The City and County of Swansea

Mumbles Coastal Scheme

Ground Investigation Report – Promenade (Phase 1)

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1 Introduction

The City and County of Swansea (CCS) have appointed Ove Arup and Partners (Arup) to review coastal flood and erosion risk at Mumbles Sea Wall. Arup completed the original Outline Business Case (OBC) in July 2017 and funding for the scheme was subsequently granted. Arup were reappointed to undertake further development of the scheme including refinement of the scheme design and intrusive ground investigation works. The proposed study area is shown on Drawing 1.

This Ground Investigation Report (GIR) has been prepared following completion of the promenade ground investigation undertaken by WYG in June 2019.

The purpose of the report is to summarise and interpret the factual results of the ground investigation, and also provide initial geotechnical and geo-environmental recommendations relating to the scheme proposals which are still currently undergoing development and have yet to be confirmed.

This report also provides a materials reuse assessment, and waste assessment to inform offsite disposal options for materials that may arise as part of the development.

1.1 Background and project scope

The Mumbles sea wall and revetment between Knab Rock to a point North of Oystermouth Square and the Dairy Car Park runs for some 1.2km. CCS completed a visual inspection of the sea wall in 2007, which was updated in 2010. It was estimated based on a qualitative assessment that without remedial actions that the wall had a residual service life of between 15-20 years.

The long-term plan for Mumbles is to continue to manage the risk of coastal erosion and flooding i.e. ‘hold the line’. The shoreline management plan states that existing defences will be maintained and upgraded along their current alignment, if funding is available and the necessary consents, licences and approvals obtained.

The aims of the scheme are to not only provide a flood defence betterment but also provide wider benefits for regeneration and tourism. The scheme will consider regeneration improvements to the promenade, creating a sustainable and attractive waterfront; an asset to the local community and an attraction for visitors.

The study area has been identified as being at risk to coastal flooding. There is a low secondary defence wall set back from the sea wall. Access is maintained through a series of tidal flood gates, operated by CCS at times of tidal flood warning.

The available historical and desk-based information for the site has been reviewed and is presented in the geotechnical desk study report **[1]**.

2 The site

2.1 Site location and description

The site is located in Mumbles on the western side of Swansea Bay at National Grid Reference SS618880 and as shown on Drawing 1. The site comprises a 1.2km long section of the promenade. The promenade level varies but is typically at around 6mOD. The ground rises up away from the coastline and does so steeply in the southeast end of the study area forming a cliff face.

In the northern end of the site, the sea wall is vertical and of mass concrete construction. Along part of its length, a small concrete parapet wall is also present. In the central and south-eastern parts of the site, there is a concrete revetment sloping down from the promenade level to the beach.

Along the promenade is a combined footpath and cyclepath. The path is bounded directly to the west by areas of watercraft storage, car parks, Southend Gardens, existing residential properties and highways. Within the study area there are 3no. slipways.

Environmental sites of importance onsite and immediately adjacent to the site include; Blackpill SSSI, Oystermouth Quarry SSSI, Mumbles Hill LNR and the Gower AONB (see Desk Study Report **[1]** for further information).

2.2 Proposed Development

Although the preferred option is currently under further development, it is anticipated that the proposed scheme will include:

- For the vertical sea wall, replacement and raising of the parapet wave wall and erosion protection measures at the wall toe.
- For the sloping revetment, construction of a new wave wall at the top of the slope and replacement / reinforcement of the sloping revetment including toe erosion protection measures
- Where required, ground raising along the promenade to limit the above ground height of the parapet / wave wall to 0.85m.
- Raising of the existing secondary wave walls which may require them to be replaced
- Where the promenade is too narrow, widening of the promenade through the construction of a new sea defence structure.

A value engineering exercise is currently being undertaken for the preferred option including consideration of reinforced earth walls. It is proposed to re-use site won materials where possible on the scheme.

2.3 Site history

A detailed summary of the site history from Ordnance Survey (OS) plans dating from 1830 to present day, supplemented by aerial photographs and local history sources is presented in the desk study report [1]. A brief summary of this is provided below

- Prior to 1880: Mumbles was a small fishing village and the site was largely undeveloped and open farmland. The Mumbles Railway terminated at the northern end of the site.
- 1880 to 1910: Mumbles began to develop and grew in size. In the central part of the site, land was reclaimed along the coastline to the approximate position as it is in the present day. The tramway was present through the site to Mumbles Pier. It is anticipated the promenade wall and revetment were constructed around the turn of the century.
- 1910 to 1970: Mumbles continued to develop. An asbestos factory was present approximately 80m from the promenade in the central part of the site. The tramway ceased operation and was removed in the 1960s.
- Post 1970 – No significant change.

A number of historic land uses have been identified as having the potential to cause land contamination at the promenade (from review of the GroundSure report and historic maps [1]) these are further listed in Section 2.8 below.

2.4 Ground Conditions

The 1:10,560 and the 1:50,000 geological maps have been reviewed as part of the Desk Study Report [1].

In summary, the bedrock is indicated to be Oxwich Head Limestone in the south-eastern end of the site. Across the central sections of the site the bedrock is indicated to be the Oystermouth Formation, comprising of interbedded limestone and mudstone, and also the Bishopton Mudstone, comprising mudstone, siltstone and sandstone. The bedrock is indicated to be the Oystermouth Formation in the northern end of the site. The direction of the dip of the bedrock is shown to be towards the coastline and varies from around 25º in the north of the site to 50º to 80º in the southeast of the site. 4no. faults are shown in the central and southeast end of the site and strike in a approximately north to south direction. One fault is shown in the north of the site and strikes in a west to south direction and is downthrown on the western side.

Marine Beach Deposits comprising sand, silt and clay are shown to be present along the coastline in front of the promenade wall. Behind the promenade, in the south-eastern area of the site where the cliff face is present no superficial deposits are indicated. In the central and northern end of the site Glaciofluvial Ice Contact deposits comprising sand and gravel are indicated to be present. In the far northern end of the study area, a small area of Devensian Till is indicated to be present. A small strip of Made Ground is indicated to be present along the

coastline in the central part of the site and is indicated to be reclaimed land with the previous coastline being approximately 75m inland. There is also the potential for made ground to be present as backfill to the sea wall and beneath the revetment.

2.5 Hydrology and Hydrogeology

Hydrology

The Bristol Channel is present to the east of the site. On the Detailed River Network map and OS map there are no watercourses within the site. A secondary river is present 250m to the north of the site and is culverted along part of its length.

Hydrogeology

The aquifer designation for the superficial deposits is as follows:

- Whole scheme area eastern boundary: Marine Beach Deposits: Secondary aquifer - undifferentiated layers (assigned where it is not possible to attribute either category A or B).
- Central scheme area: Glaciofluvial Ice Contact deposits: Secondary A aquifer - permeable (capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers).
- Very north, south and west of the scheme area: Devensian Till: Unproductive (low permeability deposits that have negligible significance for water supply or river base flow).

The aquifer designation for the bedrock is as follows:

- South scheme area: Oxwich Head Limestone: Principal Aquifer (high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale).
- North scheme area: Oystermouth Formation and Bishopton Mudstone Formation: Secondary A aquifer - permeable layers (capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers).

The site does not lie within a groundwater source protection zone and there are no groundwater or potable water abstraction licenses within 1km of the site.

2.6 Mining and cavities

The site lies outside of the South Wales coalfields. The Groundsure report did not identify any coal mining areas within 75m of the site.

2no. historic quarries have been identified from the historic maps in close proximity to the southwest boundary of the site.

The Groundsure report has identified a zone immediately to the east of the site which is classified as likely to highly likely of mineral mining.

The site has been identified as being mined for hematite and fluorspar with access gained via shafts and adits [4]. Four veins are reported to be present within the limestone, the main one being up to 4.3m in thickness. It is also reported that trials were undertaken in 1855 for lead ore which were unsuccessful and therefore were abandoned[4].

There is the potential for natural cavities to be present within limestone bedrock. The Ground Dissolution Soluble Rocks Map indicates the potential varies from very low to moderate within the study area. A natural cavity within the limestone has been identified near the northern boundary of the site.

No sites of metalliferous, evaporates or chalk have been identified [4].

2.7 Unexploded ordnance

Based on preliminary searches, there has been historic military activity in Mumbles during WWII including:

- Battery on Mumbles Head which was in use from 1861 to the 1950s [9]
- Stationing of American GIs in Mumbles [10]
- Barracks anti-aircraft guns positioned on Mumbles Hill [11]

In addition there are recorded bombings of Mumbles (both high explosives and incendiary bombs) [12] and the area has been classified as high risk by Zetica bomb risk maps [13]. As the area has previous military use, it is anticipated that a detailed UXO risk assessment will be required in accordance with CIRIA C683[14] depending on the scale and nature of intrusive works proposed

2.8 Contamination Potential

The desk study[1] included a review of available historical Ordnance Survey (OS) plans dated 1830 to present day and other information which was used to identify potentially contaminative historical land uses within the site area.

The desk study highlighted the following potential sources of contamination onsite and within close proximity to the site:

Made Ground: associated with land reclamation in the central part of the site and backfill to the sea wall and beneath the revetment and the historical use as a tram way (associated sidings and depots). Infilled quarries have also been noted in the north of the scheme.

Discharge consents: A number of discharge consents have been identified on or within 250m of the site, typically associated with sewer storm overflow to the foreshore.

Pollution Incident: One pollution incident was recorded approximately 50m from the promenade wall in the northern part of the site. The incident occurred in 2003 and was crude sewage.

Historic Land Use: A number of historic land uses have been identified from review of the GroundSure report and review of historic maps as part of the Desk Study Report. In summary, as discussed in Section 2.3 above, the western promenade was subject to historic land reclamation undertaken in the 1890s. It was subsequently developed and a historic railway and tramway with associated sidings and coal depot within the western promenade area of the scheme. Other historic features of the scheme are include a historic quarries (now infilled) present within the north west and south east areas of the scheme. A railway station was historically present in the south east promenade. Historic garages were also present along the central boundary of the site area. Offsite an historic smithy is also noted to be present in the far south east within 250m of the site as are historic tanks. An historic asbestos factory is also noted to have been present approximately 80m from the promenade in the central part of the site.

Current Industrial Land Uses: Within 50m of the site a quarry (noted to now be disused), 3no slipways and an electricity substation at the east of the promenade were noted to be present.

2.8.1 Preliminary Conceptual Site Model Summary

The UK framework endorses the principle of a 'suitable for use' approach to contaminated land, where remedial action is only required if there are unacceptable risks to health or the environment, taking into account the use of the land and its environmental setting.

The UK legislation on ground contamination describes a risk assessment methodology in terms of "significant pollutants" and "significant pollutant linkages" within a source-pathway-receptor (SPR) model of the site. The model comprises:

- The principal pollutant hazards associated with the site (the sources);
- The principal receptors at risk from the identified hazards; and
- The existence, or absence, of plausible pathways which may exist between the identified sources and receptors.

For land to be determined as contaminated and require remediation (or possibly a change to less sensitive use), all three elements (source-pathway-receptor) of a significant pollutant linkage must be present.

Based on the desk study information as presented above, a preliminary conceptual site model (CSM) for the site has been prepared and is presented below.

2.8.2 Sources

As discussed in the section above, the following potential sources of contamination have been identified across the site based on review of the site history and relevant desk study information [1]:

- **Made Ground**: associated with land reclamation in the central part of the site and backfill to the sea wall and beneath the revetment. Made ground is considered a potential source of metals, pH, organics including total petroleum hydrocarbons, polycyclic aromatic hydrocarbons, phenol, cyanide, volatile and semi volatile organic compounds and also asbestos. Made ground is also considered a potential source of ground gas.
- **Historic industrial land uses** including railway sidings, station, coal depot, quarries, smithy, asbestos factory. Potential contaminants associated with this land use includes metals, phenols, petroleum hydrocarbons and PAHs, PCBs, VOCs and SVOCs, organics, and asbestos.
- **Discharge consents:** Storm sewer overflows.
- **Pollution Incidents:** Crude sewage (noted to have a minor impact on water in an event in 2003)
- **Current Industrial Land Uses:** Within 50m of the site a quarry (disused), a waste storage and processing facility, 3no slipways and an electricity substation were noted to be present. Potential source of contamination originating from these land uses include; made ground which may be contaminated with metals, pH, organics including total petroleum hydrocarbons, polycyclic aromatic hydrocarbons, phenol, cyanide and volatile and semi volatile organic compounds, PCBs (substation) and asbestos.

2.8.3 Receptors

The most sensitive receptors identified within or in close proximity to the proposed works include:

During Construction

- Construction workers
- Members of the public
- Environmental receptors onsite / immediately adjacent to the site; Blackpill SSSI, Oystermouth Quarry SSSI, Mumbles Hill LNR, Gower AONB
- Swansea Bay / Bristol Channel
- Groundwater - Oxwich Head Limestone: Principal Aquifer, Marine Beach Deposits: Secondary aquifer, Glaciofluvial Ice Contact deposits: Secondary A aquifer, Oystermouth Formation and Bishopton Mudstone Formation: Secondary A aquifer

During Operation / Post Construction

Should materials be reused onsite the following are the most sensitive receptors to the site;

- Maintenance workers involved in future intrusive works.
- Potential areas of landscaping (vegetation / ecology)
- Site end users (in areas of potential landscaping)
- Environmental receptors onsite / immediately adjacent to the site; Blackpill SSSI, Oystermouth Quarry SSSI, Mumbles Hill LNR, Gower AONB
- Swansea Bay / Bristol Channel
- Groundwater - Oxwich Head Limestone: Principal Aquifer, Marine Beach Deposits: Secondary aquifer, Glaciofluvial Ice Contact deposits: Secondary A aquifer, Oystermouth Formation and Bishopton Mudstone Formation: Secondary A aquifer

2.8.4 Pathways

For a risk to exist, the source and receptors(s) must be connected by a viable pathway. Potential pathways which may be present within the area of the proposed works are identified below:

During Construction

· *Direct soil and dust ingestion*: Construction workers who are dealing closely with excavated soils may come into contact with any potential contaminants through ingestion of soils and dust.

Nearby residents and pedestrians may also ingest dust created during the works.

· *Dermal exposure:* Construction workers who are engaged in ground works and handling of excavated soils may come into skin contact with impacted materials. Significant groundwater is not likely to be encountered within the scheme proposals, based on recent GI. The potential risk for dermal contact with contaminated groundwater is therefore low.

· *Inhalation of vapours or particulates:* Vapours or dust generation of dust through excavation works or stockpiling of materials may impact construction workers. Site neighbours, (local workers, residents and pedestrians) may also be impacted by dust due to proximity of the proposed works to public areas.

-*Soil leachate generation and vertical/lateral migration and direct discharge:* It is possible that rainwater infiltration through potentially contaminated soils may create contaminated leachate during the construction works.
Piling works (should they be adopted – see below) may cause preferential pathways of any potentially contaminated leachate into underlying groundwater bodies.

As previously discussed the preferred development options are currently under consideration. Should piling at the site be confirmed onsite a piling risk assessment or foundation works risk assessment will likely be required for the scheme area.

During Operation / Post Construction

–*Direct soil and dust ingestion:* Maintenance workers who may be dealing closely with excavated soils may come into contact with contaminants through ingestion of soils and dust.

–*Dermal exposure:* Maintenance workers may come into direct skin contact with soils, groundwater and dust generated during works in the subsurface or service trenches.

-*Building Materials:* Building materials may be in contact with contaminated soils and or groundwater (should it be present) post construction.

- *Direct soil and dust ingestion*: Site end users may encounter any potential contaminants through ingestion of soils and dust, should site won materials be reused in areas of soft landscaping.

-*Dermal exposure:* Site end users may encounter any potential contaminants through dermal exposure, should site won materials be reused in areas of soft landscaping.

-*Inhalation of vapours or particulates:* Site end users may encounter any potential contaminants through dermal exposure, should site won materials be reused in areas of soft landscaping.

-*Soil leachate generation and vertical/lateral migration and direct discharge:* It is possible that rainwater infiltration through potentially contaminated soils may create contaminated leachate post construction should areas of soft landscaping be proposed.

3 Previous ground investigation

As part of a condition assessment undertaken in 2007 [5] 16no. shallow trial pits were undertaken along the length of the sea wall in the north of the study area to establish the founding details. The trial pits were undertaken to shallow depth (up to 1.1m) at the toe of the wall. The trial pits included a basic description of the ground conditions encountered, which was most commonly sand and gravel (encountered in 7no. holes) or blue soft clay (encountered in 7no. holes, one of which also contained peat). Granular fill was encountered in the remaining 2no. holes. No evidence of contamination was noted as part of the 2007 GI report and no further description of the granular fill was provided.

The report raised concerns about the sections of the wall founded on soft clay and peaty material and in particular, the effects of groundwater flows beneath the wall under varying tidal conditions impacting on the integrity of the formation soils. The report recommended a detailed study of the groundwater regime and a ground investigation to facilitate the analysis of the groundwater flows and the vulnerability of the formation soils.

4 Completed promenade ground investigation

The promenade ground investigation was undertaken by WYG in June 2019 and the results of the investigation are included in the factual report **[6]**.

4.1 Fieldwork

The scope of the field work for the promenade ground investigation was as follows:

- Geophysical survey of the revetment and promenade to identify voids
- Buried utilities trace along the promenade
- 12no. boreholes with a combined rotary and dynamic sampling rig. Included Standard Penetration Testing (SPT).
- 22. Hand excavated trial pits to investigate shallow ground conditions and geometry of the top of the main vertical promenade wall and the foundation geometry of the secondary walls
- 15no. structural cores to investigate the thickness and backfill to the main vertical promenade wall.
- 6no. groundwater monitoring installation with dataloggers to monitor groundwater pressures behind the coastal defences

4.2 Laboratory testing

4.2.1 Geotechnical testing

The scope of geotechnical testing was as follows:

- Moisture content
- Atterberg limits
- Organic content
- Particle Size Distribution (PSD)
- Oedometer test
- Point Load Index (PLI)
- Uniaxial Compressive Strength (UCS)
- pH and sulphate testing

4.2.2 Geo-environmental testing

A total of 28no. soil samples were obtained and analysed from the site, comprising 24no. samples of made ground and 4no. samples of underlying natural deposits. The samples were analysed for a range of dry weight chemical determinants. In addition, 14no samples were obtained for 2:1 leachate analyses to determine risks posed to controlled water receptors. Inert WAC testing was also undertaken on 6no samples to determine potential off-site disposal options for surplus materials arising as part of the works. The testing suites are outlined below and are considered to target the potential contaminants present on the site associated with the historical development of the site and the presence of made ground.

- Metals (As, Cd, Cr(III), Cr(VI), Cu, Pb, Hg, Ni, Se, Zn);
- Total cyanide;
- Water soluble boron;
- pH;
- Asbestos Screen (and quantification testing where fibres were detected during the screening);
- Speciated Total Petroleum Hydrocarbons;
- Speciated Polycylic Aromatic Hydrocarbons;
- BTEX compounds;
- Polychlorinated Biphenyls (PCBs);
- Total phenols;
- Semi volatile and volatile organic compounds;
- Leachate analyses for metals (Hg, As, Cd, Cr, Cu, Pb, Ni, Se, Zn), pH, phenol, sulphate and poly aromatic hydrocarbons (PAHs);
- Inert waste acceptance criteria suite

4.3 Proposed foreshore ground investigation

A second phase of ground investigation has recently been completed which includes machine excavated trial pits, windowless sampling holes and boreholes

along the foreshore. Results of which are to be reviewed and discussed in a Phase 2 Ground Investigation Report.

5 Encountered ground conditions

5.1 Summary

A summary of the encountered ground conditions is presented in Table 1 below. A geological long section is also presented on Figures 1 to 2.

Table 1 - Summary of encountered ground conditions

Material	Typical elevation of surface	Typical description	Hole Encountered
Made Ground	Existing Promenade Ground Level: 5.8 to 6.6mOD	Pavement underlain by brown – blackish, grey clayey sandy gravel with varying inclusions of ash, brick, clinker, tile, ceramic, slag and glass.	All holes encountered made ground Anthropogenic inclusions including ash, clinker and slag were predominantly recorded within the Western promenade (reclaimed land)
		Deeper clayey Made Ground appears to be reworked Marine Beach Deposits, without any inclusions of man-made materials in the south of the scheme.	More clayey made ground was encountered within the eastern Promenade of the scheme BH09, BH11, BH12, TP19
Marine Beach Deposits	2mOD (approximately corresponding with beach level)	Interbedded soils of variable composition, from silty clays through to slightly sandy gravels. Includes bands of very soft to soft clay and thin bands of fibrous peat encountered in BH07 and BH10	All boreholes
Rockhead	2mOD for Oystermouth Formation in northern end of scheme, reducing to -4mOD to -8mOD moving south for Bishopston Mudstone and Oxwich Head Limestone	Oystermouth Formation: Strong grey limestone with heavy mineral veining. Discontinuities are widely spaced horizontal to sub-horizontal (0-10 degrees) planar rough with occasional mineral infilling.	BH01, BH02
		Bishopston Mudstone: Weathered fractured mudstone and sandstone	BH03, BH06, BH07
		Oxwich Head Limestone: Weathered fractured limestone	BH08, BH09, BH10, BH12

	The variation is rockhead elevation as a result of natural variation along the coastal landform and faulting of the bedrock. From the geological map, the direction of the dip of the bedrock is shown to be towards the coastline and varies from around 25° in the north of the site to 50° to 80° in the southeast of the site

5.2 Made Ground

5.2.1 General

Made Ground was encountered in all exploratory holes. The majority of holes were undertaken in areas of hardstanding with asphalt at the ground surface. The general composition of the Made Ground was variable but is typically granular in nature.

The sandy gravelly Made Ground encountered beneath the north western promenade (reclaimed land) contained inclusions of ash, brick, clinker, tile, ceramic, slag and glass.

Deeper Made Ground noted to pe present in the south eastern area of the scheme (eastern promenade), was noted from the logs to to be more clayey, and comprised reworked Marine Beach Deposits, with limited inclusions of man-made materials.

The maximum depth of the Made Ground encountered was 5.70m but was typically around 4m in thickness. The base of the Made Ground was found to be at a level of around 1m to 2mOD. This broadly corresponds with the anticipated historic beach level and the zone of backfill behind the sea defence structures.

5.2.2 Classification

A summary of the classification testing undertaken on the Made Ground is provided below:

- Moisture content: 37no. moisture content tests were undertaken and the results varied between 4% and 17% as shown on Figure 3.
- Particle size distribution: 37no. Particle Size Distribution (PSD) tests were undertaken as shown on Figure 4a. The results indicate the Made Ground is typically a clayey / silty sandy to very sandy gravel with some cobbles.
- Plasticity: A single plasticity test was undertaken on a sample from BH01 which indicates the fines component of the material is a low plasticity clay as shown on Figure 5.

5.2.3 Strength

The results of 29no. Standard Penetration Tests (SPTs) undertaken in the Made Ground are shown on Figure 6. The results show a spread of data, returning N_{60} values ranging from 1 to 67. As the material is generally granular, this indicates the density of the Made Ground ranges from very loose to very dense.

5.3 Marine Beach Deposits

5.3.1 General

Marine Beach Deposits were encountered in the majority of the borehole locations. The descriptions for the Marine Beach Deposits were highly variable, comprising interbedded material varying from silty clays through to slightly sandy gravels. Bands of very soft and soft silty clays were encountered in numerous boreholes.

In BH07 three discreet layers of Peat were also encountered, varying from 0.2m to 0.5m in thickness. It was described as black fibrous peat with woody inclusions. In BH10 two layers were encountered, one was 0.1m in thickness and described as dark brown peat and the other 0.3m in thickness and described as dark brown peat with wood fragments.

The depth and thickness of Marine Beach Deposits beneath the base of the Made Ground was dependant of the rockhead level which is discussed in further detail in Section 5.4. The minimum thickness of Marine Beach Deposits encountered was 4.4m in BH01 and the maximum thickness encountered was 11m in BH08.

Note in some lengths of the borehole in BH02, BH03, BH04, BH07 and BH11 there was no recovery of the sample due to the driving of cobbles. Generally this is anticipated to be within the Marine Beach Deposits, however, in some areas the zone of no recovery was at the interface with the bedrock and therefore it may also be as a result of weathering of the rock head. These areas are highlighted on Figures 1 and 2.

5.3.2 Classification

A summary of the classification testing undertaken on the Marine Beach Deposits (excluding Peat) is provided below:

- Particle size distribution: 26no. Particle Size Distribution (PSD) tests were undertaken as shown on Figure 4b. As per the log descriptions these indicate the material is highly variable, ranging from nearly a pure clay through to sandy gravel.
- Moisture content: 25no. moisture content tests were undertaken and the results were spread between 2% and 41% as shown on Figure 3.
- Plasticity: 13no. Atterberg Limits tests were undertaken and have been plotted on a plasticity chart as shown on Figure 5. The results indicate the material is generally a clay (all but one test plotting above the A-line) of low to high plasticity (with one sample of very high plasticity).
- Moisture content vs plasticity: Generally the moisture content of the samples tested was between the plastic and liquid limits, and in some cases marginally below the plastic limit.

- Organic content: Four organic matter content tests were undertaken where the logs descriptions indicated there was an organic content. The results indicate the organic content is low at around 2% as shown on Figure 7.

5.3.2.1 Peat

A summary of the classification testing undertaken on the Peat is provided below:

- Particle size distribution: Three Particle Size Distribution (PSD) tests were undertaken as shown on Figure 4. These indicate the fines content of the Peat is low at less than 15%.
- Moisture content: Four moisture content tests were undertaken and the results varied between 118% and 203% as shown on Figure 3.
- Plasticity: Four Atterberg Limits tests were undertaken and the results are summarised in the table below

Table 2 - Summary of Atterberg Limits tests on Peat

Hole ID	Depth (mbgl)	Elevation (mOD	Moisture content (%)	Plastic limit (%)	Liquid limit (%)	Plasticity index
BH07	5.7	0.35	203	72	430	358
BH07	6.7	-0.65	118	66	200	134
BH07	8.3	-2.25	139	73	150	77
BH10	8.33	-2.43	158	63	210	147

- Moisture content vs plasticity: The moisture content of the samples tested was between the plastic and liquid limits.
- Organic content: Three organic matter content tests as shown on Figure 7 and the results varied between 10% and 12%.

5.3.3 Strength

The results of 41no. Standard Penetration Tests (SPTs) undertaken in the Marine Beach Deposits are shown on Figure 6. The resulting N_{60} values range from 6 to extrapolated values of 243. Some of the tests which returned higher N values are anticipated to have been as a result of cobbles and are therefore not representative of the soil mass as a whole.

The resulting N values are more commonly in the range of 15 to 40. For cohesive materials this equates to a material of frim to very stiff consistency and for granular material this equates to a dense to very dense material.

5.3.4 Consolidation

Where it was possible to obtain undisturbed samples of the softer clays and peat, one-dimension consolidation tests were undertaken as shown on Figure 8. The results of the testing are summarised in the table below.

Table 3 - Summary of consolidation test results

Pressure	BH07 5.7-6.3mbgl Peat		BH09 7.2-7.8mbgl Slightly sandy silty clay		BH10 7.2mbgl Organic firm clay		BH11 7.2-7.8mbgl Slightly sandy silty firm clay	
	Mv (m^2 /MN)	Cv (m^2 /yr)	Mv (m^2 /MN)	Cv (m^2 /yr)	Mv (m^2 /MN)	Cv (m^2 /yr)	Mv (m^2 /MN)	Cv (m^2 /yr)
0 – 25	0.79	1.7	1.6	1.6	1.3	3	0.48	18
25 – 50	2.3	14	0.64	0.95	1.3	3	0.59	10
50 – 100	2.1	8.9	0.53	1.2	1.2	2.7	0.56	10
100– 200	1.2	5.7	0.26	2.1	0.58	4.2	0.35	4.5
200– 400	1	2.6	0.17	4	0.42	2.1	0.33	2.6
400– 200	0.13	1.6	0.0026	11	0.031	3.7	0.0062	6.6
200- 100	0.39	1.7	0.0064	14	0.13	1.4	0	4.8

Once the proposals for the raising of the promenade level have been confirmed, the resulting settlement and potential impact on buried services (in particular the DCWW rising main) should be considered as part of the detailed design.

5.4 Bedrock

Bedrock was encountered in the majority of boreholes, with the exception of BH04, BH05 and BH11.

5.4.1 Oystermouth Formation

The Oystermouth Formation was encountered in BH01 and BH02, the two most northern boreholes in the study area. The formation consisted mainly of strong grey limestone with heavy white mineral veining. Discontinuities were present in the formation, ranging from closely to widely spaced, horizontal to sub-horizontal between 0 and 10° planar and rough with mineral infilling.

The elevation of the rockhead where the Oystermouth Formation is present was at it highest in the site at approximately 0.5mOD to 2mOD.

In BH02 voids were encountered within the limestone which are anticipated to be natural cavities. The shallowest void was encountered between 10.6m to 12.9m below the ground level and the second between 13.7m and 15.7m below ground level. The hole was terminated at the base of the second void due to the risk of losing the casing. The driller noted the voids contained brown silty water.

The desk study [1] identified recorded natural cavities from the published geological information in this area. The recorded location is approximately 70m inland (west) of BH02.

5.4.2 Bishopston Mudstone Formation

Bishopston Mudstone Formation was encountered in three boreholes; BH03, BH06 and BH07. The typically composition of the formation consisted of dark brown weathered mudstone recovered as sand and gravel, extremely weak to weak dark brown fine-grained mudstone and greyish brown clayey sandstone

gravel. Discontinuities were apparent from non-intact horizons to very closely spaced sub-horizontal, 20° to 30° planer smooth bedding with iron oxide staining.

5.4.3 Oxwich Bay Head Formation

The Oxwich Bay Head Formation was encountered in four of the borehole locations, BH08, BH09, BH10 and BH12, in the southern end of the scheme. It is generally described as strong grey limestone recovered as sandy clayey gravel and cobbles.

The elevation of the rockhead where the Oxwich Bay Head Formation is present was found to be variable, ranging from -9.5mOD to -5mOD.

5.4.4 Strength

A summary of the information relating to the strength of the bedrock is summarised in the table below. The results of the SPTs within the bedrock are shown on Figure 6 and the results of Uniaxial Compressive Strength (UCS) are shown on Figure 9.

Table 4 - Summary of rock strength information

Rock Type	Log description	SPT N_{60} value	UCS (MPa)
Oystermouth Formation	Strong	200 to 1300	32 to 79
Bishopston Mudstone Formation	Extremely weak or weathered	100 to 270	0.2 to 52*
Oxwich Bay Head Formation	None (highly weathered / fractured)	25 to 130	-

*Correlated from Point Load Index (PLI) using a multiplication factor of 20

5.5 Groundwater

5.5.1 Strikes

Groundwater strikes were recorded during the ground investigation in BH08 at 4.1mbgl and BH12 at 4.8mbgl both within gravelly Made Ground. A groundwater strike was also noted at 1.1mbgl, again within gravelly made ground in TP11.

5.5.2 Monitoring

Groundwater monitoring standpipes were installed in the boreholes as summarised in the table below. The primary objective of the monitoring was to understand the groundwater pressures behind the existing defences and how this varied with tidal levels, including any lag. As such, standpipes were installed in every other

borehole along the frontage, with the depth of the response targeted to be around the base and lower parts of the existing defences.

Readings were undertaken using 'divers' and data loggers, with readings taken every 10 minutes over a period from 06/06/19 to 13/09/2019. A summary of the monitored levels is provided in the table below. It is recommended further interrogation of the monitoring data is undertaken during the detailed design once a final option has been selected for the proposed works.

It should be noted that over this period the observed high tide level varied between 2.2mOD and 5.2mOD [15].

From review of the monitoring results below, the shallow groundwater beneath the promenade within the made ground and beach deposits would appear to be in hydraulic continuity with the Sea given the monitored groundwater levels compared to tidal levels. As such it shallow groundwater beneath the site is considered to be tidally influenced.

Table 5 - Summary of groundwater monitoring

GI Location	Response Zone (mbgl)	Response Zone (mOD)	Strata	Monitored range (mOD)
BH01	1.5 to 4	5.5 to 3	MG & Marine Beach Deposits	Dry
BH03	1.5 to 4	4.8 to 2.3	MG	4.6 to DRY
BH05	1 to 3.5	5.3 to 2.8	MG	3.5 to 3.0
BH07	2 to 4	4.1 to 2.1	MG	Dry
BH09	2 to 3	4.2 to 3.3	MG	Dry
BH11	2 to 4	4.1 to 2.1	MG	4.7 to 2.3

5.6 Sulphate and pH – DS and ACEC Classification

To determine the DS and ACEC classification for the different materials in accordance with BRE Special Digest 1 [16], the following number of samples were tested for pH, water-soluble sulphates, acid soluble sulphates and total sulphur:

- 37no. Made Ground
- 13no. Marine Beach Deposits
- 2no. Peat
- 1no. Oxwich Head Limestone
- 3no. Oystermouth Formation
- 1no. Bishopston Mudstone Formation

For a brownfield site with mobile groundwater and disturbed ground, the resulting classification is **DS-1 AC-1** for all materials.

5.7 Contamination observations

Made Ground was encountered in all exploratory holes present across the site and is considered to be a potential source of contamination.

Generally made ground was sandy or gravelly, with a number of inclusions (natural and anthropogenic inclusions) predominantly encountered beneath the north western promenade in the location of historical land reclamation.

More clayey made ground (reworked natural with little to no anthropogenic inclusions) however was encountered in the south eastern promenade scheme area, with may clayey made ground encountered at depths from approximately 0.6 – 3.7mbgl.

Iron slag was observed in the sandy gravelly made ground of three trial pits, encountered at a depth of between 0.1 to 0.6mbgl, 0.2 to 0.45mbgl and 0.1 to 0.7mbgl in TP10 and TP14 (north western promenade) and TP20 (south eastern promenade) respectively. Slag was encountered in the sandy gravelly made ground in TP01 and TP02, from 0.10 to 0.6mbgl and within BH01 within the gravelly made ground from 0.45 to 0.9mbgl (north western promenade).

Rusted metal fragments were observed within the Made Ground of TP02 from 0.50 to 1.20mbgl in the north western area of the promenade.

Occasional tiles, glass and plastic fragments were also noted within the gravelly made ground associated with bricks, concrete and limestone gravels.

No asbestos or asbestos containing materials visible by eye were recorded during the ground investigations in 23no samples of made ground analysed.

6 Void detection survey

A void detection survey was undertaken of the promenade and revetment by geophysical specialists TerraDat. The full report from the survey is included in the main factual report [6] and the drawings are included in Appendix A of this report.

TerraDat used ground-penetrating radar (GPR) which produces detailed cross-sectional images and depth slice plans that can be used to identify anomalous features. On the revetment, cross sections were obtained at 1m centres parallel to the slope. Along the promenade sections were obtained at 0.5m parallel to the coastline. The maximum depth of investigation with this technique depends on the composition of the materials being investigated; at this site, it was found to be approximately 1m to 2m below ground surface.

The sections survey along the revetment and promenade revealed a number of GPR features including dipping reflectors and diffractions, which may indicate settling and potential voiding in the subsurface. The anomalies have been presented in plan on the drawings based on TerraDats interpretation of the sections. In summary, the drawings included in Appendix A show the following

Revetment

- Figures 2 and 3: Anomaly map whereby:
    - Green dots mark diffraction point sources indicating granular material.
    - Dark blue dots mark larger diffractions, isolated features considered as important or anomalous areas which may be related to potential voiding or blocky material in the subsurface.
    - Light blue dots mark areas of increased penetration, mostly indicating a change in signal character due to changed ground conditions.
    - Yellow dots mark areas of anomalous increased signal response detected in selected depth slices, which may indicate the presence of buried services.
- Figure 4: Plot showing potential voids only (dark blue dots)

Promenade

- Figure 6 to 9: Anomaly map with yellow and dark blue dots identifying potential anomalies as per the revetment.

As can be seen from these figures, a relatively large number of blue dots representing potential voids have been identified by the survey. However, it should be noted that each of these anomalies has been picked manually to mark features which may be related to a dipping surface in the radiogram response. As well as voiding, these anomalies may also relate to features such as larger rocks, blocks, services or drains.

As such, as part of the proposed foreshore ground investigation it is proposed to undertake targeted intrusive investigation of some of the key anomalies identified by the GPR survey. This will include 10no. small diameter drill holes through the revetment inspected with an endoscope and 5no. dynamic probes along the promenade.

Other key points identified by the GPR survey are as follows:

- The surface on the southern part of the revetment (Chainage -50m to -1m) is very rough, and large boulders are visible. The concrete infills in between the boulders are mostly eroded and expose large gaps in between the rocks. The revetment between Chainage 0m and 394m comprises an undulating, relatively smooth concrete surface covering boulders of rock. The revetment between Chainage 395m and 612m comprises a rougher, rocky surface, lacking the smoothed concrete surface in some places. Also, the top of the revetment is in dressing stones, creating a very uneven surface (Plate 2b - 2d).
- Areas of reinforced concrete along the promenade and the ramps have been highlighted on the figures in transparent orange.
- Regarding reinforced areas along the promenade, areas which show reinforcement in the revetment, show some reinforcement to the very outer edge extending onto the promenade as well.
- A linear feature running towards the middle of the promenade was detected in several depth slices along the whole survey area and is likely related to a structural feature or service buried in between 0.5-1.0m depth.

Note a buried utilities trace was also undertaken along the promenade as part of the ground investigation and the results are included in the factual report [6].

7 Existing secondary wall foundations

To investigate the foundations of the existing secondary masonry walls present along the majority of the frontage as well as the underlying ground conditions, 15no. hand dug trial pits were excavated. They were generally located on the seaward side of the walls but a small number were also undertaken on the landward side.

The trial pits logs (TP06 to TP21) and sketches of the encountered geometry are presented in the factual report [6]. In summary, generally there was no foundation to the wall. The wall was founded directly on the Made Ground or on to a thin layer of concrete. The thin layer of concrete is typically around 100mm in thickness or less and is therefore anticipated to be a blinding layer rather than a structural foundation. The depth to the base of the wall was generally found to be less than 300mm below original ground level.

As part of the proposed scheme, it is anticipated that raising of the promenade ground level will be required. As such, the secondary walls may need to be raised and also act as a small retaining structure. The suitability of the existing secondary walls to be reused as part of the scheme should be considered in greater detail once the preferred option has been finalised. However, as the walls do not have a foundation it is considered unlikely that they will be suitable for raising and to act as an earth retaining structure, particularly if they are required to comply with modern engineering design standards. In addition, without a foundation there may be issues with the stability of the wall to withstand the design overtopping forces.

8 Existing top of vertical sea wall

To investigate the top of the existing vertical sea wall, 6no. hand dug trial pits were undertaken. The purpose of these trial pits was to better understand the geometry of the top of the wall to inform the design of the proposed wave wall.

Due to the existing hand railings along the edge of the promenade which partially obstructed the working room available at the proposed location of these trial pits, the operative on site moved the trial pits back away from the wall. As such, the top of the wall was not encountered in all the trial pits.

Subsequent to the ground investigation, The City and County of Swansea provided photographs of the construction of the hand rail with the top of the wall exposed in a trench as shown below.

Figure 1 - Photo from hand rail construction in 2002

9 Structural coring

As no historic drawings are available for vertical sea wall, 15no. horizontal structural cores were undertaken to investigate its composition, thickness and backfill. Half of the cores were undertaken at a lower level (circa 0.5m above beach level) and half were undertaken at mid level (circa 1.2m above beach level). The logs from the structural cores are included in the factual report [6].

The thickness of the lower level cores varied between 1.75m and 1.9m and the thickness of the mid level cores varied between 1.55m and 1.8m. The concrete is described as grey concrete with gravel of rounded to subrounded of chert with occasional shell fragments, 30% matrix 70% gravels. No reinforcement was encountered.

The descriptions of the backfill behind the wall are similar to that of the Made Ground encountered in the boreholes. There is not anticipated to be any drainage material or different backfill material immediately behind the wall.

10 Human health risk assessment

The results of the chemical analyses undertaken on soil samples obtained from across the site have been reviewed and compiled in Tables B1 and B2 included within Appendix B of this report. The assessments in relation to human health, during construction, and post construction should site won materials be reused as part of the works, are presented below.

A waste assessment has also been undertaken and is discussed further in Section 14.

In summary; currently the site is open to the public and used as a promenade with predominantly hardstanding at surface. Areas of soft landscaping are present along the periphery of the scheme area.

Although the preferred option is currently under development, it is anticipated that the proposed scheme will include: replacement and raising of the parapet wave wall and erosion protection measures at the wall toe, construction of a new wave wall at the top of the slope and replacement / reinforcement of the sloping revetment including toe erosion protection measures and ground raising along the promenade to limit the above ground height of the parapet / wave wall to 0.85m, and potentially widening of the promenade through the construction of a new sea defence structure. (A value engineering exercise is currently being undertaken for the preferred option including consideration of reinforced earth walls.)

It is proposed during the works that any made ground and natural materials excavated for the revetment and new wave wall constructions are to be reused, if found to be chemically and geotechnically suitable, within the scheme for 'land raising,' beneath hardstanding at surface level post construction.

There is a small amount of soft landscaping proposed as part of the current scheme proposals, no details are available to data and this may be subject to change.

10.1 Soil Assessment Criteria

As presented in the conceptual site model in Section 2.8.1 on account of the current proposed works, during the construction phase, construction workers may be exposed to any contamination within the subsurface via ingestion, dermal contact and inhalation of soils and dust. Any contaminated windblown dust during construction works may also impact nearby workers, residents and pedestrians.

During the operational phase, hardstanding will predominantly remain at surface level, however there is a potential for soft landscaping to be incorporated into the design.

Should soft landscaping be proposed; end site users may be exposed to any contamination within the subsurface via ingestion, dermal contact and inhalation of soils and dust in areas of soft landscaping, should site won materials be reused in these areas.

Maintenance workers involved in post construction intrusive works / excavations along the promenade for utility servicing, will also be exposed to any contamination within the subsurface via ingestion, dermal contact and inhalation of soils and dust.

In order to assess the risks to human health and based on the most sensitive receptors; construction workers and proposed site end users (public and maintenance workers) the chemical analyses results of soil samples obtained from the site have been screened against published C4SLs [7] and S4ULs [8] values for a residential end use without plant uptake (risk to construction and maintenance workers) and Public Open Space (Park) screening criteria.

In the absence of acute, short term exposure GAC values, the residential end use without plant uptake is considered conservative enough to indicate any risks posed to human health for short term exposure of construction and maintenance workers, who will come into close contact with subsurface materials.

Where screening criteria have not been published for some contaminants, Arup derived in-house Generic Assessment Criteria (GACs) for a residential land use (without plant uptake) have been used.

10.2 Methodology and Averaging Areas

As previously discussed, on account of the historic land reclamation along the north western promenade area of the site; two averaging areas have been determined for assessing the made ground at the site; the western promenade and the eastern promenade.

The north western promenade averaging area has been determined based on the historic land reclamation undertaken in the 1890s and the encountered ground conditions which consisted gravelly made ground with prevalent inclusions of clinker, ash and slag (compared to the south eastern promenade). TP1 to TP14, and BH01 to BH08 have been included within this averaging area (19no made ground samples).

The south eastern promenade has not been subject to historic ‘reclamation’ compared the north western promenade. The encountered ground conditions from review of the logs, are predominantly sand and gravels but do not have such a large occurrence of clinker, ash and slag (compared to the north western promenade). The sand and gravel made ground in this area is also noted to be underlain with a more clayey made ground (reworked natural with no anthropogenic inclusions) from approximately 0.6 – 3.7mbgl in 4no excavation holes; BH09, BH11, BH12, TP19. This material was not encountered in the north western promenade area. TP15 to TP21, and BH09 to BH12 have been included within the south eastern promenade averaging area (9no made ground samples).

In addition to the above, natural strata has been assessed separately to the made ground (on account of the difference in composition and chemical nature between the two strata) (3no samples).

10.3 Soils Assessment

10.3.1 North western promenade - Made Ground Analyses Results

The results of the analyses of the 19No. made ground samples obtained from the north western promenade are presented below:

Generally, all metals were recorded at levels less than the applied residential and POS guideline values. This is with the exception of arsenic and lead. A total of 6no. samples of made ground exceeded the applied guideline for arsenic and a total of 4no samples exceed the residential screening criteria for lead as shown in the table of exceedances below.

Table 6 - Arsenic and lead exceedances north western promenade

Contaminant				Arsenic	Lead
Residential C4SLs/S4ULs/ Arup GAC (1% OC) no plant uptake				40	310
Public Open Space (Park) C4SLs/S4ULs/ Arup GAC (1% OC) for reference				*170*	*1300*
Hole ID	**Depth(m)**	**Strata Thickness (m)**	**Strata Description**		
BH04	1	**5**	**MADE GROUND:** Reddish brown clayey gravelly SAND. Gravel is sub-angular to sub-rounded fine to coarse sandstone, limestone, brick and flint. (0.3-5.3mbgl)	80.5	49.8
BH06	0.8	0.55	**MADE GROUND:** Light brown orange slightly silty sandy GRAVEL with high cobble content. Sand is fine to coarse. Gravel is angular fine to coarse of brick, concrete, limestone and sandstone (0.4-0.95mbgl)	43.6	234
TP02	0.2	0.40	**MADE GROUND.** Dark brownish red GRAVEL/SAND. Gravel is fine to coarse subrounded to angular of **slag, clinker,** brick fragments and limestone with occasional subrounded to subangular cobble (0.1-0.5mbgl)	939	10000
TP07	0.6	0.3	**MADE GROUND:** MADE GROUND: Dark grey to brown gravelly sandy COBBLES. Cobbles are angular of limestone. Gravels are fine to coarse subrounded to angular of limestone. Sand is fine to medium. (0.3-0.8mbgl)	223	1900
TP08	0.3	1.10	**MADE GROUND:** brownish grey very gravelly slightly clayey SAND. Sand is fine to coarse. Gravels are angular to sub-rounded fine to coarse of limestone, brick, **ash,** shell and flint (0.1-1.2mbgl)	210	265
TP11	0.2	0.46	**MADE GROUND:** Orangish brown very clayey sandy GRAVEL. Gravels are fine to coarse subrounded to angular of chert and occasional **clinker** with yellow clayey inclusions. Roots present. (0.11-0.57mbgl	125	8890
TP14	0.3	0.25	**MADE GROUND:** Dark grey clayey sandy GRAVEL. Sand is fine to coarse. Gravel is angular fine to coarse of brick, **iron slag,** limestone and tile (0.2-0.45mbgl).	28.4	868

*Pink highlights indicate conc. > residential screening criteria.
Orange highlights indicate conc. > public open space screening criteria.

A number of individual polycyclic aromatic hydrocarbons have been recorded above the applicable screening criteria in samples of made ground analysed from across the site area. Anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene and Naphthalene were all recorded at concentrations in excess of the applied screening criteria, within 2no samples of made ground from the north western promenade.

Table 7 - PAH exceedances in north western promenade

Sample ID	Residential S4ULs	Public open space S4ULs	TP08	TP12

Depth (m)	(1% OC) no plant uptake (mg/kg)	(1% OC) no plant uptake (mg/kg)	0.30	0.60
Thickness of strata (m)			1.10	0.80
Strata description			MADE GROUND: brownish grey very gravelly slightly clayey SAND. Sand is fine to coarse. Gravels are angular to sub-rounded fine to coarse of limestone, brick, **ash**, shell and flint. 0.1-1.2m	Potential MG: Greyish brown slightly clayey gravelly SAND. Sand is fine to medium, Gravel is angular to sub-angular fine to medium limestone. (0.4-1.2m)
Anthracene	31000 (1.17)	150000	1.97	1.76
Benzo(b)fluoranthene	3.9	13	3.94	5.87
Dibenz(a,h)anthracene	0.31	1.1	0.46	0.503
Naphthalene	2.3	1200	0.326	2.44

*Pink highlights indicate conc. > residential screening criteria.
Orange highlights indicate conc. > public open space screening criteria.

Polychlorinated Biphenyls were generally all at less than the applied screening criteria. This is with the exception of one sample of Made Ground from TP02 at 0.2mbgl comprising of red gravel / sand with slag and clinker, which recorded a concentration of 0.377mg/kg above the Arup derived residential screening criteria (0.01mg/kg).

No asbestos was identified within any samples of made ground analysed within the north western promenade. Asbestos will not be considered further as a potential contaminant of concern.

No other contaminant exceedances were identified from samples within the north western promenade averaging area.

10.3.2 South eastern promenade - Made Ground Analyses Results

The results of the analyses of the 9No. made ground samples obtained from the eastern promenade are presented below:

Generally, all metals were recorded at levels less than the applied residential and POS guideline values, with the exception of arsenic. 2No. samples of made ground from TP20 for arsenic, as shown in the table below.

Arsenic exceedances within the south eastern promenade

Contaminant				Arsenic
Residential C4SLs/S4ULs/ Arup GAC (1% OC) no plant uptake				40
Public Open Space (Park) C4SLs/S4ULs/ Arup GAC (1% OC) for reference				*170*
Hole ID	**Depth(m)**	**Strata Thickness (m)**	**Strata Description**	
TP20	0.4	0.60	**MADE GROUND:** Dark reddish brown clayey very sandy GRAVEL. Sand is fine to coarse. Gravel is angular fine to coarse of concrete, brick and **iron slag**. (0.1-0.7mbgl)	69
TP20	0.9	0.30	**MADE GROUND:** Dark brown very clayey sandy GRAVELS and is fine to coarse. Gravel is angular to subrounded fine to coarse of concrete, chert and occasional plastic. (0.7-1mbgl).	353

*Pink highlights indicate conc. > residential screening criteria.
Orange highlights indicate conc. > public open space screening criteria.

A number of individual polycyclic aromatic hydrocarbons have been recorded above the applicable screening criteria in samples of made ground analysed from across the site area. Benzo(b)fluoranthene and Dibenz(a,h)anthracene were all recorded at concentrations in excess of the applied screening criteria, within BH10 within the south eastern promenade.

Sample ID	Residential S4ULs (1% OC) no plant uptake (mg/kg)	Public open space S4ULs (1% OC) no plant uptake (mg/kg)	BH10 - East
Depth (m)			1.00
Thickness of strata (m)			1
Strata description			MADE GROUND: Gravel and Cobbles, grey brown orange with limestone, flint and glass (0.2-1.2m)
Benzo(b)fluoranthene	3.9	13	4.05
Dibenz(a,h)anthracene	0.31	1.1	0.496

No asbestos was identified within any samples of made ground analysed within the south eastern promenade. Asbestos will not be considered further as a potential contaminant of concern.

No other contaminant exceedances were identified from the made ground samples obtained within the south eastern averaging area.

10.3.3 Natural deposits

No elevated contaminant concentrations have been recorded within three samples of natural materials analysed from across the site (north west and south east promenade areas) when screened against the applied assessment criteria.

10.3.4 Summary of Potential Contaminants of Concern

The following contaminants of concern have been identified within the made ground strata of the site:

North western promenade

- Arsenic and lead above both residential and POS screening criteria
- Individual polycyclic aromatic hydrocarbons above residential screening criteria only
- Polychlorinated Biphenyls above both residential and POS screening criteria

South eastern promenade

- Arsenic above both residential and POS screening criteria
- Individual polycyclic aromatic hydrocarbons above residential screening criteria only

These contaminants of concern are discussed further below.

North western promenade

Arsenic

Arsenic was found to be elevated above residential and POS in a number of gravelly made ground samples from the north wester promenade.

Recommendations for mitigating the risks posed to construction workers during construction is further discussed in Section 12.3.

A discussion on the risks of reusing the made ground material from the Western Promenade post construction in a Public Open Space is provided below.

The most elevated concentrations of arsenic were identified in made ground from TP02 sampled at 0.2m (0.1-0.5mbgl). This sample of made ground comprised dark brownish red gravelly sand, with gravels of slag of clinker. TP02, located at the far north west of the promenade, in the area of a historical coal depot. It is considered that the slag and clinker within the made ground, maybe present on account of the operations of the coal depot but also just as likely operations of the railway land, attributable to the significantly elevated arsenic concentrations. Notably other samples obtained and analysed from within the area of the Coal Depot did not have such elevated concentrations.

As such statistical assessment has been undertaken on the data set.

Statistical Assessment

The data sets for arsenic recorded in excess of the applied assessment criteria have been subject to further assessment, by means of statistical analyses, in order to identify whether the recorded exceedances are representative of site wide elevated concentrations or a different sample population from a localised source of contamination (Ref. **[19]**).

The Chebyshev 95% upper confidence limit (at which there is a 95% confidence that the true mean falls below the critical concentration) has been applied to the data sets for each contaminant with one or more exceedances, as set out in published statistical assessment documentation (Ref. **[19]**).

As shown in the table below, the upper confidence limit (UCL) has been calculated using all made ground soil results for the north western promenade, obtained from the made ground.

No potential outliers have been removed from the data set in the initial calculated UCL95%.

Contaminant	POS screening criteria (mg/kg)	Calculated UCL95%	Number of Samples	Outliers?

Arsenic	170	311 mg/kg	19	BH04 80.5 mg/kg BH06 43.6 mg/kg TP02 939 mg/kg TP07 223 mg/kg TP08 210 mg/kg TP11 125mg/kg

Conservatively, given that there is little discernible difference between the sample descriptions and site history across the western promenade it has been determined that the outliers will be kept in the data set.

As such, the above statistical analyses results indicate that the calculated UCL95% value is in excess of the Public Open Space (park) criteria, indicative of elevated Arsenic concentrations across the Western Promenade.

Further Action is therefore considered to be required with respect to the reuse of Arsenic across the Western Promenade.

Lead

Lead was found to be elevated above residential and POS in 4no samples of gravelly made ground from the Western Promenade.

Recommendations for mitigating the risks posed to construction workers during construction is further discussed in Section 12.3.

A discussion on the risks of reusing the made ground material from the Western Promenade post construction in a Public Open Space is provided below.

As discussed for arsenic above, similarly the most elevated concentrations of lead were identified in made ground from TP02 sampled at 0.2m (0.1-0.5mbgl), obtained from an area of a historic coal depot. The made ground with elevated lead generally comprises the same components/ similar descriptions of made ground encountered elsewhere in the western promenade (gravelly made ground with clinker and slag). Also other samples from within the area of the Coal Depot did not have such elevated lead concentrations.

Statistical Assessment

The data sets for lead recorded in excess of the applied assessment criteria have been subject to further assessment, by means of statistical analyses, in order to identify whether the recorded exceedances are representative of site wide elevated concentrations or a different sample population from a localised source of contamination (Ref **[19]**).

The Chebyshev 95% upper confidence limit (at which there is a 95% confidence

that the true mean falls below the critical concentration) has been applied to the data sets for each contaminant with one or more exceedances, as set out in published statistical assessment documentation (Ref. **[19]**).

As shown in the Table below, the upper confidence limit (UCL) has been calculated using all made ground soil results for the Western Promenade, obtained from the made ground.

No potential outliers have been removed from the data set in the initial calculated UCL95%.

Contaminant	POS screening criteria (mg/kg)	Calculated UCL95%	Number of Samples	Outliers?
Arsenic	1300	4161 mg/kg	19	TP02 10,000 mg/kg TP07 1900 mg/kg TP11 8890 mg/kg TP14 868 mg/kg

Conservatively, given that there is little discernible difference between the sample descriptions and site history across the north western promenade it has been determined that the outliers identified will be kept in the data set.

As such, the above statistical analyses results indicate that the calculated UCL95% value is in excess of the Public Open Space (park) criteria, indicative of elevated lead concentrations within the made ground across the north western promenade.

Further action with regards to lead concentrations, in line with that for arsenic concentrations, is therefore considered to be required across the north western promenade.

PCBs

Polychlorinated Biphenyls were generally all at less than the applied screening criteria. This is with the exception of one sample of Made Ground from TP02 at 0.2mbgl comprising of red gravel / sand with slag and clinker, which recorded a concentration of 0.377mg/kg above the residential screening criteria (0.01mg/kg) There is no available screening criteria for POS however commercial screening criteria is 0.24mg/kg.

There is no definitive source of elevated PCBs within this location (no sub stations or electrical components identified within the immediate area) other than the nature of the made ground itself and the site's history (reclaimed land and TP02 in an area of an historic coal depot).

Further action with regards to mitigation risks from arsenic and lead concentrations, within the north western promenade will also be considered sufficient to mitigate risks from PCBs.

PAHs

Benzo(b)fluoranthene and Dibenz(a,h)anthracene were recorded in excess of residential screening criteria, but found to be below POS (park) screening criteria in two samples of made ground from the north western site area.

No visual or olfactory evidence of hydrocarbon contamination was observed within the Made Ground strata during the ground investigation.

The two elevated results (from TP12 and TP08) were obtained from car park areas, noted to have asphalt at surface. There is a potential for localised oil leaks from parked cars and asphalt cross contamination from surface cover during excavations to have been the source of the recorded concentrations. Ash was also recorded in one of the samples of made ground (TP08) and may also be a source of the elevated concentrations recorded in this sample.

On account that concentrations are below POS screening criteria, PAHs are not considered to pose a risk to end site users / public post construction. As such no further statistical analysis will be undertaken on these samples.

A discussion on how the risks posed to construction workers and also maintenance workers post construction are to be mitigated is further discussed in Section 12 below.

South eastern promenade

Arsenic

Arsenic was found to be elevated above residential and POS in two made ground samples both from TP20 in the south eastern promenade area of the site.

Recommendations for mitigating the risks posed from arsenic to construction workers during construction and future maintenance workers is further discussed in Section 12.3.

A discussion on the risks of reusing the made ground material from the south eastern promenade post construction in a Public Open Space is provided below.

The elevated concentrations of arsenic were identified in made ground from TP20 sampled at 0.1m and 0.7mbgl (strata extending 0.1-1mbgl). These sample of made ground comprised dark reddish brown sandy gravels, with concrete, brick, iron slag and occasional plastic at depth. TP20 is located in the far south east of the promenade in the location of the historical train station. TP20's location and the presence of iron slag within the made ground at this location, is likely the source of the significantly elevated arsenic concentrations within this area of the scheme.

In order to confirm if the elevated concentration is indeed a localised hotspot statistical assessment has been undertaken on the data set.

Statistical Assessment

The data sets for arsenic within the south eastern scheme area have been subject to further assessment, by means of statistical analyses, in order to identify whether the recorded exceedances are representative of area wide elevated concentrations or a different sample population from a localised source of contamination (Ref. **[19]**).

The Chebyshev 95% upper confidence limit (at which there is a 95% confidence that the true mean falls below the critical concentration) has been applied to the data sets for each contaminant with one or more exceedances, as set out in published statistical assessment documentation (Ref. **[19]**).

As shown in the table below, the upper confidence limit (UCL) has been calculated using all made ground soil results for the Western Promenade, obtained from the made ground.

No potential outliers have been removed from the data set in the initial calculated UCL95%.

Contaminant	POS screening criteria (mg/kg)	Calculated UCL95%	Number of Samples	Outliers?
Arsenic	170	222 mg/kg	9	TP20 (0.1mbgl) 69 mg/kg TP20 (0.7mbgl) 353 mg/kg

It is considered that the maximum recorded concentration is significantly elevated with respect to other concentrations of arsenic encountered across the eastern site area. In addition the historical use of the area of TP20 as a rail and fire station, and the nature of the made ground, (with iron slag and plastic) maybe considered the main source of the recorded concentrations.

On account of this, the maximum concentration of arsenic recorded in the samples obtained from TP20 are considered to be a “true” outliers and will be removed from the data set.

The statistical assessment has been revised, with the identified true outlier removed.

With the “true” outlier removed from the dataset, the UCL 95% for arsenic is reduced to 26mg/kg which is well below the applied screening criteria for public open space for the south eastern promenade area of the scheme.

Further action is therefore considered necessary with respect to the reuse of Arsenic from TP20 within the Eastern Promenade.

10.4 Soil assessment contaminants of concern with regards to reuse of materials within the site

A review of the results of the analyses undertaken on samples of made ground (from north west and south eastern promenade areas) and natural material sampled from across the site has been undertaken. Potential contaminants of concern, from preliminary screening, have been further assessed by means of statistical analyses, to determine suitability for reuse within the development (based on a public open space land use – to account for areas of open landscaping).

A summary of the contaminants within the shallow subsurface of the site which will require further action as part of site development, i.e. mitigation and / or remediation, are summarised below:

Soil Contaminants requiring further action/mitigation:

Contaminant	Location	Mitigation and Suitability for Re Use
North Western Promenade		
Arsenic Lead PCBs	Made ground within the western promenade	Made ground not considered suitable for use at or near surface in areas of open soil or soft landscaping post completion of the development (should this be proposed as part of design) without mitigation/remediation measures.
South Eastern Promenade		
Arsenic	Made ground from the location of TP20 (historical railway station)	Made ground excavated from the location of TP20 (described as reddish brown and dark brown Gravel with concrete iron slag and plastic) is not considered suitable to remain at or near surface in areas of open soil or soft landscaping post completion of the development (should this be proposed as part of design) without mitigation/remediation measures.

Made ground from the remaining south eastern promenade, (outside of the locale of the historic railway station) including the more clayey made ground (without anthropogenic inclusions) encountered from across the wider south east site area, is consider suitable for reuse across the scheme based on soil chemical analysis. A review of its suitability based on contaminant leachability potential is provided below.

Natural strata from across the entire scheme area are also considered chemically suitable for reuse within the scheme.

11 Controlled Waters Assessment

A number of made ground soil samples have been subject to 2:1 leachability analyses, (6no of which were undertaken as part of WAC analysis) to analyse a range of leachable determinands.

11.1 Groundwater regime

Groundwater strikes were recorded during the ground investigation in seven of the twelve borehole locations;

- BH02 at 7.10 mbgl rising to 7.10 mbgl after 20 minutes noted to be a steady ingress
- BH07 at 3.50 mbgl rising to 3.50 mbgl after 20 minutes noted to be wet
- BH08 at 4.10 mbgl rising to 4.00 mbgl after 20 minutes BH noted to be a steady ingress
- BH09 at 4.50 mbgl rising to 4.50 mbgl after 20 minutes BH noted to be wet
- BH10 at 3.90 mbgl rising to 3.90 mbgl after 20 minutes BH noted to be wet
- BH11 at 5.5 mbgl rising to 5.5 mbgl after 20 minutes BH noted to be wet
- BH12 at 4.8 mbgl rising to 4.8 mbgl after 20 minutes noted to be a be a steady ingress

Generally, all groundwater was recorded to be within the gravelly Made Ground (in both the north western and south eastern promenade). A groundwater strike was also noted at 1.1mbgl, within gravelly made ground in TP11 (north western promenade).

11.2 Current and future conceptual site model

Currently the site is predominantly hardstanding at surface, with areas of landscaping present along the south western periphery of the promenade.

Infiltration is likely to occur in the site's present condition in existing areas of landscaping and also if any cracks are present in the current hardstanding.

It is considered post completion of the works, a similar scenario will remain; i.e. infiltration will only be through the limited areas of open landscaping.

The Made Ground beneath the promenade in addition to service corridors may locally create preferential pathways for shallow groundwater.

During construction works, a temporary increase in infiltration may occur on account of the removal of existing hardstanding for the works. However,

construction is proposed to be a phased approach, and only small areas of hardstanding will be removed to allow construction works at any one time.

Piling works (should they be adopted) or deep excavations, have the potential to create preferential pathways of any potentially contaminated leachate, or contaminated materials into underlying deep groundwater bodies. A piling works risk assessment has not been undertaken as part of this report on account that proposals have yet to be confirmed.

Sources

The historic reclamation of land in the western promenade in addition to the historic use of the site as railway land (station noted in the east) and coal depot in the west are considered potential sources of groundwater contamination at the site. In addition to the general nature of the Made Ground encountered during the ground investigation and leachable contaminants within the shallow subsurface.

No evidence of contamination of the groundwater was recorded or observed during the ground investigation.

Pathways

Viable pathways for leachate and groundwater contamination at the site include the following:

- Surface water run off to the beach and sea and potentially into or from areas on landscaping and subsequently into underlying groundwater during construction.
- Leaching of contaminants from shallow soils into shallow groundwater within the Made Ground or vertically from the base of the Made Ground into the underlying marine beach deposits; secondary A aquifer and undifferentiated aquifers.
- Lateral migration of contaminants within shallow groundwater in made ground and superficial deposits outside the site boundary towards the Sea.

Receptors

Given the current design proposals; (limited shallow excavations into made ground and superficial deposits) it is considered that the most sensitive receptors to any potential contamination occurring as part of the scheme development are Swansea Bay and the English Channel given their proximity to the site. Important saltwater ecosystems and environmental receptors in close proximity to the scheme also include; Blackpill SSSI, Oystermouth Quarry SSSI, Mumbles Hill LNR, Gower AONB.

Shallow groundwater present within the Made Ground and superficial deposits (Secondary and Secondary A aquifers) are not considered to be receptors given that the area is already in contact with leachable contaminants from made ground deposits within the scheme. It is considered that this shallow groundwater would

act as a mechanism of providing a transport pathway for contaminants into the Sea, (rather than be a receptor).

Deeper groundwater body, via vertical migration of leachable contaminants, into the Limestone Principal aquifers and Secondary A mudstone Aquifer is not anticipated based on current construction proposals for shallow excavations within the Made Ground and superficial deposits, undertaken in a phased manor, limiting open areas for subsequent rain/surface water infiltration. However, should scheme proposals change and should deep piling / deep excavation works be required a foundation works risk assessment will be required to assess the risks to underlying deep groundwater. Additionally further groundwater sampling and analysis may also be required to support this initial assessment.

The site does not lie within a groundwater source protection zone and there are no groundwater or potable water abstraction licenses within 1km of the site.

Construction workers involved in the development and potentially post construction maintenance workers (who may undertake works in the future along the promenade) may likely come into contact with shallow/perched groundwater during works (water strike noted at 1.1mbgl within one excavation). Risks posed from potentially contaminated shallow or perched groundwater should be adequately controlled by appropriate PPE worn during all works, and the contractor shall undertake its own assessment to confirm the level of PPE required.

A groundwater management plan however may be required should deep / large scale excavations be proposed or should significant amounts of groundwater be encountered onsite during the works. This may include groundwater sampling and analysis and subsequent piling risk assessments including a hydrogeological impact assessment (to confirm the need for a groundwater abstraction licence).

11.3 Tier 1 Risk Assessment

The risk to controlled waters has been assessed in accordance with the Environment Agency Remedial Targets Methodology (Environment Agency, 2006) which provides a tiered approach towards risk assessment. The assessment starts with a Tier 1 Assessment that comprises an initial screen of leachate data against environmental standards.

This ignores the potential effects of dilution, dispersion and attenuation along the pathway between source and receptor. A Tier 1 screening assessment was undertaken to establish whether dissolved concentrations of contaminants are above threshold values.

The results of six samples of made ground have been subject to 2:1 leachability analyses, (6no of which were undertaken as part of WAC analysis) to analyse a range of leachable determinands.

As previously discussed the most sensitive controlled water receptors with respect to the site are Swansea Bay and the Bristol Chanel and the saltwater ecosystems

that they support. As such concentrations of leachable contaminants have been screened against criteria based on published Saltwater Environmental Quality Standards (SEQS).

The most conservative saltwater EQS values have been used where a range of values are provided based on the hardness of the receiving water (cadmium), and where the DOC content of the receiving water is unknown (copper).

11.4 Results

The results of the leachate screening are presented in Table B2 in Appendix B of this report. A review of the recorded leachable contaminants indicates the following;

The leachable pH values recorded in the samples of Made Ground obtained from the site ranged between 5.64 and 9.14

Arsenic, was recorded above the screening criteria of 0.025mg/l in 4no. samples of made ground at concentration ranging from 0.036 mg/l to 0.17 mg/l.

The elevated concentrations (above the available screening criteria) were associated with samples of made ground that also had dry weight concentrations of arsenic above applied screening criteria; BH04 at 1m, TP02 at 0.2m (which also recorded elevated leachable lead and zinc), TP08 at 0.3m (in the north western promenade area of reclaimed land) and TP21 at 0.3m (south eastern promenade).

The source of the elevated arsenic concentrations may be attributable to the site's history, but also appears attributable to the presence of made ground inclusions; ash, slag and clinker.

All 8no samples analysed for leachable PAHs were found to have concentrations above available screening criteria (which themselves are considered to be extremely low). Namely Fluoranthene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene and Benzo(ghi)perylene were recorded from the north western and south eastern promenade areas above screening criteria, (but are generally considered to be low concentrations). Additional no visual or olfactory evidence of contamination was record during the ground investigation.

Typically, the made ground samples analysed had inclusions of slag, clinker and ash, and or were overlain with tarmac, or from areas of parked cars, which all maybe attributable to the recorded PAH concentrations.
Phenol was also recorded at a concentration of 0.02 above the 0.0077 SEQS in one sample from the site (TP08 at 0.3mbgl). It is likely this elevated concentration of phenol has originated from the sites current use as a carpark, or from the nature of the made ground itself (reclaimed land noted to contain inclusions of ash).

11.5 Leachable contaminants of concern

Review of the above has indicated the following leachable contaminants of concern across the site:

- Leachable PAHs: within Made Ground across both north western and south eastern promenade
- Leachable arsenic within Made Ground across both north western and south eastern promenade
- Leachable zinc and lead within Made Ground in TP02 (north western promenade)
- Leachable Phenol within TP08 (north western promenade).

It is considered that the site history (reclaimed land and historic rail land), site's current use (car park or boat park areas) and the nature of the Made Ground across the site (noted to contain ash, slag and clinker), and the recorded dry weight concentrations of metals and PAHs within the Made Ground are the sources of the leachable metals, phenol and PAHs recorded.

The conclusions and recommendations of the risks posed to controlled waters from the proposed construction works is discussed further below.

11.6 Conclusions and recommendations

There is potential for leaching of metal and PAH and phenol contaminants above available screening criteria from the made ground across the site. Consequently it is considered that this made ground should not be used in areas of open landscaping. Although it is recognised that these soils are unlikely to significant impact on the identified receptors due to infinite dilution effects following migration of shallow groundwater towards the Sea / estuary in addition to tidal flushing of potential leachable contaminants.

Based on current scheme proposals (phased construction and reinstatement of hardstanding, with limited landscaping currently proposed) there should be no significant increase in infiltration of rainwater to underling made ground during construction works.

The risk from construction works to the sensitive environmental receptors onsite including; Blackpill SSSI, Oystermouth Quarry SSSI, Mumbles Hill LNR, Gower AONB is considered to be very low. No significant pollution incidents or harm to the Sea or local environmental ecosystems is expected. Based on the current scheme proposals it is not considered that further assessment of risk to controlled waters is required.

However, as previously discussed should deep excavations and or piling be proposed in future construction design, it would be prudent to undertake further

groundwater risk assessment, which may likely include groundwater sampling and analysis to confirm the risks posed to underlying deep groundwater bodies.

Reuse of materials based on controlled waters assessment

The tier 1 risk assessment for controlled waters has identified a number of leachable contaminants recorded in excess of applied screening. However given the proximity to the Sea, which is considered to be the most sensitive controlled waters receptor to the site based on current design proposals, local groundwater and tidal regimes and infinite dilution of potential contaminants within the Sea there is no risks posed of significant harm or a significant pollution incident being caused.

As such, made ground and underlying natural strata from across the scheme is considered suitable for reuse as backfill beneath hardstanding within the proposed development.

It would not be considered acceptable for made ground material to be reused in areas of open landscaping (without remediation measures).

Natural strata from across the entire scheme area are also considered chemically suitable for reuse within areas of open landscaping at the scheme.

It would be prudent to place made ground materials, especially made ground with anthropogenic materials, above the water table, in order not to promote additional leaching of contaminants within the sub surface beneath the site.

12 Geo-environmental conclusions and recommendations

On the basis of the assessments undertaken in Sections 10 and 11, the following is concluded with respect to geo-environmental constraints and risks posed to construction workers and end site users.

A revised site conceptual model is provided in Section 13.

A discussion on the reuse of materials excavated as part of the works in addition to a materials waste assessment is provided in Section 14.

12.1 Risks posed to construction workers during construction

Construction workers involved in any intrusive / excavations works along the scheme will likely come into contact with the made ground materials and thus elevated concentrations of contaminants, attributable due to the history of the site and nature of the made ground itself noted to contain slag, ash and clinker.

Primarily, routes of arsenic, lead, PAHs and PCBs to construction workers will likely be through dermal contact and dust inhalation during any excavation works undertaken, and thus will need to be addressed prior to the onset of works.

The contractor undertaking the works shall require specific PPE, welfare, risk assessments and health and safety briefings, toolbox talks to protect construction workers from contaminants within the subsurface.

In addition, specific controls shall be required for the management and/or temporary storage of these materials upon excavation, prior to either re-use or off-site disposal; (see section 14) to be confirmed once development proposals are confirmed.

It would not be appropriate that the Made Ground materials are temporarily stored without suitable mitigation measures in place; for example, a lined and bunded holding cell with materials covered to avoid infiltration of rainwater and subsequent generation of leachate and to mitigate the risk of airborne dust or potential for site users or offsite users to come into close contact with it.

Consideration is also required with respect to risks of dust inhalation presented to surrounding site users (public, workers, residents) as part of the construction works. Dust suppression measures to be implemented during construction works.

General

Should materials different in nature to those encountered in the ground investigation or unforeseen contamination be encountered during the scheme construction the following is recommended:

- Works are halted,

- The encountered contamination is assessed by a suitably qualified and experienced person,
- Suitable risk assessments are undertaken to confirm the level of PPE required for site operatives,
- Materials exhibiting evidence of contamination are separated from other arisings and placed on plastic sheeting (for further sampling and analysis),
- In the case of asbestos, a specialist asbestos contractor should be consulted in order to confirm the appropriate management and associated mitigation measures of any asbestos impacted materials or ACM should these be encountered.

Made ground and natural strata arising from the scheme is considered suitable for reuse, providing made ground is reused above the water table and below hard standing. Please refer to Section 14 for further information and recommendation regarding the reuse of site won materials.

12.2 Risks posed to site end users post construction

The elevated concentrations of PAHs, PCBs, and arsenic and lead will also need consideration with respect to post construction intrusive site maintenance workers.

The presence of the encountered contaminants should be recorded in the health and safety file for the scheme.

As above, the maintenance contractor should undertake their own health and safety risk assessments to ensure these risks are controlled and mitigated.
As above, as a minimum, these are expected to include provision of appropriate welfare facilities allowing for hands and face washing and application of appropriate PPE.

Small areas of landscaping may potentially be incorporated into design of the scheme, however this remains to be confirmed. As such, based on a review of the chemical analysis of the soil data (as discussed previously) Made ground is not considered suitable to remain at or near surface in areas of open soil or soft landscaping post completion of the development (should this be proposed as part of design) without further mitigation/remediation measures, on account of elevated levels of contaminants.

12.3 Conclusions and recommendations risk posed to controlled waters

Made ground beneath the site has been identified to contain leachable metals, (mainly arsenic but also lead and zinc) and also PAHs and one elevated sample of phenol, in excess of the applied saltwater assessment criteria.

Elevated concentrations of contaminants appear attributable to the site's historic use, land reclamation, its current use (areas of car parking) and the nature of the made ground itself; ash, clinker and slag.

Construction phase

The proposed works at present currently comprise excavations works for replacement and raising of the parapet and erosion protection measures at the wall toe, construction of a new wave wall including toe erosion protection measures and ground raising and widening along the promenade.

The location and depths of the works and any excavation works are to be confirmed. Excavations are currently anticipated in the locale of BH01 and BH02 in the north of the scheme and BH04 and BH05 and TP08 and TP09 in the central site area, however the depth of these excavations remains to be confirmed.

Groundwater strikes were recorded during the ground investigation in BH08 at 4.1mbgl and BH12 at 4.8mbgl both within gravelly Made Ground. A groundwater strike was also noted at 1.1mbgl, again within gravelly made ground in TP11. Limited groundwater was encountered during groundwater monitoring at the site, and is likely controlled by tidal activity, with groundwater levels ranging from 4.7m to dry in BH03, 3.5-3mbgl in BH05 and 4.7-2.3mbgl in BH11.

As such it is considered that made ground is already in contact with the underlying shallow groundwater which is considered to be tidal. It is considered that the infiltration of rainwater during construction works will be limited due to phased workings proposed along the promenade. This will limit amounts of open excavations and hardstanding removal during any one phase of works, thus limiting any potential rainwater ingress to excavations.

Should any material stores be compromised, or infiltration results in leachable contaminant available to migrate to underlying groundwater given the site setting on the coast, degradation, sorption and infinite dilution within the estuary and Sea is anticipated to occur.

On this basis, with respect to the leachable contaminants identified to be present in the made ground, (which are not considered to be significantly elevated) the phased nature of the current proposed construction works and site setting/potential receptors, no unacceptable risks to underlying groundwater and the sea/estuary are considered to be present as a result of the works based on current development proposals.

During construction works, PPE should be worn during all works, which should be suitable to mitigate risks from leachable contaminants identified to construction workers involved in the development, along with appropriate health and safety briefings and welfare facilities. Contractors are responsible for their own risk assessments.

Should deep excavation works or piling works be required as part of construction should scheme proposals be developed, a foundation works risk assessment would be recommended, prior to the onset of works.

Operational phase

During the operational phase, post construction, the linear site shall be predominantly capped by hardstanding at surface level. Soft landscaping areas are considered to be limited. Any areas of soft landscaping should, based on the discussions previously, be subject to import of clean fill as a growth medium, or the reuse of natural beach deposits.

Reuse of made ground materials and natural strata, beneath hardstanding (reducing infiltration and leachate generation) and where possible, above the water table, should not result in any negative impacts on the controlled waters at the scheme.

Consequently, based on current development proposals there will be minimal changes to hydraulic regime at the site post completion of the works and as such no unacceptable risk has been identified with respect to leachable contaminants and controlled water receptors during the operational phase of the scheme.

13 Revised conceptual site model

The preliminary conceptual site model as presented in Section 2.8 of this report was formed on the basis of available desk study information. The sections following outline the results and interpretation of the recent ground investigation at the site, as scoped by Arup in 2019 [2].

Consequently, in the context of the current proposed development, based on the ground investigation results to date, the preliminary conceptual site model can be refined and is presented below.

Table 8 - Refined Conceptual Site Model

Identified Source	Identified Receptor	Possible Pathway	Comment	Further Action
	Post construction			
Elevated concentrations of lead and arsenic, PCBs and PAHs, within gravelly sandy made ground across north western site area. Elevated concentrations of arsenic from TP20 within the South eastern site area in the location of the historic rail station. Leachable elevated concentrations of arsenic, lead and zinc, phenol and PAHs within gravelly sandy made ground across the site.	Maintenance workers And general public / end site users	Direct dermal	Site will predominantly be covered in hard standing post construction, with limited areas of open landscaping. No made ground is to be reused where open landscaping is proposed. This will limit the risk to site end users post construction. There is however a risk of ingestion or dermal contact of contaminants to intrusive maintenance workers post construction. There is a risk of inhalation of lead and arsenic and potentially other contaminant particles from made ground materials within the subsurface post construction to future maintenance workers.	No made ground is to be reused where open landscaping is proposed without any further remediation / mitigation measure in place. Recorded concentrations to be recorded in H&S file for the site. PPE, to be worn during all intrusive maintenance works. Appropriate health and safety briefings, welfare facilities to be provided by maintenance contractor who are responsible for own risk assessments.
		Ingestion		
		Inhalation of dust		
		Contact with contaminated groundwater (no assessments of groundwater has been undertaken to date)	Shallow groundwater was encountered in made ground during investigation, likely impacted by contaminants within the made ground. Maintenance workers may encounter groundwater (although no groundwater analysis undertaken to date). End site users are not anticipated to encounter groundwater post construction.	PPE to be worn during all post construction maintenance works. Good practice to develop groundwater management plan should groundwater be encountered prior to site works.
	During construction			
	Construction Workers	Direct dermal	Short term exposure risk only. Presence of lead and arsenic, PAHs and PCBs to be considered as part of all site works and PPE	PPE during all works. Appropriate health and safety briefings, welfare facilities. Contractor responsible for own risk assessments to confirm appropriate levels of PPE.
		Ingestion	Short term exposure risk only. Presence of lead and arsenic, PAHs and PCBs to be considered as part of all site works and PPE	PPE during all works. Appropriate health and safety briefings, welfare facilities. Contractor responsible for own risk assessments. Dust suppression measures during earthworks.
		Inhalation of dust	Short term exposure risk only. Presence of lead and arsenic, PAHs and PCBs to be considered as part of all site works and PPE	PPE during all works. Appropriate health and safety briefings, welfare facilities. Contractor responsible for own risk assessments. Dust suppression measures during earthworks

Identified Source	Identified Receptor	Possible Pathway	Comment	Further Action
		Contact with contaminated groundwater	Considered possible (although no groundwater analysis undertaken to date) given depth of groundwater during the GI within made ground strata from 1.1mbgl.	PPE during all works. Groundwater management plan and abstraction licence may be required should significant amounts of groundwater be encountered onsite including groundwater sampling and analysis and risk assessments. Appropriate health and safety briefings, welfare facilities. Contractor responsible for own risk assessments. Good practice to develop groundwater management plan prior to site works and an assessment of appropriate management options is required.
	Underlying groundwater body – should deep excavations or piling be proposed	Leaching from overlying made ground strata, Lateral and Vertical Migration within subsurface and migration into deep groundwater	Given the nature of the current proposed works, and the phased approach to the development (no significant amounts of hardstanding to be removed at any one time) significant leachable contaminant migration into deeper groundwater bodies is not anticipated. Should piling be proposed at the site, further consideration will be required with respect to risks posed to controlled water receptors from shallow contamination and shallow groundwater within the subsurface.	Foundations works risk assessment will be required should piling and or deeper excavations be proposed to confirm the risks to the underlying aquifer.
	Swansea Bay / Estuary	Migration of contaminants within groundwater table to the Estuary or Sea.	During construction: Given the nature of the current proposed works, contaminant migration into groundwater and subsequently into the sea is not anticipated without infinite dilution and degradation; significantly minimising risks posed to the estuary or Sea.	Made ground materials to be reused above water table to minimise potential for leaching of contaminants within the subsurface.
	Offsite public, residents and workers.	Ingestion and inhalation of airborne dust	It is prudent to implement dust suppression measures during earthworks – particularly on account of risks of arsenic and lead dust borne particulates (and potential for previously unidentified contaminants e.g. asbestos).	Dust suppression measures required during earthworks; particularly for risks from metal contaminated dusts.

14 Materials Reuse and offsite disposal

It is currently understood that during construction, the intention is to reuse arisings from excavations within the development where possible and where appropriate.

The review of the soil analyses has indicated that chemically, the soils (both made ground and natural) are suitable for reuse on the site, beneath hardstanding and in relation to the made ground above the water table.

The beach deposits are considered suitable for reuse in landscaped areas of the proposed development.

Current earthworks proposals suggest a potential net surplus of material arisings particularly within the north western promenade area of the scheme. The depths of these excavations remain to be confirmed, but at present is not anticipated to be extensively deep.

To inform potential offsite disposal a preliminary waste assessment has been undertaken on all 28no soil samples (25no made ground and 3no natural strata) obtained for dry weight soil assessment. Of the 28no soil samples obtained and analysed, 6no made ground samples were also subject to WAC analysis.

The 6no samples were selected on account of their location within the areas of proposed excavations to date across the north western promenade area.

It should be noted that during construction works further sampling and analysis will most likely be required to confirm offsite disposal, particularly if materials of a different nature to those already identified are encountered, and also if significant volumes of material require offsite disposal. Landfill operators or recycling facilities may also require additional WAC analysis on the materials for offsite disposal subject to their facility requirements.

The preliminary waste assessment is provided below.

14.1 Waste Assessment – EWC Classification

In accordance with the European Waste Catalogue (EWC) and guidance from WM3 **[17]** the materials analysed as part of the ground investigation and to be excavated as part of construction have been classified using the following EWC codes:

17 05 03*: Soil and stones containing dangerous substances (mirror hazardous entry)

17 05 04: Soils and stones other than those mentioned in 17 05 03 (mirror non-hazardous entry)

Preliminary assessment of the dry weight analyses results is required in order to determine whether the materials are non-hazardous or contain hazardous properties.

14.1.1 Asbestos

As previously discussed Asbestos screening was undertaken in 23no samples of made ground from across the site area. Asbestos was not detected in any of the samples analysed.

14.1.2 Dry-weight waste classification

The results of the dry weight analyses obtained as part of the investigation have been assessed using the HazWasteOnline™ computer package. This software allows an accurate classification of materials as hazardous or non-hazardous on the basis of the concentrations of "worst case compounds" contained within the samples.

Once it is determined as to whether the materials are hazardous or non-hazardous, the results of WAC leachate analyses are compared to Waste Acceptance Criteria for the relevant landfill class (inert, stable non-reactive hazardous or hazardous).

The results of the initial dry weight assessment are summarised below, with hazardous classifications detailed in Table 10 below. The output of the HazWasteOnline™ model report is included in Appendix C.

14.1.3 Non Hazardous Classification

3no natural soil samples and 25no of made ground samples have been assessed using HazWasteOnline.™

All samples have been classified as non-hazardous in terms of waste disposal, with the exception of 5no samples of sandy gravelly made ground, typically with inclusions of ash, clinker and slag (discussed further below).

14.1.4 Hazardous Classification

As shown in Table 10 below, shallow made ground samples comprising sandy gravelly made ground from TP2, TP7, TP11, (within the north western promenade area) and TP12 and TP20 (from the south eastern promenade area) obtained from strata at depths of between 0.11-1.2mbgl have been initially classified as hazardous by virtue of Hazard Properties HP7 Carcinogenic, HP 10 toxic for reproduction, HP11 Mutagenic, and HP14 ecotoxic.

Table 9 Initial dry weight assessment – hazardous classification

ID	Sample depth (mbgl)	Strata depth (mbgl)	Strata thickness (m)	Lab sample description	Log Description	Hazardous classification details
TP2	0.2	0.1-0.5	0.4	Dark brown sand with stones	MADE GROUND. Dark brownish red GRAVEL/SAND. Gravel is fine to coarse subrounded to angular of **slag, clinker,** brick fragments and limestone with occasional subrounded to subangular cobble.	*On account of:* *HP7 Carcinogenic on account of arsenic trioxide at a concentration of 0.124% and lead compounds at a concentration of 1%* *HP10 toxic for reproduction on account of lead compounds at a concentration of 1%.* *HP14 ecotoxic on account of arsenic trioxide at a concentration of 0.124% and lead compounds at a concentration of 1%, dicopper oxide at 0.118% and zinc oxide at 2.216%*
TP07	0.6	0.3-0.8	0.5	Dark brown sandy loam with stones	MADE GROUND: Brown very gravelly slightly clayey SAND. Sand is fine to coarse. Gravels are fine to coarse angular of **ash, clinker**, limestone and mixed lithologies.	*On account of:* *HP7 Carcinogenic on account of lead compounds at a concentration of 0.19%*
TP11	0.2	0.11-0.57	0.46	Black stone/soil with stones	MADE GROUND: Orangish brown very clayey sandy GRAVEL. Gravels are fine to coarse subrounded to angular of chert and occasional **clinker** with yellow clayey inclusions. Roots present.	*On account of* *HP7 Carcinogenic and HP10 on account of lead compounds at a concentration of 0.889%* *and HP14 on account of lead compounds at a concentration of 0.889% and also zinc oxide 0.86%*
TP12	0.6	0.4-1.2	0.8	Dark brown sandy loam with stones and vegetation	MADE GROUND: Greyish brown slightly clayey gravelly SAND. Sand is fine to medium, Gravel is angular to sub-angular fine to medium limestone.	*On account of* *HP7 Carcinogenic and HP11 on account of TPH concentration of 0.113%.*
TP20	0.4	0.1-0.7	0.6	Dark brown sandy silt loam with stones and concrete/ aggregate	MADE GROUND: Dark reddish brown clayey very sandy GRAVEL. Sand is fine to coarse. Gravel is angular fine to coarse of concrete, brick and **iron slag.**	*On account of* *HP7 Carcinogenic and HP11 Mutagenic on account of TPH concentration of 0.132%.*

The 5no samples with initial hazardous classifications have been further reviewed below.

HP7 Carcinogenic and HP 11 Mutagenic (TP12 and TP20)

TPH (C6 to C40) are Category 1 or 2 substances in the context of Hazard Classes HP7 and HP11, which are known or should be regarded as carcinogenic or mutagenic respectively. If such substances are present at a concentration of ≥0.1%, the waste is classified as hazardous by HP7 or HP11. However, for waste contaminated with unknown oil, it is possible to use benzo(a)pyrene as a marker compound to determine whether the waste is classified as HP7 Carcinogenic and HP11 Mutagenic.

Where the concentration of benzo(a)pyrene is greater than 0.01% w/w of the concentration of the TPH, the waste is deemed hazardous by virtue of HP7 Carcinogenic and HP11 Mutagenic.

Samples TP12 and TP20 both have benzo(a)pyrene concentrations >0.0.1% w/w of TPH; and therefore both samples are considered truly hazardous by virtue of HP7 and HP11.

Notably, there does not appear to be a distinct source of the elevated TPHs within these two samples of made ground, other than the made ground itself.

HP7 Carcinogenic on account of Lead compounds (TP2, TP7 and TP11)

A hazardous waste classification has arisen in samples TP2, TP7 and TP11, by virtue of HP 7 Carcinogenic properties; 'waste which induces cancer or increases its incidence', with hazard statement 1A H350: 'may cause cancer' on account of elevated concentrations of lead.

The elevated concentrations of lead within these samples are likely attributable to slag, clinker, and or ash – present in all samples.

In accordance with WM3 guidance the measured concentration exceeds the concentration limit of 0.1% and therefore is hazardous by Hazard HP7.

14.1.5 Identification of Landfill Class

Non-hazardous materials can be disposed of to a non-hazardous waste management facility without the need for further testing or can be analysed further in order to confirm compliance with the Inert Waste Acceptance Criteria (WAC) for disposal at an inert waste facility.

Hazardous materials need to meet the WAC for disposal at a stable non-reactive hazardous facility or a hazardous waste facility.

6no samples of made ground from across the north western scheme area have been subject to WAC analysis.

A review of the 6no WAC results are provided below:

Hole ID	Sampled Depth (mbgl)	Strata description	Top of Strata (mbgl)	Bottom of Strata (mbgl)	Thickness (m)	Initial Waste Classification	WAC analysis
BH11	2	Made ground: clayey sandy gravel with concrete and brick inclusions	1.30	5.70	4.40	Non Hazardous	Fails inert WAC on account of elevated Chloride at 1100mg/kg above 800mg/kg WAC threshold.
BH02	1	Made ground: silty clayey sandy gravel. Cobbles, brick, glass, slate and ceramic	0.2	3.8	3.6	Non Hazardous	Pass inert WAC
TP08	0.3	Made ground: gravelly clayey sand with brick, ash, shell and flint	0.10	1.20	1.10	Non Hazardous	Fails inert WAC on TOC% 3.9 above the 3% inert WAC limit and antimony 0.076mg/kg above 0.06mg/kg threshold.
TP09	0.6	Made ground: gravelly sand with tarmac	0.40	1.20	0.80	Non Hazardous	Pass inert WAC

BH04	1	Made ground: Reddish brown clayey gravelly sand with brick and flint.	0.3	5.2	4.9	Non Hazardous	Fails inert WAC on account of elevated arsenic 1.55mg/kg above 0.5mbg/kg WAC threshold and fluoride 13.8mg/kg above 10mg/kg WAC threshold.
BH05	1	Made ground: clayey sandy gravel with brick, slate and concrete	0.6	2	1.4	Non Hazardous	Pass inert WAC

14.1.6 Discussion of disposal options

Made ground

Only 6no WAC samples have been obtained from the site (north west site area).

All 6no WAC samples, noted to be non hazardous in terms of dry weight assessment, would be considered suitable for disposal at a non-hazardous landfill should these materials from these specific locations be excavated as part of the proposed works. 3no samples of made ground from BH05, TP09 and BH02 also pass the inert WAC. However review of the sample descriptions indicate anthropogenic inclusions including concrete and tarmac, within these 'inert' samples. Review of the log and sample description indicates samples with similar matrix and anthropogenic inclusions, obtained from the same areas of the site are noted to fail the inert WAC. On account of this it is considered that onsite, segregation of such materials would be considered difficult and as such the worst-case classification would be applied for excavations within the locations of these trial hole and boreholes.

However as previously discussed 5no samples of made ground from the north west scheme area and one sample from TP20 (historic station in the south east scheme area) have been classified as hazardous in terms of dry weight assessment. Anthropogenic inclusions of slag and clinker, corresponding to the elevated concentrations of lead, zinc, arsenic and TPH, are likely attributable to the hazardous classification. No WAC analysis has been undertaken on these samples to date and as such acceptance at a hazardous landfill without the need for further treatment and assessment cannot be confirmed.

Should excavations be required within the locations of these 6no trial pits or boreholes, or indeed across the wider site area, it would be prudent to undertake further sampling and analysis prior to excavations or during excavations if appropriate storage of waste streams is available. During excavation works, materials should be excavated and stored separately (based on materials type MG/natural and colour, consistency and soil matrix / inclusions etc) and subsequently sampled and WAC tested to confirm disposal at an offsite waste facility or at waste treatment or recycling centre.

Alternatively, as previously discussed analysis has confirmed that chemically the materials are suitable for reuse of made ground beneath hardstanding and above the water table onsite.

Natural Strata

Natural strata has been classified as non-hazardous based on a review of dry weight data from 3no samples of 'beach deposits.'

Given that the materials have been classified as natural and through dry weight analysis have been confirmed as non-hazardous the materials would likely be accepted at an inert facility. However this will require confirmation with the inert landfill operator prior to disposal as some inert facilities, and treatment or soil recycling facility may still require WAC on natural strata. All natural materials are to be separated and stored from other waste streams prior to offsite disposal.

It would be anticipated that any Peat materials, should they arise as part of the construction works, will be classified as non-hazardous in terms of waste disposal on account of elevated organic content. Peat materials will also need to be excavated and stored separately from other waste streams (including other natural strata) prior to offsite disposal.

Similarly, the Peat materials would likely be accepted at a non-hazardous waste facility or soil recycling or treatment facility as they are consider 'natural materials', however confirmation with the landfill operator should be confirmed prior to acceptance at a facility. Additional sampling and WAC analysis maybe required.

14.1.7 Waste recommendations

Should landfill disposal be deemed the most preferable option, in accordance with current waste management guidance [18], all materials destined for landfill disposal require pre-treatment, to ultimately reduce the overall volume of materials being disposed. It is anticipated this could be achieved by sorting, and re-use of at least some of the arisings, and/or disposal of materials at soil recycling centres or transfer sites.

Disposal at a landfill facility should be considered as a last resort.

The operators of the landfills identified for disposal should be supplied with a copy of the chemical analyses results to confirm acceptance prior to removal of the materials from the site and may require further sampling and analyses to be undertaken.

During construction, the materials should be separated per waste stream and landfill class and stored as separate stockpiles prior to disposal. Hazardous, non-hazardous and inert materials should not be mixed, and care should be taken to avoid this during the works.

In particular, sandy gravelly made ground with inclusions of slag, ash and clinker, should not be mixed with any materials identified as non-hazardous and/or natural beach deposit strata which may be considered as inert.

Care must be taken during excavations and storage of materials to avoid this.

There is potential for materials previously not encountered to be excavated as part of the works. Any materials encountered during the construction works that differ in nature, consistency and/or colour to those sampled and tested as part of the recent ground investigation or exhibiting evidence of contamination (e.g. asbestos

or hydrocarbons) will require separate management and additional sampling and analyses to confirm potential off-site disposal options.

This preliminary waste assessment has been undertaken by competent and trained staff in accordance with current regulatory guidance and using available approved software using the available site investigation. Further sampling and waste analyses will likely be required should a large amount of offsite disposal of materials be required as part of the construction works.

The assessments and advice given are specific to the waste streams to be generated during the site works however appropriate disposal of the soils to landfill is reliant on appropriate management of the waste streams leaving site.

Arup do not have responsibility for the management of the waste streams generated during the site works. It is assumed that the management of the wastes, and compliance with the findings of the assessments, to ensure that materials are disposed of to the appropriate landfill, lies with the Contractor and their site operatives.

15 Geotechnical recommendations

15.1 Secondary flood walls

As discussed in Section 7, the trial pits undertaken to investigate the foundation details of the existing secondary walls indicate the masonry walls are founded directly on to the underlying Made Ground or on what appeared to be concrete blinding.

As part of the proposed scheme, it is anticipated that raising of the promenade ground level will be required. As such, the secondary walls may need to be raised and also act as a small retaining structure. In addition, the walls will need to withstand the design overtopping forces in regard to both their structural capacity and overall stability.

The suitability of the existing secondary walls to be reused as part of the scheme should be considered in greater detail once the preferred option has been finalised. However, as the walls do not have a foundation it is considered unlikely that they will be suitable for raising and to act as an earth retaining structure.

With the potential future effects of climate change, an allowance for future raising of the secondary walls and additional loading could be accounted for in the design of the foundations.

15.2 Ground raising

Ground raising of the promenade is likely to be required to limit the above ground height of the proposed wave wall. The required level of the wave wall and associated ground raising is dependant on the results of coastal modelling and the design return period, but at the lowest areas of the existing promenade it is anticipated that ground raising of at least 1m will be required. The following will need to be considered as part of the detailed design as a result of ground raising:

- Total and differential settlements – Raising the ground level will apply additional load in to the ground resulting in settlements. The magnitude of the settlement will be dependent on the magnitude of the loading (amount of ground raising) and the stiffness of the ground with the softer material such as the soft clays and peat resulting in larger settlements. The variation in the ground properties, in particular where lenses of peat are present, could also result in differential settlements occurring. The potential for total and differential settlements induced by ground raising will need to be considered as part of the design of the secondary walls and promenade pavement design.
- Buried services – Similar to the above, the main risk associated with ground raising is considered to be the potential impact of differential settlements on the existing buried services beneath the promenade, in particular, the DCWW assets (water main and sewer). The impact of the settlement on buried services will need to be assessed as part of the detailed design. If the settlements are considered to have the potential to damage the assets, mitigation measures may be required such as the use of lightweight fills to reduce settlement.

- Global stability – Increasing the ground level will increase the disturbing forces applied to any existing or proposed or sea defences structures in regards to their overall stability i.e. sliding, overturning, bearing.

15.3 Foundations for new sea defence structures

A value engineering exercise has recently been completed for the revetment section of the defence. Below is a summary of the key geotechnical design considerations and risks related to options with a shallow foundation on the foreshore and piled structures.

15.3.1 Shallow foundations

Thin bands of peat were encountered locally during the ground investigation but are not present across significant lengths of the scheme. However, there may be other localised bands of peat present which were not identified by the boreholes completed. The main potential impact of the peat and the resulting localised variation in ground conditions is as follows:

- Issues with the overall global stability of the defence as the low strength peat forms a potential preferential failure plain
- Differential settlements which could impact on the defence structure itself but also overlying pavement for the promenade.

To overcome the above is quite challenging in the marine environment, particularly if construction is being undertaken between tides rather than protected by a cofferdam. As the peat has only been encountered locally, shallow foundations are still considered to be a viable option and the following could be undertaken to mitigate the associated risks:

- Remove any peat if present at formation and potentially dig a shallow trial pit below formation level to confirm there isn't any present at shallow depth below the formation
- Undertake settlement monitoring during construction. If the structure is locally settling, hold the construction works to allow the peat to consolidate.
- In the selection of the promenade paving surface, use solutions which are more tolerant of different settlements.

The alternative option would be designing assuming the peat is present throughout the scheme as the worse case ground conditions. This is likely to be overly conservative and result in needing to pile the foundations. Consideration could also be given to undertaking additional ground investigation to determine the extent of peat in advance of the constructions works but this would need very extensive investigation (say boreholes at 20m centres) and is therefore likely to be very expensive and disruptive.

15.3.2 Piled structures

- **Sheet piles**: The retained height of the coastal defence will be in the region of 3m to 4m which is considered to be reaching the limit at which sheet piles are viable. Additional restraint near the top of the sheet pile is therefore likely to be required for stability and to reduce deflections. The restraint could be provided by a soil nail or dead man anchor, however, the location and design of these would need to account for the buried services within the promenade. In the northern part of the scheme where the bedrock is shallower, there may be issues with driving the sheet piles to achieve the required embedment.
- **CFA piles**: The main risk associated with the use of CFA piles is the potential for flighting and running sands in the Marine Beach Deposits. In addition, there may be issues with achieving the required embedment in the northern part of the scheme where the bedrock comprises strong limestone and is present at shallow depth.
- **Bored piles:** Bored piles are likely to be preferred to CFA piles as the holes will be cased (mitigating the risk associated with flighting and running sands) and they are capable of drilling in to bedrock. If piling is required in to the limestone bedrock in the northern part of the scheme where there is a risk of natural cavities, permanent casing is likely to be required.

15.4 Voids

15.4.1 Revetment and promenade

The GPR survey of the revetment and promenade identified a relatively large number of anomalies which indicate potential voids. As well as voiding, these anomalies may also relate to features such as larger rocks, blocks, services or drains.

As such, as part of the proposed foreshore ground investigation it is proposed to undertake targeted intrusive investigation of some of the key anomalies identified. This will include 10no. small diameter drill holes through the revetment inspected with an endoscope and 5no. dynamic probes along the promenade.

15.4.2 Natural cavities

As discussed in Section 5.4.1, natural cavities were encountered within the limestone bedrock in BH02. Further investigation on the size of the void is planned as part of the foreshore ground investigation. However, it should be noted that there is a risk that other natural cavities may be present in all areas of the scheme underlain by limestone of the Oystermouth Formation.

The potential presence of voids should therefore be considered as part of the selection of the preferred option and detailed design of the scheme. If possible, loading of the ground (which may induce collapse of cavities) and piling in to the bedrock should be avoided. In addition, the potential collapse of voids could be accounted for in the design of works.

Currently, at the location of BH02 there is a 'pinch point' in the width of the promenade. Piling is being considered to move the sea wall outwards where there is a small return in the existing sea wall alignment which forms the pinch point. Piling within voided bedrock is challenging and grouting of the voids may be required in advance of the piling which poses its own challenges, particularly controlling the grout in an environmentally sensitive area. As such, alternative options may be preferable which reduce the risks associated with natural cavities such as widening the promenade in to the adjacent car park.

15.5 Unexploded ordnance

Based on preliminary searches, there has been historic military activity in Mumbles during WWII including:

- Battery on Mumbles Head which was in use from 1861 to the 1950s [9]
- Stationing of American GIs in Mumbles [10]
- Barracks anti-aircraft guns positioned on Mumbles Hill [11]

In addition there are recorded bombings of Mumbles (both high explosives and incendiary bombs) [12] and the area has been classified as high risk by Zetica bomb risk maps [13].

As the area has previous military use, it is anticipated that further consideration of UXO will be required once the preferred options and construction methodology has been finalised.

As the existing defences were already in place during WWII, it is likely that any UXO falling on the promenade itself would have been dealt with at the time and therefore the risk associated with excavations within the footprint of the existing promenade structure is considered to be low. For excavations along the foreshore, the risk of UXO is considered to be much greater as any UXO falling on the beach may have become buried and there has been negligible post-war development of the foreshore since WWII. A detailed UXO desk study may therefore be required depending on the final scheme proposals.

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Figures

DISTANCE ALONG BASELINE (m)

ELEVATION (mOD)

No recovery -anticipated to be Marine Beach Deposits

No recovery - boundary between Marine Beach Deposits and bedrock unknown

Dissolution features

SCALE 1:111V 1:1528H @ A3-L

LEGEND

Hole offset is +ve to the RIGHT of the baseline

HoleID

SPT N value, * denotes N extrapolated by gINT:
* from main blows
** from seating blows

(Offset)

N20*

Piezometer readings

Monitoring information not shown, response zone shown only

Water strikes during boring / excavation

Time for reported water rise and flow rate remarks

20min. Steady flow

Level that water rose to

Level of water strike

Piezo response zone

Tip depth

Type of piezometer

SPIE

Key to piezo types:
SP Standpipe

PLAN

COLOUR LEGEND

- [(OYSTERMOUTH FORMATION)]
- [(MARINE BEACH DEPOSITS)]
- [(MADE GROUND)]
- [(BISHOPSTON MUDSTONE FORMATION)]

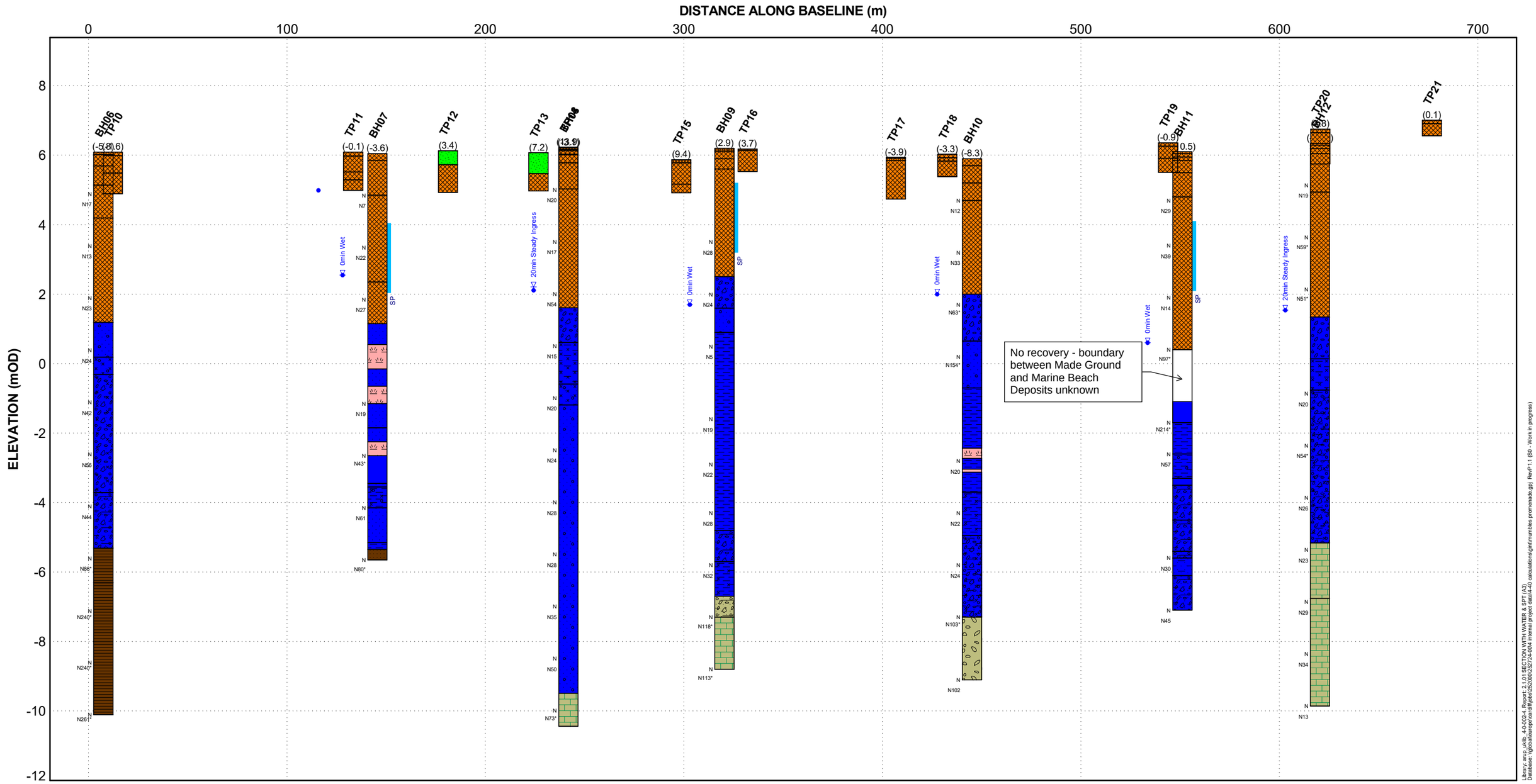
MATERIALS

- Fill (MADE GROUND)
- Gravelly SAND
- LIMESTONE
- NO RECOVERY
- Clayey sandy GRAVEL
- MUDSTONE
- Sandy gravelly CLAY
- Sandy GRAVEL
- Sandy SILT
- Clayey GRAVEL
- Sandy gravelly SILT
- Silty sandy GRAVEL
- Made Ground - FILL

MUMBLES PROMENADE GEOLOGICAL CROSS SECTION VERTICAL WALL SECTION

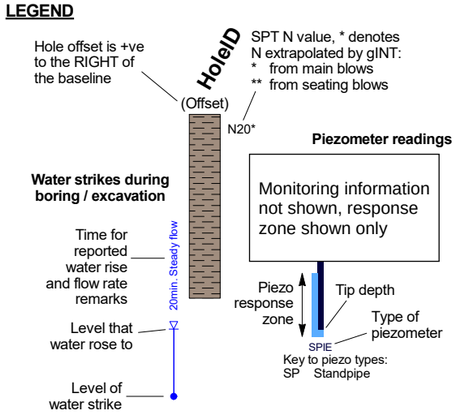
246344

FIGURE 01

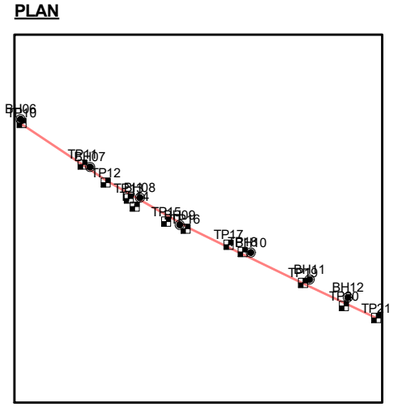


SCALE 1:111V 1:1944H @ A3-L

LEGEND



PLAN



COLOUR LEGEND

- [(TOPSOIL)]
- [(PEAT)]
- [(OXWICH HEAD LIMESTONE FORMATION)]
- [(MARINE BEACH DEPOSITS)]
- [(MADE GROUND)]
- [(BISHOPSTON MUDSTONE FORMATION)]

MATERIALS

- Fill (MADE GROUND)
- Gravelly SAND
- Sandy gravelly SILT
- Silty sandy GRAVEL
- Clayey sandy GRAVEL
- MUDSTONE
- SAND
- PEAT
- NO RECOVERY
- Silty gravelly CLAY
- CLAY
- SANDSTONE
- Sandy GRAVEL
- Clayey SILT
- LIMESTONE
- Silty Clay
- Silty sandy CLAY
- Clayey silty sandy GRAVEL
- COBBLES
- Sandy gravelly CLAY
- Clayey SAND
- TOPSOIL
- Made Ground - FILL

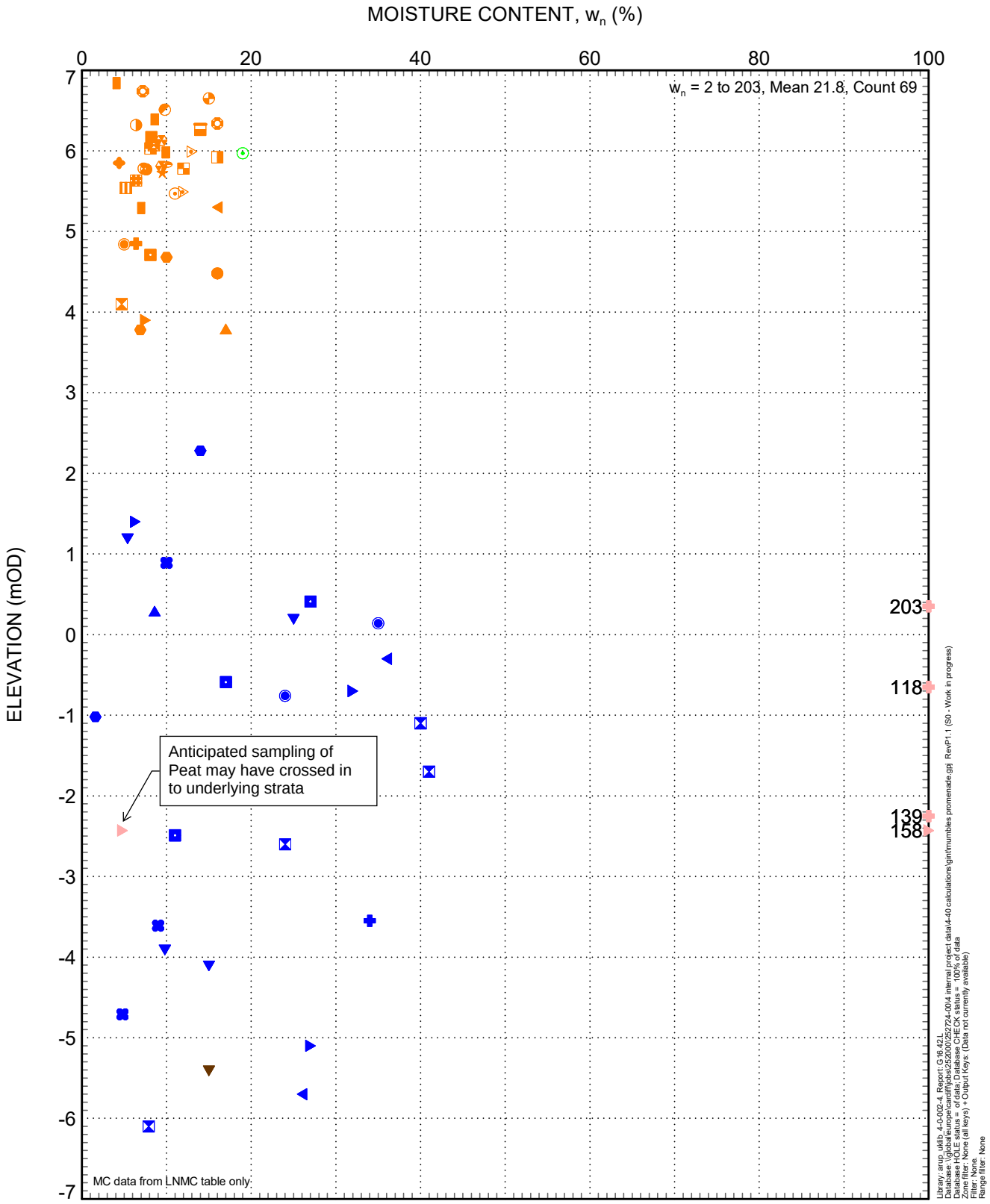
MUMBLES PROMENADE GEOLOGICAL CROSS SECTION REVETMENT SECTION

246344

FIGURE 02

ARUP gINT v8.30.003
Made by James Lancaster on 11-Oct-19

Library: atop_pkltb_4-0-002-4 Report: 2-101 SECTION WITH WATER & SPT (A3)
Database: \\global\europe\cardiff\jobs\250000\250724-004\4 Internal project data\4-04 calculations\gint\mumbles promenade.gpj ReviP 1.1 (50 - Work in progress)

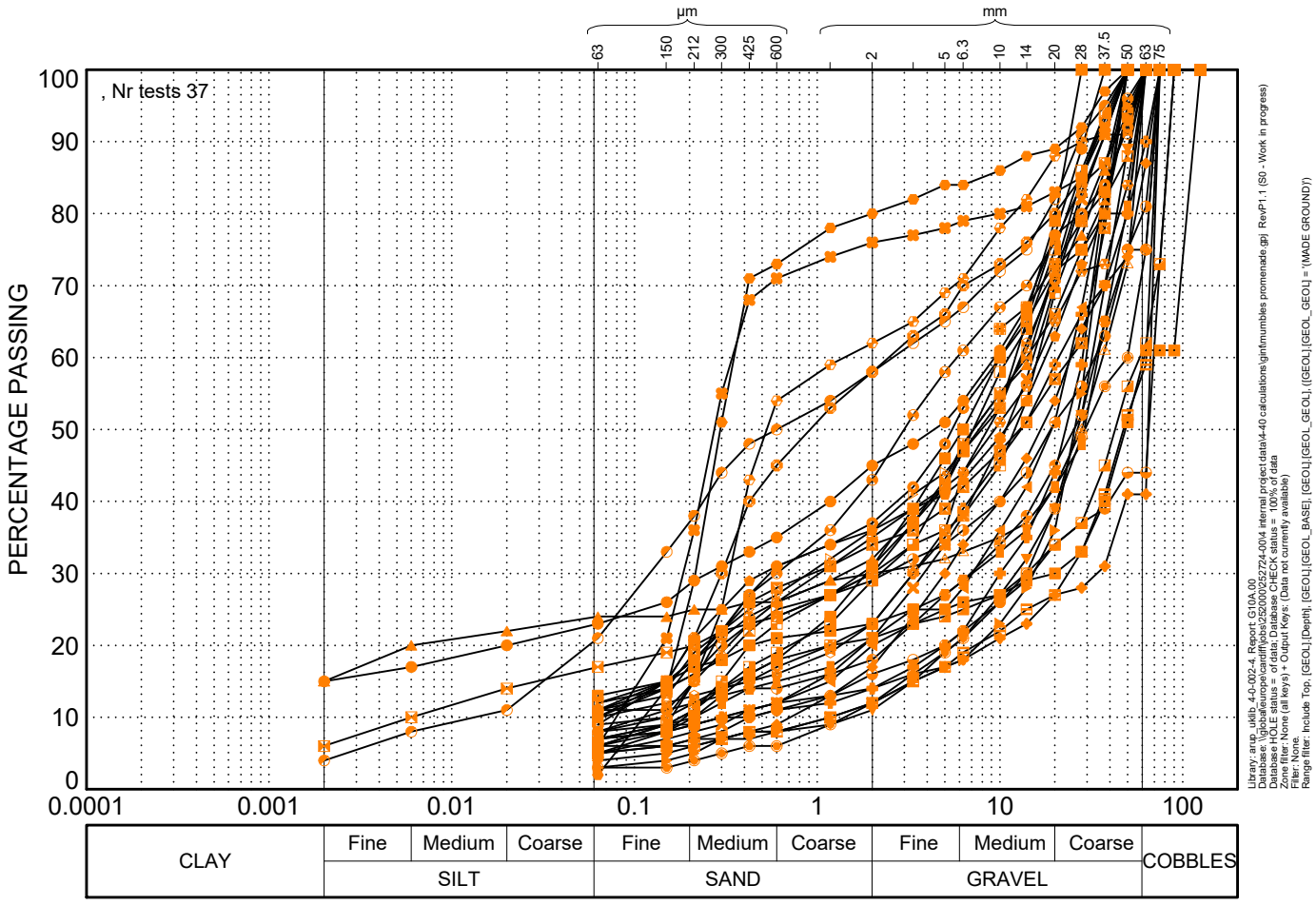


((TOPSOIL))
((PEAT))
((MARINE BEACH DEPOSITS))
((MADE GROUND))
((BISHOPSTON MUDSTONE FORMATION))
BH01
BH02
BH03
BH04
BH05
BH06
BH07
BH08
BH09
BH10
BH11
BH12
TP01
TP02
TP03
TP04
TP05
TP06
TP07
TP08
TP09
TP10
TP11
TP12
TP13
TP14
TP15
TP17
TP18
TP19
TP20

ARUP_gINT-v8.30.003
Made by Jamie Lancaster on 12-Oct-19

MUMBLES PROMENADE
NATURAL MOISTURE CONTENT

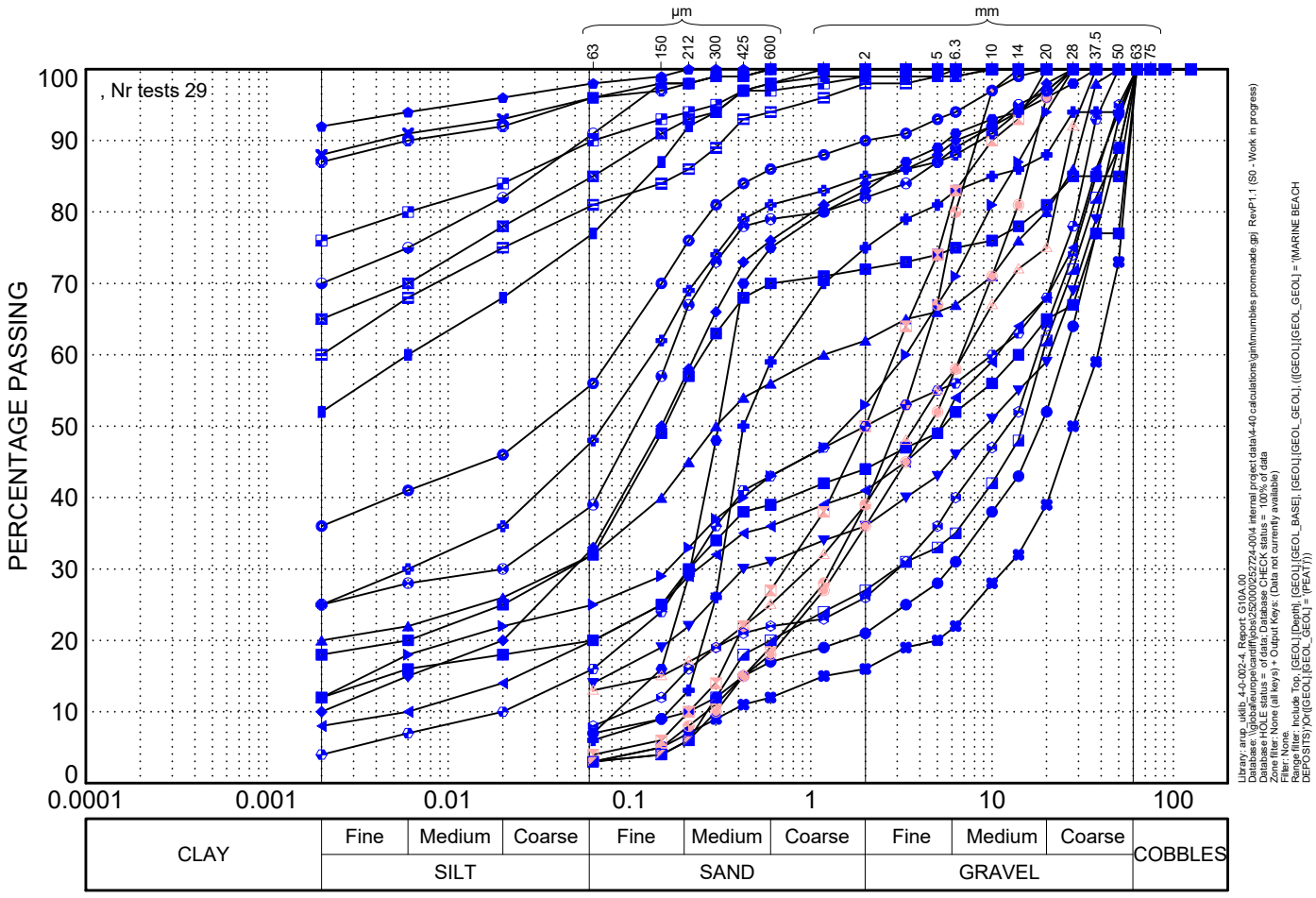
246344 **FIGURE 03**



- ((MADE GROUND))
- BH01, 4.5mOD
- BH02, 6.2mOD
- BH03, 3.8mOD
- BH05, 4.7mOD
- BH05, 3.8mOD
- BH07, 4.9mOD
- BH08, 4.7mOD
- BH09, 5.3mOD
- BH10, 3.9mOD
- BH11, 4.1mOD
- BH12, 4.8mOD
- TP01, 6.8mOD
- TP01, 6.4mOD
- TP02, 6.7mOD
- TP02, 6.3mOD
- TP03, 6.5mOD
- TP04, 5.9mOD
- TP05, 5.6mOD
- TP06, 6.3mOD
- TP06, 5.8mOD
- TP07, 5.9mOD
- TP08, 6.1mOD
- TP09, 6.1mOD
- TP09, 5.8mOD
- TP10, 6.0mOD
- TP10, 5.5mOD
- TP11, 6.0mOD
- TP11, 5.3mOD
- TP12, 5.7mOD
- TP13, 5.5mOD
- TP14, 6.0mOD
- TP14, 5.8mOD
- TP15, 5.8mOD
- TP17, 5.5mOD
- TP18, 5.8mOD
- TP19, 6.3mOD
- TP20, 6.7mOD

MUMBLES PROMENADE
PARTICLE SIZE DISTRIBUTION
(MADE GROUND)

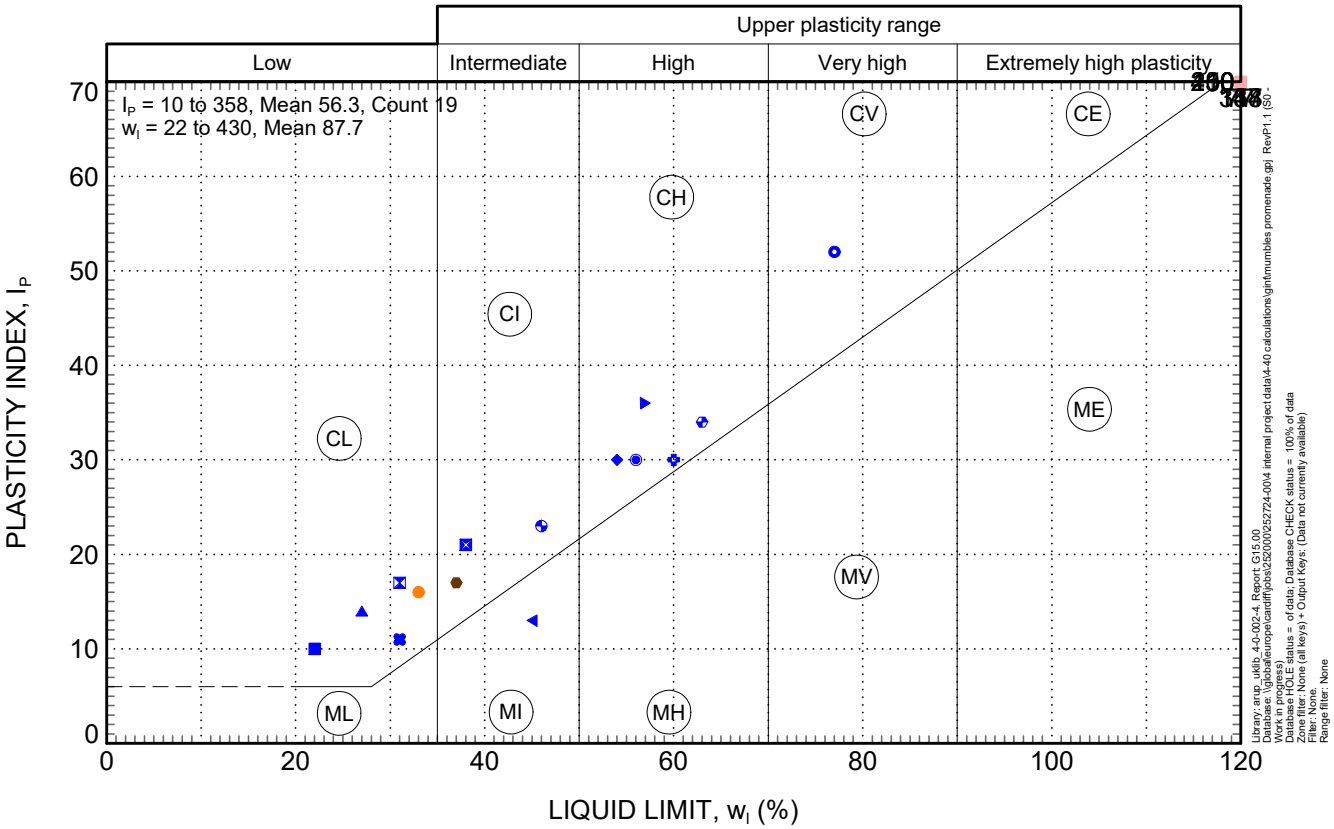
246344 **FIGURE 04a**



((PEAT))
((MARINE BEACH DEPOSITS))
BH03, 0.3mOD
BH04, 0.9mOD
BH04, -3.6mOD
BH04, -4.7mOD
BH05, 2.3mOD
BH05, -1.0mOD
BH06, 1.2mOD
BH06, 0.2mOD
BH06, -3.9mOD
BH06, -4.1mOD
BH07, 0.4mOD
BH07, -0.7mOD
BH07, -2.3mOD
BH07, -3.6mOD
BH08, 0.4mOD
BH08, -0.6mOD
BH08, -2.5mOD
BH09, -0.3mOD
BH09, -5.7mOD
BH10, 1.4mOD
BH10, -0.7mOD
BH10, -2.4mOD
BH10, -5.1mOD
BH11, -1.1mOD
BH11, -1.7mOD
BH11, -2.6mOD
BH11, -6.1mOD
BH12, 0.1mOD
BH12, -0.8mOD

MUMBLES PROMENADE
PARTICLE SIZE DISTRIBUTION (MARINE BEACH DEPOSITS) & (PEAT)

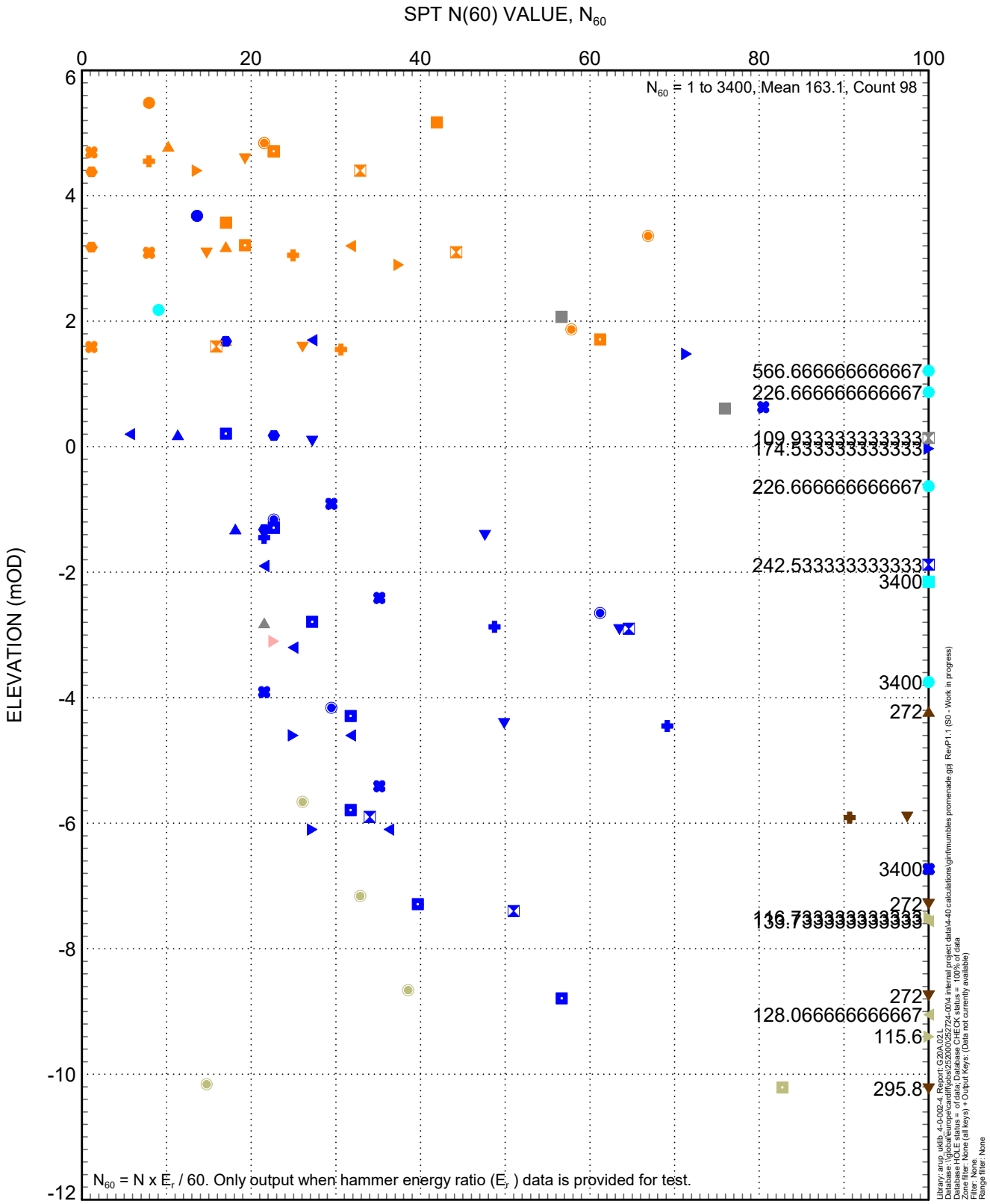
246344 **FIGURE 04b**



- ((PEAT))
- ((MARINE BEACH DEPOSITS))
- ((MADE GROUND))
- ((BISHOPSTON MUDSTONE FORMATION))
- BH01, 4.5mOD
- BH04, 0.9mOD
- BH04, -3.6mOD
- BH06, 0.2mOD
- BH06, -5.4mOD
- BH07, 0.4mOD
- BH07, -0.7mOD
- BH07, -2.3mOD
- BH07, -3.6mOD
- BH08, 0.4mOD
- BH08, -0.6mOD
- BH09, -0.3mOD
- BH09, -5.7mOD
- BH10, -0.7mOD
- BH10, -2.4mOD
- BH11, -1.1mOD
- BH11, -1.7mOD
- BH11, -2.6mOD
- BH12, 0.1mOD

MUMBLES PROMENADE
PLASTICITY CHART

246344 **FIGURE 05**

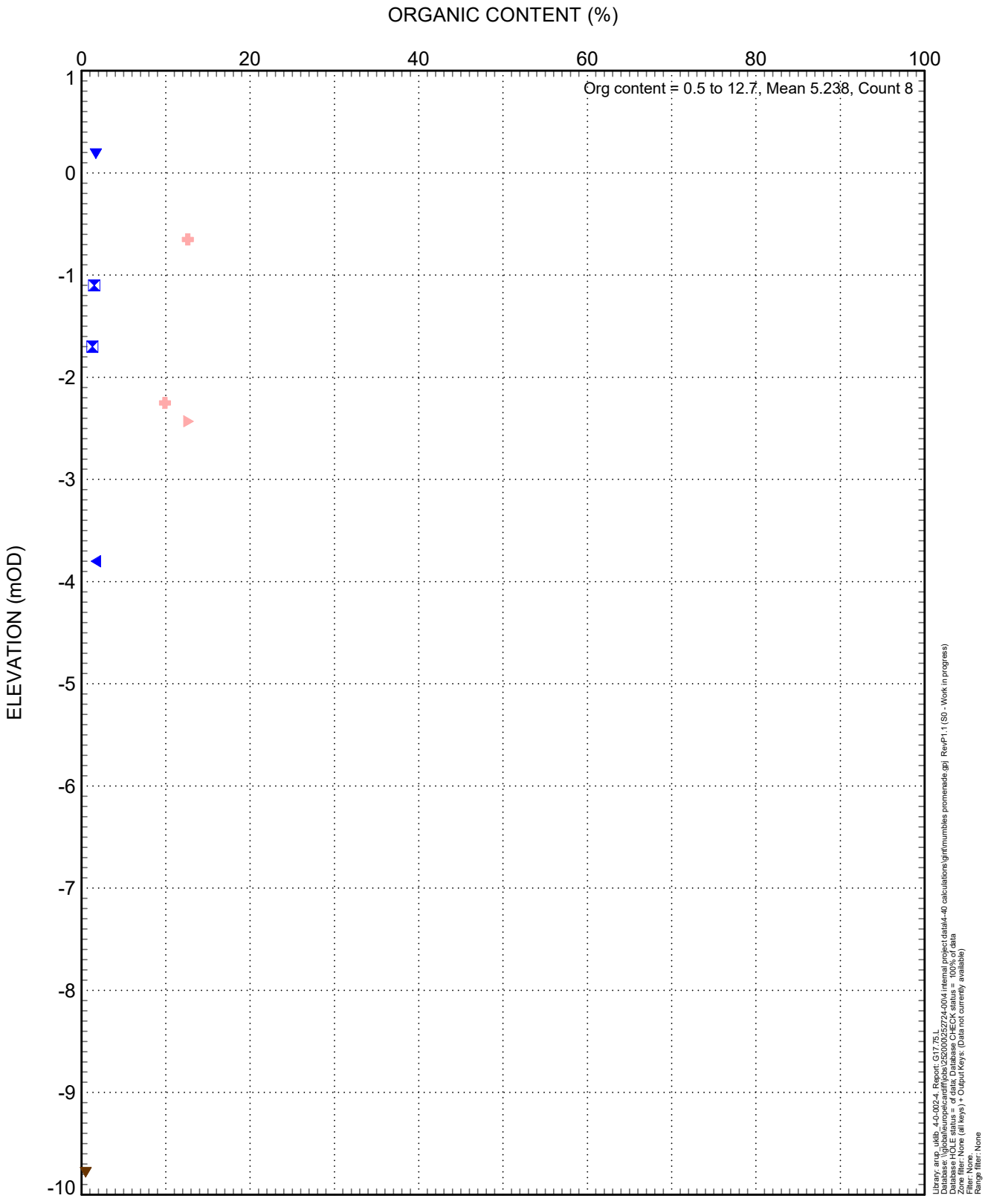


((PEAT))
((OYSTERMOUTH FORMATION))
((OXWICH HEAD LIMESTONE FORMATION))
((MARINE BEACH DEPOSITS))
((MADE GROUND))
((BISHOPSTON MUDSTONE FORMATION))
Unknown
BH01
BH02
BH03
BH04
BH05
BH06
BH07
BH08
BH09
BH10
BH11
BH12

ARUP, gINT v8.30.003
Made by Jamie Lancaster on 12-Oct-19

MUMBLES PROMENADE
STANDARD PENETRATION TESTS

246344 **FIGURE 06**

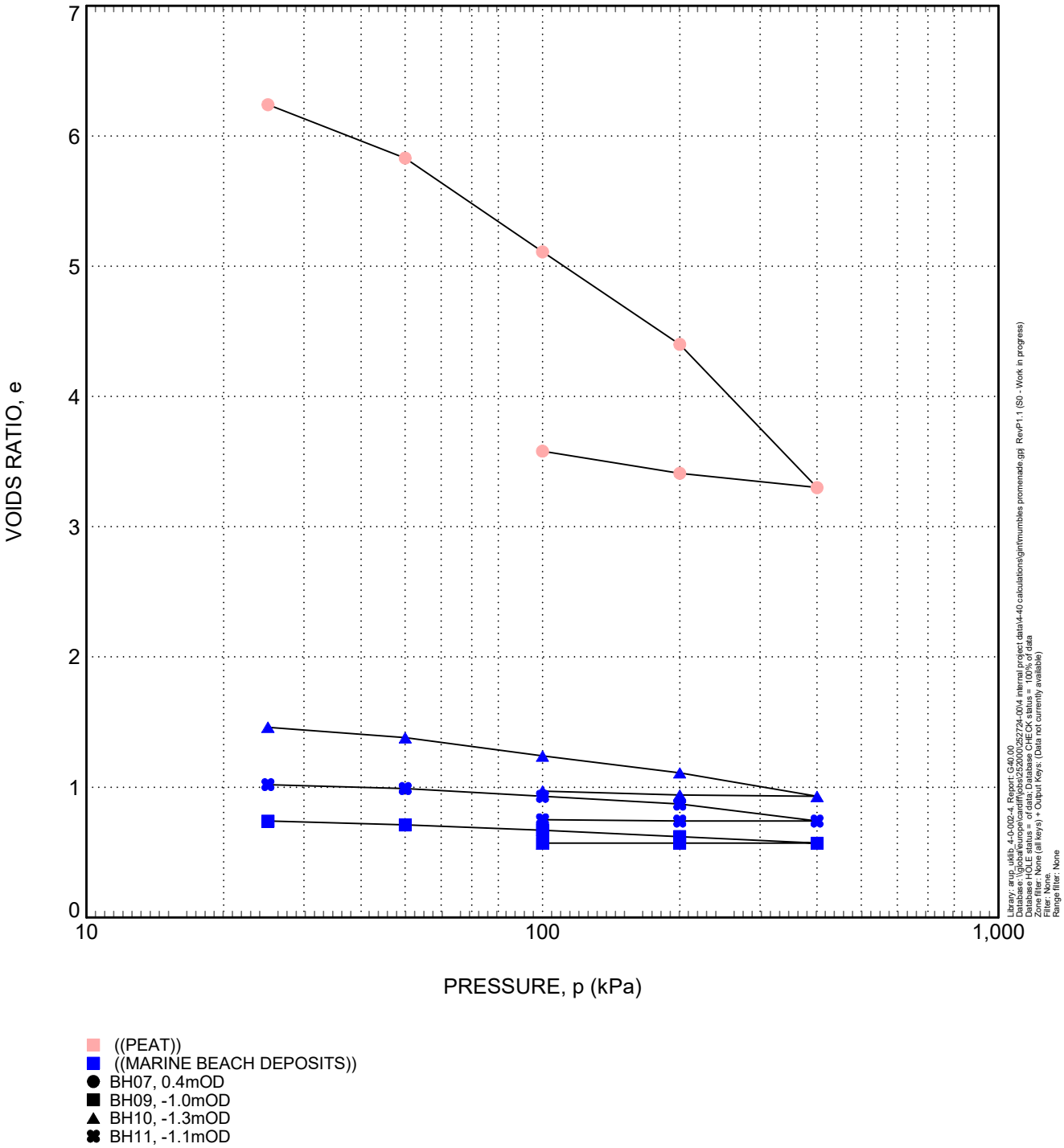


((PEAT))
((MARINE BEACH DEPOSITS))
((BISHOPSTON MUDSTONE FORMATION))
BH06
BH07
BH09
BH10
BH11

MUMBLES PROMENADE
ORGANIC CONTENT

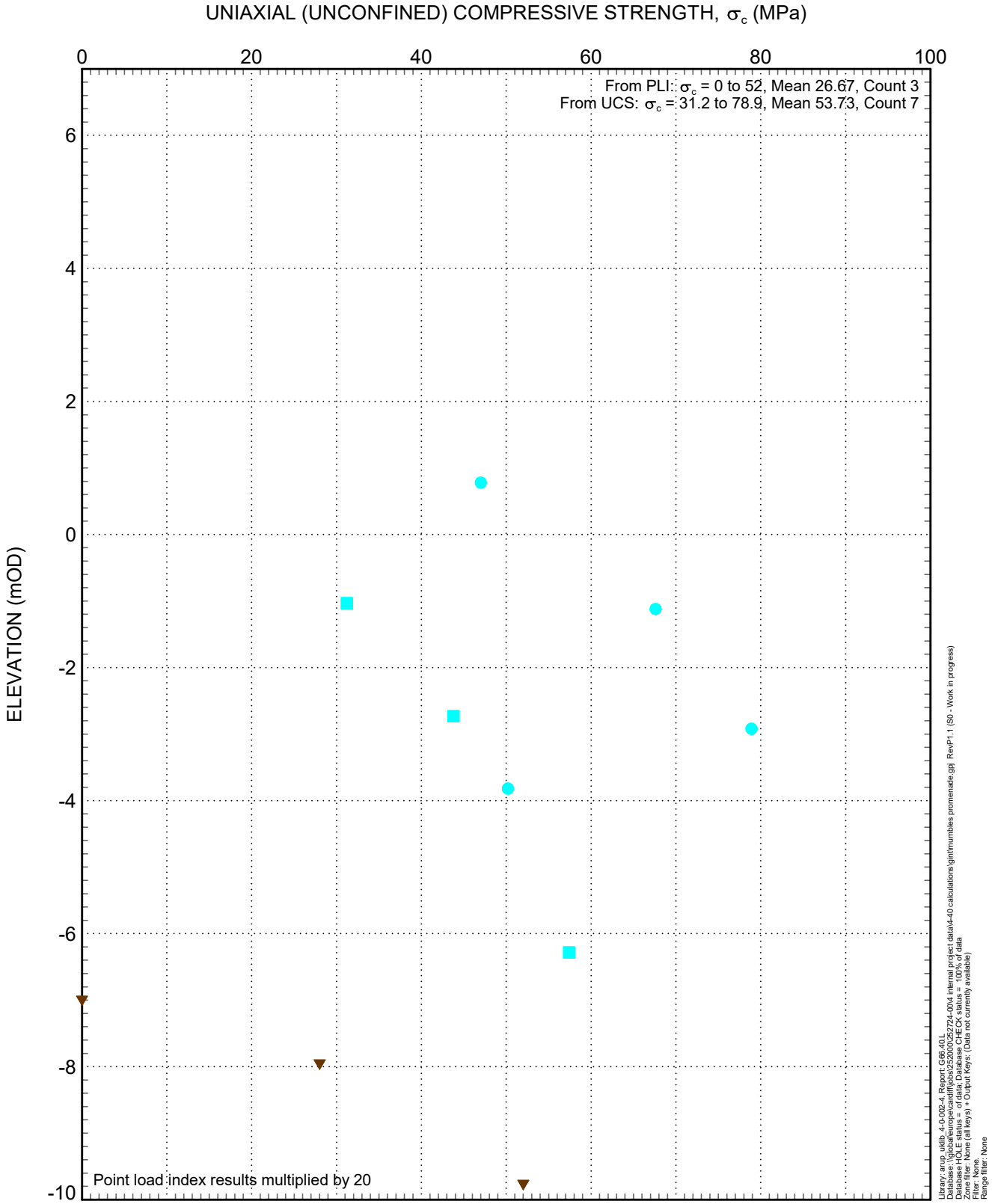
246344 **FIGURE 07**

ARUP_gINT-v8.30.003
Made by Jamie Lancaster on 12-Oct-19



MUMBLES PROMENADE
CONSOLIDATION TESTS

246344 **FIGURE 08**



■ ((BISHOPSTON MUDSTONE FORMATION))
● BH01
■ BH02
▼ BH06

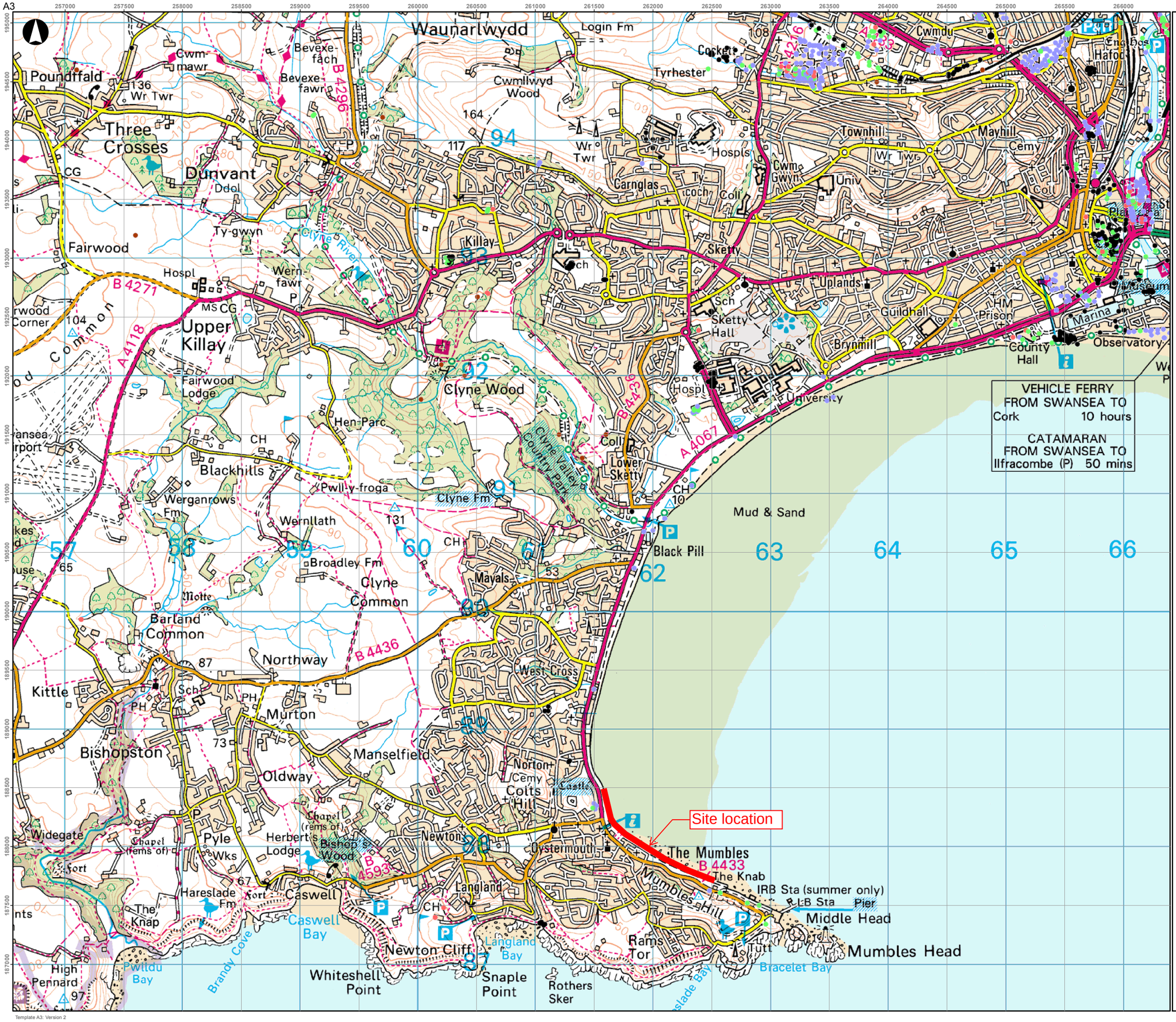
ARUP_gINT-v8.30.003
Made by Jamie Lancaster on 2-Oct-19

MUMBLES PROMENADE
UNIAXIAL COMPRESSIVE STRENGTH

246344 **FIGURE 09**

Drawings

A3



	2016-11-29	JKL	RC	AP
Issue	Date	By	Chkd	Appd

Metres
0 405 810 1,620

4 Pierhead Street
Cardiff CF10 4QP
Tel +44 29 2047 3727 Fax +44 29 2047 2277
www.arup.com

Client
Neath Port Talbot County Council

Job Title
Mumbles Promenade PAR

Drawing Title
Site location plan

Scale at A3
1:30,000

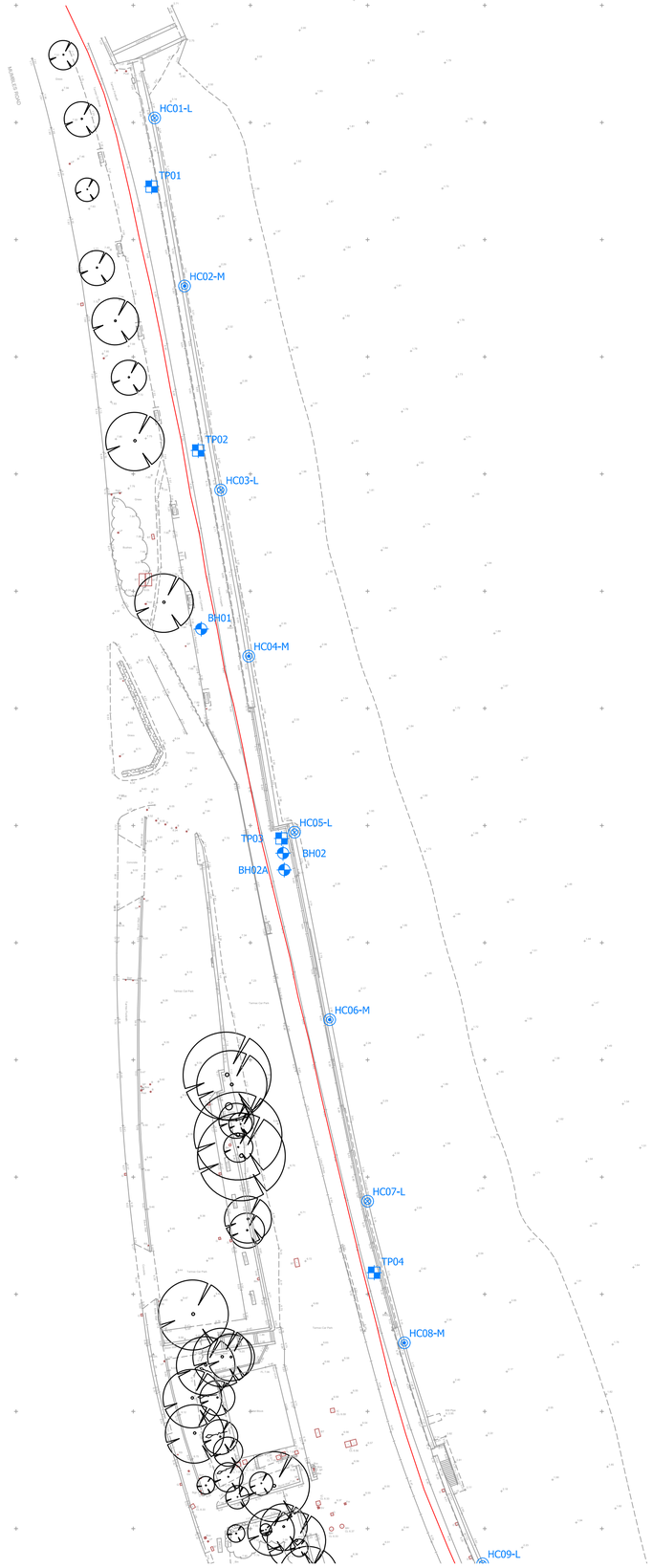
Job No	Drawing Status
252724	**Preliminary**

Drawing No	Issue
001	**P0**

22/04/2016 14:58:28

N

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS

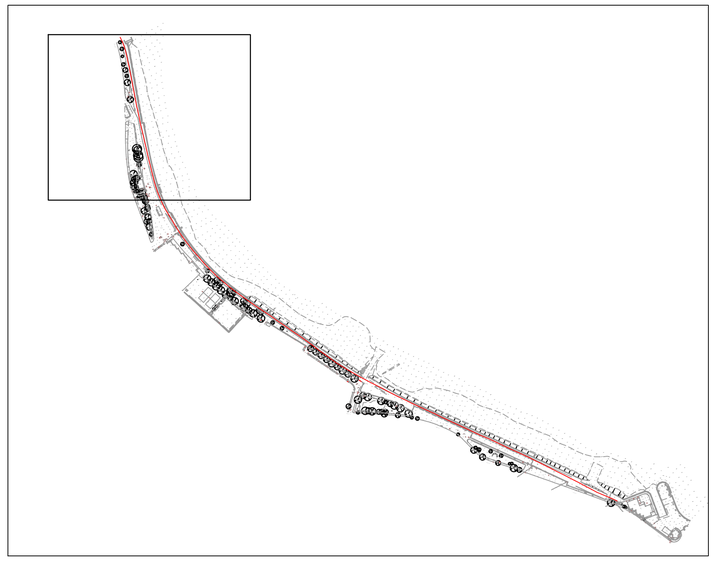


0 5 10 15 20 25 m
SCALE 1:500

KEY

- RISING MAIN
- BOREHOLE
- TRIAL PIT
- CORE
- VERTICAL CORE

SHEET LAYOUT PLAN (1:5000)



REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

CITY & COUNTY OF SWANSEA COUNCIL

5th FLOOR
LONGCROSS COURT
47 NEWPORT ROAD
CARDIFF
CF24 0AD
TEL: +44 (0)29 2082 9200
e-mail: cardiff@wyg.com

Project: A111150-4

MUMBLES COASTAL PROTECTION WORKS

Drawing Title:

EXPLORATORY HOLE LOCATION PLAN
(SHEET 1 OF 4)

Scale @ A1	Drawn Date	Checked Date	Approved Date
1:500	CM 15.07.19		

Project No.	Office	Type	Drawing No.	Revision
A111150-4	CDF	N	02	

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS

N

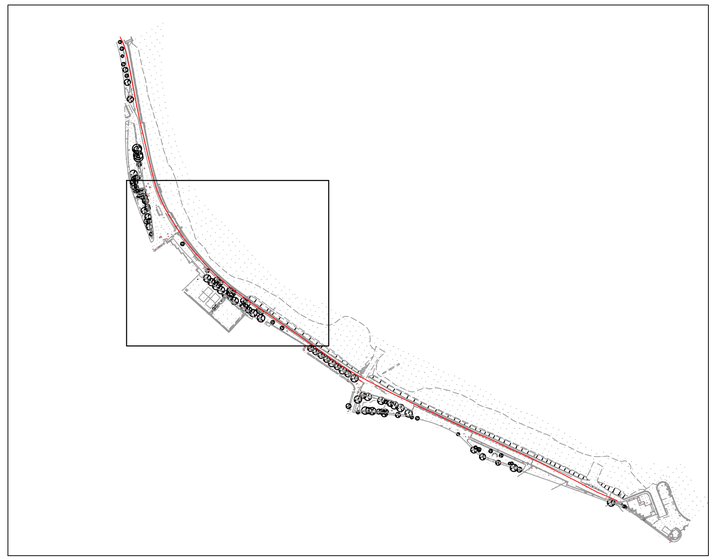
HC09-L
HC10-M
TP05
BH03
TP06
HC11-L
HC12-M
TP08
TP09
BH04
HC13-L
TP07
HC14-M
HC15-L
BH05
BH06
TP10
TP11
BH07

0 5 10 15 20 25 m
SCALE 1:500

KEY

RISING MAIN

SHEET LAYOUT PLAN (1:5000)



REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

CITY & COUNTY OF SWANSEA COUNCIL

5th FLOOR
LONGCROSS COURT
47 NEWPORT ROAD
CARDIFF
CF24 0AD
TEL: +44 (0)29 2082 9200
e-mail: cardiff@wyg.com

Project: A111150-4

MUMBLES COASTAL PROTECTION WORKS

Drawing Title:

EXPLORATORY HOLE LOCATION PLAN
(SHEET 2 OF 4)

Scale @ A1	Drawn	Date	Checked	Date	Approved	Date
1:500	CM	15.07.19				

Project No.	Office	Type	Drawing No.	Revision
A111150-4	CDF	N	03	

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS

N

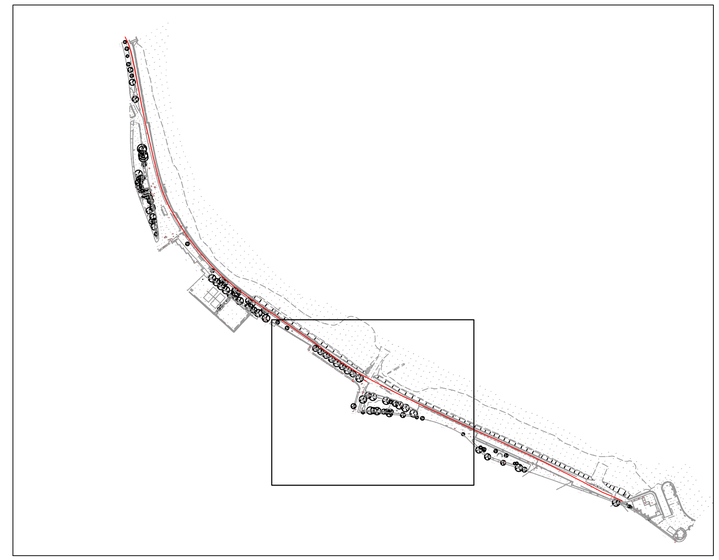
TP11
BH07
TP12
TP13
BH08
TP14
TP15
BH09
TP16
TP17

MUMBLES ROAD
PROMENADE TERRACE

KEY

RISING MAIN

SHEET LAYOUT PLAN (1:5000)



0 5 10 15 20 25 m
SCALE 1:500

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:
CITY & COUNTY OF SWANSEA COUNCIL

5th FLOOR
LONGCROSS COURT
47 NEWPORT ROAD
CARDIFF
CF24 0AD
TEL: +44 (0)29 2082 9200
e-mail: cardiff@wyg.com

Project: A111150-4
MUMBLES COASTAL PROTECTION WORKS

Drawing Title:
EXPLORATORY HOLE LOCATION PLAN
(SHEET 3 OF 4)

Scale @ A1	Drawn Date	Checked Date	Approved Date
1:500	CM 15.07.19		

Project No.	Office	Type	Drawing No.	Revision
A111150-4	CDF	N	04	

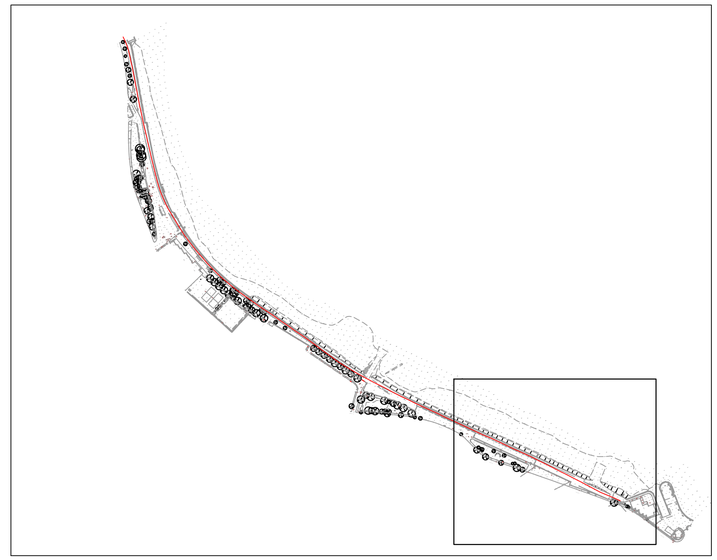
DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS

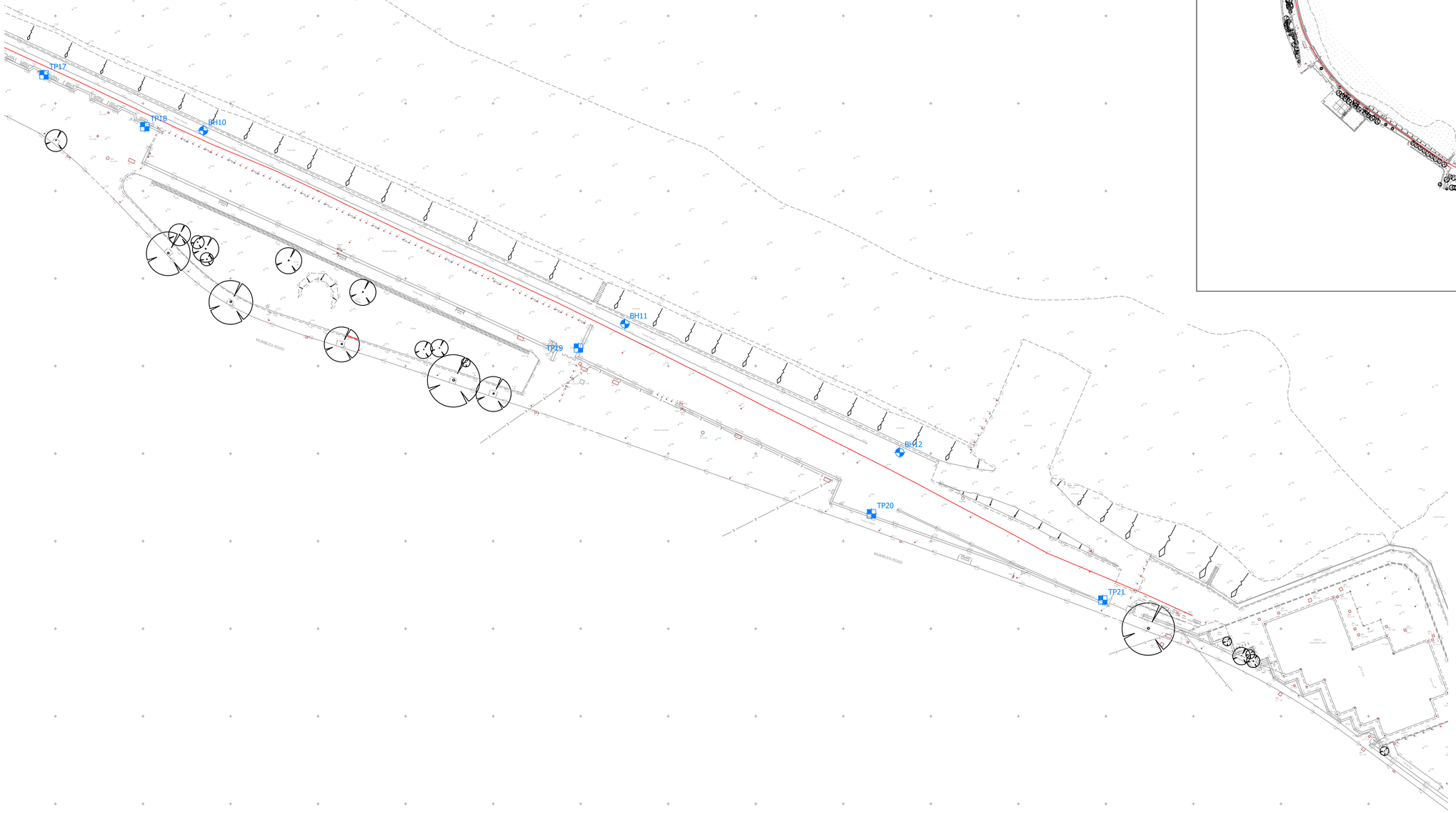
N

KEY

RISING MAIN

SHEET LAYOUT PLAN (1:5000)





0 5 10 15 20 25 m
SCALE 1:500

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:
CITY & COUNTY OF SWANSEA COUNCIL

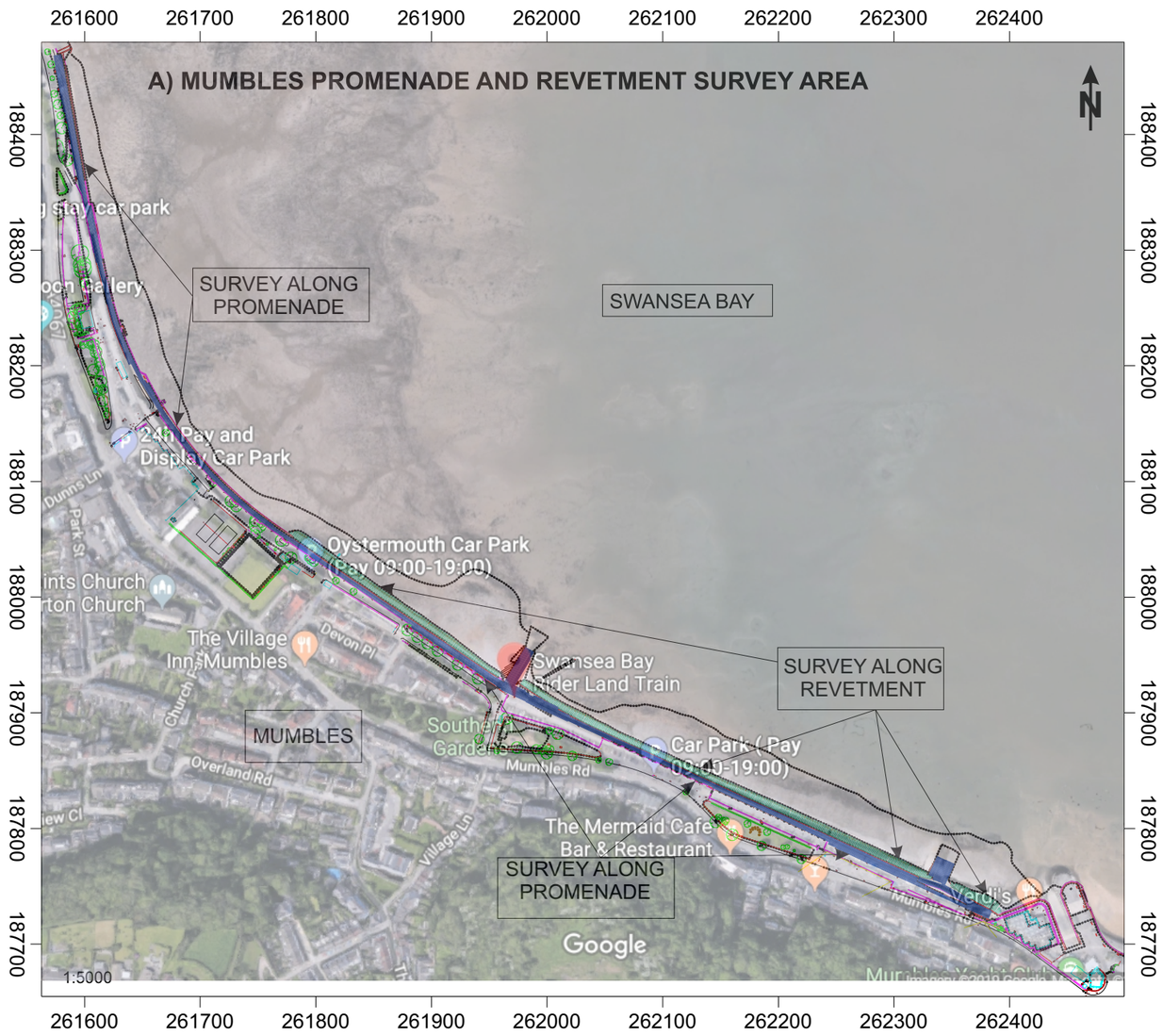
5th FLOOR
LONGCROSS COURT
47 NEWPORT ROAD
CARDIFF
CF24 0AD
TEL: +44 (0)29 2082 9200
e-mail: cardiff@wyg.com

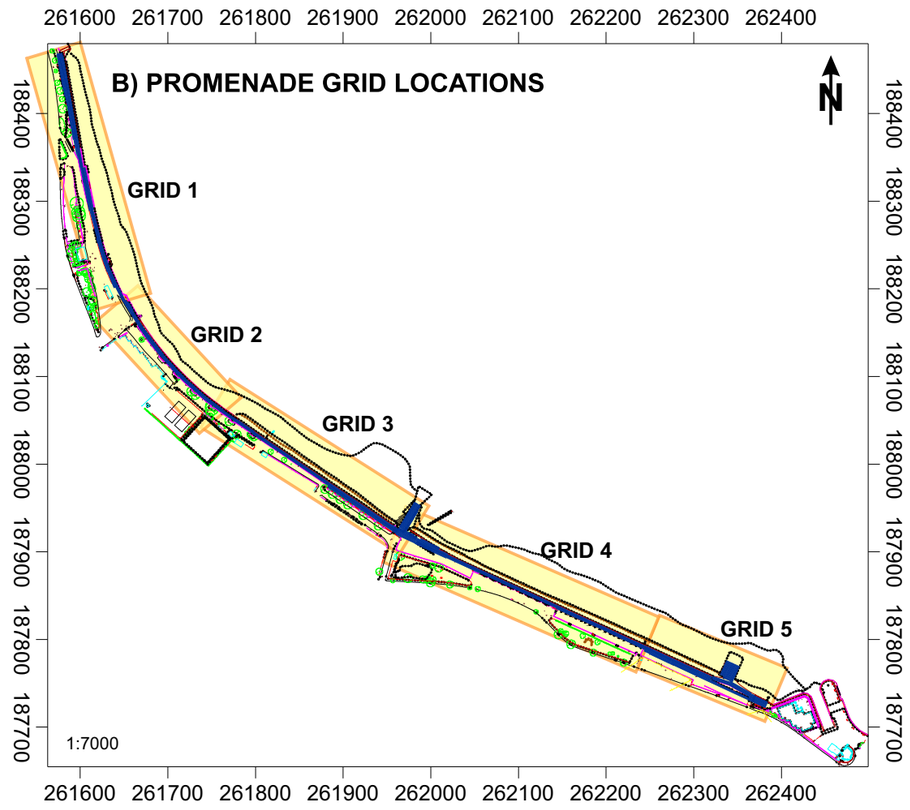
Project: A111150-4
MUMBLES COASTAL PROTECTION WORKS

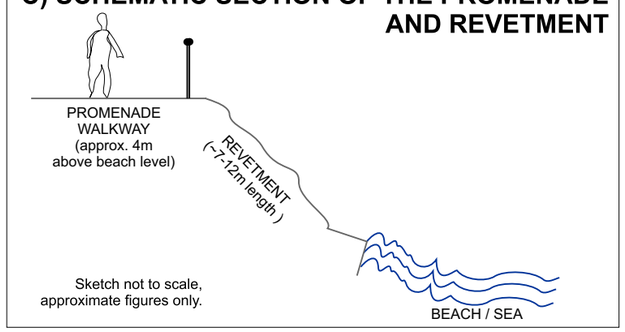
Drawing Title:
EXPLORATORY HOLE LOCATION PLAN
(SHEET 4 OF 4)

Scale @ A1	Drawn Date	Checked Date	Approved Date
1:500	CM 15.07.19		

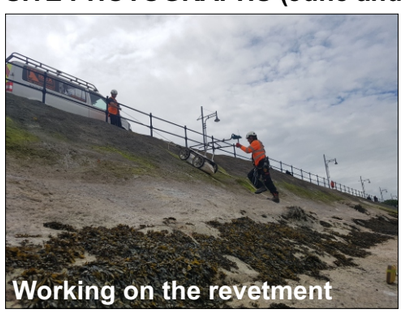
Project No.	Office	Type	Drawing No.	Revision
A111150-4	CDF	N	05	







SITE PHOTOGRAPHS (June and July 2019)


Working on the revetment


The GPR Utsi Trivue


Revetment looking west


Revetment survey in the south

Surveying the promenade

NOTES

A geophysical survey was conducted in June/July 2019 at the Promenade in Mumbles, Swansea. After an initial trial survey, the full survey was conducted using 1m spaced survey lines along the revetment and 0.5m spaced survey lines on the walkway of the promenade. The survey was commissioned by WYG (the client) for Swansea Council.

KEY

- Location of individual GPR survey lines along the revetment
- Location of individual GPR lines along the promenade
- Location of promenade grid

Project: **MUMBLES PROMENADE SURVEY**

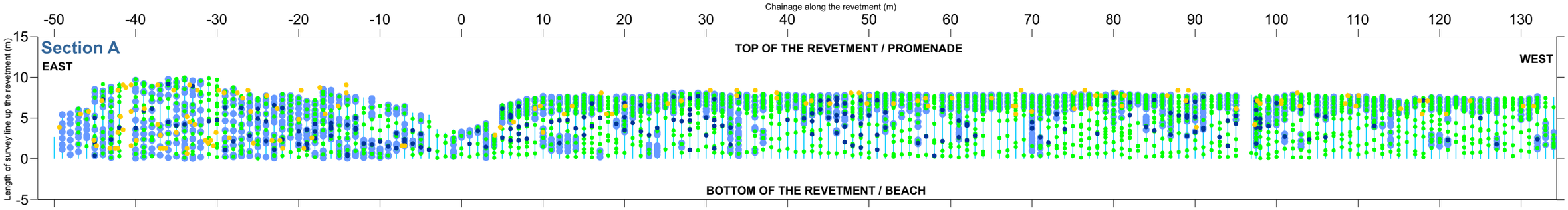
Title: **SURVEY LOCATION PLAN**

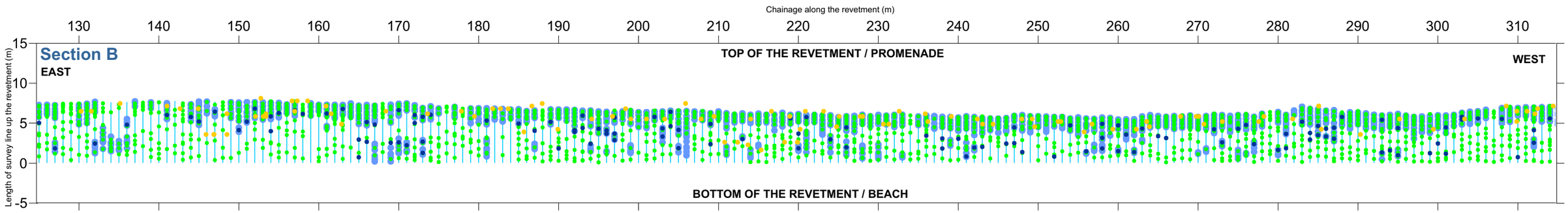
TERRA DAT geophysical innovation
Tel: +44 (0) 2920 700127
Web:www.terradat.co.uk
Email: web@terradat.co.uk

Scale: NA
Drawn by/Ref: KZ/6574/1
Date: JULY 2019

FIGURE 1

ANOMALY PLOT REVETMENT

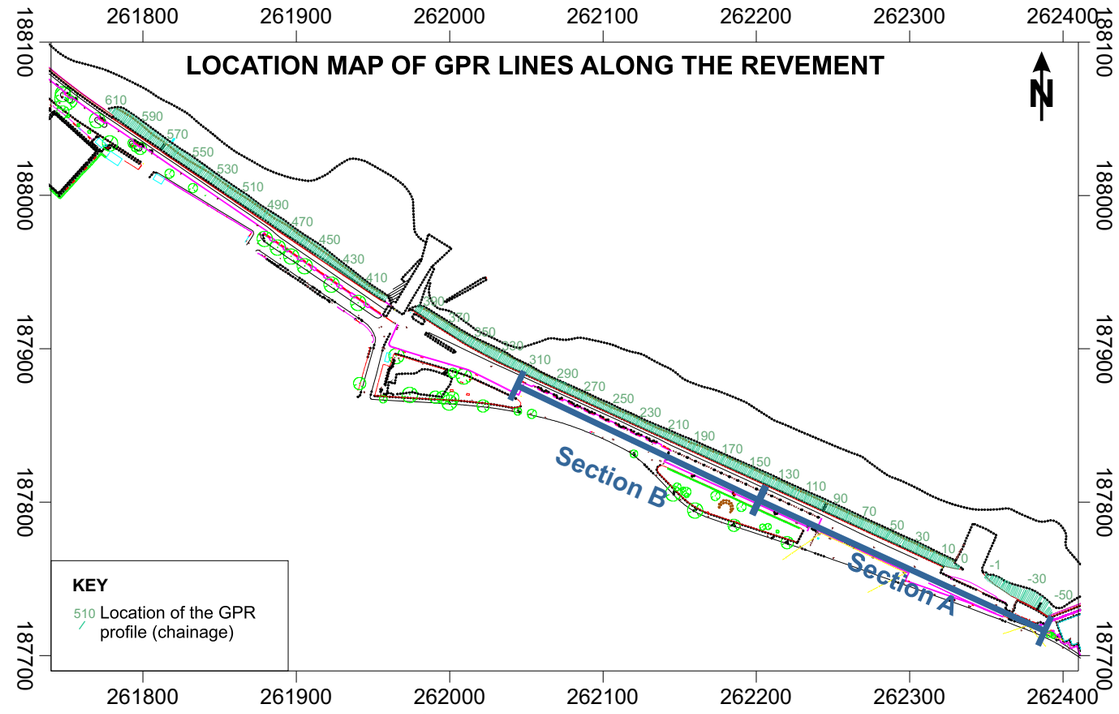




START AND END COORDINATES (OSGB) OF GPR LINES (sorted by chainage)

CHAINAGE	START EASTING	START NORTHING	START HEIGHT	END EASTING	END NORTHING	END HEIGHT
0	262332.5	187758.7	3.1	262331.3	187756.0	4.7
10	262324.6	187764.2	2.4	262321.7	187758.2	6.2
20	262315.9	187768.1	2.3	262312.6	187762.4	6.2
30	262306.6	187773.0	2.3	262303.6	187766.6	6.2
40	262297.6	187776.8	2.2	262294.5	187770.8	6.2
50	262288.2	187781.1	2.2	262284.5	187775.4	6.2
60	262279.2	187785.2	2.2	262276.3	187779.1	6.1
70	262269.9	187789.5	2.2	262267.3	187783.3	6.1
80	262260.7	187794.1	2.3	262258.2	187787.4	6.1
90	262252.1	187797.9	2.1	262249.0	187791.8	5.8
100	262242.7	187802.2	2.2	262239.9	187795.9	5.8
110	262233.8	187806.4	2.2	262230.9	187800.1	5.7
120	262224.9	187810.3	2.3	262221.8	187804.3	5.8
130	262215.8	187814.4	2.4	262212.8	187808.4	5.7
140	262206.8	187818.9	2.3	262203.6	187812.6	5.7
150	262197.7	187822.9	2.4	262194.4	187816.8	5.7
160	262188.3	187826.8	2.6	262185.3	187820.8	5.7
170	262179.2	187831.0	2.6	262176.1	187825.0	5.6
180	262170.0	187834.9	2.7	262167.1	187829.2	5.6
190	262160.6	187838.9	2.7	262158.0	187833.5	5.6
200	262151.4	187842.8	2.7	262148.9	187837.6	5.6
210	262142.4	187846.9	2.7	262139.7	187841.7	5.6
220	262133.1	187850.9	2.9	262130.7	187845.9	5.6
230	262123.7	187855.0	2.9	262121.6	187850.0	5.6
240	262114.8	187859.0	3.1	262112.4	187854.3	5.5
250	262105.9	187863.2	3.1	262103.4	187858.4	5.6
260	262096.5	187867.2	3.0	262094.4	187862.7	5.6
270	262087.4	187871.5	2.9	262085.3	187866.8	5.6
280	262078.8	187875.9	2.5	262076.2	187870.9	5.6
290	262069.7	187880.0	2.5	262067.1	187875.1	5.6
300	262060.5	187883.9	2.7	262058.0	187879.3	5.6
310	262052.0	187888.9	2.5	262048.9	187883.4	5.6
320	262042.8	187893.3	2.3	262039.9	187887.6	5.7
320	262042.8	187893.3	2.3	262039.9	187887.6	5.7

CHAINAGE	START EASTING	START NORTHING	START HEIGHT	END EASTING	END NORTHING	END HEIGHT
330	262034.6	187898.2	2.3	262030.8	187891.9	5.7
340	262025.5	187902.3	2.4	262022.0	187896.7	5.8
350	262016.4	187906.8	2.7	262013.2	187901.5	5.8
360	262008.0	187911.5	2.7	262004.7	187906.6	5.8
370	261999.6	187916.8	2.8	261996.3	187912.0	5.8
380	261991.3	187922.2	2.8	261987.9	187917.4	5.8
390	261982.5	187927.4	3.1	261979.5	187922.9	5.8
400	261955.2	187937.1	4.0	261952.9	187933.7	5.9
410	261947.1	187942.5	4.2	261944.6	187939.2	5.9
430	261931.5	187954.6	4.1	261928.0	187950.3	5.9
440	261923.5	187960.7	3.9	261919.6	187955.9	6.0
450	261915.7	187967.2	3.8	261911.7	187962.1	6.0
460	261907.2	187972.6	3.5	261903.5	187967.8	6.0
470	261899.1	187978.1	3.4	261895.2	187973.3	5.9
480	261890.6	187984.3	3.1	261886.9	187978.8	5.9
490	261882.1	187989.6	3.0	261878.6	187984.3	6.0
500	261874.6	187995.1	2.9	261870.3	187989.9	5.9
510	261866.0	188001.1	2.7	261862.1	187995.6	5.9
520	261857.7	188006.6	2.7	261853.7	188001.2	5.8
530	261849.8	188012.4	2.6	261846.1	188007.3	5.0
540	261841.2	188018.6	2.7	261837.6	188012.9	5.1
550	261833.0	188024.0	2.8	261829.2	188018.4	5.5
560	261824.7	188029.5	2.9	261821.0	188023.9	5.3
670	261816.8	188035.1	2.9	261812.8	188029.8	5.4
680	261808.7	188041.2	2.9	261804.5	188035.6	5.4
690	261800.6	188047.1	2.7	261796.2	188040.9	5.5
600	261793.0	188052.8	2.5	261787.8	188046.5	5.7
610	261783.1	188057.1	2.7	261780.2	188052.8	4.8
-10	262358.5	187750.6	1.9	262355.9	187745.1	4.8
-20	262366.5	187746.3	2.5	262364.3	187739.8	5.9
-30	262377.4	187743.3	2.0	262373.4	187735.3	5.9
-40	262386.8	187738.5	1.8	262382.4	187731.0	5.8
-42	262388.3	187737.2	1.8	262384.1	187729.8	6.0
-50	262392.9	187728.3	4.1	262391.3	187726.5	5.3



NOTES ON FIGURE
This figure shows the results of the survey conducted along the revetment. Each individual radargram has been inspected and features detected have been mapped by "picking" (marking in local grid coordinates). Four main classifications of features were made: Green dots mark diffraction point sources indicating granular blocky material. Dark blue dots mark larger diffractions, isolated features or anomalous areas. Light blue dots mark areas of increased penetration, mostly indicating a change in signal character due to changed ground conditions. Yellow dots mark areas of anomalous increased signal response detected in selected depth slices.

NOTES

1: Depth conversion based on a velocity of 0.1m/ns.
2: Results of the revetment presented on local grid coordinates. OSGB coordiantes for every 10th individual GPR lines can be found in the table.

GPR ANOMALY MAP

- Diffraction / point source in radargrams
- Interesting feature or ground character change detected in radargrams
- Isolated area of increased signal response detected in depth slices
- Increased signal penetration depth
- Individual survey lines

Project: **MUMBLES PROMENADE SURVEY**

Title: **REVETMENT SURVEY RESULTS**

TERRA DAT geophysical innovation
Tel: +44 (0) 2920 700127
Web:www.terradat.co.uk
Email: web@terradat.co.uk

Scale: NA
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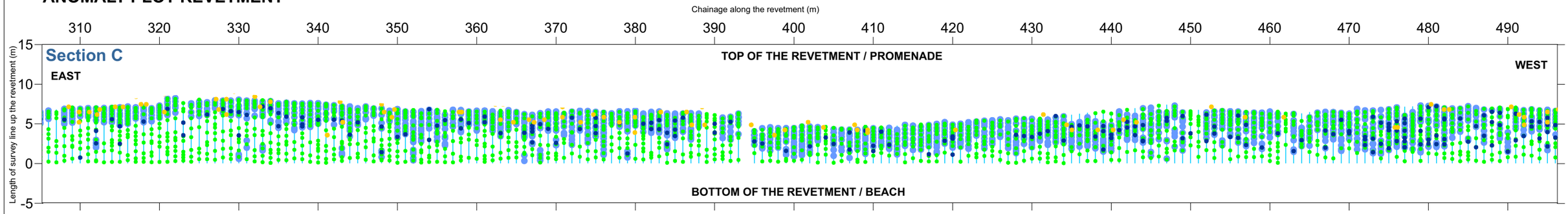
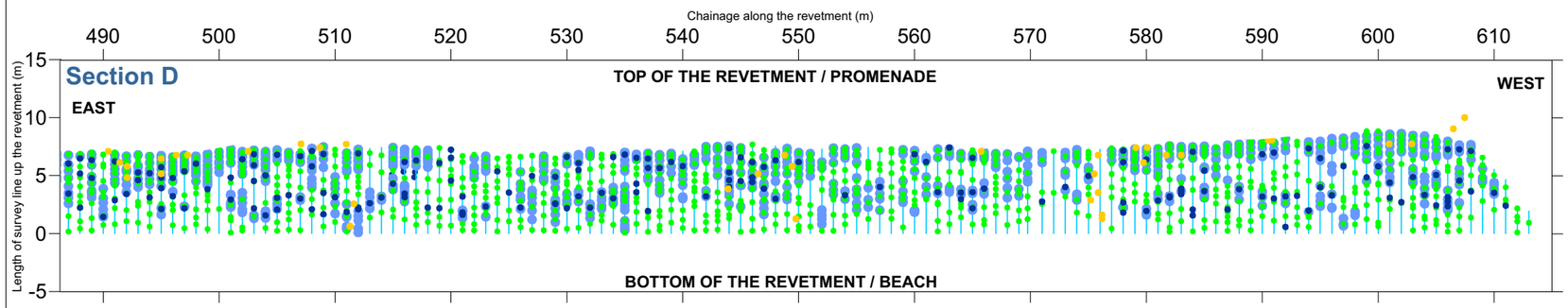
Date: JULY 2019

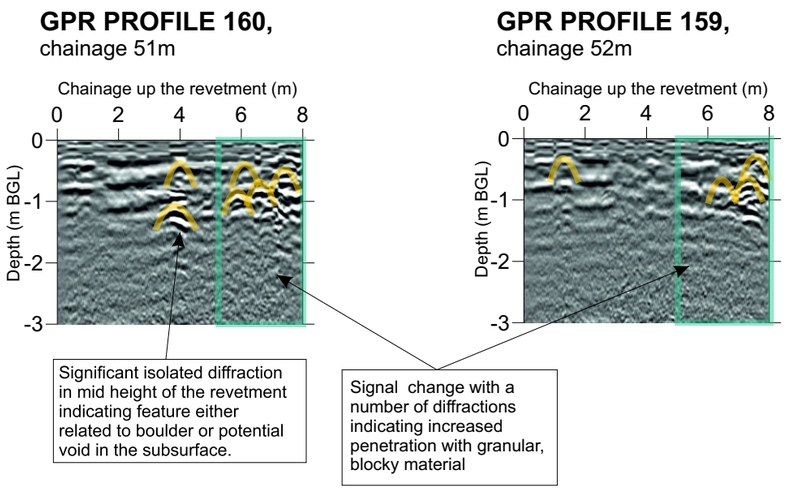
FIGURE 2

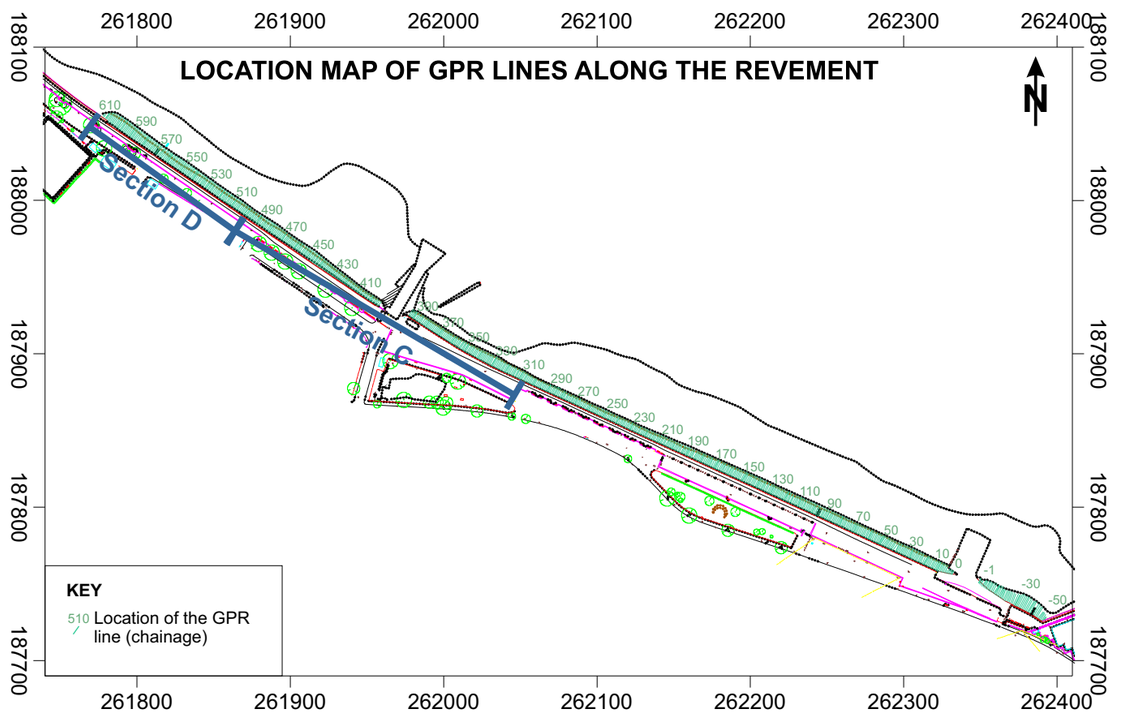
ANOMALY PLOT REVETMENT





EXAMPLES OF TYPICAL GPR PROFILES COLLECTED AT THE REVETMENT





COLOUR SCALE

Increased response

Amplitude response

GPR PROFILE ANOMALY KEY

Diffraction hyperbola curve usually indicates a "point" source, such as a void, buried service, blocky material or an edge-feature (e.g. wall).

Zone of anomalous signal character, change in ground character

DISCUSSION OF REVETMENT SURVEY RESULTS

The results of the survey characterise the revetment well and clearly highlight areas of different character. An increase in signal penetration towards the top of the revetment has been mapped. This indicates an increase of granular, blocky material close to the promenade walkway. The clear difference between the upper and lower part of the revetment can be seen, which may represent partial saline water ingress or a different material composition in the subsurface. The survey further highlights isolated areas of increased diffractions or an anomalous signal character change. These anomalous features may either represent blocky material or may be associated with possible voiding. The data of the 500MHz antenna has been investigated to detect voids and general ground features. The data of the 1000MHz antenna reveals a majority of the revetment covered in reinforced concrete.(metal mesh).

Project: **MUMBLES PROMENADE SURVEY**

Title: **REVETMENT SURVEY RESULTS**

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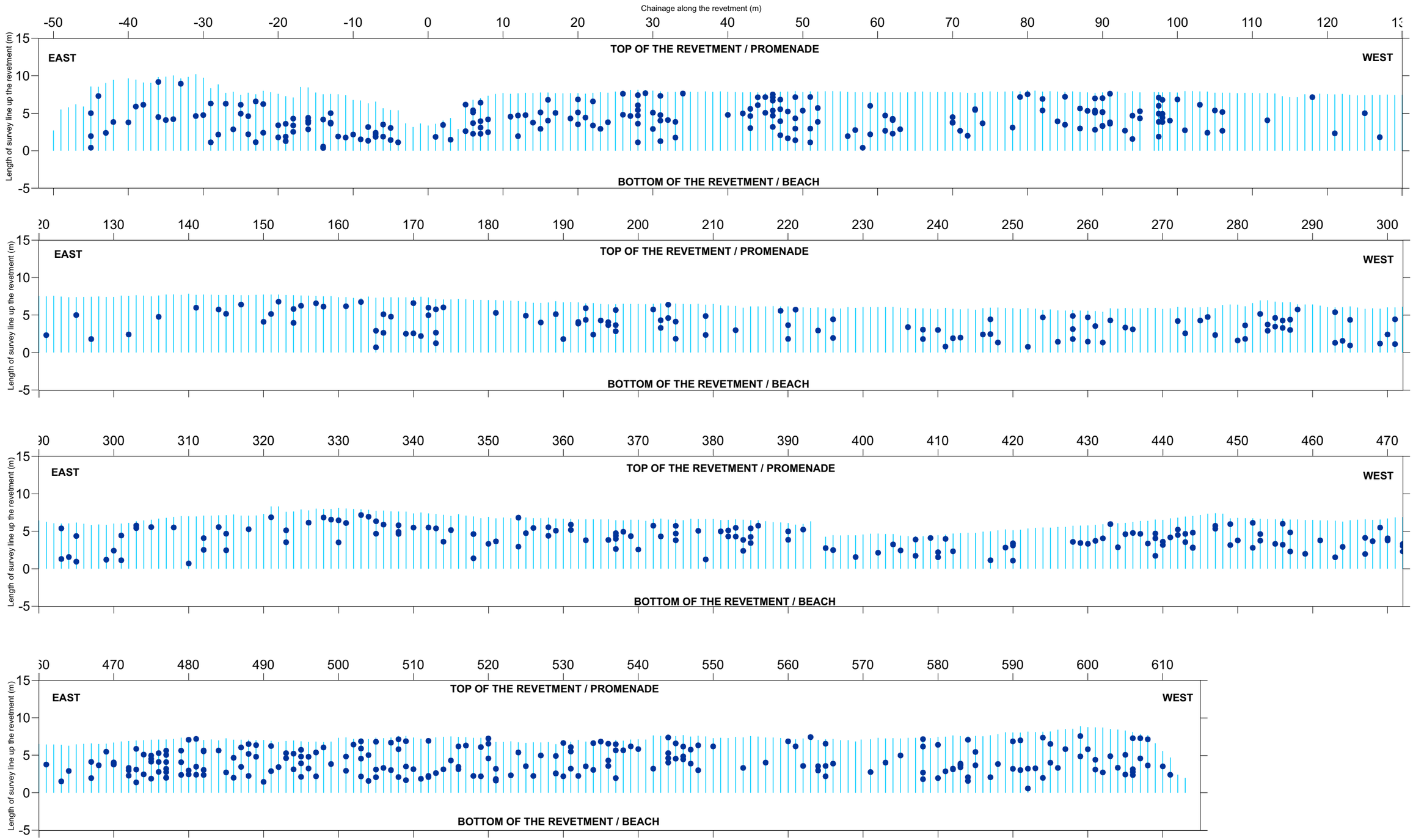
FIGURE 3

INTERESTING FEATURES PLOT REVETMENT



DISCUSSION OF REVETMENT SURVEY RESULTS

This figure shows a revised version of the revetment survey results. Compared to Figure 2 and 3, most of the manually picked anomalies have been removed to enable an easier visualisation of interesting features of anomalous character which may be associated with blocky material or potential shallow voiding.

NOTES

1: Depth conversion based on a velocity of 0.1m/ns.
2: Results of the revetment presented on local grid coordinates. OSGB coordiantes for every 10th individual GPR lines can be found in the table.

GPR ANOMALY MAP

- Interesting feature or ground character change detected in radargrams
- Individual survey lines

Project: **MUMBLES PROMENADE SURVEY**

Title: **REDUCED REVETMENT SURVEY RESULTS**

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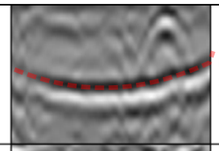
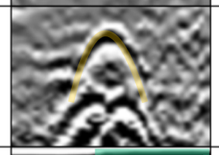
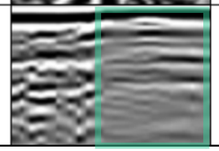
FIGURE 4

Notes on 5A and 5B

Figure 5A provides a short description of the main GPR features. Figure 5B shows two GPR radargram examples from Grid 1 where a number of typical GPR features are highlighted. Such features have been picked and plotted on the anomaly plot after. Such features are marked as blue dots on the anomaly plots of the promenade.

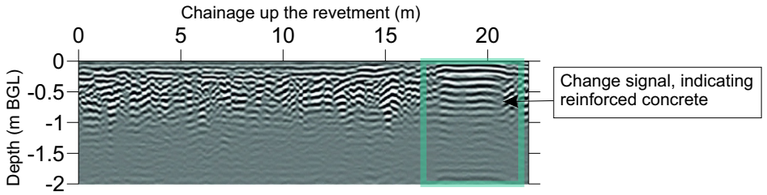
5A) MAIN GPR FEATURES

The interpretation of the radar data is based on recognising certain responses and characteristics as detailed below. These include reflection boundaries, diffraction hyperbolae and changes in signal character/penetration. With regards to signal penetration, the key factor is the relative conductivity of the ground: for example, an increase in clay or (saline) water content would attenuate the radar signal and result in a decrease in signal penetration.

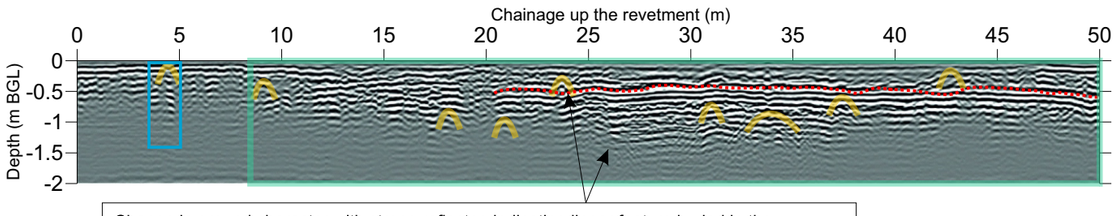
Reflection event		A laterally continuous interface between materials of contrasting electrical properties (controlled largely by composition and moisture content of the material). Examples of reflecting surfaces are soil horizons, soil-rock or air-rock interfaces, water tables, and solid metallic or non- metallic objects.
Diffraction hyperbolae		A diffraction hyperbolae curve usually indicates a 'point' source, such as a void, buried service or an edge feature (e.g. wall). A zone of small diffractions can indicate rebar or granular/blocky material. If the diffraction is associated with reverberation, then it is likely to be a metallic service.
Signal character		Some general comments may be made based on the observed changes in the character of the radar signal such as attenuation, loss of penetration and reverberation.

5B) EXAMPLES GPR PROFILES COLLECTED ON THE PROMENADE (GRID 1)

GPR PROFILE 858



GPR PROFILE 884

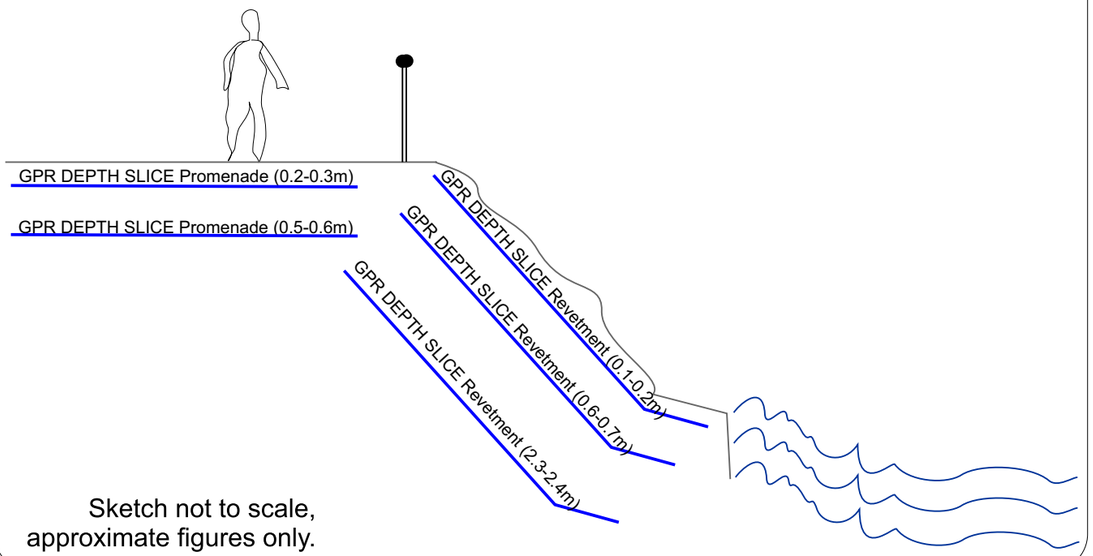


Change in ground character with strong reflector, indicating linear feature buried in the subsurface. this feature is towards the middle of the promenade in approximately 1.5m depth and can be found along the entire survey area.

Notes on 5C and 5D

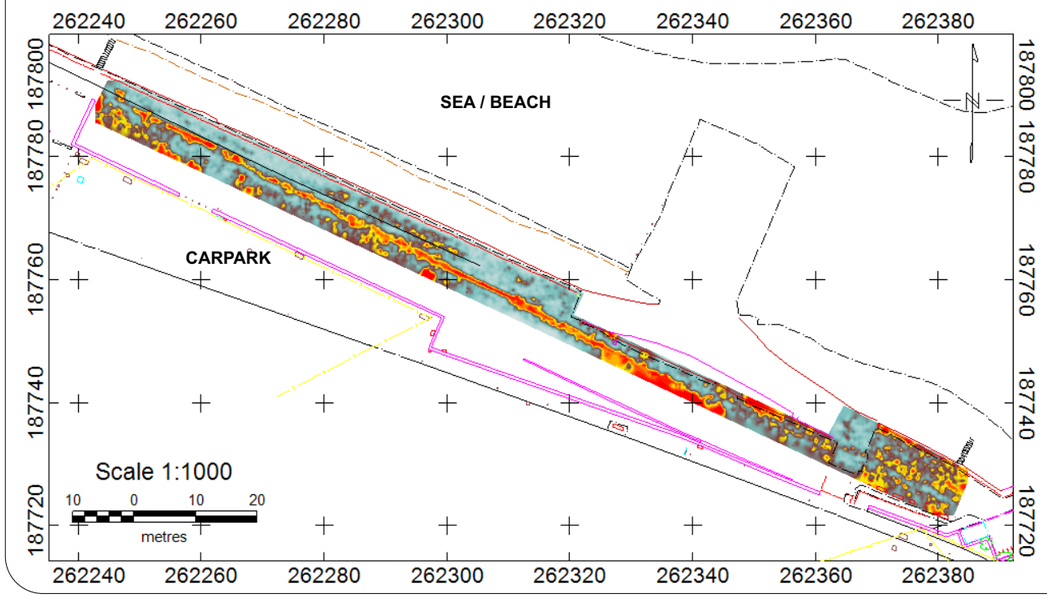
The schematic figure (5C) simplifies depth slices and Figure 5D shows an example of such a depth slice (Grid 1, depth slice at 0.8-0.9m depth below ground level).
Such features have been picked and are displayed as yellow dots in the following anomaly plots.

5C) SCHEMATIC SECTION OF THE PROMENADE



Sketch not to scale, approximate figures only.

5D) EXAMPLE GPR DEPTH SLICE (0.8-0.9m BGL), GRID 1



COLOUR SCALE

Increased response

Amplitude response

GPR PROFILE ANOMALY KEY

- Diffraction hyperbola curve usually indicates a "point" source, such as a void, buried service, blocky material or an edge-feature (e.g. wall).
- Strong planar reflector indicating presence of a boundary between materials of differing dielectric properties.
- Zone of anomalous signal character, change in ground character
- Signal reverberation

NOTES

1: Depth conversion based on a velocity of 0.1 m/ns.

Project: **MUMBLES PROMENADE SURVEY**

Title: **ANOMALY EXAMPLES**

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Scale: NA
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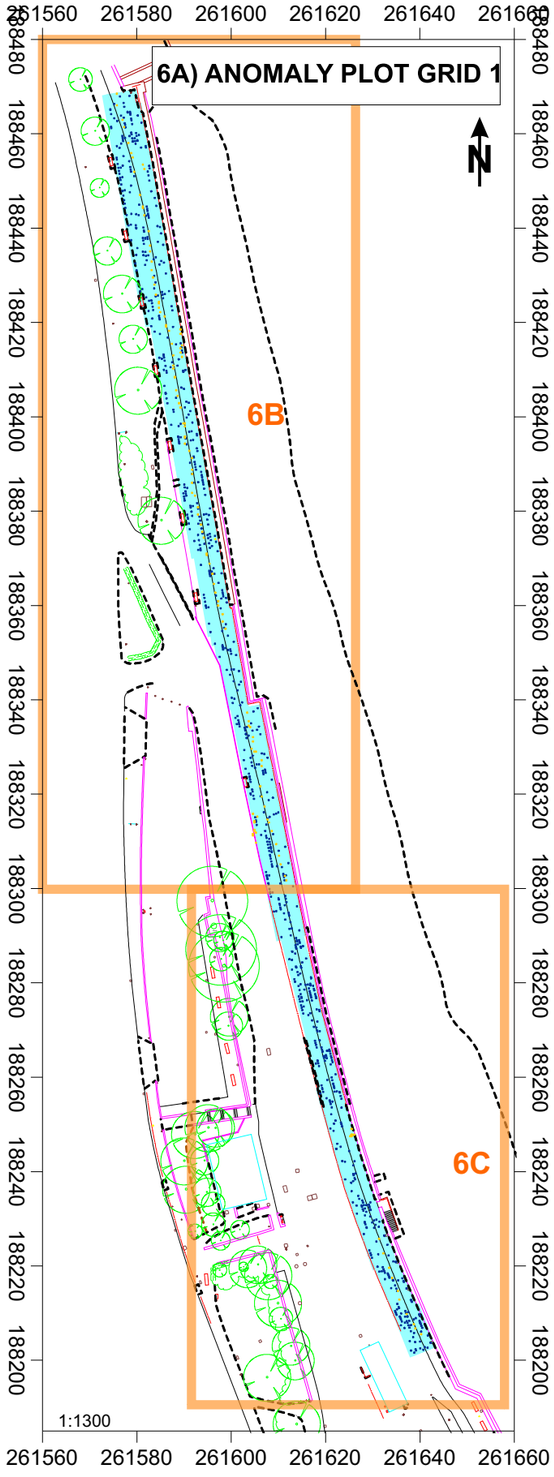
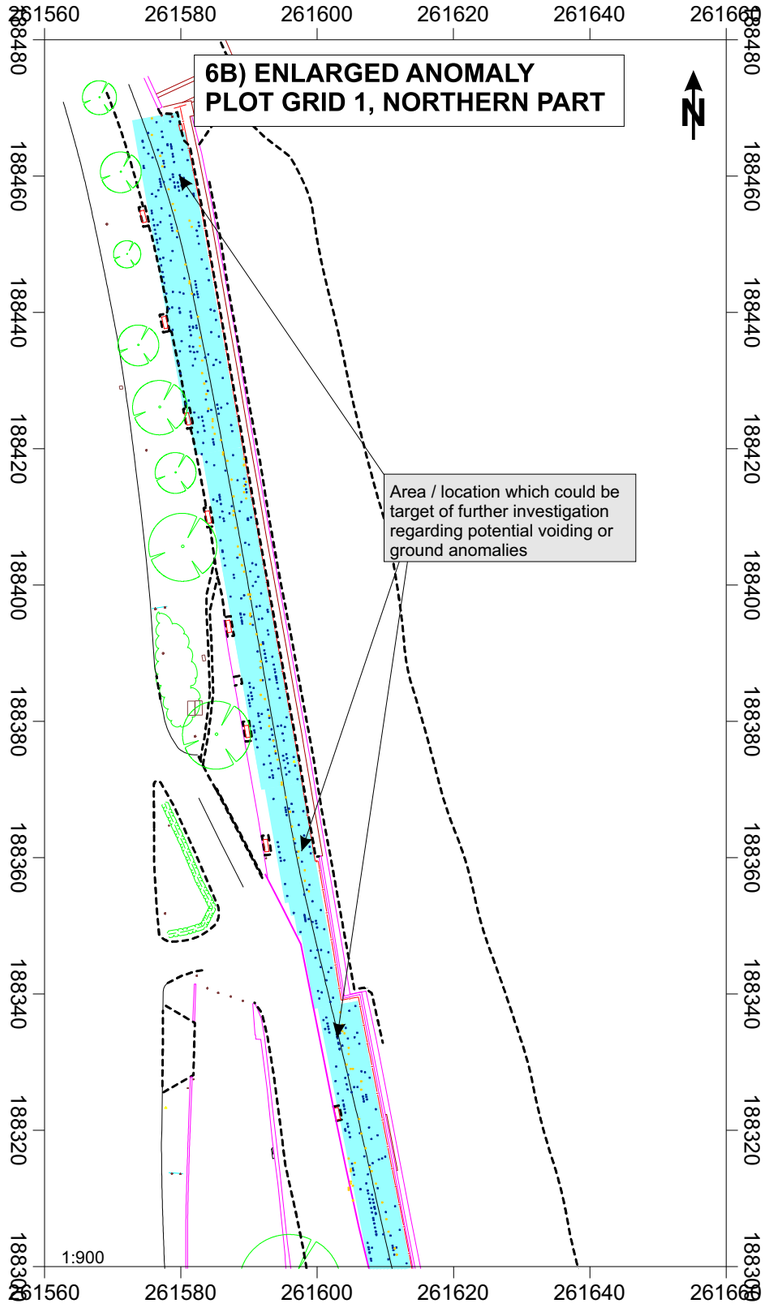
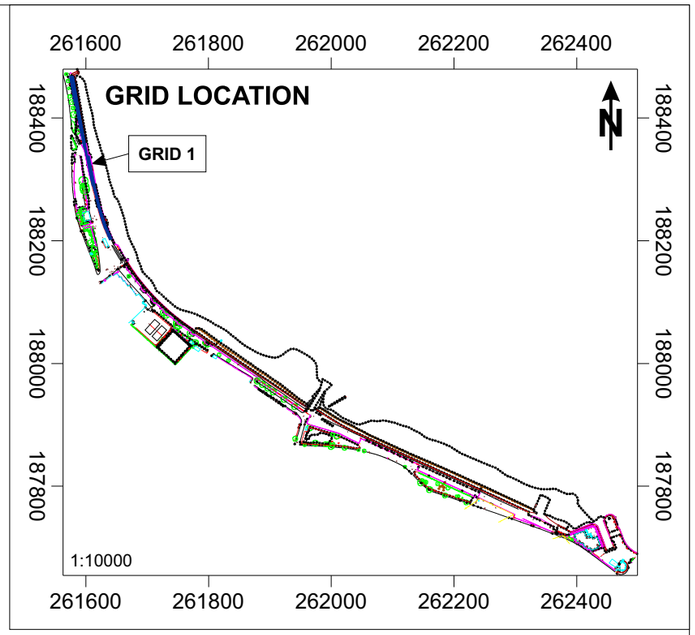
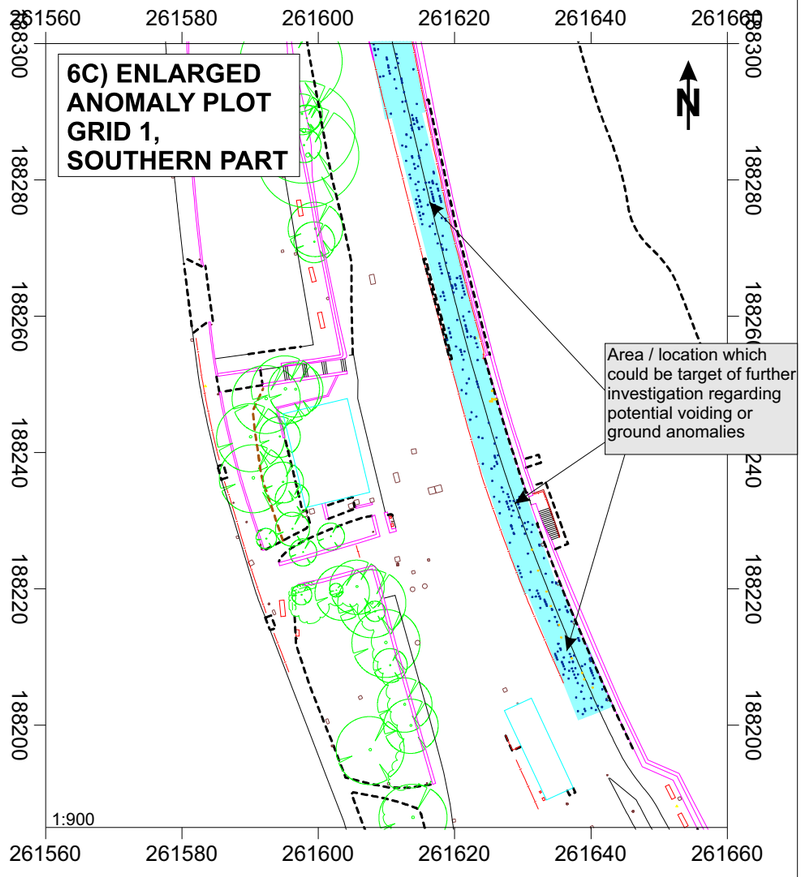
Date: JULY 2019

FIGURE 5









NOTES
The survey characterised the site well and indicates several classes of features. A large number of isolated features are scattered across the survey area. Concentrated areas of anomalous features indicate areas combining different GPR features which may be indicating a broad change ground character which may be of interest with regards to voids. A linear feature running towards the middle of the promenade was detected in several depth slices along the whole survey area and is likely related to a structural feature or service buried in between 0.5-1.0m depth.

KEY
- Diffractions, dipping reflectors or signal change indicating feature or change in ground character detected in individual GPR radargrams. These features may be associated blocky material, dipping horizons buried in the subsurface, or potential shallow voiding.
- Features of high GPR response outlining isolated feature locations detected in individual depth slices
- Outline of GPR survey grid

NOTES
1: Depth conversion based on a velocity of 0.1 m/ns.

2: Results of the promenade survey presented in OSGB coordinates.

3: Scales of anomaly plots are according best fit for the page. Results available in electronic DXF format.

Project: **MUMBLES PROMENADE SURVEY**

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Title: **GPR SURVEY RESULTS PROMENADE: GRID 1**

Scale: NA
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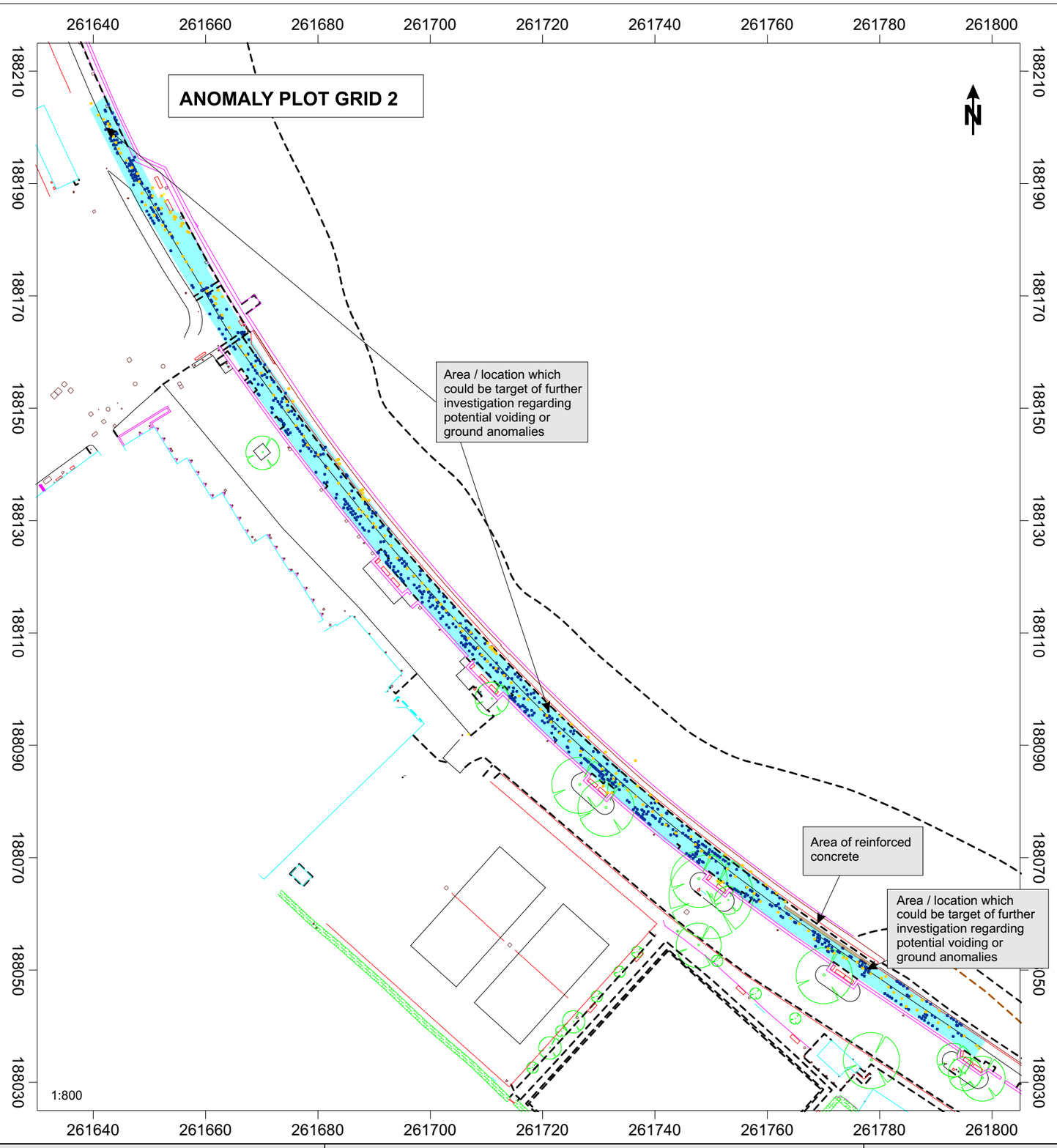
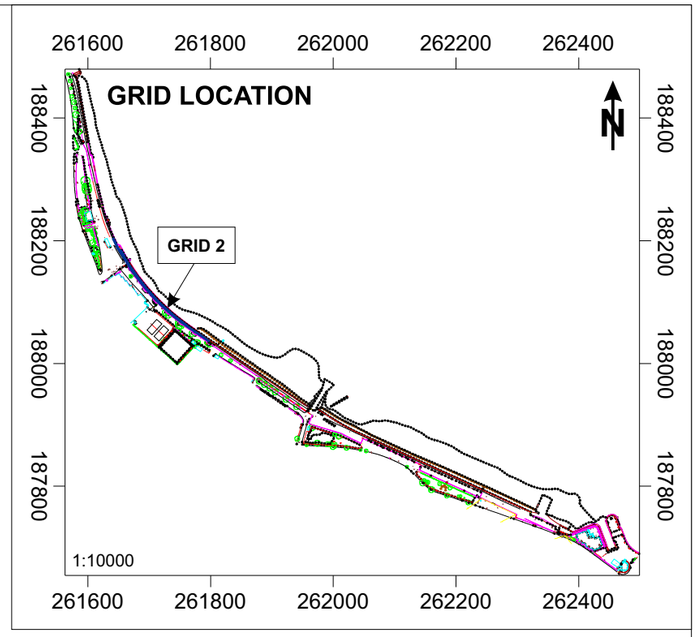
Date: JULY 2019

FIGURE 6

Appendix A

TerraDat geophysical survey figures





NOTES
The survey characterised the site well and indicates several classes of features. A large number of isolated features are scattered across the survey area. Concentrated areas of anomalous features indicate areas combining different GPR features which may be indicating a broad change ground character which may be of interest with regards to voids. A linear feature running towards the middle of the promenade was detected in several depth slices along the whole survey area and is likely related to a structural feature or service buried in between 0.5-1.0m depth.

KEY

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- Features of high GPR response outlining isolated feature locations detected in individual depth slices
- Outline of GPR survey grid

NOTES

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3: Scales of anomaly plots are according best fit for the page. Results available in electronic DXF format.

Project:
MUMBLES PROMENADE SURVEY

Title:
GPR SURVEY RESULTS PROMENADE: GRID 2

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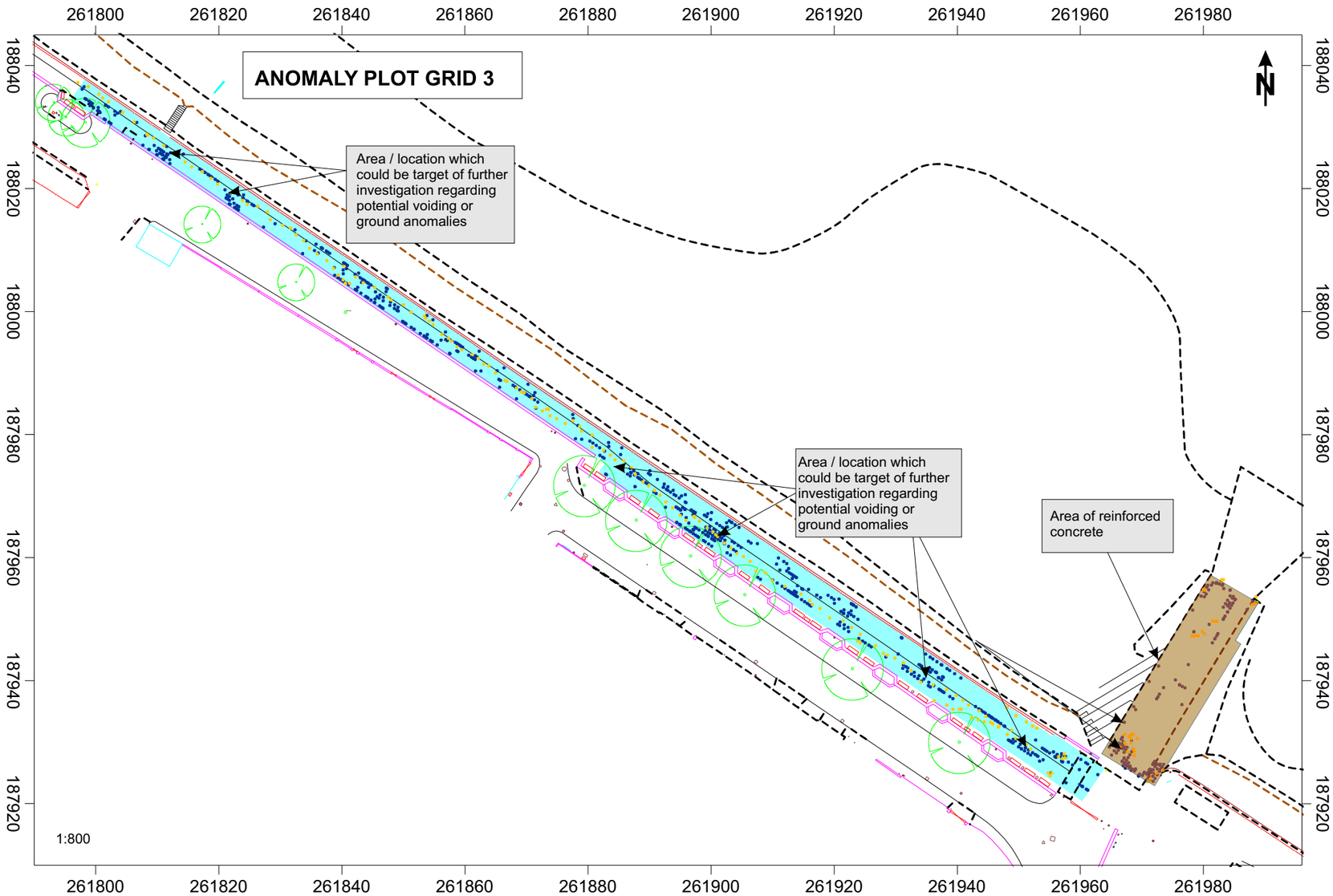
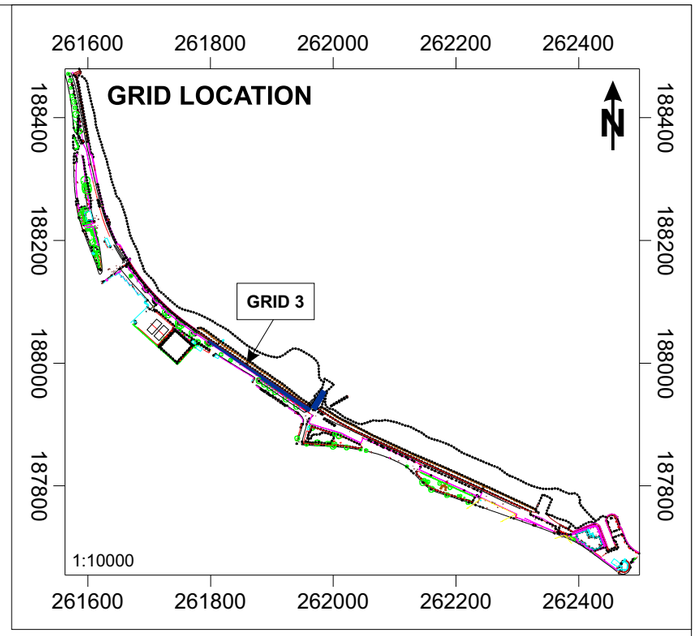
Scale: NA
Drawn by/Ref: KZ/6574/7
Date: JULY 2019

FIGURE 7





NOTES
The survey characterised the site well and indicates several classes of features. A large number of isolated features are scattered across the survey area. Concentrated areas of anomalous features indicate areas combining different GPR features which may be indicating a broad change ground character which may be of interest with regards to voids. A linear feature running towards the middle of the promenade was detected in several depth slices along the whole survey area and is likely related to a structural feature or service buried in between 0.5-1.0m depth.

KEY

- Diffractions, dipping reflectors or signal change indicating feature or change in ground character detected in individual GPR radargrams. These features may be associated blocky material, dipping horizons buried in the subsurface, or potential shallow voiding.
- Features of high GPR response outlining isolated feature locations detected in individual depth slices
- Outline of GPR survey grid

NOTES

1: Depth conversion based on a velocity of 0.1 m/ns.

2: Results of the promenade survey presented in OSGB coordinates.

3: Scales of anomaly plots are according best fit for the page. Results available in electronic DXF format.

Project:
MUMBLES PROMENADE SURVEY

Title:
GPR SURVEY RESULTS PROMENADE: GRID 3

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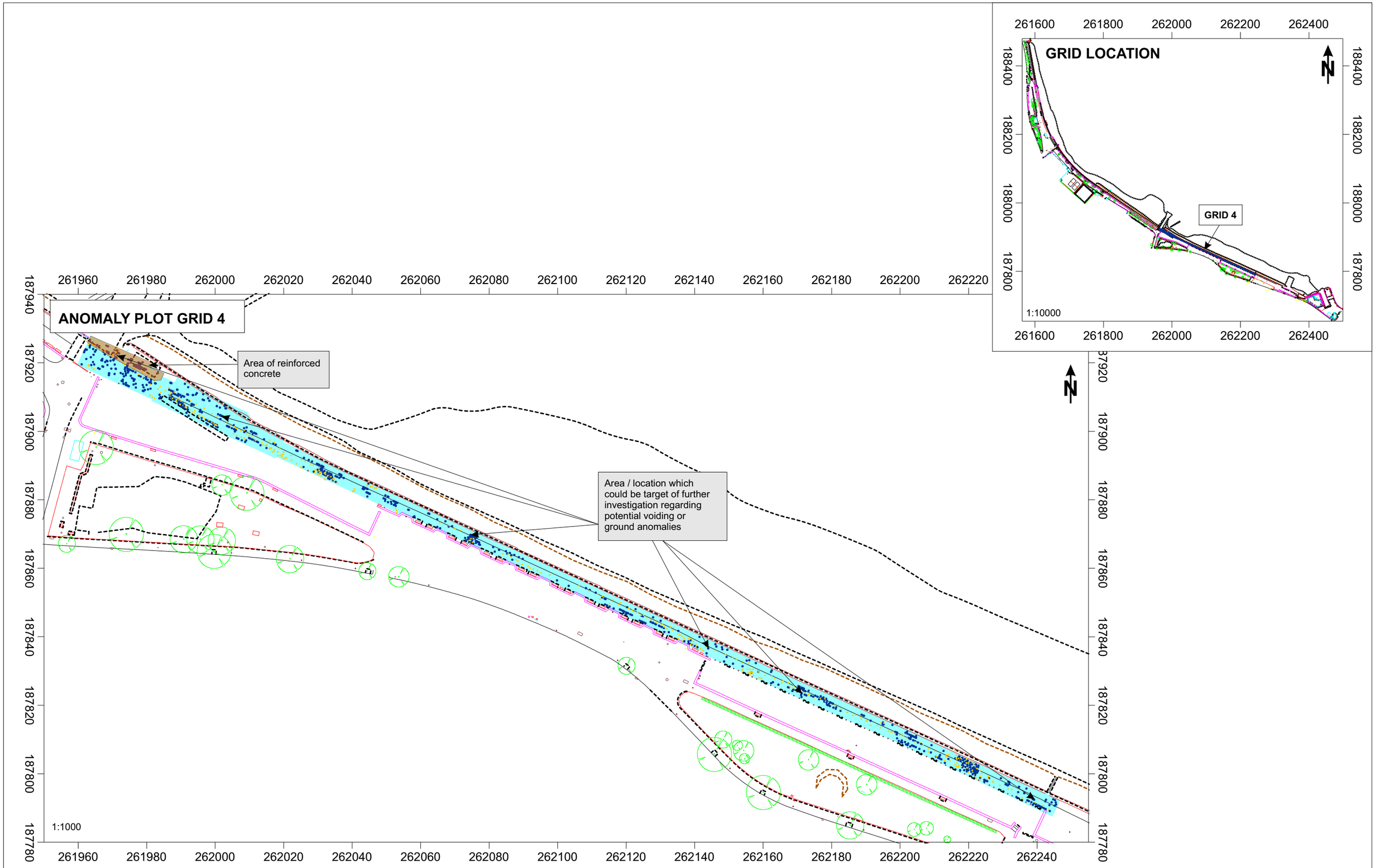
Drawn by/Ref: KZ/6574/8
Date: JULY 2019

FIGURE 8



NOTES
The survey characterised the site well and indicates several classes of features. A large number of isolated features are scattered across the survey area. Concentrated areas of anomalous features indicate areas combining different GPR features which may be indicating a broad change ground character which may be of interest with regards to voids. A linear feature running towards the middle of the promenade was detected in several depth slices along the whole survey area and is likely related to a structural feature or service buried in between 0.5-1.0m depth.

KEY

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- Features of high GPR response outlining isolated feature locations detected in individual depth slices
- Outline of GPR survey grid

NOTES

1: Depth conversion based on a velocity of 0.1 m/ns.

2: Results of the promenade survey presented in OSGB coordinates.

3: Scales of anomaly plots are according best fit for the page. Results available in electronic DXF format.

Project:
MUMBLES PROMENADE SURVEY

Title:
GPR SURVEY RESULTS PROMENADE: GRID 4

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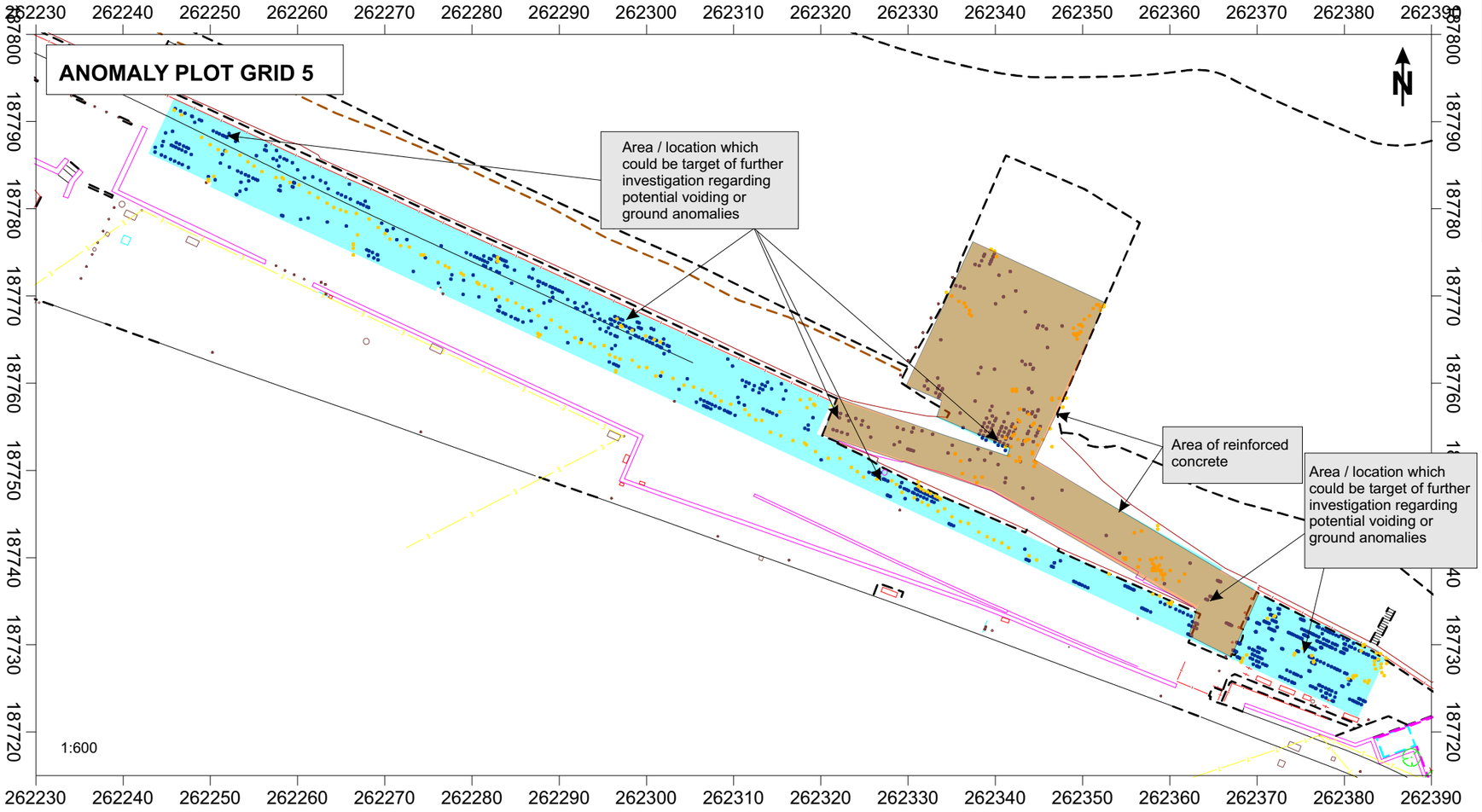
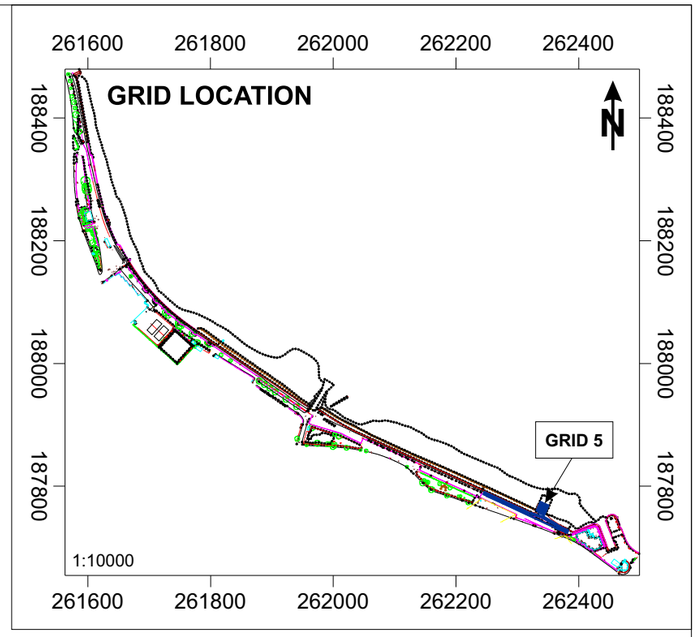
FIGURE 9





NOTES
The survey characterised the site well and indicates several classes of features. A large number of isolated features are scattered across the survey area. Concentrated areas of anomalous features indicate areas combining different GPR features which may be indicating a broad change ground character which may be of interest with regards to voids. A linear feature running towards the middle of the promenade was detected in several depth slices along the whole survey area and is likely related to a structural feature or service buried in between 0.5-1.0m depth.

KEY

Diffractions, dipping reflectors or signal change indicating feature or change in ground character detected in individual GPR radargrams. These features may be associated blocky material, dipping horizons buried in the subsurface, or potential shallow voiding.

Features of high GPR response outlining isolated feature locations detected in individual depth slices

Outline of GPR survey grid

NOTES

1: Depth conversion based on a velocity of 0.1 m/ns.

2: Results of the promenade survey presented in OSGB coordinates.

3: Scales of anomaly plots are according best fit for the page. Results available in electronic DXF format.

Project:
MUMBLES PROMENADE SURVEY

Title:
GPR SURVEY RESULTS PROMENADE: GRID 5

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Date: JULY 2019

FIGURE 10

Appendix B

Soil Screening Results

Soil Testing Results

Project / Site name: **Mumbles GI: Geo-Environmental Results**

Lab Sample Number		Assessment criteria	Residential C4SLs/S4ULs/ Aup GAC (1% OC) no plant uptake	Commercial C4SLs/S4ULs/ Aup GAC (1% OC)		20122734	20205556	20205557	20205558	20205559	20205561	20205563
Sample ID						BH01	BH04	BH04	BH05	BH05	BH05	BH06
AGS ID						ES 3	ES 2	ES 3	ES 1	ES 2	ES 4	ES 2
Sample Description						**Made Ground:** Clayey sandy gravel.	**Made ground:** Reddish brown clayey gravelly sand with brick and flint.	**Beach deposits:** Brown clayey sandy gravel with cobbles	**Made ground:** Dark brown black sandy limestone gravel	**Made ground:** clayey sandy gravel with brick, slate and concrete	**Beach Deposits:** shell fragments (NAT)	**Made ground:** light brown orange silty sandy gravel with cobbles, brick and concrete
Depth (m)						2.20-2.20	1.00	5.50	0.30	1.00	5.00	0.80
Top depth (m)						1.3	0.3	5.2	0.2	0.6	4.8	0.4
Bottom depth (m)						3.3	5.2	12.8	0.6	2	5.4	0.95
Thickness of strata (m)						2	4.9	7.6	0.4	1.4	0.6	0.55
Date Sampled						05/06/2019	18/06/2019	18/06/2019	20/06/2019	20/06/2019	20/06/2019	19/06/2019
Sample Temperature						11.6	13.4	13.4	13.4	13.4	13.4	13.4
Analytical Parameter (Soil Analysis)	Units				HWOL Waste Classification	Non Hazardous	Non Hazardous	Non Hazardous	Non Hazardous	Non Hazardous	Non Hazardous	Non Hazardous
Asbestos in Soil	Type					Not Detected	Not Detected	-	Not Detected	Not Detected	-	Not Detected
Asbestos Quantification	%											
Asbestos description												
General Inorganics												
pH	pH Units					9.19	9.09	8.47	8.69	9.2	8.73	9.42
Total Cyanide	mg/kg	(Arup GAC - 1% SOM - acute)	5.5	78		<1	<1	<1	<1	<1	<1	<1
Water soluble suplhate as SO4 2:1 extract	g/l	-	-	-								
Sulphide, Easily liberated						-	<15	-	-	<15	-	-
Sulphur, Elemental						-	<10	-	-	<10	-	-
Loss on Ignition @ 450°C	%	-	-	-		-	2.35	-	-	<0.7	-	-
Total carbon	%					0.804	0.73	0.717	3.93	1.66	1.02	6.12
Total Phenols												
Total Phenols (monohydric)	mg/kg	(LQM S4UL - 1% SOM)	440	440		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cresols	mg/kg					-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenols	mg/kg					-	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
2,3,5- Trimethylphenol	mg/kg					-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2-Isopropylphenol	mg/kg					-	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Phenols, Total Detected 5 speciated	mg/kg					-	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Speciated PAHs												
Coronene	mg/kg					-	<0.2	-	-	<0.2	-	-
Naphthalene-d8 % recovery**	%					96.2	86.4	-	-	-	-	-
Acenaphthene-d10 % recovery**	%					90.9	82.4	-	-	-	-	-
Phenanthrene-d10 % recovery**	%					92.1	81.8	-	-	-	-	-
Chrysene-d12 % recovery**	%					85.9	82	-	-	-	-	-
Perylene-d12 % recovery**	%					77	75	-	-	-	-	-
Acenaphthene	mg/kg	(LQM S4UL - 1% SOM)	3000	84000		<0.008	<0.008	-	-	-	-	-
Acenaphthylene	mg/kg	(LQM S4UL - 1% SOM)	2900	83000		<0.012	<0.012	-	-	-	-	-
Anthracene	mg/kg	(LQM S4UL - 1% SOM)	31000 (1.17)	520000		<0.016	0.0281	-	-	-	-	-
Benzo(a)anthracene	mg/kg	(LQM S4UL - 1% SOM)	11	170		0.0178	0.0922	-	-	-	-	-
Benzo(a)pyrene	mg/kg	(C4SL- 6% SOM)	5.3	77		<0.015	0.0871	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	(LQM S4UL - 1% SOM)	3.9	44		0.0294	0.0742	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	(LQM S4UL - 1% SOM)	360	3900		<0.024	0.0621	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	(LQM S4UL - 1% SOM)	110	1200		<0.014	0.0513	-	-	-	-	-
Chrysene	mg/kg	(LQM S4UL - 1% SOM)	30	350		0.0346	0.104	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	(LQM S4UL - 1% SOM)	0.31	3.5		<0.023	<0.023	-	-	-	-	-
Fluoranthene	mg/kg	(LQM S4UL - 1% SOM)	1500	23000		0.0488	0.197	-	-	-	-	-
Fluorene	mg/kg	(LQM S4UL - 1% SOM)	2800	63000 (30.9)		<0.01	<0.01	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	(LQM S4UL - 1% SOM)	45	500		<0.018	0.0484	-	-	-	-	-
Naphthalene	mg/kg	(LQM S4UL - 1% SOM)	2.3	190 (76.4)		0.0112	0.0178	-	-	-	-	-
Phenanthrene	mg/kg	(LQM S4UL - 1% SOM)	1300	22000		0.0741	0.115	-	-	-	-	-
Pyrene	mg/kg	(LQM S4UL - 1% SOM)	3700	54000		0.0382	0.171	-	-	-	-	-
Speciated Total EPA-16 PAHs	mg/kg	-	-			0.254	1.05	-	-	-	-	-
WAC	mg/kg					-	10	-	-	10	-	-
Heavy Metals / Metalloids												
Antimony	mg/kg	(Arup GAC - 1% SOM)	550	7500		0.711	4.03	1.01	0.722	0.741	<0.6	3.89
Arsenic (aqua regia extractable)	mg/kg	(C4SL- 6% SOM)	40	640		21.2	80.5	9.74	13.7	8.48	15.9	43.6
Barium	mg/kg											
Beryllium	mg/kg	(LQM S4UL- 6% SOM)	1.7	12		0.549	0.643	0.697	0.471	0.224	0.37	0.261
Boron	mg/kg	(LQM S4UL - 6% SOM)	11000	240000		8.78	-	-	-	-	-	-
Boron (water soluble)	mg/kg					-	<1	7.27	<1	<1	13	<1
Cadmium (aqua regia extractable)	mg/kg	(C4SL- 6% SOM)	150	410		0.867	<0.02	0.0424	0.243	0.0871	0.148	0.267
Chromium (hexavalent)	mg/kg	(C4SL- 6% SOM)	21	33			-	<0.6	-	-	<0.6	-
Chromium (aqua regia extractable)	mg/kg	(LQM S4UL - 6% SOM)	910	8600		0.946	<0.9	5.19	3.68	4.7	5.67	6.46
Copper (aqua regia extractable)	mg/kg	(LQM S4UL - 6% SOM)	7100	68000		27.7	19.9	18.4	82.2	10.1	31.5	38
Lead (aqua regia extractable)	mg/kg	(C4SL- 6% SOM)	310	2300		82.6	49.8	17.2	52.8	23.4	32.7	234
Mercury (aqua regia extractable)	mg/kg	(LQM S4UL - 6% SOM)	1.2	58		<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
Nickel (aqua regia extractable)	mg/kg	(LQM S4UL - 6% SOM)	180	980		33.7	14.6	26.3	11.2	6.2	10.5	9.2
Selenium (aqua regia extractable)	mg/kg	(LQM S4UL - 6% SOM)	430	12000		<1	<1	<1	<1	<1	<1	<1
Tin	mg/kg											
Vanadium	mg/kg	(LQM S4UL- 6% SOM)	1200	9000		5.98	24.5	14.9	10.4	10.1	16.2	8.47
Zinc (aqua regia extractable)	mg/kg	(LQM S4UL - 6% SOM)	40000	730000		154	138	79	77.9	86.8	81.7	539
Mineral Oil/ Oils & Greases												
Mineral Oil Surrogate % recovery**	%					-	68.6	75.8	-	74.2	67.4	-
Mineral oil >C10-C40	mg/kg					-	<1	<1	-	<1	7.04	-
Gasoline Range Organics (GRO)												
GRO >C5-C10						-	-	<0.02	-	-	<0.02	-
EPH (Extractable Petroleum Hydrocarbons)												
EPH Range >C10 - C40	mg/kg					-	-	<35	-	-	160	-
GRO Surrogate % recovery**	%					74.3	119	-	-	104	-	92.4
GRO TOT (Moisture Corrected)	mg/kg					<0.1	<0.1	-	-	<0.1	-	<0.1
Aliphatics	mg/kg											
>C5-C6 #M	mg/kg	(LQM S4UL - 1% SOM)	42	3200		<0.01	<0.01	-	-	<0.01	-	<0.01
>C6-C8 #M	mg/kg	(LQM S4UL - 1% SOM)	100	7800		<0.01	<0.01	-	-	<0.01	-	<0.01
>C8-C10	mg/kg	(LQM S4UL - 1% SOM)	27	2000		<0.01	<0.01	-	-	<0.01	-	<0.01
>C10-C12 #M	mg/kg	(LQM S4UL - 1% SOM)	130	9700		<0.01	<0.01	-	-	<0.01	-	<0.01
>C12-C16 #M	mg/kg	(LQM S4UL - 1% SOM)	1100	59000		<0.1	<0.1	-	-	<0.1	-	<0.1
>C16-C21 #M	mg/kg	(LQM S4UL - 1% SOM)	65000	1600000		<0.1	<0.1	-	-	<0.1	-	<0.1
>C21-C35 #M	mg/kg	(LQM S4UL - 1% SOM)	65000	1600000		<0.1	3.6	-	-	<0.1	-	6.32
>C35-C44 #M	mg/kg	(LQM S4UL - 1% SOM)	65000 (8.48)	1600000		<0.1	0.148	-	-	<0.1	-	1.14
Total aliphatics >C12-44	mg/kg					<0.1	3.75	-	-	<0.1	-	7.46
Aromatics												
>C5-EC7	mg/kg	(LQM S4UL - 1% SOM)	370	26000 (1220)		<0.01	<0.01	-	-	<0.01	-	<0.01
>EC7-EC8	mg/kg	(LQM S4UL - 1% SOM)	860	56000 (869)		<0.01	<0.01	-	-	<0.01	-	<0.01
>EC8-EC10 #M	mg/kg	(LQM S4UL - 1% SOM)	47	3500 (613)		<0.01	<0.01	-	-	<0.01	-	<0.01
>EC10-EC12	mg/kg	(LQM S4UL - 1% SOM)	250	3800		<0.01	<0.01	-	-	<0.01	-	<0.01
>EC12-EC16	mg/kg	(LQM S4UL - 1% SOM)	1800	36000 (169)		<0.1	0.333	-	-	<0.1	-	<0.1
>EC16-EC21	mg/kg	(LQM S4UL - 1% SOM)	1900	28000		<0.1	1.16	-	-	0.105	-	1.71
>EC21-EC35	mg/kg	(LQM S4UL - 1% SOM)	1900	28000		<0.1	7.12	-	-	2.01	-	23.7
>EC35-EC44	mg/kg					<0.1	2.01	-	-	<0.1	-	16.9
>EC40-EC44	mg/kg					0.242	0.551	-	-	<0.1	-	6.77
Total aromatics >EC12-EC44	mg/kg		-			<0.1	10.6	-	-	2.12	-	42.3
Total aliphatics and aromatics(C5-C44)	mg/kg		-			<0.1	14.4	-	-	2.12	-	49.8
EPH (C5-C40) #M	mg/kg					-	-	<35	-	-	160	-
Total TPH						<0.1	14.4	<35	-	2.12	160	49.8
Other (PCBs etc)												
PCB congener 28	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	<0.003	-	-	<0.003	-	-
PCB congener 52	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	<0.003	-	-	<0.003	-	-
PCB congener 101	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	<0.003	-	-	<0.003	-	-
PCB congener 118	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	<0.003	-	-	<0.003	-	<0.003
PCB congener 138	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	<0.003	-	-	<0.003	-	-
PCB congener 153	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	<0.003	-	-	<0.003	-	-
PCB congener 180	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	<0.003	-	-	<0.003	-	-
Sum of detected PCB 7 Congeners	mg/kg	(Arup GAC - 1% SOM)				-	<0.021	-	-	<0.021	-	-
PCB congener 81	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	-	-	-	-	-	<0.003
PCB congener 77	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	-	-	-	-	-	<0.003
PCB congener 123	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	-	-	-	-	-	<0.003
PCB congener 114	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	-	-	-	-	-	<0.003
PCB congener 105	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	-	-	-	-	-	<0.003
PCB congener 126	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	-	-	-	-	-	<0.003
PCB congener 167	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	-	-	-	-	-	<0.003
PCB congener 156	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	-	-	-	-	-	<0.003
PCB congener 157	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	-	-	-	-	-	<0.003
PCB congener 169	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	-	-	-	-	-	<0.003
PCB congener 189	mg/kg	(Arup GAC - 1% SOM)	0.01	0.24		-	-	-	-	-	-	<0.003
Sum of detected WHO 12 PCBs	mg/kg					-	-	-	-	-	-	<0.036
Semi-Volatile Organic Compounds (SVOCs)												
Phenol	mg/kg	(LQM S4UL - 1% SOM)	440	440 (26000)		-	-	-	-	<0.5	-	<0.1
Pentachlorophenol	mg/kg	(Arup GAC - 1% SOM)	22	1220		-	-	-	-	<0.5	-	<0.1
n-Nitroso-n-dipropylamine	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
Nitrobenzene	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
Isophorone	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
Hexachloroethane	mg/kg	(Arup GAC - 1% SOM)	0.22	22 (8.17)		-	-	-	-	<0.5	-	<0.1
Hexachlorocyclopentadiene	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
Hexachlorobutadiene	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
Hexachlorobenzene	mg/kg	(LQM S4UL - 1% SOM)	4.1 (0.2)	110 (0.2)		-	-	-	-	<0.5	-	<0.1
n-Dioctyl phthalate	mg/kg					-	-	-	-	<0.5	-	<0.1
Dimethyl phthalate	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
Diethyl phthalate	mg/kg	(Arup GAC - 1% SOM)	1800 (13.7)	150000 (13.7)		-	-	-	-	<0.5	-	<0.1
n-Dibutyl phthalate	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
Dibenzofuran	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
Carbazole	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
Butylbenzyl phthalate	mg/kg	(Arup GAC - 1% SOM)	42000 (26.3)	940000 (26.3)		-	-	-	-	<0.5	-	<0.1
bis(2-Ethylhexyl) phthalate	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
bis(2-Chloroethoxy)methane	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
bis(2-Chloroethyl)ether	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
Azobenzene	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
4-Nitrophenol	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
4-Nitroaniline	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
4-Methylphenol	mg/kg	(Arup GAC - 1% SOM)	3700	160000 (27400)		-	-	-	-	<0.5	-	<0.1
4-Chlorophenylphenylether	mg/kg					-	-	-	-	<0.5	-	<0.1
4-Chloroaniline	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
4-Chloro-3-methylphenol	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
4-Bromophenylphenylether	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
3-Nitroaniline	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
2-Nitrophenol	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
2-Nitroaniline	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1
2-Methylphenol	mg/kg	(Arup GAC - 1% SOM)	3700	160000 (15000)		-	-	-	-	<0.5	-	<0.1
1,2,4-Trichlorobenzene	mg/kg		2.6	220		-	-	-	-	<0.5	-	<0.1

Lab Sample Number	20122793	20184734	20185415	20184736	20185407	20185409	20185411
Sample ID	BH12	BH02	BH10	BH11	BH3	BH3	BH09 ES2
AGS ID	ES 2						
Sample Description	**Made ground**: soft brown sandy gravelly clay with cobbles; flint and granite inclusions	**Made ground:** silty clayey sandy gravel. Cobbles, brick, glass, slate and ceramic	Made ground	**Made ground:** clayey sandy gravel with concrete and brick inclusions	**Made ground:** gravelly sand with brick and slate	**Beach deposits**: flint and gravel	**Made ground:** clay with limestone cobbles and brick
Depth (m)	1.20-1.20	1.00-1.00	1.00	2.00-2.00	1.20	4.70-	1.00
Top depth (m)	0.15	0.2	0.2	1.30	0.90	4.65	0.60
Bottom depth (m)	1.4	3.8	1.2	5.70	4.65	8.80	2.50
Thickness of strata (m)	1.25	3.6	1	4.40	3.75	4.15	3.10
Date Sampled	03/06/2019	10/06/2019		10/06/2019			13/06/2019
Sample Temperature	11.6	13.2	10.4	13.2	10.4	10.4	10.4
Analytical Parameter (Soil Analysis)	Non Hazardous	Non Hazardous	Non Hazardous	Non Hazardous	Non Hazardous	Non Hazardous	Non Hazardous
Asbestos in Soil	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	-	Not Detected
Asbestos Quantification							
Asbestos description							
General Inorganics							
pH	9.31	9.51	9.66	9.23	9.23	8.3	8.65
Total Cyanide	<1	<1	<1	<1	<1	<1	<1
Water soluble suplhate as SO4 2:1 extract		-	-		-	-	-
Sulphide, Easily liberated	-	<15	-	<15	-	-	-
Sulphur, Elemental	-	<10	-	<10	-	-	-
Loss on Ignition @ 450°C	-	3.71	-	3.26	-	-	-
Total carbon	2.95	1.97	1.32	2.47	0.899	0.64	1.72
Total Phenols							
Total Phenols (monohydric)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cresols	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenols	-	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
2,3,5- Trimethylphenol	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2-Isopropylphenol	-	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Phenols, Total Detected 5 speciated	-	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Speciated PAHs							
Coronene	-	<0.2	-	<0.2	-	-	-
Naphthalene-d8 % recovery**	98.2	96.9	91.6	102	90.4	-	91.3
Acenaphthene-d10 % recovery**	96.4	99.7	96.3	103	92	-	90.5
Phenanthrene-d10 % recovery**	84.4	98.4	104	101	93.3	-	92.9
Chrysene-d12 % recovery**	93.1	95.7	108	86.4	91.4	-	91.5
Perylene-d12 % recovery**	83.1	92.1	104	81.6	94.5	-	91.5
Acenaphthene	<0.08	<0.008	0.833	<0.04	<0.008	-	0.0459
Acenaphthylene	0.153	0.108	0.0201	<0.06	<0.012	-	<0.012
Anthracene	0.435	0.126	0.933	0.188	<0.016	-	0.071
Benzo(a)anthracene	1.92	0.732	4.43	0.52	<0.014	-	0.167
Benzo(a)pyrene	1.62	0.676	4.03	0.433	<0.015	-	0.166
Benzo(b)fluoranthene	2.29	0.69	4.05	0.482	<0.015	-	0.141
Benzo(ghi)perylene	0.747	0.456	2.22	0.264	<0.024	-	0.104
Benzo(k)fluoranthene	0.925	0.336	2.06	0.248	<0.014	-	0.071
Chrysene	1.61	0.777	4.24	0.478	0.0137	-	0.166
Dibenz(a,h)anthracene	<0.23	0.0714	0.496	<0.115	<0.023	-	<0.023
Fluoranthene	3.41	2.18	9.93	1.13	0.0223	-	0.438
Fluorene	<0.1	0.0385	0.536	<0.05	<0.01	-	0.0355
Indeno(1,2,3-cd)pyrene	1.18	0.448	2.44	0.226	<0.018	-	0.119
Naphthalene	<0.09	0.0206	0.528	<0.045	<0.009	-	0.0241
Phenanthrene	1.19	1.28	8.27	0.477	0.0218	-	0.347
Pyrene	2.91	1.7	8.46	0.967	0.0182	-	0.396
Speciated Total EPA-16 PAHs	18.4	9.64	53.5	5.41	<0.118	-	2.29
WAC	-	10	-	50	-	-	-
Heavy Metals / Metalloids							
Antimony	1.35	1.75	<0.6	0.659	0.932	1.85	1.2
Arsenic (aqua regia extractable)	12.5	23.4	9.79	25.1	20.5	11	20
Barium		-	-	-	-	-	-
Beryllium	0.723	0.757	0.357	0.357	0.933	1.11	0.848
Boron	6.02						
Boron (water soluble)	-	1.55	<1	2.05	7.38	1.66	<1
Cadmium (aqua regia extractable)	0.431	0.814	0.295	0.414	0.529	0.615	0.758
Chromium (hexavalent)		<0.6	-	<0.6	-	-	-
Chromium (aqua regia extractable)	14.2	2.74	5.14	3.68	20.7	12.9	17.4
Copper (aqua regia extractable)	52.3	52.3	9.87	31.9	57.5	63.1	39.1
Lead (aqua regia extractable)	126	72.7	20.7	128	71.1	63.8	64.8
Mercury (aqua regia extractable)	0.885	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
Nickel (aqua regia extractable)	20.4	31.8	10.7	14.2	39.3	27.3	22
Selenium (aqua regia extractable)	<1	<1	<1	<1	<1	2.24	<1
Tin		-	-	-	-	-	-
Vanadium	24.5	8.64	11.6	15.8	13.5	81.7	22.2
Zinc (aqua regia extractable)	269	160	40.6	91.6	174	128	61.1
Mineral Oil/ Oils & Greases							
Mineral Oil Surrogate % recovery**	-	83	-	83.4	-	79.9	-
Mineral oil >C10-C40	-	<1	-	33.4	-	<1	-
Gasoline Range Organics (GRO)							
GRO >C5-C10	-	-	-	-	-	<0.02	-
EPH (Extractable Petroleum Hydrocarbons)							
EPH Range >C10 - C40	-	-	-	-	-	226	-
GRO Surrogate % recovery**	91.4	61.3	141	90	112	-	91.4
GRO TOT (Moisture Corrected)	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1
Aliphatics							
>C5-C6 #M	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01
>C6-C8 #M	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01
>C8-C10	<0.01	<0.01	0.0147	<0.01	<0.01	-	<0.01
>C10-C12 #M	<0.01	<0.01	0.0124	<0.01	<0.01	-	<0.01
>C12-C16 #M	0.179	<0.1	<0.1	<0.1	<0.1	-	<0.1
>C16-C21 #M	8.28	<0.1	<0.1	0.596	0.666	-	<0.1
>C21-C35 #M	78.3	<0.1	<0.1	11.6	181	-	<0.1
>C35-C44 #M	23	<0.1	<0.1	1.33	111	-	<0.1
Total aliphatics >C12-44	110	<0.1	<0.1	13.6	293	-	<0.1
Aromatics							
>C5-EC7	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01
>EC7-EC8	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01
>EC8-EC10 #M	<0.01	<0.01	0.0102	<0.01	<0.01	-	<0.01
>EC10-EC12	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01
>EC12-EC16	0.482	<0.1	27.4	0.525	0.632	-	0.131
>EC16-EC21	6.6	1.16	113	3.11	1.36	-	2.01
>EC21-EC35	43.7	8.29	174	13.9	43.4	-	8.44
>EC35-EC44	18.3	5.64	36.4	4.33	27.4	-	5.75
>EC40-EC44	6.93	2.44	12.5	1.48	8.66	-	2.94
Total aromatics >EC12-EC44	69	15.1	350	21.9	72.8	-	16.3
Total aliphatics and aromatics(C5-C44)	179	15.1	350	35.4	366	-	16.3
EPH (C5-C40) #M	-	-	-	-	-	226	-
Total TPH	179	15.1	350	35.4	366	226	16.3
Other (PCBs etc)							
PCB congener 28	-	<0.003	-	<0.003	-	-	-
PCB congener 52	-	<0.003	-	<0.003	-	-	-
PCB congener 101	-	<0.003	-	<0.003	-	-	-
PCB congener 118	-	<0.003	-	<0.003	<0.003	-	<0.003
PCB congener 138	-	<0.003	-	<0.003	-	-	-
PCB congener 153	-	<0.003	-	<0.003	-	-	-
PCB congener 180	-	<0.003	-	<0.003	-	-	-
Sum of detected PCB 7 Congeners	-	<0.021	-	<0.021	-	-	-
PCB congener 81	-	-	-	-	<0.003	-	<0.003
PCB congener 77	-	-	-	-	<0.003	-	<0.003
PCB congener 123	-	-	-	-	<0.003	-	<0.003
PCB congener 114	-	-	-	-	<0.003	-	<0.003
PCB congener 105	-	-	-	-	<0.003	-	<0.003
PCB congener 126	-	-	-	-	<0.003	-	<0.003
PCB congener 167	-	-	-	-	<0.003	-	<0.003
PCB congener 156	-	-	-	-	<0.003	-	<0.003
PCB congener 157	-	-	-	-	<0.003	-	<0.003
PCB congener 169	-	-	-	-	<0.003	-	<0.003
PCB congener 189	-	-	-	-	<0.003	-	<0.003
Sum of detected WHO 12 PCBs	-	-	-	-	<0.036	-	<0.036
Semi-Volatile Organic Compounds (SVOCs)							
Phenol	-						
Pentachlorophenol	-						
n-Nitroso-n-dipropylamine	-						
Nitrobenzene	-						
Isophorone	-						
Hexachloroethane	-						
Hexachlorocyclopentadiene	-						
Hexachlorobutadiene	-						
Hexachlorobenzene	-						
n-Dioctyl phthalate	-						
Dimethyl phthalate	-						
Diethyl phthalate	-						
n-Dibutyl phthalate	-						
Dibenzofuran	-						
Carbazole	-						
Butylbenzyl phthalate	-						
bis(2-Ethylhexyl) phthalate	-						
bis(2-Chloroethoxy)methane	-						
bis(2-Chloroethyl)ether	-						
Azobenzene	-						
4-Nitrophenol	-						
4-Nitroaniline	-						
4-Methylphenol	-						
4-Chlorophenylphenylether	-						
4-Chloroaniline	-						
4-Chloro-3-methylphenol	-						
4-Bromophenylphenylether	-						
3-Nitroaniline	-						
2-Nitrophenol	-						
2-Nitroaniline	-						
2-Methylphenol	-						
1,2,4-Trichlorobenzene	-						

Lab Sample Number	20185393	20185402	20185403	20184741	20184744	20184746	20184747
Sample ID	TP02	TP07	TP08	TP09	TP11	TP12	TP13
AGS ID							
Sample Description	**MADE GROUND.** Dark brownish red GRAVEL/SAND. Gravel is fine to coarse subrounded to angular of **slag, clinker,** brick fragments and limestone with	**MADE GROUND:** Brown very gravelly slightly clayey SAND. Sand is fine to coarse. Gravels are fine to coarse angular of **ash, clinker,** limestone and mixed lithologies.	**Made ground:** gravelly clayey sand with bric, ash, shell and flint	**Made ground:** gravelly sand with tarmac	**Made ground:** orange clayey gravel with **clinker** and roots	**Made ground:** Grey brown silty clayey gravelly sand.	**TOPSOIL:** clay
Depth (m)	0.20-	0.60	0.30-	0.60-0.60	0.20-0.20	0.60-0.60	0.30-0.30
Top depth (m)	0.10	0.30	0.10	0.40	0.11	0.40	0.00
Bottom depth (m)	0.50	0.80	1.20	1.20	0.57	1.20	0.60
Thickness of strata (m)	0.40	0.50	1.10	0.80	0.46	0.80	0.60
Date Sampled							
Sample Temperature	10.4	10.4	10.4	13.2	13.2	13.2	13.2
Analytical Parameter (Soil Analysis)	Hazardous	Hazardous	Non Hazardous	Non Hazardous	Hazardous	Hazardous	Non Hazardous
Asbestos in Soil	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	-	Not Detected
Asbestos Quantification							
Asbestos description							
General Inorganics							
pH	9.05	9.04	8.71	8.85	9.39	8.4	8.57
Total Cyanide	<1	<1	<1	<1	<1	<1	<1
Water soluble suplhate as SO4 2:1 extract	-	-	0.0163	-	-	-	-
Sulphide, Easily liberated	-	-	<15	<15	-	-	-
Sulphur, Elemental	-	-	121	37.8	-	-	-
Loss on Ignition @ 450°C	-	-	4.35	3.38	-	-	-
Total carbon	3.05	1.88	3.9	1.43	4.8	4.35	11.3
Total Phenols							
Total Phenols (monohydric)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cresols	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenols	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
2,3,5- Trimethylphenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2-Isopropylphenol	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Phenols, Total Detected 5 speciated	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Speciated PAHs							
Coronene	-	-	1.4	<0.2	-	-	-
Naphthalene-d8 % recovery**	86.6	87.8	90.9	85.4	81.8	86.3	91.7
Acenaphthene-d10 % recovery**	86.2	96.3	89.8	86.9	86	93.1	91.5
Phenanthrene-d10 % recovery**	86.7	92.6	95.8	89.1	87.5	97.7	89.6
Chrysene-d12 % recovery**	90.2	98	100	80.3	90.2	92.4	92.3
Perylene-d12 % recovery**	78.3	90.4	87.1	73	86.3	85.8	84.7
Acenaphthene	0.0769	<0.04	0.779	<0.008	0.436	1.1	0.148
Acenaphthylene	0.0846	<0.06	<0.06	<0.012	<0.06	<0.06	0.0219
Anthracene	0.216	0.0917	1.97	0.587	0.912	1.76	0.285
Benzo(a)anthracene	1.21	0.335	3.87	1.89	2.33	4.61	1.67
Benzo(a)pyrene	1.21	0.308	3.38	1.22	2.05	3.92	1.71
Benzo(b)fluoranthene	1.31	0.421	3.94	1.93	2.25	5.87	1.88
Benzo(ghi)perylene	0.792	0.193	1.96	0.648	1.2	2.15	1.23
Benzo(k)fluoranthene	0.623	0.15	1.47	0.773	0.988	1.98	0.783
Chrysene	1.11	0.316	3.59	1.69	2.25	4.74	1.64
Dibenz(a,h)anthracene	0.228	<0.115	0.46	0.158	0.251	0.503	0.265
Fluoranthene	2.13	0.694	10	3.54	5.49	10.5	3.05
Fluorene	0.0671	<0.05	0.678	0.142	0.328	0.789	0.0897
Indeno(1,2,3-cd)pyrene	1.02	0.278	2.38	0.803	1.49	2.21	1.12
Naphthalene	<0.045	<0.045	0.326	<0.009	0.373	2.44	0.14
Phenanthrene	0.673	0.348	7.97	2.19	3.85	8.85	1.6
Pyrene	1.7	0.64	8.11	2.59	4.51	9.05	2.77
Speciated Total EPA-16 PAHs	12.5	3.78	50.9	18.2	28.7	60.5	18.4
WAC	-	-	50	20	-	-	-
Heavy Metals / Metalloids							
Antimony	50.3	21.7	8.87	1.69	84	3.74	1.11
Arsenic (aqua regia extractable)	939	223	210	20.1	125	22.5	20.7
Barium	-	-	195	-	-	-	-
Beryllium	0.472	0.598	0.464	0.288	0.569	0.47	0.697
Boron							
Boron (water soluble)	<1	<1	<1	<1	<1	<1	<1
Cadmium (aqua regia extractable)	14.1	2.44	1.6	0.481	3.4	1.06	1.41
Chromium (hexavalent)	-	-	<0.6	<0.6	-	-	-
Chromium (aqua regia extractable)	66.2	29.6	6.24	4.95	128	6.71	12.4
Copper (aqua regia extractable)	1050	307	393	41	277	80.4	44
Lead (aqua regia extractable)	10000	1900	265	72.1	8890	256	101
Mercury (aqua regia extractable)	<0.14	<0.14	<0.14	<0.14	<0.14	0.146	<0.14
Nickel (aqua regia extractable)	38.5	28.1	18.4	9.3	27.3	21	23.6
Selenium (aqua regia extractable)	<1	<1	<1	<1	<1	<1	<1
Tin	-	-	26.4	-	-	-	-
Vanadium	53.1	23.3	16.8	12.9	44.5	18.7	25.6
Zinc (aqua regia extractable)	17800	<1.9	707	126	6910	400	312
Mineral Oil/ Oils & Greases							
Mineral Oil Surrogate % recovery**	-	-	82.5	72.7	-	79.4	-
Mineral oil >C10-C40	-	-	105	<1	-	45.3	-
Gasoline Range Organics (GRO)							
GRO >C5-C10	-	-	-	-	-	<0.02	-
EPH (Extractable Petroleum Hydrocarbons)							
EPH Range >C10 - C40	-	-	-	-	-	1130	-
GRO Surrogate % recovery**	77.2	89.4	75.5	89	90	-	76
GRO TOT (Moisture Corrected)	<0.1	0.381	0.212	<0.1	<0.1	-	<0.1
Aliphatics							
>C5-C6 #M	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01
>C6-C8 #M	<0.01	0.0896	0.0242	<0.01	<0.01	-	<0.01
>C8-C10	<0.01	0.0963	0.0299	<0.01	<0.01	-	<0.01
>C10-C12 #M	<0.01	0.075	0.0794	<0.01	0.0123	-	<0.01
>C12-C16 #M	2.43	<0.1	2.23	<0.1	4.92	-	<0.1
>C16-C21 #M	5.23	3.15	7.41	<0.1	7.82	-	<0.1
>C21-C35 #M	42.9	27.9	73	4.05	35.5	-	2.08
>C35-C44 #M	125	11.2	33.9	<0.1	74.6	-	<0.1
Total aliphatics >C12-44	175	42.2	117	4.05	123	-	2.08
Aromatics							
>C5-EC7	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01
>EC7-EC8	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01
>EC8-EC10 #M	<0.01	0.0638	0.0196	<0.01	<0.01	-	<0.01
>EC10-EC12	<0.01	0.0504	0.0529	<0.01	<0.01	-	<0.01
>EC12-EC16	5.43	4.79	19	0.942	7.04	-	2.28
>EC16-EC21	44.8	53.4	159	14.2	64.3	-	20.7
>EC21-EC35	229	152	439	43.4	271	-	50.4
>EC35-EC44	234	44.7	167	15.2	223	-	11.7
>EC40-EC44	117	13.2	63.7	5.28	113	-	3.17
Total aromatics >EC12-EC44	513	255	784	73.8	565	-	85.1
Total aliphatics and aromatics(C5-C44)	688	298	901	77.9	688	-	87.2
EPH (C5-C40) #M	-	-	-	-	-	1130	-
Total TPH	688	298	901	77.9	688	1130	87.2
Other (PCBs etc)							
PCB congener 28	-	-	<0.015	<0.003	-	-	-
PCB congener 52	-	-	<0.015	<0.003	-	-	-
PCB congener 101	-	-	<0.015	<0.003	-	-	-
PCB congener 118	0.00639	-	<0.015	<0.003	-	-	-
PCB congener 138	-	-	<0.015	<0.003	-	-	-
PCB congener 153	-	-	<0.015	<0.003	-	-	-
PCB congener 180	-	-	<0.015	<0.003	-	-	-
Sum of detected PCB 7 Congeners	-	-	<0.105	<0.021	-	-	-
PCB congener 81	0.074	-	-	-	-	-	-
PCB congener 77	0.0729	-	-	-	-	-	-
PCB congener 123	0.00651	-	-	-	-	-	-
PCB congener 114	0.0129	-	-	-	-	-	-
PCB congener 105	0.099	-	-	-	-	-	-
PCB congener 126	0.106	-	-	-	-	-	-
PCB congener 167	<0.003	-	-	-	-	-	-
PCB congener 156	<0.003	-	-	-	-	-	-
PCB congener 157	<0.003	-	-	-	-	-	-
PCB congener 169	<0.003	-	-	-	-	-	-
PCB congener 189	<0.003	-	-	-	-	-	-
Sum of detected WHO 12 PCBs	0.377	-	-	-	-	-	-

Lab Sample Number	20184748	20184749	20184750	20184751	20184755	20184756	20184757
Sample ID	TP14	TP16	TP16	TP17	TP20	TP20	TP21
AGS ID							
Sample Description	**Made ground:** gravel with iron slag and tile	**Made ground:** orange gravelly cobbles with brick and concrete	**Made ground:** mottled cobbles with brick, tile	**Made ground:** Orange cobbles with brick, tile	**Made ground:** Gravel with **iron slag**	**Made ground:** gravel with concrete, chert and plastic	**Made ground:** sandy gravel with clinker and chert
Depth (m)	0.30-0.30	0.25-0.25	0.50-0.50	0.40-0.40	0.40-0.40	0.90-0.90	0.30-0.30
Top depth (m)	0.20	0.04	0.04	0.09	0.10	0.70	0.10
Bottom depth (m)	0.45	0.65	0.65	1.20	0.70	1.00	0.45
Thickness of strata (m)	0.25	0.61	0.61	1.11	0.60	0.30	0.35
Date Sampled							
Sample Temperature	13.2	13.2	13.2	13.2	13.2	13.2	13.2
Analytical Parameter (Soil Analysis)	Non Hazardous	Non Hazardous	Non Hazardous	Non Hazardous	Hazardous	Non Hazardous	Non Hazardous
Asbestos in Soil	Not Detected	-	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Asbestos Quantification							
Asbestos description							
General Inorganics							
pH	8.9	8.78	-	8.96	8.95	8.7	9.05
Total Cyanide	<1	<1	-	<1	<1	<1	<1
Water soluble suplhate as SO4 2:1 extract	-	-	-	-	-	-	-
Sulphide, Easily liberated	-	-	-	-	-	-	-
Sulphur, Elemental	-	-	-	-	-	-	-
Loss on Ignition @ 450°C	-	-	-	-	-	-	-
Total carbon	2.38	3.49	-	2.24	3.25	3.43	2.86
Total Phenols							
Total Phenols (monohydric)	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01
Cresols	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01
Xylenols	<0.015	<0.015	-	<0.015	<0.015	<0.015	<0.015
2,3,5- Trimethylphenol	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01
2-Isopropylphenol	<0.015	<0.015	-	<0.015	<0.015	<0.015	<0.015
Phenols, Total Detected 5 speciated	<0.06	<0.06	-	<0.06	<0.06	<0.06	<0.06
Speciated PAHs							
Coronene	-	-	-	-	-	-	-
Naphthalene-d8 % recovery**	83.8	-	-	89.6	85.8	-	94.2
Acenaphthene-d10 % recovery**	82.2	-	-	90.6	89.2	-	91.2
Phenanthrene-d10 % recovery**	84.6	-	-	88.7	93	-	101
Chrysene-d12 % recovery**	94	-	-	91.3	92.1	-	92.1
Perylene-d12 % recovery**	90.2	-	-	85.4	86.3	-	93.5
Acenaphthene	0.0946	-	-	<0.008	<0.04	-	<0.008
Acenaphthylene	<0.06	-	-	<0.012	0.0746	-	0.019
Anthracene	0.217	-	-	<0.016	0.267	-	0.0358
Benzo(a)anthracene	0.688	-	-	0.0895	1.1	-	0.118
Benzo(a)pyrene	0.711	-	-	0.101	0.911	-	0.111
Benzo(b)fluoranthene	1.12	-	-	0.131	1.45	-	0.165
Benzo(ghi)perylene	0.524	-	-	0.0787	0.646	-	0.0646
Benzo(k)fluoranthene	0.376	-	-	0.0431	0.527	-	0.0615
Chrysene	0.639	-	-	0.0832	1.16	-	0.123
Dibenz(a,h)anthracene	<0.115	-	-	<0.023	0.153	-	<0.023
Fluoranthene	1.54	-	-	0.195	2.12	-	0.264
Fluorene	0.0762	-	-	<0.01	<0.05	-	0.014
Indeno(1,2,3-cd)pyrene	0.485	-	-	0.073	0.552	-	0.0692
Naphthalene	0.116	-	-	<0.009	<0.045	-	0.0127
Phenanthrene	0.982	-	-	0.0442	0.728	-	0.128
Pyrene	1.32	-	-	0.167	1.66	-	0.233
Speciated Total EPA-16 PAHs	8.9	-	-	1.01	11.4	-	1.42
WAC	-	-	-	-	-	-	-
Heavy Metals / Metalloids							
Antimony	12.4	1.06	-	0.762	3.36	0.91	2.28
Arsenic (aqua regia extractable)	28.4	27	-	30.6	69	353	20.2
Barium	-	-	-	-	-	-	-
Beryllium	0.259	0.434	-	0.57	0.233	0.291	0.216
Boron							
Boron (water soluble)	<1	<1	-	<1	<1	<1	<1
Cadmium (aqua regia extractable)	1.25	0.662	-	1.1	1.21	0.492	0.438
Chromium (hexavalent)	-	-	-	-	-	-	-
Chromium (aqua regia extractable)	18.1	10.3	-	3.96	73.6	4.19	7.37
Copper (aqua regia extractable)	197	38.9	-	28.8	480	136	43.2
Lead (aqua regia extractable)	868	89.6	-	212	231	150	150
Mercury (aqua regia extractable)	0.18	<0.14	-	<0.14	<0.14	<0.14	0.242
Nickel (aqua regia extractable)	11.4	14.4	-	19.1	24.5	9.11	7.98
Selenium (aqua regia extractable)	<1	<1	-	<1	<1	<1	<1
Tin	-	-	-	-	-	-	-
Vanadium	13.9	15.5	-	15.1	52.1	9.61	11.4
Zinc (aqua regia extractable)	894	103	-	130	1140	211	149
Mineral Oil/ Oils & Greases							
Mineral Oil Surrogate % recovery**	-	-	-	-	-	-	-
Mineral oil >C10-C40	-	-	-	-	-	-	-
Gasoline Range Organics (GRO)							
GRO >C5-C10	-	-	-	-	-	-	-
EPH (Extractable Petroleum Hydrocarbons)							
EPH Range >C10 - C40	-	-	-	-	-	-	-
GRO Surrogate % recovery**	70	-	-	103	75	-	72
GRO TOT (Moisture Corrected)	<0.1	-	-	<0.1	<0.1	-	<0.1
Aliphatics							
>C5-C6 #M	<0.01	-	-	<0.01	<0.01	-	<0.01
>C6-C8 #M	<0.01	-	-	<0.01	<0.01	-	<0.01
>C8-C10	<0.01	-	-	<0.01	<0.01	-	<0.01
>C10-C12 #M	<0.01	-	-	<0.01	<0.01	-	<0.01
>C12-C16 #M	3.03	-	-	<0.1	24.4	-	<0.1
>C16-C21 #M	10.4	-	-	<0.1	133	-	4.96
>C21-C35 #M	105	-	-	<0.1	193	-	83.6
>C35-C44 #M	80.4	-	-	<0.1	101	-	56.1
Total aliphatics >C12-44	199	-	-	<0.1	451	-	145
Aromatics							
>C5-EC7	<0.01	-	-	<0.01	<0.01	-	<0.01
>EC7-EC8	<0.01	-	-	<0.01	<0.01	-	<0.01
>EC8-EC10 #M	<0.01	-	-	<0.01	<0.01	-	<0.01
>EC10-EC12	<0.01	-	-	<0.01	<0.01	-	<0.01
>EC12-EC16	4.57	-	-	<0.1	3.88	-	4.59
>EC16-EC21	41.6	-	-	0.668	46.2	-	52.3
>EC21-EC35	310	-	-	10.1	426	-	269
>EC35-EC44	237	-	-	12	389	-	166
>EC40-EC44	96.3	-	-	4.74	172	-	66.7
Total aromatics >EC12-EC44	593	-	-	22.7	865	-	493
Total aliphatics and aromatics(C5-C44)	792	-	-	22.7	1320	-	637
EPH (C5-C40) #M	-	-	-	-	-	-	-
Total TPH	792	-	-	22.7	1320	-	637
Other (PCBs etc)							
PCB congener 28	-	-	-	-	-	-	-
PCB congener 52	-	-	-	-	-	-	-
PCB congener 101	-	-	-	-	-	-	-
PCB congener 118	-	-	-	-	-	-	-
PCB congener 138	-	-	-	-	-	-	-
PCB congener 153	-	-	-	-	-	-	-
PCB congener 180	-	-	-	-	-	-	-
Sum of detected PCB 7 Congeners	-	-	-	-	-	-	-
PCB congener 81	-	-	-	-	-	-	-
PCB congener 77	-	-	-	-	-	-	-
PCB congener 123	-	-	-	-	-	-	-
PCB congener 114	-	-	-	-	-	-	-
PCB congener 105	-	-	-	-	-	-	-
PCB congener 126	-	-	-	-	-	-	-
PCB congener 167	-	-	-	-	-	-	-
PCB congener 156	-	-	-	-	-	-	-
PCB congener 157	-	-	-	-	-	-	-
PCB congener 169	-	-	-	-	-	-	-
PCB congener 189	-	-	-	-	-	-	-
Sum of detected WHO 12 PCBs	-	-	-	-	-	-	-

Project / Site name:		Mumbles GI: Geo-Environmental Results																															
Lab Sample Number						20122734	20205556	20205557	20205558	20205559	20205561	20205563	20122793	20184734	20185415	20184736	20185407	20185409	20185411	20185393	20185402	20185403	20184741	20184744	20184746	20184747	20184748	20184749	20184750	20184751	20184755	20184756	20184757
Sample ID						**BH01**	**BH04**	**BH04**	**BH05**	**BH05**	**BH05**	**BH06**	**BH12**	**BH02**	**BH10**	**BH11**	**BH3**	**BH3**	**BH09 ES2**	**TP02**	**TP07**	**TP08**	TP09	**TP11**	**TP12**	**TP13**	**TP14**	**TP16**	TP16	TP17	TP20	TP20	TP21
AGS ID						**ES 3**	**ES 2**	**ES 3**	**ES 1**	**ES 2**	**ES 4**	**ES 2**	**ES 2**																					
Sample Description						**Made Ground:** Clayey sandy gravel.	**Made ground:** Reddish brown clayey gravelly sand with brick and flint.	**Beach deposits:** Brown clayey sandy gravel with cobbles	**Made ground:** Dark brown black sandy limestone gravel	**Made ground:** clayey sandy gravel with brick, slate and concrete	**Beach Deposits:** shell fragments (NAT)	**Made ground:** light brown orange silty sandy gravel with cobbles, brick and concrete	**Made ground:** soft brown sandy gravelly clay with cobbles; flint and granite inclusions	**Made ground:** silty clayey sandy gravel. Cobbles, brick, glass, slate and ceramic	Made ground	**Made ground:** clayey sandy gravel with concrete and brick inclusions	**Made ground:** gravelly sand with brick and slate	**Beach deposits:** flint and gravel	**Made ground:** clay with limestone cobbles and brick	**MADE GROUND:** Dark brownish red GRAVELLSAND. Gravel is fine to coarse subrounded to angular of **slag, clinker,** brick fragments and limestone with	**MADE GROUND:** Brown very gravelly slightly clayey SAND. Sand is fine to coarse. Gravels are fine to coarse angular of **ash, clinker,** limestone and mixed lithologies.	**Made ground:** gravelly clayey sand with bric, ash, shell and flint	**Made ground:** gravelly sand with tarmac	**Made ground:** orange clayey gravel with **clinker** and roots	**Made ground:** Grey brown silty clayey gravelly sand.	**TOPSOIL:** clay	**Made ground:** gravel with iron slag and tile	**Made ground:** orange gravelly cobbles with brick and concrete	**Made ground:** mottled cobbles with brick, tile	**Made ground:** Orange cobbles with brick, tile	**Made ground:** Gravel with **iron slag**	**Made ground:** gravel with concrete, chert and plastic	**Made ground:** sandy gravel with clinker and chert
Depth (m)			Assessment criteria	Residential C4SL:sl5/4ULsl Aup GAC (1% OC) no plant uptake	Commercial C4SL:sl5/4ULs/ Aup GAC (1% OC)	2.20-2.20	1.00	5.50	0.30	1.00	5.00	0.80	1.20-1.20	1.00-1.00	1.00	2.00-2.00	1.20	4.70-	1.00	0.20-	0.60	0.30-	0.60-0.60	0.20-0.20	0.60-0.60	0.30-0.30	0.30-0.30	0.25-0.25	0.50-0.50	0.40-0.40	0.40-0.40	0.90-0.90	0.30-0.30
Top depth (m)						1.3	0.3	5.2	0.2	0.6	4.8	0.4	0.15	0.2	0.2	1.30	0.90	4.65	0.60	0.10	0.30	0.10	0.40	0.11	0.40	0.00	0.20	0.04	0.04	0.09	0.10	0.70	0.10
Bottom depth (m)						3.3	5.2	12.8	0.6	2	5.4	0.95	1.4	3.8	1.2	5.70	4.65	8.80	2.50	0.50	0.80	1.20	1.20	0.57	1.20	0.60	0.45	0.65	0.65	1.20	0.70	1.00	0.45
Thickness of strata (m)						2	4.9	7.6	0.4	1.4	0.6	0.55	1.25	3.6	1	4.40	3.75	4.15	3.10	0.40	0.50	1.10	0.80	0.46	0.80	0.60	0.25	0.61	0.61	1.11	0.60	0.30	0.35
Date Sampled						05/06/2019	18/06/2019	18/06/2019	20/06/2019	20/06/2019	20/06/2019	19/06/2019	03/06/2019	10/06/2019		10/06/2019			13/06/2019															
Sample Temperature						11.6	13.4	13.4	13.4	13.4	13.4	13.4	11.6	13.2	10.4	13.2	10.4	10.4	10.4	10.4	10.4	10.4	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2
Analytical Parameter (Soil Analysis)	**Units**				**HWOL Waste Classification**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Hazardous**	**Hazardous**	**Non Hazardous**	**Non Hazardous**	**Hazardous**	**Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Non Hazardous**	**Hazardous**	**Non Hazardous**	**Non Hazardous**
2-Chlorophenol	mg/kg	(LQM 5four - 1% SOM)	94	3500		-	-	-	-	<0.5	-	<0.1	-																				
2,6-Dinitrotoluene	mg/kg					-	-	-	-	<0.5	-	<0.1	-																				
2,4-Dinitrotoluene	mg/kg					-	-	-	-	<0.5	-	<0.1	-																				
2,4-Dimethylphenol	mg/kg	(Anup GAC - 1% SOM)	210	16000 (1380)		-	-	-	-	<0.5	-	<0.1	-																				
2,4-Dichlorophenol	mg/kg	(LQM 5four - 1% SOM)	94	3500		-	-	-	-	<0.5	-	<0.1	-																				
2,4,6-Trichlorophenol	mg/kg	(Anup GAC - 1% SOM)	73	3880 (879)		-	-	-	-	<0.5	-	<0.1	-																				
2,4,5-Trichlorophenol	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1	-																				
1,4-Dichlorobenzene	mg/kg	(LQM 5four - 1% SOM)	61	4400 (224)		-	-	-	-	<0.5	-	<0.1	-																				
1,3-Dichlorobenzene	mg/kg	(LQM 5four - 1% SOM)	0.44	30		-	-	-	-	<0.5	-	<0.1	-																				
1,2-Dichlorobenzene	mg/kg	(LQM 5four - 1% SOM)	24	NONE		-	-	-	-	<0.5	-	<0,1	-																				
2-Chloronaphthalene	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1	-																				
2-Methylnaphthalene	mg/kg		NONE	NONE		-	-	-	-	<0.5	-	<0.1	-																				
Acenaphthylene	mg/kg	(LQM 5four - 1% SOM)	2900	83000		-	-	-	-	<0.5	-	<0.1	-																				
Acenaphthene	mg/kg	(LQM 5four - 1% SOM)	3000	84000		-	-	-	-	<0.5	-	<0.1	-																				
Anthracene	mg/kg	(LQM 5four - 1% SOM)	31000 (1.17)	520000		-	-	-	-	<0.5	-	<0.1	-																				
Benzo(a)anthracene	mg/kg	(LQM 5four - 1% SOM)	11	170		-	-	-	-	0.864	-	<0.1	-																				
Benzo(b)fluoranthene	mg/kg	(LQM 5four - 1% SOM)	3.9	44		-	-	-	-	0.553	-	<0.1	-																				
Benzo(k)fluoranthene	mg/kg	(LQM 5four - 1% SOM)	110	1200		-	-	-	-	0.728	-	<0.1	-																				
Benzo(a)pyrene	mg/kg	(C4SL- 6% SOM)	5.3	77		-	-	-	-	0.591	-	<0.1	-																				
Benzo(g,h,i)perylene	mg/kg	(LQM 5four - 1% SOM)	360	3900		-	-	-	-	<0.5	-	<0.1	-																				
Chrysene	mg/kg	(LQM 5four - 1% SOM)	30	350		-	-	-	-	1.32	-	<0.1	-																				
Fluoranthene	mg/kg	(LQM 5four - 1% SOM)	1500	23000		-	-	-	-	1.88	-	<0,1	-																				
Fluorene	mg/kg	(LQM 5four - 1% SOM)	2800 (30.9)	63000 (30.9)		-	-	-	-	<0.5	-	<0.1	-																				
Indeno(1,2,3-cd)pyrene	mg/kg	(LQM 5four - 1% SOM)	45	500		-	-	-	-	<0.5	-	<0.1	-																				
Phenanthrene	mg/kg	(LQM 5four - 1% SOM)	1300 (36.0)	22000		-	-	-	-	1.43	-	<0.1	-																				
Pyrene	mg/kg	(LQM 5four - 1% SOM)	3700	54000		-	-	-	-	1.63	-	<0.1	-																				
Naphthalene	mg/kg	(LQM 5four - 1% SOM)	2.3	190 (76.4)		-	-	-	-	<0.5	-	<0.1	-																				
Dibenz(a,h)anthracene	mg/kg	(LQM 5four - 1% SOM)	0.31	3.5		-	-	-	-	<0.5	-	<0.1	-																				
Bis(2-chloroisopropyl) ether	mg/kg					-	-	-	-	<0.5	-	<0.1	-																				
Volatile Organic Compounds (VOCs)																																	
Dibromofluoromethane**	%					101	126	107	-	107	108	103	108	110	113	112	129	109	99.2	107	105	104	104	104	109	109	111	-	-	111	111	-	109
Toluene-d8**	%					93.4	97.8	95.3	-	98.7	97.7	95.8	99.2	101	96.4	99.5	94	95.3	92.6	95.7	98.7	98.4	96.5	96.8	101	99.3	97.8	-	-	96.8	98.2	-	97.5
4-Bromofluorobenzene**	%					70	83.4	74.8	-	88.7	77.3	74.5	76.5	94.6	95	97.7	76	89.7	71.5	87	88.4	84.8	81.1	92.6	94.4	94.3	95.4	-	-	86.3	93.8	-	90.9
Dichlorodifluoromethane	mg/kg		NONE	NONE		-	-	-	-	<0.006	-	<0.006	-																				
Chloromethane	mg/kg	(Anup GAC - 1% SOM)	0.0085	1.0		-	-	-	-	<0.007	-	<0.007	-																				
Vinyl Chloride	mg/kg	(LQM 5four - 1% SOM)	0.00077	0.059		-	-	-	-	<0.006	-	<0.006	-																				
Bromomethane	mg/kg		NONE	NONE		-	-	-	-	<0.01	-	<0.01	-																				
Chloroethane	mg/kg	(Anup GAC - 1% SOM)	8.4	960		-	-	-	-	<0.01	-	<0.01	-																				
Trichlorofluoromethane	mg/kg		NONE	NONE		-	-	-	-	<0.006	-	<0.006	-																				
1,1-Dichloroethene	mg/kg	(Anup GAC - 1% SOM)	0.23	26		-	-	-	-	<0.01	-	<0.01	-																				
Carbon Disulphide	mg/kg	(Anup GAC - 1% SOM)	0.1	12		-	-	-	-	<0.007	-	<0.007	-																				
Dichloromethane	mg/kg	(Anup GAC - 1% SOM)	2.1	270		-	-	-	-	<0.01	-	<0.01																					
Methyl Tertiary Butyl Ether	mg/kg	(Anup GAC - 1% SOM)	73	7900		<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.2	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.01	<0.2	<0.2	<0.2	<0.2	-	-	<0.01	<0.2	-	<0.1
trans-1,2-Dichloroethene	mg/kg		NONE	NONE		-	-	-	-	<0.01	-	<0.01	-																				
1,1-Dichloroethane	mg/kg		NONE	NONE		-	-	-	-	<0.008	-	<0.008	-																				
cis-1,2-Dichloroethene	mg/kg		NONE	NONE		-	-	-	-	<0.006	-	<0.006	-																				
2,2-Dichloropropane	mg/kg		NONE	NONE		-	-	-	-	<0.01	-	<0.01	-																				
Bromochloromethane	mg/kg		NONE	NONE		-	-	-	-	<0.01	-	<0.01	-																				
Chloroform	mg/kg	(LQM 5four - 1% SOM)	1.2	99		-	-	-	-	<0.008	-	<0.008	-																				
1,1,1-Trichloroethane	mg/kg	(LQM 5four - 1% SOM)	9	660		-	-	-	-	<0.007	-	<0.007	-																				
1,1-Dichloropropene	mg/kg		NONE	NONE		-	-	-	-	<0.01	-	<0.01	-																				
Carbontetrachloride	mg/kg	(LQM 5four - 1% SOM)	0.026	2.9		-	-	-	-	<0.01	-	<0.01	-																				
1,2-Dichloroethane	mg/kg	(Anup GAC - 1% SOM)	0.0065	0.7		-	-	-	-	<0.005	-	<0.005	-																				
Benzene	mg/kg	(C4SL- 6% SOM)	3.3	98		<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.18	<0.009	<0.18	<0.009	<0.009	<0.009	<0.09	<0.09	<0.09	<0.009	<0.18	<0.18	<0.18	<0.18	-	-	<0.009	<0.18	-	<0.09
Trichloroethene	mg/kg	(Anup GAC - 1% SOM)	0.11	1.2		-	-	-	-	<0.009	-	<0.009	-																				
1,2-Dichloropropane	mg/kg	(Anup GAC - 1% SOM)	0.024	3.3		-	-	-	-	<0.01	-	<0.01	-																				
Dibromomethane	mg/kg		NONE	NONE		-	-	-	-	<0.009	-	<0.009	-																				
Bromodichloromethane	mg/kg		NONE	NONE		-	-	-	-	<0.007	-	<0.007	-																				
cis-1,3-Dichloropropene	mg/kg		NONE	NONE		-	-	-	-	<0.01	-	<0.01	-																				
Toluene	mg/kg	(LQM 5four - 1% SOM)	880	110000		<0.007	<0.007	<0.007	-	<0.007	<0.007	<0.007	<0.007	<0.14	<0.007	<0.14	<0.007	<0.007	<0.007	<0.07	<0.07	<0.07	<0.007	<0.14	<0.14	<0.14	<0.14	-	-	<0.007	<0.14	-	<0.07
trans-1,3-Dichloropropene	mg/kg		NONE	NONE		-	-	-	-	<0.01	-	<0.01	-																				
1,1,2-Trichloroethane	mg/kg		NONE	NONE		-	-	-	-	<0.01	-	<0.01	-																				
1,3-Dichloropropane	mg/kg		NONE	NONE		-	-	-	-	<0.007	-	<0.007	-																				
Tetrachloroethene	mg/kg		NONE	NONE		-	-	-	-	0.0137	-	<0.005	-																				
Dibromochloromethane	mg/kg		NONE	NONE		-	-	-	-	<0.01	-	<0.01	-																				
1,2-Dibromoethane	mg/kg		NONE	NONE		-	-	-	-	<0.01	-	<0.01	-																				
Chlorobenzene	mg/kg	(Anup GAC - 1% SOM)	0.33	5.9		-	-	-	-	<0.005	-	<0.005	-																				
1,1,1,2-Tetrachloroethane	mg/kg	(LQM 5four - 1% SOM)	1.5	110		-	-	-	-	<0.01	-	<0.01																					
Ethylbenzene	mg/kg	(LQM 5four - 1% SOM)	83	5700		<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004	<0.08	<0.004	<0.08	<0.004	<0.004	<0.004	<0.04	<0.04	<0.04	<0.004	<0.08	<0.08	<0.08	<0.08	-	-	<0.004	<0.08	-	<0.04
p/m-Xylene	mg/kg	(LQM 5four - 1% SOM)	79	5900		<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.2	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.01	<0.2	<0.2	<0.2	<0.2	-	-	<0.01	<0.2	-	<0.1
o-Xylene	mg/kg	(LQM 5four - 1% SOM)	88	6600		<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.2	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.01	<0.2	<0.2	<0.2	<0.2	-	-	<0.01	<0.2	-	<0.1
Styrene	mg/kg	(Anup GAC - 1% SOM)	35	NONE		-	-	-	-	<0.01	-	<0.01	-																				
Bromoform	mg/kg	(Anup GAC - 1% SOM)	5.2	760		-	-	-	-	<0.01	-	<0.01	-																				
Isopropylbenzene	mg/kg		NONE	NONE		-	-	-	-	<0.005	-	<0.005	-																				
1,1,2,2-Tetrachloroethane	mg/kg		2.7	290		-	-	-	-	<0.01	-	<0.01	-																				
1,2,3-Trichloropropane	mg/kg		NONE	NONE		-	-	-	-	<0.016	-	<0.016	-																				
Bromobenzene	mg/kg	(Anup GAC - 1% SOM)	0.91	9.7		-	-	-	-	<0.01	-	<0.01	-																				
Propylbenzene	mg/kg		NONE	NONE		-	-	-	-	<0.01	-	<0.01	-																				
2-Chlorotoluene	mg/kg		NONE	NONE		-	-	-	-	<0.009	-	<0.009	-																				
1,3,5-Trimethylbenzene	mg/kg		NONE	NONE		-	-	-	-	<0.008	-	<0.008	-																				
4-Chlorotoluene	mg/kg		NONE	NONE		-	-	-	-	<0.01	-	<0.01	-																				
tert-Butylbenzene	mg/kg		NONE	NONE		-	-	-	-	<0.014	-	<0.014	-																				
1,2,4-Trimethylbenzene	mg/kg	(Anup GAC - 1% SOM)	0.41	42		-	-	-	-	<0.009	-	<0.009	-																				
sec-Butylbenzene	mg/kg		NONE	NONE		-	-	-	-	<0.01	-	<0.01	-																				
4-Isopropyltoluene	mg/kg		NONE	NONE		-	-	-	-	<0.01	-	<0.01	-																				
1,3-Dichlorobenzene	mg/kg	(LQM 5four - 1% SOM)	0.44	30		-	-	-	-	<0.008	-	<0.008	-																				
1,4-Dichlorobenzene	mg/kg	(LQM 5four - 1% SOM)	61	4400 (224)		-	-	-	-	<0.005	-	<0.005	-																				
n-Butylbenzene	mg/kg		NONE	NONE		-	-	-	-	<0.011	-	<0.011	-																				
1,2-Dichlorobenzene	mg/kg	(LQM 5four - 1% SOM)	24	NONE		-	-	-	-	<0.01	-	<0.01	-																				
1,2-Dibromo-3-chloropropane	mg/kg		NONE	NONE		-	-	-	-	<0.014	-	<0.014	-																				
Tert-amyl methyl ether	mg/kg		NONE	NONE		-	-	-	-	<0.01	-	<0.01	-																				
1,2,4-Trichlorobenzene	mg/kg	(LQM 5four - 1% SOM)	2.6	220		-	-	-	-	<0.02	-	<0.02	-																				
Hexachlorobutadiene	mg/kg		NONE	NONE		-	-	-	-	<0.02	-	<0.02	-																				
Naphthalene	mg/kg	(LQM 5four - 1% SOM)	2.3	190 (76.4)		-	-	-	-	<0.013	-	<0.013	-																				
1,2,3-Trichlorobenzene	mg/kg	(LQM 5four - 1% SOM)	1.5	102		-	-	-	-	<0.02	-	<0.02	-																				
Sum of Detected Xylenes	mg/kg					<0.02	<0.02	-	-	<0.02	-	<0.02	<0.02	<0.4	<0.02	<0.4	<0.02	-	<0.02	<0.2	<0.2	<0.2	<0.02	<0.4	-	<0.4	<0.4	-	-	<0.02	<0.4	-	<0.2
Sum of BTEX	mg/kg					<0.04	<0.04	<0.04	-	<0.04	<0.04	<0.04	<0.04	<0.8	<0.04	<0.8	<0.04	<0.04	<0.04	<0.4	<0.4	<0.4	<0.04	<0.8	<0.8	<0.8	<0.8	-	-	<0.04	<0.8	-	<0.4
Polyaromatic Hydrocarbons (PAH) - (Solids)																																	
PAH Total 17 (inc Coronene) Moisture Corrected	mg/kg					-	<10	-	-	<10	-	-	-	<10	-	<10	-	-	-	-	-	52.3	18.2	-	-	-	-	-	-	-	-	-	-

Above residental screening criteria
Above commerical screening criteria

Soil Leachate Testing Results

Laboratory ID			20122734	20205556	20205559	20184734	20184736	20185407	20185393	20185403	20184741	20184746	20184747	20184751	20184755	20184757
Sample Reference			BH01	BH04	BH05	BH02	BH11	BH3	TP02	TP08	TP09	TP12	TP13	TP17	TP20	TP21
Ground/Sample Description		AA-EQS Inland surface waters (mg/l) SALTWATER 2015	**Made Ground:** Clayey sandy gravel.	**Made ground:** Reddish brown clayey gravelly sand with brick and flint.	**Made ground**: clayey sandy gravel with brick, slate and concrete	**Made ground:** silty clayey sandy gravel. Cobbles, brick, glass, slate and ceramic	**Made ground:** clayey sandy gravel with concrete and brick inclusions	**Made ground:** gravelly sand with brick and slate	**Made ground:** red gravel/sand with slag and clinker	**Made ground:** gravelly clayey sand with brick, ash, shell and flint	**Made ground:** gravelly sand with tarmac	**Made ground:** Grey brown silty clayey gravelly sand.	**TOPSOIL:** clay	**Made ground:** Orange cobbles with brick, tile	**Made ground:** Gravel with iron slag	**Made ground:** sandy gravel with clinker and chert
Date Sampled			05/06/2019	18/06/2019	20/06/2019	10/06/2019	10/06/2019	-	-	-	-	-	-	-	-	-
AGS ID			ES 3	ES 2	ES 2	-	-	-	-	-	-	-	-	-	-	-
Sample Depth			2.20-2.20	1	1	1.00-1.00	2.00-2.00	1.20-	0.20-	0.30-	0.60-0.60	0.60-0.60	0.30-0.30	0.40-0.40	0.40-0.40	0.30-0.30
Leach test information																
Eluate Analysis																
Antimony	mg/l	nc		0.0034735	0.0039769	0.0119602	<0.001	-	-	0.0151826	0.0038729	-	-	-	-	-
Arsenic	**mg/l**	**0.025**	0.00184	0.1735736	0.0034357	0.0207149	0.0156626	0.00514	0.104	0.0492294	0.012534	0.00174	0.00592	0.0214	0.0226	0.0356
Barium	mg/l	nc		0.0210882	0.0058655	0.0101795	0.0204171	-	-	0.0220967	0.0193165	-	-	-	-	-
Cadmium	mg/l	0.0002	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.000089	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
Chromium	mg/l	nc	<0.001	0.0043638	<0.001	<0.001	<0.001	0.00107	<0.001	0.0032197	0.0012652	0.00293	<0.001	0.00194	0.00367	0.0527
Copper	mg/l	nc	0.00405	0.0040551	0.0044844	0.0038744	0.005062	0.00456	0.00775	0.0138665	0.00269	0.0123	0.0144	0.00611	0.00952	0.00913
Mercury	mg/l	0.00007	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.0000287	<0.00001	0.0000191	0.0000229	<0.00001	<0.00001	<0.00001
Molybdenum	mg/l	nc	-	0.0074552	<0.003	0.0032988	0.0061521	-	-	0.0067824	0.008306	-	-	-	-	-
Nickel	mg/l	0.0086	0.00143	<0.0004	<0.0004	0.0004644	<0.0004	0.000536	0.000775	0.0004556	<0.0004	0.00108	0.00166	0.000664	<0.0004	0.000485
Lead	**mg/l**	**0.0013**	<0.0002	0.0002399	<0.0002	0.0003927	0.0008764	<0.0002	0.0208	0.0009774	<0.0002	0.000436	<0.0002	0.000561	<0.0002	0.000402
Selenium	mg/l	nc	0.00435	<0.001	<0.001	<0.001	<0.001	0.00147	0.00158	0.0013968	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	**mg/l**	**0.0079**	0.00266	0.0016892	0.0017375	<0.001	<0.001	0.0027	0.00989	0.0022703	0.0012151	0.00246	0.00603	0.00278	<0.001	<0.001
Napthalene	mg/l	0.002	<0.00001			-	-	<0.00002	0.0000249	-	-	0.0000355	<0.00002	<0.00001	<0.00001	<0.00001
Acenapthene	mg/l	nc	<0.000005			-	-	<0.00001	0.000266	-	-	0.0000219	<0.00001	<0.000005	<0.000005	0.0000105
Acenaphthylene	mg/l	nc	<0.000005			-	-	<0.00001	0.0000225	-	-	<0.00001	<0.00001	<0.000005	0.0000085	0.0000076
Fluoranthene	**mg/l**	**0.0000063**	0.0000396			-	-	0.0000176	0.000402	-	-	0.0000721	0.0000337	0.0000657	0.0000744	0.000141
Anthracene	mg/l	0.0001	<0.000005			-	-	<0.00001	0.0000789	-	-	0.0000129	<0.00001	0.0000107	0.00001	0.0000244
Phenanthrene	**mg/l**	**nc**	0.0000201			-	-	0.0000205	0.0000135	-	-	0.000061	0.0000295	0.0000348	0.0000302	0.0001
Fluorene	mg/l	nc	<0.000005			-	-	<0.00001	0.0000869	-	-	0.0000132	<0.00001	0.00000857	<0.000005	0.0000103
Chrysene	**mg/l**	**nc**	0.00000683			-	-	<0.00001	0.0000688	-	-	<0.00001	<0.00001	<0.000005	0.000024	0.0000345
Pyrene	**mg/l**	**nc**	0.0000312			-	-	0.000013	0.000267	-	-	0.0000579	0.0000243	0.0000526	0.0000567	0.000109
Benzo(a)anthracene	mg/l	nc	<0.000005			-	-	0.0000104	0.0000554	-	-	<0.00001	<0.00001	<0.000005	0.0000102	0.0000161
Benzo(b)fluoranthene	**mg/l**	**0.000017**	<0.000005			-	-	<0.00001	0.000117	-	-	0.0000231	<0.00001	0.0000131	0.0000571	0.0000745
Benzo(k)fluoranthene	**mg/l**	**0.000017**	<0.000005			-	-	<0.00001	0.0000053	-	-	<0.00001	<0.00001	0.00000585	0.0000278	0.0000293
Benzo(a)pyrene	**mg/l**	**0.00000017**	<0.000002			-	-	<0.000004	0.0000785	-	-	0.0000117	<0.000004	0.00000563	0.0000453	0.0000522
Dibenzo(a,h)anthracene	**mg/l**	**nc**	<0.000005			-	-	<0.00001	0.0000327	-	-	<0.00001	<0.00001	<0.000005	0.0000154	0.0000134
Benzo(g,h,i)perylene	**mg/l**	**0.00000082**	<0.000005			-	-	<0.00001	0.0000606	-	-	<0.00001	<0.00001	<0.000005	0.0000618	0.0000374
Indeno(1,2,3-cd)pyrene	**mg/l**	**nc**	<0.000005			-	-	<0.00001	0.0000756	-	-	0.0000134	<0.00001	<0.000005	0.0000459	0.0000399
PAH Sum of EPA 16 detected	**mg/l**	**nc**	0.0000977			-	-	<0.000164	0.0017	-	-	0.000323	<0.000164	0.000197	0.000467	0.0007
	mg/l															
Chloride	mg/l	N/A		45.6	2	151.3	710.4	-	-	9.9	7.5	-	-	-	-	-
Fluoride	mg/l	nc	-	3.466	<0.5	0.849	0.721	-	-	0.614	1.085	-	-	-	-	-
Sulphate	mg/l	nc	149	14.4	2.6	35.5	124.1	195	50.9	11.4	4.5	-	-	-	-	-
TDS	mg/l		-	244	78	526	1844	-	-	137.2	116.5	-	-	-	-	-
Phenol Index (Monohydric Phenols)	**mg/l**	**0.0077**	<0.002	<0.016	<0.016	<0.016	<0.016	<0.002	<0.002	0.02	<0.016	<0.002	<0.002	<0.002	<0.002	<0.002
DOC	mg/l		-	3.607	3.603	3.363	<3	-	-	4.085	<3	-	-	-	-	-
pH	pH units		9.04	8.374	8.799	7.669	7.72	8.74	5.64	8.677	7.624	8.43	7.83	8.26	8.35	9.14

Exceedance in EQS

Concentration > LOD

Appendix C

HazWasteOnline

ARUP

HazWasteOnline™

Waste Classification Report

T2M5V-QMWW7-7CPE6

Job name

Mumbles Sea Defence October 2019

Description/Comments

Project

Site

Mumbles Swansea

Related Documents

#	Name	Description
None		

Waste Stream Template

Example waste stream template for contaminated soils

Classified by

Name:
Victoria MeGraw
Date:
29 Oct 2019 22:30 GMT
Telephone:
029 2976 9028

Company:
Ove Arup & Partners International Ltd
4 Pierhead Street
Capital Waterside
Cardiff
CF10 4QP

Report

Created by: Victoria MeGraw
Created date: 29 Oct 2019 22:30 GMT

Job summary

Classification of sample: BH01

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
BH01
Sample Depth:
2.20-2.20 m
Moisture content:
10%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 10% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		0.711 mg/kg	1.197	0.851 mg/kg	0.0000851 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		21.2 mg/kg	1.32	27.991 mg/kg	0.0028 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.643 mg/kg	2.775	1.785 mg/kg	0.000178 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		8.78 mg/kg	3.22	28.271 mg/kg	0.00283 %		
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.867 mg/kg	1.142	0.99 mg/kg	0.000099 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		0.946 mg/kg	1.462	1.383 mg/kg	0.000138 %		
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		27.7 mg/kg	1.126	31.187 mg/kg	0.00312 %		
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	82.6 mg/kg		82.6 mg/kg	0.00826 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<LOD
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		33.7 mg/kg	2.976	100.3 mg/kg	0.01 %		
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
12	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		154 mg/kg	1.245	191.686 mg/kg	0.0192 %		
13	TPH (C6 to C40) petroleum group			TPH		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
14	benzene	601-020-00-8	200-753-7	71-43-2		<0.009 mg/kg		<0.009 mg/kg	<0.0000009 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
16		ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
17		xylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
19		pH				9.19	pH		9.19	pH	9.19 pH		
				PH									
20		naphthalene				0.0112	mg/kg		0.0112	mg/kg	0.00000112 %		
		601-052-00-2	202-049-5	91-20-3									
21		acenaphthylene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
			205-917-1	208-96-8									
22		acenaphthene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
			201-469-6	83-32-9									
23		fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
24		phenanthrene				0.0741	mg/kg		0.0741	mg/kg	0.00000741 %		
			201-581-5	85-01-8									
25		anthracene				<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		<LOD
			204-371-1	120-12-7									
26		fluoranthene				0.0488	mg/kg		0.0488	mg/kg	0.00000488 %		
			205-912-4	206-44-0									
27		pyrene				0.0382	mg/kg		0.0382	mg/kg	0.00000382 %		
			204-927-3	129-00-0									
28		benzo[a]anthracene				0.0178	mg/kg		0.0178	mg/kg	0.00000178 %		
		601-033-00-9	200-280-6	56-55-3									
29		chrysene				0.0346	mg/kg		0.0346	mg/kg	0.00000346 %		
		601-048-00-0	205-923-4	218-01-9									
30		benzo[b]fluoranthene				0.0294	mg/kg		0.0294	mg/kg	0.00000294 %		
		601-034-00-4	205-911-9	205-99-2									
31		benzo[k]fluoranthene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
32		benzo[a]pyrene; benzo[def]chrysene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
33		indeno[123-cd]pyrene				<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		<LOD
			205-893-2	193-39-5									
34		dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
35		benzo[ghi]perylene				<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		<LOD
			205-883-8	191-24-2									
36		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0472 %		

Key

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

Classification of sample: BH04

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
BH04
Sample Depth:
1.00 m
Moisture content:
10%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 10% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		4.03	mg/kg	1.197	4.824	mg/kg	0.000482 %		
2		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		80.5	mg/kg	1.32	106.286	mg/kg	0.0106 %		
3		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.697	mg/kg	2.775	1.934	mg/kg	0.000193 %		
4		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1	mg/kg	3.22	<3.22	mg/kg	<0.000322 %		<**LOD**
5		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.02	mg/kg	1.142	<0.0228	mg/kg	<0.00000228 %		<**LOD**
6		chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		<0.9	mg/kg	1.462	<1.315	mg/kg	<0.000132 %		<**LOD**
7		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		19.9	mg/kg	1.126	22.405	mg/kg	0.00224 %		
8		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	49.8	mg/kg		49.8	mg/kg	0.00498 %		
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14	mg/kg	1.353	<0.189	mg/kg	<0.0000189 %		<**LOD**
10		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		14.6	mg/kg	2.976	43.453	mg/kg	0.00435 %		
11		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<**LOD**
12		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		138	mg/kg	1.245	171.771	mg/kg	0.0172 %		
13		TPH (C6 to C40) petroleum group			TPH		14.4	mg/kg		14.4	mg/kg	0.00144 %		
14		benzene	601-020-00-8	200-753-7	71-43-2		<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
16		ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
17		xylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
19		pH				9.09	pH		9.09	pH	9.09 pH		
				PH									
20		naphthalene				0.0178	mg/kg		0.0178	mg/kg	0.00000178 %		
		601-052-00-2	202-049-5	91-20-3									
21		acenaphthylene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
			205-917-1	208-96-8									
22		acenaphthene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
			201-469-6	83-32-9									
23		fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
24		phenanthrene				0.115	mg/kg		0.115	mg/kg	0.0000115 %		
			201-581-5	85-01-8									
25		anthracene				0.0281	mg/kg		0.0281	mg/kg	0.00000281 %		
			204-371-1	120-12-7									
26		fluoranthene				0.197	mg/kg		0.197	mg/kg	0.0000197 %		
			205-912-4	206-44-0									
27		pyrene				0.171	mg/kg		0.171	mg/kg	0.0000171 %		
			204-927-3	129-00-0									
28		benzo[a]anthracene				0.0922	mg/kg		0.0922	mg/kg	0.00000922 %		
		601-033-00-9	200-280-6	56-55-3									
29		chrysene				0.104	mg/kg		0.104	mg/kg	0.0000104 %		
		601-048-00-0	205-923-4	218-01-9									
30		benzo[b]fluoranthene				0.0742	mg/kg		0.0742	mg/kg	0.00000742 %		
		601-034-00-4	205-911-9	205-99-2									
31		benzo[k]fluoranthene				0.0513	mg/kg		0.0513	mg/kg	0.00000513 %		
		601-036-00-5	205-916-6	207-08-9									
32		benzo[a]pyrene; benzo[def]chrysene				0.0871	mg/kg		0.0871	mg/kg	0.00000871 %		
		601-032-00-3	200-028-5	50-32-8									
33		indeno[123-cd]pyrene				0.0484	mg/kg		0.0484	mg/kg	0.00000484 %		
			205-893-2	193-39-5									
34		dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
35		benzo[ghi]perylene				0.0621	mg/kg		0.0621	mg/kg	0.00000621 %		
			205-883-8	191-24-2									
36		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
37		polychlorobiphenyls; PCB				<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.0425 %		

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00144%)

Classification of sample: BH04 Natrual

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
BH04 Natrual
Sample Depth:
5.50 m
Moisture content:
12%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 12% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		1.01	mg/kg	1.197	1.209	mg/kg	0.000121 %		
2		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		9.74	mg/kg	1.32	12.86	mg/kg	0.00129 %		
3		beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.471	mg/kg	2.775	1.307	mg/kg	0.000131 %		
4		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		7.27	mg/kg	3.22	23.409	mg/kg	0.00234 %		
5		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.0424	mg/kg	1.142	0.0484	mg/kg	0.00000484 %		
6		chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		5.19	mg/kg	1.462	7.585	mg/kg	0.000759 %		
7		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.6	mg/kg	1.923	<1.154	mg/kg	<0.000115 %		<LOD
8		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		18.4	mg/kg	1.126	20.716	mg/kg	0.00207 %		
9		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	17.2	mg/kg		17.2	mg/kg	0.00172 %		
10		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14	mg/kg	1.353	<0.189	mg/kg	<0.0000189 %		<LOD
11		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		26.3	mg/kg	2.976	78.276	mg/kg	0.00783 %		
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
13		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		79	mg/kg	1.245	98.332	mg/kg	0.00983 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		TPH (C6 to C40) petroleum group		TPH		<35	mg/kg		<35	mg/kg	<0.0035 %		<**LOD**
15		benzene											
		601-020-00-8	200-753-7	71-43-2		<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<**LOD**
16		toluene											
		601-021-00-3	203-625-9	108-88-3		<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<**LOD**
17		ethylbenzene											
		601-023-00-4	202-849-4	100-41-4		<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<**LOD**
18		xylene											
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
19		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<**LOD**
		006-007-00-5											
20		pH		PH		8.47	pH		8.47	pH	8.47 pH		
21		phenol											
		604-001-00-2	203-632-7	108-95-2		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
										Total:	0.0302 %		

Key

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

Classification of sample: BH05

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
BH05
Sample Depth:
0.30 m
Moisture content:
13.4%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 13.4% No Moisture Correction applied (MC)

#	Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number / EC Number / CAS Number							
1	antimony { antimony trioxide }		0.722 mg/kg	1.197	0.864 mg/kg	0.0000864 %		
	051-005-00-X / 215-175-0 / 1309-64-4							
2	arsenic { arsenic trioxide }		13.7 mg/kg	1.32	18.088 mg/kg	0.00181 %		
	033-003-00-0 / 215-481-4 / 1327-53-3							
3	beryllium { beryllium oxide }		0.224 mg/kg	2.775	0.622 mg/kg	0.0000622 %		
	004-003-00-8 / 215-133-1 / 1304-56-9							
4	boron { diboron trioxide; boric oxide }		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<**LOD**
	005-008-00-8 / 215-125-8 / 1303-86-2							
5	cadmium { cadmium oxide }		0.243 mg/kg	1.142	0.278 mg/kg	0.0000278 %		
	048-002-00-0 / 215-146-2 / 1306-19-0							
6	chromium in chromium(III) compounds { chromium(III) oxide }		3.68 mg/kg	1.462	5.379 mg/kg	0.000538 %		
	/ 215-160-9 / 1308-38-9							
7	copper { dicopper oxide; copper (I) oxide }		82.2 mg/kg	1.126	92.548 mg/kg	0.00925 %		
	029-002-00-X / 215-270-7 / 1317-39-1							
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	1	52.8 mg/kg		52.8 mg/kg	0.00528 %		
	082-001-00-6							
9	mercury { mercury dichloride }		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<**LOD**
	080-010-00-X / 231-299-8 / 7487-94-7							
10	nickel { nickel chromate }		11.2 mg/kg	2.976	33.334 mg/kg	0.00333 %		
	028-035-00-7 / 238-766-5 / 14721-18-7							
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<**LOD**
	034-002-00-8							
12	zinc { zinc oxide }		77.9 mg/kg	1.245	96.963 mg/kg	0.0097 %		
	030-013-00-7 / 215-222-5 / 1314-13-2							

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
13		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<**LOD**
		006-007-00-5									
14		pH				8.69 pH		8.69 pH	8.69 pH		
				PH							
15		phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2							
								Total:	0.0309 %		

Key

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

Classification of sample: BH05 [2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
BH05 [2]
Sample Depth:
1.00 m
Moisture content:
13%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 13% No Moisture Correction applied (MC)

#	Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number / EC Number / CAS Number							
1	antimony { antimony trioxide }		0.741 mg/kg	1.197	0.887 mg/kg	0.0000887 %		
	051-005-00-X / 215-175-0 / 1309-64-4							
2	arsenic { arsenic trioxide }		8.48 mg/kg	1.32	11.196 mg/kg	0.00112 %		
	033-003-00-0 / 215-481-4 / 1327-53-3							
3	beryllium { beryllium oxide }		0.37 mg/kg	2.775	1.027 mg/kg	0.000103 %		
	004-003-00-8 / 215-133-1 / 1304-56-9							
4	boron { diboron trioxide; boric oxide }		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<**LOD**
	005-008-00-8 / 215-125-8 / 1303-86-2							
5	cadmium { cadmium oxide }		0.0871 mg/kg	1.142	0.0995 mg/kg	0.00000995 %		
	048-002-00-0 / 215-146-2 / 1306-19-0							
6	chromium in chromium(III) compounds { chromium(III) oxide }		4.7 mg/kg	1.462	6.869 mg/kg	0.000687 %		
	/ 215-160-9 / 1308-38-9							
7	copper { dicopper oxide; copper (I) oxide }		10.1 mg/kg	1.126	11.371 mg/kg	0.00114 %		
	029-002-00-X / 215-270-7 / 1317-39-1							
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	1	23.4 mg/kg		23.4 mg/kg	0.00234 %		
	082-001-00-6 / /							
9	mercury { mercury dichloride }		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<**LOD**
	080-010-00-X / 231-299-8 / 7487-94-7							
10	nickel { nickel chromate }		6.2 mg/kg	2.976	18.453 mg/kg	0.00185 %		
	028-035-00-7 / 238-766-5 / 14721-18-7							
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<**LOD**
	034-002-00-8 / /							
12	zinc { zinc oxide }		86.8 mg/kg	1.245	108.041 mg/kg	0.0108 %		
	030-013-00-7 / 215-222-5 / 1314-13-2							
13	TPH (C6 to C40) petroleum group		2.12 mg/kg		2.12 mg/kg	0.000212 %		
	/ / TPH							
14	benzene		<0.009 mg/kg		<0.009 mg/kg	<0.0000009 %		<**LOD**
	601-020-00-8 / 200-753-7 / 71-43-2							

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
16		ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
17		xylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
19		pH				9.2	pH		9.2	pH	9.2 pH		
				PH									
20		naphthalene				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
21		acenaphthylene				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
			205-917-1	208-96-8									
22		acenaphthene				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
			201-469-6	83-32-9									
23		fluorene				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
			201-695-5	86-73-7									
24		phenanthrene				1.43	mg/kg		1.43	mg/kg	0.000143 %		
			201-581-5	85-01-8									
25		anthracene				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
			204-371-1	120-12-7									
26		fluoranthene				1.88	mg/kg		1.88	mg/kg	0.000188 %		
			205-912-4	206-44-0									
27		pyrene				1.63	mg/kg		1.63	mg/kg	0.000163 %		
			204-927-3	129-00-0									
28		benzo[a]anthracene				0.864	mg/kg		0.864	mg/kg	0.0000864 %		
		601-033-00-9	200-280-6	56-55-3									
29		chrysene				1.32	mg/kg		1.32	mg/kg	0.000132 %		
		601-048-00-0	205-923-4	218-01-9									
30		benzo[b]fluoranthene				0.553	mg/kg		0.553	mg/kg	0.0000553 %		
		601-034-00-4	205-911-9	205-99-2									
31		benzo[k]fluoranthene				0.728	mg/kg		0.728	mg/kg	0.0000728 %		
		601-036-00-5	205-916-6	207-08-9									
32		benzo[a]pyrene; benzo[def]chrysene				0.591	mg/kg		0.591	mg/kg	0.0000591 %		
		601-032-00-3	200-028-5	50-32-8									
33		dibenz[a,h]anthracene				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
34		benzo[ghi]perylene				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
			205-883-8	191-24-2									
35		phenol				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
36		polychlorobiphenyls; PCB				<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.0204 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00021%)

Classification of sample: BH05 Natrual

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
BH05 Natrual
Sample Depth:
5.00 m
Moisture content:
13.4%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 13.4% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<0.6 mg/kg	1.197	<0.718 mg/kg	<0.0000718 %		<**LOD**
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		15.9 mg/kg	1.32	20.993 mg/kg	0.0021 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.261 mg/kg	2.775	0.724 mg/kg	0.0000724 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		13 mg/kg	3.22	41.858 mg/kg	0.00419 %		
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.148 mg/kg	1.142	0.169 mg/kg	0.0000169 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		5.67 mg/kg	1.462	8.287 mg/kg	0.000829 %		
7	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<**LOD**
8	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		31.5 mg/kg	1.126	35.465 mg/kg	0.00355 %		
9	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	32.7 mg/kg		32.7 mg/kg	0.00327 %		
10	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<**LOD**
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		10.5 mg/kg	2.976	31.251 mg/kg	0.00313 %		
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<**LOD**
13	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		81.7 mg/kg	1.245	101.693 mg/kg	0.0102 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		TPH (C6 to C40) petroleum group		TPH		160	mg/kg		160	mg/kg	0.016 %		
15		benzene											
		601-020-00-8	200-753-7	71-43-2		<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<**LOD**
16		toluene											
		601-021-00-3	203-625-9	108-88-3		<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<**LOD**
17		ethylbenzene											
		601-023-00-4	202-849-4	100-41-4		<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<**LOD**
18		xylene											
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
19		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<**LOD**
		006-007-00-5											
20		pH		PH		8.73	pH		8.73	pH	8.73 pH		
21		phenol											
		604-001-00-2	203-632-7	108-95-2		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
										Total:	0.044 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.016%)

Classification of sample: BH06

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
BH06
Sample Depth:
0.80 m
Moisture content:
13.4%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 13.4% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		3.89 mg/kg	1.197	4.657 mg/kg	0.000466 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		43.6 mg/kg	1.32	57.566 mg/kg	0.00576 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.723 mg/kg	2.775	2.007 mg/kg	0.000201 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<**LOD**
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.267 mg/kg	1.142	0.305 mg/kg	0.0000305 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		6.46 mg/kg	1.462	9.442 mg/kg	0.000944 %		
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		38 mg/kg	1.126	42.784 mg/kg	0.00428 %		
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	234 mg/kg		234 mg/kg	0.0234 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<**LOD**
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		9.2 mg/kg	2.976	27.382 mg/kg	0.00274 %		
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<**LOD**
12	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		539 mg/kg	1.245	670.901 mg/kg	0.0671 %		
13	TPH (C6 to C40) petroleum group			TPH		49.8 mg/kg		49.8 mg/kg	0.00498 %		
14	benzene	601-020-00-8	200-753-7	71-43-2		<0.009 mg/kg		<0.009 mg/kg	<0.0000009 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
16		ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
17		xylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
19		pH				9.42	pH		9.42	pH	9.42 pH		
				PH									
20		naphthalene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
21		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-917-1	208-96-8									
22		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-469-6	83-32-9									
23		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-695-5	86-73-7									
24		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-581-5	85-01-8									
25		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			204-371-1	120-12-7									
26		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-912-4	206-44-0									
27		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			204-927-3	129-00-0									
28		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
29		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
30		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
31		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
32		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
33		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
34		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-883-8	191-24-2									
35		phenol				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.111 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00498%)

Classification of sample: BH12

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
BH12
Sample Depth:
1.20-1.20 m
Moisture content:
11.6%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 11.6% No Moisture Correction applied (MC)

#	Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number / EC Number / CAS Number							
1	antimony { antimony trioxide }		1.35 mg/kg	1.197	1.616 mg/kg	0.000162 %		
	051-005-00-X / 215-175-0 / 1309-64-4							
2	arsenic { arsenic trioxide }		12.5 mg/kg	1.32	16.504 mg/kg	0.00165 %		
	033-003-00-0 / 215-481-4 / 1327-53-3							
3	beryllium { beryllium oxide }		0.757 mg/kg	2.775	2.101 mg/kg	0.00021 %		
	004-003-00-8 / 215-133-1 / 1304-56-9							
4	boron { diboron trioxide; boric oxide }		6.02 mg/kg	3.22	19.384 mg/kg	0.00194 %		
	005-008-00-8 / 215-125-8 / 1303-86-2							
5	cadmium { cadmium oxide }		0.431 mg/kg	1.142	0.492 mg/kg	0.0000492 %		
	048-002-00-0 / 215-146-2 / 1306-19-0							
6	chromium in chromium(III) compounds { chromium(III) oxide }		14.2 mg/kg	1.462	20.754 mg/kg	0.00208 %		
	/ 215-160-9 / 1308-38-9							
7	copper { dicopper oxide; copper (I) oxide }		52.3 mg/kg	1.126	58.884 mg/kg	0.00589 %		
	029-002-00-X / 215-270-7 / 1317-39-1							
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	1	126 mg/kg		126 mg/kg	0.0126 %		
	082-001-00-6 / /							
9	mercury { mercury dichloride }		0.885 mg/kg	1.353	1.198 mg/kg	0.00012 %		
	080-010-00-X / 231-299-8 / 7487-94-7							
10	nickel { nickel chromate }		20.4 mg/kg	2.976	60.716 mg/kg	0.00607 %		
	028-035-00-7 / 238-766-5 / 14721-18-7							
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
	034-002-00-8 / /							
12	zinc { zinc oxide }		269 mg/kg	1.245	334.828 mg/kg	0.0335 %		
	030-013-00-7 / 215-222-5 / 1314-13-2							
13	TPH (C6 to C40) petroleum group		179 mg/kg		179 mg/kg	0.0179 %		
	/ / TPH							
14	benzene		<0.009 mg/kg		<0.009 mg/kg	<0.0000009 %		<LOD
	601-020-00-8 / 200-753-7 / 71-43-2							

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
16		ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
17		xylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
19		pH				9.31	pH		9.31	pH	9.31 pH		
				PH									
20		naphthalene				<0.09	mg/kg		<0.09	mg/kg	<0.000009 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
21		acenaphthylene				<0.08	mg/kg		<0.08	mg/kg	<0.000008 %		<LOD
			205-917-1	208-96-8									
22		acenaphthene				0.153	mg/kg		0.153	mg/kg	0.0000153 %		
			201-469-6	83-32-9									
23		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-695-5	86-73-7									
24		phenanthrene				1.19	mg/kg		1.19	mg/kg	0.000119 %		
			201-581-5	85-01-8									
25		anthracene				0.435	mg/kg		0.435	mg/kg	0.0000435 %		
			204-371-1	120-12-7									
26		fluoranthene				3.41	mg/kg		3.41	mg/kg	0.000341 %		
			205-912-4	206-44-0									
27		pyrene				2.91	mg/kg		2.91	mg/kg	0.000291 %		
			204-927-3	129-00-0									
28		benzo[a]anthracene				1.92	mg/kg		1.92	mg/kg	0.000192 %		
		601-033-00-9	200-280-6	56-55-3									
29		chrysene				1.61	mg/kg		1.61	mg/kg	0.000161 %		
		601-048-00-0	205-923-4	218-01-9									
30		benzo[b]fluoranthene				2.29	mg/kg		2.29	mg/kg	0.000229 %		
		601-034-00-4	205-911-9	205-99-2									
31		benzo[k]fluoranthene				0.925	mg/kg		0.925	mg/kg	0.0000925 %		
		601-036-00-5	205-916-6	207-08-9									
32		benzo[a]pyrene; benzo[def]chrysene				1.62	mg/kg		1.62	mg/kg	0.000162 %		
		601-032-00-3	200-028-5	50-32-8									
33		indeno[123-cd]pyrene				1.18	mg/kg		1.18	mg/kg	0.000118 %		
			205-893-2	193-39-5									
34		dibenz[a,h]anthracene				<0.23	mg/kg		<0.23	mg/kg	<0.000023 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
35		benzo[ghi]perylene				0.747	mg/kg		0.747	mg/kg	0.0000747 %		
			205-883-8	191-24-2									
36		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0845 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0179%)

Classification of sample: BH02

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
BH02
Sample Depth:
1.00-1.00 m
Moisture content:
13%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 13% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		1.75 mg/kg	1.197	2.095 mg/kg	0.000209 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		23.4 mg/kg	1.32	30.896 mg/kg	0.00309 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.357 mg/kg	2.775	0.991 mg/kg	0.0000991 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		1.55 mg/kg	3.22	4.991 mg/kg	0.000499 %		
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.814 mg/kg	1.142	0.93 mg/kg	0.000093 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		2.74 mg/kg	1.462	4.005 mg/kg	0.0004 %		
7	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<**LOD**
8	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		52.3 mg/kg	1.126	58.884 mg/kg	0.00589 %		
9	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	72.7 mg/kg		72.7 mg/kg	0.00727 %		
10	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<**LOD**
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		31.8 mg/kg	2.976	94.645 mg/kg	0.00946 %		
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<**LOD**
13	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		160 mg/kg	1.245	199.154 mg/kg	0.0199 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		TPH (C6 to C40) petroleum group				15.1	mg/kg		15.1	mg/kg	0.00151 %		
				TPH									
15		benzene				<0.18	mg/kg		<0.18	mg/kg	<0.000018 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
16		toluene				<0.14	mg/kg		<0.14	mg/kg	<0.000014 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
17		ethylbenzene				<0.08	mg/kg		<0.08	mg/kg	<0.000008 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
18		xylene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
19		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
20		pH				9.51	pH		9.51	pH	9.51 pH		
				PH									
21		naphthalene				0.0206	mg/kg		0.0206	mg/kg	0.00000206 %		
		601-052-00-2	202-049-5	91-20-3									
22		acenaphthylene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
			205-917-1	208-96-8									
23		acenaphthene				0.108	mg/kg		0.108	mg/kg	0.0000108 %		
			201-469-6	83-32-9									
24		fluorene				0.0385	mg/kg		0.0385	mg/kg	0.00000385 %		
			201-695-5	86-73-7									
25		phenanthrene				1.28	mg/kg		1.28	mg/kg	0.000128 %		
			201-581-5	85-01-8									
26		anthracene				0.126	mg/kg		0.126	mg/kg	0.0000126 %		
			204-371-1	120-12-7									
27		fluoranthene				2.18	mg/kg		2.18	mg/kg	0.000218 %		
			205-912-4	206-44-0									
28		pyrene				1.7	mg/kg		1.7	mg/kg	0.00017 %		
			204-927-3	129-00-0									
29		benzo[a]anthracene				0.732	mg/kg		0.732	mg/kg	0.0000732 %		
		601-033-00-9	200-280-6	56-55-3									
30		chrysene				0.777	mg/kg		0.777	mg/kg	0.0000777 %		
		601-048-00-0	205-923-4	218-01-9									
31		benzo[b]fluoranthene				0.69	mg/kg		0.69	mg/kg	0.000069 %		
		601-034-00-4	205-911-9	205-99-2									
32		benzo[k]fluoranthene				0.336	mg/kg		0.336	mg/kg	0.0000336 %		
		601-036-00-5	205-916-6	207-08-9									
33		benzo[a]pyrene; benzo[def]chrysene				0.676	mg/kg		0.676	mg/kg	0.0000676 %		
		601-032-00-3	200-028-5	50-32-8									
34		indeno[123-cd]pyrene				0.448	mg/kg		0.448	mg/kg	0.0000448 %		
			205-893-2	193-39-5									
35		dibenz[a,h]anthracene				0.0714	mg/kg		0.0714	mg/kg	0.00000714 %		
		601-041-00-2	200-181-8	53-70-3									
36		benzo[ghi]perylene				0.456	mg/kg		0.456	mg/kg	0.0000456 %		
			205-883-8	191-24-2									
37		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
38		polychlorobiphenyls; PCB				<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.05 %		

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00151%)

Classification of sample: BH10

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
BH10
Sample Depth:
1.00 m
Moisture content:
12%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 12% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<0.6 mg/kg	1.197	<0.718 mg/kg	<0.0000718 %		<LOD
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		9.79 mg/kg	1.32	12.926 mg/kg	0.00129 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.357 mg/kg	2.775	0.991 mg/kg	0.0000991 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<LOD
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.295 mg/kg	1.142	0.337 mg/kg	0.0000337 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		5.14 mg/kg	1.462	7.512 mg/kg	0.000751 %		
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		9.87 mg/kg	1.126	11.113 mg/kg	0.00111 %		
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	20.7 mg/kg		20.7 mg/kg	0.00207 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<LOD
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		10.7 mg/kg	2.976	31.846 mg/kg	0.00318 %		
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
12	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		40.6 mg/kg	1.245	50.535 mg/kg	0.00505 %		
13	TPH (C6 to C40) petroleum group			TPH		350 mg/kg		350 mg/kg	0.035 %		
14	benzene	601-020-00-8	200-753-7	71-43-2		<0.009 mg/kg		<0.009 mg/kg	<0.0000009 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
16		ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
17		xylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
19		pH				9.66	pH		9.66	pH	9.66 pH		
				PH									
20		naphthalene				0.528	mg/kg		0.528	mg/kg	0.0000528 %		
		601-052-00-2	202-049-5	91-20-3									
21		acenaphthylene				0.833	mg/kg		0.833	mg/kg	0.0000833 %		
			205-917-1	208-96-8									
22		acenaphthene				0.0201	mg/kg		0.0201	mg/kg	0.00000201 %		
			201-469-6	83-32-9									
23		fluorene				0.536	mg/kg		0.536	mg/kg	0.0000536 %		
			201-695-5	86-73-7									
24		phenanthrene				8.27	mg/kg		8.27	mg/kg	0.000827 %		
			201-581-5	85-01-8									
25		anthracene				0.933	mg/kg		0.933	mg/kg	0.0000933 %		
			204-371-1	120-12-7									
26		fluoranthene				9.93	mg/kg		9.93	mg/kg	0.000993 %		
			205-912-4	206-44-0									
27		pyrene				8.46	mg/kg		8.46	mg/kg	0.000846 %		
			204-927-3	129-00-0									
28		benzo[a]anthracene				4.43	mg/kg		4.43	mg/kg	0.000443 %		
		601-033-00-9	200-280-6	56-55-3									
29		chrysene				4.24	mg/kg		4.24	mg/kg	0.000424 %		
		601-048-00-0	205-923-4	218-01-9									
30		benzo[b]fluoranthene				4.05	mg/kg		4.05	mg/kg	0.000405 %		
		601-034-00-4	205-911-9	205-99-2									
31		benzo[k]fluoranthene				2.06	mg/kg		2.06	mg/kg	0.000206 %		
		601-036-00-5	205-916-6	207-08-9									
32		benzo[a]pyrene; benzo[def]chrysene				4.03	mg/kg		4.03	mg/kg	0.000403 %		
		601-032-00-3	200-028-5	50-32-8									
33		indeno[123-cd]pyrene				2.44	mg/kg		2.44	mg/kg	0.000244 %		
			205-893-2	193-39-5									
34		dibenz[a,h]anthracene				0.496	mg/kg		0.496	mg/kg	0.0000496 %		
		601-041-00-2	200-181-8	53-70-3									
35		benzo[ghi]perylene				2.22	mg/kg		2.22	mg/kg	0.000222 %		
			205-883-8	191-24-2									
36		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0548 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.035%)

Classification of sample: BH11

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
BH11
Sample Depth:
2.00-2.00 m
Moisture content:
5.9%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 5.9% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		0.659 mg/kg	1.197	0.789 mg/kg	0.0000789 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		25.1 mg/kg	1.32	33.14 mg/kg	0.00331 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.933 mg/kg	2.775	2.589 mg/kg	0.000259 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		2.05 mg/kg	3.22	6.601 mg/kg	0.00066 %		
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.414 mg/kg	1.142	0.473 mg/kg	0.0000473 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		3.68 mg/kg	1.462	5.379 mg/kg	0.000538 %		
7	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
8	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		31.9 mg/kg	1.126	35.916 mg/kg	0.00359 %		
9	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	128 mg/kg		128 mg/kg	0.0128 %		
10	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<LOD
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		14.2 mg/kg	2.976	42.263 mg/kg	0.00423 %		
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
13	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		91.6 mg/kg	1.245	114.016 mg/kg	0.0114 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		TPH (C6 to C40) petroleum group				35.4	mg/kg		35.4	mg/kg	0.00354 %		
				TPH									
15		benzene				<0.18	mg/kg		<0.18	mg/kg	<0.000018 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
16		toluene				<0.14	mg/kg		<0.14	mg/kg	<0.000014 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
17		ethylbenzene				<0.08	mg/kg		<0.08	mg/kg	<0.000008 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
18		xylene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
19		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
20		pH				9.23	pH		9.23	pH	9.23 pH		
				PH									
21		naphthalene				<0.045	mg/kg		<0.045	mg/kg	<0.0000045 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
22		acenaphthylene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
			205-917-1	208-96-8									
23		acenaphthene				<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
			201-469-6	83-32-9									
24		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			201-695-5	86-73-7									
25		phenanthrene				0.477	mg/kg		0.477	mg/kg	0.0000477 %		
			201-581-5	85-01-8									
26		anthracene				0.188	mg/kg		0.188	mg/kg	0.0000188 %		
			204-371-1	120-12-7									
27		fluoranthene				1.13	mg/kg		1.13	mg/kg	0.000113 %		
			205-912-4	206-44-0									
28		pyrene				0.967	mg/kg		0.967	mg/kg	0.0000967 %		
			204-927-3	129-00-0									
29		benzo[a]anthracene				0.52	mg/kg		0.52	mg/kg	0.000052 %		
		601-033-00-9	200-280-6	56-55-3									
30		chrysene				0.478	mg/kg		0.478	mg/kg	0.0000478 %		
		601-048-00-0	205-923-4	218-01-9									
31		benzo[b]fluoranthene				0.482	mg/kg		0.482	mg/kg	0.0000482 %		
		601-034-00-4	205-911-9	205-99-2									
32		benzo[k]fluoranthene				0.248	mg/kg		0.248	mg/kg	0.0000248 %		
		601-036-00-5	205-916-6	207-08-9									
33		benzo[a]pyrene; benzo[def]chrysene				0.433	mg/kg		0.433	mg/kg	0.0000433 %		
		601-032-00-3	200-028-5	50-32-8									
34		indeno[123-cd]pyrene				0.226	mg/kg		0.226	mg/kg	0.0000226 %		
			205-893-2	193-39-5									
35		dibenz[a,h]anthracene				<0.115	mg/kg		<0.115	mg/kg	<0.0000115 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
36		benzo[ghi]perylene				0.264	mg/kg		0.264	mg/kg	0.0000264 %		
			205-883-8	191-24-2									
37		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
38		polychlorobiphenyls; PCB				<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.0417 %		

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00354%)

Classification of sample: BH3

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
BH3
Sample Depth:
1.20 m
Moisture content:
16%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 16% No Moisture Correction applied (MC)

#	Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number / EC Number / CAS Number							
1	antimony { antimony trioxide }		0.932 mg/kg	1.197	1.116 mg/kg	0.000112 %		
	051-005-00-X / 215-175-0 / 1309-64-4							
2	arsenic { arsenic trioxide }		20.5 mg/kg	1.32	27.067 mg/kg	0.00271 %		
	033-003-00-0 / 215-481-4 / 1327-53-3							
3	beryllium { beryllium oxide }		1.11 mg/kg	2.775	3.081 mg/kg	0.000308 %		
	004-003-00-8 / 215-133-1 / 1304-56-9							
4	boron { diboron trioxide; boric oxide }		7.38 mg/kg	3.22	23.763 mg/kg	0.00238 %		
	005-008-00-8 / 215-125-8 / 1303-86-2							
5	cadmium { cadmium oxide }		0.529 mg/kg	1.142	0.604 mg/kg	0.0000604 %		
	048-002-00-0 / 215-146-2 / 1306-19-0							
6	chromium in chromium(III) compounds { chromium(III) oxide }		20.7 mg/kg	1.462	30.254 mg/kg	0.00303 %		
	/ 215-160-9 / 1308-38-9							
7	copper { dicopper oxide; copper (I) oxide }		57.5 mg/kg	1.126	64.739 mg/kg	0.00647 %		
	029-002-00-X / 215-270-7 / 1317-39-1							
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	1	71.1 mg/kg		71.1 mg/kg	0.00711 %		
	082-001-00-6 / /							
9	mercury { mercury dichloride }		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<LOD
	080-010-00-X / 231-299-8 / 7487-94-7							
10	nickel { nickel chromate }		39.3 mg/kg	2.976	116.967 mg/kg	0.0117 %		
	028-035-00-7 / 238-766-5 / 14721-18-7							
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
	034-002-00-8 / /							
12	zinc { zinc oxide }		174 mg/kg	1.245	216.58 mg/kg	0.0217 %		
	030-013-00-7 / 215-222-5 / 1314-13-2							
13	TPH (C6 to C40) petroleum group		366 mg/kg		366 mg/kg	0.0366 %		
	/ / TPH							
14	benzene		<0.009 mg/kg		<0.009 mg/kg	<0.0000009 %		<LOD
	601-020-00-8 / 200-753-7 / 71-43-2							

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
16		ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
17		xylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
19		pH				9.23	pH		9.23	pH	9.23 pH		
				PH									
20		naphthalene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
21		acenaphthylene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
			205-917-1	208-96-8									
22		acenaphthene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
			201-469-6	83-32-9									
23		fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
24		phenanthrene				0.0218	mg/kg		0.0218	mg/kg	0.00000218 %		
			201-581-5	85-01-8									
25		anthracene				<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		<LOD
			204-371-1	120-12-7									
26		fluoranthene				0.0223	mg/kg		0.0223	mg/kg	0.00000223 %		
			205-912-4	206-44-0									
27		pyrene				0.0182	mg/kg		0.0182	mg/kg	0.00000182 %		
			204-927-3	129-00-0									
28		benzo[a]anthracene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
29		chrysene				0.0137	mg/kg		0.0137	mg/kg	0.00000137 %		
		601-048-00-0	205-923-4	218-01-9									
30		benzo[b]fluoranthene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
31		benzo[k]fluoranthene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
32		benzo[a]pyrene; benzo[def]chrysene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
33		indeno[123-cd]pyrene				<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		<LOD
			205-893-2	193-39-5									
34		dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
35		benzo[ghi]perylene				<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		<LOD
			205-883-8	191-24-2									
36		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
37		polychlorobiphenyls; PCB				<0.036	mg/kg		<0.036	mg/kg	<0.0000036 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.0926 %		

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0366%)

Classification of sample: BH3 Natrual

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
BH3 Natrual
Sample Depth:
4.70 m
Moisture content:
11%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 11% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		1.85 mg/kg	1.197	2.215 mg/kg	0.000221 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		11 mg/kg	1.32	14.524 mg/kg	0.00145 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.848 mg/kg	2.775	2.353 mg/kg	0.000235 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		1.66 mg/kg	3.22	5.345 mg/kg	0.000534 %		
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.615 mg/kg	1.142	0.703 mg/kg	0.0000703 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		12.9 mg/kg	1.462	18.854 mg/kg	0.00189 %		
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		63.1 mg/kg	1.126	71.044 mg/kg	0.0071 %		
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	63.8 mg/kg		63.8 mg/kg	0.00638 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		**<LOD**
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		27.3 mg/kg	2.976	81.252 mg/kg	0.00813 %		
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				2.24 mg/kg	2.554	5.72 mg/kg	0.000572 %		
12	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		128 mg/kg	1.245	159.323 mg/kg	0.0159 %		
13	TPH (C6 to C40) petroleum group			TPH		226 mg/kg		226 mg/kg	0.0226 %		
14	benzene	601-020-00-8	200-753-7	71-43-2		<0.009 mg/kg		<0.009 mg/kg	<0.0000009 %		**<LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
16		ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
17		xylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
19		pH				8.3	pH		8.3	pH	8.3 pH		
				PH									
20		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0653 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0226%)

Classification of sample: BH09 ES2

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
BH09 ES2
Sample Depth:
1.00 m
Moisture content:
17%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 17% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		1.2 mg/kg	1.197	1.437 mg/kg	0.000144 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		20 mg/kg	1.32	26.407 mg/kg	0.00264 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.472 mg/kg	2.775	1.31 mg/kg	0.000131 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<**LOD**
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.758 mg/kg	1.142	0.866 mg/kg	0.0000866 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		17.4 mg/kg	1.462	25.431 mg/kg	0.00254 %		
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		39.1 mg/kg	1.126	44.022 mg/kg	0.0044 %		
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	64.8 mg/kg		64.8 mg/kg	0.00648 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<**LOD**
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		22 mg/kg	2.976	65.478 mg/kg	0.00655 %		
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<**LOD**
12	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		61.1 mg/kg	1.245	76.052 mg/kg	0.00761 %		
13	TPH (C6 to C40) petroleum group			TPH		16.3 mg/kg		16.3 mg/kg	0.00163 %		
14	benzene	601-020-00-8	200-753-7	71-43-2		<0.009 mg/kg		<0.009 mg/kg	<0.0000009 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
16		ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
17		xylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
19		pH				8.65	pH		8.65	pH	8.65 pH		
				PH									
20		naphthalene				0.0241	mg/kg		0.0241	mg/kg	0.00000241 %		
		601-052-00-2	202-049-5	91-20-3									
21		acenaphthylene				0.0459	mg/kg		0.0459	mg/kg	0.00000459 %		
			205-917-1	208-96-8									
22		acenaphthene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
			201-469-6	83-32-9									
23		fluorene				0.0355	mg/kg		0.0355	mg/kg	0.00000355 %		
			201-695-5	86-73-7									
24		phenanthrene				0.347	mg/kg		0.347	mg/kg	0.0000347 %		
			201-581-5	85-01-8									
25		anthracene				0.071	mg/kg		0.071	mg/kg	0.0000071 %		
			204-371-1	120-12-7									
26		fluoranthene				0.438	mg/kg		0.438	mg/kg	0.0000438 %		
			205-912-4	206-44-0									
27		pyrene				0.396	mg/kg		0.396	mg/kg	0.0000396 %		
			204-927-3	129-00-0									
28		benzo[a]anthracene				0.167	mg/kg		0.167	mg/kg	0.0000167 %		
		601-033-00-9	200-280-6	56-55-3									
29		chrysene				0.166	mg/kg		0.166	mg/kg	0.0000166 %		
		601-048-00-0	205-923-4	218-01-9									
30		benzo[b]fluoranthene				0.141	mg/kg		0.141	mg/kg	0.0000141 %		
		601-034-00-4	205-911-9	205-99-2									
31		benzo[k]fluoranthene				0.071	mg/kg		0.071	mg/kg	0.0000071 %		
		601-036-00-5	205-916-6	207-08-9									
32		benzo[a]pyrene; benzo[def]chrysene				0.166	mg/kg		0.166	mg/kg	0.0000166 %		
		601-032-00-3	200-028-5	50-32-8									
33		indeno[123-cd]pyrene				0.119	mg/kg		0.119	mg/kg	0.0000119 %		
			205-893-2	193-39-5									
34		dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
35		benzo[ghi]perylene				0.104	mg/kg		0.104	mg/kg	0.0000104 %		
			205-883-8	191-24-2									
36		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
37		polychlorobiphenyls; PCB				<0.036	mg/kg		<0.036	mg/kg	<0.0000036 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.0332 %		

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00163%)

Classification of sample: TP02

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample Name:
TP02
Sample Depth:
0.20 m
Moisture content:
7%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1A; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinands:

arsenic trioxide: (compound conc.: 0.124%)
lead compounds with the exception of those specified elsewhere in this Annex (worst case): (Note 1 conc.: 1%)

HP 10: Toxic for reproduction "waste which has adverse effects on sexual function and fertility in adult males and females, as well as developmental toxicity in the offspring"

Hazard Statements hit:

Repr. 1A; H360Df "May damage the unborn child. Suspected of damaging fertility."

Because of determinand:

lead compounds with the exception of those specified elsewhere in this Annex (worst case): (Note 1 conc.: 1%)

HP 14: Ecotoxic "waste which presents or may present immediate or delayed risks for one or more sectors of the environment"

Hazard Statements hit:

Aquatic Chronic 1; H410 "Very toxic to aquatic life with long lasting effects."

Because of determinands:

arsenic trioxide: (compound conc.: 0.124%)
dicopper oxide; copper (I) oxide: (compound conc.: 0.118%)
lead compounds with the exception of those specified elsewhere in this Annex (worst case): (Note 1 conc.: 1%)
zinc oxide: (compound conc.: 2.216%)

Determinands

Moisture content: 7% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		50.3 mg/kg	1.197	60.214 mg/kg	0.00602 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		939 mg/kg	1.32	1239.786 mg/kg	0.124 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.598 mg/kg	2.775	1.66 mg/kg	0.000166 %		

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
4		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<LOD
5		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		14.1 mg/kg	1.142	16.107 mg/kg	0.00161 %		
6		chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		66.2 mg/kg	1.462	96.755 mg/kg	0.00968 %		
7		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		1050 mg/kg	1.126	1182.183 mg/kg	0.118 %		
8		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	10000 mg/kg		10000 mg/kg	1%		
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<LOD
10		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		38.5 mg/kg	2.976	114.586 mg/kg	0.0115 %		
11		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
12		zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		17800 mg/kg	1.245	22155.909 mg/kg	2.216 %		
13		TPH (C6 to C40) petroleum group			TPH		688 mg/kg		688 mg/kg	0.0688 %		
14		benzene	601-020-00-8	200-753-7	71-43-2		<0.09 mg/kg		<0.09 mg/kg	<0.000009 %		<LOD
15		toluene	601-021-00-3	203-625-9	108-88-3		<0.07 mg/kg		<0.07 mg/kg	<0.000007 %		<LOD
16		ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
17		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
19		pH			PH		9.05 pH		9.05 pH	9.05 pH		
20		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.045 mg/kg		<0.045 mg/kg	<0.0000045 %		<LOD
21		acenaphthylene		205-917-1	208-96-8		0.0769 mg/kg		0.0769 mg/kg	0.00000769 %		
22		acenaphthene		201-469-6	83-32-9		0.0846 mg/kg		0.0846 mg/kg	0.00000846 %		
23		fluorene		201-695-5	86-73-7		0.0671 mg/kg		0.0671 mg/kg	0.00000671 %		
24		phenanthrene		201-581-5	85-01-8		0.673 mg/kg		0.673 mg/kg	0.0000673 %		
25		anthracene		204-371-1	120-12-7		0.216 mg/kg		0.216 mg/kg	0.0000216 %		
26		fluoranthene		205-912-4	206-44-0		2.13 mg/kg		2.13 mg/kg	0.000213 %		
27		pyrene		204-927-3	129-00-0		1.7 mg/kg		1.7 mg/kg	0.00017 %		
28		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		1.21 mg/kg		1.21 mg/kg	0.000121 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
29		chrysene				1.11	mg/kg		1.11	mg/kg	0.000111 %		
		601-048-00-0	205-923-4	218-01-9									
30		benzo[b]fluoranthene				1.31	mg/kg		1.31	mg/kg	0.000131 %		
		601-034-00-4	205-911-9	205-99-2									
31		benzo[k]fluoranthene				0.623	mg/kg		0.623	mg/kg	0.0000623 %		
		601-036-00-5	205-916-6	207-08-9									
32		benzo[a]pyrene; benzo[def]chrysene				1.21	mg/kg		1.21	mg/kg	0.000121 %		
		601-032-00-3	200-028-5	50-32-8									
33	•	indeno[123-cd]pyrene				1.02	mg/kg		1.02	mg/kg	0.000102 %		
			205-893-2	193-39-5									
34		dibenz[a,h]anthracene				0.228	mg/kg		0.228	mg/kg	0.0000228 %		
		601-041-00-2	200-181-8	53-70-3									
35	•	benzo[ghi]perylene				0.792	mg/kg		0.792	mg/kg	0.0000792 %		
			205-883-8	191-24-2									
36		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
37	•	polychlorobiphenyls; PCB				0.377	mg/kg		0.377	mg/kg	0.0000377 %		
		602-039-00-4	215-648-1	1336-36-3									
										Total:	3.558 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0688%)

Classification of sample: TP07

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample Name:
TP07
Sample Depth:
0.60 m
Moisture content:
11%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1A; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

lead compounds with the exception of those specified elsewhere in this Annex (worst case): (Note 1 conc.: 0.19%)

Determinands

Moisture content: 11% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		21.7 mg/kg	1.197	25.977 mg/kg	0.0026 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		223 mg/kg	1.32	294.433 mg/kg	0.0294 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.464 mg/kg	2.775	1.288 mg/kg	0.000129 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<**LOD**
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		2.44 mg/kg	1.142	2.787 mg/kg	0.000279 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		29.6 mg/kg	1.462	43.262 mg/kg	0.00433 %		
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		307 mg/kg	1.126	345.648 mg/kg	0.0346 %		
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	1900 mg/kg		1900 mg/kg	0.19 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<**LOD**
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		28.1 mg/kg	2.976	83.633 mg/kg	0.00836 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
11		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
		034-002-00-8											
12		zinc { zinc oxide }				<1.9	mg/kg	1.245	<2.365	mg/kg	<0.000236 %		<LOD
		030-013-00-7	215-222-5	1314-13-2									
13		TPH (C6 to C40) petroleum group				298	mg/kg		298	mg/kg	0.0298 %		
				TPH									
14		benzene				<0.09	mg/kg		<0.09	mg/kg	<0.000009 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
15		toluene				<0.07	mg/kg		<0.07	mg/kg	<0.000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
16		ethylbenzene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
17		xylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
19		pH				9.04	pH		9.04	pH	9.04 pH		
				PH									
20		naphthalene				<0.045	mg/kg		<0.045	mg/kg	<0.0000045 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
21		acenaphthylene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
			205-917-1	208-96-8									
22		acenaphthene				<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
			201-469-6	83-32-9									
23		fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			201-695-5	86-73-7									
24		phenanthrene				0.348	mg/kg		0.348	mg/kg	0.0000348 %		
			201-581-5	85-01-8									
25		anthracene				0.0917	mg/kg		0.0917	mg/kg	0.00000917 %		
			204-371-1	120-12-7									
26		fluoranthene				0.694	mg/kg		0.694	mg/kg	0.0000694 %		
			205-912-4	206-44-0									
27		pyrene				0.64	mg/kg		0.64	mg/kg	0.000064 %		
			204-927-3	129-00-0									
28		benzo[a]anthracene				0.335	mg/kg		0.335	mg/kg	0.0000335 %		
		601-033-00-9	200-280-6	56-55-3									
29		chrysene				0.316	mg/kg		0.316	mg/kg	0.0000316 %		
		601-048-00-0	205-923-4	218-01-9									
30		benzo[b]fluoranthene				0.421	mg/kg		0.421	mg/kg	0.0000421 %		
		601-034-00-4	205-911-9	205-99-2									
31		benzo[k]fluoranthene				0.15	mg/kg		0.15	mg/kg	0.000015 %		
		601-036-00-5	205-916-6	207-08-9									
32		benzo[a]pyrene; benzo[def]chrysene				0.308	mg/kg		0.308	mg/kg	0.0000308 %		
		601-032-00-3	200-028-5	50-32-8									
33		indeno[123-cd]pyrene				0.278	mg/kg		0.278	mg/kg	0.0000278 %		
			205-893-2	193-39-5									
34		dibenz[a,h]anthracene				<0.115	mg/kg		<0.115	mg/kg	<0.0000115 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
35		benzo[ghi]perylene				0.193	mg/kg		0.193	mg/kg	0.0000193 %		
			205-883-8	191-24-2									
36		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.301 %		

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0298%)

Classification of sample: TP08

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
TP08
Sample Depth:
0.30 m
Moisture content:
13%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 13% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		8.87 mg/kg	1.197	10.618 mg/kg	0.00106 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		210 mg/kg	1.32	277.268 mg/kg	0.0277 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.288 mg/kg	2.775	0.799 mg/kg	0.0000799 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<**LOD**
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.6 mg/kg	1.142	1.828 mg/kg	0.000183 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		6.24 mg/kg	1.462	9.12 mg/kg	0.000912 %		
7	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<**LOD**
8	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		393 mg/kg	1.126	442.474 mg/kg	0.0442 %		
9	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	265 mg/kg		265 mg/kg	0.0265 %		
10	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<**LOD**
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		18.4 mg/kg	2.976	54.763 mg/kg	0.00548 %		
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<**LOD**
13	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		707 mg/kg	1.245	880.013 mg/kg	0.088 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		TPH (C6 to C40) petroleum group		TPH		901	mg/kg		901	mg/kg	0.0901 %		
15		benzene											
		601-020-00-8	200-753-7	71-43-2		<0.09	mg/kg		<0.09	mg/kg	<0.000009 %		<LOD
16		toluene											
		601-021-00-3	203-625-9	108-88-3		<0.07	mg/kg		<0.07	mg/kg	<0.000007 %		<LOD
17		ethylbenzene											
		601-023-00-4	202-849-4	100-41-4		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
18		xylene											
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
19		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }											
		006-007-00-5				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
20		pH		PH		8.71	pH		8.71	pH	8.71 pH		
21		naphthalene											
		601-052-00-2	202-049-5	91-20-3		0.326	mg/kg		0.326	mg/kg	0.0000326 %		
22		acenaphthylene											
			205-917-1	208-96-8		0.779	mg/kg		0.779	mg/kg	0.0000779 %		
23		acenaphthene											
			201-469-6	83-32-9		<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
24		fluorene											
			201-695-5	86-73-7		0.678	mg/kg		0.678	mg/kg	0.0000678 %		
25		phenanthrene											
			201-581-5	85-01-8		7.97	mg/kg		7.97	mg/kg	0.000797 %		
26		anthracene											
			204-371-1	120-12-7		1.97	mg/kg		1.97	mg/kg	0.000197 %		
27		fluoranthene											
			205-912-4	206-44-0		10	mg/kg		10	mg/kg	0.001 %		
28		pyrene											
			204-927-3	129-00-0		8.11	mg/kg		8.11	mg/kg	0.000811 %		
29		benzo[a]anthracene											
		601-033-00-9	200-280-6	56-55-3		3.87	mg/kg		3.87	mg/kg	0.000387 %		
30		chrysene											
		601-048-00-0	205-923-4	218-01-9		3.59	mg/kg		3.59	mg/kg	0.000359 %		
31		benzo[b]fluoranthene											
		601-034-00-4	205-911-9	205-99-2		3.94	mg/kg		3.94	mg/kg	0.000394 %		
32		benzo[k]fluoranthene											
		601-036-00-5	205-916-6	207-08-9		1.47	mg/kg		1.47	mg/kg	0.000147 %		
33		benzo[a]pyrene; benzo[def]chrysene											
		601-032-00-3	200-028-5	50-32-8		3.38	mg/kg		3.38	mg/kg	0.000338 %		
34		indeno[123-cd]pyrene											
			205-893-2	193-39-5		2.38	mg/kg		2.38	mg/kg	0.000238 %		
35		dibenz[a,h]anthracene											
		601-041-00-2	200-181-8	53-70-3		0.46	mg/kg		0.46	mg/kg	0.000046 %		
36		benzo[ghi]perylene											
			205-883-8	191-24-2		1.96	mg/kg		1.96	mg/kg	0.000196 %		
37		phenol											
		604-001-00-2	203-632-7	108-95-2		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
38		polychlorobiphenyls; PCB											
		602-039-00-4	215-648-1	1336-36-3		<0.105	mg/kg		<0.105	mg/kg	<0.0000105 %		<LOD
										Total:	0.29 %		

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0901%)

Classification of sample: TP09

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
TP09
Sample Depth:
0.60-0.60 m
Moisture content:
11%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 11% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		1.69 mg/kg	1.197	2.023 mg/kg	0.000202 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		20.1 mg/kg	1.32	26.539 mg/kg	0.00265 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.569 mg/kg	2.775	1.579 mg/kg	0.000158 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<**LOD**
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.481 mg/kg	1.142	0.549 mg/kg	0.0000549 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		4.95 mg/kg	1.462	7.235 mg/kg	0.000723 %		
7	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<**LOD**
8	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		41 mg/kg	1.126	46.161 mg/kg	0.00462 %		
9	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	72.1 mg/kg		72.1 mg/kg	0.00721 %		
10	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<**LOD**
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		9.3 mg/kg	2.976	27.679 mg/kg	0.00277 %		
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<**LOD**
13	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		126 mg/kg	1.245	156.834 mg/kg	0.0157 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
14		TPH (C6 to C40) petroleum group				77.9	mg/kg		77.9	mg/kg	0.00779 %		
				TPH									
15		benzene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
16		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
17		ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
18		xylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
19		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
20		pH				8.85	pH		8.85	pH	8.85 pH		
				PH									
21		naphthalene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
22		acenaphthylene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
			205-917-1	208-96-8									
23		acenaphthene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
			201-469-6	83-32-9									
24		fluorene				0.142	mg/kg		0.142	mg/kg	0.0000142 %		
			201-695-5	86-73-7									
25		phenanthrene				2.19	mg/kg		2.19	mg/kg	0.000219 %		
			201-581-5	85-01-8									
26		anthracene				0.587	mg/kg		0.587	mg/kg	0.0000587 %		
			204-371-1	120-12-7									
27		fluoranthene				3.54	mg/kg		3.54	mg/kg	0.000354 %		
			205-912-4	206-44-0									
28		pyrene				2.59	mg/kg		2.59	mg/kg	0.000259 %		
			204-927-3	129-00-0									
29		benzo[a]anthracene				1.89	mg/kg		1.89	mg/kg	0.000189 %		
		601-033-00-9	200-280-6	56-55-3									
30		chrysene				1.69	mg/kg		1.69	mg/kg	0.000169 %		
		601-048-00-0	205-923-4	218-01-9									
31		benzo[b]fluoranthene				1.93	mg/kg		1.93	mg/kg	0.000193 %		
		601-034-00-4	205-911-9	205-99-2									
32		benzo[k]fluoranthene				0.773	mg/kg		0.773	mg/kg	0.0000773 %		
		601-036-00-5	205-916-6	207-08-9									
33		benzo[a]pyrene; benzo[def]chrysene				1.22	mg/kg		1.22	mg/kg	0.000122 %		
		601-032-00-3	200-028-5	50-32-8									
34		indeno[123-cd]pyrene				0.803	mg/kg		0.803	mg/kg	0.0000803 %		
			205-893-2	193-39-5									
35		dibenz[a,h]anthracene				0.158	mg/kg		0.158	mg/kg	0.0000158 %		
		601-041-00-2	200-181-8	53-70-3									
36		benzo[ghi]perylene				0.648	mg/kg		0.648	mg/kg	0.0000648 %		
			205-883-8	191-24-2									
37		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
38		polychlorobiphenyls; PCB				<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.0446 %		

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00779%)

Classification of sample: TP11

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample Name:
TP11
Sample Depth:
0.20-0.20 m
Moisture content:
11%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1A; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

lead compounds with the exception of those specified elsewhere in this Annex (worst case): (Note 1 conc.: 0.889%)

HP 10: Toxic for reproduction "waste which has adverse effects on sexual function and fertility in adult males and females, as well as developmental toxicity in the offspring"

Hazard Statements hit:

Repr. 1A; H360Df "May damage the unborn child. Suspected of damaging fertility."

Because of determinand:

lead compounds with the exception of those specified elsewhere in this Annex (worst case): (Note 1 conc.: 0.889%)

HP 14: Ecotoxic "waste which presents or may present immediate or delayed risks for one or more sectors of the environment"

Hazard Statements hit:

Aquatic Chronic 1; H410 "Very toxic to aquatic life with long lasting effects."

Because of determinands:

lead compounds with the exception of those specified elsewhere in this Annex (worst case): (Note 1 conc.: 0.889%)
zinc oxide: (compound conc.: 0.86%)

Determinands

Moisture content: 11% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		84	mg/kg	1.197	100.557	mg/kg	0.0101 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		125	mg/kg	1.32	165.041	mg/kg	0.0165 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.47	mg/kg	2.775	1.304	mg/kg	0.00013 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1	mg/kg	3.22	<3.22	mg/kg	<0.000322 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
5		cadmium { cadmium oxide }				3.4	mg/kg	1.142	3.884	mg/kg	0.000388 %		
		048-002-00-0	215-146-2	1306-19-0									
6		chromium in chromium(III) compounds { chromium(III) oxide }				128	mg/kg	1.462	187.079	mg/kg	0.0187 %		
			215-160-9	1308-38-9									
7		copper { dicopper oxide; copper (I) oxide }				277	mg/kg	1.126	311.871	mg/kg	0.0312 %		
		029-002-00-X	215-270-7	1317-39-1									
8		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	8890	mg/kg		8890	mg/kg	0.889 %		
		082-001-00-6											
9		mercury { mercury dichloride }				<0.14	mg/kg	1.353	<0.189	mg/kg	<0.0000189 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
10		nickel { nickel chromate }				27.3	mg/kg	2.976	81.252	mg/kg	0.00813 %		
		028-035-00-7	238-766-5	14721-18-7									
11		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
		034-002-00-8											
12		zinc { zinc oxide }				6910	mg/kg	1.245	8600.974	mg/kg	0.86 %		
		030-013-00-7	215-222-5	1314-13-2									
13		TPH (C6 to C40) petroleum group				688	mg/kg		688	mg/kg	0.0688 %		
				TPH									
14		benzene				<0.18	mg/kg		<0.18	mg/kg	<0.000018 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
15		toluene				<0.14	mg/kg		<0.14	mg/kg	<0.000014 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
16		ethylbenzene				<0.08	mg/kg		<0.08	mg/kg	<0.000008 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
17		xylene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
19		pH				9.39	pH		9.39	pH	9.39 pH		
				PH									
20		naphthalene				0.373	mg/kg		0.373	mg/kg	0.0000373 %		
		601-052-00-2	202-049-5	91-20-3									
21		acenaphthylene				0.436	mg/kg		0.436	mg/kg	0.0000436 %		
			205-917-1	208-96-8									
22		acenaphthene				<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
			201-469-6	83-32-9									
23		fluorene				0.328	mg/kg		0.328	mg/kg	0.0000328 %		
			201-695-5	86-73-7									
24		phenanthrene				3.85	mg/kg		3.85	mg/kg	0.000385 %		
			201-581-5	85-01-8									
25		anthracene				0.912	mg/kg		0.912	mg/kg	0.0000912 %		
			204-371-1	120-12-7									
26		fluoranthene				5.49	mg/kg		5.49	mg/kg	0.000549 %		
			205-912-4	206-44-0									
27		pyrene				4.51	mg/kg		4.51	mg/kg	0.000451 %		
			204-927-3	129-00-0									
28		benzo[a]anthracene				2.33	mg/kg		2.33	mg/kg	0.000233 %		
		601-033-00-9	200-280-6	56-55-3									
29		chrysene				2.25	mg/kg		2.25	mg/kg	0.000225 %		
		601-048-00-0	205-923-4	218-01-9									

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
30		benzo[b]fluoranthene				2.25	mg/kg		2.25	mg/kg	0.000225 %		
		601-034-00-4	205-911-9	205-99-2									
31		benzo[k]fluoranthene				0.988	mg/kg		0.988	mg/kg	0.0000988 %		
		601-036-00-5	205-916-6	207-08-9									
32		benzo[a]pyrene; benzo[def]chrysene				2.05	mg/kg		2.05	mg/kg	0.000205 %		
		601-032-00-3	200-028-5	50-32-8									
33		indeno[123-cd]pyrene				1.49	mg/kg		1.49	mg/kg	0.000149 %		
			205-893-2	193-39-5									
34		dibenz[a,h]anthracene				0.251	mg/kg		0.251	mg/kg	0.0000251 %		
		601-041-00-2	200-181-8	53-70-3									
35		benzo[ghi]perylene				1.2	mg/kg		1.2	mg/kg	0.00012 %		
			205-883-8	191-24-2									
36		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	1.907 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0688%)

Classification of sample: TP12

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample Name:
TP12
Sample Depth:
0.60-0.60 m
Moisture content:
7.5%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1B; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.113%)

HP 11: Mutagenic "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

Muta. 1B; H340 "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.113%)

Determinands

Moisture content: 7.5% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		3.74 mg/kg	1.197	4.477 mg/kg	0.000448 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		22.5 mg/kg	1.32	29.707 mg/kg	0.00297 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.697 mg/kg	2.775	1.934 mg/kg	0.000193 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		**<LOD**
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.06 mg/kg	1.142	1.211 mg/kg	0.000121 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		6.71 mg/kg	1.462	9.807 mg/kg	0.000981 %		
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		80.4 mg/kg	1.126	90.521 mg/kg	0.00905 %		

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	256 mg/kg		256 mg/kg	0.0256 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.146 mg/kg	1.353	0.198 mg/kg	0.0000198 %		
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		21 mg/kg	2.976	62.502 mg/kg	0.00625 %		
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
12	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		400 mg/kg	1.245	497.886 mg/kg	0.0498 %		
13	TPH (C6 to C40) petroleum group			TPH		1130 mg/kg		1130 mg/kg	0.113 %		
14	benzene	601-020-00-8	200-753-7	71-43-2		<0.18 mg/kg		<0.18 mg/kg	<0.000018 %		<LOD
15	toluene	601-021-00-3	203-625-9	108-88-3		<0.14 mg/kg		<0.14 mg/kg	<0.000014 %		<LOD
16	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.08 mg/kg		<0.08 mg/kg	<0.000008 %		<LOD
17	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
18	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
19	pH			PH		8.4 pH		8.4 pH	8.4 pH		
20	naphthalene	601-052-00-2	202-049-5	91-20-3		2.44 mg/kg		2.44 mg/kg	0.000244 %		
21	acenaphthylene		205-917-1	208-96-8		1.1 mg/kg		1.1 mg/kg	0.00011 %		
22	acenaphthene		201-469-6	83-32-9		<0.06 mg/kg		<0.06 mg/kg	<0.000006 %		<LOD
23	fluorene		201-695-5	86-73-7		0.789 mg/kg		0.789 mg/kg	0.0000789 %		
24	phenanthrene		201-581-5	85-01-8		8.85 mg/kg		8.85 mg/kg	0.000885 %		
25	anthracene		204-371-1	120-12-7		1.76 mg/kg		1.76 mg/kg	0.000176 %		
26	fluoranthene		205-912-4	206-44-0		10.5 mg/kg		10.5 mg/kg	0.00105 %		
27	pyrene		204-927-3	129-00-0		9.05 mg/kg		9.05 mg/kg	0.000905 %		
28	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		4.61 mg/kg		4.61 mg/kg	0.000461 %		
29	chrysene	601-048-00-0	205-923-4	218-01-9		4.74 mg/kg		4.74 mg/kg	0.000474 %		
30	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		5.87 mg/kg		5.87 mg/kg	0.000587 %		
31	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		1.98 mg/kg		1.98 mg/kg	0.000198 %		
32	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		3.92 mg/kg		3.92 mg/kg	0.000392 %		
33	indeno[123-cd]pyrene		205-893-2	193-39-5		2.21 mg/kg		2.21 mg/kg	0.000221 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
34		dibenz[a,h]anthracene				0.503	mg/kg		0.503	mg/kg	0.0000503 %		
		601-041-00-2	200-181-8	53-70-3									
35		benzo[ghi]perylene				2.15	mg/kg		2.15	mg/kg	0.000215 %		
			205-883-8	191-24-2									
36		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.215 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.113%)

Classification of sample: TP13 TS

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
TP13 TS
Sample Depth:
0.30-0.30 m
Moisture content:
12%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 12% No Moisture Correction applied (MC)

#	Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number / EC Number / CAS Number							
1	antimony { antimony trioxide }		1.11 mg/kg	1.197	1.329 mg/kg	0.000133 %		
	051-005-00-X / 215-175-0 / 1309-64-4							
2	arsenic { arsenic trioxide }		20.7 mg/kg	1.32	27.331 mg/kg	0.00273 %		
	033-003-00-0 / 215-481-4 / 1327-53-3							
3	beryllium { beryllium oxide }		0.259 mg/kg	2.775	0.719 mg/kg	0.0000719 %		
	004-003-00-8 / 215-133-1 / 1304-56-9							
4	boron { diboron trioxide; boric oxide }		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<**LOD**
	005-008-00-8 / 215-125-8 / 1303-86-2							
5	cadmium { cadmium oxide }		1.41 mg/kg	1.142	1.611 mg/kg	0.000161 %		
	048-002-00-0 / 215-146-2 / 1306-19-0							
6	chromium in chromium(III) compounds { chromium(III) oxide }		12.4 mg/kg	1.462	18.123 mg/kg	0.00181 %		
	/ 215-160-9 / 1308-38-9							
7	copper { dicopper oxide; copper (I) oxide }		44 mg/kg	1.126	49.539 mg/kg	0.00495 %		
	029-002-00-X / 215-270-7 / 1317-39-1							
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	1	101 mg/kg		101 mg/kg	0.0101 %		
	082-001-00-6 / /							
9	mercury { mercury dichloride }		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<**LOD**
	080-010-00-X / 231-299-8 / 7487-94-7							
10	nickel { nickel chromate }		23.6 mg/kg	2.976	70.24 mg/kg	0.00702 %		
	028-035-00-7 / 238-766-5 / 14721-18-7							
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<**LOD**
	034-002-00-8 / /							
12	zinc { zinc oxide }		312 mg/kg	1.245	388.351 mg/kg	0.0388 %		
	030-013-00-7 / 215-222-5 / 1314-13-2							
13	TPH (C6 to C40) petroleum group		87.2 mg/kg		87.2 mg/kg	0.00872 %		
	/ / TPH							
14	benzene		<0.18 mg/kg		<0.18 mg/kg	<0.000018 %		<**LOD**
	601-020-00-8 / 200-753-7 / 71-43-2							

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		toluene				<0.14	mg/kg		<0.14	mg/kg	<0.000014 %		**<LOD**
		601-021-00-3	203-625-9	108-88-3									
16		ethylbenzene				<0.08	mg/kg		<0.08	mg/kg	<0.000008 %		**<LOD**
		601-023-00-4	202-849-4	100-41-4									
17		xylene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		**<LOD**
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		**<LOD**
		006-007-00-5											
19		pH				8.57	pH		8.57	pH	8.57 pH		
				PH									
20		naphthalene				0.14	mg/kg		0.14	mg/kg	0.000014 %		
		601-052-00-2	202-049-5	91-20-3									
21		acenaphthylene				0.148	mg/kg		0.148	mg/kg	0.0000148 %		
			205-917-1	208-96-8									
22		acenaphthene				0.0219	mg/kg		0.0219	mg/kg	0.00000219 %		
			201-469-6	83-32-9									
23		fluorene				0.0897	mg/kg		0.0897	mg/kg	0.00000897 %		
			201-695-5	86-73-7									
24		phenanthrene				1.6	mg/kg		1.6	mg/kg	0.00016 %		
			201-581-5	85-01-8									
25		anthracene				0.285	mg/kg		0.285	mg/kg	0.0000285 %		
			204-371-1	120-12-7									
26		fluoranthene				3.05	mg/kg		3.05	mg/kg	0.000305 %		
			205-912-4	206-44-0									
27		pyrene				2.77	mg/kg		2.77	mg/kg	0.000277 %		
			204-927-3	129-00-0									
28		benzo[a]anthracene				1.67	mg/kg		1.67	mg/kg	0.000167 %		
		601-033-00-9	200-280-6	56-55-3									
29		chrysene				1.64	mg/kg		1.64	mg/kg	0.000164 %		
		601-048-00-0	205-923-4	218-01-9									
30		benzo[b]fluoranthene				1.88	mg/kg		1.88	mg/kg	0.000188 %		
		601-034-00-4	205-911-9	205-99-2									
31		benzo[k]fluoranthene				0.783	mg/kg		0.783	mg/kg	0.0000783 %		
		601-036-00-5	205-916-6	207-08-9									
32		benzo[a]pyrene; benzo[def]chrysene				1.71	mg/kg		1.71	mg/kg	0.000171 %		
		601-032-00-3	200-028-5	50-32-8									
33		indeno[123-cd]pyrene				1.12	mg/kg		1.12	mg/kg	0.000112 %		
			205-893-2	193-39-5									
34		dibenz[a,h]anthracene				0.265	mg/kg		0.265	mg/kg	0.0000265 %		
		601-041-00-2	200-181-8	53-70-3									
35		benzo[ghi]perylene				1.23	mg/kg		1.23	mg/kg	0.000123 %		
			205-883-8	191-24-2									
36		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0772 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00872%)

Classification of sample: TP14

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
TP14
Sample Depth:
0.30-0.30 m
Moisture content:
7.1%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 7.1% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		12.4 mg/kg	1.197	14.844 mg/kg	0.00148 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		28.4 mg/kg	1.32	37.497 mg/kg	0.00375 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.434 mg/kg	2.775	1.204 mg/kg	0.00012 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<**LOD**
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.25 mg/kg	1.142	1.428 mg/kg	0.000143 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		18.1 mg/kg	1.462	26.454 mg/kg	0.00265 %		
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		197 mg/kg	1.126	221.8 mg/kg	0.0222 %		
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	868 mg/kg		868 mg/kg	0.0868 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.18 mg/kg	1.353	0.244 mg/kg	0.0000244 %		
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		11.4 mg/kg	2.976	33.929 mg/kg	0.00339 %		
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<**LOD**
12	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		894 mg/kg	1.245	1112.774 mg/kg	0.111 %		
13	TPH (C6 to C40) petroleum group			TPH		792 mg/kg		792 mg/kg	0.0792 %		
14	benzene	601-020-00-8	200-753-7	71-43-2		<0.18 mg/kg		<0.18 mg/kg	<0.000018 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		toluene				<0.14	mg/kg		<0.14	mg/kg	<0.000014 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
16		ethylbenzene				<0.08	mg/kg		<0.08	mg/kg	<0.000008 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
17		xylene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
19		pH				8.9	pH		8.9	pH	8.9 pH		
				PH									
20		naphthalene				0.116	mg/kg		0.116	mg/kg	0.0000116 %		
		601-052-00-2	202-049-5	91-20-3									
21		acenaphthylene				0.0946	mg/kg		0.0946	mg/kg	0.00000946 %		
			205-917-1	208-96-8									
22		acenaphthene				<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
			201-469-6	83-32-9									
23		fluorene				0.0762	mg/kg		0.0762	mg/kg	0.00000762 %		
			201-695-5	86-73-7									
24		phenanthrene				0.982	mg/kg		0.982	mg/kg	0.0000982 %		
			201-581-5	85-01-8									
25		anthracene				0.217	mg/kg		0.217	mg/kg	0.0000217 %		
			204-371-1	120-12-7									
26		fluoranthene				1.54	mg/kg		1.54	mg/kg	0.000154 %		
			205-912-4	206-44-0									
27		pyrene				1.32	mg/kg		1.32	mg/kg	0.000132 %		
			204-927-3	129-00-0									
28		benzo[a]anthracene				0.688	mg/kg		0.688	mg/kg	0.0000688 %		
		601-033-00-9	200-280-6	56-55-3									
29		chrysene				0.639	mg/kg		0.639	mg/kg	0.0000639 %		
		601-048-00-0	205-923-4	218-01-9									
30		benzo[b]fluoranthene				1.12	mg/kg		1.12	mg/kg	0.000112 %		
		601-034-00-4	205-911-9	205-99-2									
31		benzo[k]fluoranthene				0.376	mg/kg		0.376	mg/kg	0.0000376 %		
		601-036-00-5	205-916-6	207-08-9									
32		benzo[a]pyrene; benzo[def]chrysene				0.711	mg/kg		0.711	mg/kg	0.0000711 %		
		601-032-00-3	200-028-5	50-32-8									
33		indeno[123-cd]pyrene				0.485	mg/kg		0.485	mg/kg	0.0000485 %		
			205-893-2	193-39-5									
34		dibenz[a,h]anthracene				<0.115	mg/kg		<0.115	mg/kg	<0.0000115 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
35		benzo[ghi]perylene				0.524	mg/kg		0.524	mg/kg	0.0000524 %		
			205-883-8	191-24-2									
36		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.313 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0792%)

Classification of sample: TP16

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
TP16
Sample Depth:
0.25-0.25 m
Moisture content:
11%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 11% No Moisture Correction applied (MC)

#	Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number / EC Number / CAS Number							
1	antimony { antimony trioxide }		1.06 mg/kg	1.197	1.269 mg/kg	0.000127 %		
	051-005-00-X / 215-175-0 / 1309-64-4							
2	arsenic { arsenic trioxide }		27 mg/kg	1.32	35.649 mg/kg	0.00356 %		
	033-003-00-0 / 215-481-4 / 1327-53-3							
3	boron { diboron trioxide; boric oxide }		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<LOD
	005-008-00-8 / 215-125-8 / 1303-86-2							
4	cadmium { cadmium oxide }		0.662 mg/kg	1.142	0.756 mg/kg	0.0000756 %		
	048-002-00-0 / 215-146-2 / 1306-19-0							
5	chromium in chromium(III) compounds { chromium(III) oxide }		10.3 mg/kg	1.462	15.054 mg/kg	0.00151 %		
	/ 215-160-9 / 1308-38-9							
6	copper { dicopper oxide; copper (I) oxide }		38.9 mg/kg	1.126	43.797 mg/kg	0.00438 %		
	029-002-00-X / 215-270-7 / 1317-39-1							
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	1	89.6 mg/kg		89.6 mg/kg	0.00896 %		
	082-001-00-6							
8	mercury { mercury dichloride }		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<LOD
	080-010-00-X / 231-299-8 / 7487-94-7							
9	nickel { nickel chromate }		14.4 mg/kg	2.976	42.858 mg/kg	0.00429 %		
	028-035-00-7 / 238-766-5 / 14721-18-7							
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
	034-002-00-8							
11	zinc { zinc oxide }		103 mg/kg	1.245	128.206 mg/kg	0.0128 %		
	030-013-00-7 / 215-222-5 / 1314-13-2							
12	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }		<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
	006-007-00-5							

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
13		pH				8.78 pH		8.78 pH	8.78 pH		
				PH							
14		phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2							
								Total:	0.0365 %		

Key

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

Classification of sample: TP16[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
TP16[2]
Sample Depth:
0.50-0.50 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

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

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
1		beryllium { beryllium oxide }				0.57 mg/kg	2.775	1.582 mg/kg	0.000158 %		
		004-003-00-8	215-133-1	1304-56-9							
								Total:	0.00015 %		

Key

User supplied data

Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration

Classification of sample: TP17

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
TP17
Sample Depth:
0.40-0.40 m
Moisture content:
11%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 11% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		0.762 mg/kg	1.197	0.912 mg/kg	0.0000912 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		30.6 mg/kg	1.32	40.402 mg/kg	0.00404 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.233 mg/kg	2.775	0.647 mg/kg	0.0000647 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<**LOD**
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.1 mg/kg	1.142	1.257 mg/kg	0.000126 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		3.96 mg/kg	1.462	5.788 mg/kg	0.000579 %		
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		28.8 mg/kg	1.126	32.426 mg/kg	0.00324 %		
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	212 mg/kg		212 mg/kg	0.0212 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<**LOD**
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		19.1 mg/kg	2.976	56.847 mg/kg	0.00568 %		
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<**LOD**
12	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		130 mg/kg	1.245	161.813 mg/kg	0.0162 %		
13	TPH (C6 to C40) petroleum group			TPH		22.7 mg/kg		22.7 mg/kg	0.00227 %		
14	benzene	601-020-00-8	200-753-7	71-43-2		<0.009 mg/kg		<0.009 mg/kg	<0.0000009 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
16		ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
17		xylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
18		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
19		pH				8.96	pH		8.96	pH	8.96 pH		
				PH									
20		naphthalene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
21		acenaphthylene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
			205-917-1	208-96-8									
22		acenaphthene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
			201-469-6	83-32-9									
23		fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
24		phenanthrene				0.0442	mg/kg		0.0442	mg/kg	0.00000442 %		
			201-581-5	85-01-8									
25		anthracene				<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		<LOD
			204-371-1	120-12-7									
26		fluoranthene				0.195	mg/kg		0.195	mg/kg	0.0000195 %		
			205-912-4	206-44-0									
27		pyrene				0.167	mg/kg		0.167	mg/kg	0.0000167 %		
			204-927-3	129-00-0									
28		benzo[a]anthracene				0.0895	mg/kg		0.0895	mg/kg	0.00000895 %		
		601-033-00-9	200-280-6	56-55-3									
29		chrysene				0.0832	mg/kg		0.0832	mg/kg	0.00000832 %		
		601-048-00-0	205-923-4	218-01-9									
30		benzo[b]fluoranthene				0.131	mg/kg		0.131	mg/kg	0.0000131 %		
		601-034-00-4	205-911-9	205-99-2									
31		benzo[k]fluoranthene				0.0431	mg/kg		0.0431	mg/kg	0.00000431 %		
		601-036-00-5	205-916-6	207-08-9									
32		benzo[a]pyrene; benzo[def]chrysene				0.101	mg/kg		0.101	mg/kg	0.0000101 %		
		601-032-00-3	200-028-5	50-32-8									
33		indeno[123-cd]pyrene				0.073	mg/kg		0.073	mg/kg	0.0000073 %		
			205-893-2	193-39-5									
34		dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
35		benzo[ghi]perylene				0.0787	mg/kg		0.0787	mg/kg	0.00000787 %		
			205-883-8	191-24-2									
36		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0544 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00227%)

Classification of sample: TP20

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample Name:
TP20
Sample Depth:
0.40-0.40 m
Moisture content:
8.5%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1B; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.132%)

HP 11: Mutagenic "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

Muta. 1B; H340 "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.132%)

Determinands

Moisture content: 8.5% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		3.36 mg/kg	1.197	4.022 mg/kg	0.000402 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		69 mg/kg	1.32	91.102 mg/kg	0.00911 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.291 mg/kg	2.775	0.808 mg/kg	0.0000808 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<**LOD**
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.21 mg/kg	1.142	1.382 mg/kg	0.000138 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		73.6 mg/kg	1.462	107.571 mg/kg	0.0108 %		
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		480 mg/kg	1.126	540.426 mg/kg	0.054 %		

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	231 mg/kg		231 mg/kg	0.0231 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<LOD
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		24.5 mg/kg	2.976	72.918 mg/kg	0.00729 %		
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
12	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		1140 mg/kg	1.245	1418.974 mg/kg	0.142 %		
13	TPH (C6 to C40) petroleum group			TPH		1320 mg/kg		1320 mg/kg	0.132 %		
14	benzene	601-020-00-8	200-753-7	71-43-2		<0.18 mg/kg		<0.18 mg/kg	<0.000018 %		<LOD
15	toluene	601-021-00-3	203-625-9	108-88-3		<0.14 mg/kg		<0.14 mg/kg	<0.000014 %		<LOD
16	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.08 mg/kg		<0.08 mg/kg	<0.000008 %		<LOD
17	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
18	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
19	pH			PH		8.95 pH		8.95 pH	8.95 pH		
20	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.045 mg/kg		<0.045 mg/kg	<0.0000045 %		<LOD
21	acenaphthylene		205-917-1	208-96-8		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
22	acenaphthene		201-469-6	83-32-9		0.0746 mg/kg		0.0746 mg/kg	0.00000746 %		
23	fluorene		201-695-5	86-73-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
24	phenanthrene		201-581-5	85-01-8		0.728 mg/kg		0.728 mg/kg	0.0000728 %		
25	anthracene		204-371-1	120-12-7		0.267 mg/kg		0.267 mg/kg	0.0000267 %		
26	fluoranthene		205-912-4	206-44-0		2.12 mg/kg		2.12 mg/kg	0.000212 %		
27	pyrene		204-927-3	129-00-0		1.66 mg/kg		1.66 mg/kg	0.000166 %		
28	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		1.1 mg/kg		1.1 mg/kg	0.00011 %		
29	chrysene	601-048-00-0	205-923-4	218-01-9		1.16 mg/kg		1.16 mg/kg	0.000116 %		
30	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		1.45 mg/kg		1.45 mg/kg	0.000145 %		
31	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.527 mg/kg		0.527 mg/kg	0.0000527 %		
32	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.911 mg/kg		0.911 mg/kg	0.0000911 %		
33	indeno[123-cd]pyrene		205-893-2	193-39-5		0.552 mg/kg		0.552 mg/kg	0.0000552 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
34		dibenz[a,h]anthracene				0.153	mg/kg		0.153	mg/kg	0.0000153 %		
		601-041-00-2	200-181-8	53-70-3									
35		benzo[ghi]perylene				0.646	mg/kg		0.646	mg/kg	0.0000646 %		
			205-883-8	191-24-2									
36		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.381 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.132%)

Classification of sample: TP20[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
TP20[2]
Sample Depth:
0.90-0.90 m
Moisture content:
11%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 11% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		0.91 mg/kg	1.197	1.089 mg/kg	0.000109 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		353 mg/kg	1.32	466.075 mg/kg	0.0466 %		
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.216 mg/kg	2.775	0.599 mg/kg	0.0000599 %		
4	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<**LOD**
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.492 mg/kg	1.142	0.562 mg/kg	0.0000562 %		
6	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		4.19 mg/kg	1.462	6.124 mg/kg	0.000612 %		
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		136 mg/kg	1.126	153.121 mg/kg	0.0153 %		
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	150 mg/kg		150 mg/kg	0.015 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<**LOD**
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		9.11 mg/kg	2.976	27.114 mg/kg	0.00271 %		
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<**LOD**
12	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		211 mg/kg	1.245	262.635 mg/kg	0.0263 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<**LOD**
		006-007-00-5											
14		pH				8.7	pH		8.7	pH	8.7 pH		
				PH									
15		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.108 %		

Key

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

Classification of sample: TP21

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
TP21
Sample Depth:
0.30-0.30 m
Moisture content:
6.7%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 6.7% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		2.28 mg/kg	1.197	2.729 mg/kg	0.000273 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		20.2 mg/kg	1.32	26.671 mg/kg	0.00267 %		
3	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<LOD
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.438 mg/kg	1.142	0.5 mg/kg	0.00005 %		
5	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		7.37 mg/kg	1.462	10.772 mg/kg	0.00108 %		
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		43.2 mg/kg	1.126	48.638 mg/kg	0.00486 %		
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	150 mg/kg		150 mg/kg	0.015 %		
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.242 mg/kg	1.353	0.328 mg/kg	0.0000328 %		
9	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		7.98 mg/kg	2.976	23.751 mg/kg	0.00238 %		
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
11	zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		149 mg/kg	1.245	185.462 mg/kg	0.0185 %		
12	TPH (C6 to C40) petroleum group			TPH		637 mg/kg		637 mg/kg	0.0637 %		
13	benzene	601-020-00-8	200-753-7	71-43-2		<0.09 mg/kg		<0.09 mg/kg	<0.000009 %		<LOD
14	toluene	601-021-00-3	203-625-9	108-88-3		<0.07 mg/kg		<0.07 mg/kg	<0.000007 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		ethylbenzene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
16		xylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
18		pH				9.05	pH		9.05	pH	9.05 pH		
				PH									
19		naphthalene				0.0127	mg/kg		0.0127	mg/kg	0.00000127 %		
		601-052-00-2	202-049-5	91-20-3									
20		acenaphthylene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
			205-917-1	208-96-8									
21		acenaphthene				0.019	mg/kg		0.019	mg/kg	0.0000019 %		
			201-469-6	83-32-9									
22		fluorene				0.014	mg/kg		0.014	mg/kg	0.0000014 %		
			201-695-5	86-73-7									
23		phenanthrene				0.128	mg/kg		0.128	mg/kg	0.0000128 %		
			201-581-5	85-01-8									
24		anthracene				0.0358	mg/kg		0.0358	mg/kg	0.00000358 %		
			204-371-1	120-12-7									
25		fluoranthene				0.264	mg/kg		0.264	mg/kg	0.0000264 %		
			205-912-4	206-44-0									
26		pyrene				0.233	mg/kg		0.233	mg/kg	0.0000233 %		
			204-927-3	129-00-0									
27		benzo[a]anthracene				0.118	mg/kg		0.118	mg/kg	0.0000118 %		
		601-033-00-9	200-280-6	56-55-3									
28		chrysene				0.123	mg/kg		0.123	mg/kg	0.0000123 %		
		601-048-00-0	205-923-4	218-01-9									
29		benzo[b]fluoranthene				0.165	mg/kg		0.165	mg/kg	0.0000165 %		
		601-034-00-4	205-911-9	205-99-2									
30		benzo[k]fluoranthene				0.0615	mg/kg		0.0615	mg/kg	0.00000615 %		
		601-036-00-5	205-916-6	207-08-9									
31		benzo[a]pyrene; benzo[def]chrysene				0.111	mg/kg		0.111	mg/kg	0.0000111 %		
		601-032-00-3	200-028-5	50-32-8									
32		indeno[123-cd]pyrene				0.0692	mg/kg		0.0692	mg/kg	0.00000692 %		
			205-893-2	193-39-5									
33		dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
34		benzo[ghi]perylene				0.0646	mg/kg		0.0646	mg/kg	0.00000646 %		
			205-883-8	191-24-2									
35		phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.11 %		

Key

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

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because The hazardous property HP3(i) relates to liquid waste and the materials sampled were solid. In addition, the BH and TP logs indicate that no free product, liquid hydrocarbons or any other visual or olfactory evidence of hydrocarbon contamination were observed during the ground investigation. In order to assess the Hazard HP3, the 'decision tree' presented in the WM3 guidance for 'Waste soil' in relation to Hazard HP 3 was followed. The assessment process indicated that the Hazard Property HP 3(i) in the samples originally falgged as potentially hazardous can be discounted.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0637%)

Appendix A: Classifier defined and non CLP determinands

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

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

lead compounds with the exception of those specified elsewhere in this Annex (worst case)

CLP index number: 082-001-00-6
Description/Comments: Worst Case: IARC considers lead compounds Group 1; Carcinogenic to humans; Lead REACH Consortium considers some lead compounds Carcinogenic category 1A
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): Carc. 1A H350
Reason for additional Hazards Statement(s)/Risk Phrase(s):
03 Jun 2015 - Carc. 1A H350 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html (worst case lead compounds). Review date 29/09/2015

TPH (C6 to C40) petroleum group (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Aquatic Chronic 2 H411 , Repr. 2 H361d , Carc. 1B H350 , Muta. 1B H340 , STOT RE 2 H373 , Asp. Tox. 1 H304 , Flam. Liq. 3 H226

ethylbenzene (EC Number: 202-849-4, CAS Number: 100-41-4)

CLP index number: 601-023-00-4
Description/Comments:
Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)
Additional Hazard Statement(s): Carc. 2 H351
Reason for additional Hazards Statement(s)/Risk Phrase(s):
03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2B (77) 2000

salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex

CLP index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Data source: Commission Regulation (EC) No 790/2009 - 1st Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP1)
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s)/Risk Phrase(s):
14 Dec 2015 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

pH (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

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

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

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

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

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Skin Irrit. 2 H315 , Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Sens. 1 H317 , Carc. 2 H351 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302

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

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

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

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

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

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

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2 H351

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

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

polychlorobiphenyls; PCB (EC Number: 215-648-1, CAS Number: 1336-36-3)

CLP index number: 602-039-00-4
Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans; POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): Carc. 1A H350
Reason for additional Hazards Statement(s)/Risk Phrase(s):
29 Sep 2015 - Carc. 1A H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

Appendix B: Rationale for selection of metal species

antimony {antimony trioxide}

Worst case CLP species based on hazard statements/molecular weight and low solubility. Industrial sources include: flame retardants in electrical apparatus, textiles and coatings (edit as required)

arsenic {arsenic trioxide}

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

beryllium {beryllium oxide}

Reasonable case CLP species based on hazard statements/molecular weight. Industrial sources include: most common (non alloy) form, used in ceramics (edit as required)

boron {diboron trioxide; boric oxide}

Reasonable case CLP species based on hazard statements/ molecular weight, physical form and low solubility. Industrial sources include: fluxing agent for glass/enamels; additive for fibre optics, borosilicate glass (edit as required)

cadmium {cadmium oxide}

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

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

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

copper {dicopper oxide; copper (I) oxide}

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

lead {lead compounds with the exception of those specified elsewhere in this Annex (worst case)}

No CrVI present onsite

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case. Pigment cadmium sulphoselenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil. (edit as required)

zinc {zinc oxide}

Zinc oxide species anticiapted onsite; limited sulphate and chlorine present

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case as complex cyanides and those specified elsewhere in the annex are not likely to be present in this soil: [Note conversion factor based on a worst case compound: sodium cyanide] (edit as required)

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

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1, May 2018
HazWasteOnline Classification Engine Version: 2019.256.4006.8076 (13 Sep 2019)
HazWasteOnline Database: 2019.256.4006.8076 (13 Sep 2019)

This classification utilises the following guidance and legislation:
WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010
2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010