<0.007	<0.007	<0.007	<0.007	<0.007	0.011																<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) <sup>#</sup>	<0.07	<0.07	<0.07	<0.07	<0.07	0.11																<0.07	mg/kg	TM30/PM17
Dissolved Lead <sup>#</sup>	<0.005	<0.005	<0.005	<0.005	0.008	0.009																<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) <sup>#</sup>	<0.05	<0.05	<0.05	<0.05	0.08	0.09																<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum <sup>#</sup>	0.008	0.002	0.003	<0.002	0.003	0.081																<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) <sup>#</sup>	0.08	0.02	0.03	<0.02	0.03	0.81																<0.02	mg/kg	TM30/PM17
Dissolved Nickel <sup>#</sup>	<0.002	<0.002	0.003	<0.002	<0.002	<0.002																<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) <sup>#</sup>	<0.02	<0.02	0.03	<0.02	<0.02	<0.02																<0.02	mg/kg	TM30/PM17
Dissolved Selenium <sup>#</sup>	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003																<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) <sup>#</sup>	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03																<0.03	mg/kg	TM30/PM17
Dissolved Zinc <sup>#</sup>	0.006	0.003	0.005	0.030	0.022	0.009																<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) <sup>#</sup>	0.06	0.03	0.05	0.30	0.22	0.09																<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAf <sup>#</sup>	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001																<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAf <sup>#</sup>	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001																<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	<0.3	<0.3	<0.3	0.8																<0.3	mg/l	TM173/PM0
Fluoride	<3	<3	<3	<3	<3	8																<3	mg/kg	TM173/PM0
Sulphate as SO4 <sup>#</sup>	36.1	53.0	49.0	10.5	17.2	17.5																<0.5	mg/l	TM38/PM0
Sulphate as SO4 <sup>#</sup>	361	530	490	105	172	175																<5	mg/kg	TM38/PM0
Chloride <sup>#</sup>	23.4	37.4	6.4	4.4	25.2	53.6																<0.3	mg/l	TM38/PM0
Chloride <sup>#</sup>	234	374	64	44	252	536																<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	9	<2	5	2	3	13																<2	mg/l	TM60/PM0
Dissolved Organic Carbon	90	<20	50	<20	30	130																<20	mg/kg	TM60/PM0
pH	9.02	8.06	7.84	7.89	7.80	7.89																<0.01	pH units	TM73/PM0
Total Dissolved Solids <sup>#</sup>	139	128	80	39	84	194																<35	mg/l	TM20/PM0
Total Dissolved Solids <sup>#</sup>	1390	1281	800	390	840	1939																<350	mg/kg	TM20/PM0

Please see attached notes for all abbreviations and acronyms

# Element Materials Technology

**Client Name:** Ground Investigations Ireland  
**Reference:** 9717-06-20  
**Location:** Avoca River  
**Contact:** Barry Sexton  
**EMT Job No:** 20/8722

**Report :** EN12457\_2

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18									
Sample ID	S1A	S1B	S2A	S2B	S3A	S3B									
Depth															
COC No / misc															
Containers	V J T	V J T	V J T	V J T	V J T	V J T									
Sample Date	01/07/2020	01/07/2020	01/07/2020	01/07/2020	01/07/2020	01/07/2020									
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1	1	1									
Date of Receipt	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020									
							Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.			
Please see attached notes for all abbreviations and acronyms															
<b>Solid Waste Analysis</b>															
Total Organic Carbon #	0.22	0.11	0.75	1.38	1.77	2.01				3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025				6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035				1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30	557	612				500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	0.84	<0.22	<0.22	0.24	0.36	0.85				-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	1.41	<0.64	<0.64	<0.64	0.65	1.53				100	-	-	<0.64	mg/kg	TM4/PM8
<b>CEN 10:1 Leachate</b>															
Arsenic #	0.060	<0.025	0.116	<0.025	0.049	0.377				0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	<0.03	<0.03	<0.03	0.05	0.03	0.04				20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	<0.015	<0.015	<0.015	0.018				0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	<0.07	<0.07	<0.07	0.11				2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	0.08	0.02	0.03	<0.02	0.03	0.81				0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	<0.02	0.03	<0.02	<0.02	<0.02				0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	<0.05	<0.05	0.08	0.09				0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	0.05	0.02	0.11	<0.02	0.06	0.08				0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03				0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	0.06	0.03	0.05	0.30	0.22	0.09				4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	1390	1281	800	390	840	1939				4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	90	<20	50	<20	30	130				500	800	1000	<20	mg/kg	TM60/PM0
Mass of raw test portion	0.1044	0.1032	0.1242	0.1066	0.1032	0.092				-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	85.9	86.9	72.2	84.2	87.2	98.1				-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.885	0.887	0.865	0.883	0.887	0.898				-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.8	0.8	0.8	0.8	0.8				-	-	-		l	NONE/PM17
pH #	7.68	7.72	7.04	7.38	7.52	7.54				-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	<3	<3	<3	<3	8				-	-	-	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	361	530	490	105	172	175				1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	234	374	64	44	252	536				800	15000	25000	<3	mg/kg	TM38/PM0



**Client Name:** Ground Investigations Ireland  
**Reference:** 20/06/9717  
**Location:** Avoca River  
**Contact:** Barry Sexton

**Note:**  
 Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
20/8722	1	S1A		2	14/07/2020	General Description (Bulk Analysis)	Soil/Stone
					14/07/2020	Asbestos Fibres	NAD
					14/07/2020	Asbestos ACM	NAD
					14/07/2020	Asbestos Type	NAD
					14/07/2020	Asbestos Level Screen	NAD
20/8722	1	S1B		5	14/07/2020	General Description (Bulk Analysis)	Soil/Stone
					14/07/2020	Asbestos Fibres	NAD
					14/07/2020	Asbestos ACM	NAD
					14/07/2020	Asbestos Type	NAD
					14/07/2020	Asbestos Level Screen	NAD
20/8722	1	S2A		8	14/07/2020	General Description (Bulk Analysis)	Soil/Stone
					14/07/2020	Asbestos Fibres	NAD
					14/07/2020	Asbestos ACM	NAD
					14/07/2020	Asbestos Type	NAD
					14/07/2020	Asbestos Level Screen	NAD
20/8722	1	S2B		11	14/07/2020	General Description (Bulk Analysis)	Soil/Stone
					14/07/2020	Asbestos Fibres	NAD
					14/07/2020	Asbestos ACM	NAD
					14/07/2020	Asbestos Type	NAD
					14/07/2020	Asbestos Level Screen	NAD
20/8722	1	S3A		14	14/07/2020	General Description (Bulk Analysis)	Soil/Stones
					14/07/2020	Asbestos Fibres	NAD
					14/07/2020	Asbestos ACM	NAD
					14/07/2020	Asbestos Type	NAD
					14/07/2020	Asbestos Level Screen	NAD
20/8722	1	S3B		17	14/07/2020	General Description (Bulk Analysis)	Soil/Stones
					14/07/2020	Asbestos Fibres	NAD
					14/07/2020	Asbestos ACM	NAD
					14/07/2020	Asbestos Type	NAD
					14/07/2020	Asbestos Level Screen	NAD





# NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/8722

## SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

## WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

## DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

## SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

## DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

## BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

## NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

**REPORTS FROM THE SOUTH AFRICA LABORATORY**

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

**Measurement Uncertainty**

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

**ABBREVIATIONS and ACRONYMS USED**

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x20 Dilution

EMT Job No: 20/8722

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

EMT Job No: 20/8722

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE re	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE re	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM61	Determination of Mercury by Cold Vapour Atomic Fluorescence - WATERS: Modified USEPA Method 245.7, Rev 2, Feb 2005. SOILS: Modified USEPA Method 7471B, Rev.2, Feb 2007	PM0	No preparation is required.	Yes		AR	Yes

EMT Job No: 20/8722

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 9214 - 340.2 (EPA 1998)	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	

Ground Investigations Ireland

Catherinestown House □

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**Attention :** Barry Sexton

**Date :** 21st July, 2020

**Your reference :** 9717-06-20

**Our reference :** Test Report 20/8722 Batch 1 Schedule B

**Location :** Avoca River

**Date samples received :** 6th July, 2020

**Status :** Final report

**Issue :** 1

Eighteen samples were received for analysis on 6th July, 2020 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. □

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**Authorised By:**



**Bruce Leslie**

Project Manager

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# Element Materials Technology

**Client Name:** Ground Investigations Ireland  
**Reference:** 9717-06-20  
**Location:** Avoca River  
**Contact:** Barry Sexton  
**EMT Job No:** 20/8722

**Report :** CEN 10:1 1 Batch

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18							
Sample ID	S1A	S1B	S2A	S2B	S3A	S3B							
Depth													
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T							
Sample Date	01/07/2020	01/07/2020	01/07/2020	01/07/2020	01/07/2020	01/07/2020							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1							
Date of Receipt	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020							
							LOD/LOR	Units	Method No.				
Dissolved Molybdenum #	0.008	0.003	<0.002	0.009	0.003	0.010	<0.002	mg/l	TM30/PM17				
Dissolved Molybdenum (A10) #	0.08	0.03	<0.02	0.09	0.03	0.10	<0.02	mg/kg	TM30/PM17				
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM30/PM17				
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17				
Chloride #	27.6	40.3	7.5	5.6	27.2	44.2	<0.3	mg/l	TM38/PM0				
Chloride #	276	403	75	56	272	442	<3	mg/kg	TM38/PM0				
Total Dissolved Solids #	125	128	181	107	74	291	<35	mg/l	TM20/PM0				
Total Dissolved Solids #	1250	1281	1809	1070	740	2909	<350	mg/kg	TM20/PM0				

Please see attached notes for all abbreviations and acronyms





# NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/8722

## SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

## WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

## DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

## SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

## DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

## BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

## NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

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**REPORTS FROM THE SOUTH AFRICA LABORATORY**

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

**Measurement Uncertainty**

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

**ABBREVIATIONS and ACRONYMS USED**

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 20/8722

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM0	No preparation is required.	Yes		AR	Yes

Ground Investigations Ireland

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**Attention :** Barry Sexton

**Date :** 29th July, 2020

**Your reference :** 9717-06-20

**Our reference :** Test Report 20/9183 Batch 1

**Location :** Avoca River

**Date samples received :** 14th July, 2020

**Status :** Final report

**Issue :** 2

Six samples were received for analysis on 14th July, 2020 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. □

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**Authorised By:**



**Bruce Leslie**

Project Manager

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# Element Materials Technology

**Client Name:** Ground Investigations Ireland  
**Reference:** 9717-06-20  
**Location:** Avoca River  
**Contact:** Barry Sexton  
**EMT Job No:** 20/9183

**Report :** CEN 10:1 1 Batch

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18													
Sample ID	S1A	S1B	S2A	S2B	S3A	S3B													
Depth																			
COC No / misc																			
Containers	V J T	V J T	V J T	V J T	V J T	V J T													
Sample Date	13/07/2020	13/07/2020	13/07/2020	13/07/2020	13/07/2020	13/07/2020													
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil													
Batch Number	1	1	1	1	1	1													
Date of Receipt	14/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020													
														LOD/LOR	Units	Method No.			
Dissolved Antimony #	<0.002	<0.002	<0.002	<0.002	<0.002	0.003								<0.002	mg/l	TM30/PM17			
Dissolved Molybdenum #	<0.002	<0.002	<0.002	0.003	0.002	0.028								<0.002	mg/l	TM30/PM17			
Dissolved Molybdenum (A10) #	<0.02	<0.02	<0.02	0.03	0.02	0.28								<0.02	mg/kg	TM30/PM17			
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003								<0.003	mg/l	TM30/PM17			
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03								<0.03	mg/kg	TM30/PM17			
Chloride #	1.4	6.0	2.4	0.9	7.7	21.2								<0.3	mg/l	TM38/PM0			
Chloride #	14	60	24	9	77	212								<3	mg/kg	TM38/PM0			
Total Dissolved Solids #	76	44	83	44	109	195								<35	mg/l	TM20/PM0			
Total Dissolved Solids #	760	440	830	440	1090	1950								<350	mg/kg	TM20/PM0			

Please see attached notes for all abbreviations and acronyms

**Element Materials Technology**

**Client Name:** Ground Investigations Ireland  
**Reference:** 9717-06-20  
**Location:** Avoca River  
**Contact:** Barry Sexton  
**EMT Job No:** 20/9183

**Report :** EN12457\_2

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18									
<b>Sample ID</b>	S1A	S1B	S2A	S2B	S3A	S3B									
<b>Depth</b>															
<b>COC No / misc</b>															
<b>Containers</b>	V J T	V J T	V J T	V J T	V J T	V J T									
<b>Sample Date</b>	13/07/2020	13/07/2020	13/07/2020	13/07/2020	13/07/2020	13/07/2020									
<b>Sample Type</b>	Soil	Soil	Soil	Soil	Soil	Soil									
<b>Batch Number</b>	1	1	1	1	1	1									
<b>Date of Receipt</b>	14/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020									
<b>Solid Waste Analysis</b>															
<b>CEN 10:1 Leachate</b>															
Total Dissolved Solids #	760	440	830	440	1090	1950			4000	60000	100000	<350	mg/kg	TM20/PM0	
Mass of raw test portion	0.0994	0.0943	0.1313	0.102	0.1196	0.144			-	-	-		kg	NONE/PM17	
Dry Matter Content Ratio	90.1	95.5	68.3	87.8	75.4	62.4			-	-	-	<0.1	%	NONE/PM4	
Leachant Volume	0.89	0.896	0.858	0.887	0.871	0.846			-	-	-		l	NONE/PM17	
Euate Volume	0.82	0.85	0.8	0.85	0.8	0.86			-	-	-		l	NONE/PM17	
Chloride #	14	60	24	9	77	212			800	15000	25000	<3	mg/kg	TM38/PM0	

Please see attached notes for all abbreviations and acronyms





# NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/9183

## SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

## WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

## DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

## SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

## DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

## BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

## NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

**REPORTS FROM THE SOUTH AFRICA LABORATORY**

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

**Measurement Uncertainty**

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

**ABBREVIATIONS and ACRONYMS USED**

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 20/9183

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM0	No preparation is required.	Yes		AR	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	

Ground Investigations Ireland

Catherinestown House □

Hazelhatch Road □

Newcastle □

Co. Dublin □

Ireland □

**Attention :** Barry Sexton

**Date :** 29th July, 2020

**Your reference :** 9717-06-20

**Our reference :** Test Report 20/8722 Batch 1 Schedule D

**Location :** Avoca River

**Date samples received :** 6th July, 2020

**Status :** Final report

**Issue :** 2

Eighteen samples were received for analysis on 6th July, 2020 of which twelve were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. □

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**Authorised By:**



**Bruce Leslie**

Project Manager

Please include all sections of this report if it is reproduced





**Client Name:** Ground Investigations Ireland  
**Reference:** 9717-06-20  
**Location:** Avoca River  
**Contact:** Barry Sexton

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 20/8722						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

# NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/8722

## SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

## WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

## DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

## SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

## DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

## BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

## NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced



**REPORTS FROM THE SOUTH AFRICA LABORATORY**

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

**Measurement Uncertainty**

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

**ABBREVIATIONS and ACRONYMS USED**

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 20/8722

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM0	No preparation is required.				

Ground Investigations Ireland  
Catherinstown House  
Hazelhatch Road  
Newcastle  
Co. Dublin  
Ireland



**Attention :** Barry Sexton  
**Date :** 13th July, 2020  
**Your reference :** 9717-06-20  
**Our reference :** Test Report 20/8716 Batch 1  
**Location :** Avoca River  
**Date samples received :** 6th July, 2020  
**Status :** Final report  
**Issue :** 1

Six samples were received for analysis on 6th July, 2020 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.  
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**Authorised By:**



**Bruce Leslie**  
Project Manager

Please include all sections of this report if it is reproduced



## Element Materials Technology

**Client Name:** Ground Investigations Ireland  
**Reference:** 9717-06-20  
**Location:** Avoca River  
**Contact:** Barry Sexton  
**EMT Job No:** 20/8716

**Report : Liquid**

**Liquids/products:** V=40ml vial, G=glass bottle, P=plastic bottle  
 H=H<sub>2</sub>SO<sub>4</sub>, Z=ZnAc, N=NaOH, HN=HNO<sub>3</sub>

EMT Sample No.	1-10	11-20	21-30	31-40	41-50	51-60							
Sample ID	SW01 A	SW01 B	SW01 C	GW WS08	GW WS09	GW WS13							
Depth													
COC No / misc													
Containers	V H H N HCL Z P BOD G	V H H N HCL Z P BOD G	V H H N HCL Z P BOD G	V H H N F HCL Z P BOD G	V H H N F HCL Z P BOD G	V H H N F HCL Z P BOD G							
Sample Date	01/07/2020	01/07/2020	01/07/2020	02/07/2020	02/07/2020	02/07/2020							
Sample Type	Surface Water	Surface Water	Surface Water	Ground Water	Ground Water	Ground Water							
Batch Number	1	1	1	1	1	1							
Date of Receipt	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020							
							LOD/LOR	Units	Method No.				
TPH CWG													
<b>Aromatics</b>													
>C5-EC7 #	<10	<10	<10	<10	<10	<10	<10	ug/l	TM36/PM12				
>EC7-EC8 #	<10	<10	<10	<10	<10	<10	<10	ug/l	TM36/PM12				
>EC8-EC10 #	<10	<10	<10	<10	<10	<10	<10	ug/l	TM36/PM12				
>EC10-EC12 #	<5	<5	<5	<5	<5	<5	<5	ug/l	TM5/PM16/PM30				
>EC12-EC16 #	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30				
>EC16-EC21 #	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30				
>EC21-EC35 #	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30				
Total aromatics C5-35 #	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30				
Total aliphatics and aromatics(C5-35) #	<10	<10	<10	<10	<10	<10	<10	ug/l	TM5/PM16/PM30				
Sulphate as SO <sub>4</sub> #	10.7	12.6	13.8	<0.5	150.0	1.5	<0.5	mg/l	TM38/PM0				
Chloride #	14.1	19.5	21.5	56.4	50.3	17.9	<0.3	mg/l	TM38/PM0				
Nitrate as NO <sub>3</sub> #	3.4	3.6	4.1	<0.2	<0.2	<0.2	<0.2	mg/l	TM38/PM0				
Ortho Phosphate as PO <sub>4</sub> #	<0.06	<0.06	0.07	<0.06	<0.06	<0.06	<0.06	mg/l	TM38/PM0				
Ammoniacal Nitrogen as N #	0.10	0.12	0.19	0.40	0.59	1.33	<0.03	mg/l	TM38/PM0				
Hexavalent Chromium	<2	<2	<2	<2	<2	<2	<2	ug/l	TM38/PM0				
Total Dissolved Chromium III	<2	<2	<2	<2	<2	<2	<2	ug/l	NONE/NONE				
Total Alkalinity as CaCO <sub>3</sub> #	16	22	26	444	192	314	<1	mg/l	TM75/PM0				
BOD (Settled) #	<1	<1	<1	6	1	6	<1	mg/l	TM58/PM0				
COD (Settled) #	16	15	19	159	108	187	<7	mg/l	TM57/PM0				
Total Dissolved Solids #	74	99	105	591	597	411	<35	mg/l	TM20/PM0				
Total Suspended Solids #	<10	<10	<10	16563	5590	3453	<10	mg/l	TM37/PM0				

Please see attached notes for all abbreviations and acronyms



## NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/8716

### SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

### WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

### DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

### SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

### DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

### BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

### NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

**REPORTS FROM THE SOUTH AFRICA LABORATORY**

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

**Measurement Uncertainty**

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

**ABBREVIATIONS and ACRONYMS USED**

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution





EMT Job No: 20/8716

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes			
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry); WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE re	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM37	Modified methods USEPA 160.2 (1983), EN872:2005 and APHA SMEWW 2540D:1999 22nd Edition. Gravimetric determination of Total Suspended Solids. Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM0	No preparation is required.	Yes			

EMT Job No: 20/8716

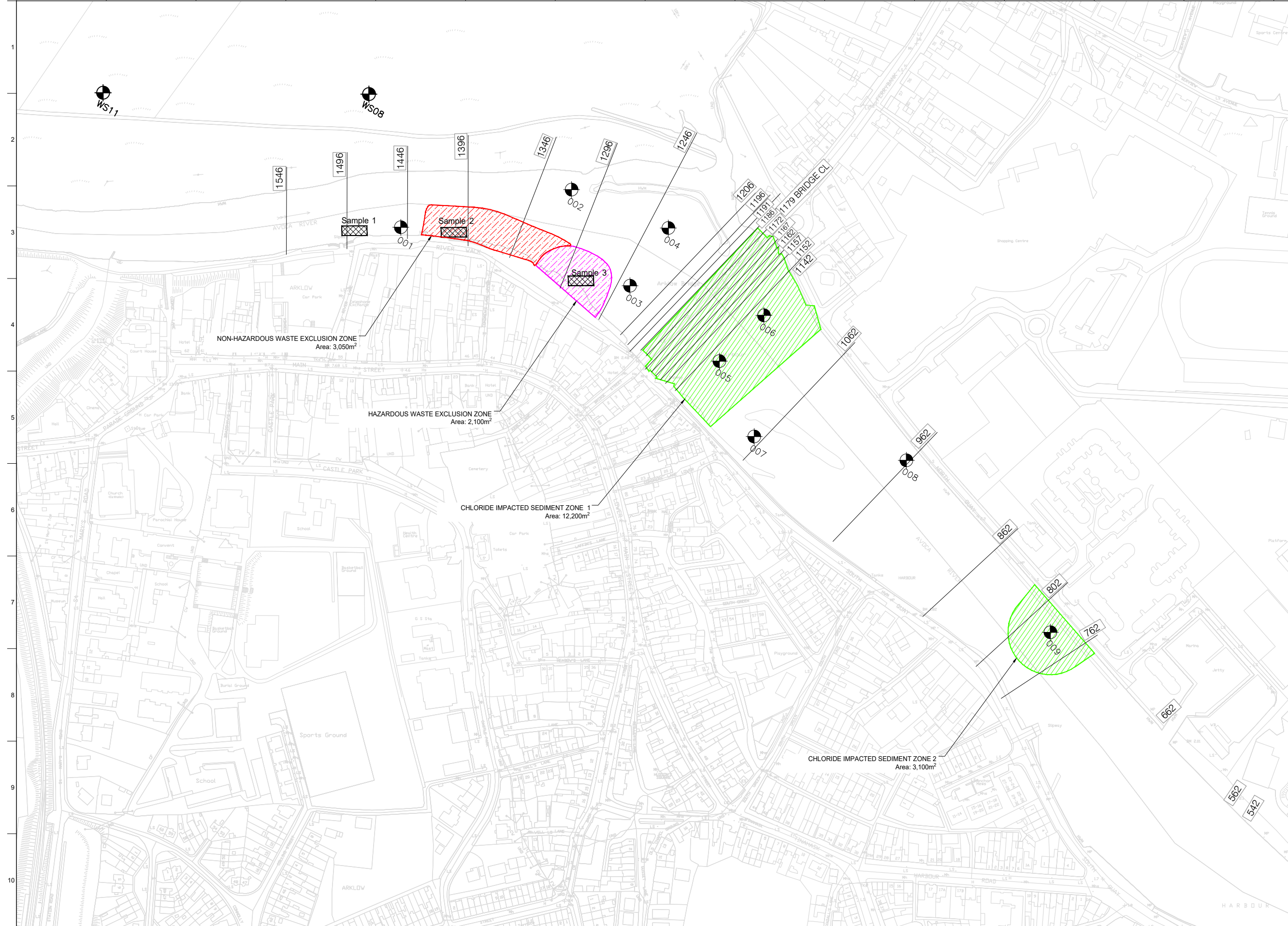
Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometrically.	PM0	No preparation is required.	Yes			
TM58	APHA SMEWW 5210B:1999 22nd Edition. Comparable with ISO 5815:1989. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as am	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM170	Determination of Trace Metals by ICP-MS (Inductively Coupled Plasma – Mass Spectrometry): Modified USEPA Method 200.8, Rev. 5.4, 1994; Modified EPA Method 6020A, Rev.1, Feb 2007; Modified BS EN ISO 17294-2:2016	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
NONE	No Method Code	NONE	No Method Code				

## **Appendix B**

Avoca dredging exclusion zones

**DRAFT**

- Notes:**
1. Do not scale from drawing.
  2. All coordinates are to Irish Grid.
  3. Estimated areas of exclusion zones are based on the proposed dredge levels and bathymetric information shown in the Draft Planning drawings 88601-1011 to 88601-1022. These estimations are approximate only and are for information only.



**Legend:**

- Hazardous waste exclusion zone
- Non-hazardous waste exclusion zone
- Chloride impacted sediment zone
- Sediment sample locations
- Borehole Locations

Issue	Date	By	Chkd	Appd
D03	15/12/2020			JR
D02	24/08/2020			JR
D01	20/08/2020			JR

Clients

Job Title  
**Arklow Flood Relief Scheme**

Scale at A1  
1:1500  
Date: December 2020

Consultant  
**ARUP**  
Arup, 50 Ringsend Road  
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Drawing Title  
**Avoca Dredging Exclusion Zones**

Drawing Status		
<b>Draft</b>		
Job No <b>253019</b>	Drawing No <b>DRDG-SK-001</b>	Issue <b>D03</b>

## Appendix C

### NWCPO Local Authority Waste Facility Register

Table 10: NWCPO Local Authority Waste Facility Register

Authorisation Reference	County	Name	Address
COR-WX-16-0115-04	WX	Murphy Recycling & Aggregates Ltd	Hayestown Taghmon Co Wexford
WFP-WX-15-0081-07	WX	Sean Kinsella Site Developments Ltd	Banntown Huntingtown Gorey Co Wexford
WFP-WX-15-0090-01	WX	Ardinagh Construction & Waste Ltd	Ardinagh Taghmon Co. Wexford
WFP-WX-15-0096-02	WX	Mulligan Dismantling & Salvage Ltd.	Scarnagh Lower Ballylarkin Inch, Gorey Co. Wexford Y25 H2K1
WFP-WX-16-0099-01	WX	C&D Recycling Kavanagh Ltd	Newtown Lower Coolgreaney Gorey Co Wexford
WFP-WX-16-0101-01	WX	Edward Warren	Coolnahinch Courtown Gorey Co Wexford
WFP-WX-20-0173-01	WX	Sean Kinsella Site Developments Ltd	Banntown Huntingtown Gorey Co. Wexford

## **Appendix D**

### **Current Licenced Local Soil Recovery Facilities**



Table 11: Current licenced local Soil Recovery Facilities

Facility Name	County	Licence Number & Facility Type	Status	Annual Authorised Intake (Tonnes)	Year of Expected Closure
Huntstown Inert Waste Recovery (Roadstone)	Dublin	W0277-03 Soil Recovery	Active	1,500,000 (soil & stones and dredging material)	2033
Milverton Waste Recovery (Roadstone)	Skerries Co. Dublin	W0272-01 Soil Recovery	Active	400,000 (soils & stones)	2024
Calary Quarry (Roadstone Ltd)	Kilmacanogue, Co. Wicklow	W0293-01 Soil Recovery	Application	300,000 (C&D inert soil waste only)	Unknown