

Remediation Strategy

July 09

# New Earth Solutions Mechanical Biological Treatment Facility

# Remediation Strategy

# **July 2009**

#### **Notice**

Halcrow Group Ltd has been appointed by St Modwen Developments Limited to provide a Remediation Strategy to accompany a joint planning application between St Modwen Developments Limited and New Earth Solutions for a Mechanical Biological Treatment facility in Avonmouth.

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Halcrow Group Limited

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# 1. Introduction

Halcrow Group Limited has been commissioned to provide a Remediation Strategy (RS) to accompany a full planning application for a Mechanical Biological Treatment (MBT) facility in Avonmouth.

The MBT facility will be operated by New Earth Solutions (NES) Group Ltd who have won a contract from the West of England Partnership (Bath & North East Somerset Council, Bristol City Council, North Somerset Council and South Gloucestershire Council) to treat 120,000 tonnes per annum (tpa) of municipal waste from the South West of England. The facility will be able to take 200,000 tpa of waste in total and will therefore have the capacity to treat 80,000 tpa of 'merchant' waste outside of the West of England Contract.

Construction is proposed to start in March 2010 and the facility will be operational by April 2011. Once the facility is fully operational it will reduce the amount of bio-degradable municipal waste (within the partnership area) going to landfill by 75%.

The MBT facility will be accommodated on part of the Access 18 site (former Britannia Zinc works), located within the Avonmouth Industrial Area.

The MBT occupies part of Area A as defined within Halcrow's Conceptual Model Report dated May 2005.

# The Site

## 2.1 Site description

The proposed development site within Area A of the Access 18 site is centred at National Grid Reference 352100 E 179400 N (Figure 1 refers), on the former mudflats of the Severn Estuary, which is located approximately 1 kilometre to the west of the site. Chemical manufacturers Rhodia Organique Fine Ltd are situated to the north, albeit that the site ceased operations during the latter part of 2008; Yara, formally the Fisons Fertiliser plant now used for fertilizer storage and distribution, to the west. To the south of Area A is the Kings Weston Landfill. The northerly section of the Kings Weston Landfill is a modern commercial landfill which received construction waste from offsite sources, referred to as the Northern Extension which is in the process of being closed. It was constructed with a lined base and with leachate management. The closure will comprise the installation of an engineered cap with associated gas management system. The remainder of the landfill is older and is unlined, having been constructed during the lifetime of the smelting works. Further to the south are other industrial units. A sewage treatment works and agricultural land occupy the area to the east of the site (outside St Modwen ownership).

The site was used for the smelting of metals since the 1920's with smelting operations ceasing in February 2003. The works have recently been dismantled with the whole site proposed for redevelopment.

The overall Access 18 site occupies an area of approximately 95 hectares and comprises former works areas, agricultural land and a landfill, comprising both an above ground slag-heap and an engineered cell. The overall Access 18 site is traversed by a number of drainage channels (Rhines) that encourage surface water drainage. The overall Access 18 site (other than the landfill) has a relatively flat topography and the ground level lies at an elevation of between 6 metres and 8 metres AOD. The top of the adjacent landfill reaches an elevation of approximately 26 metres AOD.

Area A forms the north-western area of the overall Access 18 site and is where the initial smelting works were located. These works were subsequently dismantled and the area was then used for the uncovered storage of feed and recycled materials from the smelting/refining processes. Caesium contaminated material was temporarily stored in the north-west section, which was partially remediated during the early 1990's. This is discussed in Section 4.3.

# 2.2 Hydrology

Surface water drainage at the site is controlled by a series of drains and Rhines. The Rhines have been variously buried, blocked, placed in culvert and redirected during the expansion of the industrial works. The engineered drainage system is thought to substantially control the natural hydrology of the area. The water levels within the Rhines are not controlled and fluctuate naturally. The Kings Weston Rhine (West) runs along the northern boundary of Area A. There are a number of inlets into the Rhine that are considered to be acting as pathways for contaminated perched water to infiltrate the Rhine. The Kings Weston Rhine (West) eventually discharges into the Severn Estuary approximately 1km to the west of the proposed application site.

The rhine network and their interactions is shown in Figure 2.

#### 2.3 Ground Conditions

#### 2.3.1 Geology

Published Geological information suggests that the site is underlain by considerable thicknesses of Made Ground used to reclaim the land from the tidal flats, which in turn is underlain by Tidal Flat deposits comprising clay and silt, coarsening to a silty fine sand with depth. A thin layer of peat is occasionally present below the sand. The superficial deposits are underlain by Mercia Mudstone Group deposits comprising red, calcareous mudstone (marl), interbedded with sandstone and gypsum horizons to depths of up to 50m bgl (below ground level).

#### 2.3.2 Hydrogeology

Three principal groundwater regimes have been identified at the site; a shallow perched groundwater within the Made Ground, groundwater within the Tidal Flat deposits and deeper apparently isolated groundwater within the Mercia Mudstone Group deposits. Groundwater flow within the Tidal Flat deposits and Mercia Mudstone Group appears to be generally in a westerly direction towards the Avonmouth Docks, the Severn Estuary and possibly the River Avon and is probably tidally influenced.

### 2.4 Existing Access 18 remediation strategy

In anticipation of developing the former process area which lies within the eastern part of the overall Access 18 site, a remediation strategy was devised which would sever the identified pollutant pathways. The site-wide remediation strategy was approved by Bristol City Council Environmental Health Officers and by the Environment Agency. That remediation strategy however, excluded the proposed application site which, at the time of the overall Access 18 remediation strategy, was proposed for use as a landfill.

Risk assessment identified the following pathways and receptors at the overall Access 18 site:

- Human health soil ingestion
- Human health gas inhalation/asphyxiation
- Controlled waters groundwater and surface water
- Structures and services gas risk
- Structures and services aggressive ground conditions

In order to mitigate the risks associated with the site during and following its development for an industrial end-use, the measures described in the following sections were put in place to mitigate the effects. Figures 3 and 4 also refer.

#### 2.4.1 Protection of human health – soil ingestion

A 450mm layer of "clean cover" has been provided to prevent exposure to contaminated in-situ Made Ground. The 450mm includes the pavement and floor slab construction. A marker layer of non-woven geotextile has been used to separate the "clean cover" material from the in-situ Made Ground and Made Ground that has been turned over. An orange coloured Terram-type material has been used for this demarcation purpose elsewhere within the Access 18 development site.

Service trenches have been lined with a similar separator material, and the resulting void backfilled with "clean" granular material.

#### 2.4.2 Protection of human health – gas inhalation/asphyxiation

Elevated concentrations of methane have been encountered, which require the installation of measures to protect the development from the effect of gases originating from the organic soils underlying the site. Whilst the gas monitoring undertaken has demonstrated that a passive system would be appropriate for the concentrations and flow rates of gas which have been recorded active Clean Air Blanket systems has been adopted elsewhere within the Access 18 development.

#### 2.4.3 Protection of controlled water

Ground investigations and groundwater risk assessment has demonstrated that the shallow perched groundwater (i.e. water which is within the Made Ground, perched on top of the naturally occurring clay material), is impacting on the water quality within the rhines which are in turn impacting upon the water quality within the Severn Estuary.

In order to minimise the input of contaminants into the Severn Estuary via the existing rhine system, the remediation philosophy that has been adopted has been to intercept contaminated perched water and collect in a shallow drain. The drain runs from the northern boundary, along the east boundary and along the southern boundary of the former process area, and currently terminates at a recently constructed pumping chamber. Captured water is then conveyed to, and treated at, a new effluent treatment plant (ETP) before being discharged to the Severn Estuary via Kings Weston Rhine (West).

It is intended that a cut-off wall will be installed around the western and southern boundaries of the landfill site. The cut-off along the south of the landfill will tie in to the recently constructed pumping chamber, allowing perched water within the landfill to be conveyed to the ETP.

In order to reduce the recharge of perched water within the former process area, rainfall run-off is controlled by roofs, hardstanding and drains. Clean rainwater is conveyed to a new clean-water rhine, referred to as the East Rhine. The East Rhine, which is present along parts of the northern and eastern part of the former process area, comprises a vegetated channel lined with a geo-composite liner (GCL). The liner prevents ingress of contaminated perched water into the rhine.

In order to protect the deep-lying groundwater, the piling technique adopted for new buildings comprises the installation of driven pre-cast concrete piles, which are cast with tapered leading sections, or are fitted with a sacrificial steel cone at their base. The purpose of the tapered leading section is to promote the lateral displacement of contaminated material thereby reducing the risk of advancing potentially contaminated materials ahead of the pile.

# 3. Ground investigations

#### 3.1 Introduction

Area A has been subject to previous phases of investigation as part of the 2004 and 2005 site-wide investigations. Further targeted investigation was undertaken during May 2009, designed on the basis of the proposed development.

The borehole and trial pit records for each of exploratory holes undertaken within the confines of the NES site are shown in Figure 5, and the logs for the exploratory holes are appended (Appendix A).

# 3.2 Previous investigations

Area A has been previously investigated by Ian Farmer Associates (IFA) in May 2004 (Report ref 2624) and March 2005 (Report ref 2780). Those investigations were procured by Halcrow on behalf of St Modwen

An earlier investigation was undertaken by Geotechnical Engineering in December 2001, procured by Hyder Consulting Limited on behalf of Britannia Zinc.

# 3.3 May 2009 investigation

A site-specific investigation was undertaken by Structural Soils Limited within the confines of the proposed NES site during May 2009. That investigation was procured by Halcrow on behalf of St Modwen.

# 4. Geo-environmental Assessment

#### 4.1 Introduction

The Made Ground in the vicinity of the proposed NES development site has been shown to contain concentrations of heavy metals, particularly cadmium, lead and arsenic, exposure to which needs to be limited to mitigate the risk of harm to human health and controlled waters. In addition, caesium has been identified within the Made Ground in a localised area within the Eastern portion of the application site.

The results of the chemical testing of soil and groundwater samples are appended in Appendix B.

### 4.2 Risk assessment

Tier 1 risk assessment have been undertaken to assess the significance of concentrations of contaminants in soil and groundwater in terms of the risk to identified sensitive receptors; occupants of the proposed development and controlled waters. Assessment criteria have been derived from SGV and Generic Assessment Criteria (GAC) developed using the now replaced CLEA UK model for assessing risks to human health and published EQS for assessing risks to controlled waters.

Risks to human health posed during maintenance and construction operations will be short term and controlled using standard health and safety mitigation measures for construction activities.

#### 4.2.1 Human Health

The EA withdrew the Contaminated Land Exposure Assessment (CLEA) model and associated Soil Guideline Values (SGV) in August 2008. A new CLEA Model, version 1.04, was published in mid January 2009 and updated SGV are being published by the Environment Agency on an ongoing basis and to date only a limited number of new standards have been published. Where SGV's have not yet been published, in particular for phytotoxic elements and a number of metals (chromium, copper, lead and zinc) Halcrow will continue to use the original SGV's produced by the previous CLEA model as screening vales to assess the significance of soil contaminant concentrations in relation to risks to human health.

The proposed development of the site corresponds with the CLEA model for a Commercial/Industrial site.

Table 4.1 Summary of exceedences of soil assessment criteria

Determinant	Units	Screening Value	Max (mg/kg)	Mean (mg/kg)	Count	Number exceeding Screening value	% exceeding Screening value
Arsenic	mg/kg	640 <sup>#</sup>	5500	912	34	16	47
Cadmium	mg/kg	230#	18000	1733	34	22	65
Lead	mg/kg	750*	55000	17447	34	29	85

<sup>#</sup> Current SGV

Based on Table 4.1, it can be shown that the site, in its current form, poses a risk of harm to human health from arsenic, cadmium and lead. Zinc was not encountered above the site specific assessment criterion of 180,000mg/kg.

Appendix B presents the results of all available soils analysis undertaken and the adopted assessment criteria.

#### 4.2.2 Controlled Waters

Risk to Controlled Waters has been assessed using Environmental Quality Standards (EQS) (Coastal and Estuarine standards). Where EQS values are not available for certain substances UK Drinking Water Standards (DWS) have been used.

Table 4.2 summarises those substances which have been encountered at concentrations in exceedence of the screening value. Groundwater analysis has shown total and dissolved concentrations of various metals in the groundwater to be above the Coastal and Estuarine EQS.

#### 4.2.3 Table 4.2 Summary of exceedences of groundwater assessment criteria

Determinant	Units	Screening Value	Max (μg/l)	Mean (μg/l)	Count	Number exceeding Screening value	% exceeding Screening value
Zinc (total)	μ <b>g</b> /l	40	98,000	32,375	11	11	100
Zinc (dissolved)	μg/l	1	16,000	4,529	-	1	-
Arsenic (dissolved)	μg/l	25	1,200	224	8	6	75
Cadmium (dissolved)	μg/l	2.5	1,800	337	8	7	88
Chromium (dissolved)	μ <b>g</b> /l	15	16	9	3	1	33
Copper (dissolved)	μg/l	5	230	47	7	5	71
Lead (dissolved)	μg/l	25	9.300	1,408	8	5	63
Mercury (dissolved)	μg/l	0.3	1	0.4	6	3	50

Appendix B presents the results of all available groundwater analysis undertaken and the adopted assessment criteria.

Sediment within Kings Weston Rhine (West) has been shown to contain significant concentrations of heavy metals, specifically cadmium, zinc, lead and arsenic.

<sup>\*</sup> Based on previously published SGV"s, derived using the previous version of the CLEA model

The most significant and direct pathway for contaminated groundwater from the application site to impact the Severn Estuary is likely to be via Kings Weston Rhine (West) which forms the northern boundary of the proposed application site, and eventually discharges to the Severn Estuary. There is historical and ongoing impact of the Rhine with zinc and other heavy metals. However, off-site monitoring of drainage features has demonstrated that Kings Weston Rhine (West) is not the principal source of zinc entering the Severn Estuary. The remediation strategy that has, to date, been partially implemented for the overall Access 18 site has been designed to sever that pollutant linkage. There are a number of remaining but redundant outlets into the Kings Weston Rhine (West) from Area A, some of which are thought to be linked with the drainage system from the original smelter complex. These drains are likely to be acting as pathways between the perched water in Area A and the Kings Weston Rhine (West). In addition, perched groundwater could flow directly into Kings Weston Rhine (West), although the flow of perched water appears to be restricted by the presence of buried obstructions such as remnant foundations.

#### 4.2.4 Ground Gas

Ground gas has been encountered across the entire Access 18 site, typically as Characteristic Situation 2 (CS2) in accordance with CIRIA publication C665 (2007). However, a gas pocket was encountered within the alluvial deposits during the drilling of borehole BHNES06. Periodic monitoring has been undertaken on two occasions. During the first round of monitoring, a peak gas flow rate of 21.7l/hr was recorded with a peak concentration of 69% (volume in air) of methane, resulting in a GSV of 14.97, which characterises the site as CS4. However, the flow rate rapidly (within 5 seconds) dropped to zero, with a methane concentration of 40%, resulting in a GSV of 0.4, which characterises the site as CS1. The presence of other such isolated pockets of ground gas should not be discounted.

The results of the available gas monitoring data are appended (Appendix B)

#### 4.3 Caesium 137

Part of the proposed application site was formerly used for the stockpiling of zinc-rich metaliferous bi-products imported from other industrial facilities. One such consignment of by-product, which was imported from Irish Steel during the late 1980's or early 1990's, was subsequently found to contain a small amount of the man-made radioactive isotope caesium-137 (Cs<sup>137</sup>). The Irish Steel Stockpile area was remediated by Rolls Royce Nuclear Engineering Services Limited (RRNESL) during 1993; the remediation comprised to removal of the stockpiled material which was returned to Irish Steel, and the excavation of the Made Ground underlying the stockpile. The excavated material was monitored for radioactivity and segregated for appropriate disposal. During the course of that operation, an area of impenetrable concrete was encountered. The concern was that some radioactive contamination may have leached from the stockpile and migrated beneath the concrete. As a precautionary measure, it was agreed between Britannia Zinc Limited and the then Her Majesty's Inspectorate of Pollution (HMIP) that a 225mm thick concrete slab be cast across the area to cap and mitigate the risk of residual contamination. The location of the potential caesium contamination and the concrete slab constructed as a mitigation measure is shown in Figure 6.

RRNESL expressed the opinion that the impenetrable concrete might contain asbestos; however analytical testing certificates to substantiate this have not been made available. In order to address this issue and to inform subsequent "safe systems of work" for the

breaking out of the concrete which would be necessary during the pre-construction enabling works, St Modwen procured an investigation during June 2009 to recover cores of the concrete which were then subject to asbestos screening. Asbestos was not identified in any of the samples tested. The findings of that investigation are presented in Annex 1 of this report.

That investigation was undertaken under the observation of Aurora, a specialist supplier of Health Physics services. Field monitoring of radiological activity was undertaken by Aurora. Readings above the normal background of 5-6 cps were not recorded, prior to breaking the concrete. During the excavation works a drain was uncovered and direct monitoring with the probe indicated an increased level above background (20 cps compared to a background of 5-6 cps). Aurora identified that this increase could be due to naturally occurring radioactive material (NORM) in ceramics or brick in the drain construction materials. However, a sample of sludge from within the drain was collected for subsequent laboratory testing.

Health physics monitoring was also conducted before and during drilling operations for concrete core samples. Readings above background levels were not detected. On completion of the work all equipment was monitored by direct probe and smear sample and radiological contamination was not identified.

The sludge sample from the drain was subsequently analysed by high resolution gamma spectroscopy to determine if radioactive contamination was present. The sample identified the presence of  $Cs^{137}$ , which recorded a concentration of 530 ( $\pm$  30) Bq/kg (0.56Bq/g). The significance of this value is assessed in Section 4.3.1 below.

#### 4.3.1 Risk Assessment

#### **Human health**

A Tier 1 radiological risk assessment has been undertaken using the EA's Radioactively Contaminated Land Exposure Assessment (RCLEA) methodology. Table B contained within the EA's CLR-13 (October 2006) provides a Soil Guideline Value (SGV) of 20,000Bq/kg (20Bq/g) for Cs<sup>137</sup> for a Commercial/Industrial land use, with respect to radioactivity in soil and human health. CLR-13 states that "harm" should be regarded as being caused where lasting exposure gives rise to doses that exceed one or more of the following criteria:

- An effective dose of 3 mSv/y (milisieverts per annum)
- An equivalent dose to the lens of the eye of 15 mSv/y; or
- An equivalent dose to the skin of 50 mSv/y.

CLR-13 also states that it is highly unlikely that the criterion for the lens of the eye would be exceeded without the other criteria also being exceeded.

A site specific assessment criterion (SSAC) has been calculated using the RCLEA methodology, which produced a Guideline Value for Cs<sup>137</sup> of 90,000 Bq/kg, based on an industrial setting, concrete and brick construction, and worst case sex and age of receptor. This is calculated to produce a total dose of 0.019 mSv/y.

An investigation is ongoing to demonstrate that materials exceeding the SSAC are not present at the site, and this will be reported under separate cover. Provided that this is

the case, it is considered that the presence of former radioactive contamination will have no detrimental effect on the proposed development.

The Environment Agency has concurred that the use of RCLEA is appropriate under the particular circumstances of the proposed application site.

#### **Controlled waters**

The installation of the cut-off barriers and the associated carrier drains will sever potential linkages to Kings Weston Rhine (West), hence further consideration of risks to controlled waters area not required.

# 5. Remediation Options Appraisal

# 5.1 Identified Existing Pollutant Linkages

With regard to human health, the active pathways to end users of the site are those identified for a commercial/industrial end use as defined in the former CLR10 for people working onsite;

- Oral pathways
- Dermal contact
- Indoor and outdoor vapour
- · Indoor and outdoor dust

The end use of Area A will necessitate predominantly hard cover in the form of buildings, hardstanding and access roads.

The most significant and direct pathway for contaminated groundwater from Area A to impact the Severn Estuary is likely to be the Kings Weston Rhine West which form the northern boundary of Area A and eventually discharges to the Severn Estuary. There is historical and ongoing impaction of the Rhine with zinc the remediation strategy that has partially been installed for the whole of the site has been designed to sever that important contaminant linkage. There are approximately 19 outlets into the Kings Weston Rhine from Area A and the Rhodia site, some of which are thought to be linked with the drainage system from the original smelter complex. These drains are likely to be acting as pathways between the perched water in Area A and the Kings Weston Rhine. In addition, perched groundwater could flow directly into Kings Weston Rhine.

In addition the deep groundwater within the Tidal Flats deposits flowing westwards across the site has been calculated to take approximately 18.4 years to reach the Avonmouth Docks (500m) and approximately 36.7 years to reach the Severn Estuary (1000m). This is seen as a less important pollutant linkage than the perched groundwater which is likely to be providing base flow to the Rhine system and impacting the Severn Estuary.

# 5.2 Remediation Options

Where a plausible pollutant linkage has been identified, (i.e. a source-pathway-receptor relationship) or a plausible linkage has been proven actions for removing the linkage include removal of the source, severing the pathway or removing/managing the receptors. In this case it is considered that both the human and controlled water targets are permanent features and therefore either removal of the source or management of severance of the pathway will be required to break the pollutant linkage. Since the source is generally the heavy-metal rich Made Ground, source removal is not a feasible option, neither financially nor in terms of its sustainability.

The remediation options which are anticipated for the proposed application site are complimentary to the remediation measures which have been previously approved by the EA and BCC for the Access 18 development site, which lies to the east of the proposed application site. A remediation options appraisal table for Area A is presented below;

Table 5.1: Remediation Options – Area A

Potential Issues	Potential Linkages	Action	Associated Remediation	Validation Required	Notes
Area wide heavy metals in Made	Perched water /	Remove	Cover to be provided in the form of	Yes if removed (monitoring	Provision of lined
Ground and upper horizons of	groundwater / direct	obstructions,	the building and hardstanding. Clean	wells to be installed around	clean water
Tidal Flat deposits	contact	reduce	sub-base to be imported to provide a	landfill construction)	conveyance systems
		infiltration	450mm clean cover		
			Mitigate recharge of perched water		
			by provision of impermeable hard		
			surfacing and separating clean rainwater from contaminated		
			perched water.		
Heavy metals in perched water	Groundwater	Containment	Shallow groundwater interception via	Yes	
· · · · · · · · · · · · · · · · · · ·	migration offsite via		barriers and carrier drains within		
	rhine network		Area A to capture contaminated		
			perched water from Area A and		
			convey to on-site ETP		
Heavy metals within wind blown	Airborne	Cover	Provide areas not occupied by	Yes, testing of cover (quality,	Material to by
dust	7 111001110	0010.	building or hardstanding with inert	thickness etc)	approved prior to
			cover. Total cover not to be less than	,	placement
			450mm		
Presence of underground drains /	Groundwater /	Remove	Remove or grout up any	Yes	Monitor Kings
pipe outlets to Kings Weston	perched water /	redundant pipe	underground drains and inlets		Weston Rhine
Rhine	surface water	work during a	encountered during pre-construction		(West)
		pre-construction	enabling work contract.		
		enabling works contract			
Heavy metals in perched water	Migration of perched	Containment	Hard cover leading to reduction of	Yes	Pile specification to
, , , , , , , , , , , , , , , , , , , ,	water to deeper-lying		infiltration of rainwater and		be in line with EA
	water bodies via piled		generation of perched water.		guidance document
	foundations				
Heavy metals in surface water	Off-site migration of	Source removal	Dredge sediment from Kings Weston	Yes	Chemical testing of
,	contaminated surface		Rhine (West)		removed sediment
	water from Kings		, ,		and of samples
	Weston Rhine (West)				collected from invert
					of rhine following
					sludge removal

# 5.3 Proposed Remediation

The construction of the proposed development will reduce the pollutant linkages to end users by providing a cover above the Made Ground over a significant proportion of Area A. The associated control of rainfall will significantly reduce the surface infiltration of rain water, reducing the leachate loading on the perched groundwater beneath the site.

#### 5.3.1 Enabling works

Prior to construction of the proposed development, the existing derelict concrete structures (such as pile caps, floor slabs and redundant drainage runs) will be generally removed to a level of 1.5m below existing ground level during a pre-construction enabling works contract, with ground levels reduced to formation level. Any obstructions which remain in the ground following this exercise will be surveyed and their locations noted to inform the design of below ground works.

#### 5.3.2 Clean cover

Outside of the footprint of the proposed building, it is proposed to provide a 450mm thick clean cover using a suitable fill material, however, this 450mm includes the pavement and floor slab construction in paved areas. This material should be suitable for use within an industrial/commercial setting. A minimum of one sample per 500m³ of imported material should be tested, for an appropriate suite of determinants. However, materials imported to site that have been produced in accordance with the Waste Resource Action Plan (WRAP) Quality Protocol (QP). The suite of contaminants tested for should reflect the use of the land the material was sourced from and a suitable human health risk assessment should be carried out so as to be compliant with current UK Guidance to demonstrate that the material placed is suitable for use.

#### 5.3.3 Cut-off drain

Following discussions with the Environment Agency it is proposed at this stage to deal with the shallow perched groundwater pathway which is likely to be impacting the Rhine system around the site. The presence of shallow groundwater is due to surface water infiltration and the relatively impermeable nature of the near surface Tidal Flat Deposits. Whilst the placement of the proposed development will significantly reduce the infiltration of surface water and together with the removal of the existing discharges into the Kings Weston Rhine, will significantly reduce this potential linkage, it is recommended that a shallow groundwater interceptor drain be installed. This is likely to comprise a relatively shallow trench, terminated within the tidal flat deposits. The off-site face of the trench (i.e. the face towards Kings Weston Rhine) will be lined with either an impermeable liner, either HDPE or a geocomposite clay liner (GCL). A perforated pipe would be installed within the base of the trench to act as a carrier drain, and the remainder of the trench backfilled with suitable granular pipe bedding. The carrier drain would convey water to the south or southeast corner of the NES site, where a pumping station would be constructed. Intercepted perched water would then be conveyed to the ETP, likely via the carrier drain which is proposed as part of the landfill cut-off wall. A schematic cross-section of the proposed remediation is shown as Figure 7 and a schematic plan of the proposed remediation is shown as Figure 8.

#### 5.4 Construction considerations

#### 5.4.1 Unexpected contamination

Areas of unexpected contamination, if encountered, should be segregated and stockpiled within the confines of the overall Access 18 site. Representative samples of the material would be sampled and the fate of the material determined, subject to the findings of the laboratory analysis. Subject to the findings of appropriate testing and where necessary, risk assessment, the material would be re-used as engineering fill.

#### 5.4.2 Control of perched water

During construction works, there is a risk that excavation and removal of underground obstructions might alter the near surface groundwater regime and may in turn mobilise contamination, potentially causing impact to the adjacent Kings Weston Rhine (West). To mitigate the risks, excavation works will be kept to a minimum. Where perched water is encountered during excavation operations, it will be pumped to the ETP for treatment prior to its discharge to the Kings Weston Rhine (West).

#### 5.4.3 Soil gas

A suspected pocket of soil gas was encountered during the recent ground investigation. An appropriate gas risk assessment should be undertaken prior to the commencement of piling operations. Notwithstanding this, vigilance will be required during piling operations for other pockets of soil gas, and should soil gas be encountered, site operations should be suspended pending monitoring of the work space and appropriate dynamic risk assessment.

# 6. Validation Requirements

#### 6.1 Clean Cover

The thickness of imported clean cover placed will be controlled by New Earth Solution's groundwork contractor with both pre and post placement surveys. Third party confirmation will be provided by the Engineer via the excavation of shallow inspection pits at regular intervals across the site.

A demarcation layer will be placed between the in-situ Made Ground and the imported/site derived clean cover material by New Earth Solution's groundworks contractor prior to beginning any other works following the earthworks exercise undertaken by St Modwen.

### 6.2 Protection of Kings Weston Rhine (West)

Following construction of the peripheral cut-off and the removal/capping of the redundant drainage and pipe work, the existing monitoring strategy will be continued. Should successive surveys indicate that zinc levels have not reduced then consideration shall be given to the dredging of Kings Weston Rhine (West) as part of the overall Access 18 site-wide remediation strategy.

#### 6.3 Perched Groundwater

The proposed development and the removal of redundant drainage which formerly discharged into Kings Weston Rhine will effectively cut the identified pollutant linkage via the shallow perched groundwater. To validate this it is proposed to install a number of permanent and semi-permanent shallow groundwater monitoring wells on the development site side of the cut-off drain. These will be monitored on a regular (monthly) basis as part of the monitoring of the whole of the Britannia Zinc site.

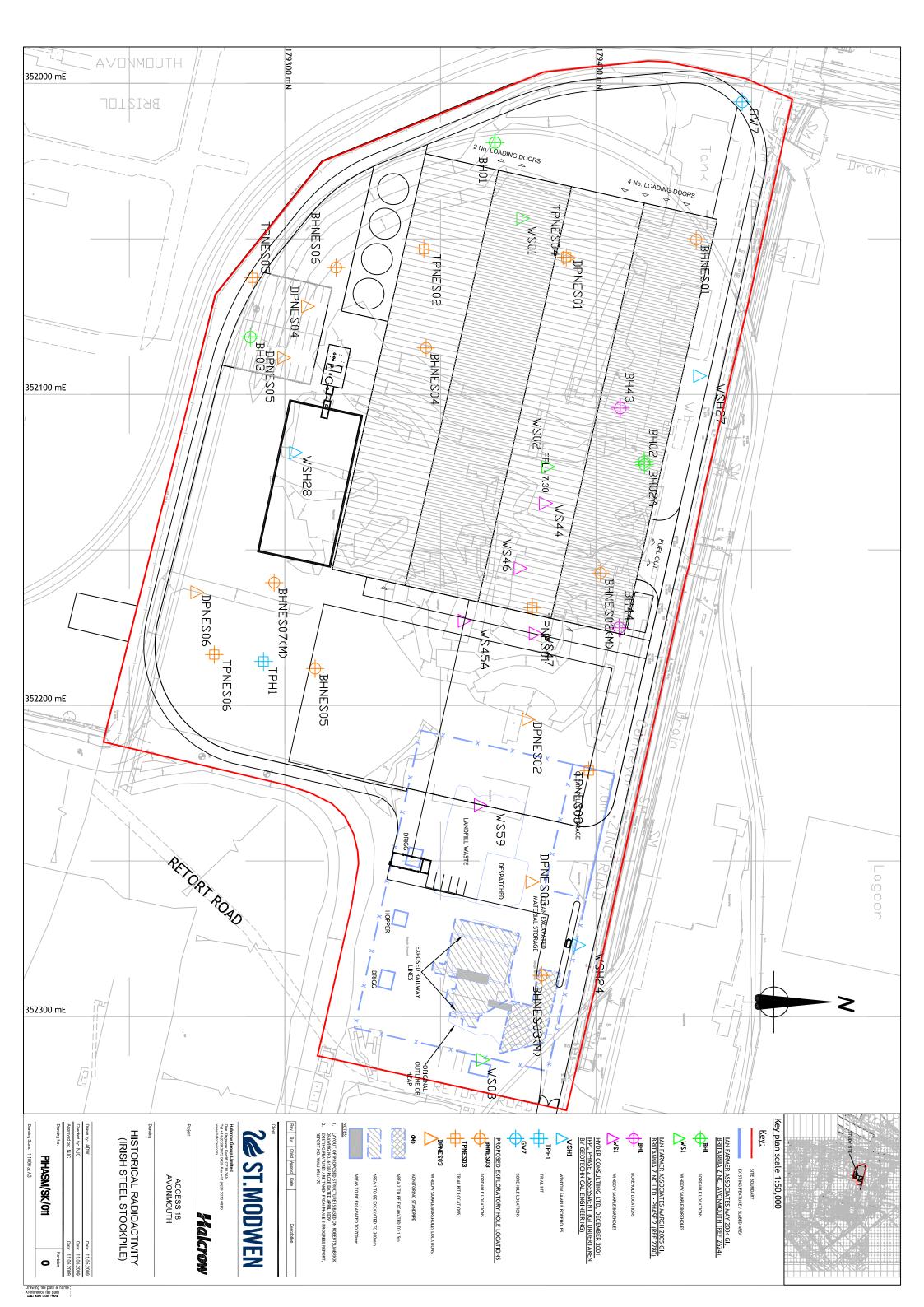
# 6.4 Validation Report

On completion of the St Modwen earthworks contract to remove underground obstructions, sever drainage linkages and install the cut-off wall, a partial Validation report will be produced by Halcrow Group Ltd, detailing the work carried out to date. Once New Earth Solutions (NES) take possession of the site, they will be responsible for placing the demarcation layer and then confirming the source and suitability of clean material prior to importation, the thickness of clean cover placed, and the results of the ongoing Kings Weston Rhine surface water surveys.

NES will be responsible for completing the validation exercise which will include construction of the required hard-paved impermeable areas, installation of the gas protection regime and other items required to complete the remediation strategy.

The Validation Report should be submitted to the Environment Agency and Local Authority for sign off of the regulatory process and discharge of planning conditions.

# Annex 1



#### **Halcrow Group Limited**

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# **Technical note**

Project Access 18, Avonmouth
New Earth Solutions

Date 29 July 2009

Note Preliminary investigation - potential asbestos-

containing concrete – Rev 1

**Author** Nathan Cummins

#### 1. Introduction

In 1990, the current Access 18 development site was subjected to a radiological survey of the entire property. That survey identified two areas of radioactivity; subsequently referred to as the RTZ hotspot and the Irish Steel hotspot. The locations of those areas of contamination are shown on Figure PI/HASM/SK011.

The RTZ hotspot area was cleared in 1993 and a Radiological Clearance Certificate issued. This area is not believed to pose a constraint to development, and further monitoring is not required.

The entire Irish Steel Stockpile area was part-treated by Rolls Royce Nuclear Engineering Services Limited (RRNESL) during 1993 and a Radiological Clearance Certificate for Areas 1 and 2 within the Irish Steel Stockpile was issued on 15 June 1993. However, the RRNESL report also identified areas of suspected asbestos-containing concrete within Area 1 of the Irish Steel Stockpile; however this can not be substantiated since analytical testing certificates were not appended within reports. A concrete slab was cast over the suspected areas of radioactive and asbestos containing material by RRNESL as part of their remediation, approved by the then Her Majesty's Inspectorate of Pollution (HMIP).

The location of the concrete slab is within the demise of the proposed New Earth Solutions site, as such the concrete will be a constraint to the development and is likely to require partial or complete removal.

A preliminary investigation was undertaken during June 2009 to confirm the location of the asbestoscontaining concrete and establish whether it contained asbestos, and thereby inform safe systems of work required for subsequent phases of investigation and development.

Analytical testing of concrete cores did not identify asbestos. As a result specific precautions will not be required to protect site operatives in respect to exposure to asbestos during breaking out the concrete. It is recommended however, that a precautionary approach to further work is adopted, particularly when excavating along the edged of the concrete as asbestos cement sheeting may have been used as temporary shuttering.

It will be necessary for a specialist radiological surveyor to be present on site during the breaking out of the concrete to undertake field measurements of radiological activity and take appropriate samples should suspected radiological contaminated sediment be encountered, either beneath the concrete slab or within any redundant drainage pipes or services trenches which may be present.



concrete

Project Access 18, Avonmouth Ref Ref2

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#### 2. Preliminary investigation of potential asbestos-containing concrete

Ian Farmer Associates (IFA) was appointed to carry out the preliminary works to determine whether the concrete slab contained asbestos. These works involved excavating a trench approximately 25m long by 1m wide across the concrete slab cast by RRNESL in an east-to-west direction to expose the underlying potentially asbestos-containing concrete (Plates 1 and 2 refer). Once the concrete slab was exposed, IFA cored four concrete samples at approximately 6m intervals along the trench with a water flush to provide mitigation against the generation of dust (Plates 3 and 4 refer).

The concrete cores were sub sampled and subjected to laboratory analysis for the presence of asbestos. None of the 13 sub samples which were analysed reported that asbestos was present.

Sample Ref Depth (m) Material Result CC1 0.30 - 0.53Concrete NAD CC1 0.53 - 1.35Concrete NAD CC1 1.35-1.42 Concrete NAD CC1 1.42-1.71 NAD Concrete CC2 0.30-1.34 Concrete NAD CC3 0.30 - 0.43Concrete NAD CC3 0.43-0.49 Concrete NAD CC3 NAD 0.49 - 1.06Concrete CC3 1.06-1.39 Concrete NAD CC3 1.39-1.79 NAD Concrete CC4 0.30 - 0.92NAD Concrete CC4 NAD 0.92 - 0.98Concrete

Table 1 – Laboratory results

\* NAD - No asbestos detected

NAD

Specific precautions will not be required to protect site operatives in respect to exposure to asbestos as a result the concrete slab within the New Solutions footprint can be broken out using conventional techniques. A precautionary approach to further work will be required, particularly when excavating along the edged of the concrete, as the potential for asbestos cement sheeting to have been used as temporary shuttering cannot be discounted.

Concrete

#### 3. Further radiological investigation

0.98-1.28

The concrete will require removal from within the development site, to allow piling operations or other construction activities from being constrained by buried obstructions. During the breaking out of the concrete, it will be necessary for a specialist radiological surveyor to be present on site to undertake field

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CC4

concrete

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measurement of radiological activity. The input of the radiological surveyor on site will be dependant upon a number of issues, such as the quantity of concrete to be broken out and the rate at which it is being broken-out.

Aurora has advised that based on the findings of RRNESL's investigations, the levels of activity anticipated would necessitate personal protective equipment (PPR) limited to disposable gloves and Tyvex-type disposable overalls. Should the field monitoring identify levels of activity of the order of 10's of Bq/g, the PPE requirements would be increased to include disposable half-face masks.

The survey stage of any work is not notifiable however if the levels are detected greater than 10Bq/g or the total activity exceeds 10kBq then the HSE will need to be informed 28 days before remediation work starts.



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## Investigation Photographs



Plate 1 – Area of works



Plate 2 – Trench dug to expose potential asbestos containing concrete

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Plate 3 – Concrete coring



Plate 4 – Concrete cores recovered



concrete

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## Concrete core photographs



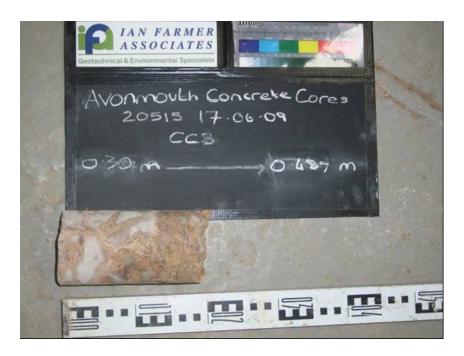




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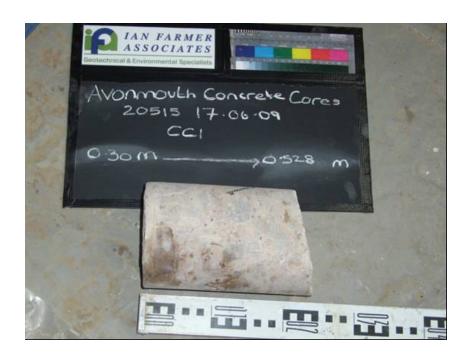






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Project Access 18, Avonmouth Ref Ref2



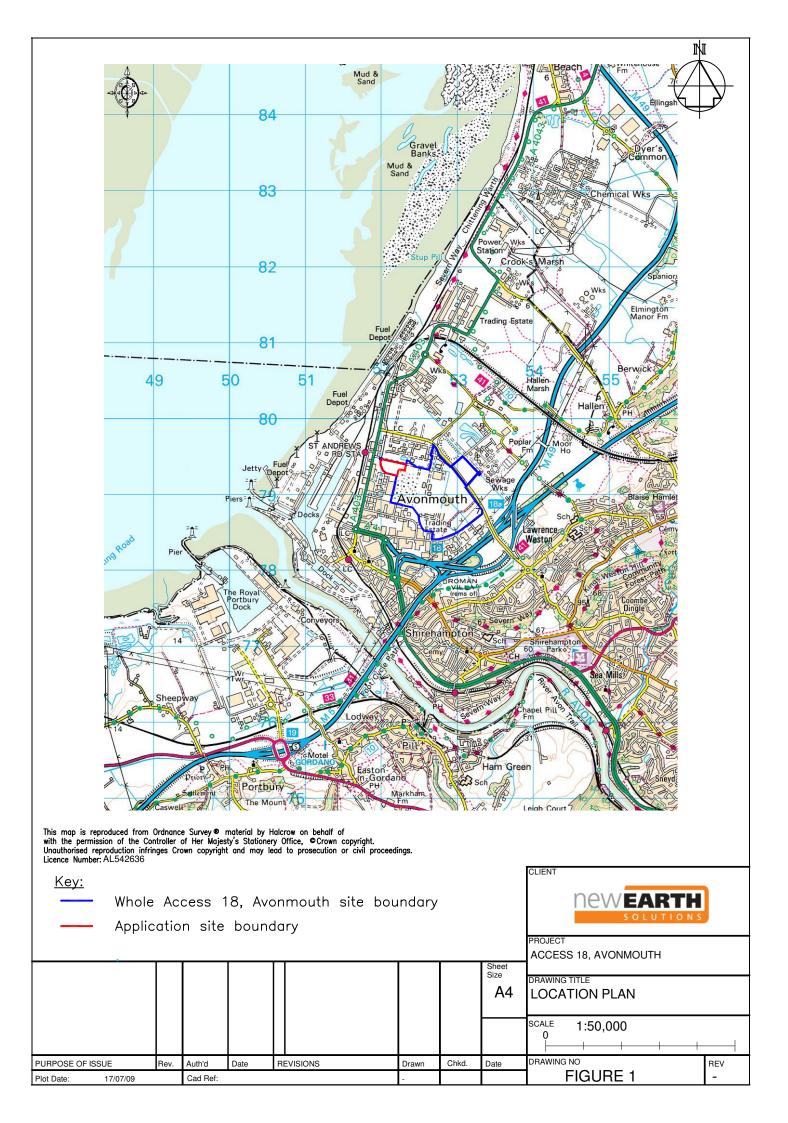


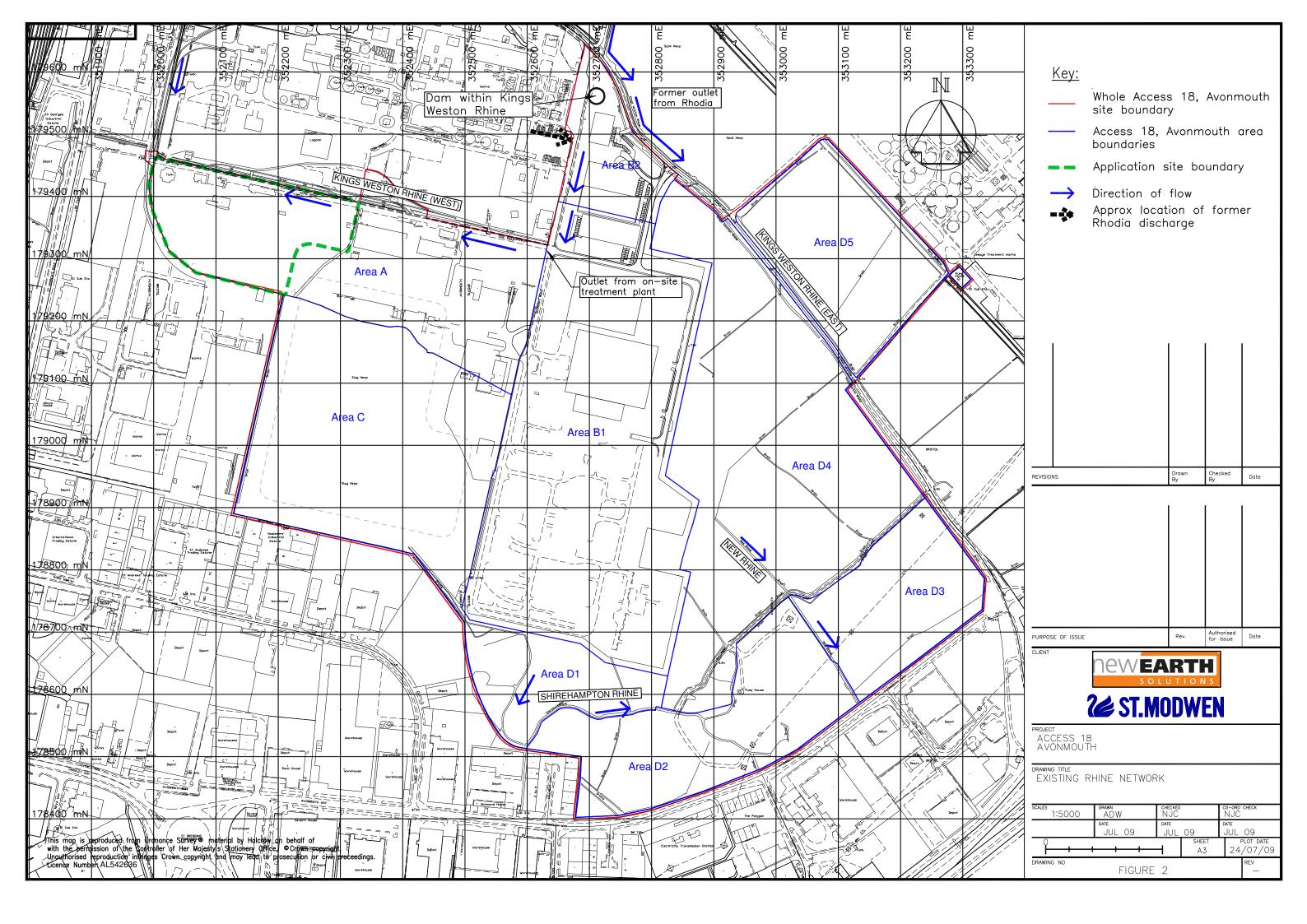


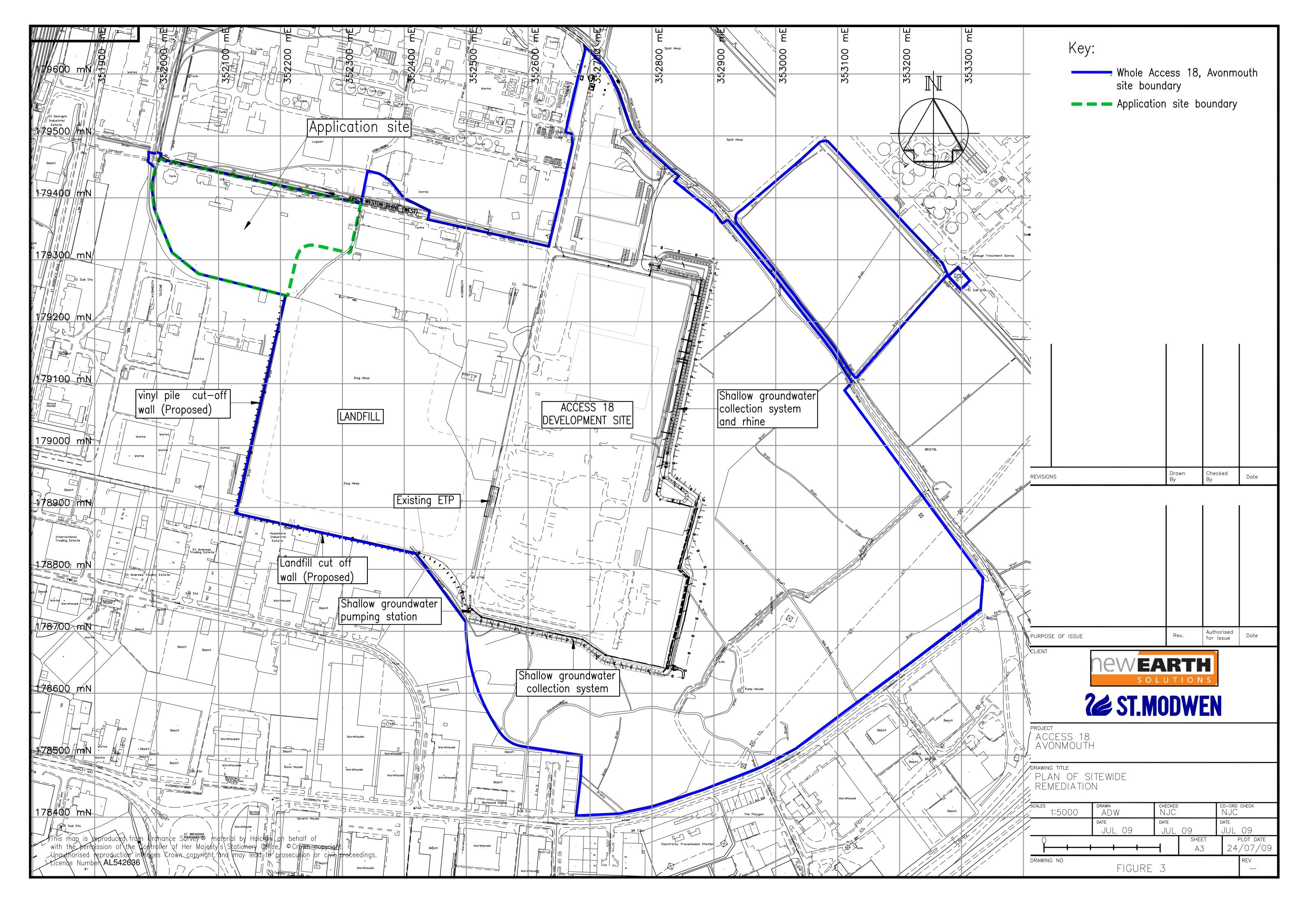
concrete

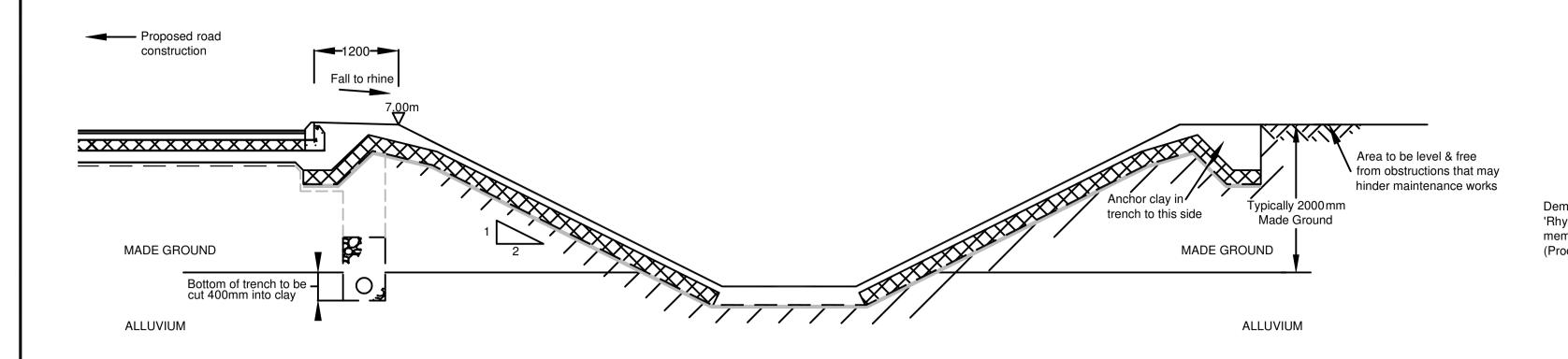
Project Access 18, Avonmouth Ref Ref2



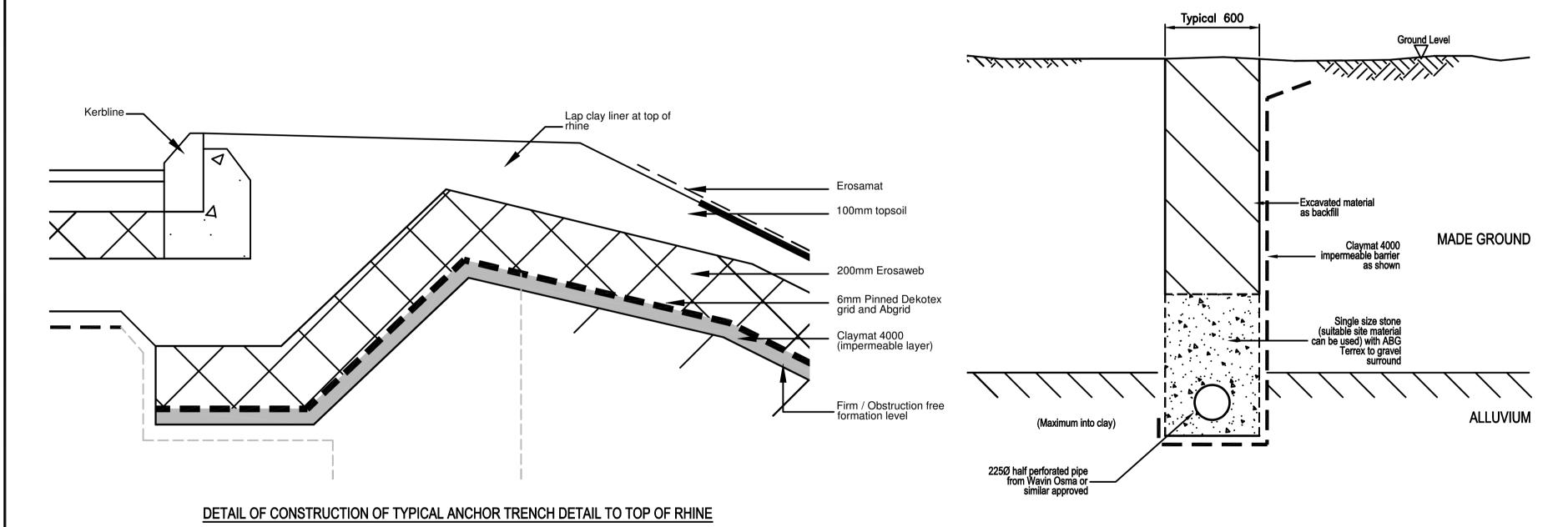








# TYPICAL CROSS SECTION THROUGH SHALLOW GROUNDWATER COLLECTION SYSTEM & RHINE



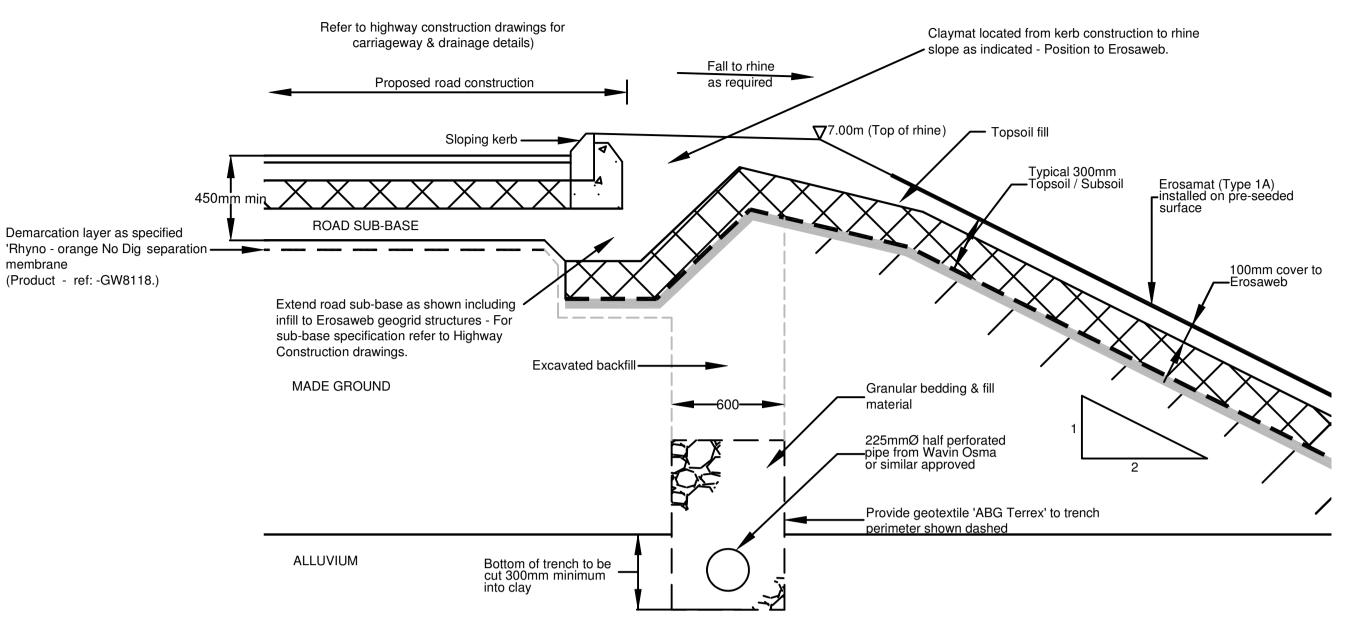
TYPICAL DETAIL OF SHALLOW GROUNDWATER COLLECTION SYSTEM

# RHINE LINER MATERIAL SPECIFICATION (IN SEQUENCE OF CONSTRUCTION)

Layer	Specification & roll size
Claymat 4000 Fibre reinforced geosynthetic clay liner	(Impermeable) - 300mm soil cover Roll size 4.85m x 50m (Dia 0.7m - weight =975kg)
ABGRID PP20/20 (Geogrid)	Polymer grid - Apertures 20x20 Roll size 4.75x100m
Dekotex (Geogrid)	Glass fibre/PVC - Apertures 7-10mm (Roll size 1m x 50m)
Erosaweb (GW200/300) 1 m wide	Honeycomb expandable structure -HDPE to be pinned using typically 8mmx400mm steel pins- Expanded size - 6.0mx1.0m - 4.0m - Honeycombs to be backfilled with topsoil - Starting at Bottom of rhine working upwards - IMPORTANT.
Erosamat (Type 1A)	Soil erosion protector - Biodegradable Jute fibres Roll size 4.15m x 200m - Rolled on tubes - 150kg each (needs pinning) Surface to be pre-seeded

ABG Geosynthetic material & products specified for rhine construction & cut off wall. Similar approved to be verified & confirmed by engineer prior to installation. Refer to ABG's manufacturers data sheets as

regarding material specification handling, installation and performance .



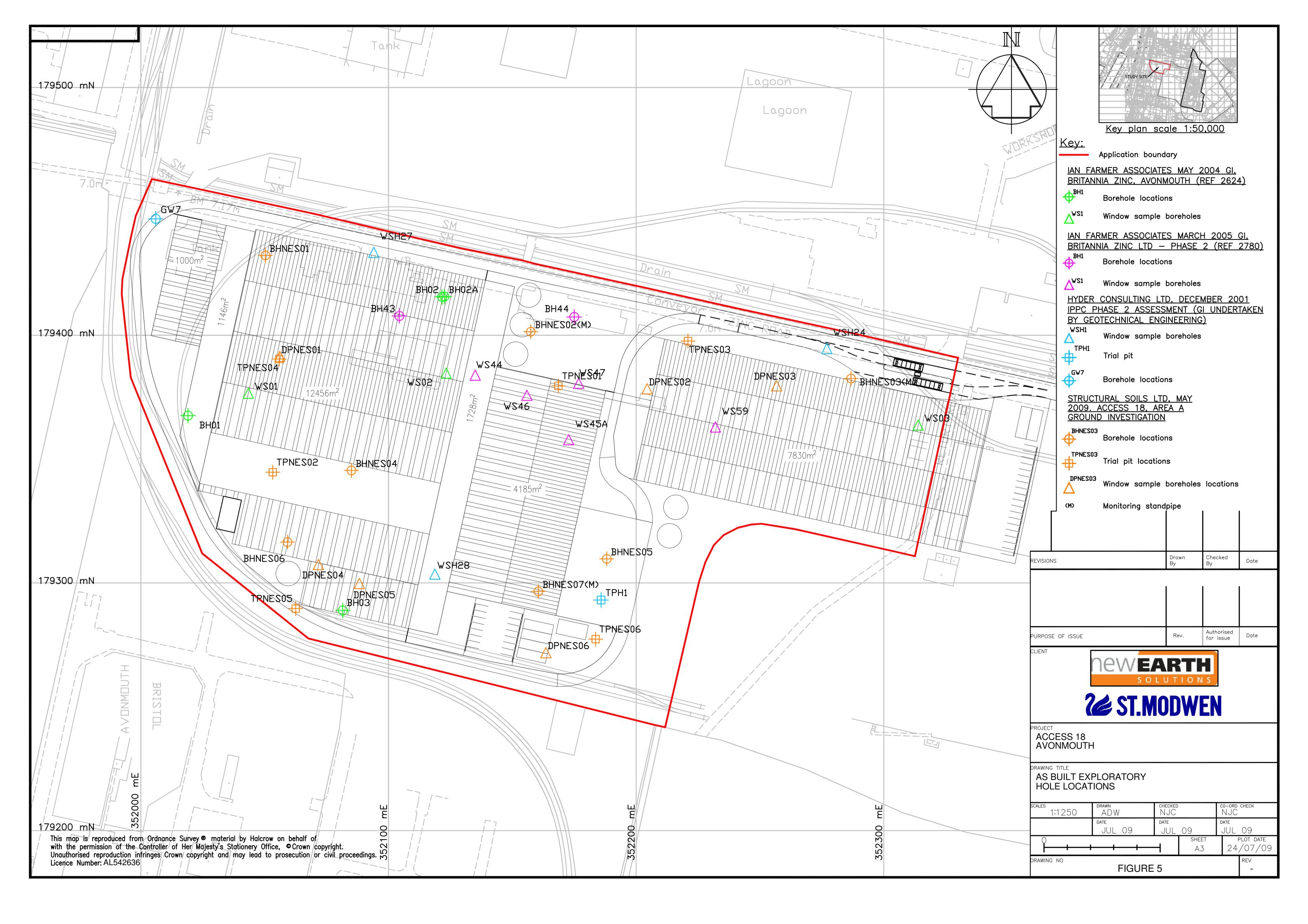
# DETAIL OF COLLECTION DRAIN / RHINE Checked REVISIONS Authorised for issue PURPOSE OF ISSUE

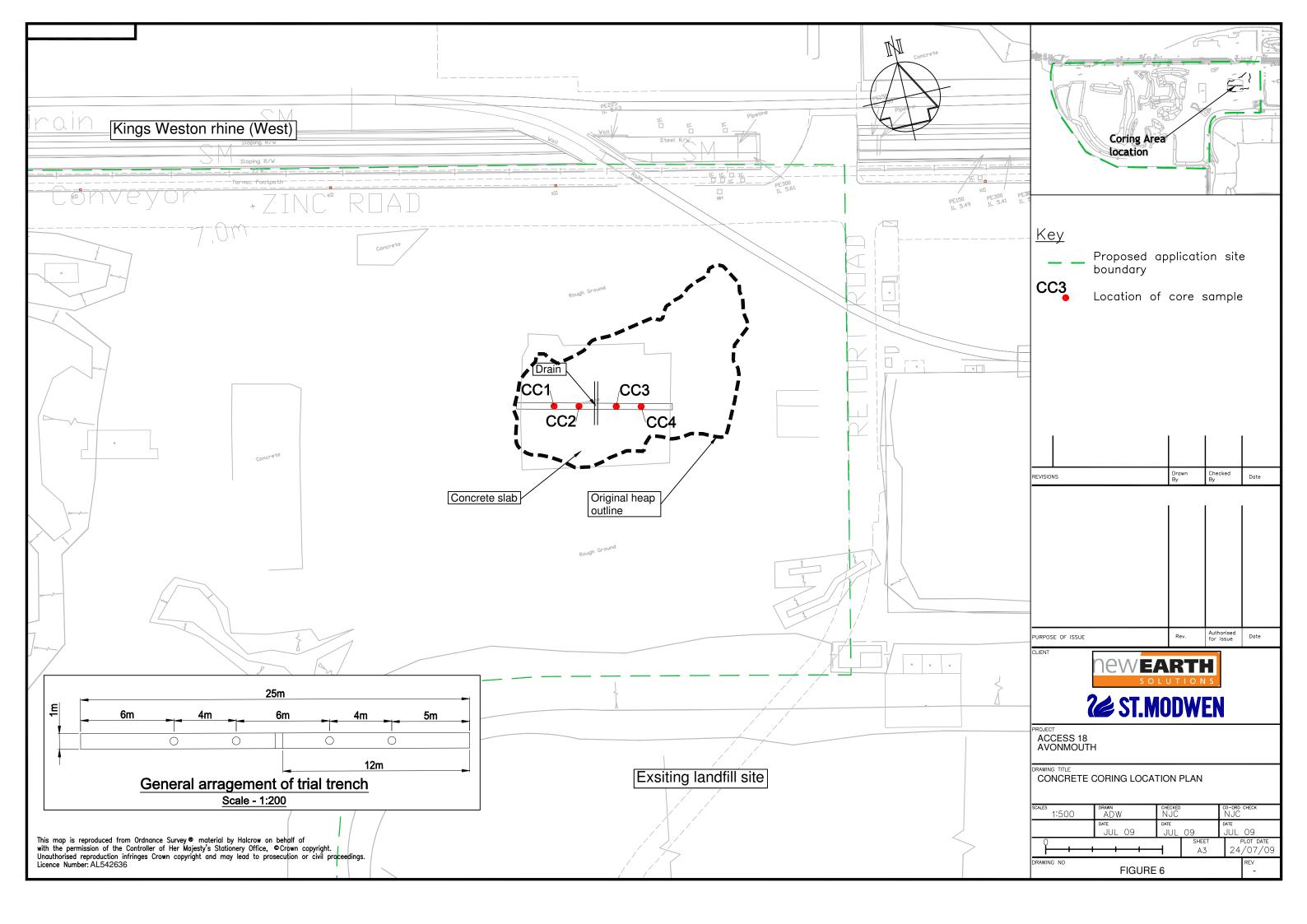
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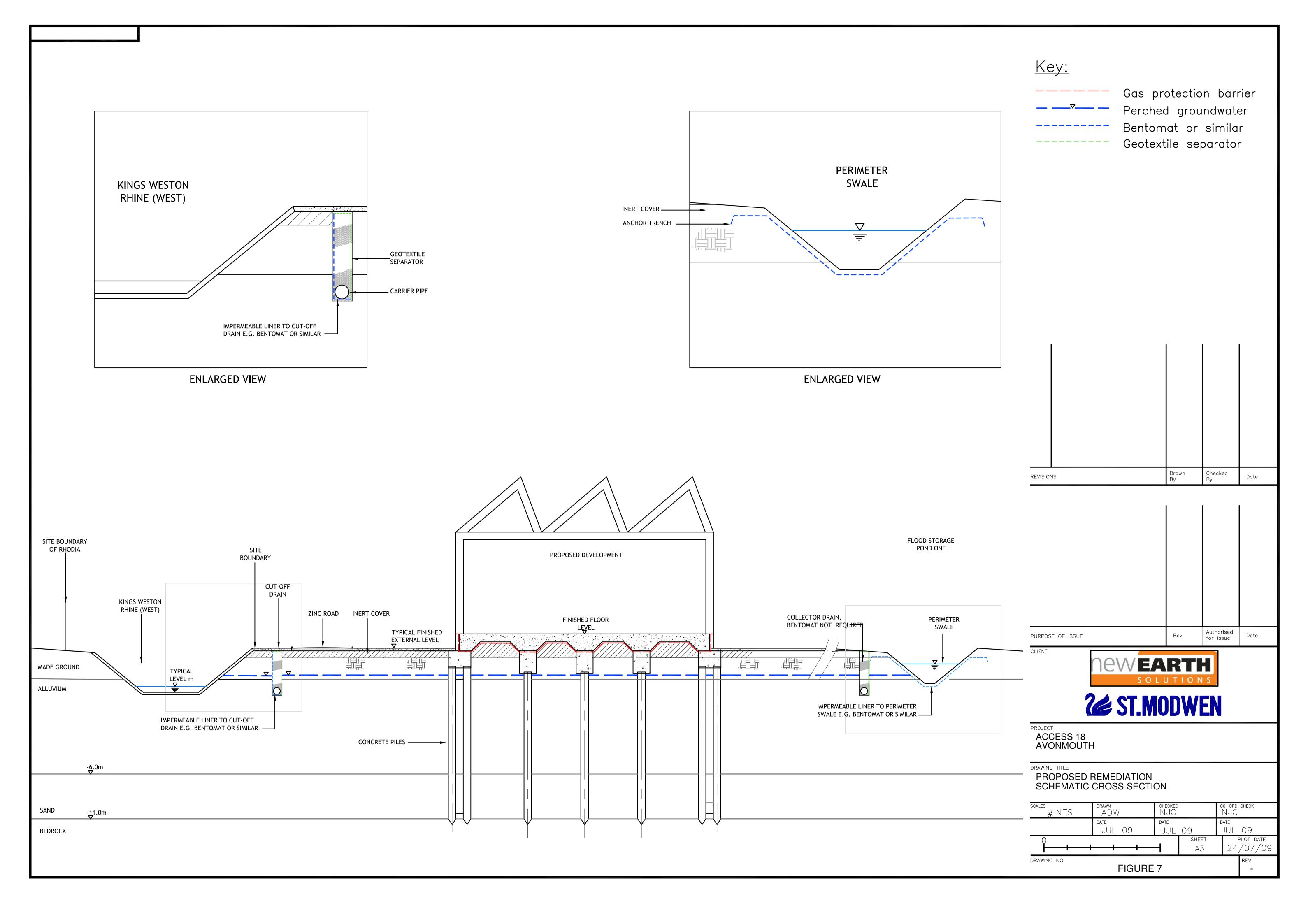
ACCESS 18 AVONMOUTH

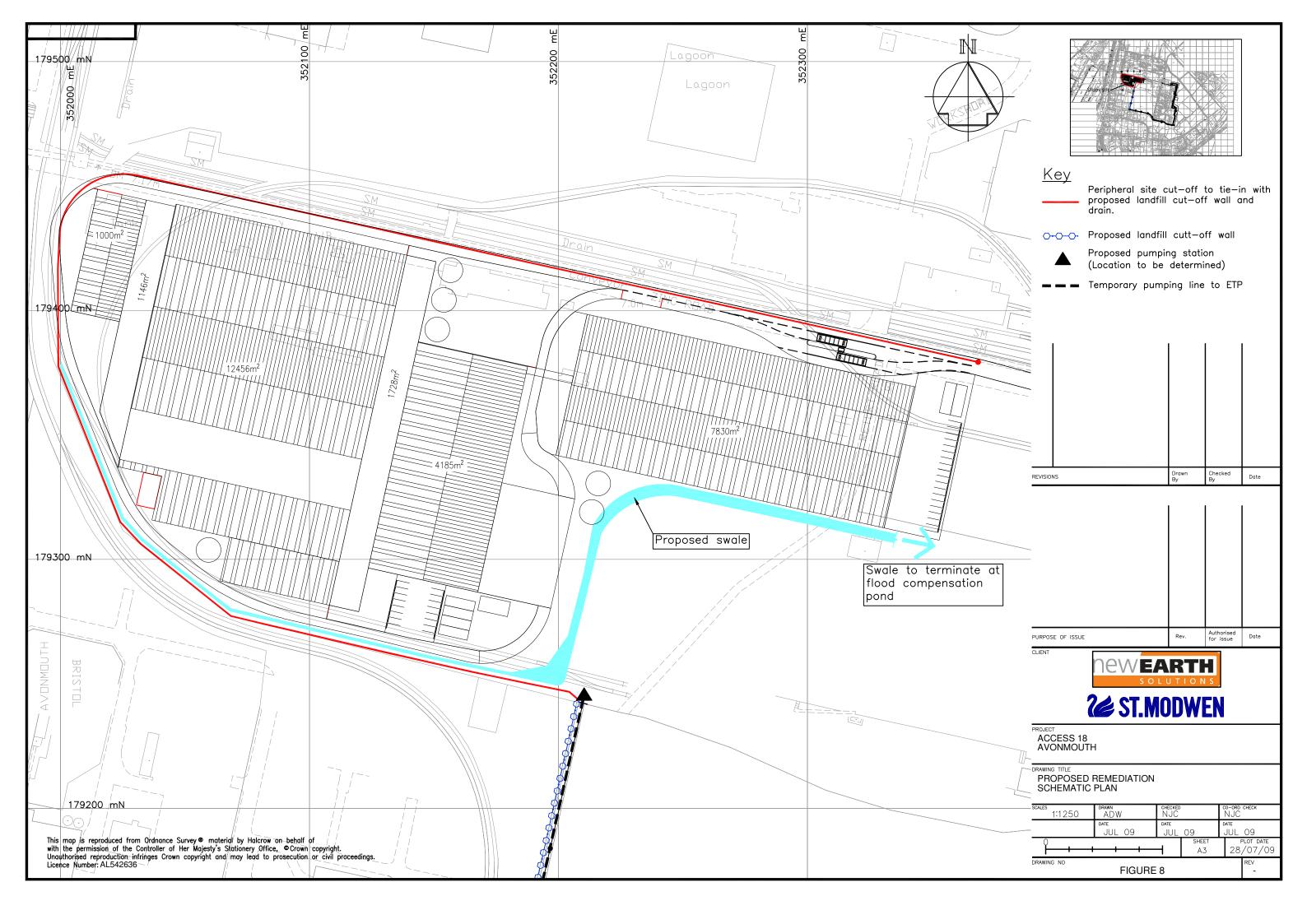
DRAWING TITLE TYPICAL CONSTRUCTION LINED RHINE AND SHALLOW GROUNDWATER COLLECTION SYSTEM

AS SHOWN PLOT DATE 24/07/09 DRAWING NO FIGURE 4













# Mechanical Biological Treatment Facility

Former Britannia Zinc Site, Avonmouth

Remediation Strategy APPENDIX A **Exploratory Hole Logs** 

**July 2009** 





# **Mechanical Biological Treatment Facility**

Former Britannia Zinc Site, Avonmouth

Remediation Strategy APPENDIX B Testing of Soil and Groundwater Samples

**July 2009** 



	AN FARI	MER TES					Site  Britannia Zinc Limited, Avonmouth		Nun Bl	ehole nber	
DUSS	d	Diameter		d to 20.20m	i	_evel (mOD 7.50	Client St Modwen Developments Limited		2	nber 624	
		Location 352		79367.5 N		/01/2004- /02/2004	Engineer Halcrow Group Limited			et 1/3	
	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness	Description Le	gend	5	instr	
	B1					(0.60)	MADE GROUND:- Light brown sand over compacted brick, concrete and ash fill		<u>:</u>		
	B2				6.90	0.60	fine to coarse, angular to subangular graver, or				-
a a	CPT N=4 B3		DRY	1/,1,2,1	6.40	1.10 1.10 1.05	GROUND)				
0	CPT N=5 B4		MOIS	T 1/1,1,2,1	5.35	2.1					
	D1 U1	2.50	DRY	23 blows					-		
	D2					(2.25					
	SPT N=5 D3 B5	3.60	DRY	1,2/1,2,1,1	3 11	4.4	Uncompact, gray SILT, with occasional traces of		- -		
50	D4 U2	4.70	DRY	16 biows	3.10	1.1 1.1 1.1 1.1	peat variety ster, with observed a server peat		lec * * * * * * * * * * * * * * * * * * *		
	D5				2.0	5.5 11.11.11.11.11.11.11.11.11.11.11.11.11.	Uncompact, grey and black SILT	* * * * * * * * * * * * * * * * * * *	x x x		
.00	D6 SPT N=3 D7 B6	6.25	DRY	1/1,,1,1					***************************************		
	D8							X X X X X X X X X X X X X X X X X X X	x x x x x x		
3,70	D9	7.75	DRY	12 blows		րորդերգրուրդ Մարդերգրություն		* * * * * * * * * * * * * * * * * * *	× × × × × × × × × × × × × × × × × × ×	1	
	. D10			J 1/1 1		نىلىلىلىلىل		X	* * * * * * * * * * * * * * * * * * *		
1 0 1 10 10 20	D11 B7	9.25	DR	Y 1/,1,,1				Scal appro	e ex)	Logge By	∍d
norics I ng	g from 0.00m to 1.20	m for 1 ho	our.					1:50 Figu		A0	

	IAN FAR ASSOCIA							Site Britannia	Zinc Limited, Avonmouth		1	Borehole Number BH1
Boring Meth	od	Diamet		ed to 20.20m	Ground	7.50		Client St Modw	en Developments Limited		J	Job
		Locatio 35		179367.5 N		D/01/2 2/02/2		Engineer Halcrow	Group Limited			Sheet 2/3
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	(Thi	epth (m) ckness)		Description	Legend	Water	Instr
10.60 11.00-11.45 11.45-11.60 11.80 12.40-12.85 12.40-12.85 12.40-13.00 13.50 14.05-14.50 14.50-14.65 15.10 15.55-16.00 15.55-16.00 15.55-16.10 16.30 16.45-16.90 16.45-16.90 17.50 18.00-18.45 18.00-18.45 18.00-18.50 18.80 18.95-19.40	D12 U4 D13 D14 SPT N=2 D15 B8 D16 U5 D17 D18 SPT N=3 D19 B9 D20 W1 D21 B10	10.70 10.70 10.70 11.70 11.70	DRY	12 blows  1/1,,1  Water strike(1) at 16.30m, rose to 8.60m in 20 mins, sealed at 19.80m. /1,1,2,3	-4.20		(m) ckness) (6.20) (6.20) (4.50) (4.50) (2.55)	Loose, g SAND	prey below 11.45m act, grey, sandy SILT, with bands of fine d. Becoming less sandy with depth reyish brown, slightly slity, fine to coarse	Legendon de la companya de la compan	Pan 2	
18.95-19.40 18.95-19.50	D25 B12				-11.70 -12.50		19.20 (0.80) 20.00	Firm, red peat. Sai	dish brown, sandy CLAY, with traces of nd is fine			1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
Remarks		<u> </u>			1 12.00	. <del>E—</del> _	20.00			Scale (approx)	F	ogged
										Figure N 262		

	IAN FARI ASSOCIA	MER					: tannia Zinc Limited, Avonr	mouth		Num Bl		
g Meth	od	Diameter		s to 20.20m		_evel (mOD) 7.50	ent Modwen Developments L	imited		Job Num 2/ She		
ible Percus	sion	Location		79367.5 N	Dates 30 02	/01/2004- /02/2004	gineer alcrow Group Limited		<del></del>	:	3/3	
∍pth m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness	Descri		Legend	Wa	Instr	1
0.00 y 0 0-20.50	D26 W2	(rh) 19.50	(m) 13.20	Water strike(2) at 20.00m, rose to 13.20m in 20 mins 100 blows		(1.00	very stiff, reddish brown Cl pluey grey, medium to coar singular, limestone gravel	LAY, with pockets of rise sand and coarse,		. ¥2		-
9.50-20.55 20.55-20.77 55-20.70 30-21.10	D27 SPT 25*/145 50/70 D28 SPT 25*/70 56/75	20.20	15.20	8,17/50 25/56	-13.50	21.0	Complete at 21.00m		333			
<b>P1.00-21.1</b>					-13.50	որույուրույր						
						علىنى المرادات المادادات المرادات المادات المرادات المراد						
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Chis	narks elling from 20.50m to	21.00m fc	or 1 hout	·						1:50 Figure 2		AO

District		IAN FAR ASSOCIA						Site  Britannia Zinc Limited, Avonmouth	N	Borehole Number BH2
Losation SS121.6 E 179415.5 N  Dose Occasion SS121.6 E 179415.5 N  Dose Occasion Historica Group Limited  Legend Doses retitled  Legend Doses retitled Do	g Meth	od	Diamete		ed to 3.20m	1		Client St Modwen Developments Limited		lumber
MADE GROUND- Very case, brownish crys, sandy, signly clayery, medium to corpret, engular to sangular places of the following sandy, signly clayery, medium to corpret, engular to sangular places of the following sandy signly clayery, medium to corpret, engular to sangular places of the following sandy signly clayery, medium to corpret, engular to sangular places of the following sandy san		,	1 "		179415.5 N	Dates 02	/02/2004	·	S	
### APP CBROUND - Vary dense, brownsh are year, angular to stangular playword, of sing, consiste and player, single to stangular playword, of sing, consiste and player, Sand is fine to country    11,1450	pth n}	Sample / Tests	Casing Depth	Water Depth	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Le	egend i
1.1.14/50 50 8070 50 8070 50 B1 50 CPT N=13 50 CPT N=13 50 CPT N=10 50 B4 51 N/R 55 CPT N=23 50 DRY 50 50	.20	B1	<u> </u>	V				MADE GROUND:- Very dense, brownish grey, sandy, slightly clayey, medium to coarse, angular to suangular gravel, of slag, concrete and clinker. Sand is fine to coar	rse SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS	
1.3/2.5.4.3  50 CPT N=10  50 B4 NNR  45 U1 NNR  45 D1 NP +23  50 DRY  1.3/2.5.4.3  50 DRY  1.3/2.5.6.8  1.46 D1 NR  45 D1 NR  46 D1 NR  47 D1 NR  48 D1 NR  48 D1 NR  48 D1 NR  48 D1 NR  49 DRY  1.3/2.5.6.8  1.3/2.6.8  1.3/2.5.8  1.3/2.5.8  1.3/2.5.8  1.3/2.5.8  1.3/2.5.8  1.3/2	.37 .50	50/70		DRY	11,14/50			OLAY (associate MADE		
50 CPT N=10 50 B4 51 N/R 55 B5 B6 blows 55	.45 .45				1,2/1,2,3,7	5,20		Firm, grey mottled brown CLAY (possible MADE GROUND). Faint hydrocarbon odour		
1.45 SPT N=23 3.20 DRY 1,2/4,5,6,8 S	1,50 3,50	B4	-		1,3/2,1,4,3		(3.75)			
1.45 5.50 Complete at 5.50m  Tarks ed large obstruction to 5.50m, unable to clear; aborted and moved rig. sturbed sample at 4.00m was placed in a bulk bag (85).  Scale (approx) at 1.50m to 1.75m for 1/2 hour. Excaveting from 0.00m to 1.20m for 1 hour.					89 blows					
narks sed large obstruction to 5.50m, unable to clear, aborted and moved rig. sturbed sample at 4.00m was placed in a bulk bag (B5). elling from 1.25m to 1.75m for 1/2 hour. Excavating from 0.00m to 1.20m for 1 hour.	5.45 5.45		3.20	DRY	1,2/4,5,6,8	1.4	5.50			
narks led large obstruction to 5.50m, unable to clear, aborted and moved rig. sturbed sample at 4.00m was placed in a bulk bag (B5). elling from 1.25m for 1/2 hour. Excavating from 0.00m to 1.20m for 1 hour.		·						Complete at 5.50m		
narks led large obstruction to 5.50m, unable to clear, aborted and moved rig. sturbed sample at 4.00m was placed in a bulk bag (B5). elling from 1.25m for 1/2 hour. Excavating from 0.00m to 1.20m for 1 hour.							المارية			
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sed large obstruction to 5,50m, unable to clear, abbried and moved rig.  sturbed sample at 4,00m was placed in a bulk bag (B5).  elling from 1,25m to 1,75m for 1/2 hour. Excavating from 0,00m to 1,20m for 1 hour.										
sed large obstruction to 5,50m, unable to clear, abbried and moved rig.  sturbed sample at 4,00m was placed in a bulk bag (B5).  elling from 1,25m to 1,75m for 1/2 hour. Excavating from 0,00m to 1,20m for 1 hour.	•									
	marks hed la	rge obstruction to 5.5	50m, unabl	e to clear I in a bulk	aborted and moved bag (B5).	rig.	_	(2	Scale approx)	Logger By
· · · · · · · · · · · · · · · · · · ·	elling	from 1.25m to 1.75n	n for 1/2 ho	our. Excav	ating from 0.00m to 1	1,20m for 1	nour.		1:50 Figure N	<u> </u>

Poring Metho		Diameter 150		i to 19.00m	Ground	Leve! 6.95	(mOD)	Client St Modwen Developments Limited		2	mbe 2624
		Location 352		79416.6 N	Dates 03. 04.	/02/20 /02/20	04- 04	Engineer Halcrow Group Limited			eet 1/3
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	De (Thic	epth m) kness)	Description	Legend	Water	Inst
10-1.20	B1					المسلسا		MADE GROUND:- Medium dense, greyish brown, sandy, fine to coarse, angular to subangular gravel of slag and clinker. Sand is fine to coarse			
						ասեւև	(1.55)				
20-1.65 20-1.65	CPT N=14 B2		DRY	3,4/7,4,2,1	5.40		1.55	Concrete fragments present below 1.25m  Firm, brown mottled grey CLAY	<b>****</b>		
70	D1							Filli, blown metass groy en a			
.00-2,45	U1	1.70	DRY	25 biows			(0.90)				
.45-2.60	D2				4.50	التنابانا	2.45	Uncompact, grey and black SILT	X X X X X X X X X X X X X X X X X X X		
.10-3.55 .10-3.55 .10-3.70	SPT N=2 D3 B3	2.80	MOIST	1/,1,,1					X X X X X X X X X X X X X X X X X X X		
15-4.60	U2	3.85		9 blows		rhtititi			X X X X X X X X X X X X X X X X X X X		
4.60-4.75	D4								X		
5.05-5.50 5.05-5.50 5.05-5.60	SPT N=1 D5 B4	4.70	MOIS	1/,,1					X X X X X X X X X X X X X X X X X X X		
6.05	D6						`		X X X X X X X X X X X X X X X X X X X	£	
		C 05		8 blows					* * * * * * * * * * * * * * * * * * *	× × ×	
6.60-7.05	U3	6.25		פאטוע כ		1			X X X X X X X X X X X X X X X X X X X	×	
7.05-7.20	D7								* * * * * * * * * * * * * * * * * * *	K X	
7.60	D8					T L			x x x x x x x x	×	
8.05-8.50 8.05-8.50 8.05-8.55	SPT N=0 D9 B5	7.75	MOIS	1		եր արդարդում արդարդում անդարդում անդարդում անդարդում անդարդում անդարդում անդարդում անդարդում անդարդում անդարդ			x x x x x x x x x x x x x x x x x x x	x x	
						Thitalia			X X X X X X X X X X X X X X X X X X X	* * * * * * * * * * * * * * * * * * *	
9.00 9.45-9.90	D10	8.70		14 blows		Physical			* * * * * * * * * * * * * * * * * * *	* * * * * *	
						ساعاطياسا			* * * * * * * *	×	L
9,90-10.05 Remarks	D11			1		_,}	-		Scale (approx	)   <u> </u>	ogg Sy
Excavating	from 0.00m to 1.20	m tor 1 hou	Γ						1:50		AC

Col.   Col.	oring Metho		Diamete 150		d to 19.00m	Ground	Level ( 6.95	(mOD)	Client St Modwen Developments Limited		Job Num 26	
1.00   14   3PT N=1   10.70   MOIS   14.1			1		79416.6 N	03			<del>-</del>		230	
1.00-11.45 SPT N=1 10.01.169 BP 12.15	Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	De (I (Thic	pth m) kness)	Description	Legend	Water	Insti
1.00-11.60 B8	0.10	D12					الململمالية	(9.65)		* * * * * * * * * * * * * * * * * * *		
2.20	1,00-11.45	D13	10.70	MOIS	1/,,1		անականումու			X X X X X X X X X X X X X X X X X X X		
15.50-15.95 SPT N=10 16.00 7.10 1/2,3,2,3	2.20 2.40 2.55-13.00 3.00-13.05	D15 U5	12.15		15 blows	-5.15 -5.30 -5.50	<u> </u>	12.25 12.45 (0.20)	fragments. Sand is fine  Soft, dark brown, fibrous PEAT  Uncompact, grey sandy SILT with occasional shell	No. 10/2		
15.50 D20 15.50-15.85 SPT N=10	13.55 13.80 14.00	W1 D18		6.70	13.80m, rose to 6.70m in 20 mins.	-6.85	سيأسيساس	13.80	Medium dense, grey, slightly slity, medium to coarse SAND, with thin bands of peat and grey clay	X X X X X X X X X X X X X X X X X X X	<b>V</b> 1	20 00 00 00 00 00 00 00 00 00 00 00 00 0
16.95-17.40 SPT N=12 16.95-17.40 B9 16.95-17.40 D23	14.10-14.60 15.00 15.50-15.95 15.55-16.00	D20 SPT N=10 B8	16.00	7.10	1/2,3,2,3		اعاشيانيا عنظيلياء	(3.90)			A CONTRACT OF THE CONTRACT OF	్ట్ స్టూర్ల్ కొర్క్ కొన్నిమండిన కొన్నికి కెస్టించారని కొన్నికి కెస్టించారని కెస్టించిన కెస్టిన్స్ కెట్టిన్స్ కెస్టిన్స్ కెస్టిన్ కెట్టిన్నికి కెస్టిన్నికి కెస్టిన్నికి కెస్టిన్నికి కెస్టిన్నికి కె కెస్టిన్స్ కెట్టిన్నికి కెస్టిన్నికి కెస్టిన్నికి కెస్టిన్నికి కెస్టిన్నికి కెస్టిన్నికి కెస్టిన్నికి
17.80	16.95-17.40 16.95-17.40	SPT N=12 - B9	16.00	4.20	1/2,3,3,4		ויוידידיין				oung ganga nu aga aga aga aga aga aga aga aga aga ag	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0
18.50-18.95 U7 18.25 9.10 125 blows 18.75 (0.75) Very stiff, reddish brown, sandy CLAY, with root traces. Sand is fine Very stiff, reddish brown, sandy CLAY. Sand is fine very stiff, reddish brown, sandy CLAY.	17.80 17.90-18.25		17.70	7.80	100 blows		⊨	(0.30)		) .	0.000,000,000,000,000	10 5 10 10 10 10 10 10 10 10 10 10 10 10 10
18.95-19.00 D26 19.00-19.35 SPT 50/200 18.80 12.25 7,9/13,21,16			18.25	9.10	125 blows		դորդոր			* * * * * * * * * * * * * * * * * * *	Bank Sara od	
Scale Logs	19,00 <b>-1</b> 9,35 19.00	SPT 50/200 W2	18.80	12.25	7,9/13,21,16	ļ	-	(0.25) 19.00	traces. Sand is fine	•	· · · · · · · · · · · · · · · · · · ·	
Remarks Scale (approx) By	20.00-20.35	SPT 50/200	19.00	15.20	6,11/17,21,12	-13.0	5	20.00			1	
Chiselling from 19.40m to 20.00m for 1 hour.	Remarks Chiselling fro	m 19.40m to 20.00	m for 1 hou	ır.						Scale (approx)	Log By	gge

	IAN FAR ASSOCIA	MER TES					Site  Britannia Zinc Limited, Avonmouth		В	orehole umber SH2A
Boring Metho		Diamete 15		d to 19.00m	ł	Level (mOD) 6.95	Client St Modwen Developments Limited			ob umber 2624
		Location 35		179416.6 N	Dates 03 04	8/02/2004- 1/02/2004	Engineer Halcrow Group Limited		- "	ueu
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
20.00-20.38	D28				·					
·						أطعته اعتماما مارأ الماماء الماماء الماماء				
Remarks	<u> </u>			<u> </u>	<u> </u>			Scale (approx	z)   }	Logged By
								1:50 Figure	No. 324.B	AO BH2A

oring Meth able Percus		1		ed to 20.50m	Ground Le	i	Client St Modwen Developments Limited		Job Numbe 2624
	150mm cased to 20.50m   Location   352081.6 E 179288.9 N   Sample / Tests   Casing Deptin (m)   Field R   Deptin (m)   Field R   Deptin (m)   Field R   Deptin (m)   Deptin (m)   Field R   Deptin (m)   Deptin (m)	179288.9 N		1/2004- 1/2004	Engineer  Halcrow Group Limited		Sheet		
Depth (m)	Sample / Tests   Casing Open   Water Open   Field R	Field Records	Level (mOD)	Depth (m) hickness)	Description	Legend	Mafe Inst		
10-0,50	B1					(0.50)	MADE GROUND:- Light brown, fine to coarse sand and whole brick fill		
50-1.20	B2				7,91	- 0.50	MADE GROUND:- Black, sandy, fine to coarse, angular to subangular gravel, ash, siag and clinke	- <b>****</b>	
30-1.20	, D2					(0.80)	angular to subangular graver, asir, slog and simile		
00 4 05	N-M TOO		DRY	2.3/1.1.1.1	7.11	1.30	MADE GROUND:- Soft, brown mottled grey.		
20-1.65 20-1.65			5111	=117171	6.61	(0.50)	gravelly CLAY. Gravel is fine to coarse, angular to subangular, of ash slag and clinker		
85	D1				F	1.80	Soft, light grey mottled brown CLAY, with small peat lenses and occasional fine, angular gravel		
00-2.45	U1	1.70	DRY	14 blows		(1.05)	(possible MADE GROUND)		
45-2.60	D2					- - -			
.90	D3				5.56	2.85	Soft, brown, slightly sandy CLAY with traces of peat and roots. Sand is fine		
00-3,45 00-3,45	SPT N=4 D4	2.65	DRY	1/1,1,1,1	5.31		Soft, grey mottled brown, slightly sandy CLAY.		
00-3.60	B4 					-	Sand is fine		
n.c	DE	ļ				_			
.85 .00-4.45	U2	3.70	DRY	57 blows		-	Becoming firm by 4.00m		
.45-4.60	De					- -			
.45-4.00	50	1	,			- (3.10) -		<u>: </u>	
.00-5.45 .00-5.45		4.75	DRY	1/1,1,2,1		<del>-</del> -	Becoming soft by 5.00m		
.00-5.60	B5					- -			
						- - -			
.00	D8	4.75	DRY				A Chiam Oli T	× ×	
.30		e 20	DBV	13 blows	2.21	6.20	Uncompact, light grey SILT	X X X X X X X X X X X X X X X X X X X	
.50-6.95	03	0.20		10 Bisws		(0.75)		* * * * * * * * * * * * * * * * * * *	
.95-7.10	D10			,	1.46	6.95	Uncompact, grey and black SILT, with traces of peat	* * * * * * * * * * * * * * * * * * *	
						<u>:</u>		**************************************	
.50	D11							* * * * * * * * * * * * * * * * * * *	
3.00-8.45		7.70	DRY	1/1,1,1,1				× × × × × × × × × × × × × × × × × × ×	4
3,00-8,45 3,00-8,60				£		<u>.</u>		×//// × × ×	
								\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	<b>V</b> .1
9,10	D13							× × × × × × × × × × × × × × × × × × ×	
9.50-9.95	U4	9.15	DRY	19 blows				* * * * * * * * * * * * * * * * * * *	4
Remarks						<u> </u>		Scale	Logg
Excavating	from 0,00m to 1,20	n for 1 hou	r.					(approx)	AC
								1:50	

	4 S S O C I A	MER TES	r		Ground L	evel (mOD)	Britannia Zinc Limited, Avonmouth  Client		Job Nurr	
Boring Metho Cable Percus		1		d to 20.50m		.41	St Modwen Developments Limited			nder 624
		Location 352		79288.9 N	Dates 28/0 29/0	01/2004- 01/2004	Engineer Halcrow Group Limited		Sher 2	et 2/3
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legen		lice:
9.95-10.10	D14					(5.90)		**************************************		
10.60	D15							* * * * * * * * * * * * * * * * * * *		
11.10-11.55 11.10-11.55 11.10-11.70	SPT N=3 D16 B7	10.80	DRY	1/1,,1,1		- - - - - - - - - - - - - - - - - - -		* * * * * * * * * * * * * * * * * * *	G. C.	
12.15	D17			×				* * * * * * * * * * * * * * * * * * *		
12.40-12.85	U5	12.10	DRY	21 blows			CUT	2 de		
12.85-13.00	D18				-4.44	12.85	Uncompact grey SILT	X		
13,55	D19							x x x x x x x x x x x x x x x x x x x		
13.90-14.35 13.90-14.35 13.90-14.50	SPT N=6 D20 B8	13.60	MOIST	<sup>-</sup> 1,2/1,2,1,2		(1.85)		X X X X X X X X X X X X X X X X X X X		
14.80 14.90 15.05-15.50 15.05-15.50 15.05-15.60	W1 D21 D22 SPT N=9 B9	14.60 14.70	8.60	Water strike(1) at 14.80m, rose to 8.60m in 20 mins. 1/1,2,3,3		Ė	Loose to medium dense, light brown and grey, to coarse SAND	îine	1.	20 (20 ) 20
16.05	D23								Tall go Wang e ou	20 20 20 20 20 20 20 20 20 20 20 20 20 2
16.40-16.85 16.40-16.85 16.40-17.00	D24	16.10		1,2/3,4,5,4		<u> </u>	Below16.40m: Medium dense		ove a cuin to or paya Quin o	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
17.45	D25								e Change on an	
17,90-18,35 17,90-18,35 17,90-18,50	D26	17.65		1/2,3,4,5	-	4.50)			"none a management	10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
19.00	D27				·		•			
19.30 19.45-19.90	D28	19.25	6.35	81 blows	-10.79	19.2		**************************************	e de x	
19.90-20.05	D29				-11.59	20.0	0	X X X	<u>w</u>	
Remarks	<u> </u>	,. <u>, i</u>						Scale (approx	;)   L	ogge:
								1:50		AO
								Figure		_

	IAN FAR ASSOCIA	MER TES					Site  Britannia Zinc Limited, Avonmouth		Borehole Number BH3
Boring Metho	*	Diamete		ed to 20.50m	1	Level (mOD) 8.41	Client St Modwen Developments Limited		Job Number 2624
		Location 35		179288.9 N	Dates 28 29	/01/2004- /01/2004	Engineer  Halcrow Group Limited		Sheet 3/3
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Lege	ž bus
20.40 20.50-20.95 20.50-20.95 20.50-21.50	D30 SPT N=45 D31 B12	20.25	8.90	4,8/9,10,12,14	-11.64	(0.25)	Soft, dark brown, fibrous PEAT  Very stiff, reddish brown, sandy CLAY. Sand is fine	allic alice	
21.50-21.95 21.50-21.95	SPT N=51 D32	20.50	11.10	6,7/10,12,14,15	-13.09	21.50	Complete at 21.50m		
y		-			-13.09	արուրդուրդուրդուրդ			
						المتاطينا الماطيل الماطينة			
						والمرامل المرامل المرا			
			·						
								Scale	Logged
Remarks Chiselling fr	om 20.80m to 21.50	m for 1 ho	ur.		-			Scale (approx)	Logged By
								Figure	<u> </u>

oring Metho	AN FAR. ASSOCIA	TES		·	Ground Le		Britannia Zinc Limited, Avonmouth  Client St Modwen Developments Limited		BH	10000
able Percuss	sion	150	mm cased	i to 20.50m		01			Shee	>1
		Location 352		79166.3 N	Dates 27/0 28/0	1/2004- 1/2004	Engineer  Halcrow Group Limited		1.	/3
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) Thickness)	Description L-6	egend	Water	nsti
10-1.20	B1					(1.55)	MADE GROUND:- Very loose, black, fine to coarse sand and fine to coarse, angular to subangular gravel of slag, brick and limestone, with grey lenses of clay, and occasional subangular, limestone cobbles			
20-1.65 20-1.65	CPT N=2 B2		DRY DRY	1/1,1	7.46	1.55	Soft, grey mottled brown CLAY, with occasional	<u></u> _		
70 00-2.45	D1 U1	1.20	DRY	13 blows		-	mv 25-70 = 0.562 0-100 = 0.562			·
,45-2.60 .05-3.40	D2 B3	2.65	DRY			(2.15)	Ф-100°			
.95-3.40 *		00				<del></del>	Soft, brown mottled grey CLAY			
.80 .95-4.40 .00-4.45	D3 CPT N=4 U2	2.55 3.70	DRY DRY	1/1,1,1,1 43 blows	5.31	3.70				
5.05-5.50 5.05-5.60 5.05-5.60	D4 SPT N=5 D5 B4	4.55	DRY	1,2/1,2,1,1		(2.25)				
3.15 3.40-6.85	D6	6.10	DRY	19 blows	3,06		Uncompact grey SILT, with occasional peat traces	W × × × × × × × × × × × × × × × × × × ×	11. C & C * * & & *	
3.85-7.00	D7							zdz * ,	* * * * * *	
7,55 8,05-8,50 8,05-8,50 8,05-8,65	D8 SPT N≃4 D9 B5	7.70	DRY	1,1/,1,1,2					/ d ×	
9.10 9.55-10.00	D10	9.15	DRY	20 blows		والمتامات أرامته المارات		* * * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * *	
Remarks	from 0.00m to 1.20	m for 1 hor	Ir.:				{a	Scale approx	) Lc	999
⊏xcavating	я он олочні со 1,20	10: 1 1101						1:50 Figure	l	AO

Boring Metho Cable Percuss		Diamete 150		ed to 20.50m	Ground	Level (mOD) 9.01	Client St Modwen Developments Limited		Nn Yoj	impe
		Location 352		179166.3 N	Dates 27 28	7/01/2004- 1/01/2004	Engineer Halcrow Group Limited			2/3
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	lns
0.00-10.15	D11					(8.25)		* * * * * * * * * * * * * * * * * * *		
								* * * * * * * * * * * * * * * * * * *		
0.60	D12							الله × × الله × × × الله × × × × الله × × × × × الله × × × × × × × × × × × × × × × × × ×		
1.00-11.45 1.00-11.45	SPT N=3 D13	10.75	DRY	1/1,,1,1			·	× × × × × × × × × × × × × × × × × × ×		
1.00-11.55	B6			-			,	× × × × × × × × × × × × × × × × × × ×		
								N/ = ×		
2.05	D14							* * * * * * * * * * * * * * * * * * *		
			·					* * * * * * * * * * * * * * * * * * *		
2.60-13.05	U5	12.25	DRY	26 blows				* * * * * * * * * * * * * * * * * * *		
3.05-13.20	D15							* * * * * * * * * * * * * * * * * * *		
4				·				* * * * * * * * * * * * * * * * * * *		
13.60	D16									
13.95-14.40 13.95-14.40	SPT N=6 D17	13.60	DRY	1,1/1,2,1,2		<b></b>	Uncompact, greyish brown, sandy SILT. Sand is	* * * * * * * * * * * * * * * * * * * *		
13.95-14.50	В7				-5,19	14.20		1		
					-		My 50-100 = O. C.	* * * * * * * * * * * *		
15.05	D18					(1.80)		* * * * * * * * * * * * * * * * * * *		
1 E E E 10 DO	U6	15,10		28 blows				x x x x x x x x x x x x x x x x x x x		
15,55-16.00	00	10,10		20 0.000			-	x x x x		
16,00-16,15 16,15	D19 W1	15.10	9.30	Water strike(1) at	-6.99	16.00	Medium dense, greyish brown, silty, fine to medium SAND	#12 #15 #1 - 12 # 15 # 15 - 12   12   12   12   12   12   12   12	Ծ1	
16,15-16.60 16,15-16.80	D20 B8	15,10	9.30 8.60	16.15m, rose to 9.30m in 20 mins. 1,2/3,4,3,5						
16.15-16.60	SPT N=15	15.10	8.60	1,20,4,0,0						
17,10	D21									
	•	1-40		1,2/3,2,3,3		(2.70)				
17.45-17.90 17.45-17.90 17.45-18.00	SPT N=11 D22 B9	17.10		1,23,2,3,3						
						<u> </u>				
18.50 18.80	D23 D24				-9.69	(2.70)		XW. X XW.		
18.95-19.40	U6	18.60		63 blows			peat	* * * * *		
19.30-19.45 19.40-19.55	D25 D26					(0.90)		**************************************		
19.70	D2 <b>7</b>				-10.59 -10.74	9				0.00000
19.80 Remarks	D28		_	-		<u></u>		Scale (approx)	<u> </u>	ogg V
, willeling			•						3	
								1:50	$\perp$	AC

-		IAN FAR ASSOCIA	TES		<del>_</del>	Ground	Level (mOD)	Britannia Zinc Limited, Avonmouth  Client		jo	
	Boring Metho Cable Percus				ed to 20.50m		9.01	St Modwen Developments Limited		Νi	umber 2624
			Location 352		179166.3 N	Dates 27 28	/01/2004- /01/2004	Engineer Halcrow Group Limited			neet 3.3
	Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	19.85-20.30 20.05 20.15-20.60 20.15-20.60 20.15-21.00	U7 D29 SPT N=49 D30 B10	19.50 20.05		70 blows 4,8/9,11,13,16		(1.00)	medium  Very stiff, dark reddish brown CLAY, with lenses grey, medium to coarse sand	of		
	21.00-21.38 21.00-21.38	SPT 48/225 D31	20.50	13.90	6,9/11,16,21	-11.99	21.00	Complete at 21.00m			
	Ţ						21.00				
		·					والماماء الماماء				
	-										
•	Remarks Chiselling from		n for 1 hou	г.					Scale (approx)	Tig.	ogged y
									1:50 Figure 1		AO

	IAN FAR ASSOCIA	MER TES	,			Site  Britannia Zinc Limited, Avonmouth	1	mber /S1
Excavation I	Method	Dimens	ions mm to 0.50m	Ground	Level (mOD) 7.11	Client St Modwen Developments Limited		 mber 2624
		Locatio 35	n 2043.1 E 179376.1 N	Dates 19	b/01/2004	Engineer Halcrow Group Limited	She	eet 1/1
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Lege	Water
0.10	D1			6.91	_	MADE GROUND: Grey, sandy slit/ clay  MADE GROUND: Brown, slightly clayey, brick and concretill with occasional timber fragments		
0.40	D2		Seepage(1) at 0.40m.	6.61	- (0.30) - 0.50	Complete at 0.50m		
Ħ								
					- - - - -			
					- - - - - -			
					- - - - - - -			
					- - - - - -			
			£		-			
					<u> </u>			
Remarks Three attemp	ots, window sampler	refused at	0.50m.	<del></del> -		Scale (appro	ļ	gged
						1:25 Figur 2		OM 1

	IAN FAR ASSOCIA	MER				Britannia Zinc Limited, Avonmouth	Ws
xcavation	Method dow Sampler		to 2.00m to 3.00m to 4.00m	1	Level (mOD) 6.72	Client St Modwen Developments Limited	Job Numi 26;
		Location 35212	3.4 E 179384.5 N	Dates 19	01/2004	Engineer Halcrow Group Limited	Shee
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legen
.20	D1 <sub>.</sub>				(0.40)	MADE GROUND: Grey, sandy, slightly gravelly silt/ clay. Gravel is fine to coarse angular to subangular, of brick and concrete	
				6.32	0.40	MADE GROUND: Brown, gravelly sand. Sand is fine to coarse, gravel is fine to coarse, angular to subangular, of ash and slag	
.00,	.D2				(1.80)	Below 1.40m: Clayey	
.00	D3 ·			4.52	2.20	Soft, blue grey SILT/ CLAY (Alluvium)	
3,00	D4				(1.80)		x x
1.00	D5		f	2.72	- - - - - - - - - - - - - - - - - - -	Complete at 4.00m	x
Remarks No groundv	vater encountered.				<u></u>		ale Log
						1: Fig	25 N ure No.

cavation	IAN FAR ASSOCIA	<del>,</del>	ions nm to 2.00m	Ground	Level (mOD)			Job Num	53 — ber
	dow Sampler	70r	nm to 2.00m nm to 3.00m nm to 4.00m		6.55	St Modwen Developments Limited			24
		Location		Dates 19	/01/2004	Engineer Halcrow Group Limited			et /1
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	nst
50	<b>p</b> 1					MADE GROUND: Black, gravelly sand. Sand is fine to coarse, gravel is fine to coarse, angular to subangular, of ash and slag			an and an and an
30			Seepage(1) at 0,70m.	5.65	0.90	Soft to firm, brown SILT/ CLAY		V1	30 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
50 *	D2				- - - - - - - (1.80)		x x x	HIGH STATE OF THE	2 3 4 2 5 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
.50	D3					Below 2.10m: Becoming soft	* * * * * * * * * * * * * * * * * * *	2 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1850 00 00 00 00 00 00 00 00 00 00 00 00 0
.50				3.85	2.70	Soft, grey SILT/ CLAY		<b>]</b>	
.50	D4				(1.30)		*		
			14	2.55	4.00	Complete at 4.00m			
Remarks			,				Scale (approx)	Log By	
							1:25		NJ

Boring Meti		Dīamete 15		ed to 18.70m	Ground	Level (mOD) 7.07	Client St Modwen Developments Limited			b mbe 2780
		Location 35		179407.8 N		)/12/2004- 8/12/2004	Engineer Halcrow Group Limited			
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Inst
0.10-0.65	B1					(0.66)	MADE GROUND: Dark grey, cemented, sandy gravel, with inclusions of slag, concrete and metal. Sand is fine to coarse, gravel is fine to coarse, angular		3.	
),60 ),65-0,95 ),95-1,10	A1 B2 B3 A2				6.41 6.11 5.97	0.66 (0.30) - 0.96 - 1.10	MADE GROUND: Dark grey/ brown, sandy gravel, with inclusions of concrete, slag, tile, ash and clinker. Sand is fine to coarse, gravel is fine to coarse, angular	· :-: ·		
.10 .15 .20-1.65	D1 U1 D2		DRY	27 blows	5.87	0.96 1.10 (0.14)	MADE GROUND: Soft, dark brown/ black, sandy, gravelly clay, with inclusions of brick, concrete, ash and slag. Sand is fine to coarse, gravel is fine to coarse, angular			
2.10-2.55 2.10-2.55 2.10-2.80	SPT N=7 D3 B4	1.85	DRY	1/1,2,2,2			Soft, brown, sandy CLAY. Sand is fine			
90 .05-3.50	D4 U2	3.30		10 blows	4.27	2.80	Very soft, brown mottled grey, sandy CLAY. Sand is fine			
.50-3.65	D5									
.15-4.60 .15-4.60 .15-5.05	SPT N=1 D6 B5	4.35	MOIS	<sup>-</sup> 1/,1					. Constitution of the second	
.05-5.50	U3	5.20		6 blows						
50-5.65	D7					(5.30)				
.10 .60-7.05 .60-7.05	SPT N=0	6.20	MOIS	.,						
.05-8.00	B6		-			8.10				
10-8.55	U4	7.60		10 blows	-1.03	8.10	Very soft, dark grey, slightly sandy, peaty CLAY. Sand is fine	*.Wa	▼1	
55-8.70	D10							× 1/16 ×		
10	D11							×alle		
30-10.05 30-10.05	\$PT N=2 D12	9.35	MOIS	1/,1,,1				×.\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		
emarks ater added	from 8.00m to 17.80	m. Excaval	ting from	0.55m to 1.20m for 1	hour,			Scale (approx)	Log By	gec
								1:50	s	s

Description	Boring Meth	od	Diamete	er .	<u> </u>	Ground	Level (mOD)	Client		Job	
SS2104.4 E 178407.8 N   19712/2004   Helstrow Group Limited   Helstro	Cable Percus	sion	15	0mm cas	ed to 18.70m		7.07	St Modwen Developments Limited		ı	
0.05-11.00 S7			i		179407.8 N	10		_	,		eet 2/2
1.00-11.45   U5	Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
2.15 D14 2.45-12.90 SPT N=6 2.45-12.90 D15 8.8 B8  3.60-14.05 U6 13.30 Z1 blows  4.05-14.20 D18 4.20 D	10.05-11.00	B7					(4.50)	Very soft, dark grey, slightly sandy, peaty CLAY. Sand is fine	×.Wa. ×. .Wa. ×. ×.Wa. ×.		
2.15 D14 2.45-12.90 SPT N=6 2.45-12.90 D15 8.8 B8  3.60-14.05 U6 13.30 Z1 blows  4.05-14.20 D18 4.20 D	1.00-11.45	U5	10.75		13 blows				* 24/2 - 24/2 * 24/2 - 24/2 * 24/2 - 24/2		
2.15 D14 2.45-12.90 SPT N=6 2.45-12.90 D15 8.8 B8  3.60-14.05 U6 13.30 Z1 blows  4.05-14.20 D18 4.20 D	1.45-11.60	D13							×		
2.45-12.90 D15 2.90-13.60 B8 3.60-14.05 U8 13.30 21 blows 4.05-14.20 D16 4.20 4.20 4.50 4.50-14.95 D17 4.50-14.95 D18 SPT N=16 13.30 MOIST 1/2.3.5.6  12.60 Moist restrict() at 14.20m, rose to 8.10m in 20 mins. MOIST 1/2.3.5.6  12.60 Soft, grey with occasional orange brown mottling.  7.13	2.15								×24/4. ************************************		
3.80-14.05 U6 13.30 21 blows  4.05-14.20 D16  4.00 W1 4.30 D17 D18 A.50-14.95 SPT N=16 13.30 MOIST 1/2,3,5,6  MOIST 1/2,3,5,6  MOIST 1/2,3,4,5,8  5.55-16.00 SPT N=20 D19  5.55-16.00 D19  1.2/3,4,5,8  D21 3.00-18.45 U7 17.01-7.55 D20 17.01-7.55 D2	2.45-12.90 2.45-12.90 2.90-13.60	D15	12.15	MOIS	1/1,2,1,2	-5.53	12.60	Soft, grey with occasional orange brown mottling, sandy CLAY. Sand is fine			
4.20 W1 D17 D18	3.60-14.05	U6	13.30		21 biows		(1.60)			Poly 0 22 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	200 00 00 00 00 00 00 00 00 00 00 00 00
## Water strike(1) at 14.20m, rose to 8.10m in 20 mins. ## 4.50	4.05-14.20	D16								100 100 100 100 100 100 100 100 100 100	
5.55-16.00 D19  6.60-17.10 B9  7.10-17.55 SPT N=12 D20 T.10-17.55 D20 T.10-17.55 B10  7.90 B10  17.85 T.75 86 blows  17.85 T.75 86 blows  11.53 T.860 D22  3.80 D23  3.05-19.50 D24  18.70 D24  18.70 10.30 3.4/5,7,8,11  18.70 D24  18.70 10.30 3.4/5,7,8,11  18.70 D24  18.70 D25 SPT N=38 18.70 12.70 4,6/8,9,9,12 -12.93 20.00	4.20 4.30 4.50-14.95 4.50-14.95	D17 D18	13.30	моіѕ	14.20m, rose to 8.10m in 20 mins.	-7.13	14.20	Medium dense, grey mottled white and black, clayey, slightly gravelly, fine to coarse SAND, with quartz, mudstone and shell fragments. Gravel is fine to coarse, subrounded			3 - 3 - 3 - 3 - 5 - 5 - 5 - 5 - 5 - 5 -
3.45-18.60 D22 3.80 D23 9.05-19.50 SPT N=31 D24  18.70 10.30 3,4/5,7,8,11 9.05-19.50 SPT N=38 18.70 12.70 4,6/8,9,9,12  17.85 7.75 86 blows  (0.80)  18.60 Very weak, orange red, highly weathered MUDSTONE (Mercia Mudstone)  (1.40)  (1.40)  (0.80)  (1.40)	5.55-16.00 5.55-16.00		15.30		1,2/3,4,5,8		(3.60)			3 4 5 5 6 5 6 5 6 5 6 5 6 5 6 5 6 6 6 6 6	\$ \frac{1}{2} \text{\$ \text{\$ \frac{1}{2} \tex
3.45-18.60 D22 3.80 D23 9.05-19.50 SPT N=31 D24  18.70 10.30 3,4/5,7,8,11 9.05-19.50 SPT N=38 18.70 12.70 4,6/8,9,9,12  17.85 7.75 86 blows  (0.80)  18.60 Very weak, orange red, highly weathered MUDSTONE (Mercia Mudstone)  (1.40)  (1.40)  (0.80)  (1.40)	6.60-17.10	B9								25 20 20 20 20 20 20 20 20 20 20 20 20 20	A CHARLES OF THE PARTY OF THE P
3.45-18.60 D22 3.80 D23 9.05-19.50 SPT N=31 D24  18.70 10.30 3,4/5,7,8,11 9.05-19.50 SPT N=38 18.70 12.70 4,6/8,9,9,12  17.85 7.75 86 blows  (0.80)  18.60 Very weak, orange red, highly weathered MUDSTONE (Mercia Mudstone)  (1.40)  (1.40)  (0.80)  (1.40)	7.10-17.55 7.10-17.55 7.10-17.80	D20	16.90		1/2,3,2,5					10000000000000000000000000000000000000	
9.80-20.00 D25 0.00-20.45 SPT N=38 18.70 12.70 4,6/8,9,9,12 -12.93 20.00	7.90 8.00-18.45		17.85	7.75		-10.73	17.80	Stiff, grey and brown, sandy, peaty CLAY. Sand is fine to coarse	* AVE	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	S. 200
9.80-20.00 D25 0.00-20.45 SPT N=38 18.70 12.70 4,6/8,9,9,12 -12.93 20.00	8.45-18.60	D22	]	Andrew to		44.50	10.00	Vancuus arongs and highly use the sel	. * 	8 5 6 6 6 5 6 5 6 5 6 5 6 5 6 5 6 5 6 5	
9.80-20.00 D25 0.00-20.45 SPT N=38 18.70 12.70 4,6/8,9,9,12 -12.93 20.00	8.80					-11.00	10.00	MUDSTONE (Mercia Mudstone)			
9.80-20.45 SPT N=38 18.70 12.70 4,6/8,9,9,12 -12.93 20.00	9.05-19.50 9.05-19.50		18.70	10.30	3,4/5,7,8,11						
	9.80-20.00 0.00 <b>-</b> 20.45		18.70	12.70	4,6/8,9,9,12	-12.93	20.00				<del></del>
									1:50	SS	s

Internal Distriction   Type   Distriction	Boreho Number BH43				∋ 2	ted Phase	linc Limit	Site Britannia 2			1		R M E I		A S S		£
1	Job Number 2780				imited	pments L	n Develo		- 1		ហផា	sions nat Diameter of Tube [A] = 5 neter of Filter Zone = 150 mn	Dimens Interr Diam		Type Ilation	ation <sup>*</sup> Instal	Install Single
Date   Time   Sheft   Casing   Inflow Rate   Readings   Smin   10 min   15 min   20 min   13 min   20 min   2	Sheet 1/1					ited	roup Lim	-			ļ		İ				
Date   Time   Spenth   Casing   Instrument Groundwater Observations   Remarks			-	g Drilling	es During	ter Strike	oundwa	G	- 1			Description	Depth (m)	Level (mOD)	Instr (A)	Water	egend
13/12/04	Depti Seale (m)					w Rate	Inflo	Casing Depth	Depth Struck	Time	Date						
Bentonite Seal    Start of Shift	i (m)	<del> </del>			<del> </del>						13/12/04			-			<u></u>
Bentonite Seal    Start of Shift   End of Shift															A PARTICIPATION OF THE PARTICI		
Bentonite Seal    Date   Time   Depth   Casing   Water   City   C			illing	Ouring Dr	vations [	er Obser	undwat	Gro									
Time   Höle   Geriff   Depth   Time   Höle   Geriff   Depth   Time   Höle   Time   Höle   Depth   Time   Höle   Depth   Time   Höle   Depth   Time   Höle   Time   Höle   Depth   Time   Höle   Depth   Time   Höle   Ti											Data			:			<u> </u>
Instrument Groundwater Observations  Inst. [A] Type: Slotted Standpipe  Instrument [A]  Remarks  Time Depth Level (mOD)  Slotted Standpipe  3.13.50  Gravel Filter  Slotted Standpipe	Water Level (mOD	Water Depth (m)	Casing Depth (m)	Depth Hole (m)	Time	Water Level (mOD)	Water Depth (m)	Casing Depth (m)	Depth Hole (m)	Time	Date						
Inst. [A] Type : Slotted Standpipe  Instrument [A]  Date Time Depth Level (m)  Remarks  A13.30  Gravel Filter  Slotted Standpipe  1.3.30  Slotted Standpipe  3.3.40  Slotted Standpipe		!										Bentonite Seal					
Inst. [A] Type : Slotted Standpipe  Instrument [A]  Date Time Depth (m)  Remarks  Remarks  Slotted Standpipe  Instrument [A]  Remarks  Slotted Standpipe  1.3.30  Gravel Filter  Slotted Standpipe									:							<b>Z</b> 1	
Inst. [A] Type : Slotted Standpipe  Instrument [A]  Date Time Depth (m)  Remarks  Remarks  Slotted Standpipe  Instrument [A]  Remarks  Slotted Standpipe  1.3.30  Gravel Filter  Slotted Standpipe			A. C.	vations	er Obser	oundwat	nent Gr	instru									×
Date   Date   Date   Time   Depth   Level (m)D   Remarks   Date   Time   Depth (m)D   Depth (m						·			Slotted	Al Tyne	Inst. [						. × × × × × × × × × × × × × × × × × × ×
-6.23 13.30 Gravel Filter  -6.23 13.60 Slotted Standpipe  Slotted Standpipe  -11.53 18.60				······································		· · · · · · · · · · · · · · · · · · ·											× × × × × × × × × × × × × × × × × × ×
-6.53 13.60 Slotted Standpipe  -11.53 18.60			rks	Rema				Level (mOD)	Depth (m)	Time	Date						الايب : . مالايب : . الايب :
-11.53 18.60		1										Gravel Filter	13.30 13.60	-6.23 -6.53	201 6 80 201	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
-11.53 18.60															22,565 - 12,565 - 12,565 25,565 - 12,565 - 12,565 5,565	Z1 8	
												Slotted Standpipe			100 200 0 000 0 000 0 000 0 000 0 000 0 000 0	2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
												ś			20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0400 000 000 000 000 000 000 000 000 00	
Bentonite Sea!											anna agus agus agus agus agus agus agus agu		18.60	-11.53	200 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	100 00 00 00 00 00 00 00 00 00 00 00 00	/a
												Bentonite Seal		10.00			
-12.93 20.00 emarks						74·1							20.00	<u> l</u>		<u> </u>	emark
Sas valve and cover fitted.														fitted.	d cover	ve and	3as va

Boring I	ASSOC  Method  ercussion		meter	m cas	ed to 18.60m	Ground		evel (mOE	D) C			<u> </u>	B	
		Loc	ation				6.6	63		St Modwen Developments Limited			ì	<b>mbe</b> i 2780
				5 E 1	79407.4 N	Dates 0 1	9/12 0/12	2/2004- 2/2004	i	ngineer falcrow Group Limited			She	et
Depth (m)	Sample / Tes	cas Sts Dep (m	ing Worth De	ater epth m)	Field Records	Level (mOD)	\	Depth (m) hickness		Description		egend	##	Instr
						6.47	E		M	IADE GROUND: Red tiles		××××	5	<del></del> .
0.20-0.45 0.45-0.90	f - ·					6,47 6.43 6.18		0.16 0.20 (0.04)	M	ADE GROUND: Concrete	ck X		-	
0.90-1.20	B3							0.45 (0.25) (0.45)	ت ا	ADE GROUND: Black, sandy gravel, with bri procrete, ash and slag inclusions. Sand is fine parse, gravel is fine to coarse, angular	188			
1.20-1.65	U1				74 blows	5.73		. `0,90	sa co	ADE GROUND: Firm, dark brown mottled bla indy, gravelly clay, with inclusions of brick, ncrete, ash and slag. Sand is fine to coarse, avel is fine to coarse, angular	ick,	***		
1.65-1.80	D1				14 DIOWS			i	Ve	avel is fine to coarse, angular ery soft, grey mottled brown, slightly sandy AY. Sand is fine				
1.90 2.05-2.50	D2 SPT N=1	1.80	1	ois	/ 1				CL	AY. Sand is fine	1.			
.05-2,50 .05-3.00	D3 B4	1.00		013	/, l						: ·			
							<u>-</u>	(3.10)						
.00-3.45	U2	2.70			7 blows									
45-3.60	D4						_							
							-							
10-4.55 10-4.55	SPT N=0 D5	3.85	МО	ıs† /		2.63	<u>-</u>  :	4.00	Very	v soft, grey mottled black, peaty CLAY, with asional peat bands	: <del>: :</del> 			
0-5.05	85						<b>-</b>		UCC	asional peat bands	××	-X/-		
05-5.50	110										× ×	-Al/e		
13-5,50	U3 .	4.70		9	biows		_				×	-34/2		
50-5.65	D6						-				× —	2016. 2016.		
o i	D7						_				×	يلاد × ملاد		
0-6.85 0-6.85	SPT N=0	5.80	MOIS	ST /							×	ь <u>х</u> ×		
ļ	D8										×	NA.		
D-8.10	B6						-				×	Ma In ×		
						tutul.					×	₩. ₩.		
											×	Ma M		
-8.55	U4	7.80		8 bi	ows	TITITE					×	14		
-8.70	D9				ś						× 2/1/2×	W .		
	D.(0		ļ								×			
}	D10					THE					×			
	SPT N=3 D11	9.30	MOIST	` /1,,1	.1	الماييات المرايد					x All			
arks	. 0.00					<u>E</u> _					X X Nh. x			
aung from	0.20m to 1.20m fo	r 1 hour.									Scale approx)	Logg	ed	
											1:50	SS	<u>.                                    </u>	
	·····										Figure N	o. BH44		

	IAN FAR ASSOCIA			\			, 1.	Site  Britannia Zinc Limited Phase 2		Borehole Number BH44
Boring Meth Cable Percu		Diamete 15		sed to 18.60m	Ground	6.63	el (mOD)	Client St Modwen Developments Limited		Job Number 2780
		Locatio		79407.4 N		9/12/2 0/12/2	2004- 2004	Engineer Halcrow Group Limited	,	Sheet 2/2
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	(Th	Depth (m) ickness)	Description	Legen	instr Instr
10.00-11.05	B7					_ հանանական,	(7.30)	Very soft, grey mottled black CLAY, with inclusions of peat and wood fragments	x	100 100 100 100 100 100 100 100 100 100
11.05-11.50	U5	10.70		15 blows	4.07	اعلىاماماما	44.00		*	20 20 20 20 20 20 20 20 20 20 20 20 20 2
11.50-11.65	D12				-4.67		11.30	Soft, grey, sandy CLAY. Sand is fine to medium, i occasional bands	n ::	2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -
12.05	D13						(1.40)			6 - 0 (6) 6
12.65-13.10 12.65-13.10	SPT N=7 D14	12.40	MOIS	T 1/1,2,2,2	-6.07	التلتلتك	12.70	Loose, grey speckled brown, clayey, fine to coars SAND, with quartz, mudstone lithorelicts and shel	e	100 100 100 100 100 100 100 100 100 100
13.10 13.10-14.00 *	W1 B8	12.40 12.45	7.10 7.10	Water strike(1) at 13.10m, rose to 7.10m in 20 mins.				fragments  Below 13.10m: Grey speckled black and white, with inclusions of peat and no mudstone lithorelicts		V1
14.00-14.45 14.00-14.45	SPT N=14 D15			1,2/3,2,4,5			1	Below 14.00m: Medium dense		200 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
14.50-15,10	89	14.25								19 0 1 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
15.60-16.05 15.60-16.05 16.05-17.05	SPT N=15 D16 B10	15.70		1/3,3,4,5			(5.40)			
17.05-17.50 17.05-17.50 17.05-18.10	SPT N=25 D17 B11			2,3/3,6,7,9						
18.20 18.30-18.75 18.30-18.75	D18 SPT N=34 D19	18.15	9.20	3,5/6,9,8,11			18.10 (0.30) 18.40	Firm, grey mottled light grey CLAY, with occasional peat Very weak, red brown mottled grey, highly weathered MUDSTONE (Mercia Mudstone)		400 A
19.00	D20						(1.60)			
19.50-19.95 19.50-19.95	SPT N=43 D21	49.00	40.05	4,5/7,9,11,16		<u>-</u>	00.00			
20.00 Remarks	D22	18.60	13.25	1	-13.37		20.00		Scale	Longed
Water added f	from 13.10m to 18.4	0m.							Scale (approx)	Logged By
									1:50 Figure N	SS o.
										.BH44

				RMEI					Site	7: I :I						Borehole Number
(a-4-1)			O C I	ATES					Britannia i	ZINC LIMII	ted Phase	= 2				BH44
	ation Tyr Installati			Dimens Intern Diame	ions al Diameter of Tube [A] = : eter of Filter Zone = 150 m	50 mm m			Client St Modwe	n Develo	pments L	imited				Job Number 2780
				Location	1	Ground	Level (m	10D) E	Engineer							Sheet
				35217	75 E 179407.4 N		3.63		Halcrow G	Broup Lim	ited					771
Legend	Mater (A	tr )	Level (mOD)	Depth (m)	Description				G	roundwa	iter Strik	es Durin	g Drilling	l		
	<u> </u>		6.43	0.20	Concrete	Date	Time	Depth Struck (m)	Casing Depth (m)	Inflo	w Rate		T	lings		Depth Sealed (m)
								<del> </del>				5 min	10 min			(m)
						09/12/04		13.10	12.40			7.90	7.60	7.25	7.10	
××									Gr	oundwat	er Obser	vations	During D	rilling		
×	again paragraphic				Bentonite Seal				Start of S	hift	-			End of Sh	ift	
×						Date	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
.WW.		İ						(m)	(m)	(m)	(mOD)		(m)	(m)	(m)	(mOD)
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×			-3.37	10.00					Instru	ment Gr	oundwat	er Obse	vations			
*			-3.31	10.00		Inst f	Al Timo	Slotted	Standpipe	<del></del>						
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×	100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0					D-4-	ins	trument	Aj				Rema	arks		
	00 C C C C C C C C C C C C C C C C C C	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				Date	Time	Depth (m)	Level (mOD)				1101111			
										······································				<u>.</u>		
. <del></del>	Z1				Slotted Standpipe											
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		2000 2000 2000 2000 2000 2000 2000 200														
	200 C				€											
			-11.37	18.00												
	***************************************				Bentonite Seal											
			-13.37	20.00												
Remarks			fitted	1										,		
Geo-so	ve and co ck fitted.	uver 1	iciGU.													

	IAN FAR ASSOCIA					Site  Britannia Zinc Limited Phase 2		1	Number
Excavation Drive-in Win		Dimension 90mm 80mm	n to 2.00m n to 4.00m n to 5.00m	Ground	Level (mOD) 6.48	Client St Modwen Developments Limited		  - 	WS44
		Location	85.1 E 179383.1 N	Dates 08	1/12/2004	Engineer Halcrow Group Limited	***************************************	25	Sheet 1/1
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legeno	Water	Instr
0.50	D1			6.18	(0.30)	MADE GROUND: Concrete  MADE GROUND: Dense, black, sandy, clayey gravel. Sand is fine to coarse, gravel is fine to coarse, angular, of slag, concrete, metal and brice	****		100 mg/m/m/m/m/m/m/m/m/m/m/m/m/m/m/m/m/m/m/
				5.38	1.10	MADE GROUND: Stiff, brown mottled black, sandy, gravelly clay, with occasional cobbles and inclusions of slag, brick, concrete and chalk. San is fine to coarse, gravel is fine to coarse, angular	d		
ч				4.78	1.70	Stiff to very stiff, brown mottled grey CLAY		!	To the second se
2,50	D2				(1.70)	Below 2.50m: Grey mottled brown			
				3.08	- 3.40	Soft to firm, grey mottled black, peaty CLAY			
			ş.	4.40	(1.60)		x alla x		
Remarks lo groundwate	er encountered.			1.48	5.00		Scale (approx)	Los By	gged
							1:25 Figure No. 2780.V		SS

IAN FARMER ASSOCIATES					Site  Britannia Zinc Limited Phase 2	Number WS45	
Excavation Method Drive-in Window Sampler	Dimensions 90mm to 0.70m  Location 352170.7 E 179357.3 N		Ground	Level (mOD) 6.68	Client St Modwen Developments Limited	Job Number 2780 Sheet	
			Dates 08	/12/2004	Engineer  Halcrow Group Limited		
Depth (m) Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	
(III) Sample / rests			6.38 6.18 5.98	(0.30) - 0.30 - (0.20) - (0.20) - 0.70 - (0.20)	MADE GROUND: Light brown, clayey, sandy gravel, with inclusions of concrete. Sand is fine to coarse, gravel is fine to coarse, angular  Firm to stiff, light brown grey mottled, gravelly clay, with inclusions of brick, concrete and slag. Gravel is fine to coarse, angular  Complete at 0.70m	Legend 1	
Remarks No groundwater encountered. Window sampler refused at 0.70m.						Logged By SS o. WS45	

IAN FARMER ASSOCIATES					Site  Britannia Zinc Limited Phase 2	Number		
Excavation Method Drive-in Window Sampler		Dimensions 90mm to 0.70m  Location 352155.4 E 179375 N		Ground	Level (mOD) 6.94		Job Number 2780	
				Dates 08	3/12/2004	Engineer Halcrow Group Limited		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	
0.50	D1		£	6.74	(0.20) - (0.30) - (0.30) - (0.20) - (0.20) - (0.70) - (0.20)	MADE GROUND: Firm, blue grey mottled black, sandy, gravelly clay, with inclusions of slag and ash. Sand is fine to coarse, gravel is fine to coarse, angular  MADE GROUND: Dense, brown mottled orange, sandy gravel, with inclusions of brick, concrete and slag. Sand is fine to coarse, gravel is fine to coarse, angular  Complete at 0.70m		
o groundwate indow sampl	er encountered. er refused at 0.70m.					Scale (approx)	Logged By	
						Figure No. 2780.W		

IAN FARMER ASSOCIATES					Site  Britannia Zinc Limited Phase 2	Number WS47		
Excavation Method Drive-in Window Sampler		Dimensions 90mm to 1.00m  Location 352176.3 E 179379.8 N		Ground	Level (mOD) 6.25	Client St Modwen Developments Limited		er
				Dates 08/12/2004		Engineer Halcrow Group Limited		1
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Mater
					(0.50)	MADE GROUND: Dense, black, clayey, sandy gravel, with inclusions of slag, brick and concrete. Sand is fine to coarse, gravel is fine to coarse, angular		XXXXXXXXXXXXX
0.50	D1			5.75	0.50 - - - - (0.50)	MADE GROUND: Dense, dark brown mottled red and black, sandy gravel, with cobbles and inclusions of brick, concrete and slag. Sand is fine to coarse, gravel is fine to coarse, angular		XXXXXXXXXXXXX
				5.25	1.00	Complete at 1.00m		
ч		to the control of the		The Control of Control				
					-			
	·				- - - - - - - -			
	#11 <del>**</del>				-			
Remarks No groundwater encountered. Window sampler refused at 1,00m on brick and reinforced concrete rubble.					Scale (approx		d	
			•			1:25 Figure 278	SS No. 30.WS47	

F	IAN FAR ASSOCIA	MER TES				Site  Britannia Zinc Limited Phase 2	Number WS59
Excavation Drive-in Win	Method dow Sampler	Dimension 90mm	s to 0.70m	Ground	Level (mOD) 6.31	Client St Modwen Developments Limited	Job Number 2780
		Location 35223	1.8 E 179362.2 N	Dates 08	3/12/2004	Engineer Halcrow Group Limited	Short
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend
0.50	D1			5.81	(0.20) - (0.30) - (0.30) - (0.20) - (0.20) - (0.70)	MADE GROUND: Firm, blue grey mottled black, sandy, gravelly clay, with inclusions of slag and ash. Sand is fine to coarse, gravel is fine to coarse, angular  MADE GROUND: Dense, brown mottled orange, sandy gravel, with inclusions of brick, concrete and slag. Sand is fine to coarse, gravel is fine to coarse, angular  Complete at 0.70m	
Remarks o groundwate 'indow sampl	er encountered. er refused at 0.70m.					Scale (approx)	Logged By
						1:25	SS
						Figure No. 2780.	

#### **BOREHOLE LOG**



CLIENT

HYDER CONSULTING LTD

SITE

BRITANNIA ZINC, AVONMOUTH

Sheet

Start Date 21st September 2001

Scale

1:25

End Date 21st September 2001

Depth

1.20 m

progress date/time	sample no &	depth (m)	casing	SPT type &	test	instru -ment	description	depth (m)	reduced	legend
water depth		from to	(m)	N value	range	-1118111	age an phon	\$1117	(m)	
21/09/01	1D	0.20 -					MADE GROUND: Red brown black sand with fine to coarse gravel and fragments of brick, ash and clinker.		The state of the s	
Dry	2D	0.70 -					MADE GROUND: Black sand and gravel with soft gey clay.	0.75		
			-	PAN NA NIPONINOPONI	1000	XXX	Borehole refused at 1.20m	1.20		XXXX
								4.00		

EQUIPMENT: Competitor 130 rig.

METHOD: Continuous disturbed sampling 0.00-1.20m.

BACKFILL: On completion, hole backfilled with local materials.

water depth of strike (m) casing (m) rose to (rn)

time to rise (min)

remarks

Groundwater not encountered

CONTRACT 12784

CHECKED

#### **BOREHOLE LOG**



CLIENT

HYDER CONSULTING LTD

SITE

BRITANNIA ZINC, AVONMOUTH

Start Date 20th September 2001

End Date 20th September 2001

Sheet

1 of 1

Scale

1:25

Depth 2.00 m

progress date/time water depth	sample no &	190		type &	test /core	instru -ment		depth (m)	reduced level	legend
	no &	0.50 -	to		/core	-ment	description	0.70 . 1.10 . 1.25	reduced level (m)	legend X
EQUIPMENT:	Compe	titor 120	ria					4.00]		

METHOD: Continuous disturbed sampling 0.00-2.00m.

BACKFILL: On completion, a slotted standpipe was installed to 2.00m, granular response zone 2.00-0,40m, bentonite seal 0.40-0.10m, concrete and raised helmet cover 0.10-0.00m.

water depth of strike (m) casing (m)

rose to (m)

time to rise (min) remarks

Groundwater not encountered

CONTRACT

12784

#### **BOREHOLE LOG**



CLIENT

HYDER CONSULTING LTD

SITE

BRITANNIA ZINC, AVONMOUTH

Start Date 20th September 2001

End Date 20th September 2001

Sheet

1 of 1

Scale

1:25

Depth 2.00 m

progress date/time /ater depth	sample no & type	depth	(m)	casing depth (m)	SPT type & N value	test /core	instru -ment	description	depth (m)	reduced leg
20/09/01	1D	0.50 ~		(10)	iv value	range		MADE GROUND: Black brown red mottled sand with fine to coarse gravel and fragments of brick, ash and clinker and occasional cobbles of sandstone.	7	(m)
				-	10 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	VV		MADE GROUND: Soft grey brown silt:clay.  MADE GROUND: Black brown clayey sand with	0.85	
The state of the s	<b>2</b> D	1.30-	- constant and a second	**************************************	Section of the sectio		1:14:1	medium to coarse angular gravel and ash.  Soft to firm brown SILT:CLAY.	1.20	X 
гу					The state of the s			Borehole completed at 2.00m	2.00	*
				The state of the s		- Proposition			1	7117
V 2004	or some time to the source of									
					A CONTRACTOR OF THE CONTRACTOR				1	
					TO OPERATE AND A PARTY OF THE P	WALL PRODUCTION			1	
UIPMENT:	Come	.i	F						4.00)	

METHOD: Continuous disturbed sampling 0.00-2.00m.

BACKFILL: On completion, a slotted standpipe was installed to 2.00m, granular response zone 2.00-0.40m, bentonite seal 0.40-0.10m, concrete and raised helmet cover 0.10-0.00m.

depth of strike (m) casing (m) rose to (m)

time to rise (min)

Groundwater not encountered

CONTRACT 12784

#### **BOREHOLE LOG**



HYDER CONSULTING LTD

SITE

BRITANNIA ZINC, AVONMOUTH

Start Date 26th September 2001

End Date 26th September 2001



Sheet

1 of 3

Scale

1:50

Depth 18.70 m

progress date/time /ater depth	sample no & type	depti from	to	casing depth (m)	1		ins -me	tru ent	description	depth (m)	reduced level	leger
26/09/01	Activity was not assessed to be a second			E					MADE GROUND: Brown red coarse sand with some fine angular gravel and some cobbles of crushed	-	, (m)	
	1 D	0.45 -	- 0.50						brick and concrete.	1		
	2D	0.95 -	1.00						•			$\overset{\diamond\diamond}{>}$
	3D	1.45 -	1.50	-						1.70	ķ ķ	X
	4D	1.95 -	2.00	-				!	MADE GROUND: Soft red grey brown silt:clay with some fine to medium subangular to subrounded gravel of sandstone, with some black staining.			
, was	5D	2.45 -	2.50			-						$\overset{\times}{\times}$
- The second sec	6D	2.95 -	3.00	-   -   -					Soft grey brown SILT:CLAY.	2.90		$\underset{\tilde{\mathbf{x}}}{\bigotimes}$
The state of the s	7D	3.45 -	3.50								×	×
	80	3.95-	4.00	-							*	× ,
The state of the s	9D	4.45 -	4.50			111111111111111111111111111111111111111				1	×	× × × × × ×
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- P - NO.			<u> </u>							7 1-1 7	× →	<del>- *</del>
										]	× ×	×
JIPMENT:	Pilcon 1	50 cabl	e nerci	ission d		<u> </u>		(	Continued Next Page	8.007		

IPMENT: Pilcon 150 cable percussion rig.

METHOD: Cable percussion (150mm) 0.00m-18.70m.

BACKFILL: On completion, borehole collapsed 18.70m-16.10m. Standpipe piezometer installed with geotextile filter and response zone 16.10m-9.00m. Bentonite seal placed 9.00m-0.50m. Concrete and raised heimet cover placed 0.50m-0.00m.

REMARKS:

water depth of rose to time to remarks strike (m) casing (m) CONTRACT (m)rise (min) Groundwater not encountered. 12784

#### **BOREHOLE LOG**



GW07

CLIENT

HYDER CONSULTING LTD

SITE

BRITANNIA ZINC, AVONMOUTH

Sheet

2 of 3

Start Date 26th September 2001

Scale

1:50

End Date 26th September 2001

Depth 18.70 m

progress date/time ater depth	sample no & type	depth		casing depth (m)	SPT type & N value		instri -men			depth (m)	reduced level	lege
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#### **BOREHOLE LOG**

CLIENT

HYDER CONSULTING LTD

SITE

BRITANNIA ZINC, AVONMOUTH

Start Date 26th September 2001

End Date 26th September 2001



**GW07** 

Sheet

3 of 3

Scale

1:50

Depth 18.70 m

progress date/time	sample	depth (m)	casing		test	instru			010000000000000000000000000000000000000	18.7 reduced le
ater depth	type	from to	depth (m)	type & N value	range /core	-ment	description		(m)	level (m)
Dry	23D 24D	18.25-18.30 18.45-18.50	-		101940		Brown medium to coarse SAND with sometrial.	me organic	18.30 18.40 18.70	
		orași de la constant					Firm to stiff red very sandy CLAY End of borehole at 18.70m,		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
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	J,	1198	(3 2 3 5 5 5 5 5	Ground	water	not encoun	ered.	12784	1	N.

MADE GROUND: Black sand of ash and clinker with some  0.25  MADE GROUND: Coarse angular gravel.  0.40  MADE GROUND: Black, red and brown sand and gravel of ash, clinker, brick fragments. Some large lumps of black, yellow, white and brown fused clinker and cementatous material.  0.40  Firm motited bluey grey and brown fissured CLAY.  1.20  END OF TRIAL PIT AT 1.2M.  SOIL. TP1 1.15m  Plant:  Dimensions: Bearing of Long Axis: Shored To Logged By Date: 11/10/01	Hyder	Project : BRITTANIA IPPC PHAS	ZINC LTD SE 2			Tr	ial Pr TP1	it:
0.25  MADE GROUND: Elack, red and brown sand and gravel of ash, clinker, brick fragments. Some lerge lumps of black, yellow, white and brown fused clinker and cementatous meterial.  0.90  Firm mottled bluey grey and brown fissured CLAY.  1.20  END OF TRIAL PIT AT 1.2M.  SOIL TP1 0.5m  Firm mottled bluey grey and brown fissured CLAY.  SOIL TP1 i.15m					ĺ			Depth (m)
MADE GROUND: Black, red and brown sand and gravel of seh. clinker, brick fragments. Some large lumps of black, yellow, white and brown fused clinker and cementatous  0.00  Firm mottled bluey grey and brown fissured CLAY.  1.20  END OF TEIAL PIT AT 1.2M.  SOIL TP1 1.15m  Plant:  Dimensions: Bearing of Long Axis: Shored To Logged By Date: 3CX  None  Dimensions: Bearing of Long Axis: Shored To DC 11/10/01	- 0.25	graver.		r with som	e			
Plant: Dimensions: Bearing of Long Axis: Shored To Logged by Date: 3CX  Dimensions: Bearing of Long Axis: Shored To Logged by Date: 11/10/01	0.40							
Firm mottled bluey grey and brown fissured CLAY.  1.20  END OF TRIAL PIT AT 1.2M.  SOIL TP1 1.15m  Plant:  Dimensions: Bearing of Long Axis: Shored To Logged By Date: 11/10/01		yellow, white and	CHAPIDEDIE NOTOG IGNOG IN	mann as Lin.	_ 1 _ 1	SOIL	TP1	0.5m
Plant: Dimensions: Bearing of Long Axis: Shored To Logged By Date: 3CX None DC 11/10/01	0.90	Firm mottled blue	y grey and brown fissured	CLAY.				
Plant: Dimensions: Bearing of Long Axis: Shored To: Logged By: Date: 3CX	1.20	END OF TRIAL PIT	AT 1 2M			SOIL	TP1	1.15m
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Stability :		Dimensions :	Bearing of Long Axis :		o Log			)/01
OK Groundwater : Notes :	Stability : OK		Groundwater : None Encountered		es:			



Contract:	cc 18	Rritar	mia Zin	ıc A	vonmou	ıth	Client:	Andwen	Develo	pments Limited	Boreho		ES01
Contract F		Diltai			<b>27.05.09</b>				Co-ordinates	-	Sheet:	Din	
	723	110			28.05.09							1	of <b>3</b>
Sa	amples	and In-sit	u Tests		ter III &			_			ced	Depth	Materi
Depth	No	Type	Result	S	Water Backfill & Instru-			Descri	iption of S	trata	Reduced Level	(Thick ness)	Graphi Legen
0.50	1	ES			***	of fin	e to coarse	subangular	to subround	y clayey sandy GRAVEL led brick, concrete and ash steel reinforcement bars.	-	(1.30)	
1.00-1.45 1.00	2 3	SPT(c)	N=23		Ĭ.; <u>*</u> B;						-	1.30	
1.00-1.30 1.30-1.50 1.50-2.50	4 5	B D P				Soft 1	locally close	ely fissured l	light grey m	nottled light brown CLAY.	-	-	
											-	(1.70)	
2.50	7	В									- - -	3.00	
3.00-3.50 3.00	10 9	B D				Soft 1	light bluish	grey silty Cl	LAY.		-	-	x
4.00 4.00-4.50	11 12	D B									- - - - -	(3.00)	x x x
5.00 5.00-5.50	13 14	D B									-	- - - - - - -	x
6.00 6.00-6.50	15 16	D B				Soft 1	light bluish	grey clayey	SILT.		- - - - -	6.00	× × × × ×
7.00 7.00-7.50	18 19	D B									-	- - - - -	× × × × × × × × × × × × × × × × × × ×
7.00-7.50		Б									- - - - -	- - - -	× × × × × × × × × × × × × × × × × × ×
8.00 8.00-8.50	20 21	D B									- - - - -	- - - - -	× × × × × × × × × × × × × × × × × × ×
							П				<u> </u>	-	x <u>x</u>
Date	Boring Time	Borel		ng	Borehole Diameter	Water	From	Chiselling	Duration (hh:mm)	General 1	Rema	ırks	
		Dep	oth Dep	oth	(mm)	Depth			(	Inspection pit hand dug     No water added to aid of     No groundwater encour     50mm diameter monitor installed to 1.0m depth-zone 0.50-1.00m).	lrilling. ntered. ring well	c/w flus	
F 4								D.". :		All dimensions in metres	Scale:	1:50	
Method Jsed:	Cabl	e percu	1 =	Plant Used:		ndo 1	50	Drilled By:	PO	Logged By: MChappell	Checke By:	ed	AG



120														<u> </u>		
Contract:				_				Client:		_			T.A. A. T	Boreho		
Access		Brita							Mod				Limited	GI 4	BHN	ES01
Contract Ref		110					Ground	d Level:			Co-ordinates	:		Sheet:	2	c 2
	<b>723</b> 1			End:	28.0									 	1	of 3
Sam Depth	ples a	nd In-sit	tu Tests Rest	ults	Water	Backfill & Instru-				Desc	ription of St	rata		Reduced Level	Depth (Thick ness)	Materia Graphic Legend
9.00-10.00	22	P				i B	Soft 1	light bluis	sh grey	claye	y SILT. (stra	tum text co	pied from layer	- 22	-	×—×-
							at 6.0	00m depti	h from	previo	us sheet)			-	-	× × ×
														-		× × × ×
														-	(0.20)	*
														-	[(8.30)	× × ×
														-	-	× × ×
														-	-	× - ×
11.00 11.00-11.50	24 25	D B												-	-	× × ×
11.00-11.50	23													-	-	\(\frac{1}{\times} \)
														-	-	* ^ <del>* </del>
12.00	26	D												-	-	× × ×
12.00-12.50	27	D												-	-	× × ×
														-	-	× × ×
														-	-	× × ×
13.00 13.00-13.50	28 29	D B												-	-	\ ×
							a	ıt 13.50m	locally	sandy	along thin la	aminations.		-	-	× ^ × :
									,	,	8			-	-	* × × ;
														-	14.30	× × ×
14.30 14.30-14.50	30 31	D B					Medi	um dense	e light g	grey br	own medium	to fine SA	ND.	-	-	
														-	-	
15.00-15.45	32	SPT	N=	17										-	-	
														-	[	
15.50 15.50-16.00	33 34	D B												-	[	
16.00-16.45	35	SPT	N=	15										[ -	(3.60)	
16.00 16.00-16.50	36 37	D B	11	15										-		
10.00 10.50	37	Б												-	[	
														-	-	
17.00 17.00-17.50	39 40	D B												E	E	
														-	[	
														-	17.90	
В	oring	Progress	s and Wa	ter Ob	servati	ons			Cl	hisellin	g		- 11	<u> </u>	1	11, 11,
	Time	Bore	hole Ca	asing	Borel Diam	nole	Water	From		То	Duration		General 1	Rema	arks	
		Dep	oth D	epth	(mn	n)	Depth				(hh:mm)					
												All dimer	nsions in metres	Scale:	1:50	)
Method Used:	a 1. 1			Plan		T.		<b>5</b> 0	Dri By		DO.	Logged		Checke		AGS
Oseu.	able	percu	ssion	Usec	d.	Da	ndo 1	50	By:		PO	By:	<b>MChappell</b>	By:		AUE



0													
Contract:	10	D:4		7:	<b>A</b>	41-	Client:	Maderia	n Davida		Boreho		IECO1
Contract R		, Brita	annıa		Avonmo 27.05.09			woawe	Co-ordinate	pments Limited	Sheet:	BHN	ES01
Contract R		110		End:	27.05.09		id Level.		Co-ordinates	S. 	Sheet.	3	of <b>3</b>
			· . T.								 		1
Depth	Mo	and In-s	-	Results	Water Backfill & Instru-	entatio		Des	cription of S	trata	Reduced Level	Depth (Thick ness)	
- 17.90	41	D		- Courts	Ba	¬ Firn	n dark brov	vn fibrous F	PEAT. (stratu	m text copied from layer at [	2	18.10	11/ 11/ \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
18.10-18.5	0   42	В				\17.9 Stif	<i>00m depth j</i> f_red_mottl	<i>from previo</i> led grev C	us sheet) LAY with ra	are fine to medium gravel	Ē	18.50	===
18.50-19.0	0   43	В				size	d pockets o	of firm fibro ed grey CL	ous peat.	are fine to medium gravel		_	
- - 19.00-19.4	5 44	SPT(c		N=34		Tiar	a rea mour	cu gicy CL			_	-	
-											- - -	(1.50)	
-											-	-	
20.00	M 45	ш ъ	<u> </u>								-	20.00	
20.00	5 46	D SPT(c		N=50	]						Ē	-	
-											Ē	F	
-											-	-	
											E	E	
-											E	-	
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											Ē	<u> </u>	
		Rot	ess and rehole	Water Ob Casing	Borehole	Water	_	Chiselli	ng Duration	General 1	Rema	arks	
Date	Time	<u> </u>	epth	Depth	Diameter (mm)	Depth	Hron	n To	(hh:mm)				
										All dimonsisses is an a	Ca-1.	1 =	`
Method				Plan	t			Drilled		All dimensions in metres  Logged	Scale: Checke	1:50 ed	
1	Cabl	le perc	ussio			ando 1	150	By:	PO	By: MChappell	By:		AGS



Acces	s 18,	Britar	nnia Z	Zinc,	Avon	mou	ıth	St. N	Iodwe	n Develoj	oments Limited		BHN	ES(
Contract Re	ef:			Start:	27.0	5.09	Ground	l Level:		Co-ordinates	:	Sheet:		
	723	110		End:	28.0	5.09							1	of a
	-	and In-sit		1.	Water	Backfill			Desc	cription of St	rata	Reduced Level	Depth (Thick	Mat Graj
Depth	No	Туре	Res	sults		Ba	7.5	n cnc-		•		Rec	ness)	Leg
0.30 0.50	1 2	D ES					sandy	GRAVEL with frequer	of fine to	coarse angul	ish brown slightly clayey ar to subangular brick and 5mm) and rare polythene	- - - - - - - -	(1.50)	
1.20-1.65	3	SPT	N	=4								- - - -	1.50	
							Firm	locally close	ely fissure	ed brown mott	led grey CLAY.	- - -		
2.00-2.50	4	В										-	-	<u> </u>
												-	-	
2.75	22	117										-	-	
3.00	23	W D			1							-	(3.00)	
5.00					<u>∓</u> <u>∓</u>							F	Ė	
3.50-4.50	6	P			<u>=</u>							-	E	
												-	-	=
-												-	-	
												-	4.50	
							Soft 1	ight bluish į	grey claye	y SILT.		_		~ ×
_												_	-	× ×
												-	-	××
5.50		3.7		00								-	-	* <del>-×</del>
5.50 5.50		V	c <sub>u</sub> =	=90 =60										
6.00-6.50	8	В										-	-	×
0.00 0.50												-	-	×
												-	-	×_×
														× _×
-												-	-	× <del>×</del>
												-	-	× _×
7.50	9	D											-	×_×
_												_	-	× ×
												-	-	$\times \frac{\times}{\times}$
9.50	11									0.50	a.	Ė	(8.00)	×
8.50	11	D					b	ecoming ve	ry soft fro	om 8.50m dep	tn.	-	Ē	×
	<u>.</u>	<u> </u>			<u> </u>			П	GI: 1::				<u>t                                      </u>	×
Date	Boring Time	Progress Borel		ater Ob Casing	servati Borel Diam	nole	Water	From	Chisellin	Duration	General 1	Rema	arks	
Date	ıme	Dep	oth I	Depth	(mr		Depth	FIOM	10	(hh:mm)	Inspection pit hand dug     Groundwater encounter     to 3.20m depth after 20     No water added to aid of	ed at 3.5 minutes	0m dept	h, risi
)				ъ,		)·1	***		D :		All dimensions in metres	Scale:	1:50	
Method Used:	Cakl	e percu	agie	Plan Used	t I ₁·	'ilcor	1500 Way	tarer	Drilled By:	JW	Logged By: <b>MChappell</b>	Checke By:	ed	A



0														
Contract:							Client:		_			Boreho		
		Brita	nnia Z		Avonm			Mo			pments Limited		BHN	ES02
Contract Re		110			27.05.0		nd Level:		C	o-ordinates	3:	Sheet:	2	
	723			End:	28.05.0	_						 	1	of 3
	-	and In-si			Water				Descri	ption of S	trata	Reduced Level	Depth (Thick	Material Graphic
Depth	No	- 1	Res	sults	<b> </b>		1.1.11	1		_		Rec	ness)	Legend
9.00-9.50	12	В				at 4	t light blui '.50m dept	sh gre th fron	ey clayey i n <i>previou</i> .	SIL1. (stra s sheet)	tum text copied from layer		-	× × × =
												- - -	-	×_×_×
-												Ė	Ė	× × ×
-												-	-	<del>*</del> * *
-												-	-	x x x x
10.50-11.50	13	P										-	-	$\times \times $
												_	-	× - × -
_												-	-	× × × ×
-												-	-	× × ×
[												-	-	* * * *
-												-	-	× × ×
Ē												-	12.50	× × ×
12.50-12.95 12.50	14	$\mathop{SPT_{(NR)}}_{D}$	N	I=5		Med	dium dens	e light	t greyish b	prown fine	to coarse SAND.		- 12.30	
-												-	-	
13.00-14.00	17	В										-	-	
[ - 13.50-13.95	16	SPT	NI-	=11								-	-	
13.30-13.93	10	SPI	IN-	-11								-	-	
_												-	-	
Ė												-	-	
14.50-14.95	18	SPT	N	<b>[=9</b>								-	-	
[												-	[(5.00)]	
[												-		
15.50-15.95 15.50	19 20	SPT D	N=	=12								-	-	
- -												-	-	
-												-	-	
[ - 16.50-16.95		SPT	N=	=18									-	
16.50-17.50	22	В											-	
E												-	-	
-												-	17.50	
17.50-17.95	24	SPT	N=	=18		Stif	f brownish kets of fib	h grey	y silty C	LAY with	rare medium gravel size	-	17.80	× ×
						poc	KCIS OI IIU	rous p	Cat.		/	-	-	
]	Boring				servations			(	Chiselling		General 1	Rema	arke	
Date	Time	Bore De		Casing Depth	Borehole Diameter (mm)	Water Deptl	II Hro	m	То	Duration (hh:mm)	General	CIIIC	ıı KS	
		Dej	5th 1	Бериг	(11111)	Бери								
											All dimensions in metres	Scale:	1:50	)
Method Used:	a. 1. 1			Plan Used	t Pilc	on Wa	yfarer	Di By	rilled	7447	Logged By: MCL	Checke		AGS
Oscu.	Cable	e percu	ssion	Used	J.	1500	1	D	у.	$\mathbf{JW}$	By: MChappell	By:		AGO



<b>7</b> 2-															. • •
Contract:								Client:		_			Boreho		
		Brita	nnia	Zinc,					M			pments Limited		BHN	IES02
Contract R		440			27.0		Groun	d Level:		C	Co-ordinates	5:	Sheet:		
	723	110		End:	28.0	5.09								3	of <b>3</b>
Sa	mples	and In-s	itu Te	sts	Water	Backfill				Descri	iption of S	trata	Reduced Level	Depth (Thick	Material Graphic
Depth	No	Type	I	Results	M.	Вас					_		Red	ness)	Legend
18.30	25	D					nock	rets of fir	m f	ttled grey ibrous pea <i>n previous</i> 18.30m de	t (stratum	h rare medium gravel size text copied from layer a	;	(2.20)	
	5 26	SPT		N=33									-		
- - 19.80	27	D											-	20.00	
20.00-20.4	4 1 28	SPT		N=53*						red at 20.00					
	Boring	g Progre	ss and	Water Ob	servati	ons				Chiselling	;		D	1	
Date	Time	Bor	ehole epth	Casing Depth	Borel Diam (mr	nole eter	Water Depth		n	То	Duration (hh:mm)	General	Rema	arks	
												All dimensions in metres	Scale:	1:50	
Method Used:				Plan Used	t F	Pilcor	1 Way	farer	J	Drilled By:	7447	Logged By: MCL	Check		AGS
Oseu.	<u>Cabl</u>	e perc	ussio	$\mathbf{n} \mid^{\cup \text{sec}}$	d.		<u>1500</u>			υy.	JW	By: MChappel	By:		AUS



7														
Contract:	:							Client:				Boreho		
Acce	ess 1	18, I	Britan	nia Zinc	, Avo	nmo	outh	St. I	Modwen	Develo	pments Limited		BHN	ES03
Contract	Ref:			Star	rt: 20	.05.0	<b>9</b> Grou	nd Level:	(	Co-ordinates	S:	Sheet:		
	7	231	10			.05.0							1	of <b>3</b>
				Enc	ı. <b>21</b>		_				<b></b>	<u> </u>	1	I
5	Samp	oles ar	nd In-situ	ı Tests	1	Backfill &	trion		-			Reduced Level	Depth	Material
Depth	1	No	Туре	Results	Water	ackf Inst	enta		Desci	ription of S	trata	edu Lev	(Thick ness)	Graphic Legend
- ·P			-71			- BE		DE CDOIL	ND: Dark	gray brown	and red brown silty very	<u> </u>	iicss)	XXXXX
							gra	velly SANE	) with a m	nedium cob	ble content. Gravel and	[	E	
						•••	cob	bles are ang	ular to subar	ngular concre	ete and concrete. Gravel is	E	(1.20)	
0.50-1.00	0	1 2	B ES				fine	e to coarse, in	neldues occa	isional glass	, metal, wood and ash.	_	(1.20)	$\bowtie$
0.50		2	ES				### T					-	-	
						::E	]: <u>`</u> :					-	1.20	
1.20-1.65		3	SPT	N=12			: M/	ADE GROUI	ND: Firm gr	rey, grey-bro	own and red-brown slightly bble content. Gravel and	-	1.20	
1.20-2.20	0	4	В		7	╧╠╩	gra	velly sandy	CLAY with	h a low co	bble content. Gravel and	-	Ī.,	
					1	,		obles are ang e to coarse.	gular to suba	angular bric	k and concrete. Gravel is	-	(1.00)	$\bowtie$
					₹		11110	to coarse.				-	F	
												<u> </u>	2.20	
.20-2.65	5	5	SPT	N=3			Ve	ry soft light t	orown-grey a	and light gre	y CLAY.	<u> </u>	<u> </u>	<u> </u>
2.50		6	D									-	-	<u> </u>
												ļ	(1.30)	<u> </u>
												Ė	<u> </u>	<u> </u>
												ļ.	ļ.	<u> </u>
												F	3.50	<del> </del>
5.50		8	D				Ve	ry soft dark t	olue-grey CI	LAY.		-	E	
3.50-4.00	U	9	В									_	E	<u> </u>
												_	_	<u> </u>
												-	-	
												-	-	
												-	(2.50)	
												-		
5.00		10	P									-	-	
5.00 5.00		11 12	W D			2						-	-	
7.00		12	Ь		7	<u>2</u>						E	E	
					2								[	
					Ţ							<u> </u>	6.00	
5.00-7.00	0	13	В				Sof	t closely fiss	ured blue-gr	rey CLAY.		-	-	
												-	-	
												F	F	<del> </del>
												E	E	
												ŀ	F	
												_	-	
								_				-	-	<u> </u>
								locally	slightly gra	avelly from	7.50m depth, gravel of lar cobbles/boulders/bands	-	-	
							of e	extremely we	eak to very v	veak mudsto	one.	Ė	ļ.	[ <del>-</del>
3.00		14	D					,	- · <del></del> <i>y</i> •	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		F	F	<del></del>
.00-9.00	0	15	В									F	F	<u> </u>
												E	E	===
												-	(5.50)	<u> </u>
												-	_	
	Во	ring I	Progress	and Water	Observa	ations			Chiselling	g	C 13		1	
D /			Boreh		σ Bo	rehole	Wate	r F		Duration	General 1	Kema	arks	
Date	T	ime	Dep		1 1016	nmeter mm)	Dept	II From	То	(hh:mm)	1. To an a cities with 1. 1. 1.	4- 1.00	. 1a	
0/05/09		0:00	1.9			150	1.90				1. Inspection pit hand dug 2. No water added to aid of		n aepth.	
0/05/09	10	0:20	1.9	0 -		150	1.60				3. Groundwater struck at 1		epth. risir	ng to
		2:00	6.0			150	6.00				1.60m depth after 20 m	inutes.	-	
	1 1	2:20	6.0			150 150	5.60	'			4. Groundwater struck at 6	5.00m de	epth, risir	ng to
0/05/09		/ '	1			150	4.20	,			5.60m after 20 minutes.		1 - 4 · 0	1
0/05/09 0/05/09	1	7:00 8:00	13.0	)()   13 ()(				- 11		-1	5. 50mm diameter monitor	പ്പള well	c/w flus	n cover
0/05/09 0/05/09 1/05/09	08	8:00 2:00	13.0 20.0			150	-							
20/05/09 20/05/09 20/05/09 21/05/09 21/05/09	08	8:00		00 19.50	) [	150	-		12		All dimensions in metres	Scale:	1:50	
20/05/09 20/05/09 21/05/09	0 08	8:00 2:00		00 19.50 P1		150	on Wa 1500	yfarer	Drilled By:	JW			1:50	



Contract:						Client:				OL		
	<b>18,</b> l	Britann	nia Zinc,	Avonmo			dwen	Develor	oments Limited			IES03
Contract Ref:				20.05.09				Co-ordinates		Sheet:		
7	231	10	End:	21.05.09							2	of <b>3</b>
Samp	oles ar	nd In-situ	Tests	er II &	uoi		•			el	Depth	Mater
Depth	No	Туре	Results	Water Backfill & Instru-	nental		Descri	iption of St	rata	Reduced Level	(Thick ness)	Graph Leger
•		71		<u>m</u>	Soft c	losely fissure	d blue-gr	rey CLAY.	(stratum text copied from	-	-	
					layer i	at 6.00m dep	th from pi	revious shee	et)	-	-	
9.50	16	P								-		
										E	_	
										-	-	
											-	
											-	
11.00-12.00	17	В								-	Ė	
11.00 12.00	1,	Б								-	-	
					Mediu	ım dense br	own and	grey sligh	tly silty fine to medium	-	11.50	<u> </u>
					SAND							× · ·
12.00-12.45	18	SPT	N=15							-	(1.50)	×
										-	- (1.50)	×
										-	-	î ×
12.80	19	D				cally silty fro				-	13.00	×
13.00-13.45	20	SPT	N=8		Soft b	lue-grey sligh	tly sandy	locally sand	ly SILT.	E	Ė	× ·×
										-	(1.00)	× .×.
										F	-	×××
14.00-14.45	21	SPT	N=6		Firm h	orownish grev	slightly s	sandy locall	y clayey SILT.	-	14.00	· ×· ^
						2 3	0 3		, , ,	-	-	
14.50	22	D								E	Ė	<u> </u>
										-	(2.00)	
15.00-15.45 15.00-16.00	23 24	SPT B	N=7							F	Ē` ´	
13.00 10.00	2-1	В								-		
										_	-	
16.00-16.45	25	SPT	N=6		Eima a	amar, ali alatte, a	andri CII '	T vvitla a a a	sional plant fibres.	-	16.00	x ×
10.00-10.43	23	SF I	IN-0		riiiii g	grey slightly s	andy SIL	1 with occa	sional plant hores.	-	-	× .× .
										-	(1.30)	×××
16.70	26	D								Ė	È Í	× × ×
17.00-17.45	27	SPT	N=10		ra	are fine grave	size shel	lls from 17.0	00m depth.	-	-	× · × · ×
					Firm c	dark brown fil	orous PEA	AT.		-	17.30	× · ×
	•				~					-	17.70	<u>" " " " " " " " " " " " " " " " " " " </u>
17.70	28	D			Soft li fibres	ight grey and and fine grav	light bro el size sho	own sandy S ell fragment	ILT with occasional plant	-	18.00	× ·×
Вс	ring l		nd Water Ob			11	Chiselling		General	Dame	rka	
Date 7	ime	Boreho	_	Borehole Diameter	Water	From	To	Duration (hh:mm)	- General	IXCIII	11 KS	
		Depth	n Depth	(mm)	Depth				installed to 1.50m deptl zone 0.40-1.60m depth		pletion (	respons
									2016 0.40-1.00m gepm	<i>j</i> .		
									All dimensions in metres	Scale:	1:50	<u> </u>
1			Plan		n Wayf	ш	rilled		Logged	Checke		, <u> </u>



0														
Contract:							Clier					Boreho		
		Brita	nnia Zii								pments Limited		BHN	ES03
Contract Re		110			20.05.		ound Leve	el:		Co-ordinates	3:	Sheet:	•	•
	723			ind:	21.05.		•					<u> </u>	3	of <b>3</b>
	_	and In-si			Water	Instru- mentation			Descri	iption of St	trata	Reduced Level	Depth (Thick	Material Graphic
Depth	No	Type	Resul		W Back	Ins				_		Red	ness)	Legend
18.00-18.45	29	SPT	N=25	5		8	Stiff light and shell fi	grey sl	lightly sand ts.	dy SILT w	ith occasional plant fibres	-	10.40	× ·× ·
-						7	Very stiff i	red brov	wn CLAY.			-	- 18.40 -	- <u>× ·×</u>
18.70	30	D				f	locally ibres.	y sandy	between 1	18.40 to 19.	.00m depth with rare plant	-	Ē	
_ - 19.00-19.45	31	SPT	N=40	)								_	(1.60)	
<u> </u>												-	(1.00)	
19.50	32	D										-	-	
[												-	20.00	
20.00-20.37	33	SPT	N=68	*		I	Borehole to	erminat	ted at 20.00	Om depth.		-	-	
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H	Boring	Progres	s and Wate	er Obs	servations	S			Chiselling	ţ	C - 11		1	•
Date	Time	Bore	hole Cas	sing	Borehole Diameter	e W	ater	From	То	Duration	General 1	Rema	arks	
Bute	11110	De	pth De	pth	(mm)	De	epth	10111	10	(hh:mm)				
Method				Plant	p;i.	con V	 Vayfarei	r 1	Drilled		All dimensions in metres  Logged	Scale:	1:50	
	Cable	e percu		Used	: 1110	15	vaytarei 100	•	By:	JW	By: TPayne	By:	-u	AGS



Contract:							Client:				Boreho	ole:	
Acces	s 18,	Britai	nnia Zinc,	Avon	mou	ıth	St. M	[odwer	n Develo	pments Limited		BHN	NES
Contract R						Ground			Co-ordinate:		Sheet:		
	723	110	End:	27.0								1	of
				T							<del> </del>	I	1
Depth	No	and In-sit	Results	Water	Backfill			Desc	ription of S	trata	Reduced Level	Depth (Thick ness)	
Бериі	110	Турс	Results	+	ш	MAD	E GROUN	D: Dark	grev black	k very silty very gravelly	~ ~	liess)	XXX
						SANI	<ol> <li>Gravel is</li> </ol>	s fine to o	coarse suban	gular to subrounded brick,	-	-	
0.50	1	ES		1		concre	ete and occa	sional san	dstone and a	ash.	Ē	Ė	
0.50	2 3	ES		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\							-	-	
0.50-1.00 -0.80	5	B W		1							-	(2.20)	
1.20-1.65	4	SPT	N=6	<u> </u>							-	-	$\bowtie$
											Ē	Ė	$\bowtie$
											-	-	
-											Ė	£ 200	$\otimes$
2.20-2.65	6	SPT	N=8			Firm 9	grey and bro	wn locall	y slightly san	ndy CLAY.	-	2.20	<u> </u>
								•		-	-	Ė	
											-	-	
3.00	7	D									-	F	
5.00	′										-	-	
											-	(2.80)	
											-	ļ (	<u></u>
4.00	8	В									-	-	
4.00	"	ь									-	-	
											-	Ė	<u> </u>
											-	-	
5.00-5.50	10	В				Verv	soft dark gro	v CLAY			-	5.00	
5.00 5.00		V	$c_u = 70$ $c_r = 64$			very .	son dan gr	oy CEIII	•		-	-	
3.00		\ \ \	C <sub>r</sub> =04										
5.70	11	D									-	-	
6.00-7.00	12	P									-	-	H
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=											-	-	
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8.00	13	В									F	Ė	
8.00 8.00		V V	$c_u = 175$ $c_r = 140$								-	Ė	
5.00		'	¥, 110								F	-	E
											-	(7.80)	<u> </u>
	Roring	Progress	s and Water Ob	cernati	one			Chisellin	ισ		L	<u> </u>	1
		Borel		Boreh	nole	Water	Erom		Duration	General 1	Rema	arks	
Date	Time	Dep		(mn	n)	Depth	From	То	(hh:mm)	1. Inspection pit dug to 1.2	2m		
26/05/09 26/05/09	08:00 08:20		<b>I</b>	150 150		1.20 0.80				2. No water added during	drilling.		
27/05/09	07:30			150		2.20				3. Groundwater struck at 1 0.80m after 20 minutes.		epth, risi	ng to
										4. Groundwater standing a		depth at	t start (
										second shift. 5. Water inflow from the s	and of 1	3 00m 4	enth
											Scale:	3.00m d	
Method			Plan	t P	Pilcon	Wayf	arer	 Drilled		Logged	Checke		
	0.1.1	e percu		d:		1500		By:	$\mathbf{JW}$	By: TPayne	By:		A



STRUCTURAL SOILS GINT LIBRARY. GLBICABLE PERCUSSION LOG | 723110, ACCESS 18 BRITANNIA ZINC AVONMOUTH. GPJ - v8 02 | 08/06/09 - 11:07.
Structural Soils Ltd, Head Office - Bristoi: The Old School, Stillhouse Lane, Bedminsfer, Bristoi, BS3 4EB. Tei: 0117-947-1000, Fax: 0117-947-1004, Web: www.soils.co.uk, Email:admin@soils.co.uk.

#### PRELIMINARY BOREHOLE LOG

Second   S	120									DUILLI			.00
Sumplex   Sump	Contract:										Boreho	ole:	
Sample   S	Acces	s 18,	Brita	nnia Zinc,	Avonmo	uth	St. N	<b>Iodwe</b> i	ı Develo <sub>l</sub>	pments Limited		BHN	ES04
Description of Strata	Contract Re	ef:		Start:	26.05.09	Grour	nd Level:		Co-ordinates	5:	Sheet:		
100		723	110	End:	27.05.09							2	of <b>3</b>
100	Saı	mples	and In-sit	tu Tests	er fill						ced	Depth	
100	Depth	No	Туре	Results	Wat Wat Back			Desc	cription of S	trata	tedu		
11.00	- 9.00-10.00	15	В			Ver	y soft dark	grey CLA	Y. (stratum	text copied from layer at	-		
11.00	- -					5.00	m depth from	m previous	sheet)		-	[	
11.00	- - -										Ė	Ė	
11.00	- -										_	E	<del> </del>
11.00											-	-	
11.00													
11.00	-										Ė	Ė	
11.00	-	16	D								-	-	
12.80   18	11.00	10		$c_u = 63$								-	<del> </del>
12.80	- 11.00		\ \ \	$c_r=22$							Ė	Ė	
12.80	-										-	-	
12.80	-										-	-	
12.80	- - -										Ē	Ė	
12.80	-										Ė	12.00	
14.00	12.80	18	D			Loo	se dark grey	slightly sil	ty fine to me	dium SAND.	-	12.80	
14.00-14.45   21   SPT_(NR)   N=8	13.00-13.45	5   19	$SPT_{(NR)}$	N=6			locally silty	12.80 to 14	4.0m depth.		E	F	
14.00-14.45   21   SPT_(NR)   N=8	- - -										Ė	Ė	
14.00-14.45   21   SPT_(NR)   N=8	-										Ė	Ė	
14.00-14.45   21   SPT_(NR)   N=8		20	D								-	-	
15.80 24 D 16.00-16.45 25 SPT N=12  16.80 26 D 17.00-17.45 27 SPT N=34  Boring Progress and Water Observations  Date Time Borehole Depth D		$5 \begin{vmatrix} 20\\21 \end{vmatrix}$	$SPT_{(NR)}$	N=8								Ē	
15.80 24 D 16.00-16.45 25 SPT N=12  16.80 26 D 17.00-17.45 27 SPT N=34  Boring Progress and Water Observations  Date Time Borehole Depth D	-										Ė	Ė	
15.80 24 D 16.00-16.45 25 SPT N=12  16.80 26 D 17.00-17.45 27 SPT N=34  Boring Progress and Water Observations  Date Time Borehole Depth D	-										-	-	
15.80 24 D 16.00-16.45 25 SPT N=12  16.80 26 D 17.00-17.45 27 SPT N=34  Boring Progress and Water Observations  Date Time Borehole Depth D	_ - 15.00	22	D				becoming m	edium den	se from 15.0	0m depth.	-	(4.70)	
16.80 26 D 17.00-17.45 27 SPT N=34  Boring Progress and Water Observations Date Time Borehole Depth De	15.00-15.45	5 23	SPT	N=19			becoming li	ghter in co	lour from 15.	00m depth.	-		
16.80 26 D 17.00-17.45 27 SPT N=34  Boring Progress and Water Observations Date Time Borehole Depth De	- -										-	-	
16.80   26   D	- 15.80	24	D								-	[	
Time   Borehole   Depth   De	16.00-16.45	5 25	SPT	N=12								Ē	
Time   Borehole   Depth   De	- - -										-	Ė	
Time   Borehole   Depth   De	- -										-	-	
dense from 17.00m depth.    17.50	_			NI 24					<i>c</i> 1		-	[	
Dense locally slightly clayey slightly gravelly SAND. Gravel is medium to coarse very weak mudstone and sandstone.    Dense locally slightly clayey slightly gravelly SAND. Gravel is medium to coarse very weak mudstone and sandstone.   Chiselling	- 17.00-17.43 -	2/	SPI	N=34		dens	locally cose from 17.0	ntaining ra Om depth.	are fine subr	ounded quartz gravel and	-	Ė	
Boring Progress and Water Observations  Date Time Borehole Casing Depth	- -					Don	sa laadhy sl	ightly alon	ov slightly o	eravally SAND. Graval is	-	17.50	
Boring Progress and Water Observations  Date Time Borehole Depth D	17.00	20				med	lium to coars	e very wea	ik mudstone	and sandstone.	[	[	::0:::s
Date Time Borehole Depth Depth Depth Depth Depth Depth To Duration (hh:mm)    Time Depth D			<u> </u>	1377 01				CI: 11:				<u> </u>	
Date Time Depth Depth Depth Depth Depth Depth Depth Depth (nmm) Depth Depth Depth (nmm) Depth Depth Depth (nmm) Depth Depth Depth (nmm) Depth Depth Depth (nmm) Depth Depth Depth (nmm) Depth Depth Depth (nmm) Depth Depth Depth (nmm) Depth Depth Depth (nmm) Depth Depth Depth Depth (nmm) Depth Depth Depth Depth (nh:mm) 6. Borehole backfilled with bentonite pellets on completion.  All dimensions in metres Scale: 1:50  Method Plant Pilcon Wayfarer Drilled Logged Checked			Bore		Borehole	Water	-		_	General 1	Rema	arks	
All dimensions in metres Scale: 1:50  Method Plant Pilcon Wayfarer Drilled Logged Checked	Date	Time	.				Erom	То		6 Rorehole backfilled wit	h henton	ite nelle	te on
Method Plant Pilcon Wayfarer Drilled Logged Checked											ii belitoli	ne pene	18 011
Method Plant Pilcon Wayfarer Drilled Logged Checked													
Method Plant Pilcon Wayfarer Drilled Logged Checked													
Method Plant Pilcon Wayfarer Drilled Logged Checked													
													)
	Method Used:	Cabl	a naran		t <b>Pilco</b> d:				IW			ed	AGS



Contract:	:								Client:				Boreho	ole:	
		18,	Brita	nnia l	Zinc, A	Avon	mou	ıth		<b>Aodwe</b> i	n Develo	pments Limited		BHN	ES04
Contract	Ref:				Start:	26.0	5.09	Groun	d Level:		Co-ordinates	3:	Sheet:		
	7	<b>23</b> 1	110		End:	27.0	5.09							3	of 3
	Samj	oles a	ınd In-si	tu Tests	3	er	EII						ced	Depth	
Depth	1	No	Type	Re	sults	Water	Backfill			Desc	ription of S	trata	Reduced Level	(Thick ness)	Graphic Legend
- 18.00-18		29	SPT	N	I=42			Dens	se locally sl	ightly clay	ey slightly g	ravelly SAND. Gravel is	-	(1.10)	· 0
Ę								medi text	um to coar	se very w laver at l	eak mudston 7 50m denth	e and sandstone. (stratum from previous sheet)			O 6
Ė										-		CLAY with rare plant	-	18.60	. <i>0</i>
- -18.90		30	D					fibre	s/rootlets.	ii uiu u	and brown	CLITT WITH THE PRINT	-	-	
19.00-19	.45	31	SPT	N	I=27								-	-	
Ē														Ē	
Ė													-	(2.20)	
19.80 20.00-20	15	32 33	D SPT	, .	I=36				l 11- · · 4 ·	11	d-4 C	20 00 11-	-	-	
20.00-20	1.43	33	SF 1	IN IN	1-30				ocany extre	mery wear	mudstone ii	rom 20.00m depth.		Ē	
<u> </u>														Ė	
-								Et-	11-	1:-1-4		MUDCTONE	-	20.80	
21.00-21	.30	<b>\34</b> [	SPT [	N=	=103*	$\vdash$			chole termina			n MUDSTONE.	-	21.00	
						1					•			Ė	
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	Bo	oring	Progres Bore		Vater Ob Casing	servation Boreh		Water	-	Chisellin	_	General 1	Rema	arks	
Date	-	Гіте	De		Depth	Diame (mn	eter	Depth	II From	То	Duration (hh:mm)				
					•			•							
												All dimensions in metres	Scale:	1:50	)
Method Used:	1		norei		Plant		ilcor	Way	farer	Drilled By:	IW	Logged By: TPoyne	Checke By:		AGS



Continue   Continue	Contract:								Client:				Boreho	ole:	
Starty   Start   Start   21.05.09   Co-ordinates   Start   Start   21.05.09   Co-ordinates   Start			Brita	nnia	Zinc, A	Avon	mou			Aodwei	n Develo	pments Limited			ES05
Sumples and lin-situ Tests   Sum   Progress and Water Observations   Sum   Sum   Progress and Water Observations   Sum   Progress												Sheet:			
MADE_GROUND: Firm dark grey and brown sightly sandy   Clay with two cobble content. Graved and cobbles are angular to subangular brick and concrete. Graved and cobbles are angular to subangular brick and concrete. Graved is fine to coarse.    John		723	110		End:	21.0	5.09							1	of 1
MADE_GROUND: Firm dark grey and brown sightly sandy   Clay with two cobble content. Graved and cobbles are angular to subangular brick and concrete. Graved and cobbles are angular to subangular brick and concrete. Graved is fine to coarse.    John	S	Samples a	and In-si	tu Tes	ts	er							el	Depth	Material
MADE_GROUND: Firm dark grey and brown sightly sandy   Clay with two cobble content. Graved and cobbles are angular to subangular brick and concrete. Graved and cobbles are angular to subangular brick and concrete. Graved is fine to coarse.    John	Depth	No	Type	R	Results	Wat	Back			Desc	cription of S	trata	Sedu Lev	(Thick ness)	Graphic Legend
Date Time Borehole Casing Depth Depth Depth Depth Depth From To Duration (hh:mm)  To Duration (hh:mm)  All dimensions in metres Scale: 1:50	Depth - 0.50 - 0.50 - 0.50-1.00	No 1 2 3	Type  ES J B	R	Results	Water	Backfill	slight cobbl fine to	ly gravelly es are ang o coarse.	ND: Firn 7 CLAY ular to su	n dark grey with low co bangular bric	and brown slightly sandy	Reduced   Level   Le	(Thick ness)	Graphic
Depth Depth (mm) Depth (mm) Depth All dimensions in metres Scale: 1:50	Data		Bore			Boreh	ole	Water	Errore		Duration	General	Rema	arks	
	Date	Time	Dej	pth	Depth		1)	Depth	FIOIII	10	(hh:mm)	All dimensions in metres		1:50	)
	Method		<u>'</u>			P	ilcon	Way	farer	Drilled	****	Logged	Checke	ed	AGS



On										BOKEH	OL		.UG
Contract:							Client:				Boreho		
		Britai	nnia Z		Avonmo					pments Limited		BHNE	S05A
Contract R		110			21.05.09		l Level:		Co-ordinates	S:	Sheet:	4	•
	723			End:	22.05.09	<u> </u>							of <b>3</b>
	<del>-</del>	ınd In-sit			Water Backfill			Desc	ription of S	trata	Reduced Level	Depth (Thick	Material Graphic
Depth	No	Type	Re	sults	Ba	MAE	NE CROLIN		•	gravelly CLAY. Gravel is	Re	ness)	Legend
						suban	igular fine	to coarse	brick, coal	and ash with rare steel	Ē	(0.50)	
0.50	1	ES					orcement bade GROUN		brown slight	ly clayey sandy GRAVEL	-	0.50	
0.50-1.00	2	В				of sul	oangular fin	e to mediu	m ash and bi	ick.	Ē	(1.00)	0.0.0
•											-	[	
												1.50	0 - 1 - 2 - 6
						Stiff	locally clos	ely fissured	l light grey n	nottled light brown CLAY.	-	_	
											E	Ė	
											-	(1.50)	
2.50	3	D									F	F	
											-	3.00	
3.00-4.00	5	В				Soft 1	ight grey lo	cally mottl	ed brown sil	ty CLAY.	F	F	<u>xx</u>
											Ė	Ē	x
											_	Ė	× ×
											-	-	xx
											-	E	××
											-	-	xx
											Ę	Ę	xx
5.00	6	D									Ē	Ē	xx
											Ė	Ē	xx
												Ė	
6.00	9	D									_	-	x
0.00		5									E	Ė	
											F	F	
											Ę	[	
7.00	10	ES									Ē	F	
											-	Ė	<u> </u>
											_	Ė	× ×
8.00	11	P									-	-	<u>*                                    </u>
											-	<u> </u>	x
											-	-	x
											F	[ (12.00)	x
	Boring	Progress	s and W	Vater Ob	servations			Chisellin	ıg	C a a 1 1	D 0455		
Date	Time	Borel		Casing	Borehole Diameter	Water	From	То	Duration (hh:mm)	General 1	kema	ııks	
21/05/09 21/05/09	10:45 11:05		50	Depth 15.00 15.00	(mm) 150 150	Depth 15.50 8.10			(mmm)	Inspection pit dug to 1.2     Groundwater struck at 8.10m depth after 20 m     3.3no. buckets of water at to aid drilling.	15.50m of the state of the stat	m 2.50 t	o 19.50m
										completion.  All dimensions in metres	Scale:	1.50	`
Method				Plant	Pilco	n Way	il farer	Drilled		Logged	Checke	1:50 ed	
	Cable	percu	ssion	Used	1:	1500		By:	JW	By: MChappell	By:		AGS



On											DOILLI	OL		
Contract:							(	Client:				Boreho		
Access		Brita									pments Limited		BHNE	SO5A
Contract Re		440					Ground	Level:		Co-ordinate:	S:	Sheet:		
	<b>723</b> 1	110	]	End:	22.05	5.09								of <b>3</b>
San	ples a	and In-sit			Water	Backfill			Desc	ription of S	trata	Reduced Level	Depth (Thick	Material Graphic
Depth	No	* 1	Resu	lts	8	Вас				•		Red	ness)	Legend
- 9.00-10.00	12	В					Soft li	ght grey l I from lave	ocally more	ttled brown	silty CLAY. (stratum text previous sheet)	-	_	x
- -							1			1 5	,	-	-	x
[ -												F	[	<u> </u>
- - -												-	Ē	<u>xx</u>
-												-		xx
- - -												E	Ė	xx
<del>-</del> =												-	-	<u> </u>
11.00-11.50	14	В										-	Ē	× ×
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13.00	15	P										-	-	<u> </u>
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- -												-	<u>-</u>	xx
-												Ė		<u>xx</u>
-												-	Ė	xx
<u>-</u>												E	15.00	xx
- 15.00	16	D					Soft lo	cally clos	ely fissured	d grey claye	y SILT with fine light grey	-	15.00	× × × ×
-					<b>±</b>		sand al	long very	closely spa	ced partings.	•	F	15.50	× × × ×
15.50-15.95	17	SPT	N=1	.5	-		Mediu	m dense li	ght greyish	brown fine	to medium SAND.	-	-	
												_		
16.00	18	D										E	E	
- - 16.50-16.95	19	SPT	N=1	1								-	(2.30)	
- 10.30-10.93	19	51 1	11-1	. 1								-	[(2.30)	
<del>-</del> 												-	_	
- - -												-	_	
17.50	20	D	NT 1	2								Ė	17.00	
17.50-17.95	21	SPT <sub>(NR)</sub>	N=1	.2			Descri	ption on n	ext sheet			-	17.80 -	× * * ×
Е	oring	Progress	s and Wat	ter Ob	servatio	ns			Chisellin	ıg	C 1 -	D	.1	
Date	Time	Bore		sing	Boreh Diame	ter	Water	From	То	Duration (hh:mm)	General	Kema	ırks	
		Dej	oth Do	epth	(mm	1)	Depth		-	(1111.11111)	-			
											A 11 Ji	C = 1	4 =-	`
Method				Plan	t P	ilco	n Wayfa	arer	Drilled		All dimensions in metres  Logged	Scale:	1:50 ed	
	Cable	e percu	ssion	Used	1:		1500	~1 ~1	By:	$\mathbf{JW}$	By: MChappell	By:		AGS



Contract:	 s 18.	Brita	nnia 7	Zinc.	Avon	moi	 ıth	Client:		n Develo	pments Limited	Boreho		S05A
Contract Re		1711000			21.0			d Level:		Co-ordinates	_	Sheet:	/	100011
<u> </u>	723	110		End:	22.0								3	of <b>3</b>
	<u> </u>	and In-si			Water	Backfill			Desc	cription of S	trata	Reduced Level	Depth (Thick	Material Graphic
Depth - 18.00	No 23	Type D	Re	sults	<b> </b>	Ba	Eirm	locally, the		_		Re	ness)	Legend
-							frequ peat	ent medium and fine gra	n gravel siz avel of she	zed pockets o ell fragments	h grey sandy SILT with of black brown firm fibrous . Laminations occasionally		(1.00)	× · × · × · × · × · × · × · × · × · × ·
- 18.50-18.95 -	5 24	SPT	N:	=27			_ 17.80	0m depth fro	om previou	ıs sheet)	text copied from layer at	-	18.80	× × × × × × × × × × × × × × × × × × ×
19.00	27	W					very	stiff red mo	ottled grey	CLAY.		-	(0.70)	
- 19.30 - 19.50-19.88	25 8[[]26[	D SPT [	N:	=65*			∴ ∖fibro	at 19.30m us peat.	occasional	l medium gra	avel sized pockets of firm	-	19.50	
<u>- 19.30-19.88</u> -	3 20	51 1	11	-03	]			hole termina	ated at 19.5	50m.				
<del>-</del> - -												Ē	-	
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	Boring	g Progres	s and W	Vater Ob	servation	ons		T	Chisellin	ıg	Camanali	D	1	
Date	Time	Bore		Casing Depth	Boreh Diame (mr	eter	Water Depth	From	То	Duration (hh:mm)	General 1	Kema	arks	
				1	<u> </u>	$\perp$						Scale:	1:50	
Method Used:	Cabl	o norcii		Plant Used			1 Way	tarer	Drilled By:	1137	Logged By: MChannell	Checke By:	ed	AGS



Contract: Access	s 18,	Brita	nnia Z	inc,	Avoi	nmou	ıth	Client: St. N	Iodwei	n Develo	pments Limited	Boreho	BHN	ES0
Contract Re	ef:			Start:	26.0	5.09	Ground	d Level:		Co-ordinates	: ::	Sheet:		
	723	110		End:	27.0	)5.09							1	of .
San	nples a	and In-sit	tu Tests		ıe	1.6						ed	Depth	Mat
Depth	No		Res	ults	Water	Backfill & Instru-			Desc	cription of S	trata	Reduced Level	(Thick ness)	Graj Leg
- F ·		Jr -				E E	MAE	DE GROUN	ID: Med	dium dense o	lark grey and black very	<u> </u>	-	XX
							claye	y very grav	elly SAN	D. Gravel is	fine to coarse angular to chert includes occasional	Ė	-	$\bowtie$
0.50	1	ES						wood and a		k, Siate and	chert includes occasional	-	-	$\bowtie$
												Ė	(2.00)	
1.00	2	D										-	(2.00)	
1.00-1.50 1.00-1.45	3 4	B SPT(c)	N=	27								E	[	$\bowtie$
												Ė	-	$\bowtie$
												-	2.00	$\bowtie$
2.00	5	D					Firm	grey and bro	own locall	ly slightly san	dy CLAY.	-	2.00	
2.00-2.30	6	В										-	-	
												-	-	<u> </u>
												Ė	(1.90)	<u> </u>
3.00 3.00-3.50	8	D D										F	F	<u>:</u>
5.00-5.50		"										Ė	Ė	<u> </u>
												-	-	<u> </u>
							Verv	soft dark gr	ev and or	ev CLAY			3.90	
4.00 4.00-4.50	10 11	D B					VCIY	Soft dark gr	cy and giv	cy CLATT.		-	-	
												Ė	-	==
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5.00 5.00-5.50	13 14	D B										ŀ	-	==
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	1.5	D										-	-	
6.00 6.00-6.50	15 16	D B										Ė	Ė	
												-	-	
												Ė	-	
7.00-8.00	17	P										-	-	
7.00-8.00	1 /	r										Ē	[	
												-	(7.10)	
												E	[	
												-	-	==
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												-	-	
т	Porin-	Drogra-	g and W	ntar Ol-	Servet	ions		П	Chigall:	ng			<u> </u>	<u> </u>
		Bore	s and Wa	asing	Bore	hole	Water		Chisellin	Duration	General	Rema	arks	
Date	Time	Dep		Depth	Dian (m	neter	Depth	From	То	(hh:mm)	1. Inspection pit dug to 1.	20m		
26/05/09	17:00	11.	$00 \mid \overline{1}$	1.00	15	50	Dry	1.30	1.50	00:45	2. No water added to aid	drilling,		
											<ul><li>3. No groundwater encou</li><li>4. On entering Sand at 12</li></ul>		rehole re	oduc
											gas. Initial gas monitor	reading	from the	top o
											the casing showed gas methane.	composit	tion of 82	2%
											All dimensions in metres	Scale:	1:50	)
Method				Plan					Drilled	1	Logged	Checke		A
Used: (	Cable	e percu	ssion	Used	1:	Da	ndo 1	50	By:	PO	By: <b>TPayne</b>	By:		A



Contract:								Client:				Doroho		
Contract: Acces	s 18,	Brita	nnia	Zinc, A	Avor	ımoı	ıth		Modwe	n Develo	pments Limited	Boreho		NES06
Contract Re	-							d Level:	100	Co-ordinates	_	Sheet:		
	<b>723</b> 1	110		End:	27.0								2	of <b>2</b>
Sar	mples a	and In-sit	tu Tests	S	Water	Backfill & Instru-	ativa		Des	cription of S	trata	Reduced Level	Depth (Thick	Material Graphic
Depth	No	**	Re	esults	Ĭ Š	Back	П			•		Red	ness)	Legend
- 9.00 - 9.00-9.50	18 19	D B	Ī	_			Very laye	soft dark at 3.90m c	grey and g lepth from	grey CLAY. previous she	(stratum text copied from eet)	Ē	[	
Ė							,		* -	•	,	Ė	-	
F												ļ.	ļ	
- - 10.00 - 10.00-10.50	$\begin{bmatrix} 21 \\ 22 \end{bmatrix}$	D B										F	-	<u> </u>
_ 10.00 10.00	,   22											Ė	-	===
- F												ţ	ļ.,	<u> </u>
- - -							Grey	silty CLA	Y - (Driller	s description)	).	+	11.00	xx
- - -							ļ	-	`	-	,	ŧ	(1.00)	xx
- F							ļ					F	(/	xx
Ē 							SAN	ID - (Driller	descripti	-m)		<u> </u>	12.00	X   X X
 E							Bore	hole termin	nated at 12	2.10m depth	due to high concentrations	E	12.14	
Ē							of m	ethane reiea	ised on ent	ering the san	d at 12.00m depth.	[	[	
												E	E	
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	Poring	Drogres	I bne s	Water Obs		one	<u> </u>		Chisellir	ng	T	<u> </u>	<u> </u>	
Date	Time	Borel		Casing	Boreh Diame	hole	Water	Erom		Duration	General 1	Rema	arks	
Date	1 11116	Dep	oth	Depth	(mn		Depth	From	10	(hh:mm)	5. Borehole terminated at			
											diameter monitoring we installed to 12.0m depth engineer.			
											All dimensions in metres	Scale:	1:50	<u> </u>
Method				Plant	 ; 1.				Drilled		Logged	Checke		AGS
Used:	Cable	e nercu	iccion	Used	4.	n <sub>o</sub>	ndo 1	50	By:	PO	By: <b>TPavne</b>	By:		11/4/02/2



Contract:	s 18.	Britar	nnia Zinc	. Av	vonm	ontl		Client: St. N	Modwen	Develo	pments Limited	Boreho		IES07
Contract R		Diltai		-	8.05.0					Co-ordinates		Sheet:	DIII	LDU
	723	110	Enc		9.05.	- 1							1	of <b>3</b>
C-														
	<u> </u>	nd In-sit			Water ackfill 8	Instru- mentation			Descr	ription of S	trata	Reduced Level	Depth (Thick	Graphi
Depth	No	Туре	Results		Bac		MAD	CDOL	UD DI 1 1	1: 1.4	1 1 CDALIE	Re	ness)	Legen
							of fine	to coarse	subangular	rown slight to subround	y clayey sandy GRAVEL ed brick and ash with rare	-	(0.50)	
0.50	1	ES							(<10mm).	roun mott	led grey slightly gravelly	-	0.50	
0.50-1.00	2	B					CLAY	. Gravel i	s fine to med	dium subang	gular ash and brick.	-	-	
· - ·					• • •	.⊟••						-	-	$\bowtie$
1.20-1.65	3 4	SPT B	N=5		• • •							-		
1.20-2.20	4	ь			: :							Ė	-	
					۰۰۰							-	[(2.70)]	
<del>-</del>					• • •							-	-	
2.20-2.65 2.20-3.20	5	SPT B	N=3		: :							<u>-</u>	Ė	
					• • • •							-	-	
<del>-</del>					• • •							_	_	
3.20-3.65	7	SPT	N=9		•••		Soft 1	ncally clo	selv fissure	d light grey	mottled light brown silty		3.20	
3.20 3.03		SI I	11 )				CLAY		sery missured	a fight grey	motiled light brown shity	-	-	<u>x</u>
												-	(1.30)	
4.00	8	D										-		<u> </u>
4.00-5.00	9	P										-	4.50	
							Soft li	ght bluish	grey clayey	SILT.			4.50	<u>x                                     </u>
							·					Ė	-	× × ×
<del>-</del>												-	-	x × :
												-	-	* * *
														~ <del>~</del> ~
_												Ė	_	×××
6.00	10	D										-	-	$\times \times \times \times$
												-	-	× × ×
												-		x × ×
7.00		V	c =50									-	-	× × ×
7.00		V	$c_u = 50$ $c_r = 32$									-	-	* <del>*</del> *
												Ē		× × ×
												Ė	E	× ×
8.00	12	D										-	-	× × ×
												Ē		× × ×
												-	-	× <u>×</u> ×
												-	-	× × ×
	Boring	Progress	and Water	Obser	vations	S			Chiselling	g	G 11	_	-	<u> </u>
Date	Time	Borel		σΕ	Borehole Diameter	e u	ater	From	То	Duration	General 1	Rema	arks	
		Dep		h	(mm)	D	epth	1710111	10	(hh:mm)	Inspection pit hand dug	to 1.20n	n.	
28/05/09 29/05/09	17:00 07:30				150 150		0.50 0.40				<ol><li>Groundwater standing a</li></ol>			at 17.00
											on 28/05/09. 3. Groundwater standing a	ıt 9.40m	depth at	07.30 c
											29/05/09. 4. 50mm diameter monito:		-	
											installed to 3.00m. (resp			
											All dimensions in metres	Scale:	1:50	
Method			P	lant	Pil	con Ī	Vayf	arer	Drilled		Logged	Checke	ed	AG



<b>7</b>														
Contract:							Client:					Boreho		
		Brita	nnia Z		Avonmo			Mody			pments Limited		BHN	ES07
Contract R				Start:	28.05.09		l Level:		C	Co-ordinates	3:	Sheet:		
	723	110		End:	29.05.09								2	of 3
Sa	mples	and In-si	tu Tests		Water Backfill & Instru-	HIGH						Reduced Level	Depth	Material Graphic
Depth	No	Type	Res	sults	Wa Sacki Inst	meng		1	Descri	ption of S	trata	Redu	(Thick ness)	Legend
9.00-10.00	13	P				Soft 1	ight bluis	sh grey c	layey	SILT. (stra	tum text copied from layer	-	(9.50)	×
- - 9.40	23	W				at 4.5	0m depth	i from pi	reviou	s sheet)		-	(5.50)	× × ×
- 9. <del>4</del> 0 -	23	l vv										[	-	× <u>×</u> × <u>×</u>
- - -												_	Ė	* <del>^</del> * ~
ŀ												-	E	× × ×
-												-	-	× × ×
												_	Ē	× × ×
- - 11.00	14	D										-	-	× × × ×
-												-	-	× <u>*</u> × <u>*</u>
-												Ę	F	×××
												_	Ė	^ <del>*</del> ~ *
12.00		V	C <sub>u</sub> =	=85								-	E	× <u>×</u> ×
12.00		V	C <sub>r</sub> =	=65								-	-	$\frac{\times}{\times} \times \frac{\times}{\times} \times$
-												-	-	× - × -
_												_	Ė	×-×
- 13.00 - 13.00	16	D V	c,=	=175 =120								-	Ė	× × ×
13.00		V	c <sub>r</sub> =	120								-	F	× × ×
													-	~~ ~ ~
- 14.00	18	D				Medi	um dense	light gre	ev bro	wn medium	n to fine SAND.	-	14.00	^ x ^ x 
- 100						TVICAL	uni dense	iigiit giv	<b>c</b> y 010	WII IIICGIGII	to line of it (b).	-	E	
[												-	F	
[													ļ	
15.00	19	D										_	E	
-												-	-	
15.50-15.9	5 20	SPT	N=	=16								-	F	
_												-	_	
16.00	21	D										-	(4.70)	
- - 16.50-16.9	5 22	SPT	NI-	=35								-	(1.70)	
- 10.30-10.9	3   22	SF I	IN-	-33								-	-	
- - -												_	-	
17.30	24	D										-	-	
17.50-17.9	5 25	SPT	N=	=20								Ę	F	
17.50-18.5	0   26	В											Ė	
	Boring	Progres	s and W	ater Ob	servations			Chis	selling					[. • • • . • • • . •
Date	Time	Bore	hole	Casing	Borehole Diameter	Water	Fron		То	Duration	General l	Rema	arks	
Date	1 11110	De	pth ]	Depth	(mm)	Depth	11011		10	(hh:mm)				
Method				Plan	t Pilco	n Way	 farer	Drille	ed		All dimensions in metres  Logged	Scale: Checke	1:50 ed	
l	Cable	e perci	ission	Use	d:	1500	(1	By:		$\mathbf{JW}$	By: MChappell	By:	- •	AGS



Contract:								Client:				Boreho		
	-	Brita	nnia Z					1	<u>Iodwe</u> i		oments Limited		BHN	IES07
Contract R		110					Groun	d Level:		Co-ordinates	:	Sheet:	•	•
	723			End:	29.0								3	of <b>3</b>
Sa	mples	and In-si	tu Tests		Water	Backfill & Instru-	Tarion I		Desc	cription of St	rata	Reduced Level	Depth (Thick	Material Graphic
Depth	No	Type	Res	sults	Š	Back Ins			Desc	Aiption of Si	iata	Red	ness)	Legend
-							Med	ium dense l	ight grey l	orown mediu	m to fine SAND. (stratum from previous sheet)	-	-	
-							iexi (	сорієй угот	iayer ai 1	4.00m aepin <sub>s</sub>	from previous sneet)	Ē	Ė	
- 18.50-18.9 -	5 27	SPT	N=	=25			Firm	fibrous dar	k brown F	PEAT locally	thinly interlaminated with		18.70	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
- 19.00	20	D					stiff	light brown	gravelly C	LAY. Gravel	is fine shell fragments.	-	19.10	<u> </u>
19.10	28 29	D D					Stiff	blue green	ish grey s	silty CLAY	with frequent medium to fibrous peat and shell/		19.30	xx
- 19.30 - - 19.50-19.9	5 30	D SPT	N=	=26			\fragi	nents.	-		_	Ė	Ė	
-		51 1	1	20			Stiff	red mottle	d grey Cl	LAY with on fibrous pear	ccasional fine to medium	-	-	
-  -							grav	er sized poe	KCt3 Of IIII	n norous pea	••	-	(1.70)	===
20.30	32	D										Ė		
20.50-20.9		SPT	N=	=37								-	-	
- - -												Ē	21.00	
<del>-</del> - -							Haro	l red mottled	d grey CLA	AY.			(0.50)	
<del>-</del> -												-	21.50	
21.50-	34	SPT	HI	ELP			Bore	hole termin	ated at 21.	50m depth.				
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	Boring	Progres							Chisellin	ng	General 1	Dame	relza	
Date	Time	Bore		Casing	Borel Diam	nole eter	Water	11 From	То	Duration (hh:mm)	General	Kema	IIKS	
		De	pth 1	Depth	(mr	n)	Depth			(1111.11111)				
											1			
Method				Plan	 + T	Dilaa	. 11/~-	<u> </u>	Drilled		All dimensions in metres	Scale: Checke	1:50	
	Cable	e percu	ission	Used		ncol	1 Way 1500	тагег	By:	$\mathbf{J}\mathbf{W}$	Logged By: <b>MChappell</b>	By:	u	AGS



	ef: <b>723</b>			Date:	21.0		MAD SANI concr MAD	Level  GROUND:  O with a mediete and brick, s	Descri Grey a jum cob jilt/sand	iption of Stand black shele content. content includes	rata lightly silty very Gravel and cobudes ash.	gravelly obles are	Sheet:	1	of 1  Materia Graphic Legend
Sar Depth 0.20 0.50	723 mples : No 1 2	Type  B  B					MAD SANI concr MAD	E GROUND: D with a mediete and brick, s	Description of the control of the co	iption of So and black so ble content. content includer	rata lightly silty very Gravel and cobudes ash.	gravelly obles are		Depth (Thick ness)	Materia Graphi
Sar Depth 0.20 0.50	No  1 2	Type  B  B					SANI concr MAD	D with a mediete and brick, so E GROUND:	Grey a ium cob ilt/sand	and black s ble content content incl grey and re	lightly silty very Gravel and cobudes ash.	obles are	Reduced	Depth (Thick ness)	Materia Graphi
Depth 0.20 0.50	No 1 2	Type B B		ults	Water	Backfill	SANI concr MAD	D with a mediete and brick, so E GROUND:	Grey a ium cob ilt/sand	and black s ble content content incl grey and re	lightly silty very Gravel and cobudes ash.	obles are	Reduced	(Thick ness)	Graphi
0.20	2	В	Kes	uto			SANI concr MAD	D with a mediete and brick, so E GROUND:	um cob ilt/sand Brown	ble content. content incl grey and re	Gravel and cobudes ash.  ed brown sandy G	obles are	<u> </u>	-	Ecgen
										oour	aci content.			-	XX
1.20	3	В										-		(1.15)	
							Trial	pit refused at 1	40 1-	41		-		1.40	
Plan (Not to	o Scale	;)			<u> </u>				G	eneral i	Remarks				
0.70	A _	3.80	)		1.1	st atte	npt to e	xcavate trial pi			m depth on a cond	crete slab.			
							All d	imensions in m	etres		Scale:		1:28		
Method Used:				Plant					L						



Contract:								Client:				Trialpit	:	
Access	s 18,	Britar	mia Z	Zinc, A	vor	ımou	ıth	St. Modw	en Develo	opments Lim	ited	[ ]	<b>FPNE</b>	S01A
Contract Re	ef:			Date:			Ground	d Level	Co-ordinat	es:		Sheet:		
	723	110			21.0	5.09							1	of <b>1</b>
San	nnles :	and In-sit	n Tests			1						р <sub>-</sub>	Depth	Materi
				11ta	Water	Backfill		D	escription of	Strata		Reduced Level	(Thick	Graph
Depth	No	Type	Res	uits	_	_ m	NAF	DE CROUNDL 1	-l-4li-l	htly sandy slightly	11	Re	ness)	Legen
							SILT	. Gravel is fine to	gnt grey siigi medium angt	nuy sandy sugnuy ılar to subangular t	graveny orick and	_	(0.40)	$\bowtie$
							conci	rete.					(0.40)	$\bowtie$
0.40	1	В					MAT	DE CDOLIND: Dor	hroun bloo	k and orange brown	aliahtlu	-	0.40	
0.50	2	В					silty	very sandy GRAV	EL with a hig	h cobble and a low	boulder	_	-	$\bowtie$
0.50	2A	ES						ent. Gravel, cobble and concrete.	s and boulder	rs are angular to su	bangular		(0.60)	$\bowtie$
							Office	and concrete.				-	-	$\bowtie$
												_	1.00	$\bowtie$
1.00	3	В					Light	grey and orange b	rown slightly	sandy locally sandy	slightly			
								elly ČLAY with occ high strength light					1.20	===
							Suii .	ingn suchgui ngit į	icy and brown	II CLAT.		-	-	
		_												
1.50 1.50	4	D V	c,=	<b>=</b> 75			8					-	-	
-10-0			-u	, -								-	-	
													Į	
	_	Б					8					_	-	
2.00 2.00	5	D V	c <sub>u</sub> =	<del>-</del> 89								-	-	
			u									-	<u> </u>	
							8					_	(2.30)	
												-	-	
												-	-	
2.70	6	D V		50			t	elow about 2.7m n	edium strengt	h.				
2.70			$c_u$ =	-30			8					-	-	
-												-	-	
												-	-	
							8					_	3.50	
							Soft	very low strength d	rk blue grey a	and CLAY.		-	_	
												-	-	
3.80	7	D										-	-	
3.80		V	$c_u$ =	20			8							
							8					-	(1.10)	
												-	-	
4.50	8	D										-	1.00	
4.50	لـْلر	Ţ	$c_u$	:14		×××××	Trial	pit terminated at 4.	50m depth.				4.60	
												-	-	
		<u> </u>							<u>C 1</u>	D 1				
Plan (Not to	Scale	e)							General	Remarks				
		4.30		_	1. 5	Sides st	able be	low 1.20m depth.						
	<b>↓</b> □	4.30	, -	7										
08.0	Ī													
0	<b>↓</b> ∟													
							All	limensions in metre	<u> </u>	Scale:		1:28		
Method				Plant					Logged		Checked	d		AG
Used:	Ma	chine d	lug	Used			JCB	-3CX	By:	TPayne	By:			AG



Contract:								Client:					Trialpit	:	
Access	s 18,	Britar	ınia Z	inc, A	Avon	mou	ıth	St. M	odwe	en Develo <sub>j</sub>	pments Lim	ited		TPN	ES02
Contract Re	ef:			Date:			Ground	d Level		Co-ordinates	3:		Sheet:		
	723	110			21.0	5.09								1	of <b>1</b>
San Depth	nples a	and In-sit	u Tests Res	ults	Water	Backfill			Des	scription of S	trata		Reduced Level	Depth (Thick ness)	Materia Graphi Legend
0.20	1	В					MAI GRA	DE GROUN VEL with a n	D: Lig nedium	ght and dark cobble and a l	grey silty ver ow boulder conte	ry sandy nt.	- - -	(0.40)	
0.50 0.50	2 2A	B ES									rown gravelly SA		- -	0.40 (0.30) 0.70	
-					<b>1</b> 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		MAI and a subar	DE GROUNE a high boulde ngular.	D: Sligh er conte	itly sandy GRA ent. Gravel is	AVEL with a high fine to coarse a	th cobble ngular to	- -	(0.70)	
1.20	3	В									1.1.1		-	1.40	
1.50 1.50	4	D V	$c_u^{-}$	46			many	rootlets.			slightly sandy CL slightly sandy CL		-	(0.30)	
2.00 2.00	5	D V	$c_u$ =	130			Suii	mgn suengui	ngnt gi	ey and brown	siightiy sandy CL	AI.	- - - -	(0.80)	
2.50 2.50	6	D V	$c_{\rm u}$ =	90	Г		Trial	pit terminate	ed at 2.	.50m depth duter inflow into	ue to constant co	llapse of	-	2.50	
-							OTICK	coolic layer	and wa	ter innow into	pit.		- - -	- - -	
													- - -	-	
													- - -	-	
-													- - -	- - -	
													- - -	-	
													- -	_	
Plan (Not to	Scale	<u>.                                    </u>			1	1	1		(	General	Remarks		L	L	ı
05.1	<b>4</b> _	4.00	) —					moderate flow gress filling h	v at 0.80	0m depth.	ned standing at 0.9	95m depth.			
							All	limensions in	metres		Scale:		1:28		
Method Used:	Ma	chine d	lug	Plant Used			JCB	-3CX		Logged By:	TPayne	Checked By:	i		AG



Depth   No   Type   Results   Section   Section   Description of Strata   Section   Depth   No   Type   Results   Section   Section   Description of Strata   Section   Depth   Min   Depth   Depth   Min   Depth   Depth   Min   Depth   Depth   Min   Depth	Contract:								Client:					Trialpit	t:	
Sumples and In-situ Tests	Access	s 18,	Brita	nnia Z	inc, A	vor	ımot	ıth	St. Modw	en	Develo	pments Li	mited		TPN	IES03
Depth   No   Type   Results	Contract Re	ef:			Date:			Groun	d Level	C	o-ordinates	S:		Sheet:		
MADE_GROUND_Dark grey black and brown silty sarely (0.50)   MADE_GROUND_Content of the anticum cobble and neckum cobbl		723	110			21.0	5.09								1	of 1
MADE_GROUND_Dark grey black and brown silty sarely (0.50)   MADE_GROUND_Content of the anticum cobble and neckum cobbl	Sar	mples a	and In-si	tu Tests		Te.	Ţ,							sed el	Depth	Materia
MADE_GROUND_Dark grey black and brown silty sarely (0.50)   MADE_GROUND_Content of the anticum cobble and neckum cobbl				1	ults	Wate	Backf		D	escri	ption of S	trata		Reduc	(Thick	Graphi Legen
Comparison of the comparison								MAI	DE GROUND: I	Dark	grey blac	k and brown	silty sandy	-		
MADE_GROUND_Dark_grey_and brown silty_very_sandy   0.50   0.50   0.50   0.60   2A   D   Dark_grey_and brown silty_very_sandy   0.75								Grav	el, cobbles and bo	ulder	s are cond	crete, brick, pro	bable slag	-	(0.50)	$\bowtie$
MADE_GROUND: Dark grey and brown silty very sandy   0.75	0.40	1	D					and s	sleepers.					-	[ 0.50	
1.50	. 0.40	1						MAI	DE GROUND: I	Dark	grey and	brown silty v	very sandy		0.30	
Suff high strength light grey mortied brown slightly sandy CLAY	0.60							GRA and s	VEL of fine to coolsing.	arse	angular to	subangular con	crete, brick	<u> </u>	0.75	
3								Stiff	high strength light	grey	mottled b	rown slightly sa	ndy CLAY		-	===
1.50	1.00	3	D					Willi	many rootiets.					-	-	
1.50	1.00			$c_u = 85/10$	05/120			8						ļ		<u> </u>
1.90								8						-	(1.15)	
1.90			-					8							-	
Very soft low strength light grey and brown slightly sandy CLAY.  Very soft low strength light grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  L50 7 D C,=14  L50 7 D C,=34  Trial pit terminated at 4.60m depth.  Trial pit terminated at 4.60m depth.  See All dimensions in metres  All dimensions in metres  Scale: 1:28  [Checked]	1.50 1.50	4		c,=92/1	10/119			8						-	-	
Very soft low strength light grey and brown slightly sandy CLAY.  Very soft low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  1.50  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  1.50  Very soft very low strength blue grey and brown CLAY.  1.50  Very soft very low strength blue grey and brown CLAY.  1.50  Very soft very low strength blue grey and brown CLAY.  1.50  Very soft very low strength blue grey and brown CLAY.  1.50  Very soft very low strength blue grey and brown CLAY.  1.50  Very soft very low strength blue grey and brown CLAY.  1.50  Very soft very low strength blue grey and brown CLAY.  1.50  Very soft very low strength blue grey and brown CLAY.  1.50  Very soft very low strength blue grey and brown CLAY.  1.50  Very soft very low strength blue grey and brown CLAY.  1.50  Very soft very low strength blue grey and brown CLAY.  1.50  Very soft very low strength blue grey and brown CLAY.  1.50  Very soft very low strength blue grey and brown CLAY.  1.50  Very soft very low streng															-	
1.00								Very	soft low strength li	ight o	rev and bro	own cliabtly can	dy CLAV		1.90	=
Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Losson 7 D V C <sub>2</sub> =34  Losson 7 D V C <sub>2</sub> =34  Losson 7 D V C <sub>2</sub> =34  Losson Remarks  1. First attempt to excavate pit refused on obstruction at 0.30m depth, relocated position 10m west.	2.00	5						Very	soft low strength in	igiit g	icy and on	own slightly san	uy CLAT.		<u> </u>	
Very soft very low strength blue grey and brown CLAY.  Very soft very low strength blue grey and brown CLAY.  Capture of the strength blue grey and brown Clay.  Capture of the strength blue grey and brown Clay.  Capture of the strength blue grey and brown Clay.  Capture of the strength blue grey and brown Clay.  Capture of the strength blue grey and brown Clay.  Capture of the strength blue grey and brown Clay.  Capture of the strength blue grey and brown Clay.  Capture of the strength blue grey and brown Clay.  Capture of the strength blue grey and brown Clay.  Capture of the strength blue grey and brown Clay.  Capture of the strength blue grey and brown Clay.  Capture of the strength blue grey and brown Clay.	2.00		V	$c_u = 2$	22			8						-	(0.50)	
1.50								8							2.40	
1.50 7 D C <sub>u</sub> =34 low strength below about 3.50m depth low stren								Very	soft very low stren	gth b	lue grey ar	nd brown CLAY	•	-	-	
1.50 7 D V c <sub>u</sub> =34 low strength below about 3.50m depth low str	2.60	6												-	-	
1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.30	2.60		V	$c_u =$	14			<b>X</b>						[	-	
1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.30								8						-	-	
1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.30	-							8						F	F	
1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.30								8						-	_	
1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.30								8						-	-	
All dimensions in metres  V	3.50	7	D					<b>)</b>	low strength below	abou	t 3.50m de	oth.		-	(2.20)	<u></u>
All dimensions in metres  Scale:  1.30  V	3.50			$c_u = 1$	34			<b>X</b>				r		-	-	
All dimensions in metres  Scale:  1.30  V								8						-	-	<del> </del>
All dimensions in metres  Scale:  1.30  V	<u>-</u>							8							_	
All dimensions in metres  Scale:  1.30  V								8						-	-	
All dimensions in metres  Scale:  1.30  V															-	
Ian (Not to Scale)  General Remarks  1. First attempt to excavate pit refused on obstruction at 0.30m depth, relocated position 10m west.  All dimensions in metres  Scale: 1:28  Method  Plant  Logged  Checked	4.30	8		c,=	35			<b>X</b>						-	-	
Ian (Not to Scale)  General Remarks  1. First attempt to excavate pit refused on obstruction at 0.30m depth, relocated position 10m west.  All dimensions in metres Scale: 1:28  Method Plant Logged Checked	•							<b>X</b>							4.60	
1. First attempt to excavate pit refused on obstruction at 0.30m depth, relocated position 10m west.  All dimensions in metres Scale: 1:28  Method Plant Logged Checked								Trial	pit terminated at 4.	.60m	depth.			-	-	
1. First attempt to excavate pit refused on obstruction at 0.30m depth, relocated position 10m west.  All dimensions in metres Scale: 1:28  Method Plant Logged Checked														-	<u> </u>	
1. First attempt to excavate pit refused on obstruction at 0.30m depth, relocated position 10m west.  All dimensions in metres Scale: 1:28  Method Plant Logged Checked										<u> </u>	1	D 1				
All dimensions in metres Scale: 1:28  Method Plant Logged Checked	Plan (Not to	) Scale	;)													
All dimensions in metres Scale: 1:28  Method Plant Logged Checked		-	4.0	0	•	1. I	First at	tempt to	excavate pit refuse	ed on	obstructio	n at 0.30m dept	th, relocated	d position	10m w	est.
All dimensions in metres Scale: 1:28  Method Plant Logged Checked	0	<b>†</b> [			]											
Method Plant Logged Checked	0.7	<b>↓</b>														
Method Plant Logged Checked																
Method Plant Logged Checked																
retnod Plant Logged Checked By: TPavne By:	3.f.d. 1				D.			All	dimensions in metre	_	1	Scale:				<b>-</b>
	Method Used:	Mя	chine 4	dug				JCB	3-3CX			TPayne		d		AG



Contract:								Client:					Trialpit	:	
Access	s 18,	Britar	ınia Z	inc, A	von	mou	ıth	St. Modv	vei	n Develo	pments Lir	nited		TPN	IES04
Contract Re	f:			Date:			Groun	d Level		Co-ordinates	3:		Sheet:		
	723	110			21.0	5.09								1	of <b>1</b>
San Depth	nples a	and In-sit	u Tests Res	ults	Water	Backfill		Ε	esc	cription of S	trata		Reduced Level	Depth (Thick ness)	Materia Graphi Legen
0.10 0.10	1 1A	B ES					MAI SILT	DE GROUND: I	igh	t grey slight	ly gravelly slig	htly sandy	-	(0.35)	
0.40 0.40	2 2A	B ES					silty	DE GROUND: BI fine to coarse SAI tins ash. Gravel is	ND.	. Sand fracti	ion is party crys	talline and	-	0.60	
0.70	3	В			<u></u>		MAI sligh Grav	DE GROUND: Gritly silty sandy Gel and cobbles are wood.	rev.	brown, vo	ellow, and ora	nge-brown	- - - -	-(0.80)	
1.50	4	В					Stiff	dark grey-brown s	ligh	tly sandy CL	AY.		-	1.40	
2.00 2.00	5	D V	$c_u$ =	90			Stiff	high strength light	and	l brown sligh	tly sandy CLAY	-	-	2.00	
2.60 2.60	6	D V	c <sub>11</sub> =	:52			1	pecomes medium s	stren	ngth below ab	oout 2.60m deptl	1.	- - - -	(1.00)	
-		,	<b>℃</b> u	32			Soft	low strength blue g	grey	CLAY.			-	3.00	
3.10 3.10	7	D V	c <sub>u</sub> =	22									-	- - -	
-													- - -	(1.30)	
4.20	8	D											-	4.30	
4.20		V	c <sub>u</sub> =	:25			Trial	pit terminated at 4	.301	m depth.			-	-	
													-	_	
Plan (Not to	Scale	e)							(	ieneral	Remarks				
444	<b>†</b>	???			1. F	Capid v	vater in	gress from 1.00m o	depi	th.					
							All	dimensions in metro	es		Scale:		1:28		
Method Used:	Ma	chine d	lug	Plant Used:	_ <del></del>		JCR	3-3CX		Logged By:	TPayne	Checke By:	d		AG



Contract:								Client:					Trialpit	t:	
Access	s 18,	Britai	nnia Z	Zinc, A	Vor	ımoı	ıth	St. Modw	en D	evelo	pments Lin	nited		TPN	IES05
Contract Re	ef:			Date:			Groun	d Level	Co-c	ordinates	3:		Sheet:		
	723	110			21.0	5.09								1	of <b>1</b>
		and In-sit		1.	Water	Backfill		D	escripti	ion of St	trata		Reduced Level	Depth (Thick	Graph
Depth	No	Type	Res	ults	5		S MAT	DE GROUNDL GF	ANTEL	aumfaaa	of modium to a	and and	Re	ness)	Leger
							limes		AVEL	surrace	of medium to co	barse grey	-	- 25	$\bowtie$
							MAI	DE GROUND: Da	k grey	to black	k slightly silty v	ery sandy	-	0.25	
0.40	1	В					₿ GRA	VEL of fine to stone, concrete and	mediu	m angu	lar to subangu	lar brick,	-	-	
							8	stone, concrete una	uoii.					(0.70)	$\bowtie$
													-	-	
							8						-	0.95	
1.00	2	В					Dark	grey, brown and nic odour, many roo	black sl	lightly s	andy CLAY wit	h a slight	-	-	
							orga	nic odour, many foc	niets and	a much (	organic matter.		-	(0.45)	
							8						-	1.40	<u></u> -
1.40 1.40	3	D V	c,=	:62			Firm	medium strength li	ght grey	and bro	own slightly sand	y CLAY.			
1.40		v	C <sub>u</sub> -	-02			<b>X</b>						-	-	
							<b>X</b>							ļ	<u></u>
							8						-	-	
							8						_		<u> </u>
2.10 2.10	4	D V	c <sub>u</sub> =	:65			8						-	-	
			-u				8						_	<u> </u>	
							8						-	-	
													-	-(2.40)	
2.70 2.70	5	D V	c <sub>u</sub> =	:82			1	locally stiff from 2.7	70m dep	oth and l	ocally more sand	ly.			
2.70			ou ou	02			8						-	-	
							8						-	ļ.	
							8						-	-	
													-	-	
3.50	6	D											-	-	
							<b>X</b>								
3.80		V	c,,=	:51	<b>*</b>		Soft	medium strength lig	ht grev	and bro	wn slightly sand	CLAY.		3.80	
									, 5-5		<i>5</i> - <i>y</i>	-	_	(0.50)	
							<b>X</b>						-	(0.50)	•
4.20 4.20	7	D V (	$c_u$ =	34 !				low strength below					ļ	4.30	
4.20	낕		C <sub>u</sub> -	-34			Trial	pit terminated at 4.	30m de <sub>l</sub>	pth.			-	-	
													-	-	
													-	-	
Plan (Not to	Scale	<u>)</u>				1	<u> </u>		Gen	eral i	Remarks			L	<u> </u>
(1.00.00		,			1 6	21:-1.4		omaga f 2.00							
	<b>-</b>	3.90	0	-		Slight v Sides s		epage from 3.80m	depth in	orner (	of pit.				
0.70	<b>↑</b>														
0.	<b>↓</b>														
							All	dimensions in metre	S		Scale:		1:28		
Method Used:	Ma	chine d	luc	Plant Used			ICD	3-3CX	Logge By:	ed	TPayne	Checke By:	d		AC
	1 <b>71</b> A	CHILL U	·ug				JUD	JU11	1 -		ттаунс				144



Contract:							Client:				Trialpit		
		Britan	nnia Zino	e, A	von	mou			pments Limi	ited		TPN	IES0
Contract Ref	f:		Da	te:			Ground Level	Co-ordinate:	5:		Sheet:		
<b>,</b>	723	110		2	21.0	5.09						1	of <b>1</b>
Sam	ples a	and In-site	u Tests Results		Water	Backfill	De	escription of S	trata		Reduced Level	Depth (Thick ness)	Mater Graph Leger
0.30	1 1A	B ES					MADE GROUND: D GRAVEL with a low angular to subangular bri	cobble content.	Gravel and cob	y sandy obles are	- - - -	(0.45)	
0.60	2	В					MADE GROUND: C GRAVEL with mediun angular to subangular bri	ı cobble conter	nt. Gravel and cob	y sandy obles are	-	(0.55)	
1.10	3	В					MADE GROUND: Ye cobble content. Grav concrete.	low brown gr el is angular	avelly SAND wit to subangular br	h a low rick and	- - -	1.00	
1.50	4	D					Dark grey orange brown	slightly silty sa	ndy locally sandy	CLAY.	- - -	1.45	
							Stiff high strength light g	rey and brown	slightly sandy CL	AY.	-	1.80	
2.10 2.10	5	D V	c <sub>u</sub> =115								- - - -	- - - -	
2.60 2.60	6	D V	c <sub>u</sub> =50				becomes medium st	rength below 2.	60m depth.		- - - -	(2.30)	
3.70	7	D V	a – 49								- - - - -	-	
3.70	0		c <sub>u</sub> =48				C-Ain-A-GI	-t	d blada CI	AN	- -	4.10	
4.10 4.10 4.40	8	D V D	c <sub>u</sub> =45				Soft varying to firm low	strength blue, g	grey, and black CL.	AY.	- - -	(0.40)	
4.40	ابُ ا	\_v_/	c <sub>u</sub> =39			*****	Trial pit terminated at 4.	50m depth.			-	-	
Plan (Not to	Scale	<u>                                     </u>				<u> </u>		General	Remarks				<u> </u>
0.70	\	3.90	)			lides st	able. Indwater encountered.						
				-			All dimensions in metres		Scale:		1:28		
Method				lant				Logged		Checked			A
Used:	Ma	chine d	lug 🗀	sed:			JCB-3CX	By:	TPayne	By:			<u> </u>

Separate Sep																Structual S	oils May 2009											lan Farmers	March 2005	2005
THE PROPERTY SETTING AND SETTI	ample Identity									TPNES01	TPNES02	TPNES03	TPNES04	TPNES04	TPNES05	TPNES06	BHNES03	BHNES01	BHNES02	BHNES04	BHNES05A	BHNES06	BHNES07	BH43	BH44	WS44	BH43	BH43	BH44	44
Section 1. Section 1.								1																		TF			MG	
Semination of the property of	nple Depth									0.5	0.5	0.6	0.1	0.4	1.0	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.1	1.5	2.50	0.6	1.1	0.2	2
THE PARTIES OF THE PA	terminand							Count >SV	%>SV																					
Martin	anide (total)							7																8.0	8.7	8.2	7.6	8	11.4	4
See the second s					1			2																						-+
Part   Part					1 2			2		-4	.4	-1	-1		-4	-4	-4	.4		-1			-4							-+
See See See See See See See See See See					1.2	1.1		10													-									$\rightarrow$
Series   1906																		No ACM	No ACM	No ACM	No ACM	No ACM	No ACM							
The section of the control of the co	latale (Intal)					_		6				l	<u> </u>	<u> </u>	<u> </u>				1	1.01.0			1		l			l		_
September 1969 1979 1989 1989 1989 1989 1989 1989 198		mg/kg	>640		5500	91	2 3	34 16	47	2200	1300	62	5500	2100	15	1100	530	300	280	850	320	680	5100	13	7.5	25	650	13	860	10
Section 1. 19 1. 1																													82	
The section of the se	admium					149	11 3		26	2800									990							5.1			3500	30
Segretary 1 1964 1 1970	hromium	mg/kg	>5000		1400	12	7 2	23 0	0	75	27	13	42	120	28	99	180	47	52	1400	66	110	400							
See See See See See See See See See See	opper	mg/kg		>45700	25000	261	4 3	34 0	0	5500	1600	260	800	2500	68	3300	2500	660	850	3000	2200	1700	25000	47	29	44	1700	47	1800	00
THE COLOR STATE ST	on				170000	5006	7 2	24 0	0	47000	100000	38000	24000	170000	28000	85000	58000	30000	55000	36000	42000	44000	58000	26000		29000	35000	26000	39000	000
THE COLUMN STATE S	ead	mg/kg	>750		55000	1744	7 3	34 29	85	33000	15000	2200	41000	25000	530	38000	34000	16000	13000	29000	20000	32000	43000	190	840	480	23000	190	41000	00
See See See See See See See See See See	ercury									44	3.2	1.0	220	42	0.4	34	- 11	7.6	7.1	44	5.1	15	2.4							$\neg$
See 1975   1970					1400	15	i7 2	28 0	0		73	52			31	140	100		98		71			41	36		83	41	81	
THE COLOR STATE OF THE COLOR STA	elenium	mg/kg	>13000					26 0	0																		15		280	.0
Series of Series   Se	inc			>188000			16 3	34 0	0	80000	38000		110000		3300			28000	42000	180000	13000	78000					76000		110000	000
TREE					720	28	12 1	14 0	0			2.1				2.4	1.8			1				220	350	460	570	220	580	.0
Section   Sect																			_											تِعد
Signature 1								2																						
Prince   P								2																						
A year   Mys   300								2																						
Proceedings								2																						
TEXT		mg/kg	3500					2																						$\rightarrow$
Professor   Prof		mg/kg	2600					2									0.10					0.10								
Page   Page																														
Implement SC-CC 10 mg/s								2																						$\rightarrow$
Implantes x-19-16-127								2																						$\rightarrow$
Paper   Pape								2																						$\rightarrow$
pipelines CRIC-CRI myly		mg/kg						2																						$\rightarrow$
Importance of CC-CCS								2																						
Seal Alphables   Proly		mg/kg						2																						$\rightarrow$
Nonemarks S-CFC   mg/kg   mg								2																						$\rightarrow$
remarkers CPC-DB mg/kg   mg/kg					0.1			2																						$\rightarrow$
Vernation S-CS-CS   mylog								2																						$\rightarrow$
remarkers ASP-CFC 10 mg/lg								2																						
Vernalities CD-C12								2																						
Normalies of 12-62-61   mg/kg   8.7   2   9   9   9   1   1   9   9   9   1   1								2									0.01													
Vernaties 2-16-25								2									0.10													
Vernatics   Coll Aromatics   Coll Arom						_		2											1											$\rightarrow$
Cold Annexies   mg/kg   136.5   2						_		2											1											$\rightarrow$
Pit places & Aromatics) 19/9 19/5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2						_		2											1											$\rightarrow$
Nightatics & Aromatics    19/9   19/5   2           19/9					136.5			2																						$\rightarrow$
paphthalene mg/kg 0.75 4 0.05 0.75 0.11 0.08 0.08 0.09 0.09 0.09 0.09 0.09 0.09	Aliphatics & Aromatics)	mg/kg			136.5			2									136.50					0.41								
Compathylene   mykg   0.13   4   0.01   0.13   0.01   0.01   0.01   0.01   0.00   0.	AH (Total 16)																													
Companies   mg/kg   0.66   4   0.03   0.66   0.01   0.05   0.01   0.02   0.00								4																						
Complete   mg/kg   0.66   4   0.03   0.66   0.01   0.02   0.02   0.05   0.01   0.05   0.01   0.05   0.01   0.05   0.01   0.05   0.01   0.05								4																						
Personative								4																						
nthracene mg/kg 2 1.5 4 0.05 2.15 0.39 0.05 0.07 0.07 0.07 0.07 0.07 0.07 0.07								4														0.01								
Note   Note								4																						
yene mg/kg 15.7 4 0.32 15.70 0.39								4											1											
ents [al anthracene myNg   0.25   4   0.10   6.25   0.01   0.04   0.04   0.05   0.07								4											1											
hysene myskg 11.2 4 0.35 11.20 0.01 0.13 0.13 0.14 0.15 0.15 0.01 0.15 0.15 0.15 0.15 0.15								4											1											
Seed p   Discreptible   Proceedings   Procedings   Proceedings   Procedings   Proceedings   Proced								4											1											
ence (b) floreamhene (19-74) 9.42 4 0.14 9.42 (10-14) 9.4		mg/kg			11.2			4		0.35		11.20	0.01						1			0.13								_
Part of the provision o	enzo [b] fluoranthene	mg/kg			9.42			4		0.14		9.42	0.01									0.14								
deno [123-cd] pyrene   mg/kg   1.5   4   0.01   1.50   0.01   0								4		0,01		5 44	0.01	<b>!</b>	<b>!</b>				1	_		0,01	<b>+</b>	-						$\rightarrow$
Illeans pain anthracene mg/kg					V-77		_	4						<b>!</b>	<del>                                     </del>	<b>†</b>			+				<b> </b>	l			<b>†</b>			$\rightarrow$
enzo (ghi) perylène mg kg 5.37 4 0.10 5.37 0.01 0.02 0.02 0.01 0.02 0.01 0.01 0.01				_			_	4						<b>!</b>	<del>                                     </del>	<b>†</b>			+				<b> </b>	l			<b>†</b>			$\rightarrow$
colai 16 PAH Reported         mg/kg         83.49         4         2.00         83.49         1.58         0.92         0.92           PH - Total Petroleum Hydrocarbons         OV - Soil Oxide/Hydrocarbons         OV - Soil Oxide/Hydrocarbons         OV - Soil Oxide/Hydrocarbons         OV - Soil Oxide/Hydrocarbons				_			_	4						<b>!</b>	<del>                                     </del>	<b>†</b>			+				<b> </b>	l			<b>†</b>			$\rightarrow$
PH = Total Petroleum Hydrocarbons 3V = Soil Guideline Value				_			_	4						<b>!</b>	<del>                                     </del>	<b>†</b>			+				<b> </b>	l			<b>†</b>			$\rightarrow$
GV - Soil Guideline Value					UU. 40		1	1	1		1				1	1	1		1						1		1	1		
SAC - Site Specific Assessment Criteria  MG = Made Cround  FF - Total Plats  CMM - Abbestos containing material  - Value above adopted screening value	MG = Made Ground FF = Tidal Flats ACM = Asbestos containing ma	terial	novo adente d	orozolog ve!																										

													lan	Farmers May				riyuei Col	sulting Dece		
Sample Identity									WS45	WS46	WS47	WS3	WS3	WS3	BH1	BH2a	GW7	WSH27	WSH24	WSH28	TPI
ampled Strata									MG	MG	MG	MG	TF	TF	MG	MG	MG	MG	MG	MG	М
ample Depth									0.5	0.5	0.5	0.5	1.5	2.5	0.6 - 1.2	0.1 - 1.2	0.5	0.5	0.2	0.5	0.
eterminand	Units	Screeni	ng Value SSAC	Max	Mean	Count	Count >SV	%>SV													
н	s.u.	SGV	SSAC	11.4	8.18				7.6	8.5	8.2	6.7	8.5	8.6	7.7	7.6					_
cyanide (total)	mg/kg			1.2	0.10	10			7.0	0.0	0.2	<1.00	0.5	0.0	1.2	7.0	<0.50	<0.50	<0.50	<0.50	<0
Cyanide (free)	mg/kg			1	1.00							<1.00			<1.00		40.00	40.00	20.00	10.00	
Cyanide (complex)	mg/kg			1.2	1.10	16						<1.00			1.2						_
Sulphate	mg/kg																				1
Asbestos containing material	None																				
	None					6															
Metals (total)																					_
Arsenic	mg/kg	>640		5500	912	34		47	41	960	180	2600	42	83	470	1300	430	680	800	70	1
Barium	mg/kg			730	234	24	0	0	180	720	730										_
Cadmium	mg/kg	>1400		18000	1491	34		26	20	17	120	1500	55	310	480	330	480	400	380	61	
Chromium	mg/kg	>5000		1400	127	23		0				48	35		37	31	28	18	32	15	
Copper	mg/kg		>45700	25000	2614			0	120	1600	600	11000	130	36	2100	5600	1200	1000	2900	680	- 1
ron	mg/kg			170000	50067	24		0	8600	81000	39000										_
ead Mercury	mg/kg	>750 >3600		55000	17447	34 23		85	470	7600	6800	38000	1100	6700	14000	9800	2200	6400	32000	1300	4
lickel	mg/kg mg/kg	>3600		220 1400	21 157	28		0			-	8.1 280	39		8.4 96	1.1	11	0.69 200	7.2 91	0.45 94	
								0	-		-		39			130					
Selenium Zinc	mg/kg	>13000	>188000	1600 180000	149 48626	26	0	0	8100	36000	18000	160 82000	2600	12000	43 37000	29000	2.3 70000	6.1 38000	1.1	0.74 19000	18
Caesium	mg/kg	>1000	>100000	720	48626 282	14		0	48	720	18000	02000	2000	12000	3/000	29000	70000	38000	110000	19000	11
BTEX	mg/kg	>1000		120	282	14	0		40	720	440										
MTBE	mg/kg																				
Benzene	mg/kg	95				2			-		-	-							-		<b>t</b> -
oluene	mg/kg	4400							<del>                                     </del>		<del>                                     </del>	<del>                                     </del>				<del>                                     </del>			<del>                                     </del>	<del>                                     </del>	$\vdash$
Ethyl Benzene	mg/kg	2800																			<del>                                     </del>
n & p Xylene	mg/kg	3500							<del>                                     </del>		<del>                                     </del>	<del>                                     </del>				<del>                                     </del>			<del>                                     </del>		$\vdash$
Xviene	mg/kg	2600				-															-
STEX	IIIg/kg	2000		1			1	l		l				l	l	l———		l		l	_
MTBE	mg/kg	1								T	1	1		T	T			T			_
Aliphatics >C6-C8	mg/kg					-	-				-	-									<del></del>
Aliphatics >C8-C10	mg/kg					-															-
Aliphatics >C10-C12	mg/kg																				-
Aliphatics >C12-C16	mg/kg					-															-
Aliphatics >C16-C21	mg/kg					-															-
Aliphatics >C21-C35	mg/kg					-															1
Total Aliphatics	mg/kg			0.1																	-
Aromatics >C5-C7	mg/kg					-															-
Aromatics >C7-C8	mg/kg					-															-
Aromatics >C8-C9	mg/kg																				1
Aromatics >C9-C10	mg/kg					2															
Aromatics >C10-C12	mg/kg					2															
Aromatics >C12-C16	mg/kg			8.7		2															
Aromatics >C16-C21	mg/kg			62.5																	_
Aromatics >C21-C35	mg/kg			65.3		2															1
Total Aromatics	mg/kg			136.5		2					l	l									
TPH											l	l									
Aliphatics & Aromatics)	mg/kg			136.5		2															
PAH (Total 16)											_	_									
Naphthalene	mg/kg			0.75		4															
Acenaphthylene	mg/kg			0.13		4															▙▔
Acenapthene	mg/kg			0.66		4															<u> </u>
luorene	mg/kg			0.28		4															<u> </u>
Phenanthrene	mg/kg			7.73		4	-														<u> </u>
Anthracene	mg/kg			2.15		4					1	1									<u> </u>
luoranthene	mg/kg			16.2		4					1	1									<u> </u>
Pyrene	mg/kg			15.7		4					1	1									<u> </u>
Benz [a] anthracene	mg/kg			6.25		4					1	1									ـــــ
Chrysene	mg/kg			11.2		4															₩
Benzo [b] fluoranthene Benzo [k] fluoranthene	mg/kg			9.42					1		1	1				1			1	l	1
	mg/kg			5.44		4			-		-	-				-			-	-	<b>+</b> -
Benzo [a] pyrene ndeno [123-cd] pyrene	mg/kg mg/kg			1.5		4			<del>                                     </del>		<del>                                     </del>	<del>                                     </del>				<del>                                     </del>			<del>                                     </del>	<del>                                     </del>	$\vdash$
Dibenz [ah] anthracene	mg/kg mg/kg			0.71		- 4			l	1			1	1	1			1	-		+
Benzo [ghi] perylene				5.37		- 1				-	<b> </b>	<b> </b>	-	-	-			-			$\vdash$
Total 16 PAH Reported	mg/kg mg/kg			83.49		- 1				-	<b> </b>	<b> </b>	-	-	-			-			-
FPH = Total Petroleum Hydrocar				UJ.45		4	1		l		1	1				l			·	l	ш
GV = Soil Guideline Value SAC = Site Specific Assessme IG = Made Ground IF = Tidal Flats ICM = Asbestos containing mat	nt Criteria																				
2200 5000	- Value abov	re adopted scre		ous CLEA																	

DH pM  Free grande m  Free grande m  Free cande m  Free ca	Units  pH units  mgA  ys/cm  %  mgA  mgA  mgA  mgA  mgA  mgA  mgA	Screeninness 6-8.5	g Value  DWS**  >2500  >0.5  >250  >250	Screenin-	g Value  DWS**  2500  0.5  250  250	Count  12 2 6 1 1 4 10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	7.7 0.05 7710 9.2 58 3100 850 19 10 2800 5	Mean 7.3 3670.7 9.2 15.5 86.8 390.0 317.1 10.0 2800.0	Count >SV 4 4 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6		9.0 - 12.0 TF 7.43	0.4 - 1.6 MG 6.57 1.05	TF 6.95	13.8 - 18.75 TF 6.95	TF 6.95	BH3  13-Jan-06  15-19  TF  8.41  7  790  9.2	13.3-18 TF 7.07	13.3-18 TF 7.07	7.07 7.2	10-18 TF 6.63	10-18 TF 6.63	8H44  4-Aug-05 10-18 TF 6.63	9.0 - 16.1 TF	GW7 29-May-08 9,0-16.2 TF	9.0 - 16.3 TF	0.5-2 C MG N 6.48 6	0.5-2 MG 6.48	W\$44 4-Aug-05 0.5-2 MG 6.48
Determination of the control of the	Units  pH units  mgA  ys/cm  %  mgA  mgA  mgA  mgA  mgA  mgA  mgA	EQS*	>2500 >0.5 >250	EQS*	2500 0.5 250	12 2 6 1 4 10 1 1 6 1 1 1	7.7 0.05 7710 9.2 58 3100 380 850 19	7.3 3670.7 9.2 15.5 861.8 390.0 317.1 19.0	Count >SV  4  3  8	%> <b>SV</b> 67  75  80	9.0 - 12.0 TF 7.43 2.18	0.4 - 1.6 MG 6.57 1.05	13.8 - 18.75 TF 6.95	13.8 - 18.75 TF 6.95	13.8 - 18.75 TF 6.95	15 - 19 TF 8.41 7	13.3-18 TF 7.07	13.3-18 TF 7.07	13.3-18 TF 7.07	10-18 TF 6.63	10-18 TF 6.63	10-18 TF 6.63	9.0 - 16.1 TF	9.0 - 16.2 TF	9.0 - 16.3 TF	0.5-2 C MG N 6.48 6	0.5-2 MG 6.48	0.5-2 MG 6.48
Screened Strata  Toround Elevation  Tround Water Depth (m)  Tround Water Depth (m)  Determinand  Use the Control of the Contro	Units  pH units  mgA  ys/cm  %  mgA  mgA  mgA  mgA  mgA  mgA  mgA	EQS*	>2500 >0.5 >250	EQS*	2500 0.5 250	12 2 6 1 4 10 1 1 6 1 1 1	7.7 0.05 7710 9.2 58 3100 380 850 19	7.3 3670.7 9.2 15.5 861.8 390.0 317.1 19.0	Count >SV  4  3 8  2	%>\$V 67 75 80 0	TF 7.43 2.18	MG 6.57 1.05	TF 6.95	TF 6.95	TF 6.95	TF 8.41 7 7 7 9 0	7.1	TF 7.07	7.07 7.2	7.6	TF 6.63	TF 6.63	TF	TF	TF	MG N 6.48 6	MG 6.48 7.1	MG 6.48
Treated Elevation Treated Service of Treated Servic	pH units mgA ps/cm mgA ps/cm % mgA mgA mgA mgA mgA mgA mgA mgA mgA mgA	EQS*	>2500 >0.5 >250	EQS*	2500 0.5 250	12 2 6 1 4 10 1 1 6 1 1 1	7.7 0.05 7710 9.2 58 3100 380 850 19	7.3 3670.7 9.2 15.5 861.8 390.0 317.1 19.0	Count >SV 4 4 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	%>SV  67  75  80	7.43 2.18	6.57	7.3	7.3	7.4	7	7.1	7.07	7.2	7.6		6.63				6.48 6	7.1	6.48
Incumed Water Depth (m) Incumed Water Elevation (m AOD) Determinand  Until Potential Control of the Control of	pH units mgA ps/cm mgA ps/cm % mgA mgA mgA mgA mgA mgA mgA mgA mgA mgA	EQS*	>2500 >0.5 >250	EQS*	2500 0.5 250	12 2 6 1 4 10 1 1 6 1 1 1	7.7 0.05 7710 9.2 58 3100 380 850 19	7.3 3670.7 9.2 15.5 861.8 390.0 317.1 19.0	Count >SV 4 4 3 8 8 2 2	%>SV  67  75  80	2.18	1.05	7.3	7.3	7.4	7	7.1		7.2	7.6				58			7.1	
Use the second section of the second section of the second section of the second section of the second section of the second section of the second section of the second section of the second section of the second section of the second section of the section of	pH units mgA ps/cm mgA ps/cm % mgA mgA mgA mgA mgA mgA mgA mgA mgA mgA	EQS*	>2500 >0.5 >250	EQS*	2500 0.5 250	12 2 6 1 4 10 1 1 6 1 1 1	7.7 0.05 7710 9.2 58 3100 380 850 19	7.3 3670.7 9.2 15.5 861.8 390.0 317.1 19.0	Count >SV 4 4 3 8 8	%> <b>SV</b> 67 75 80								7.1			7.7	7.4		58	1.8	7		7.1
Determinand  U  Per particular of the post	pH units mgA ps/cm mgA ps/cm % mgA mgA mgA mgA mgA mgA mgA mgA mgA mgA	EQS*	>2500 >0.5 >250	EQS*	2500 0.5 250	12 2 6 1 4 10 1 1 6 1 1 1	7.7 0.05 7710 9.2 58 3100 380 850 19	7.3 3670.7 9.2 15.5 861.8 390.0 317.1 19.0	Count >SV  4  4  2	67 75 80 0	0.05							7.1			7.7	7.4		58	1.8	7		7.1
DH pM  Free grande m  Free grande m  Free cande m  Free ca	pH units mgA ps/cm mgA ps/cm % mgA mgA mgA mgA mgA mgA mgA mgA mgA mgA	EQS*	>2500 >0.5 >250	EQS*	2500 0.5 250	12 2 6 1 4 10 1 1 6 1 1 1	7.7 0.05 7710 9.2 58 3100 380 850 19	7.3 3670.7 9.2 15.5 861.8 390.0 317.1 19.0	4 4 3 8 2 2	67 75 80 0	0.05							7.1			7.7	7.4		58	1.8	7		7.1
DH pM  Free grande m  Free grande m  Free cande m  Free ca	pH units mgA ps/cm mgA ps/cm % mgA mgA mgA mgA mgA mgA mgA mgA mgA mgA		>2500 >0.5 >250		2500 0.5 250	12 2 6 1 4 10 1 1 6 1 1 1	7.7 0.05 7710 9.2 58 3100 380 850 19	7.3 3670.7 9.2 15.5 861.8 390.0 317.1 19.0	4 4 3 3 8 8 2 2	67 75 80 0	0.05							7.1			7.7	7.4		58	1.8	7		7.1
ries gande   ries   rie	mg/s ps/cm % mg/s mg/s mg/s mg/s mg/s mg/s mg/s mg/s	6-8.5	>0.5 >250	6-8.5	0.5 250	2 6 1 4 10 1 6 1 1 1	0.05 7710 9.2 58 3100 390 850 19 10 2600	3670.7 9.2 15.5 861.8 390.0 317.1 19.0	3 8	75 80 0	0.05							7.1			7.7	7.4		58	1.8	7		7.1
IEROFICAL CONDUCTIVITY  INTERPRETATION OF THE PROPERTY OF THE	μs/cm % mgA mgA mgA mgA mgA mgA mgA mgA mgA mgA		>0.5 >250		0.5 250	6 1 4 10 1 6 1 1 1 1 1 1 1 1	7710 9.2 58 3100 390 850 19 10 2600	9.2 15.5 861.8 390.0 317.1 19.0	3 8	75 80 0	0.05	0.05	3315	5580			3275			1354				58	1.8	7	7710	
IEROFICAL CONDUCTIVITY  INTERPRETATION OF THE PROPERTY OF THE	% mgA mgA mgA mgA mgA mgA mgA mgA mgA mgA		>0.5 >250		0.5 250	1 4 10 1 6 1 1 1	9.2 58 3100 390 850 19 10 2600	9.2 15.5 861.8 390.0 317.1 19.0	3 8	75 80 0			3315	5580			3275			1354				58	1.8	7	7710	
Immonia m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makalini m	тдл тдл тдл тдл тдл тдл тдл тдл		>250		250	4 10 1 6 1 1 1	58 3100 390 850 19 10 2600	15.5 861.8 390.0 317.1 19.0	3 8	80 0			300			0.2								58	1.8			
Immonia m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makaliniy m Makalini m	тдл тдл тдл тдл тдл тдл тдл тдл тдл тдл		>250		250	10 1 6 1 1 1	3100 390 850 19 10 2600	861.8 390.0 317.1 19.0 10.0	3 8	80 0			300											58	1.8			
Districte m Maclairity m m Sulphate m Sulpha	тдл тдл тдл тдл тдл тдл тдл тдл тдл тдл					1 6 1 1 1	390 850 19 10 2600	390.0 317.1 19.0 10.0	2	0			300			2				1			0.2		200			
Mealinky	тдл тдл тдл тдл тдл тдл тдл тдл					6 1 1 1	850 19 10 2600	317.1 19.0 10.0	2	0 33 0				260		28	310	300		1300	240		2400	3100				1
Julphate m DIOD	mg/l mg/l mg/l mg/l mg/l mg/l mg/l mg/l		>250		250	1 1 1	19 10 2600	19.0 10.0	2	33 0						390												1
DOO mode Saids of the Saids of	mg/l mg/l mg/l mg/l mg/l mg/l mg/l mg/l					1 1 1	19 10 2600	19.0 10.0		0			850	1.9			850	0.66		200	0.17							1
DOD  misspended Solids m folds Organic Carbon of m folds Organic Carbon of m folds Organic Ninopan  listolved solids m folds organic Ninopan  listolved solids m folds folds folds  wrearing  μ barkum  μ μ  Divronium  μ μ  Chronium    Chronium    Chronium    Chronium    Chronium    Chronium     Chronium    Chronium     Chronium     Chronium      Chronium	mg/l mg/l mg/l mg/l mg/l mg/l µg/l µg/l µg/l					1	2600	10.0								19												
Suspended Salder  Faled Organic Carbon m  Faled Organic Nillogen m  Sesolved soldis Medesta (rolla)  resenic μ  Safrium μ  Safrium μ  Safrium μ  Catenium μ  Cate	тдл тдл тдл тдл µдл µдл µдл µдл µдл µдл					1	2600					i .	1			10	1											<b>T</b>
Total Organic Carbon Total Organic Nitrogen m Total Organic Nitrogen m Total Organic Nitrogen m Medals (cotal) Nasanic μ Jadrinum μ Jadmium μ Copper μ Con	тдл тдл тдл µдл µдл µдл µдл µдл					1						1	1			2600	1					t	t					t
Total Crganic Nitrogen m Dissolved solids m Metala (total) Vrsenic μ Sarium μ Jadmium μ Jadmium μ Joopper μ Copper μ Co	тдл ндл ндл ндл ндл ндл ндл							5.0		0		l	1	<b>†</b>		5	1						1					1
Левойчей solids m  Metals (Iotal)  Verenic	тgЛ µgЛ µgЛ µgЛ µgЛ						0.7	0.7						<b> </b>		0.7	t	<b>-</b>	<b>-</b>			<b>†</b>	<b>†</b>			-		+
Metals (total)  Insenic	µдл µдл µдл µдл					1	660	660.0		0			1	<b>+</b>		660	1			-		<b>!</b>	<b>!</b>			+		+
Дизеліс   Дитим   Дит	µg/l µg/l µg/l µg/l						000	000.0		0			l			000	1											
Barium	µg/l µg/l µg/l µg/l					4	440	207.5				1	1-10	110	70		1					_	_			-10	440	Tota
Cadmium         μ           Chromium         μ           Copper         μ           ron         μ           .ead         μ	µдЛ µдЛ µдЛ						440	207.5		0		ļ	<10	110	/0		<del>                                     </del>					<u> </u>	<b>!</b>			<10 4	440	210
Chromium   μ   Copper   μ   μ   μ   μ   μ   μ   μ   μ   μ	µдЛ µдЛ					4	440	260.0		0		l	l		110		1		440			80						410
Copper         μ           ron         μ           .ead         μ	µg/I					12	11000	1588.3		0			12	1500	3300		11	360	11000	17	150	120				190 1	1100	1300
ron μ ead μ						2	19	14.5		0					10				19			<10						
						12	1400	292.5		0			8.3	16	88		5	820	200	8.5	230	46				7.6 1	1400	680
	µg/I					8	86000	25552.5		0			<10		2200		10	29000	86000		3500	2700				10 8	81000	
'ercury II	µg/I					12	72000	12529.8		0			13	9700	1800		16	16000	72000	48	4300	2200				280 2	28000	16000
	µg/I					2	11	5.8		0					<0.5				11			0.5					_	
	µg/I					9	49	24.2		0			20	23	49		20	20	26	20	20	20						
	mg/l					0	0																					1
	µg/I					9	40	11.9		0			2.8	8.8	40		2.9	5.6	10	22	5.4	10						
Sodium m	mg/l					0	0															-						+
	µg/I	>40		40		11	98000	32375.5	11	100			2100	15000	31000		930	11000	98000	1000	4100	4000				is in	97000	92000
	mg/l		-	40		12	10	4.2	- "	100	10	10			0.28							2.7				0.01		4.3
Beryllium m	mg/l	-	-			12	10	4.2		U	10	10	0.01	0.3	0.28		0.01	7.5	4.0	2.2	2.0	2.7				0.01	$\overline{}$	4.3
Metals (dissolved)	mgn											-		-		ļ		ļ	ļ	-							-	
	μg/Ι	>25		25		8	1200	224.0		75	180	32				<10	13	210	1200	24	78	55						
		>20	-	20		2	140	130.0		/5		140				<10	13	210	1200	24	/8	55					$\overline{}$	+
	µg/I																											+
	µg/I	>7000		7000		2	2900	1680.0	0			460																+
	µg/I	>2.5		2.5		8	1800	337.2	7	88		16			1800	75			94	5.1	26	680						
	µg/I	>15		15		3	16	9.0	1	33	16	1				10												
	µg/I	>5		5		7	230	47.0	5	71		7.1			43				31	3	13	230						
	µg/I	>1000		1000		3	510	436.7	0			320				480												
	µg/I	>25		25		8	9300	1407.9	5	63		150			1000	50	1		740	10	10	9300						
	µg/I	>30		30		3	20	10.5	0	0	5.2	6.3				20												
	mg/l					4	100	63.0	0	0						11							97	100	44			
	µg/I		>10		10	8	83	26.5	0			83			25	2			10	6.3	10	28						
	µg/I					8	16000	4528.8	0			180			16000	1900			1500	390	680	15000						
Mercury (dissolved) µ	μg/I	>0.3		0.3		6	1	0.4	3	50	0.01	0.02			0.22	1			0.5			0.5						
	mg/l					0			0																			
Caesium (dissolved) m	mg/l					5	15	5.1	0	0			1	l	0.24			4	3.8		2.4	2.4	1			1	15	
Sodium (dissolved) m	mg/l		>200		200	1	29	29.0	0	0						29												
PAH									0																			
	µg/I	>5		5		1	0.01	0.0	0	0		0.01																
	µg/I					1	0.01	0.0	0	0		0.01	1				1											<b>T</b>
	µg/I					1	0.01	0.0	0	0		0.01	i e			l	1			1							-	
	µд/I					1	0.01	0.0				0.01		<b> </b>		<b>-</b>	<del>                                     </del>	<b>-</b>	<b>-</b>			<b>†</b>	<b>†</b>					+
						1	0.03	0.0	-	0		0.03		<b> </b>		<b>-</b>	<del>                                     </del>	<b>-</b>	<b>-</b>			<b>†</b>	<b>†</b>			-		+
	μg/l						0.03	0.0	U	0		0.01	<del> </del>	-				<b>-</b>	<b>-</b>			<del>                                     </del>	<b>+</b>			-		+
	μg/Ι					1	0.01	0.0	0			0.01	1	-			1	-	-			<del>                                     </del>	<del>                                     </del>	<b> </b>		-		+
	μg/Ι								0	0			1	-			1	-	-			<del>                                     </del>	<del>                                     </del>	$\vdash$				+
	µg/I					1	0.04	0.0	0	0		0.04	ļ				1											-
Benz [a] anthracene μ	µg/I					1	0.02	0.0	0	0		0.02	ļ				1											-
Chrysene μ	µg/I					1	0.02	0.0	0	0		0.02					<b>I</b>						ļ					
Benzo [b] fluoranthene						1	0.02	0.0				0.02		1		1	1	1	1			1	1					
	µg/I								0	0			ļ				1											-
Benzo [a] pyrene μ	µg/I					1	0.01	0.0	0	0		0.01	1				1											
	µg/I					1	0.01	0.0	0	0		0.01	1				1											
	µg/I								0			0.01	1				1											
	µg/I					1	0.02	0.0	0	0		0.02											1					
Fotal 16 PAH Reported µ	µg/I		>0.1		0.1	1	0.22	0.2	0	0		0.22	_			1				1		1	1	1 7		1		1

Notes:

"- Costatal and Estuarine Environmental Quality Standards (EQS)

"- Water Supply Regs 2000 (where EQS not available) or 1989

DWS - Drinking Water Standards

EQS - Environmental Quality Standard

MG - Made Gound

Mathematical   Mat	lan Farmers (	as Monitoring 2	004/200	5							
## 1	Borehole	Strata within Borehole Capture Zone	Monitori	ing parameters	Mar-04	Anr.04	hun-04	Date monitored	Aug-04	San Al	lan-05
# 1		-	Atmospheri	c pressure (mb)			Junea	301-04	Aug-04	вереч	3411-05
### Page of the control of the cont							1				
## 18   19   19   19   19   19   19   19					1						
## 18					20.4		i				
### Part		Baro of Tidal Flat		% by volume	0	0					
## 100   Page		deposits including sand	CO2		0	0	1				
### Page 1	BH1	(2.55 m) and top of Memia Muristone Group			1	1	Unable to locate	Destroyed	Destroyed	Destroyed	Destroyed
### Part   Part		deposits (0.2 m)		% by volume in air	0	0	1				
### 180   10   10   10   10   10   10   10			CH4		0	0					
## 14				Characteristic Situation	1	1					
### Page			H2S (ppm)		0	0					
### Part   Part			CO (ppm)		0	0					
## Page 17 Gar Page 19   1											
## 14 Page 1 7 3 1 6 1 7 3 1 7 3 1 8 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9			_	ster (m)			3.83	4.1			
### Page 1 Fig.   1							0	0			
### 14 Part 1 Fair 1 F			02%	% by volume						20.9	
### Minimary 12 - 17 19		Base of Tidal Flat	000	in air			4.5	3.8		0	
### Part   Part	BH2	deposits including sand horizon 13.8 m - 17.7 m	UU2	Characteristic	0.0072	0.0045			0.0033		-0.0369
### Part   Part		(3.9 m)		Situation % by volume	50.0	51	52.2	40.5	21.1	0	79
### Part			CH4	in air			0	0		0	
Manual		1		Characteristic	2	1	1	1	1	1	1
Manual   M		1	H2S (pnm)	Situation	0	0	0	0	0	0	0
March   Marc					0	0	0	0	0	0	0
### Manual Professor (Professor				c pressure (mb)	1028	1008	1030	1018	998	1017	
### Part		1									
### 1841 - 1										18.6	
### March 1764 Pfm		1				0		0			
Marco of Card Team   100		1		% by volume in air		0		0.3			
### Disposits and fractions (A. In. 1922 of 1945)  **Processing of the Company of the Company of Co		Base of Tidal Flat	CO2			0		0			
### 150 points   1	ВН3	deposits, sand horizon 14.7 m - 19.2 m (4.5 m)	Ì	Characteristic Situation	1	1	1	1	1	1	Destroyed
Plate   Description   Plate   Description   Plate   Description   Plate   Description   Plate   Plate   Plate   Description   Plate				% by volume in air	0.7	0	0	0.1	0.5	0.1	
## Mod grow   P			CH4	GSV	0.0007	0	0	0	0.0005	0.0009	
## Mod grow				Characteristic Situation	1	1	1	1	1	1	
### Part   Part			H2S (ppm)		0	0	0	0	0	0	
### Part Plat disposit 130-  ### Plat Plat Plat disposit 130- ### Plat Plat Plat disposit 130- ### Plat Plat Plat disposit 130- ### Plat Plat Plat disposit 130- ### Plat Plat Plat disposit 130- ### Plat Plat Plat disposit 130- ### Plat Plat Plat disposit 130- ### Plat Plat Plat disposit 130- ### Plat Plat Plat disposit 130- ### Plat Plat Plat disposit 130- ### Plat Plat Plat Regions 130- ### Plat Plat Plat Regions 130- ### Plat Plat Regions 130- ### Plat Plat Regions 130- ### Plat Plat Regions 130- ### Plat Plat Regions 130- ### Plat Plat Regions 130- ### Plat Plat Plat Regions 130- ### Plat Plat Plat Regions 130- ### Plat Plat Plat Plat Regions 130- ### Plat Plat Plat Regions 130- ### Plat Plat Plat Plat Regions 130- ### Plat Plat Plat Regions 130- ### Plat Plat Plat Plat Regions 130- ### Plat Plat Plat Plat Regions 130- ### Plat Plat Plat Plat Plat Plat Plat Plat			CO (ppm)		0	0	0	0	0	0	
### Part Plant appears 100- ### Plant Plant					1028						
Total Flat disposals (18)   1			Depth to wa	ster (m)	3.12						
### Published For Appendix State   For Appendix Sta			O2%		20.5						
### Part   Part			Flow (Vh)		0						
### Part disposals 10 - 10 - 10 - 10 - 10 - 10 - 10 - 10				in air	0.1						
### Part disposals 10 - 10 - 10 - 10 - 10 - 10 - 10 - 10	GW7	Tidal Flat deposits (Silt) C Sand horizon 14.8 m -	CO2		0	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed
### Part   March   Mar		18.4 m (3.6 m)		Situation	1	ļ					
Part   Part		c		in air	0.4	ļ					
March   Marc			CH4		0						
BH41   Flat   Flat (spools 1.5)   Copy   C				Situation	1						
### DB40    Part   Ford (posed 13.3)   Part   Part (posed 13.3)   Part   Part (posed 13.3)   Part   Part (posed 13.3)   Part   Part (posed 13.3)   Part   Part (posed 13.3)   Part   Part (posed 13.3)   Part   Part (posed 13.3)   Part   Part (posed 13.3)   Part   Part (posed 13.3)   Pa			_		0						
### Part   Face   Face deposed 13.3   1.2				(mb)	U						
### Part Field (spool 11-3) ### Part (spool											
Part   Part				aur (m)							
Teal Flat disposit 13, 100   200											0
### Part For dispose 1.3—   COS   CO				% by volume							41
### 1			CO2								0
State   Stat	BH43	18.0 m (4.7m)		Characteristic							1
Description   Description		1		% by volume							59.9
#Manual Part		1	CH4								0
Part   Part		1		Characteristic Situation							1
CO (ppm)			H2S (ppm)								0
### Part disposits 10 ### Pa		<u></u>	CO (ppm)								0
Pos (th)   Pos (th)			Atmospheri	c pressure (mb)							1034
### Page (1)		1	Depth to wa	ater (m)							2.94
### Table File deposits 10—0026											
### Part of Each of Ea		1	Flow (Ih)								
### Part of Each of Ea		1		% by volume in air							
Pack of (state)   Packetalists	BH44	Tidal Flat deposits 10.0 -	CO2	GSV							0.0016
CH   CON		in (iaum)		Situation							1
Desiration   Des		1		>> by volume in air	ļ	ļ	ļ	ļ	ļ	ļ	0
### District   Coll (print)		1	CH4		ļ	ļ	ļ	ļ	ļ	ļ	0
Management pressure (refs   1005				Situation	ļ	ļ	ļ	ļ	ļ	ļ	1
Maniciphotic pressure (mb)   1005   1007		1			ļ	ļ	ļ	ļ	ļ	ļ	0
VIS44   Made Chount depost 0 - 5   2 on (1.5m)   3 on (1		ļ			<b> </b>						
No.   No.		1			<b> </b>						
WS44 Made Ground depost 0.6-D02   15-by valume   0.1		1		ster (m)	<del>                                     </del>	<del>                                     </del>	<del>                                     </del>	<del>                                     </del>	<del>                                     </del>	<del>                                     </del>	
WS44 Nade Crowd depost 0.5-022   5. by Verlands   5.1		1			<b> </b>	18.9					
W544 Made Critical deposit 0.5 Page 1		1	rlow (Ih)	1% by yolume	ļ	ļ	ļ	ļ	ļ	ļ	0
W944 Page 1 Page		1	000	in air	<b> </b>	0.1					
Statem	WS44	Made Ground deposit 0.5- 2.0m (1.5m)	JU2		<del>                                     </del>	<del>                                     </del>	<del>                                     </del>	<del>                                     </del>	<del>                                     </del>	<del>                                     </del>	
10 at		1	-	% by volume	<b> </b>						
Constitution			CH4	in air	<b> </b>						
H2S (ppm) 0		1			<b> </b>	1					
		1	H2S (nom)	Situation	<b> </b>						
			CO (ppm)								

#### GAS MONITORING RESULTS

Contract No: 723110 Contract Name: ACCESS 18, AVONMOUTH

STRUCTURAL SOILS LTD Contract Engineer: TP Date: 12/06/09

	nditions: OVEF Wind Conditi re: Falling					Equipment u	sed: LMXsi							Data Collect	ed By: BOB I	DAVIES		Input Check	ed by (sign):	
		, flooded, frost,	snow etc): D	RY											(nnm)		to water (m			Notes (eg,
	[] [] [] [] [] [] [] [] [] [] [] [] [] [			Ti	me										(ppm)		bgl) (for a	Well depth	Top of	samples
Location	Flow (I/hr) (peak and residual) [	Atmospheric Pressure (mb)	BH Pressure	hours	secs		Methane			Carbon Diox	ride	Oxygen	LEL (%)	H2S	СО	PID	period of time (specify)	(mbgl) Current and [as	Response zone (m	taken, dual installation, odours,
	] = time period	11000010 (1110)	(mb)	mins	3003	% by volume in air	GSV	Characteristic situation	% by volume in air	GSV	Characteristic situation	% by volume in air		1120			following tap removal)	installed]	bgl)	sheens, broken headworks)
BHNES01	-0.4	1018	1016		0 (initial)	0.0			0.0			20.8		0.0	0.0		0.78	0.9 [1.0]		Too shallow to sample.
	0.0	1018	1018		15	0.0			1.7	-		17.0		0.0	0.0		1			to sample.
	[2 secs]				30	0.0			1.9	1		16.7		0.0	0.0		-			
					60	0.0	0		1.9			16.7		0.0	0.0		1			
					90	-	0	1	-	0	1	-		-	- 0.0		1			
					120	_			_			_		_	_					
					180	_			_			_		_	_					
					240	_			_	-		_		_	_					
BHNES03	-0.4	1017	1015		0 (initial)	0.0			0.0			20.5					1.05	1.4 [1.5]		Tap open Sampled.
	0.0	1017	1017		15	0.0			0.0			19.9								
	[3 secs]				30	0.0			0.0			19.9								
					60	0.0	0	1	0.0	0	1	19.9								
					90	-			-			_								
					120	-			-			-								
					180	-			-			-								
		1018			240	-			-			-								
BHNES06	21.7	1018	1143		0 (initial)	0.0	Pe	ak flow	0.0	Pe	ak flow	20.6		0.0	0.0		2.18	7.87 [12.0]		Sampled.
	0	1018	1018		15	66.0			2.5			3.1		0.0	0.0		1			
	[5 secs]				30	69.0	14.97	,	3.8	1		0.6		0.0	0.0					
					60	66.0	14.97	4	3.6		3	0.1		0.0	0.0					
					90	59.0			3.2			2.7		0.0	0.0					
					120	56.0	Resi	dual flow	2.9	Res	idual flow	3.9		0.0	0.0					
					180	51.0			2.5			5.5		0.0	0.0					
					240	48.0			2.2			6.4		0.0	0.0					
					300	43.0	0	1	2.0	0	1	7.9		0.0	0.0					
					360	40.0			1.9			9.1		0.0	0.0					
					420	40.0			1.8			9.1		0.0	0.0					
BHNES07	-0.4	1017	1016		0 (initial)	0.0			0.0			20.6		0.0	0.0		2.79	2.88 [3.0]		Too shallow to sample.
	0.0	1017	1017		15	0.0			0.0			19.8		0.0	0.0					
	[2 secs]				30	0.0			0.0			19.6		0.0	0.0					
					60	0.0	0	1	0.0	0	1	19.6		0.0	0.0					
					90	-			-	]		-		-	-					
					120	-			-	]		-		-	-					
					180	-			-	]		-		-	-					
					240	-			-			-		-	-					

#### GAS MONITORING RESULTS

Contract No: 723110 Contract Name: Access 18, Avonmouth Contract Engineer:TP Date:26/06/09



Atmosphe	eather Conditions: Overcast mospheric Wind Conditions: Light M Pressure: Rising ound Conditions (eg dry, flooded, frost, snow etc): Dry					Equipment used: LMXsi									lected By	: BD		Input Checked	by (sign):	
Ground C	onditions (eg	dry, flooded, fro	st, snow etc	c): Dry		1									(nnm)					
	Flow (I/hr)			Time	е										(ppm)		Depth range to	Well depth		No.
	(peak and	Atmospheric	ВН				Methane	!		Carbon Die	oxide	Oxygen					water (m bgl) (for a period of time	(mbgl) Current and	Top of Response	Notes (eg, samples taken, dual installation,
Location	residual) [ ] = time	Pressure (mb)	Pressure (mb)	hours mins	secs	% by			% by			% by	LEL (%)	H2S	со	PID	(specify) following tap removal)	[as installed]	zone (m bgl)	odours, sheens, broken headworks).
	period		, ,			volume in air	GSV	Characteristic situation	volume in air	GSV	Characteristic situation	volume in air					tap removal)			
BHNES	-0.2	1009	1008		0	all			III ali			III ali					DRY	0.88 [1.0]		
01	0.0	1009	1009		(initial)	0.0			0.0			20.6		0	0		4			
	[2 secs]	1009	1009		15	5.0			3.7			14.1		0	0		4			
	[2 5005]				30	5.1			3.8			13.9		0	0		1			
					60	5.4	0	1	3.9	0	1	13.7		0	0		1			
					90	5.6			3.9			13.7		0	0		4			
					120	6.1			3.9			13.2		0	0		-			
					180	6.1			3.9			13.2		0	0		-			
BHNES	0.3	1009	1010		240					_							1.15	1.52 [1.5]		
03					(initial)	0.0	Pea	ak flow	0.0	Pe	ak flow	20.5		0	0			[]		
	0.0	1009	1009		15	0.0			0.0			18.6		0	0					
	[2 secs]				30	0.0	0	1	0.0	0	1	18.9		0	0					
					60	0.0			0.0			19.1		0	0					
					90	0.0	Resid	lual flow	0.0	Resi	dual flow	19.2		0	0					
					120															
					180		0	1		0	1									
					240															
BHNES 06	0.7	1009	1012		0 (initial)	0.0	Pea	ak flow	0.0	Pe	ak flow	20.6		0	0		2.2	7.77 [12.0]		
•	0	1009	1009		15	56.0			3.0			4.2		0	0		1			
	[4 secs]	<u> </u>			30	41.0	0.39	2	2.1	0.02	1	7.7		0	0		1			
		1			60	34.5			1.8			9.8		0	0		1			
					90	29.0	Resid	lual flow	1.9	Resi	dual flow	11.5		0	0		1			
					120	28.0			1.5			11.9		0	0		1			
					180	23.0	0	1	1.2	0	1	13.4		0	0					
					240	21.0			0.9			14.0		0	0					
BHNES 07	0.4	1009	1015		0	0.0	Pea	ak flow	0.0	Pe	ak flow	00.5					2.79	2.83 [3.0]		
0,	0.0	1009	1009		(initial) 15	0.0			0.0		1	20.5		0	0		1			
	[3 secs]				30	0.0	0	1	0.0	0	1	20.2		0	0		†			
					60	0.0	-		0.0	1		20.2		0	0		1			
						0.0	Resid	lual flow	0.0	Reci	dual flow	20.2					1			
					90		116310			11031	Juan 11011						1			
					120		0	1		0	1						-			
					180		U	'			'						1			
					240					<u> </u>		L	L	l	L		L			