

FEZ Holbeach

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Assessment

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60550563/HOLB/03 – Conceptual Site Model

60550563/HOLB/04 – Exploratory Hole Location Plan

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1. Introduction

1.1 Project Background

AECOM Infrastructure & Environment UK Ltd (herein referred to as “AECOM”) was commissioned by Lincolnshire County Council to prepare a Phase II Geo-Environmental and Geotechnical Assessment report for the Food Enterprise Zone (FEZ) Holbeach site (herein referred to as the “Site”), based on a ground investigation designed and supervised by AECOM. The location of the Site is presented in Drawing 60550563/HOLB/01 – FEZ Holbeach Site Location.

The Ground Investigation (GI) was based on the recommendations provided in the AECOM FEZ Holbeach Phase I Geo-environmental and Geotechnical Desk Study Report undertaken for and issued to Lincolnshire County Council in February 2019. The GI was undertaken by Socotec and supervised by AECOM between 17th June and 25th June 2019 in accordance with the AECOM (April 2019) Geo-environmental and Geotechnical Ground Investigation Specification.

1.2 Purpose of Report

This interpretative report is intended to provide a summary of the Ground Investigation works undertaken and to interpret the findings in the context of the engineering and development requirements of the proposed development scheme. The scope of the interpretative report includes:

- Summary of the ground investigation site works;
- Review of the geological and hydrogeological conditions;
- Characterisation of the geotechnical properties (composition, strength, deformability etc.) of the sub-surface materials to inform geotechnical design of the development platforms; and,
- Characterisation of the geochemical conditions and potential risks from contaminants to human health and the wider environment in the context of the proposed development.

This report will be used to inform any subsequent Remediation / Reclamation Strategy for the proposed development should this be required.

1.3 Proposed Development

The proposed development will be on an area of land approximately 3.5 hectares, located west of the A151 and east of Hungerdike Gate Road, in Holbeach, South Lincolnshire. It is intended that the site will be developed for office accommodation or other industrial use. The proposed development plan can be found in Drawing 60550563/HOLB/02.

1.4 Sources of Information

The information and documents received for the purpose of this report are given:

- AECOM (2019) FEZ Holbeach Phase 1 Geo-environmental and Geotechnical Desk Study Report;
- AECOM (2019) Geoenvironmental and Geotechnical Ground Investigation Specification.
- British Geological Survey Solid and Drift Geological Map for Spalding (Sheet 144) 1:50,000;
- Envirocheck Report, Landmark Group, 22nd January 2019, Order No. 191780895_1_1; and
- British Geological Survey (BGS) website (www.bgs.ac.uk accessed 02/09/2019).

2. Site Setting and Review of Existing Data

2.1 General

The following sections comprise a summary of the FEZ Holbeach Phase I Geo-environmental and Geotechnical Desk Study of existing data prepared by AECOM in February 2019. The Phase I Geo-environmental and Geotechnical Desk Study should be read in conjunction with this Phase II Report.

2.2 Location and Current Land Use

The proposed development site is located in the Holbeach area in South Lincolnshire. The site lies between the A151 and a track known as Hungerdike Gate, approximately 15km southwest of the east coast of England (The Wash) and 9.10km northeast of Spalding. The centre of the Holbeach site can be located at National Grid Reference TF347256 (E534711, N325601). The location of the site is presented in Drawing 60550563/HOLB/01.

At present the proposed 3.49 Ha development site currently consists of an arable field. A site layout is presented in Drawing 60550563/HOLB/02.

Adjacent to the southern boundary of the site is the Rose View Drive residential travellers' site. The Frontier Agriculture site, which is described as a chemical merchant specialising in seed supply, crop protection products and fertilisers, is located adjacent to the northern site boundary. The website for the company can be found here: <https://www.frontierag.co.uk/>. Further residential areas can be found 470m east of the site, along with agricultural fields in all locations around the site boundaries.

The A151 runs along the eastern boundary of the site and meets the A17 approximately 200m northeast of the site.

2.3 Historical Land Use

2.3.1 On-site

A review of the available historical maps for the Site has yielded the following information and potential contaminative uses within the boundaries of the Site:

- Since 1887 the site has consisted of agricultural fields with a footpath running through the southern and western boundaries from 1906 onwards.

2.3.2 Adjacent Areas

The following describe the potential contaminative uses of the adjacent areas to the Site:

- From 1970-1977 a Distillery Farm has been developed approximately 20m north of the site boundary
- From the 1992 the A17 and the A151 are both recorded to the north and east of the site respectively. The A151 almost passing along the east site boundary.

2.4 Geology

This section summaries the geology of the site based on information contained in the Envirocheck Report (191780895_1_1), the BGS website and the BGS Solid and Drift Geology BGS 1:50,000 Sheet 144 (Spalding). The geology and ground conditions encountered during the intrusive ground investigation are discussed in Section 4.

2.4.1 Made Ground

No Made Ground/Infilled Ground was recorded within the site boundaries of the proposed development area.

2.4.2 Superficial Deposits

Superficial Tidal Flat Deposits (Clay and Silt) is identified within the site boundary and the immediate surroundings. These deposits are described by the BGS Lexicon as '*a consolidated soft silty clay, with layers of sand, gravel and peat*'.

The AECOM/SOCOTEC 2019 ground investigation confirmed the presence of the Superficial Tidal Flat Deposits.

2.4.3 Bedrock

The BGS solid and drift geological map for Spalding (Sheet 144) 1:50,000 indicate that the underlying solid geology for the site is comprised of West Walton Formation (Mudstone and Siltstone), of Jurassic age, described by the BGS Lexicon as '*calcareous mudstone, silty mudstone and siltstone, with subordinate fine-grained sandstones and argillaceous limestone or siltstone nodules*'.

The AECOM/SOCOTEC 2019 ground investigation confirmed the presence of the West Walton Formation.

2.5 Hydrogeology

The superficial or bedrock geology on-site or within a 1km radius of its boundaries (MAGIC website) are classified as unproductive strata.

Envirocheck Report (191780895_1_1) indicates that the site is not located within a SPZ.

2.6 Hydrology

One surface water body is located on-site. This is an unnamed drain which runs along the eastern boundary of the site. Additionally, there are drains in all directions around the site boundaries, including one approximately 25m north. The closest significant water bodies are the New River (Drain) (also identified as the Whaplode River on the Environment Agency's Catch Data Explorer website - <https://environment.data.gov.uk/catchment-planning/WaterBody/GB205031055495>), approximately 85m east of the site. The New River (Drain) is identified as the Holbeach River (Drain) approximately 650m northeast of the site boundaries. The Whaplode River was given a moderate ecological and good chemical classification in 2016, and also a moderate overall classification.

The FEZ Holbeach site is within the Anglian River Basin District and the Welland Lower operational catchment. The Environment Agency states that the surface waters within this area are all of good chemical status.

The site lies in an area which is at risk from extreme flooding from rivers or seas without defences (Envirocheck Report (191780895_1_1)).

3. Summary of Ground Investigation

3.1 Introduction

SOCOTEC UK Ltd carried out intrusive investigation works between 17th June and 25th June 2019 supervised on a full time basis by AECOM. The scope and detail of the site works were based upon the guidance set out in BS 1-175:2001, BS 5930:2015 and BSEN 1997 – 2:2007. AECOM developed a Geo-environmental and Geotechnical Ground Investigation Specification (April 2019). The ground investigation comprised of cable percussion boreholes and trial pitting.

3.2 Purpose and Scope of Works

The ground investigation comprised a combined geotechnical and geo-environmental assessment. The purpose of the investigation was to evaluate the extent, nature, geo-environmental and geotechnical properties of the underlying ground conditions.

The main objectives were:

- To determine the sequence of strata;
- Investigate the nature of the underlying natural ground (Tidal Flat Deposits), including determination of in-situ properties
- Investigate depths to the rockhead (West Walton Formation);
- To obtain sufficient information regarding the groundwater regime at the site to enable an assessment of the risks to and from groundwater and surface water regarding the proposed development;
- To obtain soil and groundwater samples for chemical laboratory testing and geotechnical laboratory testing;
- To install gas and groundwater monitoring wells and undertake monitoring of ground gas concentrations and groundwater levels;
- Undertake a range of suitable soil, leachate and groundwater chemical tests, including BRE sulphate tests.

The summary of the scope of the site investigation works was as follows:

- 4 No. Cable Percussion Boreholes with disturbed and undisturbed (U100) sampling;
- 8 No. Machine Dug Trial Pits with disturbed sampling;
- 6 No. In situ CBR tests (undertaken in the trial pits);
- 4 No. 50mm gas/water monitoring standpipes in the completed cable percussion boreholes;
- In situ testing – SPTs;
- Survey of exploratory hole location and level;
- Geo-environmental laboratory testing;
- Geotechnical laboratory testing.

The location of exploratory holes and the surface sampling points were surveyed and levelled at the end of the fieldwork. The as-built co-ordinates are presented on the exploratory hole logs in Appendix A.

3.3 In-situ Testing

3.3.1 Standard Penetration Tests (SPTs)

Standard Penetration Tests (SPTs) were undertaken at regular intervals in the cable percussion boreholes in both granular and cohesive soils. The tests were carried out in accordance with the proposals recommended by BS 1377, Part 9, 1990.

The results are reported as SPT 'N-values' on the borehole logs, which are included in Appendix A.

3.4 Geotechnical Laboratory Testing

A range of geotechnical tests were scheduled to assess the physical properties of the soils encountered. All soil samples were prepared in accordance with BS 1377: Part One: 1990 and representative sub-samples were taken for testing. The following tests were undertaken:

- 37 moisture content tests;
- 14 Atterberg Limits tests;
- 4 particle size distribution tests;
- 4 Sedimentation tests;
- 6 particle density (Gas Jar) tests;
- 2 “quick” unconsolidated undrained triaxial shear strength test;
- 1 consolidated undrained triaxial compression tests with multistage loading;
- 1 small shear box tests;
- 1 Oedometer Tests;
- 14 BRE sulphate suite.

3.5 Chemical Laboratory Testing

Contamination samples were taken at a number of locations across the site and from a range of encountered strata. The range of testing scheduled on soil, leachate and groundwater samples are detailed in the following sections.

3.5.1 Soils

- 14 Soil Suite tests, which included the following determinands; Arsenic, Boron, Cadmium, Copper, Chromium (hexavalent), Chromium (total), Iron, Lead, Mercury, Nickel, Selenium, Zinc; Cyanide (total), Cyanide (free), Thiocyanate, pH Value, Ammoniacal Nitrogen, Soil Organic Matter, Phenols (total HPLC);
- 12 tests for Asbestos Screens;
- 3 tests for Total Petroleum Hydrocarbons (TPH CWG);
- 1 test for Polycyclic Aromatic Hydrocarbons (PAH);
- 2 tests for Semi-Volatile Organic Compounds (SVOC); and
- 5 tests for Pesticides and Herbicides.

3.5.2 Soil Leachate

- 8 Soil Leachate Suite Tests, which included the following determinands; Arsenic, Boron, Cadmium, Copper, Chromium (hexavalent), Chromium (total), Calcium, Iron, Lead, Mercury, Nickel, Selenium, Zinc, Ammoniacal Nitrogen, Cyanide (total), Cyanide (free), Thiocyanate, Chloride, pH, EPH, Phenols (HPLC), and Dissolved Organic Carbon;
- 1 test for Total Petroleum Hydrocarbons (TPH CWG);
- 1 test for Polycyclic Aromatic Hydrocarbons (PAH);
- 1 test for Semi-Volatile Organic Compounds (SVOC); and
- 3 tests for Pesticides and Herbicides.

3.5.3 Groundwater

Three rounds of groundwater sampling and testing has been carried out from the standpipes installed in four boreholes. The locations of monitoring standpipes are detailed on drawing 60550563/HOLB/04 – Exploratory Hole Location Plan.

Groundwater samples for chemical analysis were taken from the installations and put into appropriate containers and sent to the laboratory for analysis; the details of the groundwater testing suites scheduled are listed below:

- 12 Water Suite tests including the following determinands; Arsenic, Cadmium, Calcium, Boron, Copper, Chromium, Chromium (Hexavalent), Lead, Mercury, Nickel, Selenium, Iron, Zinc, Ammoniacal Nitrogen, Sulphate, Cyanide (free), Cyanide (total), Thiocyanate, Chloride, Nitrate, pH, Suspended Solids, Total Hardness, EPH, Dissolved Organic Carbon, and Phenols (by HPLC).
- 4 tests for Total Petroleum Hydrocarbons (TPH CWG);
- 4 tests for Pesticides and Herbicides;
- 4 tests for Semi Volatile Organic Compounds (SVOC); and
- 2 tests for Phenols (Speciated GC-MS).

3.6 Groundwater Level and Ground Gas Monitoring

Four standpipes (nominal 50mm diameter) were installed within selected boreholes to monitor soil gas emissions and groundwater levels within the Tidal Flat Deposits.

At the time of writing this report three rounds of gas and groundwater monitoring have been undertaken between the 19th July 2019 and 6th August 2019.

The locations of the monitoring standpipes are detailed on drawing 60550563/HOLB/04 – Exploratory Hole Location Plan.

Standing water levels were monitored using an electrical dip-meter and composition of ground gases as well as flow were monitored using a GA2000 gas analyser. The gas monitoring recorded the following parameters:

- Concentrations of gases; Methane, Carbon Dioxide, Oxygen, Hydrogen Sulphide and Carbon Monoxide;
- Gas Flow Rate;
- Atmospheric Pressure; and
- Relative Pressure.

The details for the installations are shown in Table 1.

Table 1. Standpipe Installation Details

Location	Screened Depths (m bgl)	Screened Strata
BH01	1.0 – 6.0	Tidal Flat Deposits
BH02	1.0 – 6.0	Tidal Flat Deposits
BH03	1.0 – 7.0	Tidal Flat Deposits
BH04	1.0 – 6.0	Tidal Flat Deposits

4. Encountered Ground Conditions

4.1 Ground Profile

The records of boreholes and trial pits report a consistent sequence of strata across the site, the materials identified at the site mainly comprised Topsoil overlying Superficial Tidal Flat Deposits overlying bedrock geology of the West Walton Formation.

Table 2 presents the summary of the strata encountered across the site.

Table 2. Summary of encountered strata across the site

Strata	Top of strata (m bgl)		Depth to base (m bgl)		Thickness (m)	
	Min	Max	Min	Max	Min	Max
Topsoil	GL	GL	0.4	0.4	0.4	0.4
Tidal Flat Deposits	0.4	0.4	15.0	15.0	14.6	14.6
West Walton Formation	15.0	15.0	20.45*	21.45*	5.45*	7.45*

GL = ground level

* Base not determined

4.1.1 Topsoil

Topsoil was encountered in all the exploratory hole locations across the site. There is a relative consistency of Topsoil thickness across the site of between 0.4m.

The Topsoil was generally encountered as a brown slightly sandy SILT with frequent rootlets and roots (up to 10mm).

4.1.2 Superficial (Tidal Flat Deposits)

The Tidal flat deposits were encountered in all locations from depths between 0.4m to 15m. From 0.4m to 1.2m the Tidal Flat deposits comprised of brown slightly sandy SILT, then generally from 1.2m to 8m consisted of a loose to medium dense brown slightly silty to silty fine SAND, and from 8m to 15m this becomes medium dense with shell fragments.

4.1.3 Bedrock (West Walton Formation)

The West Walton Formation was encountered in a weathered state in all four boreholes from a consistent top depth of 15.0m to >22.45m bgl. The base of the formation was not proven. From 15m to between 16.8 and 19m bgl the stratum generally comprised a soft to firm extremely closely fissured grey mottled yellowish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine to medium of chalk, extremely weak mudstone, flint and sandstone. Then from between 16.8m and 19m down to 22.45m bgl it becomes firm to stiff.

4.2 Physical Evidence of Potential Contamination

There was no evidence within the boreholes or trial pits of potential contamination.

4.3 Groundwater Strikes

Groundwater was encountered in BH02 at 2.20m bgl (rising to 1.30m bgl after 20 minutes) and BH04 at 2.50m bgl (rising to 0.75m bgl after 20 minutes) within the Tidal flat deposits.

Groundwater was encountered in BH02 at 15.5m bgl (rising to 4.5m bgl after 20 minutes) in the weathered West Walton Formation.

4.4 Groundwater Monitoring Levels

Three rounds of groundwater level monitoring have been undertaken at the site in all 4 of the standpipes during the period 19th July 2019 to 6th August 2019. A summary of the monitoring results is presented in Table 3.

Table 3. Summary of Groundwater Level Monitoring

Exploratory Hole	Standing Groundwater Level (m bgl)			Strata Screened
	Minimum	Maximum	Mean	
BH01	1.83	2.13	1.96	Tidal Flat Deposits
BH02	1.72	2.06	1.85	Tidal Flat Deposits
BH03	1.78	2.18	1.94	Tidal Flat Deposits
BH04	1.65	1.85	1.76	Tidal Flat Deposits

At the time of writing ground levels details for the exploratory locations have not been received. However, the depths to groundwater suggest that the groundwater flow direction in the Tidal Flat deposits is generally towards the east.

5. Geotechnical Assessment

5.1 Introduction

An assessment of the geotechnical properties and classification of the encountered strata (Topsoil, Tidal Flat Deposits and West Walton Formation) was undertaken in order to establish their geotechnical properties. The geotechnical properties were established from in-situ geotechnical testing and laboratory geotechnical analysis. The following sections present and interpret available geotechnical testing data obtained during the ground investigation. The geotechnical test results are included in Appendix A.

5.2 Topsoil

5.2.1 Index Properties

Atterberg Limit testing was undertaken on 5 samples of Topsoil. A summary of the testing is presented in Table 4.

Table 4. Classification Properties of Topsoil

Soil Parameter	No. of Samples	Average Values	Range of Values
Moisture Content	5	25	21 – 30
Liquid Limit (%)	5	35	31 - 38
Plastic Limit (%)	5	23	22 - 24
Plasticity Index (%)	5	12	7 - 14

The Plasticity Chart (see Chart 1) indicates that the Topsoil can generally be classified as low to intermediate plasticity clay and intermediate plasticity silts. The natural moisture content of Topsoil ranged from 21% and 30% with an average value of 25.4%.

5.2.2 Particle Density

One sample of Topsoil was tested for Particle Density (Mg/m^3) giving a result of 2.64 Mg/m^3 .

5.3 Tidal Flat Deposits

5.3.1 Index Properties

Atterberg Limit testing was undertaken on 2 samples of Tidal Flat Deposits (upper silt horizon). A summary of the testing is presented in Table 5.

The Plasticity Chart (see Chart 1) indicates that the Tidal Flat Deposits (Silt) can generally be classified as low plasticity clay.

Table 5. Classification Properties of Tidal Flat Deposits (Silt)

Soil Parameter	No. of Samples	Average Values	Range of Values
Moisture Content	4	26	21 – 31
Liquid Limit (%)	2	40	38 – 41
Plastic Limit (%)	2	23	22 - 24
Plasticity Index (%)	2	17	16 – 17

A total of 19 samples of granular Tidal Flat Deposits (Sand) were tested for moisture content with an average moisture content value of 25.9% and a range of between 19% and 31%.

A moisture content vs depth chart is presented as Chart 2.

5.3.2 Particle Size Distribution and Particle Density

Two particle size distribution (PSD) tests were undertaken on samples of granular Tidal Flat Deposits. Table 6 summarises the average and range of size fractions of the various materials encountered.

Table 6. Proportions of Size Fractions in granular Tidal Flat Deposits

Material Classification	No. of Tests	Average and Range of Size Fractions (%)				
		Cobbles	Gravel	Sand	Silt	Clay
Tidal Flat Deposits (Granular)	2	0 (0)	0 (0)	86 (74 – 98)	10 (0 – 19)	5 (2 – 7)

The PSD tests show that the granular Tidal Flat Deposits consist mainly of Sand, with a small proportion of Silt and Clay.

Five samples of Tidal Flat Deposits were tested for Particle Density (Mg/m^3), the results are summarised in Table 7.

Table 7. Particle Density of Tidal Flat Deposits

Strata	No. of samples	Particle Density (Mg/m^3)	
		Average	Range
Tidal Flat Deposits (Cohesive)	2	2.68	2.67 – 2.69
Tidal Flat Deposits (Granular)	3	2.67	2.66 – 2.68

5.3.3 Consistency and Relative Density

Standard Penetration Tests (SPTs) were undertaken at regular intervals and were alternated with U100s where cohesive soils were present.

Twenty-nine SPTs were undertaken during the ground investigation within the granular Tidal Flat Deposits resulting in N Values in a range of 1 – 52 (average 21).

An upper limit N Value 50 was applied to indicate effective refusal during the test. The plot of the SPT 'N' Value against depth is presented in Chart 3. The plot tends to show a general increase in 'N' Value with depth.

From the recorded SPT results, estimates of density for the Tidal Flat Deposits vary from very loose to very dense. The majority of laboratory test classify the material as medium dense.

5.3.4 Shear Strength

One small shear box test was undertaken on a sample of granular Tidal Flat Deposits. The tests resulted in a peak angle of internal friction of 27.5° and an effective cohesion of 13 kPa.

5.3.5 California Bearing Ratio (CBR)

Plate bearing tests were completed at six of the trial pit locations at 0.45m bgl which was just within the Tidal Flat Deposits. The in-situ CBR values ranged from 0.7% to 3.2% with an average CBR value of 1.6%.

5.4 West Walton Formation

5.4.1 Index Properties

Atterberg Limit testing was undertaken on 7 samples of cohesive West Walton Formation. A summary of the testing is presented in Table 8.

The Plasticity Chart (Chart 1) indicates the weathered cohesive West Walton Formation is classified as intermediate plasticity clay. The natural moisture content of the cohesive West Walton materials ranged from 15% and 24% with an average value of 20%.

Table 8. Classification Properties of weathered West Walton Formation (cohesive)

Soil Parameter	No. of Samples	Average Values	Range of Values
Moisture Content	8	20	15 – 24
Liquid Limit (%)	7	39	35 – 45
Plastic Limit (%)	7	19	17 – 24
Plasticity Index (%)	7	21	17 – 24

A moisture content vs depth chart is presented as Chart 2.

5.4.2 Particle Size Distribution and Particle Density

Two particle size distribution (PSD) tests were undertaken on samples of weathered West Walton Formation. Table 9 summarises the average and range of size fractions of the various materials encountered.

Table 9. Proportions of Size Fractions in West Walton Formation

Material Classification	No. of Tests	Average and Range of Size Fractions (%)				
		Cobbles	Gravel	Sand	Silt	Clay
West Walton Formation	2	9 (0 – 17)	3 (1 – 4)	9 (5 – 13)	45 (41 – 48)	35 (24 – 45)

The PSD tests show the cohesive materials within the West Walton Formation consists mainly of Silt and Clay, with a small proportion of Cobbles and Gravel.

One sample of West Walton Formation was tested for Particle Density (Mg/m^3), giving a result of 2.73 Mg/m^3 .

5.4.3 Shear Strength

Standard Penetration Tests (SPTs) were undertaken at regular intervals and were alternated with UT100s where cohesive soils were present in the cable percussion boreholes.

Twelve SPTs were undertaken during the ground investigation within weathered West Walton Formation resulting in N Values in a range of 18 – 50 (average 33).

An upper limit N Value 50 was applied to indicate effective refusal during the test. The plot of the SPT 'N' Value against depth is presented in Chart 3. The plot tends to show a general increase in 'N' Value with depth.

To interpret 'N' values in Cohesive Made Ground deposits correctly, and in accordance with recommendations made by Stroud (1989), a conversion factor of C_u (shear strength) is required: $C_u (\text{kPa}) = 5 \text{ 'N'}$ is often considered to be an appropriate 'average'. From the recorded SPT results estimates of shear strength for the Cohesive West Walton Formation range from 90 to 250 kPa (i.e. high strength to very high strength).

One Consolidated Undrained Triaxial Compression test with measurement of pore pressure was undertaken on a sample of cohesive West Walton Formation. The test resulted in a peak angle of internal friction of 26.5° and an effective cohesion of 0 kPa.

5.4.4 Compressibility

A single One Dimensional Oedometer Consolidation test was undertaken on a sample of the cohesive weathered West Walton Formation. The test yielded a coefficient of compressibility value (M_v) of $0.16 \text{ m}^2/\text{MN}$ and a coefficient of consolidation (C_v) of $8.8 \text{ m}^2/\text{yr}$ to $14 \text{ m}^2/\text{yr}$ at a load approximate to the overburden pressure.

The test also yielded an M_v value of $0.041 \text{ m}^2/\text{MN}$ and a C_v of $0.029 \text{ m}^2/\text{yr}$ at a load approximate to the overburden pressure plus 150 kPa.

The values of M_v suggest that the cohesive weathered West Walton Formation is of medium to very low compressibility.

5.5 Chemical Attack on Buried Concrete

Fourteen sulphate analysis suites were carried out on samples of Topsoil (2), Tidal Flat Deposits (8), and the weathered West Walton Formation. The aggressivity classification of the soil at the site, based on the results received in accordance with guidance provided by BRE Special Digest 1: 'Concrete in Aggressive Ground' (SD1: 2005 Third Edition), assuming mobile groundwater conditions is detailed in Table 10.

Table 10. Summary of Ground Aggressivity Classification

Material Classification	Design Sulphate Class	Aggressive Chemical Environment for Concrete	Potentially Pyritic
Topsoil	DS-1	AC-1	No
Tidal Flat Deposits	DS-1	AC-1	No
Weathered West Walton Formation	DS-4	AC-4	Yes

5.6 Settlement Assessment

Predicted primary settlement calculations have been undertaken to assess the potential settlements that may be experienced by the proposed development resulting from load-settlement response of the underlying strata (Tidal Flat Deposits and weathered West Walton Formation) and assuming the proposed buildings may be founded on small pad foundations, raft foundations or shallow strip foundations located at shallow depth in the existing Tidal Flat Deposits.

The calculations are based on granular Tidal Flat Deposits and cohesive weather West Walton Formation and a maximum vertical load of 150 kN/m² for the pad foundations, a maximum vertical load of 15 kN/m² for the raft foundations and a maximum vertical load of 85 to 125 kN/m² (based on a wall loading of 50 kN/linear metre) for the strip foundations. The calculations have allowed for the reduction in load-related effective stress with depth.

The ranges of potential primary settlement for pad and raft foundations are detailed in Table 11.

Table 11. Summary of Potential Maximum Settlements (Pad & Raft Foundations)

Pad Size (m)	Immediate Settlement (mm)	Long-Term Settlement (mm)	Total Settlement (mm)	Settlement Remaining After 6 months (mm)
0.8 x 0.8	19	11	30	8
1.0 x 1.0	25	13	38	10
1.5 x 1.5	36	20	56	15
10 x 10 (raft)	13	9	21	7

The predicted estimates of total primary settlement for pad foundations are between approximately 30 to 56mm, with long-term settlements estimated to be between 10 to 20mm. The predicted estimates of total primary and long-term settlement for raft foundations are between approximately 20mm and 10mm respectively.

The ranges of potential primary settlement for strip foundations are detailed in Table 12.

Table 12. Summary of Potential Maximum Settlements (Strip Foundations)

Strip Size (m)	Applied Load (kN/m ²)	Immediate Settlement (mm)	Long-Term Settlement (mm)	Total Settlement (mm)	Settlement Remaining After 6 months (mm)
0.4 x 8.0	125	17	10	27	7
0.5 x 8.0	100	17	10	27	7
0.6 x 8.0	85	17	10	27	7

5.7 Bearing Capacity

Assessments of the net safe bearing capacity and allowable bearing pressure (for a maximum total settlement of 25mm) have been determined for varying sizes of potential raft and pad foundation solutions based on the prevailing ground conditions.

The calculations for the foundations have been based on the geotechnical properties of the Tidal Flat Deposits and the weathered West Walton Formation.

The net safe bearing capacity and allowable bearing pressure for the existing ground conditions for various sizes of pad and raft foundations are given in table 13.

Table 13. Net Safe Bearing Capacity and Allowable Bearing Pressure for Raft, Pad and Strip Foundations

Foundation Width (m)	Foundation Length (m)	Net Safe Bearing Capacity (kN/m ²)	Allowable Bearing Pressure* (kN/m ²)
0.8	0.8	220	125
1.0	1.0	230	100
1.5	1.5	250	65
10.0	10.0	570	18
0.4	8.0	160	115
0.5	8.0	165	95
0.6	8.0	170	80

* for 25mm total settlement

6. Human Health Risk Assessment

6.1 Tier 1 Assessment Approach

The following sections present an evaluation of the risks to human health (e.g. future site users following redevelopment of the site) associated with any potential contamination present within the Topsoil and natural deposits at the Site. This evaluation has been based on the chemical analysis results obtained during the recent ground investigation undertaken by SOCOTEC between 17th and 25th June, with regard to the proposed commercial/industrial end use.

Initial Tier 1 Risk Assessment was undertaken on the soil sample test data to identify whether any of the samples had recorded concentrations of the various metals, inorganic and organic determinands that were elevated in comparison with the corresponding Generic Assessment Criteria (GAC) for commercial/industrial end uses.

GAC are defined in the Model Procedures for the Management of Land Contamination (CLR11) as:

“Criteria derived using largely generic assumptions about the characteristics and behaviour of Sources (S), Pathways (P) and Receptors (R)”.

These generic assumptions are generally conservative based upon a defined range of conditions. The appropriateness of such values to the site conditions therefore needs to be fully understood and evaluated.

The hierarchy of soil generic assessment criteria sources for a commercial / industrial land use (Sand TOC >0.58% – <1.45%) utilised in the analysis as follows:

- AECOM (modified LQM/CIEH Suitable 4 Use Levels (2015)) Commercial. 1% SOM. Sand;
- AECOM GAC, modified EIC. Commercial/Industrial, Sand, 1% SOM;
- DEFRA (2014) SP1010: Development of Category 4 Screening Levels for Assessment of Land Contamination – Policy Companion Document, December 2014. Commercial. 1% SOM;
- US Environmental Protection Agency, Regional Screening Levels, May 2019. Industrial (no vapours).

These GAC constitute Tier 1 Quantitative risk assessment criteria and are based upon the series of standard default assumptions as to ground conditions, the duration and frequency of exposure of the end-use receptor group as defined in the EA/DEFRA science reports and are based on a sandy soil type with a Total Organic Carbon content of $\geq 0.58\%$ – $< 1.45\%$.

This report focuses on the development of the FEZ Holbeach site which will be re-developed for commercial and industrial use. The purpose of this ground investigation was to assess the ground conditions and to identify the presence of any potential contamination and inform Lincolnshire County Council plans for the development of the Site. It is considered, based on the proposed future land uses of the Site, that the GAC for commercial / industrial end uses can be used to serve as a conservative initial Tier 1 screen to assess the potential risks to human health.

Statistical analysis has been carried out on the sample dataset for those determinands where at least one sample was recorded at a concentration greater than the corresponding GAC. Laboratory chemical analysis data from the 2019 ground investigation has been used in the analysis of risk to human health. The following sections detail the assessment of the laboratory test results against the Tier 1 GAC.

6.1.1 Tier 1 Screen (Soil)

A total of fourteen (14) soil samples were analysed for range of metallic, inorganics, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), phenols, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), herbicides and pesticide contaminants. Of these, six samples were from Topsoil and eight were from Tidal Flat Deposits (Sand). The certificates of chemical analysis are presented in (Appendix A). The soil results were screened for commercial / industrial land uses. Table 14 presents a summary of the samples considered as part of this assessment.

Table 14. A summary of the tests undertaken on each strata

Determinand	Strata	
	No. of tests in Topsoil	No. of tests in Tidal Flat Deposits
Metals	6 / 6	8 / 8
Inorganics	6 / 6	8 / 8
TPH CWG	1 / 6	2 / 8
PAH	1 / 6	0 / 8
Phenols (HPLC)	6 / 6	8 / 8
SVOCs	1 / 6	1 / 8
Herbicides and Pesticides	4 / 6	1 / 8

The results of the Tier 1 screening assessments for soils are presented in Appendix B. The results show that the concentrations of all determinands were below the GAC for commercial / industrial end-uses in the samples tested, also many of the concentrations of metals, inorganics, TPHs, PAHs, phenols, SVOCs, herbicides and pesticides in soil samples were below the detection limit of the analysis.

6.1.2 Hazard Quotient for TPH Risk Assessment

The Environment Agency Report 'The UK Approach for Evaluating Human Health Risk from Petroleum Hydrocarbons in Soils' (SR: P5-080/TR3, 2005) states that even where guideline values for the individual fractions are not exceeded, potential additive toxicological effects between the fractions may result in a potential risk to human health.

The suggested approach to address this issue is to calculate Hazard Quotients (HQs) for each fraction by dividing the recorded concentration of the fraction by the corresponding guideline value. These HQs are then summed to form an overall Hazard Index (HI). Where HI exceeds 1, further risk assessment or an appraisal of remedial works should be undertaken; where HI is less than one, no further action is required. The calculated Hazard Quotient and Hazard Index are presented in Table 15.

Table 15. Calculation of Hazard Quotient and Index

Hydrocarbon Fraction	Maximum Detected Concentration (mg/kg)	GAC Commercial / Industrial (mg/kg)	Hazard Quotient Commercial / Industrial
>C5-C6 Aliphatics	<0.01	2,000	5.00E-06
>C6-C8 Aliphatics	<0.01	4,300	2.33E-06
>C8-C10 Aliphatics	0.0133	1,000	1.33E-05
>C10-12 Aliphatics	0.0121	5,000	2.42E-06
>C12-C16 Aliphatics	<0.1	37,000	2.70E-06
>C16-C21 Aliphatics	<0.1	-	-
>C21-C35 Aliphatics	0.806	-	-
>C35-C44 Aliphatics	<0.1	1,400,000	7.14E-08
>C12-C44 Aliphatics	0.806	-	-
>EC5-EC7 Aromatics	<0.01	12,000	8.33E-07
>EC7-EC8 Aromatics	<0.01	28,000	3.57E-07
>EC8-EC10 Aromatics	<0.01	1,800	5.56E-06
>EC10-EC12 Aromatics	<0.01	9,100	1.10E-06
>EC12-EC16 Aromatics	0.433	34,000	1.27E-05
>EC16-EC21 Aromatics	0.233	28,000	8.32E-06
>EC21-EC35 Aromatics	5.26	28,000	1.88E-04

Hydrocarbon Fraction	Maximum Detected Concentration (mg/kg)	GAC Commercial / Industrial (mg/kg)	Hazard Quotient Commercial / Industrial
>EC35-EC44 Aromatics	2.12	28,000	7.57E-05
>EC40-EC44 Aromatics	0.562	-	-
>EC12-EC44 Aromatics	8.05	-	-
Hazard Index			3.18E-04

The calculated Hazard Index of 3.18E-04 for commercial / industrial developments is significantly lower than 1, which suggests the risks to human health from the additive effects of total petroleum hydrocarbons are negligible for a commercial and industrial end use.

6.2 Asbestos Analysis and Assessment

Twelve soil samples underwent laboratory analysis for asbestos screen and identification during the ground investigation. No asbestos or Asbestos Containing Materials (ACMs) were encountered at any of the exploratory hole locations during the 2019 ground investigation. Therefore, based on the results of laboratory testing and exploratory hole records, there is a very low likelihood of encountering significant quantities of asbestos within the Topsoil or Tidal Flat Deposits at the Site.

6.3 Summary of Tier 1 Human Health Risk Assessment

Soil samples were analysed for metals, inorganics, TPHs, PAHs, phenols, SVOCs, herbicides and pesticide contaminants. Tier 1 screening assessment undertaken against the relevant GACs for commercial / industrial end-uses recorded no exceedances.

Additionally, no asbestos or asbestos containing materials were identified. Therefore, based on the site data, it is considered that there are negligible risks to human health in the context of a commercial / industrial development.

7. Controlled Waters Risk Assessment

7.1 Basis of Tier 1 Risk Assessment

The underlying superficial and solid geology of the Tidal Flat Deposits and West Walton Formation are designated as unproductive strata and there are no Principal or Secondary aquifer designations identified within a 1km radius of its boundaries. Due to the area being in unproductive strata there is no groundwater vulnerability is associated with the area. The site is not within a Groundwater Source Protection Zone.

The nearest water feature is an unnamed drain which runs along the eastern boundary of the site.

Groundwater was identified in two of the boreholes at depths of 2.2m bgl and 2.5m bgl in the Tidal Flat Deposits and in one borehole at 15.5m bgl in the weathered West Walton Formation.

The closest significant water bodies are the New River (Drain), approximately 85m east of the site, the Whaplode River approximately 840m west and the Holbeach River approximately 650m northeast of the site boundaries.

Soil leachate and groundwater datasets have been evaluated against the following hierarchy of criteria for any potential surface and groundwater receptors as mentioned above, and hence is a conservative approach, in order to assess potential risks to controlled waters:

- The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 - AA-EQS Inland; MAC-EQS Inland and Freshwater Standards;
- SEPA - Supporting Guidance (WAT-SG-53) Environmental Quality Standards for Discharges to Surface Waters. v6. Dec 2015. Fresh EQS – AA and Fresh EQS – MAC;
- Water, England & Wales - Water Supply (Water Quality) Regulations, 2016;
- Guidelines for Drinking-water Quality (4th Edition). World Health Organisation. 2011;
- WHO, Petroleum Products in Drinking-water. Background document for development of WHO Guidelines for Drinking-water Quality WHO/SDE/WSH/05.08/123, 2008;
- US Environmental Protection Agency, Risk Screening Levels, May 2016. Tapwater.

An initial Tier 1 Risk Assessment was undertaken to compare the soil leachate and groundwater datasets to the criteria above to identify whether any of the samples had recorded elevated concentrations of metals, inorganic or organic determinands compared to the above hierarchy of criteria.

Laboratory chemical analysis from the ground investigation has been used in the analysis of risk to controlled waters. It should be noted that for a risk to be present then a viable pollutant linkage should be identified between the source and receptor. The results of the Tier 1 Screen for controlled waters are presented in Appendix C.

7.2 Leachate Analysis Results (Tier 1 Screening)

Eight soil samples were taken and were subject to leachate analysis for a variety of determinands, 4 of which were from the Topsoil and 4 were taken from the Tidal Flat Deposits. Results of the Tier 1 Assessment for leachate test results are presented in Appendix C and are discussed in the following sections.

7.2.1 Metals and Inorganics

Eight leachate samples from Topsoil and Tidal Flat Deposits were analysed for metals and inorganics. The majority of the determinands exhibited concentrations below their respective Tier 1 criteria. However, the following determinands exhibited concentrations above their Tier 1 Assessment criteria: Thiocyanate, Arsenic, Copper, Iron, Lead and zinc. Table 16 summarises the exceedances of the determinands against the assessment criteria.

Table 16. Summary of Metal and Inorganic Exceedances in Leachate

Determinand	Units	No. of Exceedances EQS	No. of Exceedances DWS	Recorded Concentrations	EQS	DWS
Thiocyanate	mg/l	-	1/8	<0.05 - 0.06	-	0.004
Arsenic	µg/l	0/8	1/8	<0.5 - 11.6	50	10
Copper	µg/l	8/8	0/8	1.28 – 15.3	1	2000
Iron	µg/l	0/8	4/8	<19 - 650	1000	200
Lead	µg/l	1/8	0/8	<0.2 – 1.22	1.2	10
Zinc	µg/l	1/8	0/8	1.24 - 241	10.9	6000

7.2.2 Organic Determininands

Eight samples were analysed for organic determinands comprising Polycyclic Aromatic Hydrocarbons (PAHs), Total Petroleum Hydrocarbons (TPHs) and Semi-Volatile Organic Compounds (SVOCs). The majority of the determinands exhibited concentrations below their respective Tier 1 criteria and also below the detection limit of the analysis. There was an exceedance of the EQS for Fluoranthene in a sample of Topsoil summarised in Table 17.

Table 17. Summary of Organic Exceedances in Leachate

Determinand	Units	No. of Exceedances EQS	Number of Exceedances DWS	Recorded Concentration	EQS	DWS
Fluoranthene	µg/l	1/1	0/1	0.0245	0.0063	4

7.3 Groundwater Analysis Results (Tier 1 Screening)

Three rounds of groundwater sampling have been undertaken between 19th July 2019 and 6th August 2019 from the four wells installed. The Tier 1 Screening Table for the groundwater samples are presented in Appendix C and the results are discussed in the following sections.

7.3.1 Metals and Inorganics

Twelve groundwater samples from the Tidal Flat Deposits were analysed for metals and inorganics. The majority of the determinands exhibited concentrations below their respective Tier 1 criteria. However, the following determinands exhibited concentrations above their Tier 1 Assessment criteria: Chloride, Nitrate (as NO³⁻), Iron, Iron (Filtered), Nickel (Filtered) and Zinc (Filtered). Table 18 summarises the exceedances of the determinands against the assessment criteria.

Table 18. Summary of Metal and Inorganic Exceedances in Groundwater

Determinand	Units	No. of Exceedances EQS	Number of Exceedances DWS	Recorded Concentrations	EQS	DWS
Chloride	mg/l	9/12	9/12	137 - 2180	250	250
Nitrate (as NO ³⁻)	mg/l	-	1/12	<0.3 - 760		50
Iron	µg/l	12/12	12/12	3260 – 275000	1000	200
Iron (Filtered)	µg/l	2/12	4/12	<19 - 11100	1000	200
Nickel (Filtered)	µg/l	6/12	0/12	2.94 – 7.51	4	20
Zinc (Filtered)	µg/l	6/12	0/12	<1 - 444	10.9	6000

7.3.2 Organic Determinands

Three samples of groundwater from the Tidal Flat Deposits was analysed for organic determinands. Table 19 summarises the exceedances of the determinands against the assessment criteria.

Table 19. Summary of Metal and Inorganic Exceedances in Groundwater

Determinand	Units	No. of Exceedances EQS	Number of Exceedances DWS	Recorded Concentrations	EQS	DWS
>C21-C35 Aliphatics	µg/l	-	2/4	57 - 430	-	300
>EC21-EC35 Aromatics	µg/l	-	1/2	<10 - 134	-	90
Phenol	µg/l	3/12	0/12	<2 – 10	7.7	10
Di-n-butyl phthalate	µg/l	1/4	0/4	<2 - 10.6	900	8
Atrazine	µg/l	0/4	1/4	<0.01 – 0.276	0.6	0.1
4,6-Dinitro-2-methylphenol	µg/l	-	2/4	1.06 - 3.99	-	1.5

7.4 Summary of the Controlled Waters Risk Assessment

A number of metals and inorganic determinands in samples of soil leachate from samples of Topsoil and the Tidal Flat Deposit, and samples of groundwater within the Tidal Flat Deposits exceeded the Tier 1 GAC.

However, it is considered that as there is no evidence of Made Ground or potential contamination at the site these are reflective of background concentrations in the natural deposits and thus no further risk assessment is necessary.

Marginal exceedances of some organic determinands have been identified in groundwater. It is possible that some of these relate to the application of pesticides and herbicides as a result of the site agricultural use.

8. Ground Gas Risk Assessment

8.1 General

The generation or migration of ground gases from natural sources can pose a major hazard to structures, if the gases are able to accumulate within them. In terms of the proposed development, the main risks are that ground gases may accumulate within any enclosed structures or beneath any pavements.

For this study, the borehole gas concentration and flow rate results for carbon dioxide (CO₂) and methane (CH₄) have been compared to guidance values given in the following documents:

- BSI Standards Publication BS 8485:2015 “Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings”;
- CIRIA Report C665 (2007) “Assessing Risks Posed by Hazardous Ground Gases to Buildings”; and

For commercial/industrial end-use the Wilson and Card (1997) classification method is used to give a semi-quantitative estimate of risk for the site.

8.2 Ground Gas Monitoring Results

Four boreholes were monitored for ground gas on three occasions between the 19th July 2019 and 6th August 2019. Gas measurements were made for carbon dioxide (CO₂), methane (CH₄), oxygen (O₂), carbon monoxide (CO), hydrogen sulphide (H₂S) and flow rate. All 4 boreholes (BH01, BH02, BH03 and BH04) were screened within the Tidal Flat Deposits.

The following assessment has been undertaken for the site based on the monitoring data from all three rounds. The range of gas concentrations, flow rates and atmospheric pressures recorded during the monitoring rounds is presented in Appendix D. Table 20 presents a summary of the results. The calculated gas screening values are shown in Table 22. The values are based on the maximum concentration and the maximum flow rate recorded at each borehole during the monitoring period.

Table 20. Summary of Recorded Maximum Gas Concentrations and Flow Rates

Borehole	Peak Gas Readings					Flow Rates (l/hr)
	Max CH ₄ (% v/v)	Max CO ₂ (% v/v)	Min O ₂ (% v/v)	Max CO (ppm)	Max H ₂ S (ppm)	
BH01	<0.1	18.2	1.1	<1	<1	<0.1
BH02	0.2	17.4	1.4	<1	<1	0.1
BH03	0.1	18.7	0.6	<1	<1	<0.1
BH04	<0.1	15.2	2.3	<1	<1	<0.1

8.3 Classification of Gas Regime

In accordance with guidelines within CIRIA C665 (2007), Gas Screening Values (GSVs) have been calculated to assess the significance of gas generation at the site. This is achieved by multiplying the percentage gas concentration (as a decimal) by the flow rates. A Gas Screening Value has been calculated for each monitoring well location in the development plots based on the maximum gas concentration and maximum flow rate recorded in each monitoring well.

Gas screening values (GSV) can be calculated from the gas concentration and the flow rate:

$$GSV (l/hr) = \frac{Gas\ concentration\ (\% v/v)}{100} \times flow\ rate\ (l/hr)$$

The corresponding Characteristic Situation (CS) for the site is based on comparison of the generated GSVs to the values given in Table 21 taken from CIRIA report C665.

Table 21. Classification Scheme for Site Gas Risk Assessment (Modified by Wilson and Card Classification)

Characteristic Situation	Risk Classification	Gas Screening Value (CH ₄ /CO ₂) l/hr	Additional Factors	Typical Source of Generation
1	Very Low	<0.07	Typically CH ₄ <1% and CO ₂ <5%. Otherwise consider increase to CS2.	Natural Soil with low organic content. "Typical" Made Ground.
2	Low	<0.7	Borehole air flow rate not to exceed 70l/hr. Otherwise consider increase to CS3.	Natural Soil with high peat/organic content. "Typical" Made Ground.
3	Moderate	<3.5	-	Old landfill Inert waste Mineworking (flooded)
4	Moderate to High	<15	Quantitative Risk Assessment required evaluating scope of protective measures.	Mineworking susceptible to flooding Completed Landfill (WMP 26b criteria)
5	High	<70	-	Mineworking unflooded inactive with shallow workings near the surface.
6	Very High	>70	-	Recent Landfill site

Source: Table reproduced from CIRIA Report C665

The initial approach in the assessment is to use the worst case scenario by determining the Gas Screening Value (GSV) based on the maximum methane / carbon dioxide concentration and maximum flow rate recorded across the site over the monitoring period. Table 22 presents the most conservative GSV and characteristic situation.

Based on the maximum gas concentrations and maximum flow rate at the site over the monitoring period, the site would be classified as a Characteristic Situation 2 (CS2).

Table 22. Summary of Gas Regime based on Overall Peak Readings at the Site

End Use	Peak Gas Readings			Gas Screening Values		Characteristic Situation
	Max CH ₄ (% v/v)	Max CO ₂ (% v/v)	Max Flow (l/hr)	GSV CH ₄ (l/hr)	GSV CO ₂ (l/hr)	
Commercial/Industrial	0.2	18.7	0.1	0.0002	0.0187	CS2*

* based on maximum recorded CO₂ concentration

8.4 Additional Gas Risk Assessment

8.4.1 Oxygen

The results show that minimum oxygen concentrations in each borehole ranged from 0.6% v/v to 2.3% v/v. Depleted oxygen (i.e. less than 18% v/v) was detected in all boreholes.

Table 23 summarises the physiological effects of an oxygen deficient atmosphere. Based on the oxygen data recorded at the site, it is concluded that there would be a potential risk to construction workers entering excavations or other enclosed spaces at the site.

Table 23. Effects of Reduced Oxygen Concentrations

Oxygen (% vol/vol)	Physiological Effects
19 – 21	Normal range of concentration in the atmosphere
17	Faster, deeper breathing, slight impairment of judgement.
10-16	Initial signs of anoxia leading to emotional upsets; abnormal fatigue upon exertion.
6-10	Nausea, vomiting, unconsciousness; collapse may occur.
<6	Convulsions, gasping respiration, death.

8.4.2 Methane

8.4.2.1 Explosion Risk

The greatest hazards posed by methane are those of fire and explosion. The limits of flammability, i.e. the Lower Explosion Limit (LEL) and Upper Explosion Limit (UEL) are 5% v/v and 15% v/v, respectively. Where methane concentrations are encountered between these two ranges there is the possibility of ignition/explosion. However, concentrations above this should not necessarily be considered safe, because on dilution with air the composition may fall within this flammable range.

8.4.2.2 Assessment

Methane concentrations were recorded across the site in the range of <0.1% v/v to 0.2% v/v. Therefore, there is considered to be a negligible risk of explosion due to methane.

8.4.3 Carbon Dioxide

For carbon dioxide there is no risk of flammability. However, there is a risk of asphyxiation and as such there are toxicity limits of 0.5% (v/v) for an 8 hour long term Occupational Exposure Limit (OEL) and 1.5% (v/v) for a 10 minute Occupational Exposure Limit (OEL).

Concentrations of carbon dioxide were reported in the range of 0.7% to 18.7% v/v during monitoring in the boreholes with response zones located within the Tidal Flat Deposits. The concentrations of carbon dioxide recorded were sufficient to exceed the 8 hour long term OEL and 10 minute Occupational Exposure Limit (OEL) at all locations.

It is concluded that there may be a potential risk to construction workers entering excavations from carbon dioxide. Where entry into excavations is unavoidable, the activity should comply with confined space legislation, and assessed prior to site workers entering.

8.4.4 Carbon Monoxide

A long term (8 hour) workplace exposure limit of 30ppm and a short term (15 minute) workplace exposure limit of 200ppm are given for carbon monoxide.

Carbon monoxide was not recorded above the detection limit of the gas analyser of <1ppm. Therefore, potential risks due to short term or prolonged exposure to carbon monoxide are considered to be negligible at the site.

8.4.5 Hydrogen Sulphide

A long term (8 hour) workplace exposure limit of 5ppm and a short term (15 minute) workplace exposure limit of 10ppm are given for hydrogen sulphide.

Hydrogen sulphide was not recorded above the detection limit of the gas analyser of <1ppm. Therefore, potential risks due to short term or prolonged exposure hydrogen sulphide at the site is considered to be negligible.

8.5 Gas Protection Measures

The ground gas monitoring undertaken at the site has recorded elevated concentrations of carbon dioxide at the site up to a maximum of 18.7% v/v. For the purpose of recommending adequate protection measures for the site, it is recommended that the site is classed as CS2 (low).

It is considered that the buildings associated with the proposed development could be classified as Type C buildings as detailed in BS:8485:2015+A1:2019. A Type C building is described as a commercial building with central building management control with small to large room sizes.

If the development is classified as Type C (medium risk building) then for a CS2 classification a minimum gas protection score of 2.5 is required as identified in Table 4 of BS:8485:2015+A1:2019.

A gas protection score of 2.5 can be achieved by the presence of:

- a cast in situ ground-bearing floor slab (with only nominal mesh reinforcement): 0.5 points; and
- a gas resistant membrane: 2.0 points; or
- a passive sub floor dispersal layer: 2.5 points.

8.6 Summary

The gas monitoring undertaken has identified the potential presence of negligible methane concentrations, elevated carbon dioxide concentrations and depleted oxygen concentrations which may pose potential risks to construction workers entering excavations. Where entry into excavations is unavoidable, the activity should comply with confined space legislation, and assessed prior to site workers entering.

Based on the recorded gas concentrations and flow rates the site classifies as a CS2 which would require the implementation of simple gas protection measures.

9. Updated Conceptual Site Model and Risk Assessment

9.1 General

Current best practice recommends that the determination of health hazards due to contaminated land is based on the principle of risk assessment, as outlined in Part 2A of the Environmental Protection Act 1990.

The risk assessment process for the environmental contaminants is based on a source-pathway-receptor analysis. These terms can be defined as follows:

- Source: Hazardous substance that has the potential to cause adverse impacts;
- Pathway: Route whereby a hazardous substance may come into contact with the receptor: examples include ingestion of contaminated soil and leaching of contaminants from soil into watercourses;
- Receptor: Target that may be affected by contamination: examples include human occupants/users of site, water resources (surface waters or groundwater), or structures.

For a risk to be present there must be a viable pollutant linkage i.e. a mechanism whereby a source impacts on a sensitive receptor via a pathway. A conceptual site model has been developed for the site with the view to assessing the potential risks during construction and upon completion of the proposed new development. The conceptual model takes into account the human health, controlled waters and ground gas risk assessments presented in Chapters 6, 7 and 8 of this report. The potential sources of contamination, potential receptors and potential contaminant pathways are identified (and are presented in Tables 24 to 26) for the site. The associated contaminant linkages between these sources, pathways and receptors are presented in Table 27.

9.2 Potential Sources of Contamination

Table 24 lists the considered sources of potential contamination at the site of the proposed development.

Table 24. Description of Potential Sources of Contamination

Potential Source	Description
Topsoil (Onsite)	Confirmed to depths of 0.4m bgl across the site, during AECOM investigation. The Tier 1 assessment carried out by AECOM has also identified there were no exceedances of GAC for risk to human health. However, concentrations of organic determinands including TPH and DDE were recorded above the method detection limit of the laboratory analysis.
West Walton Formation	The Tier 1 assessment carried out by AECOM has also identified there were no exceedances of GAC for risk to human health. However, potentially aggressive ground conditions are present within the West Walton Formation.
Soil Leachate	Elevated concentrations of thiocyanate, ammoniacal nitrogen, copper, lead, nickel, zinc, TPH-CWG - Aromatic >C12 - C16 and TPH-CWG - Aromatic >C16 - C21 were detected in the soil leachate from the Made Ground. Elevated concentrations of copper, chromium, anthracene and fluoranthene were also found to be present within the soil leachate during the previous investigation (results based on one sample only).
Groundwater	Groundwater was present within the Tidal Flat Deposits. A number of elevated concentrations of metals, inorganic and organic determinands have been identified within the groundwater of the Tidal Flat Deposits.
Ground Gas	Ground gas monitoring at the site has recorded the presence of carbon dioxide at elevated concentrations up to a maximum of 18.7 % v/v in the Tidal Flat Deposits.

9.3 Potential Pathways

This section provides a summary of the potential pathways by which the identified sources may come into contact with receptors.

Table 25. Potential Pathways

Potential Pathways	Description	
Soil Pathways Including the following sources: <ul style="list-style-type: none"> Topsoil / Superficial Deposits West Walton Formation 	Dermal Contact	Dermal contact with soils, soil derived dust, or soil leachate.
	Direct Contact	Direct contact of building materials with contaminated soils, or soil leachate.
	Ingestion	Direct or indirect ingestion of soil and soil derived dust.
	Inhalation	Inhalation of soil derived dust, organic vapours or ground generated gas.
Groundwater Pathways Including the following sources: <ul style="list-style-type: none"> Leachate from Topsoil Groundwater within the Tidal Flat Deposits 	Rainfall Infiltration & Vertical / Lateral migration via permeable strata	Rainfall infiltration can generate and mobilise soil-derived leachate impacting on surface waters and groundwater.
	Lateral Migration through Aquifer	As well as being a receptor, aquifers allow transportation of contaminants through the permeable strata.
Gas Pathways Including the following sources: <ul style="list-style-type: none"> Ground gas generation from Tidal Flat Deposits 	Vertical / Lateral Migration via permeable strata.	Permeable strata may allow transportation of ground gases.

9.4 Potential Receptors

A number of potential receptors have been identified as associated with the proposed development. Table 26 lists the potential receptors at the site.

Table 26. Potential Receptors

Potential Receptors	Description
Future Site Users	Includes workers at and visitors to the proposed development
Controlled Waters	<p><i>Onsite controlled water receptor</i> is Unproductive Strata of the Tidal Flat Deposits and the West Walton Formation.</p> <p><i>Offsite controlled water receptor</i> is the Whaplode River located approximately 85m from the northern boundary at its nearest point.</p>
Development Infrastructure	Concrete is a receptor of chemical aggressivity in contaminated soils with a low pH and high sulphate concentrations. Mass concrete or piled foundations are likely to be used; if reinforced concrete piles are to be used then the design mix should be suitable for a design sulphate class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) of 1 if in contact with Topsoil or Tidal Flat Deposits, suitable for a design sulphate class of DS-4 and an Aggressive Chemical Environment for Concrete (ACEC) of 4 if in contact with the West Walton Formation
Construction workers	The construction workers involved in the construction of the proposed development and associated infrastructures. It is considered that they would have potential for encountering contaminated soils, albeit there will be limited period of exposure compared to the future site users.

9.5 Potential Contaminant Linkages

The potential contaminant linkages and associated risks identified for the site are summarised in Table 27.

Table 27. Potential Contaminant Linkages

Source	Pathway	Receptor
Concentrations of metal, Inorganic and organic determinands within the Topsoil, Superficial Deposits and West Walton Formation	<ul style="list-style-type: none"> • Ingestion of contaminated soil • Inhalation/ingestion of soil derived dust • Inhalation of organic vapours • Direct contact with soils/dusts 	<ul style="list-style-type: none"> • Future Site Users • Construction Workers • Development Infrastructure •
Generated leachate from Topsoil	<ul style="list-style-type: none"> • Rainfall Infiltration and Vertical / Lateral migration via permeable strata 	<ul style="list-style-type: none"> • Groundwater- onsite Unproductive Strata of the Tidal Flat Deposits and West Walton Formation • Whadpole River (offsite) • Future Site Users • Construction Workers • Development Infrastructure
Contaminants in groundwater	<ul style="list-style-type: none"> • Vertical and lateral migration via permeable strata 	<ul style="list-style-type: none"> • Groundwater –onsite Unproductive Strata of the Tidal Flat Deposits and West Walton Formation • Whaplode River (offsite) • Future Site Users • Construction Workers • Development Infrastructure
Ground Gases	<ul style="list-style-type: none"> • Vertical and lateral migration of gas through permeable strata 	<ul style="list-style-type: none"> • Future Site Users • Construction Workers • Development Infrastructure

10. Environmental Risk Assessment

From information obtained from the Phase I desk study, the ground investigation undertaken by SOCOTEC and AECOM in June 2019, a conceptual site model was developed for the site, as detailed in Section 9. Based on the subsequent risk assessment, the various components of the model are discussed in the following sections and take into account the site in its current condition, the proposed future use and the risk assessments detailed in Sections 6, 7 and 8.

10.1 Risk Assessment Principles

Current best practice recommends that the determination of hazards due to contaminated land is based on the principle of risk assessment, as outlined in Part 2A of the Environmental Protection Act 1990.

For a risk to be present there must be a viable pollutant linkage; (i.e. a mechanism whereby a source impacts on a sensitive receptor via a pathway). The potential contaminant linkages that have been identified for this site are presented in Table 27.

Assessments of risks associated with each of these contaminant linkages, following review of available information for the site is discussed in the following sections.

Using criteria broadly based on those presented in Section 6.3 of the CIRIA Report "Contaminated Land Risk Assessment: A Guide to Good Practice" (CIRIA Report C552) the magnitude of the risk associated with potential contamination at the site has been assessed.

To do this an estimate is made of:

- the potential severity of the risk; and
- the likelihood of the risk occurring.

The severity of the risk is classified according to the criteria in Table 28.

Table 28. Severity of Risk

Severity	Description
Severe	<p>Acute risks to human health likely to result in "significant harm" (e.g. very high concentrations of contaminants / ground gases).</p> <p>Catastrophic damage to buildings/property (e.g. by explosion, sites with high gassing potential, extensive VOC contamination).</p> <p>Major pollution of controlled waters (e.g. surface watercourses or Principal aquifers/source protection zones).</p> <p>Short term risk to a particular ecosystem.</p>
Medium	<p>Chronic (long-term) risk to human health likely to result in "significant harm" (e.g. elevated concentration of contaminants/ground gases).</p> <p>Pollution of sensitive controlled waters (e.g. surface watercourses or Principal / Secondary aquifers).</p> <p>Significant effects on sensitive ecosystems or species.</p>
Mild	<p>Pollution of non-sensitive waters (e.g. smaller surface watercourses or Unproductive Strata).</p> <p>Significant damage to crops, buildings, structures or services (e.g. by explosion, sites with medium gassing potential, elevated concentrations of contaminants).</p>
Minor	<p>Non-permanent human health effects (requirement for protective equipment during site works to mitigate health effects).</p> <p>Damage to non-sensitive ecosystems or species.</p> <p>Minor (easily repairable) damage to buildings, structures or services (e.g. by explosion, sites with low gassing potential).</p>

The probability of the risk occurring is classified according to the criteria given in Table 29.

Table 29. Probability of Risk Occurring

Probability	Description
High likelihood	Pollutant linkage may be present that appears very likely in the short-term and risk is almost certain to occur in the long term, or there is evidence of harm to the receptor.
Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term.
Low likelihood	Pollutant linkage may be present and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Unlikely	Pollutant linkage may be present but the circumstances under which harm would occur even in the long-term are improbable.

An overall evaluation of the level of risk is gained from a comparison of the severity and probability as shown in Table 30.

Table 30. Comparison of Severity and Probability

		SEVERITY			
		Severe	Medium	Mild	Minor
PROBABILITY	High Likelihood	Very High	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/Low	Low
	Low Likelihood	Moderate	Moderate/Low	Low	Very Low
	Unlikely	Moderate/Low	Low	Very Low	Very Low

10.2 Evaluation of Risk

An evaluation of the potential risks associated with the identified sources at the site to the various receptors is discussed and presented in the following sections. The level of risk is determined based on the current condition of the site and takes into account the proposed development.

The evaluation includes an assessment of the significance of the potential contaminant linkages.

The potential contaminant linkages identified at the site has been compared with the risk matrix shown in Table 30, and the resultant risk evaluation is presented in Table 31.

Table 31. Risk Evaluation of Potential Contaminant Linkages

Source	Pathway	Receptor	Potential Pollutant Linkage	Severity	Probability	Risk Rating
Topsoil, Superficial Deposits	Direct contact / ingestion / inhalation	Future Site Users	Y	Minor	Unlikely	Very Low
	Direct contact / ingestion / inhalation	Construction Workers	Y	Minor	Low	Very Low
	Direct contact	Development Infrastructure	Y	Minor	Low	Very Low
West Walton Formation	Direct contact	Development Infrastructure	Y*	Mild	Likely	Moderate/Low
Topsoil Leachate & contaminants in groundwater	Direct contact / ingestion / inhalation	Future Site Users	Y	Minor	Unlikely	Very Low
	Direct contact / ingestion / inhalation	Construction Workers	Y	Minor	Low	Very Low

Source	Pathway	Receptor	Potential Pollutant Linkage	Risk Evaluation		
				Severity	Probability	Risk Rating
Ground Gases	Rainfall Infiltration & Vertical / Lateral migration of contaminants via permeable strata	Controlled Waters	Y	Mild	Low	Low
	Direct contact	Development Infrastructure	Y	Minor	Low	Very Low
	Migration & Inhalation / Explosion	Future Site Users	Y	Mild	Unlikely	Very Low
	Migration & Inhalation / Explosion	Construction Workers	Y	Mild	Low	Low
	Migration & Explosion	Development Infrastructure	Y	Minor	Unlikely	Very Low

* only where a piled foundation solution is employed

10.3 Evaluation of Risk to Future Site Users

10.3.1 Risks from Contaminants in Topsoil / Superficial Deposits

The recent ground investigation did not identify concentrations of potential contaminants above corresponding Tier 1 criteria for the proposed landuse. Therefore, the risks to future site users from contaminants in Topsoil or Superficial Deposits is considered to be Very Low.

10.3.2 Risks from Contaminants in Leachate / Groundwater

Although the recent ground investigation identified concentrations of potential contaminants above Tier 1 criteria, these concentrations are considered to reflect natural background concentrations. Also the potential for contact with leachate or groundwater is considered to be unlikely. Therefore, the risks to future site users from contaminants in leachate or groundwater is considered to be Very Low.

10.3.3 Risks from Ground Gases

Methane was recorded at low concentrations at the site with a maximum concentration of 0.2% v/v and elevated carbon dioxide concentrations of up to 18.7%v/v. The flow rate recorded was <0.1 l/hr. The site has been classified as Gas Characteristic Situation CS2, according to guidance within CIRIA C665.

The risk to the future users from ground gas at the site is considered to be Very Low as it is considered that the proposed design of the plant will effectively include measures sufficient to mitigate the risks from ground gas to the future users.

10.4 Evaluation of Risk to Construction Workers

10.4.1 Risks from Contaminants in Topsoil / Superficial Deposits

The assessment has identified a Very Low risk to construction workers at the site regarding risks from underlying soils. This takes into consideration that whilst construction/site workers might be expected to come into contact with soils the soils are of natural origin and do not contain elevated concentrations of determinands and the use of personal protective equipment will be a prerequisite to them being on site.

10.4.2 Risks from Contaminants in Leachate / Groundwater

The recent ground investigation identified concentrations of contaminants above Tier 1 criteria. However, potential for contact with leachate of groundwater is considered to be low. Therefore, the risks to construction workers from contaminants in leachate or groundwater are considered to be Very Low.

10.4.3 Risks from Ground Gases

It is concluded that there may be a Low risk to construction workers from concentrations of carbon dioxide and depleted oxygen concentrations in the Tidal Flat Deposits. This risk will be mitigated through wearing appropriate PPE and monitoring the atmospheric conditions. Where entry into underground structures or excavations is unavoidable it should comply with confined space legislation and assessed prior to entry.

10.5 Evaluation of Risk to Controlled Waters

The site is not within a Groundwater Source Protection Zone and there are no groundwater or surface water abstractions within 1000m of the site.

The underlying Superficial Tidal Flat Deposits and bedrock of the West Walton Formation are classified as Unproductive Strata and are considered non-sensitive receptors. The nearest surface water feature is the Whaplode River approximately 85m from the eastern boundary at its nearest point.

Although a number of metals and inorganic determinands in samples of soil leachate from samples of Topsoil and the Tidal Flat Deposit, and samples of groundwater within the Tidal Flat Deposits exceeded the Tier 1 GAC it is considered that as there is no evidence of Made Ground or potential contamination at the site these are reflective of background concentrations in the natural deposits.

Whilst there are marginal exceedances of some organic determinands in groundwater, potentially relating to the application of pesticides and herbicides from the sites agricultural use, the overall the risks to controlled waters from leachate and groundwater at the site are considered to be Low.

10.6 Evaluation of Risk to Development Infrastructure

The design sulphate class determined for the Topsoil and Tidal Flat Deposits is DS-1, AC-1. This is the lowest classification of aggressive ground conditions. Therefore, the risk to the development infrastructure from aggressive ground is considered to be Very Low. However, the design sulphate class determined for the West Walton Formation is DS-4, AC-4, and therefore risk to the development infrastructure from such aggressive ground is considered to be Moderate/Low. However, this rating would only apply should piled foundations be employed for the buildings in the proposed development.

Due to the low methane concentrations and low flow rates recorded, it is considered that the potential risks to the development infrastructure are Very Low.

11. Conclusions

11.1 Ground Conditions

The investigation identified a consistent sequence of strata across the site, the materials identified at the site mainly comprised Topsoil to 0.4m bgl, overlying Superficial Tidal Flat Deposits to 15m bgl, overlying bedrock geology of the West Walton Formation (which was encountered in a weathered state to ~22.5m bgl).

The Tidal Flat Deposits comprised of brown slightly sandy SILT and loose to medium dense brown slightly silty to silty fine SAND.

Groundwater was identified in the Tidal Flat Deposits with posit investigation monitoring recording standing groundwater levels of between 1.76m bgl to 1.96m bgl.

11.2 Geo-environmental Constraints

The following conclusions have been reached following the geo-environmental assessment of the ground investigation and monitoring results:

- The Tier 1 screening of the soil test results indicate that the risks to human health from metals, organic and inorganic determinands in the soil are very low in the context of the proposed end-use of the site.
- The Tier 1 Screening assessment identified marginally elevated concentrations of metals, inorganic and organic contaminants in Topsoil leachate. However, the majority of these are considered to be reflective of background concentrations in the natural deposits, and therefore it is considered that there is a low risk to controlled waters.
- The ground gas risk assessment undertaken has classified the site as a Characteristic Situation CS2, which requires the incorporation of gas protection measures into building design.
- There is a potential risk to construction workers from asphyxiation in confined spaces due to the presence of carbon dioxide and depleted oxygen concentrations recorded in the Tidal Flat Deposits.
- Should a piled foundation option be utilised for the development then any potential constraints associated with this approach should be assessed in a Piling Risk Assessment Report.

11.3 Geotechnical Constraints

The following conclusions have been reached following the geotechnical assessment of the ground investigation data and laboratory results:

- The ground investigation has identified the presence of up to 15.0m depth of Tidal Flat Deposits across the site. These deposits predominantly consist of both granular deposits of silty fine Sand, which have been identified as being in a very loose to very dense state with a general increase in density with increase in depth.
- Analysis of the pad and raft foundation options for the existing ground conditions has yielded total settlement estimates of between 20 mm to 60 mm.
- Analysis of the strip foundation option for the existing ground conditions yielded total settlement estimates of up to around 30 mm.
- For the existing ground conditions the net safe bearing capacity for the large raft foundation is estimated to be 570 kN/m² and the allowable bearing pressure (for a total settlement of 25 mm) is estimated to be 15 kN/m².
- For the existing ground conditions the net safe bearing capacity for the small pad foundations is estimated to be between 220 to 250 kN/m² and the allowable bearing pressure (for a total settlement of 25 mm) is estimated to be between 65 to 125 kN/m².
- For the existing ground conditions the net safe bearing capacity for the strip foundations is estimated to be between 160 to 170 kN/m² and the allowable bearing pressure (for a total settlement of 25 mm) is estimated to be between 80 to 115 kN/m².

- Based on the settlement analysis it is concluded that ground improvement may be required to mitigate potential settlement and ensure they remain within the specified limits.

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12. Recommendations

Based on the ground investigation undertaken at the site, the following recommendations are considered necessary to facilitate the proposed development scheme:

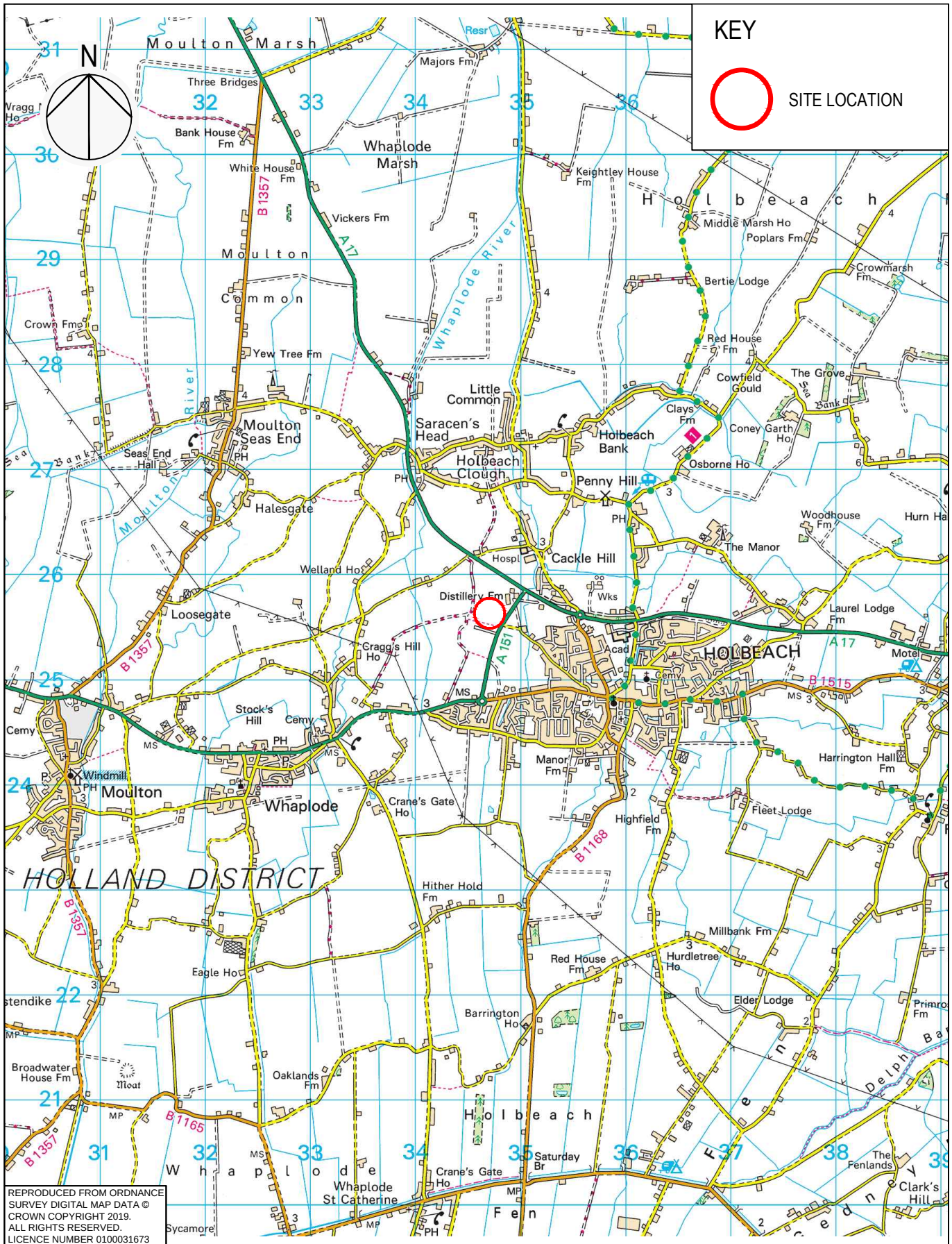
- A sulphate design classification of DS-1 / AC-1 should be adopted for any concrete construction in the Topsoil or Tidal Flat Deposits.
- It is considered a prudent and cautious measure that appropriate gas protective measures for a CS2 classification are included into the building designs.
- It is recommended further detailed geotechnical assessment (settlement and bearing capacity) is undertaken when further details of the potential foundation options, structural loadings and settlement tolerances are available, to determine whether ground improvement or piled foundation may be required.
- A detailed health and safety risk assessment should be carried out, in accordance with current guidance, before redevelopment works commence on site and appropriate level of personal protective equipment should be worn by all construction workers and site personnel. Where entry into excavations is unavoidable, the activity should comply with confined space legislation, and be assessed before site workers entering.

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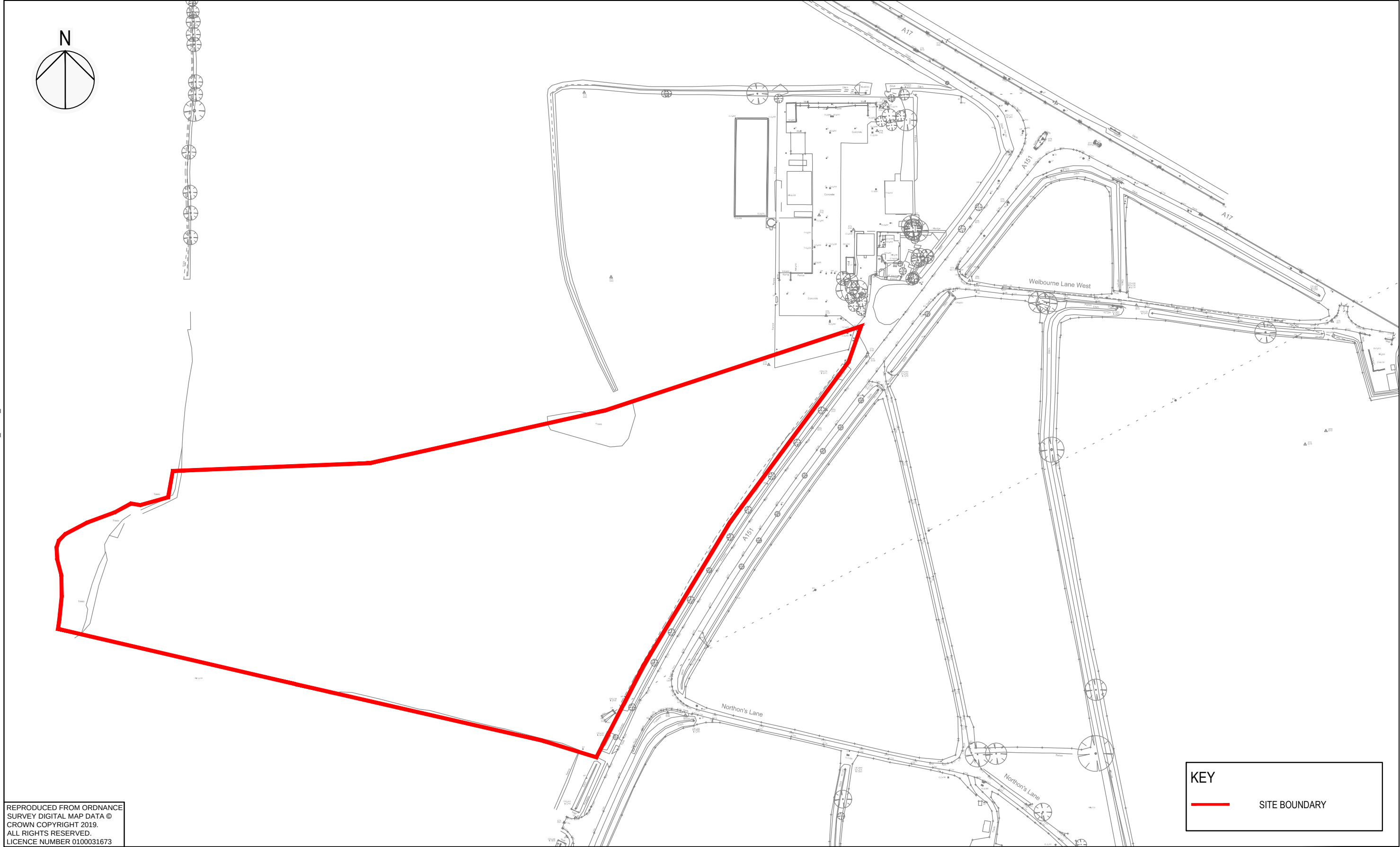
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KEY

SITE BOUNDARY

PHASE 1 BOUNDARY

TP06

TRIAL PIT

BH3

BOREHOLE

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CHARTS

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Chart 1

Plasticity Chart



Project	FEZ Holbeach	Job no.	60550563
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Date	18/09/2019
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Revisions	Suffix	Orig	Suffix	Orig
Date	Date	Check	Date	Check

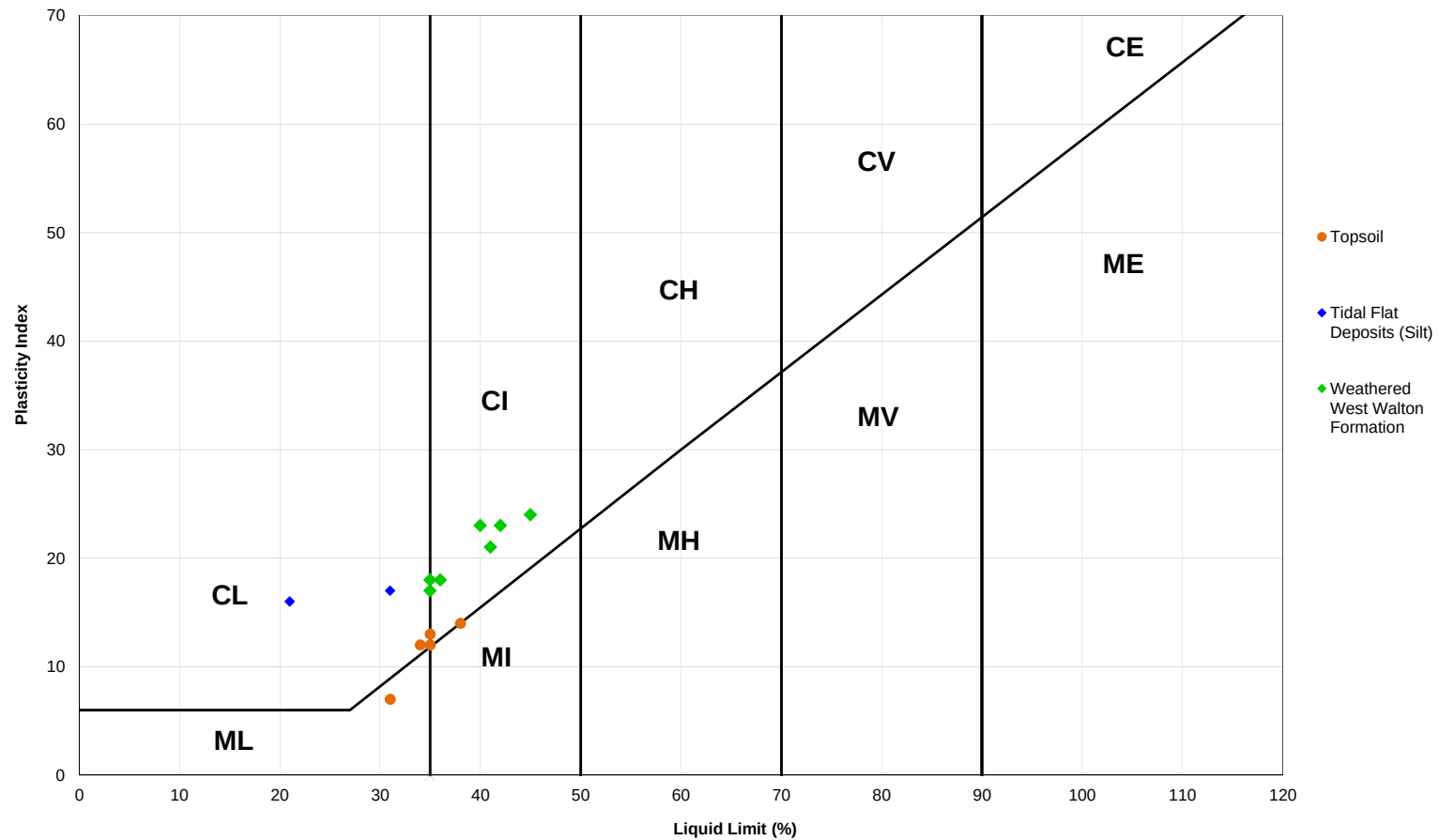


Chart 2

Moisture Content vs Depth

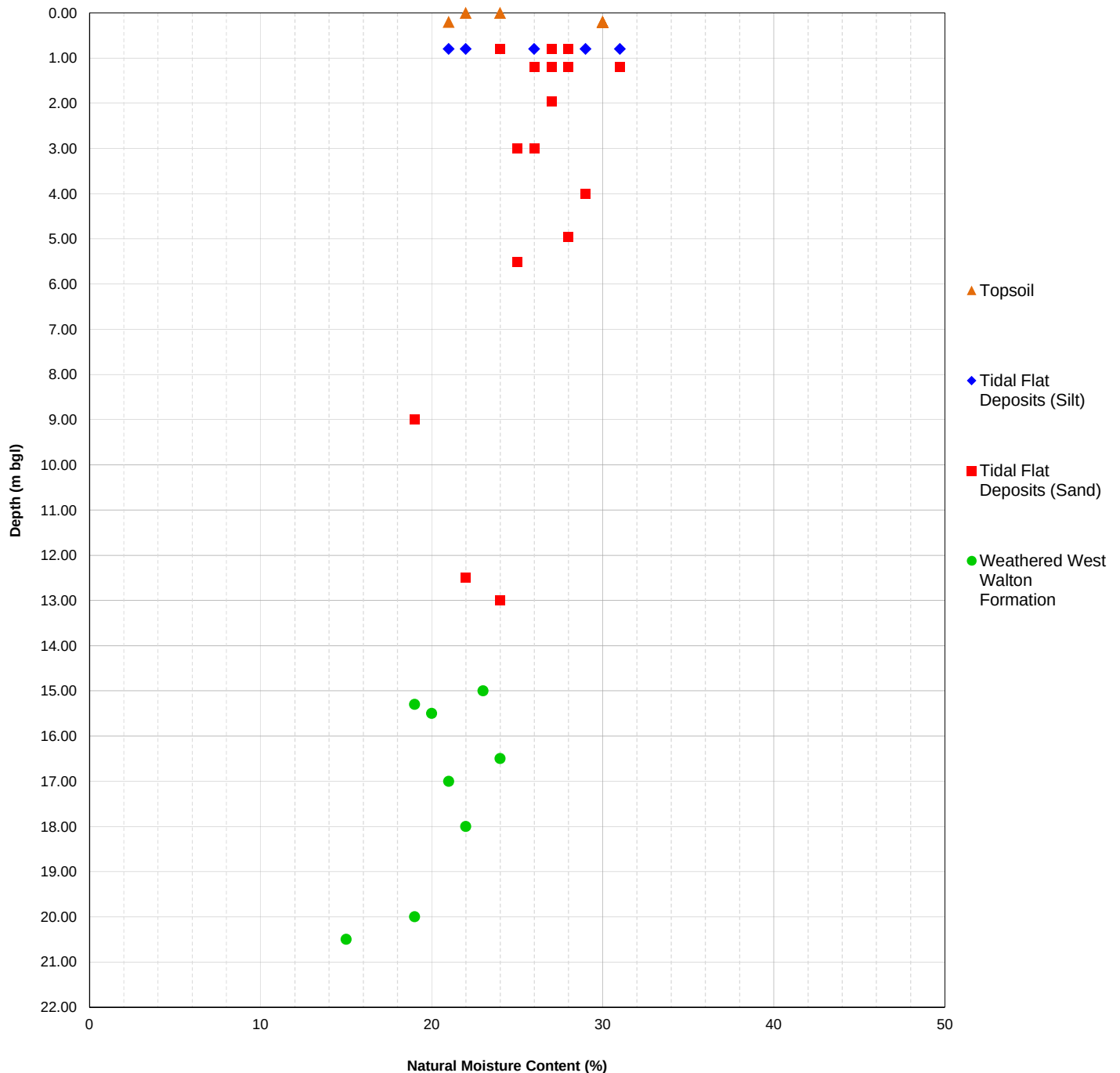


Project	FEZ Holbeach	Job no.	60550563
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Date	18/09/2019
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Originator	Checked
JH	DT

Revisions	Suffix		Orig		Suffix		Orig	
	Date		Check		Date		Check	



SPT N-Value vs Depth

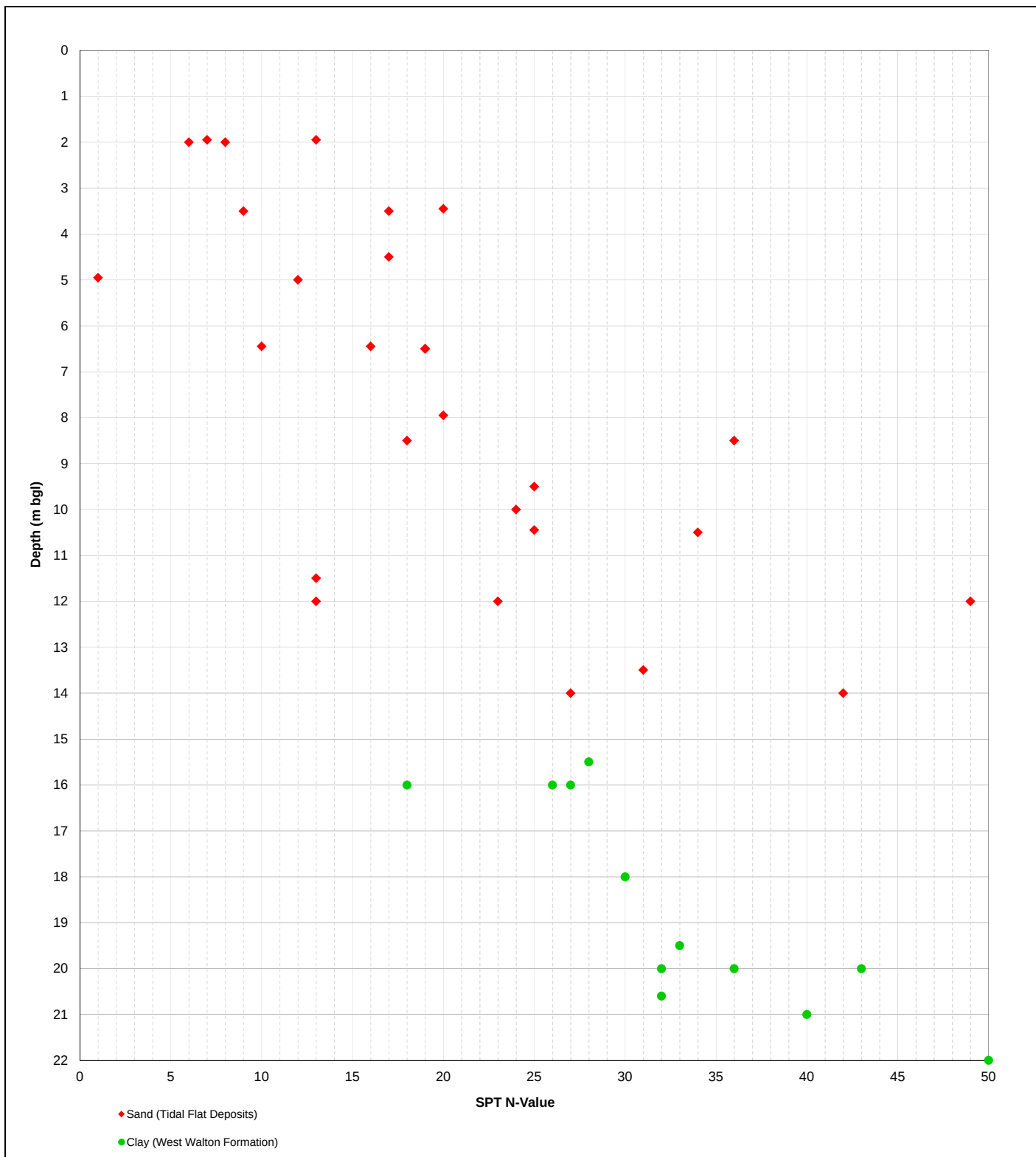


Project	FEZ Holbeach	Job no.	60582224
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Date	18/09/2019
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Originator	Checked
JH	DT

Revisions	Suffix		Orig		Suffix		Orig	
	Date		Check		Date		Check	



Appendix A - Ground Investigation: Exploratory Hole Logs, Geotechnical and Geochemical Results

DRAFT

Key to Exploratory Hole Records

SAMPLES

Undisturbed

U	Driven tube sample	} nominally 100 mm diameter and full recovery unless otherwise stated
UT	Driven thin wall tube sample	
TW	Pushed thin wall tube sample	
P	Pushed piston sample	
L	Liner sample from dynamic (windowless) sampling. Full recovery unless otherwise stated	
CBR	CBR mould sample	
BLK	Block sample	
C / CS	Core sample (from rotary core) taken for laboratory testing.	
AMAL	Amalgamated sample	

Disturbed

D	Small sample
B	Bulk sample

Other

W	Water sample
G	Gas sample

	Environmental chemistry samples (in more than one container where appropriate)
ES	Soil sample
EW	Water sample

Comments

Sample reference numbers are assigned to every sample taken. A sample reference of 'NR' indicates that, while an attempt was made to take a tube sample, there was no recovery.

Samples taken from borehole installations (ie water or gas) after hole construction are not shown on the exploratory hole logs.

Specimens for point load testing undertaken on site (or other non-lab location) are not shown on the log.

IN SITU TESTS

SPT S or SPT C	Standard Penetration Test, open shoe (S) or solid cone (C)
----------------	--

The Standard Penetration Test is defined in BS EN ISO 22476-3:2005+A1:2011. The incremental blow counts are given in the Field Records column; each increment is 75 mm unless stated otherwise and any penetration under self-weight in mm (SW) is noted. Where the full 300 mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach 50 the total blow count beyond the seating drive is given (without the N = prefix).

IV	<i>in situ</i> vane shear strength, peak (p) and remoulded (r)
HV	Hand vane shear strength, peak (p) and remoulded (r)
PP	Pocket penetrometer test, converted to shear strength
KFH, KRH, KPI	Permeability tests (KFH = falling head, KRH = rising head; KPI = packer inflow); results provided in Field Records column (one value per stage for packer tests)

DRILLING RECORDS

The mechanical indices (TCR/SCR/RQD & If) are defined in BS 5930:2015

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
If	Fracture spacing, mm. Minimum, typical and maximum spacing measurements are presented.
NI	Non-intact - used where the core is fragmented (ie no Solid Core).
NA	Not-applicable - used where a measurement is not applicable (eg. If, SCR and RQD in non-rock materials).

Flush returns, estimated percentage with colour where relevant, are given in the Records column

CRF	Core recovered in the following run (length in m)
AZCL	Assessed zone of core loss

GROUNDWATER

▼	Groundwater entry
▽	Depth to groundwater after standing period

Notes:

See report text for full references of standards.

Updated October 2018

Project	FEZ HOLBEACH GROUND INVESTIGATION
Project No.	E9014-19
Carried out for	Lincolnshire County Council

Key

Key to Exploratory Hole Records

INSTALLATION

Details of standpipe/piezometer installations are given on the Record. Legend column shows installed instrument depths including slotted pipe section or tip depth, response zone filter material type and layers of backfill.

Standpipe/ piezometer

The type of instrument installed is indicated by a code in the Legend column at the depth of the response zone:

SP	Standpipe				
SPIE	Standpipe piezometer	Plain		Slotted	Piezometer
PPIE	Pneumatic piezometer	Pipe		Pipe	Tip
EPIE	Electronic piezometer				

Inclinometer or Slip Indicator

The installation of vertical profiling instruments is indicated on the Record. The base of tubing is shown in the Legend column.

ICE	The type of instrument installed is indicated by a code in the Legend column at the base of the tubing:
ICM	Biaxial inclinometer
SLIP	Inclinometer tubing for use with probe Slip indicator

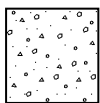
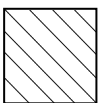
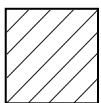
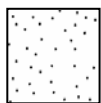
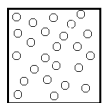
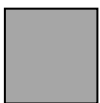
Settlement Points or Pressure Cells

The installation of single point instruments is indicated on the Record. The location of the measuring device is shown in the Legend column. The type of instrument installed is indicated by a code in the Legend column:

ESET	Electronic settlement cell/gauge
ETM	Magnetic extensometer settlement point
EPCE	Electronic embedment pressure cell
PPCE	Electronic push in pressure cell

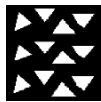
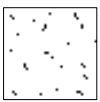
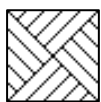
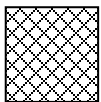
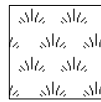
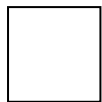
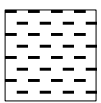
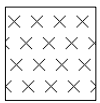
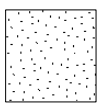
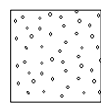
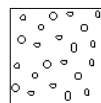
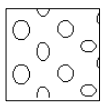
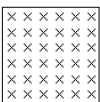
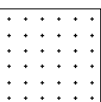
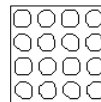
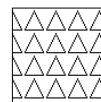
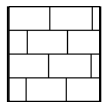
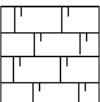
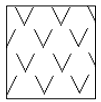
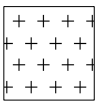
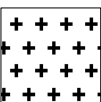
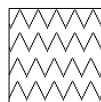
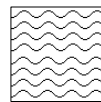
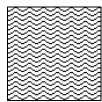
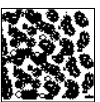
INSTALLATION / BACKFILL LEGENDS

A legend describing the installation is shown in the rightmost column. Legend symbols used to describe the backfill materials are indicated below.

Macadam	Concrete	Grout	Bentonite	Sand	Gravel	Arising
						

STRATUM LEGENDS

The legend symbols used for graphical representation of soils, rocks and other materials on the borehole logs are shown below. For soils with significant proportions of secondary soil types, a combination of two or more symbols may be used.

Macadam	Concrete	Topsoil	Made Ground / Fill	Peat	Void or No Information	
						
Clay	Silt	Sand	Gravel	Cobbles	Boulders	Coal
						
Mudstone	Siltstone	Sandstone	Conglomerate	Breccia	Limestone	Chalk
						
Igneous (Fine)	Igneous (Med)	Igneous (Coarse)	Metamorphic (Fine)	Metamorphic (Med)	Metamorphic (Coarse)	Tuff
						

Notes:

See report text for full references of standards.

Updated October 2018

Project FEZ HOLBEACH GROUND INVESTIGATION
Project No. E9014-19
Carried out for Lincolnshire County Council

Key

Sheet 2 of 3

Key to Exploratory Hole Records

NOTES

- 1 Soils and rocks are described in accordance with BS EN ISO 14688-1:2018 and 14689-1:2018 respectively and the guidance of BS 5930:2015.
- 2 For fine soils, consistency determined during description is reported for those strata where undisturbed samples are available. Where the logger considers that the sample may not be representative of the condition in situ, for whatever reason, the reported consistency is given in brackets. The reliability of the sample is indicated by Probably or Possibly as appropriate. Hence (Probably firm) indicates the logger is reasonably confident of the assessment, but (Possibly firm) means less certainty. Where the samples available are too disturbed to allow a reasonable assessment of the in situ condition, no consistency is given.
- 3 Evidence of the occurrence of very coarse particles (cobbles and boulders) is presented on the logs. However, because of their size in relation to the exploratory hole these records may not be fully representative of their size and frequency in the ground mass.
- 4 The declination of bedding and joints is given with respect to the normal to the core axis. Thus in a vertical borehole this will be the dip.
- 5 The assessment of SCR, RQD and Fracture Spacing excludes artificial fractures.
- 6 Observations of discernible groundwater entries during the advancement of the exploratory hole are given at the foot of the log and in the Legend column. The absence of a recorded groundwater entry should not, however, be interpreted as a groundwater level below the base of the borehole. Under certain conditions groundwater entry may not be observed, for instance, drilling with water flush or overwater, or boring at a rate faster than water can accumulate in the borehole. Similarly, where water entry observations do exist, groundwater may also be present at higher elevations in the ground than where recorded in the borehole. In addition, where appropriate, water levels in the hole at the time of recovering individual samples or carrying out in situ tests and at shift changes are given in the Records column.
- 7 The borehole logs present the results of Standard Penetration Tests recorded in the field without correction or interpretation. However, in certain ground conditions (eg high hydraulic head or where very coarse particles are present) some judgement may be necessary in considering whether the results are representative of in situ mass conditions.

REFERENCES

- 1 BS EN ISO 14688-1:2018 : Geotechnical investigation and testing - Identification and classification of soil. Part 1 Identification and description. British Standards Institution
- 2 BS EN ISO 14689-1 : 2018 : Geotechnical investigation and testing - Identification and classification of rock. Part 1 Identification and description. British Standards Institution
- 3 BS EN ISO 22476-3:2005+A1 : 2011 : Geotechnical investigation and testing - Field testing. Part 3 Standard penetration test. British Standards Institution
- 4 BS 5930 : 2015 : Code of practice for ground investigations. British Standards Institution

Notes:

See report text for full references of standards.

Updated October 2018

Project FEZ HOLBEACH GROUND INVESTIGATION
 Project No. E9014-19
 Carried out for Lincolnshire County Council

Key

Sheet 3 of 3

Borehole Log

PRELIMINARY



Drilled SA Logged WT Checked Approved	Start 20/06/2019 End 20/06/2019	Equipment, Methods and Remarks Dando 2000 Service inspection pit hand dug to 1.20m. Cable percussion drilled to 21.05m.	Depth from (m) to (m) Diameter (mm) Casing Depth (m)	Ground Level Coordinates (m) E 534701.00 National Grid N 325655.00				
Samples and Tests		Strata Description						
Depth 0.00 - 0.20 0.10 - 0.20 0.20 0.20 - 1.20 0.40	Type & No. B 2 D 3 ES 1 B 7 ES 4	Records 	Date 18/06/19 Time 0800	Main TOPSOIL: Brown slightly sandy SILT with frequent rootlets and roots (up to 10mm). Sand is fine. Brown slightly sandy SILT with occasional rootlets. Sand is fine.	Detail	Depth, Level (Thickness) (0.40) 0.40 (0.80) 1.20	Legend	Backfill
0.80 - 0.90 0.80 - 1.00	D 6 B 5	 	18/06/19 1600 Dry	 	 	 	 	
1.50 - 1.95	UT 8	13 blows 60% rec	19/06/19 0800 Dry	Loose to medium dense brown slightly silty to silty fine SAND.	 	1.20	 	
2.00 - 2.45 2.00 - 2.45	SPTS D 9	N=8 (1,2/2,2,2,2)	1.80 1.00	 	 	 	 	
3.00 - 3.45 3.00 - 3.45	UT NR B 10	9 blows No Recovery	2.90 1.00	 	 	 	 	
3.50 - 3.95 3.50 - 3.95	SPTS D 11	N=9 (2,2/2,2,3,2)	3.00 1.00	 	 	 	 	
4.00 - 4.50 4.20 - 4.30	B 12 D 13	 	 	 	 	 	 	
4.50 - 4.95 4.50 - 4.95	UT NR B 14	11 blows No Recovery	4.40 1.00	 	 	 	 	
5.00 - 5.45 5.00 - 5.45	SPTS D 15	N=12 (2,3/3,3,3,3)	4.90 1.00	 	 	 	 	
5.50 - 6.00 5.70 - 5.80	B 16 D 17	 	 	 	 	 	 	
6.00 - 6.45 6.00 - 6.45	UT NR B 18	16 blows No Recovery	5.90 1.00	 	 	 	 	
6.50 - 6.95 6.50 - 6.95	SPTS D 19	N=19 (2,4/4,4,5,6)	6.20 1.00	 	 	 	 	
8.00 - 8.45 8.00 - 8.45	UT NR B 20	29 blows No Recovery	4.20	Medium dense to dense brown slightly silty fine to medium SAND.	 	8.00	 	
8.50 - 8.95 8.50 - 8.95	SPTS D 21	N=36 (4,7/8,8,9,11)	8.30 2.10	 	 	 	 	
9.00 - 9.50	B 22	 	 	 	 	 	 	
9.60 - 9.70	D 23	 	19/06/19 9.00 1600 2.10	 	 	 	 	
Groundwater Entries No. Depth Strike (m) Remarks		Depth Sealed (m)	Depth Related Remarks Depths (m) Remarks 0.00 - 15.00 Water added. 2.00 - 20.60 SPT Hammer ID: AR825, Er 64%.		Hard Boring Depths (m) Duration (mins) Tools used			
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project FEZ HOLBEACH GROUND INVESTIGATION Project No. E9014-19 Carried out for Lincolnshire County Council		Borehole BH01 Sheet 1 of 3			
Scale 1:50 © Copyright SOCOTEC UK Limited 02/07/2019 09:49:47								

Borehole Log

PRELIMINARY



Drilled SA Logged WT Checked Approved	Start 20/06/2019 End 20/06/2019	Equipment, Methods and Remarks Dando 2000 Service inspection pit hand dug to 1.20m. Cable percussion drilled to 21.05m.	Depth from (m) to (m) Diameter (mm) Casing Depth (m)	Ground Level Coordinates (m) E 534701.00 National Grid N 325655.00					
Samples and Tests		Strata Description							
Depth 10.00 - 10.45 10.00 - 10.45 10.50 - 10.95 10.50 - 10.95 11.00 - 11.50 11.70 - 11.80 12.00 - 12.45 12.00 - 12.45 12.50 - 13.50 13.50 - 13.70 14.00 - 14.45 14.00 - 14.45 15.00 - 15.20 15.20 - 15.30 15.30 - 15.80 15.80 - 16.00 16.00 - 16.45 16.00 - 16.45 16.80 - 17.00 17.00 - 18.00 18.00 - 18.45 18.45 - 18.50 19.00 - 20.00	Type & No. UT NR B 24 SPTS D 25 B 26 D 27 SPTS D 28 B 29 D 30 SPTS D 31 D 32 ES 33 B 34 D 35 SPTS D 36 ES 40 B 37 UT 38 D 39 B 41	Records No Recovery N=34 (4,7/8,8,9,9) N=13 (2,3/3,2,4,4) N=42 (4,6/8,11,11,12) N=26 (4,5/6,6,6,8) 15 blows 55% rec	Date 20/06/19 19.80 10.20 11.90 13.70 15.90	Time 0800 17.00 0.00 1.80 2.00 Dry	Main Medium dense to dense brown slightly silty fine to medium SAND. Soft to firm extremely closely fissured grey mottled yellowish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine to medium of chalk, extremely weak mudstone, flint and sandstone. Firm to stiff dark grey mottled yellowish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to rounded of chalk, extremely weak mudstone, flint and sandstone.	Detail	Depth, Level (Thickness) (7.00) 15.00 (1.80) 16.80 (4.20)	Legend	Backfill
Groundwater Entries No. Depth Strike (m) Remarks		Depth Related Remarks Depth Sealed (m) Depths (m) Remarks		Hard Boring Depths (m) Duration (mins) Tools used					
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50 © Copyright SOCOTEC UK Limited 02/07/2019 09:49:47		Project FEZ HOLBEACH GROUND INVESTIGATION Project No. E9014-19 Carried out for Lincolnshire County Council		Borehole BH01 Sheet 2 of 3					

[illegible]

Drilled RT		Start		Equipment, Methods and Remarks		Depth from (m) to (m) Diameter (mm) Casing Depth (m)		Ground Level			
Logged WT		17/06/2019		Dando 3000				Coordinates (m) E 534758.00			
Checked		End		Service inspection pit hand dug to 1.20m. Cable percussion drilled to 20.45m.				National Grid N 325610.00			
Approved		19/06/2019									
Samples and Tests				Strata Description							
Depth		Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill	
0.20 0.20 - 0.25 0.20 - 0.40		ES 1 D 2 B 3		17/06/19	0800	TOPSOIL: Brown slightly sandy SILT with frequent rootlets and roots (up to 10mm). Sand is fine.		(0.40)			
						Brown slightly sandy SILT with occasional rootlets. Sand is fine.		0.40			
0.80 0.80 - 0.90 0.80 - 1.00		ES 4 D 5 B 6						(0.80)			
1.50 - 1.95		UT 7	21 blows 100% rec	1.20		Loose to medium dense brown slightly silty to silty fine SAND.		1.20			
1.95 - 2.40 1.95 - 2.30 1.95 - 2.30		SPTS D 8 B 9	N=13 (1,1/2,3,4,4)	1.20							
2.50		D 10									
3.00 3.00 - 3.45 3.00		ES 25 UT NR D 11	40 blows No Recovery	2.50	1.50						
3.45 - 3.90 3.45 - 3.90 3.45 - 4.00		SPTS D 13 B 14	N=20 (2,3/4,5,5,6)	2.50	1.50						
4.00		D 15									
4.50 - 4.95		UT 16	25 blows 100% rec	3.50	3.50			(6.80)			
4.95 - 5.50 4.95 - 5.30		D 17 B 18									
6.00 - 6.45 6.00		UT NR D 19	25 blows No Recovery	5.80	3.50						
6.45 - 6.82 6.45 - 6.90 6.45		SPTS D 21 B 22	N=10 (,1/1,2,3,4)	5.80	3.50						
7.00 7.00 - 8.00		D 23 B 24									
8.00 - 8.45 8.00		UT NR D 25	35 blows No Recovery	17/06/19 5.80	1600 3.50			8.00			
8.45 - 8.60 8.45 - 8.90 8.45 - 9.00		SPTS D 27 B 28		18/06/19 5.80	0800 3.90	Medium dense to dense brown slightly silty fine to medium SAND.					
9.00 9.00 - 10.00		D 29 B 30		8.00	4.00						
Groundwater Entries				Depth Related Remarks				Hard Boring			
No.		Depth Strike (m) Remarks		Depth Sealed (m)		Depths (m) Remarks		Depths (m)		Duration (mins) Tools used	
1		2.20 Rose to 1.30 m after 20 minutes.				1.95 - 20.00 SPT Hammer ID: AR1772, Er 66%.					
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.				Project FEZ HOLBEACH GROUND INVESTIGATION				Borehole			
Scale 1:50				Project No. E9014-19				BH02			
© Copyright SOCOTEC UK Limited				Carried out for Lincolnshire County Council				Sheet 1 of 3			

Borehole Log

PRELIMINARY



Drilled RT Logged WT Checked Approved	Start 17/06/2019 End 19/06/2019	Equipment, Methods and Remarks Dando 3000 Service inspection pit hand dug to 1.20m. Cable percussion drilled to 20.45m.	Depth from (m) to (m) Diameter (mm) Casing Depth (m)	Ground Level Coordinates (m) E 534758.00 National Grid N 325610.00					
Samples and Tests		Strata Description							
Depth 10.00 - 10.45 10.00 10.45 - 10.90 10.45 - 10.90 10.45 - 11.00 11.00 11.00 - 12.00 12.00 - 12.45 12.00 12.00 - 12.45 12.00 - 12.50 13.00 13.00 - 14.00 14.00 - 14.38 14.00 14.00 - 14.45 14.00 - 14.50 15.00 15.00 15.00 - 16.00 16.00 - 16.45 16.00 16.00 - 16.45 16.00 - 16.50 17.00 17.00 - 18.00 18.00 - 18.45 18.00 18.00 - 18.45 18.00 - 18.50 18.50 19.00	Type & No. UT NR D 31 SPTS D 33 B 34 D 35 B 36 SPTS D 37 D 38 B 39 D 40 B 41 SPTS D 42 D 43 B 44 ES 58 D 45 B 46 SPTS D 47 D 48 B 49 D 50 B 51 SPTS D 52 D 53 B 54 ES 59 D 55	Records 45 blows No Recovery Too much water in BH N=25 (3,4/5,6,7,7) N=49 (5,7/10,12,12,15) 52 (8,11/15,15,18,4 for 5mm) N=27 (4,5/5,6,7,9) N=30 (5,5/6,7,7,10)	Date Casing 9.80 9.80 11.80 13.80 15.00 16.50	Time Water 4.00 4.00 3.00 3.00 4.50 4.50	Main Medium dense to dense brown slightly silty fine to medium SAND. Soft to firm extremely closely fissured grey mottled yellowish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine to medium of chalk, extremely weak mudstone, flint and sandstone. Firm to stiff dark grey mottled yellowish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to rounded of chalk, extremely weak mudstone, flint and sandstone.	Detail	Depth, Level (Thickness) (7.00) 15.00 (3.00) 18.00 (2.45)	Legend	Backfill
Groundwater Entries No. Depth Strike (m) Remarks 2 15.50 Rose to 4.50 m after 20 minutes.		Depth Sealed (m)		Depth Related Remarks Depths (m) Remarks	Hard Boring Depths (m) Duration (mins) Tools used				
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50 © Copyright SOCOTEC UK Limited 02/07/2019 09:52:01		Project FEZ HOLBEACH GROUND INVESTIGATION Project No. E9014-19 Carried out for Lincolnshire County Council			Borehole BH02 Sheet 2 of 3				

Borehole Log

PRELIMINARY



Drilled RT Logged WT Checked Approved	Start 17/06/2019 End 19/06/2019	Equipment, Methods and Remarks Dando 3000 Service inspection pit hand dug to 1.20m. Cable percussion drilled to 20.45m.	Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level Coordinates (m) E 534758.00 National Grid N 325610.00		
Samples and Tests			Strata Description						
Depth 20.00 - 20.45 20.00 20.00 - 20.45	Type & No. SPTS D 56 D 57	Records N=36 (5,7,7,9,10,10)	Date 18/06/19 18.00	Time 1600 3.50	Main Firm to stiff dark grey mottled yellowish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to rounded of chalk, extremely weak mudstone, flint and sandstone. END OF EXPLORATORY HOLE	Detail	Depth, Level (Thickness) 20.45	Legend	Backfill
Groundwater Entries No. Depth Strike (m) Remarks			Depth Related Remarks Depths (m) Remarks			Hard Boring Depths (m) Duration (mins) Tools used			
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50 © Copyright SOCOTEC UK Limited 02/07/2019 09:52:01			Project FEZ HOLBEACH GROUND INVESTIGATION Project No. E9014-19 Carried out for Lincolnshire County Council			Borehole BH02 Sheet 3 of 3			

Drilled	SA	Start	Equipment, Methods and Remarks		Depth from	to	Diameter	Casing Depth	Ground Level
Logged	WT	24/06/2019	Dando 2000 Service inspection pit hand dug to 1.20m. Cable percussion drilled to 22.45m.		(m)	(m)	(mm)	(m)	Coordinates (m)
Checked		End							National Grid
Approved		25/06/2019							E 534725.00 N 325544.00
Samples and Tests					Strata Description				
Depth	Type & No.	Records	Date	Time	Main	Detail	Depth, Level	Legend	Backfill
			Casing	Water			(Thickness)		
0.00 - 0.20 0.10 0.20 0.20 - 1.20 0.40	B 2 D 3 ES 1 B 36 ES 4		24/06/19	0800	TOPSOIL: Dark brown slightly sandy SILT with frequent rootlets and roots (up to 10mm). Sand is fine. Brown slightly sandy SILT with occasional rootlets. Sand is fine.		(0.40) 0.40		
0.80 - 1.00 0.90 - 1.00	B 5 D 6						(0.80)		
1.50 - 1.95	UT 37	7 blows 100% rec			Loose to medium dense brown slightly silty to silty fine SAND.		1.20		
2.00 - 2.45 2.00 - 2.45	SPTS D 38	N=6 (1,1/1,1,2,2)	1.50	Dry					
3.00 - 3.45 3.00 - 3.45	UT NR B 39	14 blows No Recovery							
3.50 - 3.95 3.50 - 3.95	SPTS D 40	N=17 (4,4/4,4,4,5)	2.90	1.00		3.50-8.00 Slightly silty.			
4.00 - 4.45	UT NR	17 blows No Recovery							
4.50 - 4.95 4.50 - 4.95	SPTS D 7	N=17 (3,4/4,4,4,5)	4.10	0.70		4.50 Frequent shell fragments.	(6.80)		
5.50 - 5.90	B 8								
5.80 - 6.00	D 9								
6.00 - 6.45 6.00 - 6.45	UT NR B 10	17 blows No Recovery							
6.50 - 6.95 6.50 - 6.95	SPTS D 11	N=19 (3,3/4,4,5,6)	6.00	1.00					
7.00 - 7.50	B 12								
7.50 - 7.80	D 13								
8.00 - 8.45 8.00 - 8.45	UT NR B 14	16 blows No Recovery			Medium dense to dense Brown slightly silty fine to medium SAND with shell fragments.		8.00		
8.50 - 8.95 8.50 - 8.95	SPTS D 15	N=18 (2,3/4,4,4,6)	8.00	1.10					
9.00 - 9.50	B 16		24/06/19 9.00	1600					
9.50 - 9.70	D 17		25/06/19 9.00	0800					
Groundwater Entries					Depth Related Remarks		Hard Boring		
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used
					0.00 - 15.00	Water added.			
					2.00 - 22.00	SPT Hammer ID: AR825, Er64%.			
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project		Borehole		
© Copyright SOCOTEC UK Limited					FEZ HOLBEACH GROUND INVESTIGATION				
AGS					Project No.		BH03		
Scale 1:50					Carried out for		Sheet 1 of 3		

Borehole Log

PRELIMINARY



Drilled SA Logged WT Checked Approved	Start 24/06/2019 End 25/06/2019	Equipment, Methods and Remarks Dando 2000 Service inspection pit hand dug to 1.20m. Cable percussion drilled to 22.45m.	Depth from (m) to (m) Diameter (mm) Casing Depth (m)	Ground Level Coordinates (m) E 534725.00 National Grid N 325544.00					
Samples and Tests		Strata Description							
Depth 10.00 - 10.45 10.00 - 10.45 10.50 - 11.50 11.50 - 11.70 12.00 - 12.45 12.00 - 12.10 12.00 - 12.45 12.50 - 13.50 13.50 - 13.70 14.00 - 14.45 14.00 - 14.45 15.00 - 15.10 15.10 - 16.00 16.00 - 16.45 16.00 - 16.45 16.50 - 17.50 17.50 - 17.70 18.00 - 18.45 18.20 - 18.30 18.70 - 19.00 19.30 - 19.50	Type & No. SPTS D 18 B 19 D 20 SPTS ES 25 D 21 B 22 D 23 SPTS D 24 ES 26 B 27 SPTS D 28 B 29 D 30 UT 31 ES 35 B 32 D 33	Records N=24 (3,4/6,6,6,6) N=23 (4,4/5,5,6,7) N=27 (4,5/6,6,7,8) N=18 (3,4/4,4,5,5) 17 blows 80% rec	Date Casing 9.80 11.80 13.70 15.20	Time Water 2.20 1.00 6.00 Dry	Main Medium dense to dense Brown slightly silty fine to medium SAND with shell fragments. Soft to firm extremely closely fissured grey mottled yellowish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine to medium of chalk, extremely weak mudstone, flint and sandstone. Firm to stiff dark grey mottled yellowish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of chalk, extremely weak mudstone, flint and sandstone.	Detail	Depth, Level (Thickness) (7.00) 15.00 (3.20) 18.20	Legend	Backfill
Groundwater Entries No. Depth Strike (m) Remarks		Depth Sealed (m)		Depth Related Remarks Depths (m) Remarks	Hard Boring Depths (m) Duration (mins) Tools used				
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50 © Copyright SOCOTEC UK Limited 02/07/2019 09:52:52		Project FEZ HOLBEACH GROUND INVESTIGATION Project No. E9014-19 Carried out for Lincolnshire County Council			Borehole BH03 Sheet 2 of 3				

Borehole Log

PRELIMINARY



Drilled SA Logged WT Checked Approved	Start 24/06/2019 End 25/06/2019	Equipment, Methods and Remarks Dando 2000 Service inspection pit hand dug to 1.20m. Cable percussion drilled to 22.45m.		Depth from (m) to (m) Diameter (mm) Casing Depth (m)	Ground Level Coordinates (m) National Grid	E 534725.00 N 325544.00			
Samples and Tests			Strata Description						
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
20.00 - 20.45 20.00 - 20.45	SPTS D 34	N=43 (3,5,7,9,10,17)	19.80	Dry	Firm to stiff dark grey mottled yellowish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of chalk, extremely weak mudstone, flint and sandstone.		(3.45)		
20.50 - 21.50	B 36								
21.50 - 21.80	D 37								
22.00 - 22.45 22.00 - 22.45	SPTS D 38	N=50 (6,7,13,15,19,3)	25/06/19 22.00	1600					
					END OF EXPLORATORY HOLE		22.45		
Groundwater Entries			Depth Related Remarks			Hard Boring			
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project FEZ HOLBEACH GROUND INVESTIGATION			Borehole			
Scale 1:50 © Copyright SOCOTEC UK Limited 02/07/2019 09:52:52			Project No. E9014-19 Carried out for Lincolnshire County Council			BH03 Sheet 3 of 3			

Drilled	RT	Start	Equipment, Methods and Remarks		Depth from	to	Diameter	Casing Depth	Ground Level
Logged	TH	20/06/2019	Dando 3000 Service inspection pit hand dug to 1.20m. Cable percussion drilled to 21.80m.		(m)	(m)	(mm)	(m)	Coordinates (m)
Checked		End							National Grid
Approved		21/06/2019							E 534793.00 N 325554.00
Samples and Tests					Strata Description				
Depth	Type & No.	Records	Date	Time	Main	Detail	Depth, Level	Legend	Backfill
			Casing	Water			(Thickness)		
0.00 - 0.20 0.10 - 0.20 0.20 0.40	B 2 D 3 ES 1 ES 4		19/06/19	0800	TOPSOIL: Dark brown slightly sandy SILT with frequent rootlets and roots (up to 10mm). Sand is fine.		(0.40)		
					Brown slightly sandy SILT with occasional rootlets. Sand is fine.		0.40		
0.80 - 1.00 0.90 - 1.00	B 5 D 6						(0.80)		
							1.20		
1.50 - 1.95	UT 7	25 blows 90% rec			Loose to medium dense brown slightly silty to silty fine SAND.				
1.95 - 2.40 1.95 - 2.40 1.95 - 2.50	SPTS D 8 B 9	N=7 (1,2/1,1,2,3)	1.50						
2.50	D 10								
3.00 - 3.45 3.00	UT NR D 11	30 blows No Recovery							
3.45 - 3.90 3.45 - 3.90 3.45 - 4.00	SPTS D 13 B 14	N=0 (2,1/,,)	2.50	1.00					
4.00	D 15								
4.50 - 4.95	UT NR	40 blows No Recovery					(6.80)		
4.95 - 5.40 4.95 - 5.40 4.95 - 5.50	SPTS D NR B 18	N=1 (1/,,1)	4.00	2.50					
5.50	D 19								
6.00 - 6.45 6.00	UT NR D 20	45 blows No Recovery							
6.45 - 6.90 6.45 - 6.90 6.45 - 7.00	SPTS D 22 B 23	N=16 (2,3/3,3,4,6)	5.80	4.00					
7.00	D 24								
7.50 - 7.95	UT NR	50 blows No Recovery							
7.95 - 8.40 7.95 - 8.40 7.95 - 8.50	SPTS D 26 B 27	N=20 (3,3/4,5,5,6)	7.00	4.50	Medium dense to dense brown slightly silty fine to medium SAND with shell fragments.		8.00		
9.00	D 28								
9.50 - 9.95 9.50 - 9.95 9.50 - 10.00	SPTS D 29 B 30	N=25 (4,4/5,6,6,8)	9.00	3.00					
			19/06/19 9.00	1600 3.00					
Groundwater Entries					Depth Related Remarks		Hard Boring		
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used
1	2.50		Rose to 0.75 m after 20 minutes.		1.95 - 21.00	SPT Hammer ID: AR1772, Er 66%.			
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project		Borehole		
© Copyright SOCOTEC UK Limited					FEZ HOLBEACH GROUND INVESTIGATION				
AGS					Project No.		BH04		
Scale 1:50					Carried out for		Sheet 1 of 3		

Borehole Log

PRELIMINARY



Drilled RT Logged TH Checked Approved	Start 20/06/2019 End 21/06/2019	Equipment, Methods and Remarks Dando 3000 Service inspection pit hand dug to 1.20m. Cable percussion drilled to 21.80m.	Depth from (m) to (m) Diameter (mm) Casing Depth (m)	Ground Level Coordinates (m) E 534793.00 National Grid N 325554.00
Samples and Tests		Strata Description		
Depth	Type & No.	Records	Date Casing Time Water	Main Detail Depth, Level (Thickness) Legend Backfill
10.00	D 31		20/06/19 0800 9.00 3.00	Medium dense to dense brown slightly silty fine to medium SAND with shell fragments.
11.00	D 32			
11.50 - 11.95 11.50 - 11.95 11.50 - 12.00	SPTS D 33 B 34	N=13 (2,2/3,3,3,4)	11.30 3.00	(7.00)
12.00	D 35			
13.00	D 36			
13.50 - 13.95 13.50 - 13.95 13.50 - 14.00	SPTS D 37 B 38	N=31 (4,5/4,7,9,11)	13.20 3.00	
14.00	D 39			
15.00	D 40			
15.50 - 15.95 15.50 15.50 - 15.95 15.50 - 16.00	SPTS ES 54 D 41 B 42	N=28 (3,4/6,6,7,9)	15.00 3.00	Soft to firm extremely closely fissured grey mottled yellowish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine to medium of chalk, extremely weak mudstone, flint and sandstone.
16.00	D 43			
17.00	D 44			
17.50 - 17.95	UT NR	75 blows No Recovery		
17.95 - 18.40 17.95 - 18.50	D 46 B 47			
19.00	D 48			
19.50 - 19.95 19.50 - 19.95	SPTS D 49	N=33 (4,5/7,8,9,9)	18.00 3.00	Firm to stiff dark grey mottled yellowish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of chalk, extremely weak mudstone, flint and sandstone.
Groundwater Entries		Depth Related Remarks		Hard Boring
No.	Depth Strike (m) Remarks	Depth Sealed (m)	Depths (m) Remarks	Depths (m) Duration (mins) Tools used
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50 © Copyright SOCOTEC UK Limited 02/07/2019 09:55:37		Project FEZ HOLBEACH GROUND INVESTIGATION Project No. E9014-19 Carried out for Lincolnshire County Council		Borehole BH04 Sheet 2 of 3

Borehole Log

PRELIMINARY



Drilled RT Logged TH Checked Approved	Start 20/06/2019 End 21/06/2019	Equipment, Methods and Remarks Dando 3000 Service inspection pit hand dug to 1.20m. Cable percussion drilled to 21.80m.	Depth from (m) to (m) Diameter (mm) Casing Depth (m)	Ground Level Coordinates (m) E 534793.00 National Grid N 325554.00
Samples and Tests		Strata Description		
Depth 20.00 20.00 - 21.00	Type & No. D 50 B 51	Records N=40 (6,8/9,10,10,11)	Date Casing 18.00 20/06/19 18.00	Time Water 4.50 1600 4.50
Firm to stiff dark grey mottled yellowish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of chalk, extremely weak mudstone, flint and sandstone.		(2.80)		
END OF EXPLORATORY HOLE		21.80		
Groundwater Entries No. Depth Strike (m) Remarks		Depth Related Remarks Depths (m) Remarks		Hard Boring Depths (m) Duration (mins) Tools used
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50 © Copyright SOCOTEC UK Limited 02/07/2019 09:55:37		Project FEZ HOLBEACH GROUND INVESTIGATION Project No. E9014-19 Carried out for Lincolnshire County Council		Borehole BH04 Sheet 3 of 3

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Logged	WT	Start	19/06/2019	Equipment, Methods and Remarks	JCB JS131 Machine excavated trial pit dug to 2.80m. Collapse during excavation at 2.80 m.	Dimension and Orientation	Width 1.50 m Length 3.00 m	<div><div>A</div><div>B</div><div>C</div><div>D</div></div> <div>22 (Deg)</div>	Ground Level	E 534737.00 N 325637.00	
Checked		End	19/06/2019							Coordinates (m)	E 534737.00 N 325637.00
Approved										National Grid	
Samples and Tests				Strata Description							
Depth	Type & No.	Records	Main				Detail	Depth, Level (Thickness)	Legend	Backfill	
0.00 - 0.20	B2	19/06/19	TOPSOIL: Dark brown silty fine SAND with frequent rootlets and roots (up to 10mm).					(0.40)			
0.10 - 0.20	D3										
0.20	ES1										
0.40	ES4		Light brown very silty fine SAND with rare rootlets.								
0.80 - 1.00	B5										
0.90 - 1.00	D6	19/06/19 Dry						0.40			
1.20	ES7										
1.20 - 1.40	B8										
1.40 - 1.50	D9										
			END OF EXPLORATORY HOLE					2.80			

	Logged Checked Approved	TH	Start End	Equipment, Methods and Remarks JCB JS131 Machine excavated trial pit dug to 2.20m. Collapse during excavation at 2.20 m.	Dimension and Orientation Width 1.50 m Length 3.00 m	A D B C ➡ C ➔ 52 (Deg)	Ground Level Coordinates (m) National Grid	E 534711.00 N 325609.00	
Samples and Tests								Strata Description	
Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill		
0.00 - 0.20	B2		TOPSOIL: Dark brown very silty fine SAND with frequents rootlets and roots (up to 10mm). Light brown very silty fine SAND with rare rootlets.		(0.40)				
0.10 - 0.20	D3				21/06/19				
0.20	ES1								
0.40	ES4								
0.80 - 1.00	B5								
0.90 - 1.00	D6								
1.20	ES7								
1.20 - 1.40	B8								
1.40 - 1.50	D9								
					21/06/19 Dry				
			END OF EXPLORATORY HOLE		2.20				
Groundwater Entries			Remarks			Stability Unstable			
No.	Depth Strike (m) Remarks		Depth (m) Remarks			Shoring None			
			0.00 - 2.20 No groundwater encountered.			Weather Dry			
Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project FEZ HOLBEACH GROUND INVESTIGATION			Trial Pit TP03			
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INDEX PROPERTIES - SUMMARY OF RESULTS

Hole No.	Sample				Soil Description	p	p_d	W	< 425 μm sieve	W_L	W_P	I_p	p_s	Remarks
	No.	Depth (m)		type										
		from	to			Mg/m3	%	%	%	%		Mg/m3		
BH01	7	0.20	1.20	B	Brown slightly sandy SILT.			30	100 n	31 a	24	7	2.64-p	
BH01	5	0.80	1.00	B	Light brown sandy SILT with abundant rootlets			29		b	NP			
BH01	10	3.00	3.45	B	Brown silty SAND.			26					2.68-p	
BH01	12	4.00	4.50	B	Light brown slightly silty SAND.			29						
BH01	16	5.50	6.00	B	Brown silty SAND.			25						
BH01	29	12.50	13.50	B	Light brown SAND.			22						
BH01	34	15.30	15.80	B	Light brown slightly sandy slightly gravelly CLAY.			19	96 s	35 a	18	17		
BH01	37	17.00	18.00	B	Brownish grey slightly sandy slightly gravelly silty CLAY.			21	98 n	36 a	18	18	2.73-p	
BH02	3	0.20	0.40	B	Brown slightly sandy silty CLAY with occasional rootlets.			21	99 n	35 a	22	13		
BH02	30	9.00	10.00	B	Light brown slightly silty SAND.			19						
BH02	41	13.00	14.00	B	Brown SAND.			24						
BH02	46	15.00	16.00	B	Brown slightly sandy slightly gravelly silty CLAY.			23	99 n	42 a	19	23		
BH02	54	18.00	18.50	B	Brown slightly sandy slightly gravelly silty CLAY.			22	95 s	40 a	17	23		
BH03	36	0.20	1.20	B	Brown slightly sandy clayey SILT.			30	99 n	38 a	24	14		
BH03	5	0.80	1.00	B	Brown slightly sandy silty CLAY with rare rootlets.			31	100 n	41 a	24	17		
BH03	39	3.00	3.45	B	Light brown very silty SAND.			25						
BH03	22	12.50	13.50	B	Brown SAND.			22						
BH03	29	16.50	17.50	B	Greyish brown slightly sandy CLAY.			24	100 n	45 a	21	24		
BH03	36	20.50	21.50	B	Grey slightly sandy slightly gravelly silty CLAY with one cobble.			15	75 s	35 b	17	18		
BH04	5	0.80	1.00	B	Brown slightly sandy clayey SILT.			21	100 n	38 a	22	16		
BH04	9	1.95	2.50	B	Greyish brown silty SAND.			27						
BH04	18	4.95	5.50	B	Brown slightly sandy SILT.			28						
BH04	42	15.50	16.00	B	Greyish brown slightly sandy slightly gravelly silty CLAY.			20						
BH04	51	20.00	21.00	B	Greyish brown slightly sandy slightly gravelly CLAY.			19	95 s	41 a	20	21		
TP01	5	0.80	1.00	B	Greyish brown very silty SAND.			27						
TP01	8	1.20	1.40	B	Light brown very sandy SILT.			26						
TP02	2	0.00	0.20	B	Greyish brown slightly sandy silty CLAY with frequent rootlets.			24	99 n	34 a	22	12		
TP02	5	0.80	1.00	B	Brown slightly sandy SILT with rare rootlets.			24						
TP04	5	0.80	1.00	B	Brown very silty SAND.			24						
TP04	8	1.20	1.40	B	Brown silty SAND.			28					2.66-p	
TP05	8	1.20	1.40	B	Light brown sandy SILT with rare rootlets.			27						

General notes:

All above tests carried out to BS1377 : 1990 unless annotated otherwise. See Remarks for further details

Key : *p* bulk density, linear

p_d dry density

w moisture content

W_L Liquid limit

a 4 point cone test

b 1 point cone test

WP Plastic limit

NP non - plastic

IP Plasticity Index

<425µm preparation

n from natural soil

s sieved specimen

p_s particle density

-g = gas jar

-p = small pyknometer

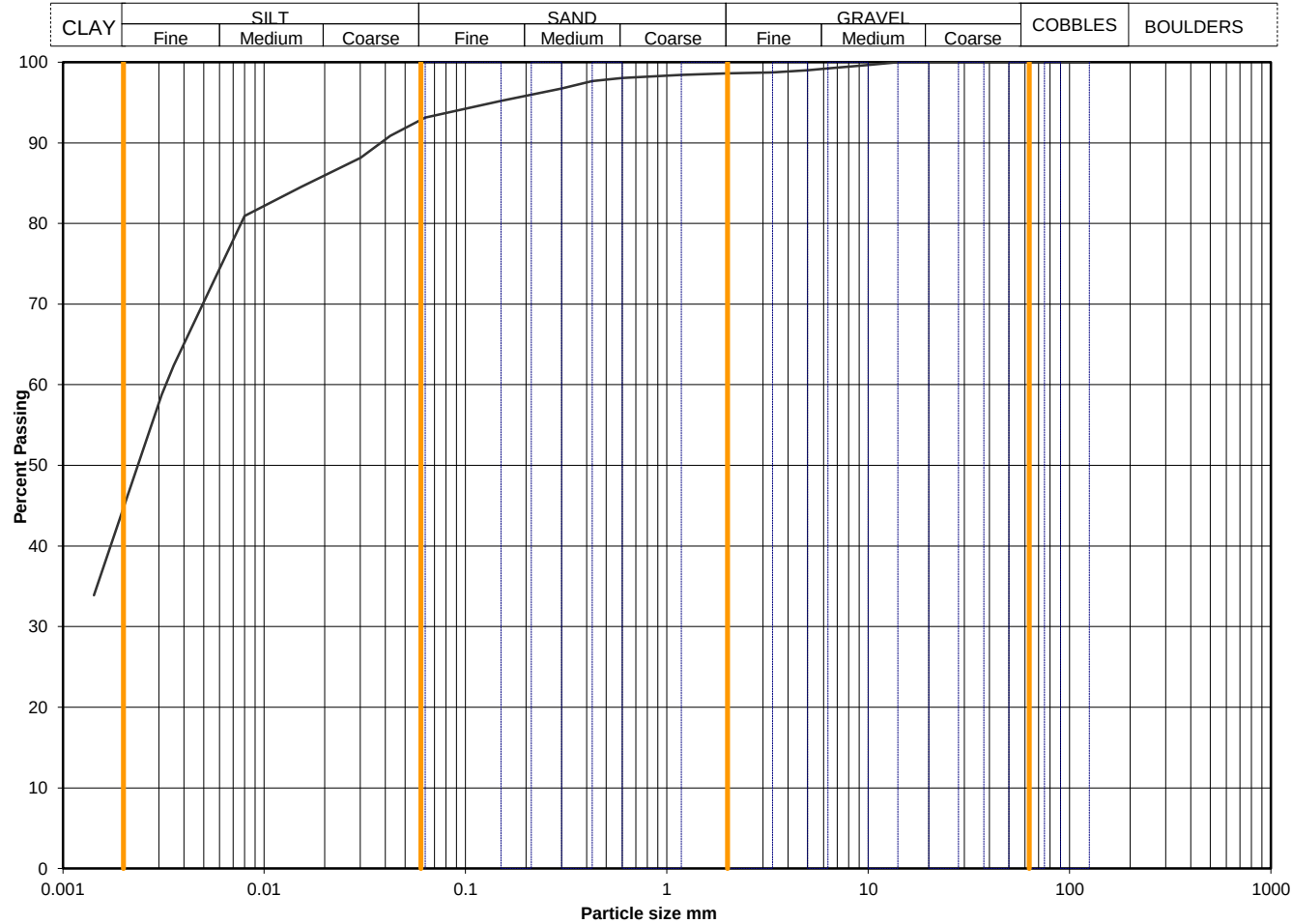
* test carried out to BS EN ISO 17892

QA Ref SLR 1 Rev 2.93 Mar 17	 SOCOTEC	Project No	E9014-19	Figure INDX
		Project Name	FEZ HOLBEACH GROUND INVESTIGATION	
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[illegible]

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH01
	E9014-1920190627111137	Sample Depth (m BGL)	17.00 - 18.00
		Sample Type and No	B37
		Specimen Ref	

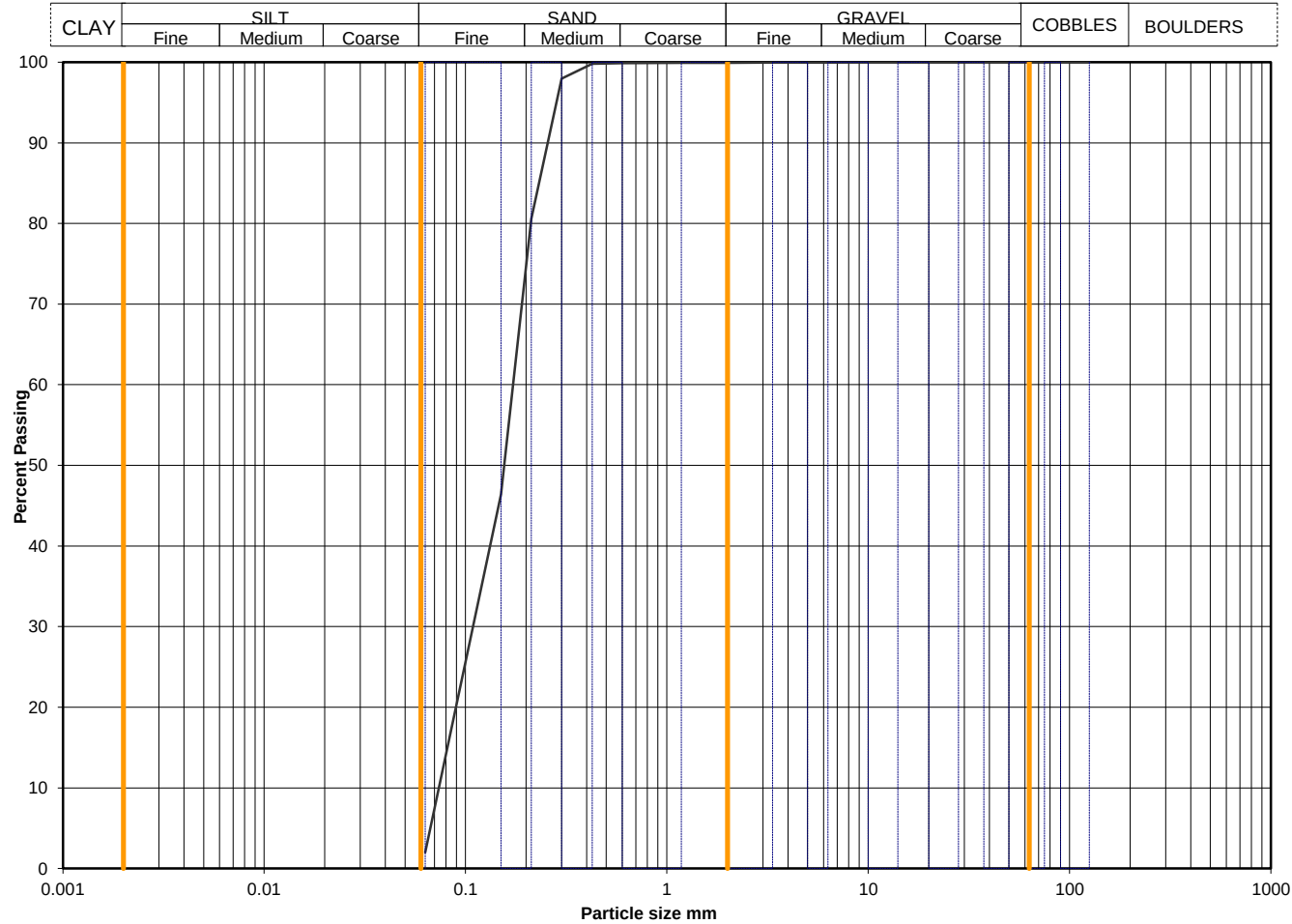


Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	93
90	100	0.0422	91
75	100	0.0301	88
63	100	0.0215	86
50	100	0.0153	85
37.5	100	0.0080	81
28	100	0.0036	62
20	100	0.0031	59
14	100	0.0014	34
10	100		
6.3	99		
5.0	99		
3.35	99		
2.00	99		
1.18	98		
0.600	98	Particle density, Mg/m3	
0.425	98	2.73 measured	
0.300	97	Dry mass of sample, kg	
0.212	96	3.6	
0.150	95		
0.063	93		

Soil description	Brownish grey slightly sandy slightly gravelly silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions * <small><60mm values to aid description only</small>	Cobbles / boulders Gravel Sand Silt Clay	Whole	* <small><60mm</small>
		0	0
		1	1
		5	5
		48	48
		45	45
Uniformity Coefficient D60 / D10		Not applicable	
Test Method	BS 1377 : Part 2 : 1990		
	Sieving	9.2 wet sieve	
	Sedimentation	9.5 hydrometer	

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH02
		Sample Depth (m BGL)	9.00 - 10.00
	E9014-1920190627014912	Sample Type and No	B30
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100		
0.425	100		
0.300	98		
0.212	81		
0.150	46		
0.063	2		

Dry mass of sample, kg	
8.9	

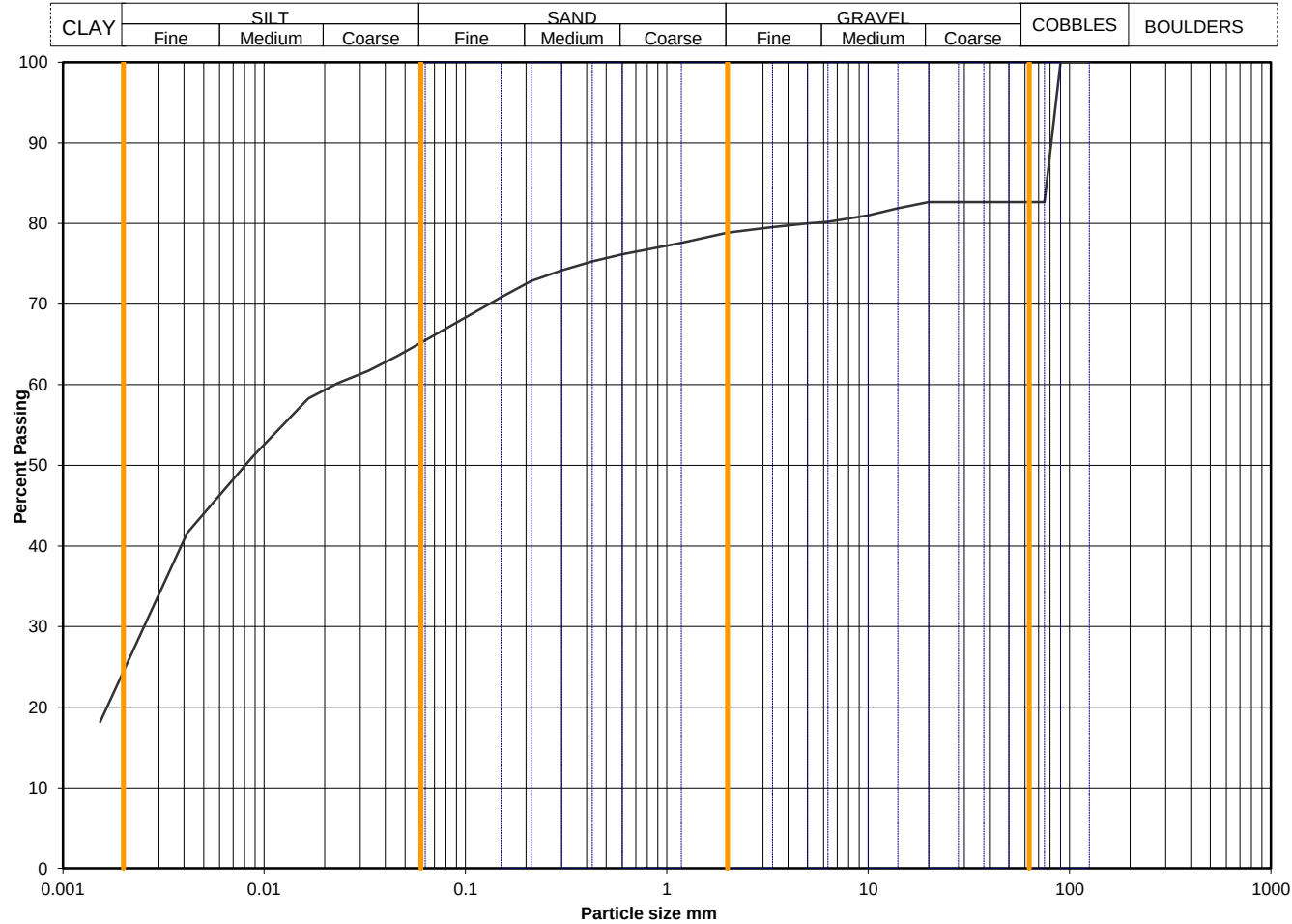
Soil description	Light brown slightly silty SAND.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions * <small><60mm values to aid description only</small>	Cobbles / boulders Gravel Sand Silt Clay	Whole	* <small><60mm</small>
		0	0
		0	0
		98	98
		silt+clay =	
		2	2

Uniformity Coefficient	D60 / D10	2
-------------------------------	------------------	---

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH03
	E9014-1920190627043040	Sample Depth (m BGL)	20.50 - 21.50
		Sample Type and No	B36
		Specimen Ref	

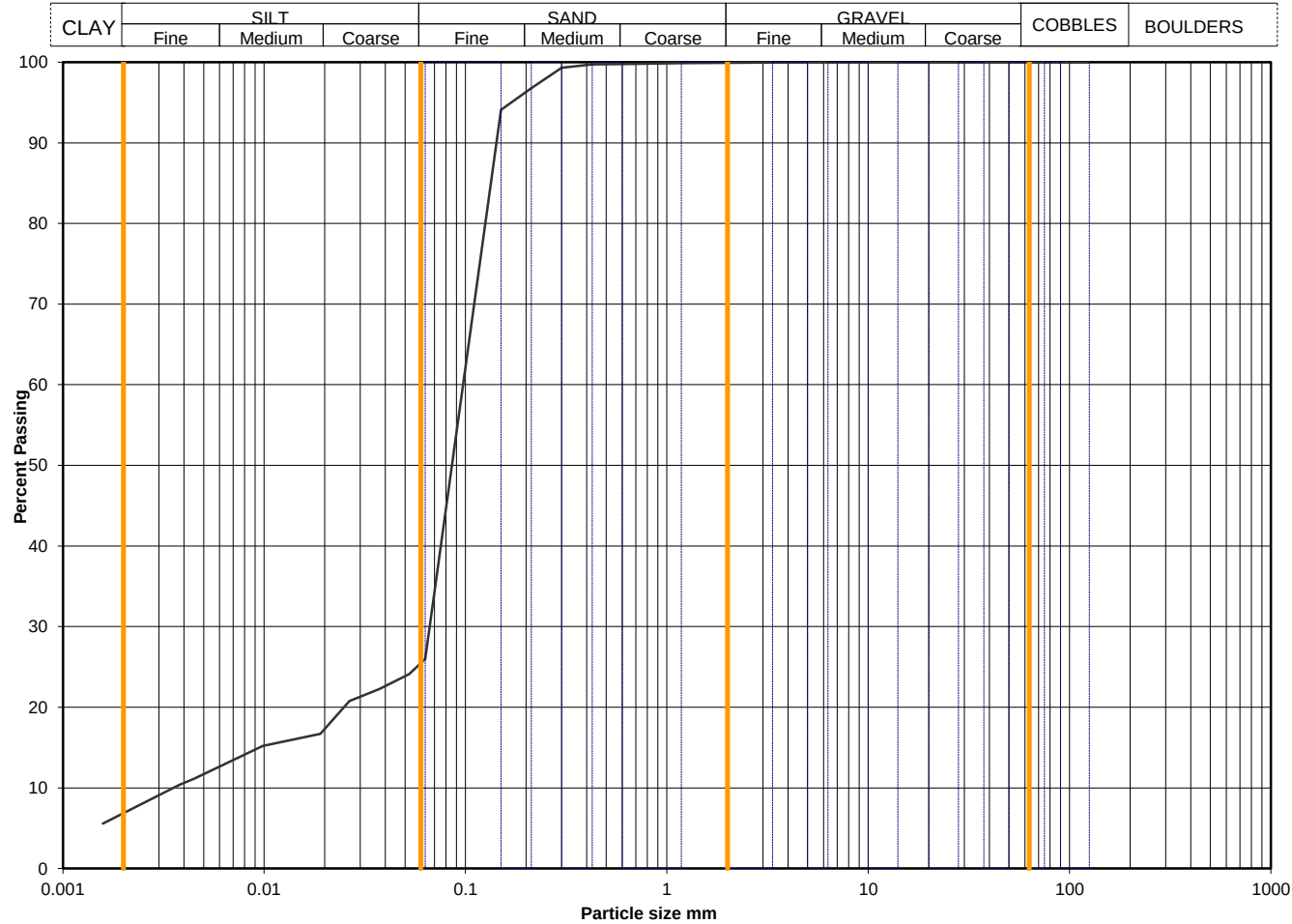


Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	65
90	100	0.0459	64
75	83	0.0327	62
63	83	0.0233	60
50	83	0.0166	58
37.5	83	0.0088	51
28	83	0.0041	42
20	83	0.0035	38
14	82	0.0015	18
10	81		
6.3	80		
5.0	80		
3.35	80		
2.00	79		
1.18	78		
0.600	76	Particle density, Mg/m3	
0.425	75	2.65 assumed	
0.300	74	Dry mass of sample, kg	
0.212	73	5.2	
0.150	71		
0.063	65		

Soil description	Grey slightly sandy slightly gravelly silty CLAY with one cobble.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions * <small><60mm values to aid description only</small>	Cobbles / boulders Gravel Sand Silt Clay	Whole	* <small><60mm</small>
		17	0
		4	5
		13	16
		41	49
		24	30
Uniformity Coefficient D60 / D10		Not applicable	
Test Method	BS 1377 : Part 2 : 1990		
	Sieving	9.2 wet sieve	
	Sedimentation	9.5 hydrometer	

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH04
	E9014-1920190628085208	Sample Depth (m BGL)	1.95 - 2.50
		Sample Type and No	B9
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	26
90	100	0.0525	24
75	100	0.0373	22
63	100	0.0265	21
50	100	0.0190	17
37.5	100	0.0098	15
28	100	0.0045	11
20	100	0.0038	10
14	100	0.0016	6
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	100	Particle density, Mg/m3	
0.425	100	2.65 assumed	
0.300	99	Dry mass of sample, kg	
0.212	97	3.1	
0.150	94		
0.063	26		

Soil description	Greyish brown silty SAND.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions * <small><60mm values to aid description only</small>	Cobbles / boulders Gravel Sand Silt Clay	Whole	* <small><60mm</small>
		0	0
		0	0
		74	74
		19	19
		7	7
Uniformity Coefficient		D60 / D10	28
Test Method	BS 1377 : Part 2 : 1990		
	Sieving	9.2	wet sieve
	Sedimentation	9.5	hydrometer

**Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)**

Project No	E9014-19	Sample Details:	Hole No.		BH02	
Project Name	Fez Holbeach Ground Investigation		Depth (m BGL)		3.45 - 4.00	
			Sample No	14	Type	B
			ID			
			Spec Ref			

Soil Description	Brown SAND.
Specimen Type /Preparation	-2mm material. Recompacted to a bulk density of 1.853 Mg/m ³ and at as received moisture content as determined by a single point compaction.

Specimen(s) nominally 60mm x 60mm square

Test(s) carried out in submerged condition

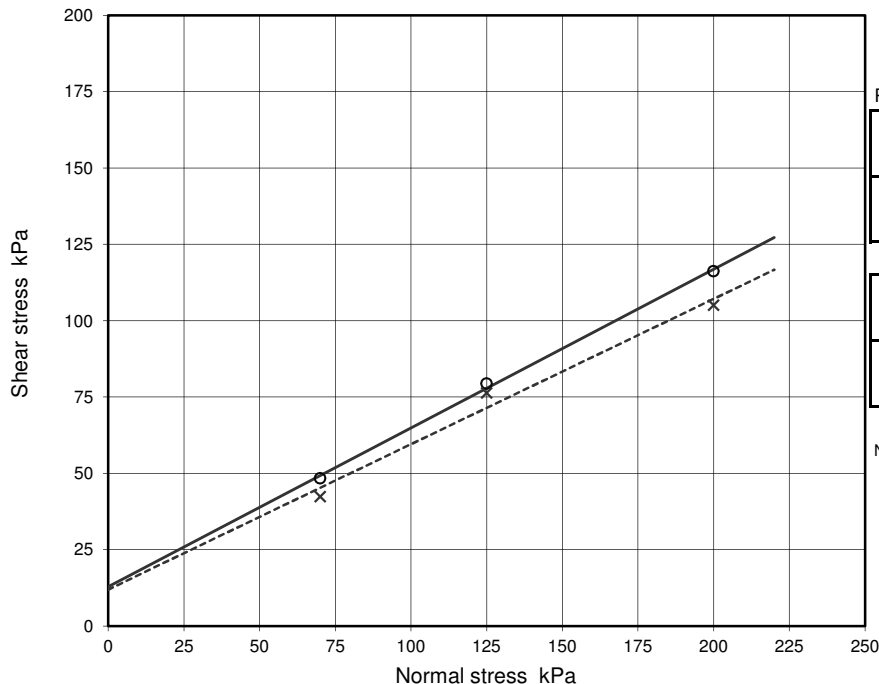
Particle density, assumed 2.65 Mg/m³

Specimen Details

		No.	1	2	3	4	5	6
Initial	Height	mm	25.6	25.6	25.6			
	Bulk Density	Mg/m ³	1.85	1.85	1.85			
	Water Content	%	25.3	25.0	24.9			
	Dry density	Mg/m ³	1.48	1.48	1.48			
	Voids ratio		0.792	0.788	0.787			
	Degree of Saturation	%	85	84	84			
Consol ¹	Consolidation / Normal Stress applied	kPa	70	125	200			
	Change in height during consolidation	mm	-0.248	-0.422	-0.462			
	Voids ratio after consolidation		0.774	0.758	0.754			
Shear see note 1	Voids ratio at end of test		0.749	0.693	0.608			
	Moisture content at end of test	%	25.4	26.1	23.0			
	Saturation at end of test	%	90	100	100			

Shearing stage

Rate of displacement	Peak	mm/min	0.600	0.600	0.600			
	Residual	mm/min	0.600	0.600	0.600			
Peak values, (o)	Relative displacement	mm	1.30	7.00	2.25			
	Shear stress	kPa	48.4	79.4	116.2			
Residual values, (x)	No. of reversals		2	2	2			
	Relative displacement	mm	20.00	30.00	4.00			
	Shear stress	kPa	42.4	76.3	105.0			



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c'	kPa	13	-
Ø'	degrees	27½	-

Residual strength, (x)		Regression	Manual
c' _R	kPa	12	-
Ø' _R	degrees	25½	-

Notes :

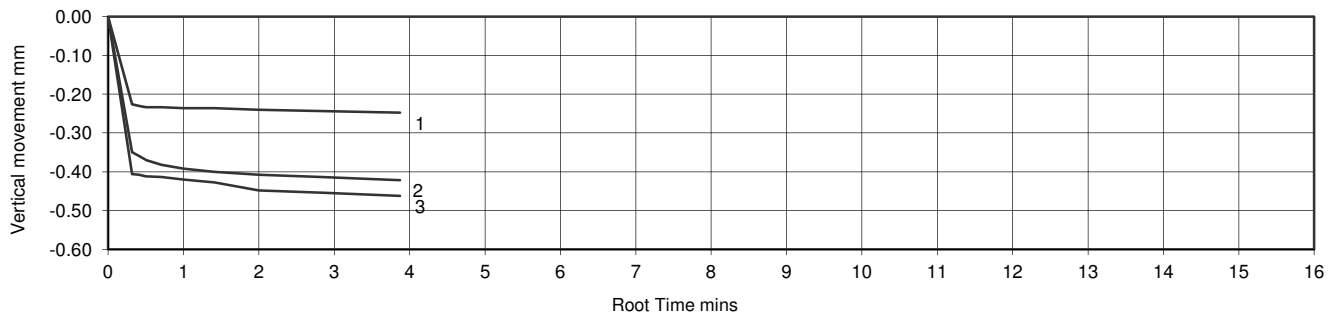
1 After shear values based on BS1377. Pt 7 cl. 4.6.1.6 using δH calculated from consolidation and shear stages

Ref SLR7.4 Rev 86.0 Feb18	 1157	Printed:30/07/2019 08:17	Figure SSB sheet 1 of 2
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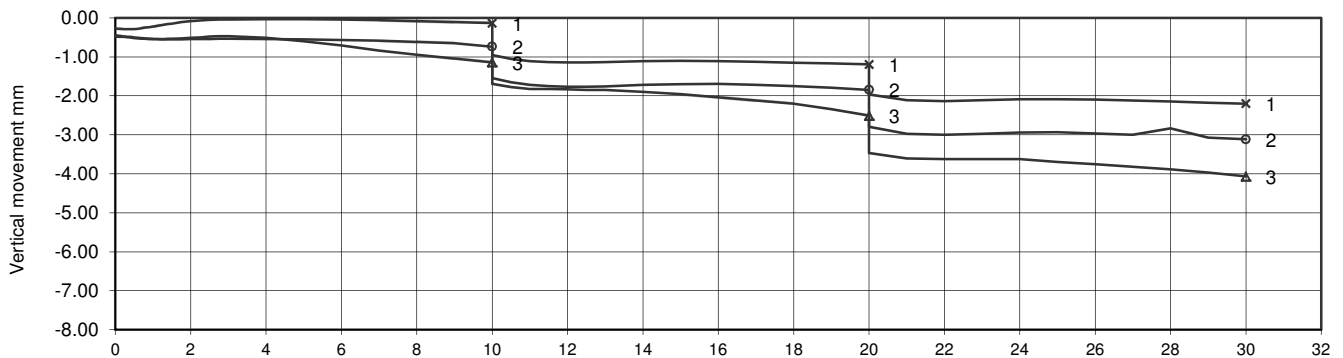
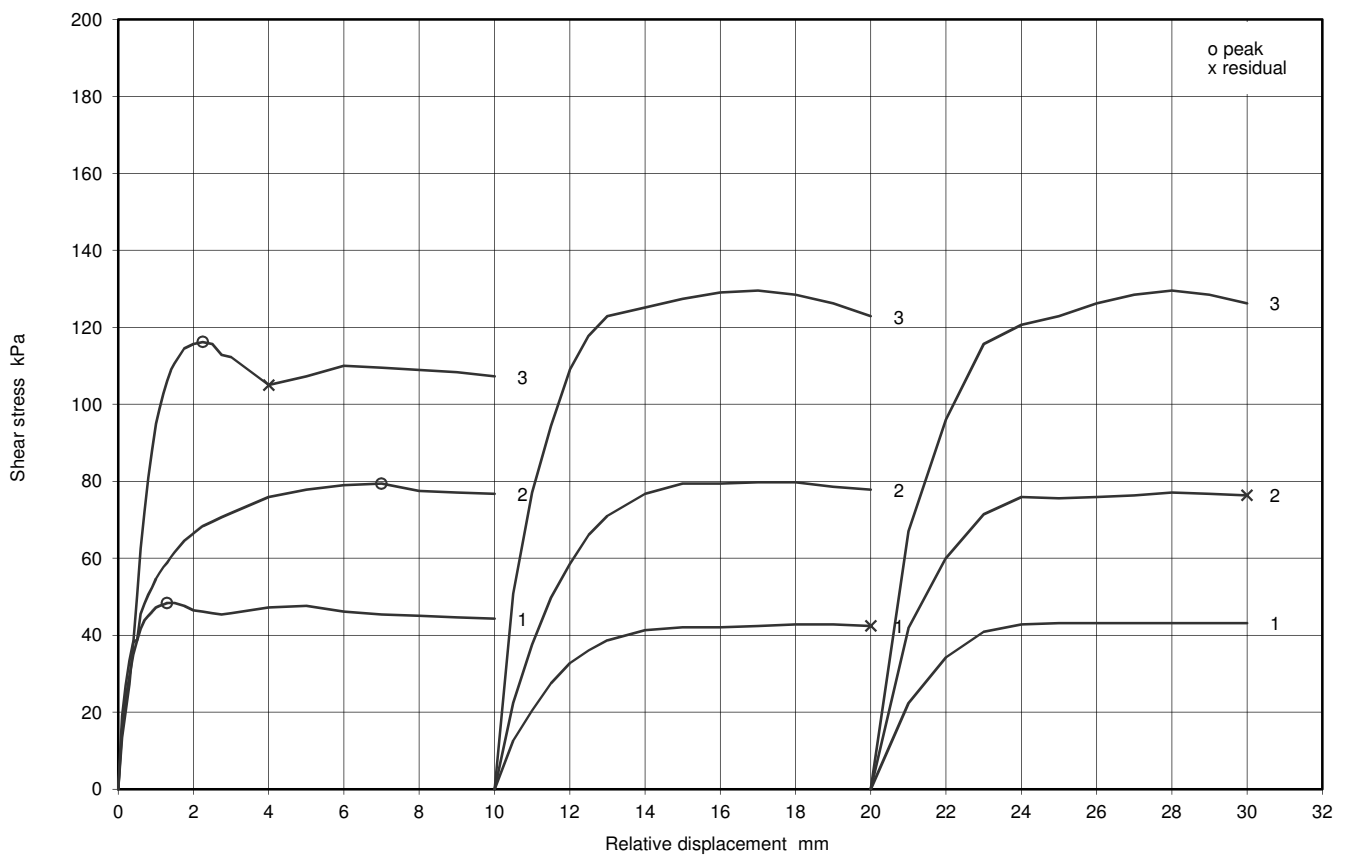
**Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)**

Project No	E9014-19	Sample Details:	Hole No.		BH02	
Project Name	Fez Holbeach Ground Investigation		Depth (m BGL)		3.45 - 4.00	
			Sample No	14	Type	B
			ID			
			Spec Ref			

Consolidation stage(s)



Shearing stage(s)



Ref	 SOCOTEC	 UKAS TESTING 1157	Printed:30/07/2019 08:17	Figure
SLR7.4 Rev 86.0 Feb18				SSB sheet 2 of 2

Hole No.	Sample				Soil Description	Density		w	Test type	Dia.	σ3	At failure / end of stage					Membrane Thickness	Remarks																																																																																																																																																																																																																																																																																																																																												
	No.	Depth (m)		type		bulk	dry					σ1	σ2	σ3	σ4	σ5			σ6	σ7	σ8	σ9	σ10	σ11	σ12	σ13	σ14	σ15	σ16	σ17	σ18	σ19	σ20	σ21	σ22	σ23	σ24	σ25	σ26	σ27	σ28	σ29	σ30	σ31	σ32	σ33	σ34	σ35	σ36	σ37	σ38	σ39	σ40	σ41	σ42	σ43	σ44	σ45	σ46	σ47	σ48	σ49	σ50	σ51	σ52	σ53	σ54	σ55	σ56	σ57	σ58	σ59	σ60	σ61	σ62	σ63	σ64	σ65	σ66	σ67	σ68	σ69	σ70	σ71	σ72	σ73	σ74	σ75	σ76	σ77	σ78	σ79	σ80	σ81	σ82	σ83	σ84	σ85	σ86	σ87	σ88	σ89	σ90	σ91	σ92	σ93	σ94	σ95	σ96	σ97	σ98	σ99	σ100	σ101	σ102	σ103	σ104	σ105	σ106	σ107	σ108	σ109	σ110	σ111	σ112	σ113	σ114	σ115	σ116	σ117	σ118	σ119	σ120	σ121	σ122	σ123	σ124	σ125	σ126	σ127	σ128	σ129	σ130	σ131	σ132	σ133	σ134	σ135	σ136	σ137	σ138	σ139	σ140	σ141	σ142	σ143	σ144	σ145	σ146	σ147	σ148	σ149	σ150	σ151	σ152	σ153	σ154	σ155	σ156	σ157	σ158	σ159	σ160	σ161	σ162	σ163	σ164	σ165	σ166	σ167	σ168	σ169	σ170	σ171	σ172	σ173	σ174	σ175	σ176	σ177	σ178	σ179	σ180	σ181	σ182	σ183	σ184	σ185	σ186	σ187	σ188	σ189	σ190	σ191	σ192	σ193	σ194	σ195	σ196	σ197	σ198	σ199	σ200	σ201	σ202	σ203	σ204	σ205	σ206	σ207	σ208	σ209	σ210	σ211	σ212	σ213	σ214	σ215	σ216	σ217	σ218	σ219	σ220	σ221	σ222	σ223	σ224	σ225	σ226	σ227	σ228	σ229	σ230	σ231	σ232	σ233	σ234	σ235	σ236	σ237	σ238	σ239	σ240	σ241	σ242	σ243	σ244	σ245	σ246	σ247	σ248	σ249	σ250	σ251	σ252	σ253	σ254	σ255	σ256	σ257	σ258	σ259	σ260	σ261	σ262	σ263	σ264	σ265	σ266	σ267	σ268	σ269	σ270	σ271	σ272	σ273	σ274	σ275	σ276	σ277	σ278	σ279	σ280	σ281	σ282	σ283	σ284	σ285	σ286	σ287	σ288	σ289	σ290	σ291	σ292	σ293	σ294	σ295	σ296	σ297	σ298	σ299	σ300	σ301	σ302	σ303	σ304	σ305	σ306	σ307	σ308	σ309	σ310	σ311	σ312	σ313	σ314	σ315	σ316	σ317	σ318	σ319	σ320	σ321	σ322	σ323	σ324	σ325	σ326	σ327	σ328	σ329	σ330	σ331	σ332	σ333	σ334	σ335	σ336	

Legend	UU - single stage test (may be in sets of specimens)	ó3	cell pressure	Mode of failure	P	plastic
	UUM - multistage test on a single specimen	ó1 - ó3	deviator stress		B	brittle
	suffix R - remoulded or recompacted	CU	undrained shear strength		C	compound

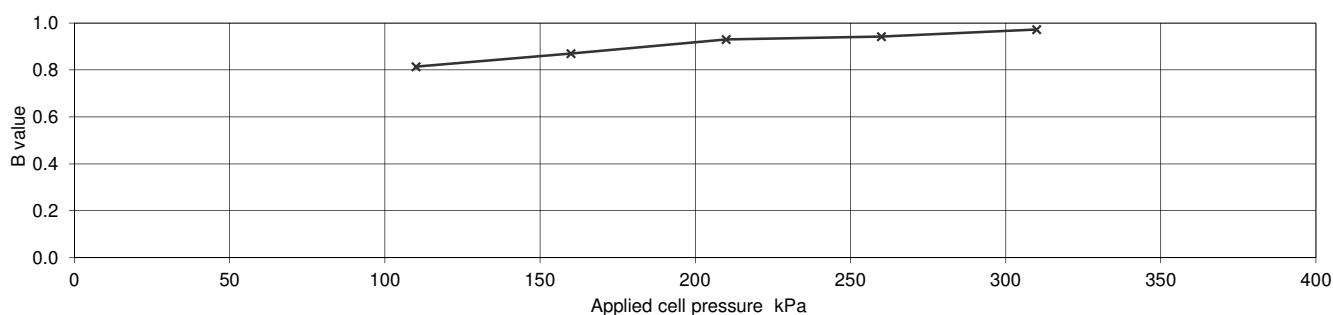
Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	E9014-19	Sample Details:	Hole No	BH01
Project Name	Fez Holbeach Ground Investigation		Depth (m BGL)	18.00-18.45
			No	38
			Type	UT
			ID	
			Spec Ref	

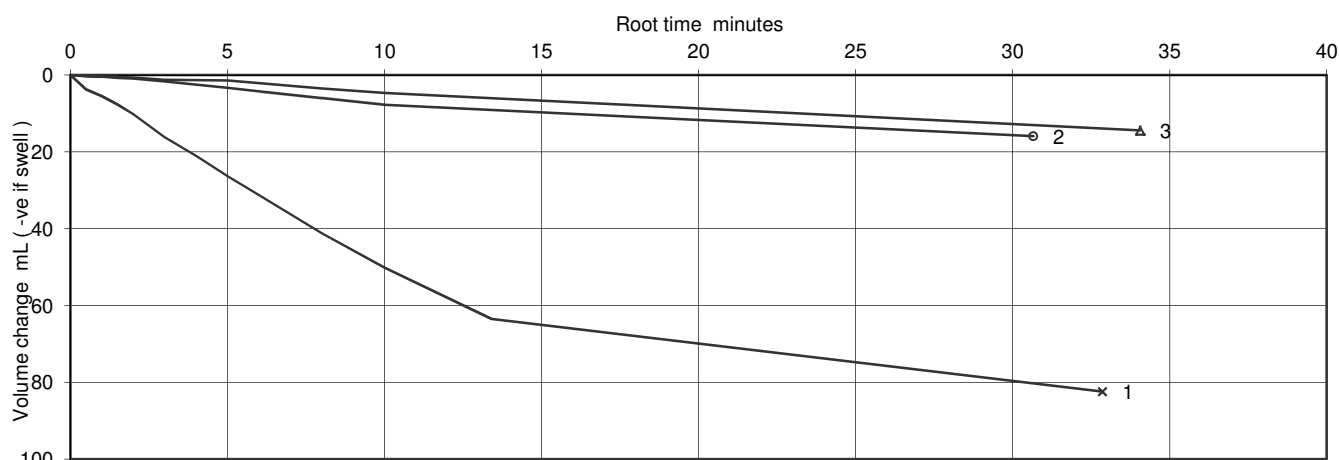
Specimen Details		
Initial		
Length	mm	182.72
Diameter	mm	103.63
Bulk Density	Mg/m ³	2.07
Water Content	%	23
Dry density	Mg/m ³	1.69
After test		
Bulk Density	Mg/m ³	2.13
Water Content	%	19
Dry density	Mg/m ³	1.79

Soil Description	Soft greyish brown silty CLAY. With rare FM chalk fragments.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation
		Increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	310
Final pore water pressure	kPa	285.2
Final B Value		0.97



Consolidation Details		From radial boundary and one end			
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Drainage Conditions				
	Stage No.	1	2	3	
	Cell Pressure applied	650	700	750	kPa
	Back Pressure applied	300	300	300	kPa
	Effective Pressure	350	400	450	kPa
	Pore pressure at start of consolidation	623	501	502	kPa
	Pore pressure at end of consolidation	302	301	301	kPa
	Pore pressure dissipation at end of consolidation	100	100	100	%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C _{vi}	1.10	0.71	0.45
	Coefficient of Compressibility	M _{vi}	0.16	0.05	0.05
	Coefficient of Permeability (calculated)	k _{vi}	5.6E-11	1.2E-11	6.8E-12

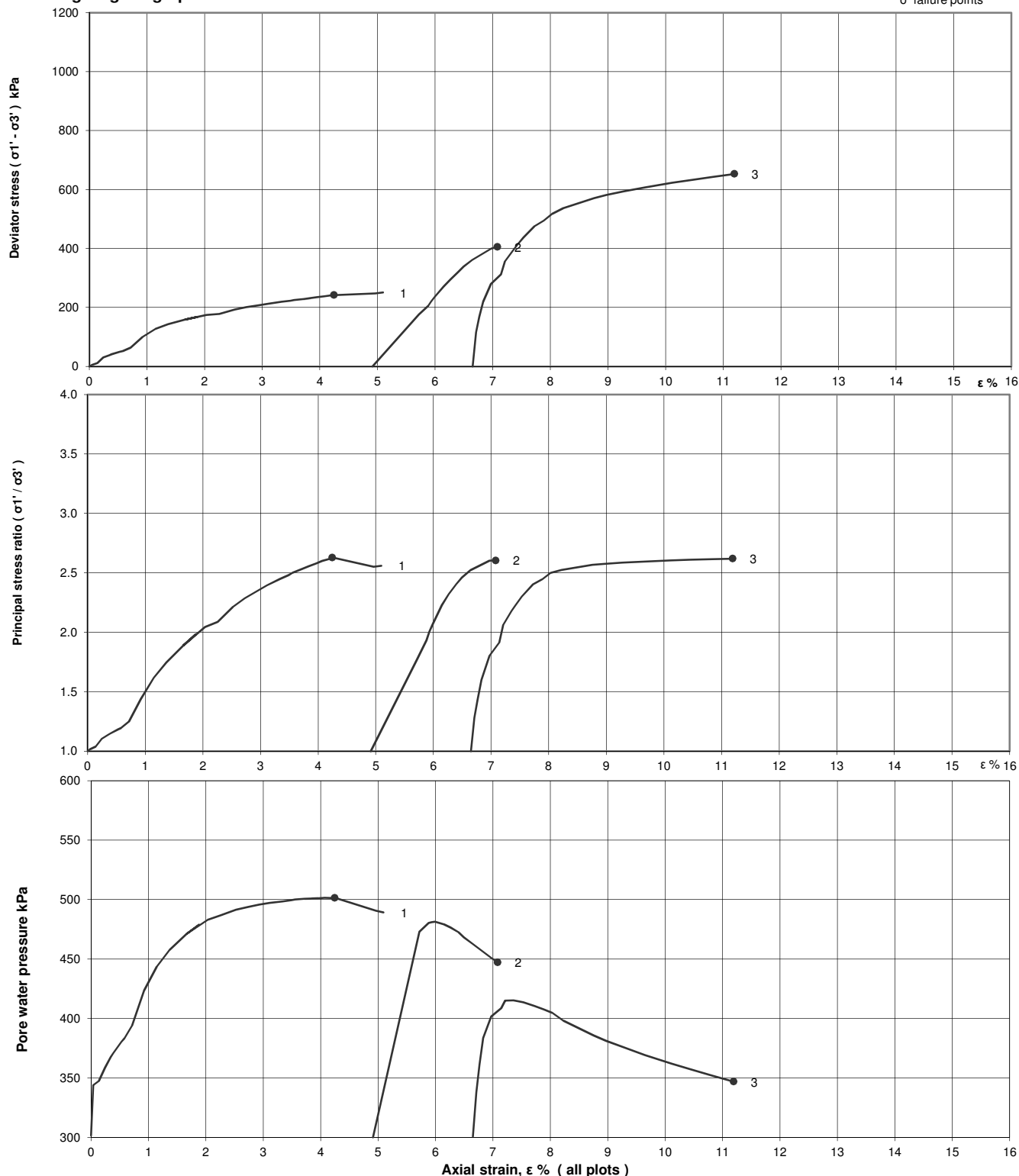


**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	E9014-19	Sample Details:	Hole No		BH01		
Project Name	Fez Holbeach Ground Investigation		Depth (m BGL)		18.00-18.45		
			No	38	Type	UT	
			ID				
			Spec Ref				

Shearing stages - graphical data

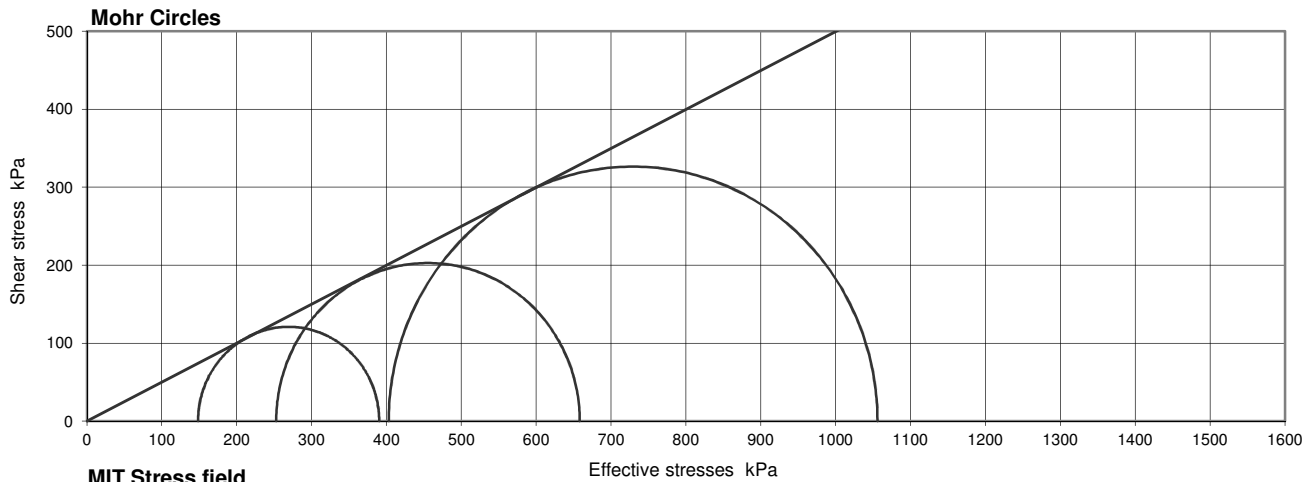
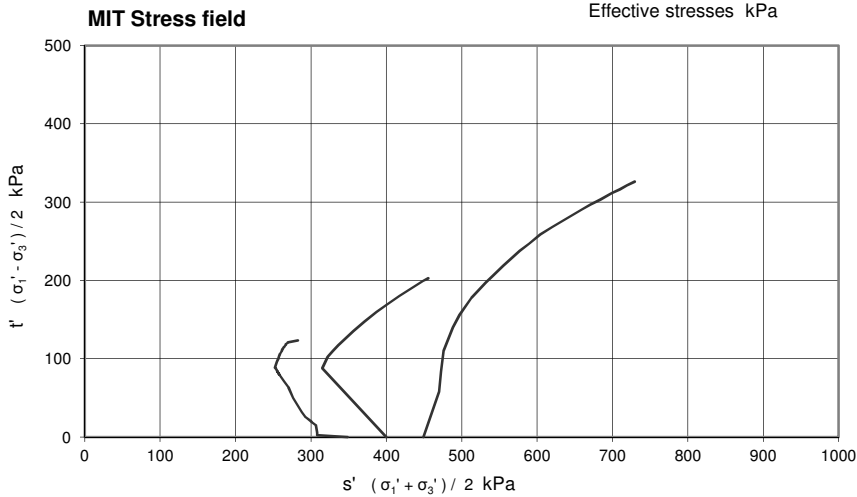
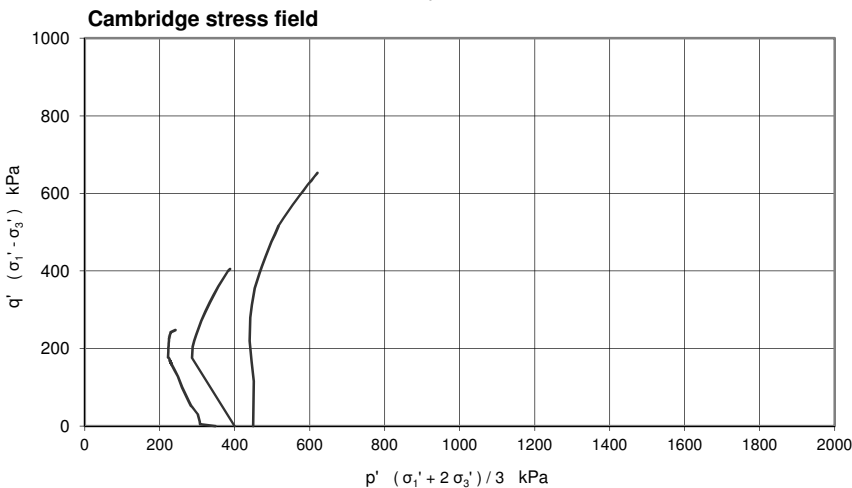
o failure points



Ref	SLR8.1 Rev 86.0 Feb18		 1157	Printed:30/07/2019 08:18	Figure CUM sheet 2 of 3
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Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure (BS1377 : Part 8 : 1990) - Multistage test on a single specimen

Project No	E9014-19	Sample Details:	Hole No	BH01
Project Name	Fez Holbeach Ground Investigation		Depth (m BGL)	18.00-18.45
			No	38
			Type	UT
			ID	
			Spec Ref	



Compression stages

Stage	1	2	3	
Cell pressure	650	700	750	kPa
Initial pwp	302	300	301	kPa
Initial σ_3'	348	400	449	kPa
Rate of strain	0.67	0.67	0.67	%/hr

Failure conditions

Criterion				
Axial strain	4.25	7.08	11.19	%
$(\sigma_1' / \sigma_3')_f$	2.629	2.604	2.619	
$(\sigma_1' - \sigma_3')_f$	241.9	405.5	652.7	kPa
u_f	502	447	347	kPa
$\sigma_{3'f}$	149	253	403	kPa
$\sigma_{1'f}$	390	658	1056	kPa
A_f	0.83	0.36	0.07	
Time to failure	6.3	10.6	16.7	hrs

Shear Strength Parameters

		Linear regression
c'	kPa	0.0
ϕ'	degrees	26.5
		Manual re-assessment
c'	kPa	-
ϕ'	degrees	-

Mode of failure

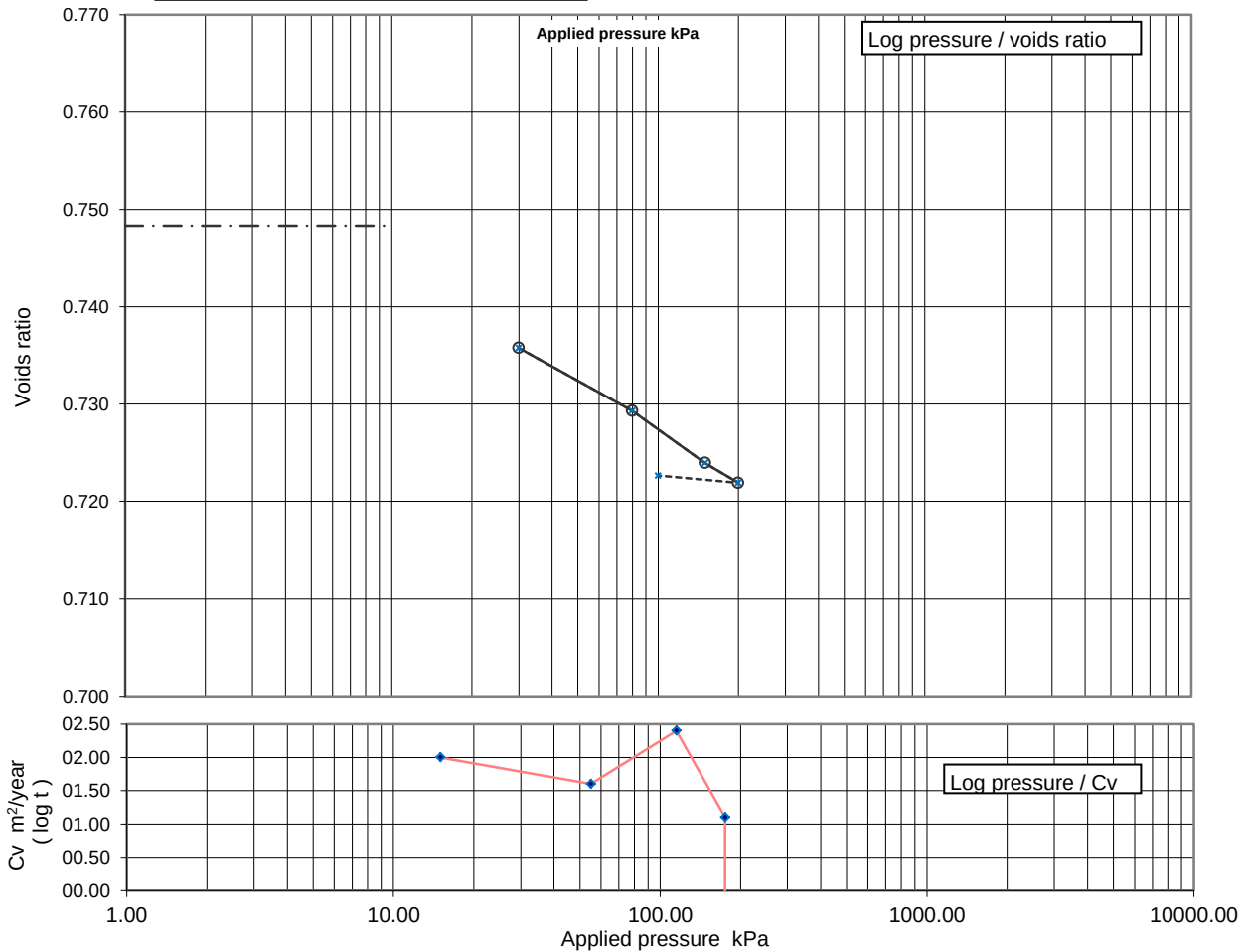


Notes : Deviator stresses corrected for area change, vertical side drains and 0.35 mm thick rubber membrane(s)

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377 : Part 5 : 1990 : clause 3

Sample Details:	SAMPLE ID:	Hole No	BH02
		Sample Depth (m BGL)	1.50 - 1.95
	E9014-1920190627012545	Sample Type and No	UT7
		Specimen Ref	



Soil description

Brown SAND.

Preparation

Undisturbed

Index properties

Liquid limit %		Plastic limit %	
----------------	--	-----------------	--

(if available)

Specimen details

Initial	Final	
2.65	assumed	Mg/m ³
74.99		mm
18.93	18.65	mm
0.748	0.723	
27	27	%
1.92	1.95	Mg/m ³
1.52	1.54	Mg/m ³
95	98	%
20		oC

Particle density

Mg/m³

Diameter

mm

Height

mm

Voids ratio

1

Moisture co

%

Bulk density

Mg/

Dry density

Mg/m³

Saturation

%

Average te

0C

Swelling pressure

not measured	kPa
--------------	-----

Notes :

[illegible]

Specimen taken 20 mm from base of sample

QA Ref
SLR 5.3
Rev 2.21
Feb 19



1157



Project No

E9014-19

Project Name

FEZ HOLBEACH GROUND
INVESTIGATION

Figure

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Sample Details:	SAMPLE ID:	Hole No	BH03
	E9014-1920190627042727	Sample Depth (m BGL)	18.00 - 18.45
		Sample Type and No	UT31
		Specimen Ref	

Voids ratio

Applied pressure kPa

Log pressure / voids ratio

Cv m²/year (log t)

Log pressure / Cv

Applied pressure kPa

Soil description		Soft to firm light brownish grey slightly sandy slightly gravelly CLAY.			
Preparation		Undisturbed			
Index properties		Liquid limit %		Plastic limit %	
(if available)					
Specimen details		Initial	Final		
Particle density		2.65	assumed	Mg/m3	
Diameter		74.99		mm	
Height		18.85	17.66	mm	
Voids ratio		0.510	0.415		
Moisture content		17	16	%	
Bulk density		2.06	2.18	Mg/m3	
Dry density		1.75	1.87	Mg/m3	
Saturation		89	105	%	
Average temperature for test		20		oC	
Swelling pressure		not measured		kPa	
<p>Notes :</p> <p>Unable to obtain T50 & T90 on stage 2 due to insufficient movement.</p>					
Specimen taken 10 mm from base of sample					

Applied Pressure kPa	Voids ratio	mv m2/MN	cv (t50, log) m2/year	cv (t90, root) m2/year	
0	0.5101				
375	0.4189	0.160	8.8	9.4	
425	0.4174	0.021	-	-	
475	0.4156	0.026	0.035	0.036	
500	0.4141	0.041	0.029	0.035	
300	0.4148	0.003	-	-	

QA Ref
SLR 5.3
Rev 2.21
Feb 19

1157

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Project No

E9014-19

Project Name

FEZ HOLBEACH GROUND INVESTIGATION

Figure

OED

Printed:
30/07/2019 08:14

Our Ref: EFS/200326 (Ver. 1)

Your Ref: E9014-19

July 11, 2019



Environmental Chemistry

SOCOTEC UK Limited

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Tim Rust
SOCOTEC UK Southam
Unit 4 and 5
Gainsborough Trading Estate
Leamington Road
Southam
Warwickshire
CV47 1RB

For the attention of Tim Rust

Dear Tim Rust

Sample Analysis - E9014-19 Fez Holbeach Ground Investigation

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

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

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

Where appropriate the samples will be kept until 17/08/19 when they will be discarded. Please call 01283 554458 for an extension of this date.

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

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

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

Yours sincerely

for SOCOTEC UK Limited

A handwritten signature in dark ink, appearing to read 'S. Akhtar', written over a horizontal line.

S Akhtar

Project Co-ordinator

01283 554458

TEST REPORT



Report No. EFS/200326 (Ver. 1)

SOCOTEC UK Southam
Unit 4 and 5
Gainsborough Trading Estate
Leamington Road
Southam
Warwickshire
CV47 1RB

Site: E9014-19 Fez Holbeach Ground Investigation

The 14 samples described in this report were registered for analysis by SOCOTEC UK Limited on 06-Jul-2019. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 11-Jul-2019

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

The following tables are contained in this report:

Table 1 Main Analysis Results (Page 2)
Analytical and Deviating Sample Overview (Page 3)
Table of Method Descriptions (Page 4)
Table of Report Notes (Page 5)
Table of Sample Descriptions (Appendix A Page 1 of 1)

On behalf of
SOCOTEC UK Lim
Becky Batham

A handwritten signature in black ink, appearing to read 'R. Batham'.

Operations Manager
Energy & Waste Services

Date of Issue: 11-Jul-2019

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

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

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

Where individual results are flagged see report notes for status.

Units : Method Codes : Method Reporting Limits : UKAS Accredited :			mg/kg ICPACIDS 20 Yes	mg/l ICPWSS 10 Yes	% TSBRE1 0.005 No	pH Units WSLM50 No															
LAB ID Number CL/	Client Sample Description	Sample Date	SO4-- (acid sol)	SO4-- (H2O sol) mg/l	Total Sulphur.	pH (BS1377)															
1965103	BH01 D 6 0.80	19-Jun-19	405	106	0.033	8.0															
1965104	BH01 D 11 3.50	19-Jun-19	373	82	0.037	8.4															
1965105	BH01 D 35 15.80	20-Jun-19	946	421	0.082	8.1															
1965106	BH02 D 40 13.00	18-Jun-19	276	65	0.040	9.2															
1965107	BH02 D 55 19.00	18-Jun-19	1360	362	0.381	8.1															
1965108	BH03 D 28 16.00	25-Jun-19	2360	1070	0.123	8.0															
1965109	BH04 D 3 0.10	19-Jun-19	346	34	0.028	7.8															
1965110	BH04 D 6 0.90	19-Jun-19	215	17	0.030	7.9															
1965111	BH04 D 8 1.95	19-Jun-19	333	56	0.029	8.4															
1965112	BH04 D 52 21.00	20-Jun-19	1630	435	0.765	8.1															
1965113	TP01 D 6 0.90	21-Jun-19	184	34	0.023	8.7															
1965114	TP03 D 3 0.10	21-Jun-19	267	12	0.027	8.1															
1965115	TP04 D 9 1.40	21-Jun-19	157	16	0.020	8.6															
1965116	TP06 D 6 0.90	21-Jun-19	216	19	0.026	8.3															
<div><div>SOCOTEC</div><div></div></div> <div>Bretby Business Park, Ashby Road</div> <div>Burton-on-Trent, Staffordshire, DE15 0YZ</div> <div>Tel +44 (0) 1283 554400</div> <div>Fax +44 (0) 1283 554422</div>			Client Name		SOCOTEC UK Southam						Sample Analysis										
			Contact		Tim Rust																
			E9014-19 Fez Holbeach Ground Investigation									Date Printed		11-Jul-2019							
												Report Number		EFS/200326							
												Table Number		1							

Customer SOCOTEC UK Southam
 Site E9014-19 Fez Holbeach Ground Investigation
 Report No S200326

Consignment No S86214
 Date Logged 06-Jul-2019
 In-House Report Due 15-Jul-2019

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

ID Number	Description	MethodID	CustServ	ICP ACIDS	ICP WSS	TSBREI	WISLM50
		Sampled	REPORT A	SO4-- (acid sol)	SO4-- (H2O sol) mg/l	Total Sulphur.	pH (BS1377)
				✓	✓		
CL/1965103	BH01 0.80	19/06/19					
CL/1965104	BH01 3.50	19/06/19					
CL/1965105	BH01 15.80	20/06/19					
CL/1965106	BH02 13.00	18/06/19					
CL/1965107	BH02 19.00	18/06/19					
CL/1965108	BH03 16.00	25/06/19					
CL/1965109	BH04 0.10	19/06/19					
CL/1965110	BH04 0.90	19/06/19					
CL/1965111	BH04 1.95	19/06/19					
CL/1965112	BH04 21.00	20/06/19					
CL/1965113	TP01 0.90	21/06/19					
CL/1965114	TP03 0.10	21/06/19					
CL/1965115	TP04 1.40	21/06/19					
CL/1965116	TP06 0.90	21/06/19					

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

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

Deviating Sample Key

- A The sample was received in an inappropriate container for this analysis
- B The sample was received without the correct preservation for this analysis
- C Headspace present in the sample container
- D The sampling date was not supplied so holding time may be compromised - applicable to all analysis
- E Sample processing did not commence within the appropriate holding time
- F Sample processing did not commence within the appropriate handling time

Requested Analysis Key

- Analysis Required
- Analysis dependant upon trigger result - **Note: due date may be affected if triggered**
- No analysis scheduled
- Analysis Subcontracted - **Note: due date may vary**

Where individual results are flagged see report notes for status.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	ICPACIDS	Oven Dried @ < 35°C	Determination of Total Sulphate in soil samples by Hydrochloric Acid extraction followed by ICPOES detection
Soil	ICPWSS	Oven Dried @ < 35°C	Determination of Water Soluble Sulphate in soil samples by water extraction followed by ICPOES detection
Soil	TSBRE1	Oven Dried @ < 35°C	Determination of Total Carbon and/or Total Sulphur in solid samples by high temperature combustion/infrared detection
Soil	WSLM50	Oven Dried @ < 35°C	Determination of pH of 2.5:1 deionised water to soil extracts using pH probe.

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,

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

Waters Analysis

Unless stated otherwise results are expressed as mg/l

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

Oil analysis specific

Unless stated otherwise,

- Results are expressed as mg/kg
- SG is expressed as g/cm³@ 15°C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile

TR Denotes Tremolite

CR Denotes Crocidolite

AC Denotes Actinolite

AM Denotes Amosite

AN Denotes Anthophyllite

NAIIS No Asbestos Identified in Sample

NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.

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

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

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

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

¥ Results for guidance only due to possible interference

& Blank corrected result

I.S Insufficient sample to complete requested analysis

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

Intf Unable to analyse due to interferences

N.D Not determined

N.Det Not detected

N.F No Flow

NS Information Not Supplied

Req Analysis requested, see attached sheets for results

▮ Raised detection limit due to nature of the sample

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

‡ MCERTS accreditation has been removed for this result

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

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

Sample Descriptions

Client : SOCOTEC UK Southam
Site : E9014-19 Fez Holbeach Ground Investigation
Report Number : S20_0326

Note: major constituent in upper case

[illegible]

Determination of Equivalent CBR Value derived from Plate Bearing Test

Report No: WAM0014615/131/M1

Report Date: 24 June 2019

Client: SOCOTEC UK Limited
Address: BRETBY BUSINESS PARK
ASHBY ROAD
BURTON ON TRENT
STAFFORDSHIRE
DE15 0YZ

Our Contract Ref: 51050854/2019-06-20

Test Number: Test 1
Date Tested: 20 Jun 2019
Tested By: SOCOTEC Warrington

Client Contact: Waleed Tariq
Site: A151 Rouabout, Spalding
Location: Location 1 - TP 1

Material Supplier: Not Supplied
Material Source: Not Supplied
Kentledge Type: 16 Tonne 360
Plate Diameter (mm): 450

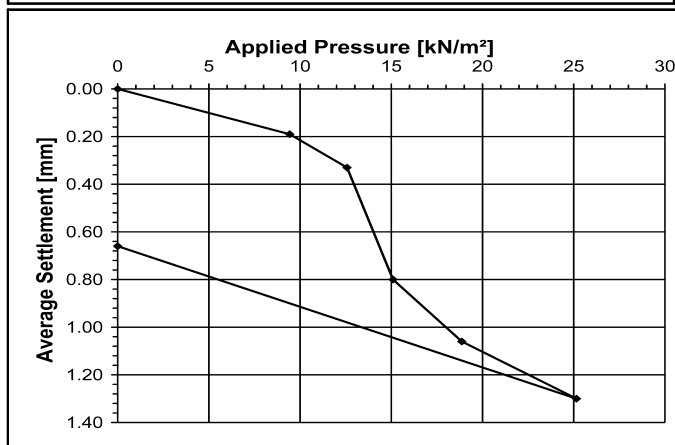
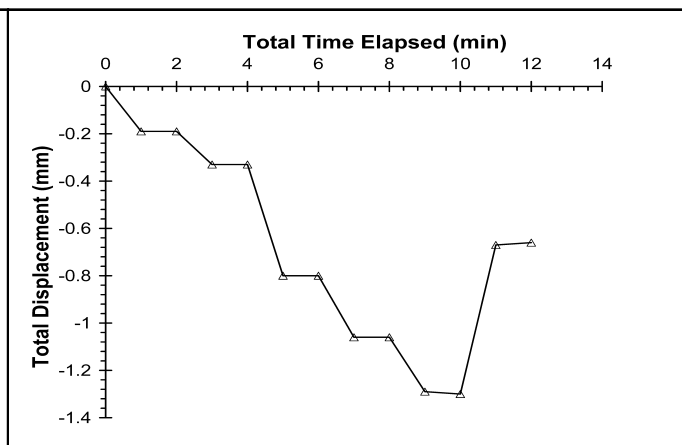
Depth of Test (mm): 450
Material Description: Clay/ Soil
Layer Thickness (mm): Unknown

Weather Conditions: Sunny

Results :

Applied Load (kN)	Applied Pressure (kN/m ²)	Applied Plate Settlement (mm)
1.50	9	0.19
2.00	13	0.33
2.40	15	0.80
3.00	19	1.06
4.00	25	1.30
0.00	0	0.66
End of Test		

Pressure at 1.25mm Settlement (kN/m²): 24
Modulus of Subgrade Reaction (MN/m²/m): 12
Moisture Content (%): 22
Equivalent CBR by Plate Loading (%): 0.7



Certified that testing was carried out in accordance with Design Manual for Roads and Bridges Volume 7, Pavement Design and Maintenance, IAN 73/06 Rev.1 (2009)
Certified that Moisture Content was carried out in accordance with BS1377-2:1990 Method 3.2

Signed:



Mark Beastall - Laboratory Manager
for and on behalf of SOCOTEC UK Limited

Determination of Equivalent CBR Value derived from Plate Bearing Test

Report No: WAM0014615/132/M2

Report Date: 24 June 2019

Client: SOCOTEC UK Limited
Address: BRETBY BUSINESS PARK
ASHBY ROAD
BURTON ON TRENT
STAFFORDSHIRE
DE15 0YZ

Our Contract Ref: 51050854/2019-06-20

Test Number: Test 2
Date Tested: 20 Jun 2019
Tested By: SOCOTEC Warrington

Client Contact: Waleed Tariq
Site: A151 Rouabout, Spalding
Location: Location 2 - TP 5

Material Supplier: Not Supplied
Material Source: Not Supplied
Kentledge Type: 16 Tonne 360
Plate Diameter (mm): 450

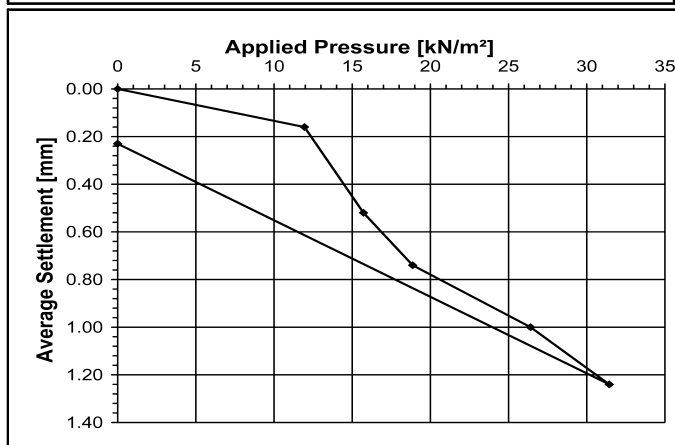
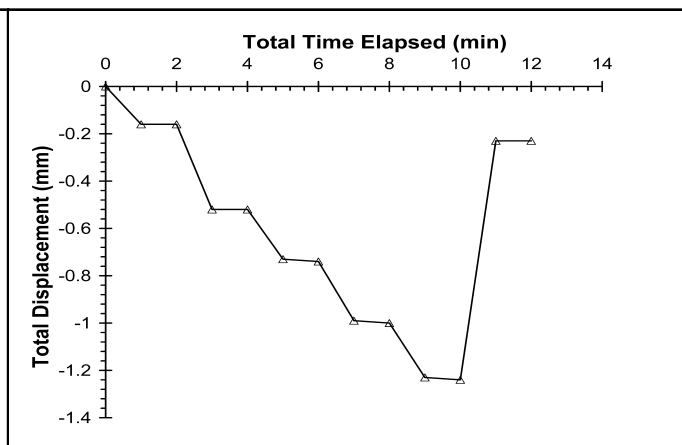
Depth of Test (mm): 450
Material Description: Clay/ Soil
Layer Thickness (mm): Unknown

Weather Conditions: Sunny

Results :

Applied Load (kN)	Applied Pressure (kN/m ²)	Applied Plate Settlement (mm)
1.90	12	0.16
2.50	16	0.52
3.00	19	0.74
4.20	26	1.00
5.00	31	1.24
0.00	0	0.23
End of Test		

Pressure at 1.25mm Settlement (kN/m²): 31
Modulus of Subgrade Reaction (MN/m²/m): 16
Moisture Content (%): 22
Equivalent CBR by Plate Loading (%): 1.1



Certified that testing was carried out in accordance with Design Manual for Roads and Bridges Volume 7, Pavement Design and Maintenance, IAN 73/06 Rev.1 (2009)
Certified that Moisture Content was carried out in accordance with BS1377-2:1990 Method 3.2

Signed:



Mark Beastall - Laboratory Manager
for and on behalf of SOCOTEC UK Limited

Determination of Equivalent CBR Value derived from Plate Bearing Test

Report No: WAM0014615/133/M3

Report Date: 24 June 2019

Client: SOCOTEC UK Limited
Address: BRETBY BUSINESS PARK
ASHBY ROAD
BURTON ON TRENT
STAFFORDSHIRE
DE15 0YZ

Our Contract Ref: 51050854/2019-06-20

Test Number: Test 3
Date Tested: 20 Jun 2019
Tested By: SOCOTEC Warrington

Client Contact: Waleed Tariq
Site: A151 Rouabout, Spalding
Location: Location 3 - TP 4

Material Supplier: Not Supplied
Material Source: Not Supplied
Kentledge Type: 16 Tonne 360
Plate Diameter (mm): 450

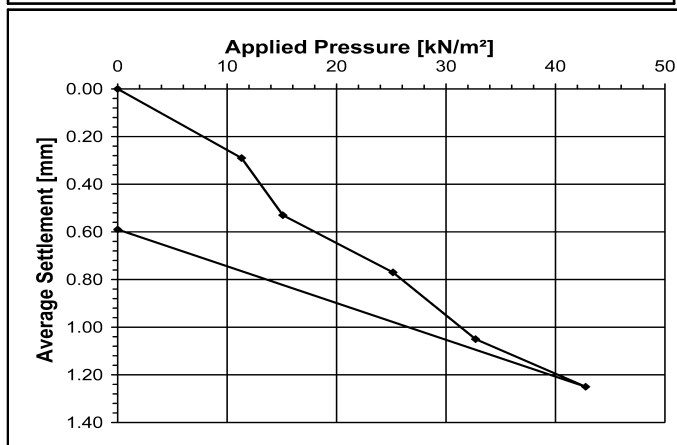
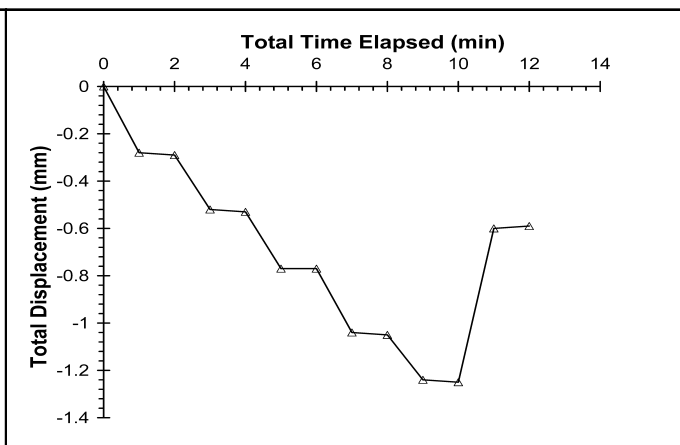
Depth of Test (mm): 450
Material Description: Clay/ Soil
Layer Thickness (mm): Unknown

Weather Conditions: Sunny

Results :

Applied Load (kN)	Applied Pressure (kN/m ²)	Applied Plate Settlement (mm)
1.80	11	0.29
2.40	15	0.53
4.00	25	0.77
5.20	33	1.05
6.80	43	1.25
0.00	0	0.59
End of Test		

Pressure at 1.25mm Settlement (kN/m²): 43
Modulus of Subgrade Reaction (MN/m²/m): 21
Moisture Content (%): 23
Equivalent CBR by Plate Loading (%): 1.9



Certified that testing was carried out in accordance with Design Manual for Roads and Bridges Volume 7, Pavement Design and Maintenance, IAN 73/06 Rev.1 (2009)
Certified that Moisture Content was carried out in accordance with BS1377-2:1990 Method 3.2

Signed:



Mark Beastall - Laboratory Manager
for and on behalf of SOCOTEC UK Limited

Determination of Equivalent CBR Value derived from Plate Bearing Test

Report No: WAM0014615/134/M4

Report Date: 24 June 2019

Client: SOCOTEC UK Limited
Address: BRETBY BUSINESS PARK
ASHBY ROAD
BURTON ON TRENT
STAFFORDSHIRE
DE15 0YZ

Our Contract Ref: 51050854/2019-06-20

Test Number: Test 4
Date Tested: 20 Jun 2019
Tested By: SOCOTEC Warrington

Client Contact: Waleed Tariq
Site: A151 Rouabout, Spalding
Location: Location 4 - TP 8

Material Supplier: Not Supplied
Material Source: Not Supplied
Kentledge Type: 16 Tonne 360
Plate Diameter (mm): 450

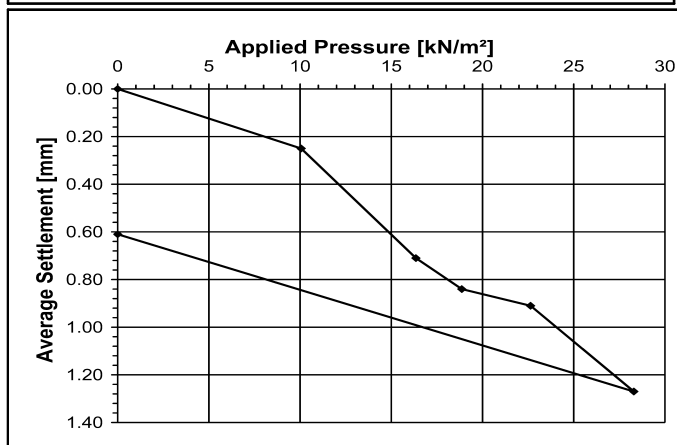
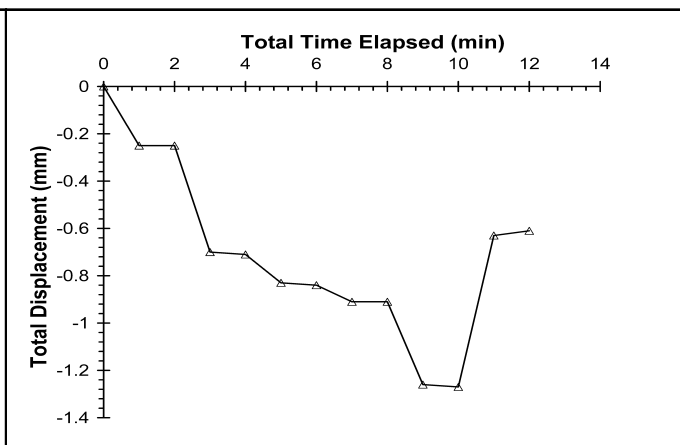
Depth of Test (mm): 450
Material Description: Clay/ Soil
Layer Thickness (mm): Unknown

Weather Conditions: Sunny

Results :

Applied Load (kN)	Applied Pressure (kN/m ²)	Applied Plate Settlement (mm)
1.60	10	0.25
2.60	16	0.71
3.00	19	0.84
3.60	23	0.91
4.50	28	1.27
0.00	0	0.61
End of Test		

Pressure at 1.25mm Settlement (kN/m²): 28
Modulus of Subgrade Reaction (MN/m²/m): 14
Moisture Content (%): 21
Equivalent CBR by Plate Loading (%): 0.9



Certified that testing was carried out in accordance with Design Manual for Roads and Bridges Volume 7, Pavement Design and Maintenance, IAN 73/06 Rev.1 (2009)
Certified that Moisture Content was carried out in accordance with BS1377-2:1990 Method 3.2

Signed:



Mark Beastall - Laboratory Manager
for and on behalf of SOCOTEC UK Limited

Determination of Equivalent CBR Value derived from Plate Bearing Test

Report No: WAM0014615/135/M5

Report Date: 24 June 2019

Client: SOCOTEC UK Limited
Address: BRETBY BUSINESS PARK
ASHBY ROAD
BURTON ON TRENT
STAFFORDSHIRE
DE15 0YZ

Our Contract Ref: 51050854/2019-06-20

Test Number: Test 5
Date Tested: 20 Jun 2019
Tested By: SOCOTEC Warrington

Client Contact: Waleed Tariq
Site: A151 Rouabout, Spalding
Location: Location 5 - TP 3

Material Supplier: Not Supplied
Material Source: Not Supplied
Kentledge Type: 16 Tonne 360
Plate Diameter (mm): 450

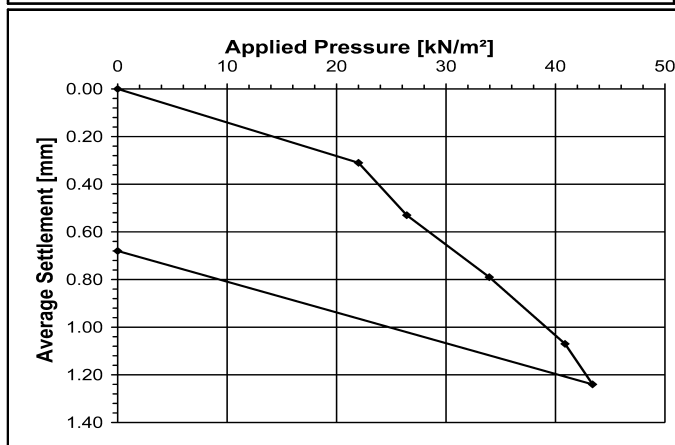
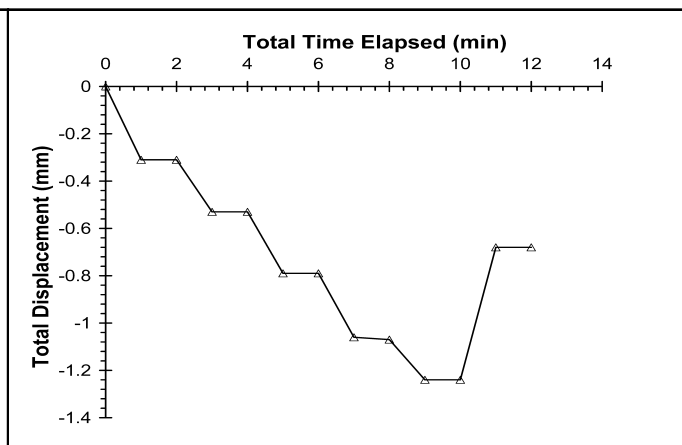
Depth of Test (mm): 450
Material Description: Clay/ Soil
Layer Thickness (mm): Unknown

Weather Conditions: Sunny

Results :

Applied Load (kN)	Applied Pressure (kN/m ²)	Applied Plate Settlement (mm)
3.50	22	0.31
4.20	26	0.53
5.40	34	0.79
6.50	41	1.07
6.90	43	1.24
0.00	0	0.68
End of Test		

Pressure at 1.25mm Settlement (kN/m²): 43
Modulus of Subgrade Reaction (MN/m²/m): 22
Moisture Content (%): 21
Equivalent CBR by Plate Loading (%): 2.0



Certified that testing was carried out in accordance with Design Manual for Roads and Bridges Volume 7, Pavement Design and Maintenance, IAN 73/06 Rev.1 (2009)
Certified that Moisture Content was carried out in accordance with BS1377-2:1990 Method 3.2

Signed:



Mark Beastall - Laboratory Manager
for and on behalf of SOCOTEC UK Limited

Determination of Equivalent CBR Value derived from Plate Bearing Test

Report No: WAM0014615/136/M6

Report Date: 24 June 2019

Client: SOCOTEC UK Limited
Address: BRETBY BUSINESS PARK
ASHBY ROAD
BURTON ON TRENT
STAFFORDSHIRE
DE15 0YZ

Our Contract Ref: 51050854/2019-06-20

Test Number: Test 6
Date Tested: 20 Jun 2019
Tested By: SOCOTEC Warrington

Client Contact: Waleed Tariq
Site: A151 Rouabout, Spalding
Location: Location 6 - TP 6

Material Supplier: Not Supplied
Material Source: Not Supplied
Kentledge Type: 16 Tonne 360
Plate Diameter (mm): 450

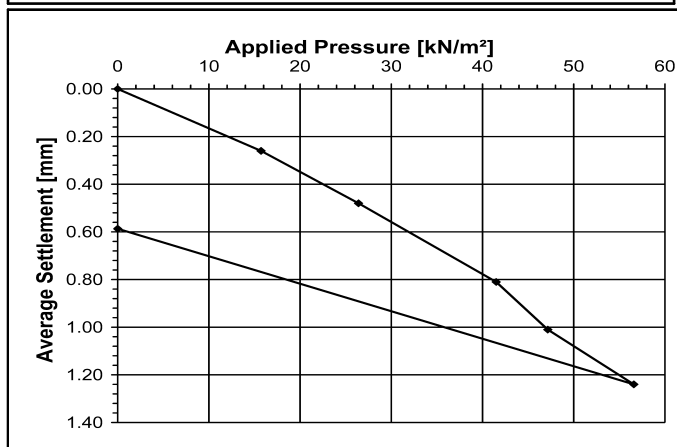
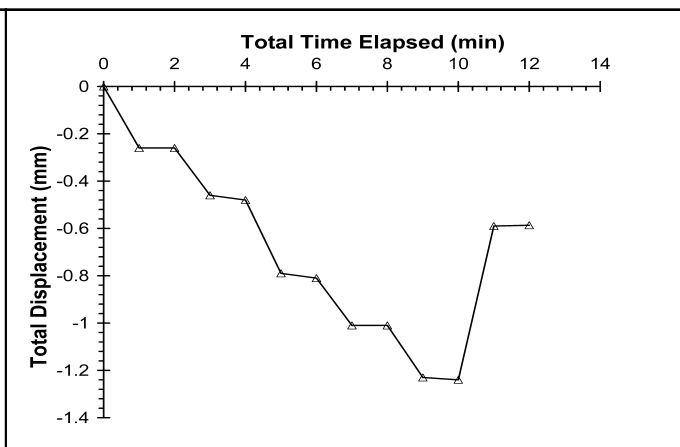
Depth of Test (mm): 450
Material Description: Clay/ Soil
Layer Thickness (mm): Unknown

Weather Conditions: Sunny

Results :

Applied Load (kN)	Applied Pressure (kN/m ²)	Applied Plate Settlement (mm)
2.50	16	0.26
4.20	26	0.48
6.60	42	0.81
7.50	47	1.01
9.00	57	1.24
0.00	0	0.59
End of Test		

Pressure at 1.25mm Settlement (kN/m²): 57
Modulus of Subgrade Reaction (MN/m²/m): 28
Moisture Content (%): 22
Equivalent CBR by Plate Loading (%): 3.2



Certified that testing was carried out in accordance with Design Manual for Roads and Bridges Volume 7, Pavement Design and Maintenance, IAN 73/06 Rev.1 (2009)
Certified that Moisture Content was carried out in accordance with BS1377-2:1990 Method 3.2

Signed:



Mark Beastall - Laboratory Manager
for and on behalf of SOCOTEC UK Limited



Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US

Tel: (01244) 528700

Fax: (01244) 528701

email: hawardencustomerservices@alsglobal.com

Website: www.alsenvironmental.co.uk

SOCOTEC
Unit 4
Gainsborough Trading Estate
Leamington Road
Southam
Warwickshire
CV47 1RB

Attention: Giuseppe Melosu

CERTIFICATE OF ANALYSIS

Date of report Generation:	02 July 2019
Customer:	SOCOTEC
Sample Delivery Group (SDG):	190619-61
Your Reference:	E9014-19
Location:	FEZ HOLBEACH GROUND INVESTIGATION
Report No:	512671

This report has been revised and directly supersedes 512380 in its entirety.

We received 3 samples on Wednesday June 19, 2019 and 3 of these samples were scheduled for analysis which was completed on Tuesday July 02, 2019. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager



CERTIFICATE OF ANALYSIS

Validated

SDG: 190619-61

Client Reference: E9014-19

Report Number: 512671

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report: 512380

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
20184450	BH02	ES1	0.20 - 0.20	16/06/2019
20184452	BH02	ES4	0.80 - 0.80	16/06/2019
20184455	BH02	ES25	3.00 - 3.00	16/06/2019

Maximum Sample/Coolbox Temperature (°C) :

16.8

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 190619-61

Client Reference: E9014-19

Report Number: 512671

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report: 512380

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
 UNS - Unspecified Solid
 GW - Ground Water
 SW - Surface Water
 LE - Land Leachate
 PL - Prepared Leachate
 PR - Process Water
 SA - Saline Water
 TE - Trade Effluent
 TS - Treated Sewage
 US - Untreated Sewage
 RE - Recreational Water
 DW - Drinking Water Non-regulatory
 UNL - Unspecified Liquid
 SL - Sludge
 G - Gas
 OTH - Other

Lab Sample No(s)

Customer Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

Acid herbicides*	All	NDPs: 0 Tests: 2	20184450	20184452	20184455	BH02	ES25	3.00 - 3.00	1kg TUB	S
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 1	BH02	BH02					120g Amber Jar (ALE217)	S
Ammonium Soil by Titration	All	NDPs: 0 Tests: 2	ES1	ES4					1kg TUB	S
Anions by Kone (w)	All	NDPs: 0 Tests: 1	0.20 - 0.20	0.80 - 0.80					120g Amber Jar (ALE217)	S
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 2	120g Amber Jar (ALE217)	120g Amber Jar (ALE217)					1kg TUB	S
CEN Readings	All	NDPs: 0 Tests: 1								S
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 3								S
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1								S
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 1								S
EPH (DRO) (C10-C40) Aqueous (W)	All	NDPs: 0 Tests: 1								S
GRO by GC-FID (W)	All	NDPs: 0 Tests: 1								S
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 2								S
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 1								S
Mercury Dissolved	All	NDPs: 0 Tests: 1								S
Metals in solid samples by OES	All	NDPs: 0 Tests: 2								S



CERTIFICATE OF ANALYSIS

Validated

SDG: 190619-61

Client Reference: E9014-19

Report Number: 512671

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report: 512380

Results Legend



Test


No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

Customer
Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

OC, OP Pesticides and Triazine Herb

All

NDPs: 0
Tests: 2

X

X

pH

All

NDPs: 0
Tests: 2

X

X

pH Value of Filtered Water

All

NDPs: 0
Tests: 1

X

Phenols by HPLC (S)

All

NDPs: 0
Tests: 2

X

X

Phenols by HPLC (W)

All

NDPs: 0
Tests: 1

X

Sample description

All

NDPs: 0
Tests: 3

X

X

X

Total EPH (aq)

All

NDPs: 0
Tests: 1

X

Total Organic Carbon

All

NDPs: 0
Tests: 2

X

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 190619-61

Client Reference: E9014-19

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Location: FEZ HOLBEACH GROUND

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Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
-----------	----------	------	-----------------	--------	-------------	--------	------------	-------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
20184450	BH02	0.20 - 0.20	Dark Brown	Loamy Sand	Vegetation	None
20184452	BH02	0.80 - 0.80	Light Brown	Loamy Sand	None	None
20184455	BH02	3.00 - 3.00	Dark Brown	Sand	None	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

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SDG: 190619-61
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Client Reference: E9014-19
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Results Legend		Customer Sample Ref.	BH02	BH02	BH02			
#	ISO17025 accredited.							
M	mCERTS accredited.							
sq	Aqueous / settled sample.							
dis.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3*§@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	14	19	19			
2,4,5-Trichlorophenol (2,4,5-T)*	<0.01 mg/kg	SUB	<0.01	<0.01				
2,4,5-TP (Fenoprop)*	<0.01 mg/kg	SUB	<0.01	<0.01				
2,4-D*	<0.01 mg/kg	SUB	<0.01	<0.01				
2,4-DB*	<0.01 mg/kg	SUB	<0.01	<0.01				
2,4-Dichloroprop (2,4 DP)*	<0.01 mg/kg	SUB	<0.01	<0.01				
4-Chlorophenoxyacetic acid (4-CPA)*	<0.01 mg/kg	SUB	<0.01	<0.01				
Acifluorfen*	<0.01 mg/kg	SUB	<0.01	<0.01				
Bentazone*	<0.01 mg/kg	SUB	<0.01	<0.01				
Bromoxynil*	<0.01 mg/kg	SUB	<0.01	<0.01				
Dicamba*	<0.01 mg/kg	SUB	<0.01	<0.01				
Diclofop*	<0.01 mg/kg	SUB	<0.01	<0.01				
Dinoseb*	<0.01 mg/kg	SUB	<0.01	<0.01				
DNOC*	<0.01 mg/kg	SUB	<0.01	<0.01				
Fluroxypyr*	<0.01 mg/kg	SUB	<0.01	<0.01				
Ioxynil*	<0.01 mg/kg	SUB	<0.01	<0.01				
2-methyl-4-Chlorophenoxyacetic acid (MCPA)*	<0.01 mg/kg	SUB	<0.01	<0.01				
4-(4-Chloro-o-tolyloxy) butyric acid (MCPB)*	<0.01 mg/kg	SUB	<0.01	<0.01				
Mecoprop (MCP)*	<0.01 mg/kg	SUB	<0.01	<0.01				
Propoxycarbazone-sodium*	<0.01 mg/kg	SUB	<0.01	<0.01				
Triclopyr*	<0.01 mg/kg	SUB	<0.01	<0.01				
Triclosan*	<0.01 mg/kg	SUB	<0.01	<0.01				
Exchangeable Ammonia as NH4	<15 mg/kg	TM024	<15		<15			
Phenol	<0.01 mg/kg	TM062 (S)	<0.01		<0.01			
Cresols	<0.01 mg/kg	TM062 (S)	<0.01		<0.01			
Xylenols	<0.015 mg/kg	TM062 (S)	<0.015		<0.015			
Phenols, Total Detected monohydric	<0.035 mg/kg	TM062 (S)	<0.035		<0.035			
Fraction Organic Carbon (FOC)	<0.002	TM132	0.00916		<0.002			
Soil Organic Matter (SOM)	<0.35 %	TM132	1.58		<0.35			
pH	1 pH Units	TM133	8.33		8.61			
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6		<0.6			
Cyanide, Total	<1 mg/kg	TM153	<1		<1			
Cyanide, Free	<1 mg/kg	TM153	<1		<1			



CERTIFICATE OF ANALYSIS

Validated

SDG: 190619-61
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 512671
Superseded Report: 512380

OC, OP Pesticides and Triazine Herb

Results Legend		Customer Sample Ref.	BH02	BH02				
#	ISO17025 accredited.							
M	mCERTS accredited.							
sq	Aqueous / settled sample.							
dis.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3*5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Dichlorvos	<50 µg/kg	TM073	<50	<50				
Mevinphos	<50 µg/kg	TM073	<50	<50				
Phorate	<50 µg/kg	TM073	<50	<50				
alpha-Hexachlorocyclohexane (HCH)	<50 µg/kg	TM073	<50	<50				
Diazinon	<50 µg/kg	TM073	<50	<50				
gamma-Hexachlorocyclohexane (HCH / Lindane)	<50 µg/kg	TM073	<50	<50				
Disulfoton	<50 µg/kg	TM073	<50	<50				
Heptachlor	<50 µg/kg	TM073	<50	<50				
Aldrin	<50 µg/kg	TM073	<50	<50				
beta-Hexachlorocyclohexane (HCH)	<50 µg/kg	TM073	<50	<50				
Methyl parathion	<50 µg/kg	TM073	<50	<50				
Malathion	<50 µg/kg	TM073	<50	<50				
Fenitrothion	<50 µg/kg	TM073	<50	<50				
Heptachlor epoxide	<50 µg/kg	TM073	<50	<50				
Parathion	<50 µg/kg	TM073	<50	<50				
Endosulphan I	<50 µg/kg	TM073	<50	<50				
p,p-DDE	<50 µg/kg	TM073	114	<50				
Dieldrin	<50 µg/kg	TM073	<50	<50				
Endrin	<50 µg/kg	TM073	<50	<50				
p,p-TDE (DDD)	<50 µg/kg	TM073	<50	<50				
Ethion	<50 µg/kg	TM073	<50	<50				
Endosulphan II	<50 µg/kg	TM073	<50	<50				
p,p-DDT	<50 µg/kg	TM073	<50	<50				
p,p-Methoxychlor	<50 µg/kg	TM073	<50	<50				
Endosulphan sulphate	<50 µg/kg	TM073	<50	<50				
Azinphos-methyl	<50 µg/kg	TM073	<50	<50				



CERTIFICATE OF ANALYSIS

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SDG: 190619-61

Client Reference: E9014-19

Report Number: 512671

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report: 512380

Asbestos Identification - Solid Samples

Results Legend

ISO17025 accredited.
M mCERTS accredited.
* Subcontracted test.
(F) Trigger breach confirmed
1-5&*\$@ Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH02ES1 0.20 - 0.20 MISC_SOLID 16/06/2019 00:00:00 19/06/2019 08:25:00 190619-61 20184450 TM048	24/06/2019	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH02ES25 3.00 - 3.00 MISC_SOLID 16/06/2019 00:00:00 19/06/2019 08:25:00 190619-61 20184455 TM048	24/06/2019	Renata Bozhkov	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

Validated

SDG: 190619-61
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 512671
Superseded Report: 512380

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.216

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 23.5

Dry Matter Content (%) 81

Case

SDG 190619-61

Lab Sample Number(s) 20184452

Sampled Date 16-Jun-2019

Customer Sample Ref. BH02 ES4

Depth (m) 0.80 - 0.80

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	<0.0005	<0.0005	<0.001	<0.001	0.5	2	25
Barium	-	-	-	-	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	<0.001	<0.001	<0.002	<0.002	0.5	10	70
Copper	0.00128	<0.0003	0.00256	<0.0006	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.00002	<0.00002	0.01	0.2	2
Molybdenum	-	-	-	-	0.5	10	30
Nickel	<0.0004	<0.0004	<0.0008	<0.0008	0.4	10	40
Lead	<0.0002	<0.0002	<0.0004	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	<0.001	<0.001	<0.002	<0.002	0.1	0.5	7
Zinc	0.00365	<0.001	0.0073	<0.002	4	50	200
Chloride	4.1	<2	8.2	<4	800	15000	25000
Fluoride	-	-	-	-	10	150	500
Sulphate (soluble)	-	-	-	-	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.032	1	-	-
Dissolved Organic Carbon	4.51	<3	9.02	<6	500	800	1000

Leach Test Information

Date Prepared 24-Jun-2019

pH (pH Units) 8.13

Conductivity (µS/cm) 171.00

Temperature (°C) 20.30

Volume Leachant (Litres) 0.309

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

02/07/2019 14:46:40

14:46:27 02/07/2019



CERTIFICATE OF ANALYSIS

Validated

SDG: 190619-61
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 512671
Superseded Report: 512380

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.216

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 23.5

Dry Matter Content (%) 81

Case

SDG 190619-61

Lab Sample Number(s) 20184452

Sampled Date 16-Jun-2019

Customer Sample Ref. BH02 ES4

Depth (m) 0.80 - 0.80

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-
pH Value of Filtered Water	8.2	<0.001	16	<0.002	-
EPH (DRO) (C10-C40)	<0.1	<0.1	<0.2	<0.2	-
Total Ammonia as NH3	<0.2	<0.2	<0.4	<0.4	-
Total Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-
Total EPH (C6-C40)	<0.1	<0.1	<0.2	<0.2	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-
Phenol by HPLC (W)	<0.002	<0.002	<0.004	<0.004	-
Cresols by HPLC (W)	<0.006	<0.006	<0.012	<0.012	-
Thiocyanate (W)	0.06	<0.05	0.12	<0.1	-
Xylenols by HPLC (W)	<0.008	<0.008	<0.016	<0.016	-
Boron	0.0281	<0.01	0.0562	<0.02	-
EPH Band C10-C12	<0.1	<0.1	<0.2	<0.2	-
EPH Band C12-C16	<0.1	<0.1	<0.2	<0.2	-
EPH Band C16-C21	<0.1	<0.1	<0.2	<0.2	-
EPH Band C21-C28	<0.1	<0.1	<0.2	<0.2	-
EPH Band C35-C40	<0.1	<0.1	<0.2	<0.2	-
Calcium (Dis.Filt) mg/l	26.9	<0.2	53.8	<0.4	-
EPH Band C28-C35	<0.1	<0.1	<0.2	<0.2	-
Iron (Dis.Filt) mg/l	<0.019	<0.019	<0.038	<0.038	-
TPH CWG (W)					
GRO TOT (C5-C12)	<0.05	<0.05	<0.1	<0.1	-
MTBE GC-FID	<0.003	<0.003	<0.006	<0.006	-

Leach Test Information

Date Prepared 24-Jun-2019

pH (pH Units) 8.13

Conductivity (µS/cm) 171.00

Temperature (°C) 20.30

Volume Leachant (Litres) 0.309

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

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CERTIFICATE OF ANALYSIS

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SDG: 190619-61
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 512671
Superseded Report: 512380

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.216

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 23.5

Dry Matter Content (%) 81

Case

SDG 190619-61

Lab Sample Number(s) 20184452

Sampled Date 16-Jun-2019

Customer Sample Ref. BH02 ES4

Depth (m) 0.80 - 0.80

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Concⁿ in 2:1
eluate (mg/l)

2:1 concⁿ
leached (mg/kg)

Limit values for compliance leaching test
using BS EN 12457-3 at L/S 10 l/kg

TPH CWG (W)

	Result	Limit of Detection	Result	Limit of Detection	
Benzene by GC	<0.007	<0.007	<0.014	<0.014	-
Toluene by GC	<0.004	<0.004	<0.008	<0.008	-
Ethylbenzene by GC	<0.005	<0.005	<0.01	<0.01	-
m & p Xylene by GC	<0.008	<0.008	<0.016	<0.016	-
o Xylene by GC	<0.003	<0.003	<0.006	<0.006	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.022	<0.022	-
Sum of BTEX by GC	<0.028	<0.028	<0.056	<0.056	-
GRO_bandC (>C7-C8)	<0.01	<0.01	<0.02	<0.02	-
GRO_bandC (C5-C6)	<0.01	<0.01	<0.02	<0.02	-
GRO_bandC (>C6-C7)	<0.01	<0.01	<0.02	<0.02	-
GRO_bandC (>C8-C10)	<0.01	<0.01	<0.02	<0.02	-
GRO (C10-C12)	<0.01	<0.01	<0.02	<0.02	-

Leach Test Information

Date Prepared 24-Jun-2019

pH (pH Units) 8.13

Conductivity (µS/cm) 171.00

Temperature (°C) 20.30

Volume Leachant (Litres) 0.309

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

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02/07/2019 14:46:40

14:46:27 02/07/2019



CERTIFICATE OF ANALYSIS

Validated

SDG: 190619-61 Client Reference: E9014-19 Report Number: 512671
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report: 512380

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
SUB		Subcontracted Test
TM024	Method 4500A & B, AWWA/APHA, 20th Ed., 1999	Determination of Exchangeable Ammonium and Ammoniacal Nitrogen as N by titration on solids
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM073	MEWAM BOOK 60 1980,95 1985, HMSO / Modified: US EPA Method 8081A & 8141A	Determination of organochlorine and organophosphorous pesticides by GCMS
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990:BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 190619-61

Client Reference: E9014-19

Report Number: 512671

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report: 512380

Test Completion Dates

Lab Sample No(s)	20184450	20184452	20184455
Customer Sample Ref.	BH02	BH02	BH02
AGS Ref.	ES1	ES4	ES25
Depth	0.20 - 0.20	0.80 - 0.80	3.00 - 3.00
Type	Unspecified So	Unspecified So	Unspecified So

Acid herbicides*	02-Jul-2019	02-Jul-2019	
Ammoniacal Nitrogen		27-Jun-2019	
Ammonium Soil by Titration	27-Jun-2019		27-Jun-2019
Anions by Kone (w)		26-Jun-2019	
Asbestos ID in Solid Samples	24-Jun-2019		24-Jun-2019
CEN 2:1 Leachate (1 Stage)		24-Jun-2019	
CEN Readings		26-Jun-2019	
Cyanide Comp/Free/Total/Thiocyanate	27-Jun-2019	28-Jun-2019	27-Jun-2019
Dissolved Metals by ICP-MS		27-Jun-2019	
Dissolved Organic/Inorganic Carbon		27-Jun-2019	
EPH (DRO) (C10-C40) Aqueous (W)		28-Jun-2019	
GRO by GC-FID (W)		27-Jun-2019	
Hexavalent Chromium (s)	24-Jun-2019		24-Jun-2019
Hexavalent Chromium (w)		27-Jun-2019	
Mercury Dissolved		27-Jun-2019	
Metals in solid samples by OES	27-Jun-2019		27-Jun-2019
OC, OP Pesticides and Triazine Herb	28-Jun-2019	28-Jun-2019	
pH	25-Jun-2019		25-Jun-2019
pH Value of Filtered Water		26-Jun-2019	
Phenols by HPLC (S)	26-Jun-2019		27-Jun-2019
Phenols by HPLC (W)		27-Jun-2019	
Sample description	22-Jun-2019	22-Jun-2019	22-Jun-2019
Total EPH (aq)		28-Jun-2019	
Total Organic Carbon	26-Jun-2019		26-Jun-2019



CERTIFICATE OF ANALYSIS

Work Order	: PR1966163	Issue Date	: 02-Jul-2019
Amendment	: 1		
Customer	: ALS Life Sciences Ltd	Laboratory	: ALS Czech Republic, s.r.o.
Contact	: Reporting	Contact	: Client Service
Address	: Unit 7-8 Hawarden Business Park Manor Road, Hawarden CH5 3US Deeside United Kingdom	Address	: Na Harfe 336/9 Prague 9 - Vysocany 190 00 Czech Republic
E-mail	: euhdsubconresults@ALSGlobal.com	E-mail	: customer.support@alsglobal.com
Telephone	: ----	Telephone	: +420 226 226 228
Project	: 190619-61	Page	: 1 of 2
Order number	:	Date Samples	: 25-Jun-2019
		Received	
		Quote number	: PR2018ALSAL-GB0004 (CZ-256-18-0022)
Site	: ----	Date of test	: 26-Jun-2019 - 01-Jul-2019
Sampled by	: ----	QC Level	: ALS CR Standard Quality Control Schedule

General Comments

This report shall not be reproduced except in full, without prior written approval from the laboratory.

The laboratory declares that the test results relate only to the listed samples.

Amendment No. 1: Project ID corrected. This report replaces CoA PR1966163 issued on 01-Jul-2019.

Responsible for accuracy

Testing Laboratory No. 1163
Accredited by CAI according to
CSN EN ISO/IEC 17025:2005

Signatories

Zdeněk Jiráček

Position

Environmental Business Unit
Manager





Analytical Results

Sub-Matrix: SOIL

Client sample ID

Laboratory sample ID

Client sampling date / time

				20207229 BH02	20207098 BH02	----	
				PR1966163-001	PR1966163-002	----	
				16-Jun-2019 00:00	16-Jun-2019 00:00	----	
Parameter	Method	LOR	Unit	Result	MU	Result	MU
Physical Parameters							
Dry matter @ 105°C	S-DRY-GRCI	0.10	%	83.8	± 6.0%	81.1	± 6.0%
Pesticides							
2.4.5-T	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
2.4.5-TP	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
2.4-D	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
2.4-DB	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
2.4-DP (isomers)	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
4-CPP	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
Bentazone	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
Dinoseb	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
Fluroxypyr	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
MCPA	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
MCPB	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
MCPB (isomers)	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
Acifluorfen	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
Bromoxynil	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
DNOC	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
Dicamba	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
Diclofop	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
Ioxynil	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
Propoxycarbazone-sodium	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
Triclopyr	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----
Triclosan	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, delivery date in brackets without a time component will be displayed instead. Measurement uncertainty is expressed as expanded measurement uncertainty with coverage factor k = 2, representing 95% confidence level.

Key: LOR = Limit of reporting; MU = Measurement Uncertainty

The end of result part of the certificate of analysis

Brief Method Summaries

Analytical Methods	Method Descriptions
Location of test performance: Na Harfe 336/9 Prague 9 - Vysocany Czech Republic 190 00	
S-DRY-GRCI	CZ_SOP_D06_01_045 (CSN ISO 11465, CSN EN 12880, CSN EN 14346), CZ_SOP_D06_07_046 (CSN ISO 11465, CSN EN 12880, CSN EN 14346, CSN 46 5735) Determination of dry matter by gravimetry and determination of moisture by calculation from measured values.
S-PESLMSA1	CZ_SOP_D06_03_182.B (CSN EN 15637, US EPA 1694) Determination of acidic herbicides and drug residues by liquid chromatography method with MS/MS detection.

A ** symbol preceding any method indicates laboratory or subcontractor non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited. Please refer to General Comment section on front page for information. If the report contains subcontracted analysis, those are made in a subcontracted laboratory outside the laboratories ALS Czech Republic, s.r.o.

The calculation methods of summation parameters are available on request in the client service.



CERTIFICATE OF ANALYSIS

SDG:	190619-61	Client Reference:	E9014-19	Report Number:	512671
Location:	OLBEACH GROUND INVESTIG	Order Number:		Superseded Report:	512380

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2107).

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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Deeside
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email: hawardencustomerservices@alsglobal.com

Website: www.alsenvironmental.co.uk

SOCOTEC
Unit 4
Gainsborough Trading Estate
Leamington Road
Southam
Warwickshire
CV47 1RB

Attention: Giuseppe Melosu

CERTIFICATE OF ANALYSIS

Date of report Generation:	10 July 2019
Customer:	SOCOTEC
Sample Delivery Group (SDG):	190628-5
Your Reference:	E9014-19
Location:	FEZ HOLBEACH GROUND INVESTIGATION
Report No:	513665

This report has been revised and directly supersedes 513660 in its entirety.

We received 29 samples on Thursday June 27, 2019 and 13 of these samples were scheduled for analysis which was completed on Wednesday July 10, 2019. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5

Client Reference: E9014-19

Report Number: 513665

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report: 513660

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
20237653	BH01	ES33	15.20 - 15.30	20/06/2019
20237654	BH1	ES40	16.80 - 17.00	20/06/2019
20237641	BH03	ES1	0.20 - 0.20	24/06/2019
20237642	BH03	ES4	0.40 - 0.40	25/06/2019
20237643	BH03	ES25	12.00 - 12.10	25/06/2019
20237644	BH03	ES26	15.00 - 15.10	20/06/2019
20237645	BH03	ES35	18.20 - 18.20	20/06/2019
20237652	BH04	ES54	15.50 - 15.50	23/06/2019
20237629	TP01	ES1	0.20 - 0.20	20/06/2019
20237630	TP01	ES4	0.40 - 0.40	20/06/2019
20237631	TP01	ES7	1.20 - 1.20	20/06/2019
20237626	TP03	ES1	0.20 - 0.20	20/06/2019
20237627	TP03	ES4	0.40 - 0.40	20/06/2019
20237628	TP03	ES7	1.20 - 1.20	20/06/2019
20237635	TP04	ES1	0.20 - 0.20	20/06/2019
20237636	TP04	ES4	0.40 - 0.40	20/06/2019
20237637	TP04	ES7	1.20 - 1.20	20/06/2019
20237646	TP05	ES1	0.20 - 0.20	20/06/2019
20237647	TP05	ES4	0.40 - 0.40	20/06/2019
20237648	TP05	ES7	1.20 - 1.20	20/06/2019
20237638	TP06	ES1	0.20 - 0.20	20/06/2019
20237639	TP06	ES4	0.40 - 0.40	20/06/2019
20237640	TP06	ES7	1.20 - 1.20	20/06/2019
20237649	TP07	ES1	0.20 - 0.20	20/06/2019
20237650	TP07	ES4	0.40 - 0.40	20/06/2019
20237651	TP07	ES7	1.20 - 1.20	20/06/2019
20237632	TP08	ES1	0.20 - 0.20	20/06/2019
20237633	TP08	ES4	0.40 - 0.40	20/06/2019
20237634	TP08	ES7	1.20 - 1.20	20/06/2019

Maximum Sample/Coolbox Temperature (°C) :

15.4

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5 Client Reference: E9014-19 Report Number: 513665
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report: 513660

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Results Legend	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	20237639		TP06		ES4		0.40 - 0.40		1kg TUB		S	
	20237638		TP06		ES1		0.20 - 0.20		120g Amber Jar (ALE217) 1kg TUB		S	
	20237647		TP05		ES4		0.40 - 0.40		120g Amber Jar (ALE217) 1kg TUB		S	
	20237635		TP04		ES1		0.20 - 0.20		120g Amber Jar (ALE217) 1kg TUB		S	
	20237627		TP03		ES4		0.40 - 0.40		120g Amber Jar (ALE217) 1kg TUB		S	
	20237626		TP03		ES1		0.20 - 0.20		120g Amber Jar (ALE217) 1kg TUB		S	
	20237630		TP01		ES4		0.40 - 0.40		120g Amber Jar (ALE217) 60ml Amber Glass Jar 1kg TUB		S	
	20237642		BH03		ES4		0.40 - 0.40		120g Amber Jar (ALE217) 1kg TUB		S	
	20237641		BH03		ES1		0.20 - 0.20		120g Amber Jar (ALE217) 1kg TUB		S	
Acid Herbicides by GCMS	All	NDPs: 0 Tests: 2										
Acid herbicides*	All	NDPs: 0 Tests: 2										
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 5										
Ammonium Soil by Titration	All	NDPs: 0 Tests: 8										
Anions by Kone (w)	All	NDPs: 0 Tests: 5										
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 8										
CEN Readings	All	NDPs: 0 Tests: 5										
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 13										
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 5										
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 5										
EPH (DRO) (C10-C40) Aqueous (W)	All	NDPs: 0 Tests: 5										
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 2										
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 2										
GRO by GC-FID (S)	All	NDPs: 0 Tests: 2										
GRO by GC-FID (W)	All	NDPs: 0 Tests: 5										



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5 Client Reference: E9014-19 Report Number: 513665
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report: 513660

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type
20237639	TP06	ES4	0.40 - 0.40	1kg TUB	S
20237638	TP06	ES1	0.20 - 0.20	120g Amber Jar (ALE217) 1kg TUB	S
20237647	TP05	ES4	0.40 - 0.40	120g Amber Jar (ALE217) 1kg TUB	S
20237635	TP04	ES1	0.20 - 0.20	120g Amber Jar (ALE217) 1kg TUB	S
20237627	TP03	ES4	0.40 - 0.40	120g Amber Jar (ALE217) 1kg TUB	S
20237626	TP03	ES1	0.20 - 0.20	120g Amber Jar (ALE217) 1kg TUB	S
20237630	TP01	ES4	0.40 - 0.40	120g Amber Jar (ALE217) 60ml Amber Glass Jar 1kg TUB	S
20237642	BH03	ES4	0.40 - 0.40	120g Amber Jar (ALE217) 1kg TUB	S
20237641	BH03	ES1	0.20 - 0.20	120g Amber Jar (ALE217) 1kg TUB	S
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 8			
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 5			
Mercury Dissolved	All	NDPs: 0 Tests: 5			
Metals in solid samples by OES	All	NDPs: 0 Tests: 8			
OC, OP Pesticides and Triazine Herb	All	NDPs: 0 Tests: 2			
PAH by GCMS	All	NDPs: 0 Tests: 1			
PAH in waters by GC-MS (diss.filt)	All	NDPs: 0 Tests: 1			
Pesticides (Suite I) by GCMS	All	NDPs: 0 Tests: 2			
Pesticides (Suite II) by GCMS	All	NDPs: 0 Tests: 2			
pH	All	NDPs: 0 Tests: 8			
pH Value of Filtered Water	All	NDPs: 0 Tests: 5			
Phenols by HPLC (S)	All	NDPs: 0 Tests: 8			
Phenols by HPLC (W)	All	NDPs: 0 Tests: 5			
Sample description	All	NDPs: 0 Tests: 12			
Semi Volatile Organic Compounds	All	NDPs: 0 Tests: 1			



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5

Client Reference: E9014-19

Report Number: 513665

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report: 513660

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
-----------	----------	------	-----------------	--------	-------------	--------	------------	-------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
20237641	BH03	0.20 - 0.20	Dark Brown	Sandy Silt Loam	Vegetation	None
20237630	TP01	0.40 - 0.40	Light Brown	Loamy Sand	None	None
20237626	TP03	0.20 - 0.20	Light Brown	Loamy Sand	Vegetation	None
20237627	TP03	0.40 - 0.40	Light Brown	Loamy Sand	Vegetation	None
20237635	TP04	0.20 - 0.20	Dark Brown	Loamy Sand	None	None
20237647	TP05	0.40 - 0.40	Light Brown	Loamy Sand	None	None
20237638	TP06	0.20 - 0.20	Light Brown	Loamy Sand	None	None
20237639	TP06	0.40 - 0.40	Light Brown	Loamy Sand	None	None
20237649	TP07	0.20 - 0.20	Dark Brown	Loamy Sand	Vegetation	None
20237650	TP07	0.40 - 0.40	Dark Brown	Loamy Sand	Vegetation	None
20237632	TP08	0.20 - 0.20	Dark Brown	Loamy Sand	Vegetation	None
20237634	TP08	1.20 - 1.20	Light Brown	Loamy Sand	None	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5 Client Reference: E9014-19 Report Number: 513665
 Location: FEZ HOLBEACH GROUND Order Number: Superseded Report: 513660

Results Legend		Customer Sample Ref.	BH03	BH03	TP01	TP03	TP03	TP04
#	ISO17025 accredited.							
M	mCERTS accredited.							
sq	Aqueous / settled sample.							
dis.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3*5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	21		13	18	19	22
2,4,5-Trichlorophenol (2,4,5-T)*	<0.01 mg/kg	SUB					<0.01	
2,4,5-TP (Fenoprop)*	<0.01 mg/kg	SUB					<0.01	
2,4-D*	<0.01 mg/kg	SUB					<0.01	
2,4-DB*	<0.01 mg/kg	SUB					<0.01	
2,4-Dichloroprop (2,4 DP)*	<0.01 mg/kg	SUB					<0.01	
4-Chlorophenoxyacetic acid (4-CPA)*	<0.01 mg/kg	SUB					<0.01	
Acifluorfen*	<0.01 mg/kg	SUB					<0.01	
Bentazone*	<0.01 mg/kg	SUB					<0.01	
Bromoxynil*	<0.01 mg/kg	SUB					<0.01	
Dicamba*	<0.01 mg/kg	SUB					<0.01	
Diclofop*	<0.01 mg/kg	SUB					<0.01	
Dinoseb*	<0.01 mg/kg	SUB					<0.01	
DNOC*	<0.01 mg/kg	SUB					<0.01	
Fluroxypyr*	<0.01 mg/kg	SUB					<0.01	
Ioxynil*	<0.01 mg/kg	SUB					<0.01	
2-methyl-4-Chlorophenoxyacetic acid (MCPA)*	<0.01 mg/kg	SUB					<0.01	
4-(4-Chloro-o-tolyloxy) butyric acid (MCPB)*	<0.01 mg/kg	SUB					<0.01	
Mecoprop (MCP)*	<0.01 mg/kg	SUB					<0.01	
Propoxycarbazone-sodium*	<0.01 mg/kg	SUB					<0.01	
Triclopyr*	<0.01 mg/kg	SUB					<0.01	
Triclosan*	<0.01 mg/kg	SUB					<0.01	
Exchangeable Ammonia as NH4	<15 mg/kg	TM024		<15	<15		<15	<15
Phenol	<0.01 mg/kg	TM062 (S)		<0.01	<0.01		<0.01	<0.01
Cresols	<0.01 mg/kg	TM062 (S)		<0.01	<0.01		<0.01	<0.01
Xylenols	<0.015 mg/kg	TM062 (S)		<0.015	<0.015		<0.015	<0.015
Phenols, Total Detected monohydric	<0.035 mg/kg	TM062 (S)		<0.035	<0.035		<0.035	<0.035
Fraction Organic Carbon (FOC)	<0.002	TM132		0.00538	<0.002		0.00485	0.00422
Soil Organic Matter (SOM)	<0.35 %	TM132		0.928	<0.35		0.836	0.728
pH	1 pH Units	TM133		8.74	8.98		8.69	8.72
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6	<0.6		<0.6	<0.6
Cyanide, Total	<1 mg/kg	TM153		<1	<1		<1	<1
Cyanide, Free	<1 mg/kg	TM153		<1	<1		<1	<1



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5 Client Reference: E9014-19 Report Number: 513665
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report: 513660

Results Legend			Customer Sample Ref.	TP05	TP06	TP06	TP07	TP07	TP08
#	ISO17025 accredited.								
M	mCERTS accredited.								
sq	Aqueous / settled sample.								
dis.filt	Dissolved / filtered sample.								
tot.unfilt	Total / unfiltered sample.								
*	Subcontracted - refer to subcontractor report for accreditation status.								
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery								
(F)	Trigger breach confirmed								
1-3+5@	Sample deviation (see appendix)								
Component	LOD/Units	Method	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.40 - 0.40 Unspecified Solid (UNS) 20/06/2019 10:00:00 27/06/2019 190628-5 20237647 ES4	0.20 - 0.20 Unspecified Solid (UNS) 20/06/2019 10:00:00 27/06/2019 190628-5 20237638 ES1	0.40 - 0.40 Unspecified Solid (UNS) 20/06/2019 10:00:00 27/06/2019 190628-5 20237639 ES4	0.20 - 0.20 Unspecified Solid (UNS) 20/06/2019 10:00:00 27/06/2019 190628-5 20237649 ES1	0.40 - 0.40 Unspecified Solid (UNS) 20/06/2019 10:00:00 27/06/2019 190628-5 20237650 ES4	0.20 - 0.20 Unspecified Solid (UNS) 20/06/2019 10:00:00 27/06/2019 190628-5 20237632 ES1
Moisture Content Ratio (% of as received sample)	%	PM024		20	15	17	15	19	19
2,4,5-Trichlorophenol (2,4,5-T)*	<0.01 mg/kg	SUB					<0.01		
2,4,5-TP (Fenoprop)*	<0.01 mg/kg	SUB					<0.01		
2,4-D*	<0.01 mg/kg	SUB					<0.01		
2,4-DB*	<0.01 mg/kg	SUB					<0.01		
2,4-Dichloroprop (2,4 DP)*	<0.01 mg/kg	SUB					<0.01		
4-Chlorophenoxyacetic acid (4-CPA)*	<0.01 mg/kg	SUB					<0.01		
Acifluorfen*	<0.01 mg/kg	SUB					<0.01		
Bentazone*	<0.01 mg/kg	SUB					<0.01		
Bromoxynil*	<0.01 mg/kg	SUB					<0.01		
Dicamba*	<0.01 mg/kg	SUB					<0.01		
Diclofop*	<0.01 mg/kg	SUB					<0.01		
Dinoseb*	<0.01 mg/kg	SUB					<0.01		
DNOC*	<0.01 mg/kg	SUB					<0.01		
Fluroxypyr*	<0.01 mg/kg	SUB					<0.01		
Ioxynil*	<0.01 mg/kg	SUB					<0.01		
2-methyl-4-Chlorophenoxyacetic acid (MCPA)*	<0.01 mg/kg	SUB					<0.01		
4-(4-Chloro-o-tolylxy) butyric acid (MCPB)*	<0.01 mg/kg	SUB					<0.01		
Mecoprop (MCP)*	<0.01 mg/kg	SUB					<0.01		
Propoxycarbazone-sodium*	<0.01 mg/kg	SUB					<0.01		
Triclopyr*	<0.01 mg/kg	SUB					<0.01		
Triclosan*	<0.01 mg/kg	SUB					<0.01		
Exchangeable Ammonia as NH4	<15 mg/kg	TM024		<15		<15	<15		
Phenol	<0.01 mg/kg	TM062 (S)		<0.01		<0.01	<0.01		
Cresols	<0.01 mg/kg	TM062 (S)		<0.01		<0.01	<0.01		
Xylenols	<0.015 mg/kg	TM062 (S)		<0.015		<0.015	<0.015		
Phenols, Total Detected monohydric	<0.035 mg/kg	TM062 (S)		<0.035		<0.035	<0.035		
Fraction Organic Carbon (FOC)	<0.002	TM132		0.00366		0.00508	0.00968		
Soil Organic Matter (SOM)	<0.35 %	TM132		0.631		0.876	1.67		
pH	1 pH Units	TM133		8.76		8.7	7.96		
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6		<0.6	<0.6		
Cyanide, Total	<1 mg/kg	TM153		<1		<1	<1		
Cyanide, Free	<1 mg/kg	TM153		<1		<1	<1		



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5 Client Reference: E9014-19 Report Number: 513665
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report: 513660

OC, OP Pesticides and Triazine Herb

Results Legend		Customer Sample Ref.	TP03	TP07				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
sq	Aqueous / settled sample.							
dis.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3*5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Dichlorvos	<50 µg/kg	TM073	<50	<50				
Mevinphos	<50 µg/kg	TM073	<50	<50				
Phorate	<50 µg/kg	TM073	<50	<50				
alpha-Hexachlorocyclohexane (HCH)	<50 µg/kg	TM073	<50	<50				
Diazinon	<50 µg/kg	TM073	<50	<50				
gamma-Hexachlorocyclohexane (HCH / Lindane)	<50 µg/kg	TM073	<50	<50				
Disulfoton	<50 µg/kg	TM073	<50	<50				
Heptachlor	<50 µg/kg	TM073	<50	<50				
Aldrin	<50 µg/kg	TM073	<50	<50				
beta-Hexachlorocyclohexane (HCH)	<50 µg/kg	TM073	<50	<50				
Methyl parathion	<50 µg/kg	TM073	<50	<50				
Malathion	<50 µg/kg	TM073	<50	<50				
Fenitrothion	<50 µg/kg	TM073	<50	<50				
Heptachlor epoxide	<50 µg/kg	TM073	<50	<50				
Parathion	<50 µg/kg	TM073	<50	<50				
Endosulphan I	<50 µg/kg	TM073	<50	<50				
p,p-DDE	<50 µg/kg	TM073	<50	<50				
Dieldrin	<50 µg/kg	TM073	<50	<50				
Endrin	<50 µg/kg	TM073	<50	<50				
p,p-TDE (DDD)	<50 µg/kg	TM073	<50	<50				
Ethion	<50 µg/kg	TM073	<50	<50				
Endosulphan II	<50 µg/kg	TM073	<50	<50				
p,p-DDT	<50 µg/kg	TM073	<50	<50				
p,p-Methoxychlor	<50 µg/kg	TM073	<50	<50				
Endosulphan sulphate	<50 µg/kg	TM073	<50	<50				
Azinphos-methyl	<50 µg/kg	TM073	<50	<50				



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5 Client Reference: E9014-19 Report Number: 513665
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report: 513660

Semi Volatile Organic Compounds

Results Legend		Customer Sample Ref.	BH03				
#	ISO17025 accredited.						
M	mCERTS accredited.						
sq	Aqueous / settled sample.						
dis.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted - refer to subcontractor report for accreditation status.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-3*§@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Phenol	<100 µg/kg	TM157	<100				
Pentachlorophenol	<100 µg/kg	TM157	<100				
n-Nitroso-n-dipropylamine	<100 µg/kg	TM157	<100				
Nitrobenzene	<100 µg/kg	TM157	<100				
Isophorone	<100 µg/kg	TM157	<100				
Hexachloroethane	<100 µg/kg	TM157	<100				
Hexachlorocyclopentadiene	<100 µg/kg	TM157	<100				
Hexachlorobutadiene	<100 µg/kg	TM157	<100				
Hexachlorobenzene	<100 µg/kg	TM157	<100				
n-Dioctyl phthalate	<100 µg/kg	TM157	<100				
Dimethyl phthalate	<100 µg/kg	TM157	<100				
Diethyl phthalate	<100 µg/kg	TM157	<100				
n-Dibutyl phthalate	<100 µg/kg	TM157	<100				
Dibenzofuran	<100 µg/kg	TM157	<100				
Carbazole	<100 µg/kg	TM157	<100				
Butylbenzyl phthalate	<100 µg/kg	TM157	<100				
bis(2-Ethylhexyl) phthalate	<100 µg/kg	TM157	<100				
bis(2-Chloroethoxy)methane	<100 µg/kg	TM157	<100				
bis(2-Chloroethyl)ether	<100 µg/kg	TM157	<100				
Azobenzene	<100 µg/kg	TM157	<100				
4-Nitrophenol	<100 µg/kg	TM157	<100				
4-Nitroaniline	<100 µg/kg	TM157	<100				
4-Methylphenol	<100 µg/kg	TM157	<100				
4-Chlorophenylphenylether	<100 µg/kg	TM157	<100				
4-Chloroaniline	<100 µg/kg	TM157	<100				
4-Chloro-3-methylphenol	<100 µg/kg	TM157	<100				
4-Bromophenylphenylether	<100 µg/kg	TM157	<100				
3-Nitroaniline	<100 µg/kg	TM157	<100				
2-Nitrophenol	<100 µg/kg	TM157	<100				
2-Nitroaniline	<100 µg/kg	TM157	<100				
2-Methylphenol	<100 µg/kg	TM157	<100				
1,2,4-Trichlorobenzene	<100 µg/kg	TM157	<100				
2-Chlorophenol	<100 µg/kg	TM157	<100				



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5 Client Reference: E9014-19 Report Number: 513665
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report: 513660

Semi Volatile Organic Compounds

Results Legend		Customer Sample Ref.	BH03				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.40 - 0.40				
M	mCERTS accredited.		Unspecified Solid (UNS)				
aq	Aqueous / settled sample.						
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted - refer to subcontractor report for accreditation status.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-3*5@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
2,6-Dinitrotoluene	<100 µg/kg	TM157	<100				
2,4-Dinitrotoluene	<100 µg/kg	TM157	<100				
2,4-Dimethylphenol	<100 µg/kg	TM157	<100				
2,4-Dichlorophenol	<100 µg/kg	TM157	<100				
2,4,6-Trichlorophenol	<100 µg/kg	TM157	<100				
2,4,5-Trichlorophenol	<100 µg/kg	TM157	<100				
1,4-Dichlorobenzene	<100 µg/kg	TM157	<100				
1,3-Dichlorobenzene	<100 µg/kg	TM157	<100				
1,2-Dichlorobenzene	<100 µg/kg	TM157	<100				
2-Chloronaphthalene	<100 µg/kg	TM157	<100				
2-Methylnaphthalene	<100 µg/kg	TM157	<100				
Acenaphthylene	<100 µg/kg	TM157	<100				
Acenaphthene	<100 µg/kg	TM157	<100				
Anthracene	<100 µg/kg	TM157	<100				
Benzo(a)anthracene	<100 µg/kg	TM157	<100				
Benzo(b)fluoranthene	<100 µg/kg	TM157	<100				
Benzo(k)fluoranthene	<100 µg/kg	TM157	<100				
Benzo(a)pyrene	<100 µg/kg	TM157	<100				
Benzo(g,h,i)perylene	<100 µg/kg	TM157	<100				
Chrysene	<100 µg/kg	TM157	<100				
Fluoranthene	<100 µg/kg	TM157	<100				
Fluorene	<100 µg/kg	TM157	<100				
Indeno(1,2,3-cd)pyrene	<100 µg/kg	TM157	<100				
Phenanthrene	<100 µg/kg	TM157	<100				
Pyrene	<100 µg/kg	TM157	<100				
Naphthalene	<100 µg/kg	TM157	<100				
Dibenzo(a,h)anthracene	<100 µg/kg	TM157	<100				
Bis(2-chloroisopropyl) ether	<100 µg/kg	TM157	<100				



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5 Client Reference: E9014-19 Report Number: 513665
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report: 513660

Asbestos Identification - Solid Samples

Results Legend

ISO17025 accredited.
M mCERTS accredited.
* Subcontracted test.
(F) Trigger breach confirmed
1-5&*\$@ Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH03ES4 0.40 - 0.40 MISC_SOLID 25/06/2019 00:00:00 27/06/2019 13:40:00 190628-5 20237642 TM048	05/07/2019	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP01ES4 0.40 - 0.40 MISC_SOLID 20/06/2019 00:00:00 27/06/2019 13:40:00 190628-5 20237630 TM048	02/07/2019	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP03ES4 0.40 - 0.40 MISC_SOLID 20/06/2019 00:00:00 27/06/2019 13:40:00 190628-5 20237627 TM048	02/07/2019	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP04ES1 0.20 - 0.20 MISC_SOLID 20/06/2019 00:00:00 27/06/2019 13:40:00 190628-5 20237635 TM048	02/07/2019	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP05ES4 0.40 - 0.40 MISC_SOLID 20/06/2019 00:00:00 27/06/2019 13:40:00 190628-5 20237647 TM048	02/07/2019	Marcin Magdziarek	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP06ES4 0.40 - 0.40 MISC_SOLID 20/06/2019 00:00:00 27/06/2019 13:40:00 190628-5 20237639 TM048	03/07/2019	Agnieszka Chelmonska	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP07ES1 0.20 - 0.20 MISC_SOLID 20/06/2019 00:00:00 27/06/2019 13:40:00 190628-5 20237649 TM048	02/07/2019	Marcin Magdziarek	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP08ES7 1.20 - 1.20 MISC_SOLID 20/06/2019 00:00:00 27/06/2019 13:40:00 190628-5 20237634 TM048	02/07/2019	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.213
Mass of dry sample (kg) 0.175
Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES
Natural Moisture Content (%) 22
Dry Matter Content (%) 82

Case

SDG 190628-5
Lab Sample Number(s) 20237626
Sampled Date 20-Jun-2019
Customer Sample Ref. TP03 ES1
Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -
Loss on Ignition (%) -
Sum of BTEX (mg/kg) -
Sum of 7 PCBs (mg/kg) -
Mineral Oil (mg/kg) -
PAH Sum of 17 (mg/kg) -
pH (pH Units) -
ANC to pH 6 (mol/kg) -
ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00275	<0.0005	0.0055	<0.001	0.5	2	25
Barium	-	-	-	-	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	0.00109	<0.001	0.00218	<0.002	0.5	10	70
Copper	0.0109	<0.0003	0.0218	<0.0006	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.00002	0.01	0.2	2
Molybdenum	-	-	-	-	0.5	10	30
Nickel	0.00181	<0.0004	0.00362	<0.0008	0.4	10	40
Lead	0.000643	<0.0002	0.00129	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	<0.001	<0.001	<0.002	<0.002	0.1	0.5	7
Zinc	0.00533	<0.001	0.0107	<0.002	4	50	200
Chloride	6.4	<2	12.8	<4	800	15000	25000
Fluoride	-	-	-	-	10	150	500
Sulphate (soluble)	-	-	-	-	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.032	1	-	-
Dissolved Organic Carbon	6.92	<3	13.8	<6	500	800	1000

Leach Test Information

Date Prepared 29-Jun-2019
pH (pH Units) 7.70
Conductivity (µS/cm) 155.00
Temperature (°C) 18.10
Volume Leachant (Litres) 0.312
Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
10/07/2019 10:56:01

10:55:46 10/07/2019



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.213

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 22

Dry Matter Content (%) 82

Case

SDG 190628-5

Lab Sample Number(s) 20237626

Sampled Date 20-Jun-2019

Customer Sample Ref. TP03 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-
pH Value of Filtered Water	8.4	<0.001	17	<0.002	-
EPH (DRO) (C10-C40)	<0.1	<0.1	<0.2	<0.2	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.00002	<0.00002	-
Total Ammonia as NH3	<0.2	<0.2	<0.4	<0.4	-
Total Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-
Total EPH (C6-C40)	<0.1	<0.1	<0.2	<0.2	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00001	<0.00001	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00001	<0.00001	-
Phenol by HPLC (W)	<0.002	<0.002	<0.004	<0.004	-
Cresols by HPLC (W)	0.01	<0.006	0.02	<0.012	-
Fluoranthene (diss.filt)	0.0000245	<0.000005	0.000049	<0.00001	-
Thiocyanate (W)	<0.05	<0.05	<0.1	<0.1	-
Anthracene (diss.filt)	<0.000005	<0.000005	<0.00001	<0.00001	-
Xylenols by HPLC (W)	<0.008	<0.008	<0.016	<0.016	-
Boron	0.0307	<0.01	0.0614	<0.02	-
Phenanthrene (diss.filt)	0.0000197	<0.000005	0.0000394	<0.00001	-
Fluorene (diss.filt)	<0.000005	<0.000005	<0.00001	<0.00001	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00001	<0.00001	-
Pyrene (diss.filt)	0.0000187	<0.000005	0.0000374	<0.00001	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00001	<0.00001	-

Leach Test Information

Date Prepared 29-Jun-2019

pH (pH Units) 7.70

Conductivity (µS/cm) 155.00

Temperature (°C) 18.10

Volume Leachant (Litres) 0.312

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

10/07/2019 10:56:01

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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.213

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 22

Dry Matter Content (%) 82

Case

SDG 190628-5

Lab Sample Number(s) 20237626

Sampled Date 20-Jun-2019

Customer Sample Ref. TP03 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00001	<0.00001	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00001	<0.00001	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.000004	<0.000004	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00001	<0.00001	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00001	<0.00001	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00001	<0.00001	-
PAH 16 EPA Total by GCMS (diss.filt)	<0.000082	<0.000082	<0.000164	<0.000164	-
EPH Band C10-C12	<0.1	<0.1	<0.2	<0.2	-
EPH Band C12-C16	<0.1	<0.1	<0.2	<0.2	-
EPH Band C16-C21	<0.1	<0.1	<0.2	<0.2	-
EPH Band C21-C28	<0.1	<0.1	<0.2	<0.2	-
EPH Band C35-C40	<0.1	<0.1	<0.2	<0.2	-
Calcium (Dis.Filt) mg/l	25	<0.2	50	<0.4	-
EPH Band C28-C35	<0.1	<0.1	<0.2	<0.2	-
Iron (Dis.Filt) mg/l	0.208	<0.019	0.416	<0.038	-
TPH CWG (W)					
GRO TOT (C5-C12)	<0.05	<0.05	<0.1	<0.1	-
MTBE GC-FID	<0.003	<0.003	<0.006	<0.006	-
Benzene by GC	<0.007	<0.007	<0.014	<0.014	-
Toluene by GC	<0.004	<0.004	<0.008	<0.008	-
Ethylbenzene by GC	<0.005	<0.005	<0.01	<0.01	-
m & p Xylene by GC	<0.008	<0.008	<0.016	<0.016	-
o Xylene by GC	<0.003	<0.003	<0.006	<0.006	-

Leach Test Information

Date Prepared 29-Jun-2019

pH (pH Units) 7.70

Conductivity (µS/cm) 155.00

Temperature (°C) 18.10

Volume Leachant (Litres) 0.312

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.213
Mass of dry sample (kg) 0.175
Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 22
Dry Matter Content (%) 82

Case

SDG 190628-5
Lab Sample Number(s) 20237626
Sampled Date 20-Jun-2019
Customer Sample Ref. TP03 ES1
Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -
Loss on Ignition (%) -
Sum of BTEX (mg/kg) -
Sum of 7 PCBs (mg/kg) -
Mineral Oil (mg/kg) -
PAH Sum of 17 (mg/kg) -
pH (pH Units) -
ANC to pH 6 (mol/kg) -
ANC to pH 4 (mol/kg) -

-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
TPH CWG (W)							
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.022	<0.022	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.056	<0.056	-	-	-
GRO_bandC (>C7-C8)	<0.01	<0.01	<0.02	<0.02	-	-	-
GRO_bandC (C5-C6)	<0.01	<0.01	<0.02	<0.02	-	-	-
GRO_bandC (>C6-C7)	<0.01	<0.01	<0.02	<0.02	-	-	-
GRO_bandC (>C8-C10)	<0.01	<0.01	<0.02	<0.02	-	-	-
GRO (C10-C12)	<0.01	<0.01	<0.02	<0.02	-	-	-

Leach Test Information

Date Prepared 29-Jun-2019
pH (pH Units) 7.70
Conductivity (µS/cm) 155.00
Temperature (°C) 18.10
Volume Leachant (Litres) 0.312
Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.216
Mass of dry sample (kg) 0.175
Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 23.5
Dry Matter Content (%) 81

Case

SDG 190628-5
Lab Sample Number(s) 20237632
Sampled Date 20-Jun-2019
Customer Sample Ref. TP08 ES1
Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -
Loss on Ignition (%) -
Sum of BTEX (mg/kg) -
Sum of 7 PCBs (mg/kg) -
Mineral Oil (mg/kg) -
PAH Sum of 17 (mg/kg) -
pH (pH Units) -
ANC to pH 6 (mol/kg) -
ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00287	<0.0005	0.00574	<0.001	0.5	2	25
Barium	-	-	-	-	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	<0.001	<0.001	<0.002	<0.002	0.5	10	70
Copper	0.00613	<0.0003	0.0123	<0.0006	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.00002	0.01	0.2	2
Molybdenum	-	-	-	-	0.5	10	30
Nickel	0.00197	<0.0004	0.00394	<0.0008	0.4	10	40
Lead	<0.0002	<0.0002	<0.0004	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	<0.001	<0.001	<0.002	<0.002	0.1	0.5	7
Zinc	0.00215	<0.001	0.0043	<0.002	4	50	200
Chloride	4.6	<2	9.2	<4	800	15000	25000
Fluoride	-	-	-	-	10	150	500
Sulphate (soluble)	-	-	-	-	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.032	1	-	-
Dissolved Organic Carbon	6.54	<3	13.1	<6	500	800	1000

Leach Test Information

Date Prepared 29-Jun-2019
pH (pH Units) 6.00
Conductivity (µS/cm) 128.00
Temperature (°C) 18.90
Volume Leachant (Litres) 0.309
Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.216
Mass of dry sample (kg) 0.175
Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES
Natural Moisture Content (%) 23.5
Dry Matter Content (%) 81

Case

SDG 190628-5
Lab Sample Number(s) 20237632
Sampled Date 20-Jun-2019
Customer Sample Ref. TP08 ES1
Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -
Loss on Ignition (%) -
Sum of BTEX (mg/kg) -
Sum of 7 PCBs (mg/kg) -
Mineral Oil (mg/kg) -
PAH Sum of 17 (mg/kg) -
pH (pH Units) -
ANC to pH 6 (mol/kg) -
ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-
pH Value of Filtered Water	8.3	<0.001	17	<0.002	-
EPH (DRO) (C10-C40)	<0.1	<0.1	<0.2	<0.2	-
Total Ammonia as NH3	<0.2	<0.2	<0.4	<0.4	-
Total Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-
Total EPH (C6-C40)	<0.1	<0.1	<0.2	<0.2	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-
Phenol by HPLC (W)	<0.002	<0.002	<0.004	<0.004	-
Cresols by HPLC (W)	<0.006	<0.006	<0.012	<0.012	-
Thiocyanate (W)	<0.05	<0.05	<0.1	<0.1	-
Xylenols by HPLC (W)	<0.008	<0.008	<0.016	<0.016	-
Boron	0.047	<0.01	0.094	<0.02	-
DNOC	<0.0001	<0.0001	<0.0002	<0.0002	-
Clpyralid	<0.00004	<0.00004	<0.00008	<0.00008	-
MCPA	<0.00005	<0.00005	<0.0001	<0.0001	-
Mecoprop	<0.00004	<0.00004	<0.00008	<0.00008	-
Dicamba	<0.00004	<0.00004	<0.00008	<0.00008	-
MCPB	<0.00005	<0.00005	<0.0001	<0.0001	-
2,4-DB	<0.0001	<0.0001	<0.0002	<0.0002	-
2,3,6-TBA	<0.00005	<0.00005	<0.0001	<0.0001	-
Trifluralin	<0.00001	<0.00001	<0.00002	<0.00002	-
alpha-HCH	<0.00001	<0.00001	<0.00002	<0.00002	-

Leach Test Information

Date Prepared 29-Jun-2019
pH (pH Units) 6.00
Conductivity (µS/cm) 128.00
Temperature (°C) 18.90
Volume Leachant (Litres) 0.309
Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.216

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 23.5

Dry Matter Content (%) 81

Case

SDG 190628-5

Lab Sample Number(s) 20237632

Sampled Date 20-Jun-2019

Customer Sample Ref. TP08 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Dichloroprop	<0.0001	<0.0001	<0.0002	<0.0002	-
gamma-HCH (Lindane)	<0.00001	<0.00001	<0.00002	<0.00002	-
Triclopyr	<0.00005	<0.00005	<0.0001	<0.0001	-
Fenoprop (Silvex)	<0.0001	<0.0001	<0.0002	<0.0002	-
Heptachlor	<0.00001	<0.00001	<0.00002	<0.00002	-
2,4-Dichlorophenoxyacetic acid	<0.00005	<0.00005	<0.0001	<0.0001	-
Aldrin	<0.00001	<0.00001	<0.00002	<0.00002	-
2,4,5-Trichlorophenoxyacetic acid	<0.00005	<0.00005	<0.0001	<0.0001	-
beta-HCH	<0.00001	<0.00001	<0.00002	<0.00002	-
Bromoxynil	<0.00004	<0.00004	<0.00008	<0.00008	-
Isodrin	<0.00001	<0.00001	<0.00002	<0.00002	-
Benazolin	<0.00004	<0.00004	<0.00008	<0.00008	-
delta-HCH	<0.00001	<0.00001	<0.00002	<0.00002	-
EPH Band C10-C12	<0.1	<0.1	<0.2	<0.2	-
Heptachlor epoxide	<0.00001	<0.00001	<0.00002	<0.00002	-
Ioxynil	<0.00005	<0.00005	<0.0001	<0.0001	-
EPH Band C12-C16	<0.1	<0.1	<0.2	<0.2	-
o,p-DDE	<0.00001	<0.00001	<0.00002	<0.00002	-
Pentachlorophenol	<0.00004	<0.00004	<0.00008	<0.00008	-
Endosulphan I	<0.00001	<0.00001	<0.00002	<0.00002	-
EPH Band C16-C21	<0.1	<0.1	<0.2	<0.2	-
Fluroxypyr	<0.0001	<0.0001	<0.0002	<0.0002	-

Leach Test Information

Date Prepared 29-Jun-2019

pH (pH Units) 6.00

Conductivity (µS/cm) 128.00

Temperature (°C) 18.90

Volume Leachant (Litres) 0.309

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.216
Mass of dry sample (kg) 0.175
Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES
Natural Moisture Content (%) 23.5
Dry Matter Content (%) 81

Case

SDG 190628-5
Lab Sample Number(s) 20237632
Sampled Date 20-Jun-2019
Customer Sample Ref. TP08 ES1
Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -
Loss on Ignition (%) -
Sum of BTEX (mg/kg) -
Sum of 7 PCBs (mg/kg) -
Mineral Oil (mg/kg) -
PAH Sum of 17 (mg/kg) -
pH (pH Units) -
ANC to pH 6 (mol/kg) -
ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
trans-Chlordane	<0.00001	<0.00001	<0.00002	<0.00002	-
cis-Chlordane	<0.00001	<0.00001	<0.00002	<0.00002	-
p,p-DDE	<0.00001	<0.00001	<0.00002	<0.00002	-
1,3,5-Trichlorobenzene	<0.00001	<0.00001	<0.00002	<0.00002	-
Dieldrin	<0.00001	<0.00001	<0.00002	<0.00002	-
EPH Band C21-C28	<0.1	<0.1	<0.2	<0.2	-
Hexachlorobutadiene	<0.00001	<0.00001	<0.00002	<0.00002	-
o,p-DDD (TDE)	<0.00001	<0.00001	<0.00002	<0.00002	-
1,2,4-Trichlorobenzene	<0.00001	<0.00001	<0.00002	<0.00002	-
Endrin	<0.00001	<0.00001	<0.00002	<0.00002	-
1,2,3-Trichlorobenzene	<0.00001	<0.00001	<0.00002	<0.00002	-
o,p-DDT	<0.00001	<0.00001	<0.00002	<0.00002	-
Dichlorvos	<0.00001	<0.00001	<0.00002	<0.00002	-
EPH Band C35-C40	<0.1	<0.1	<0.2	<0.2	-
p,p-DDD (TDE)	<0.00001	<0.00001	<0.00002	<0.00002	-
Dichlobenil	<0.00001	<0.00001	<0.00002	<0.00002	-
Endosulphan II	<0.00002	<0.00002	<0.00004	<0.00004	-
Calcium (Dis.Filt) mg/l	21.3	<0.2	42.6	<0.4	-
EPH Band C28-C35	<0.1	<0.1	<0.2	<0.2	-
Mevinphos	<0.00001	<0.00001	<0.00002	<0.00002	-
p,p-DDT	<0.00001	<0.00001	<0.00002	<0.00002	-
Iron (Dis.Filt) mg/l	<0.019	<0.019	<0.038	<0.038	-

Leach Test Information

Date Prepared 29-Jun-2019
pH (pH Units) 6.00
Conductivity (µS/cm) 128.00
Temperature (°C) 18.90
Volume Leachant (Litres) 0.309
Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.216
Mass of dry sample (kg) 0.175
Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES
Natural Moisture Content (%) 23.5
Dry Matter Content (%) 81

Case

SDG 190628-5
Lab Sample Number(s) 20237632
Sampled Date 20-Jun-2019
Customer Sample Ref. TP08 ES1
Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -
Loss on Ignition (%) -
Sum of BTEX (mg/kg) -
Sum of 7 PCBs (mg/kg) -
Mineral Oil (mg/kg) -
PAH Sum of 17 (mg/kg) -
pH (pH Units) -
ANC to pH 6 (mol/kg) -
ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
o,p-Methoxychlor	<0.00001	<0.00001	<0.00002	<0.00002	-
Tecnazene	<0.00001	<0.00001	<0.00002	<0.00002	-
Hexachlorobenzene	<0.00001	<0.00001	<0.00002	<0.00002	-
p,p-Methoxychlor	<0.00001	<0.00001	<0.00002	<0.00002	-
Demeton-S-methyl	<0.00001	<0.00001	<0.00002	<0.00002	-
Endosulphan Sulphate	<0.00002	<0.00002	<0.00004	<0.00004	-
Permethrin I	<0.00001	<0.00001	<0.00002	<0.00002	-
Phorate	<0.00001	<0.00001	<0.00002	<0.00002	-
Diazinon	<0.00001	<0.00001	<0.00002	<0.00002	-
Permethrin II	<0.00001	<0.00001	<0.00002	<0.00002	-
Triallate	<0.00001	<0.00001	<0.00002	<0.00002	-
Atrazine	<0.00001	<0.00001	<0.00002	<0.00002	-
Simazine	<0.00001	<0.00001	<0.00002	<0.00002	-
Disulfoton	<0.00001	<0.00001	<0.00002	<0.00002	-
Propetamphos	<0.00001	<0.00001	<0.00002	<0.00002	-
Chlorpyrifos-methyl	<0.00001	<0.00001	<0.00002	<0.00002	-
Dimethoate	<0.00001	<0.00001	<0.00002	<0.00002	-
Pirimiphos-methyl	<0.00001	<0.00001	<0.00002	<0.00002	-
Chlorpyrifos	<0.00001	<0.00001	<0.00002	<0.00002	-
Methyl Parathion	<0.00001	<0.00001	<0.00002	<0.00002	-
Malathion	<0.00001	<0.00001	<0.00002	<0.00002	-
Fenthion	<0.00001	<0.00001	<0.00002	<0.00002	-

Leach Test Information

Date Prepared 29-Jun-2019
pH (pH Units) 6.00
Conductivity (µS/cm) 128.00
Temperature (°C) 18.90
Volume Leachant (Litres) 0.309
Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
10/07/2019 10:56:01

10:55:46 10/07/2019



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.216

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 23.5

Dry Matter Content (%) 81

Case

SDG 190628-5

Lab Sample Number(s) 20237632

Sampled Date 20-Jun-2019

Customer Sample Ref. TP08 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Fenitrothion	<0.00001	<0.00001	<0.00002	<0.00002	-
Triadimefon	<0.00001	<0.00001	<0.00002	<0.00002	-
Pendimethalin	<0.00001	<0.00001	<0.00002	<0.00002	-
Parathion	<0.00001	<0.00001	<0.00002	<0.00002	-
Chlorfenvinphos	<0.00001	<0.00001	<0.00002	<0.00002	-
trans-Chlordane	<0.00001	<0.00001	<0.00002	<0.00002	-
cis-Chlordane	<0.00001	<0.00001	<0.00002	<0.00002	-
Ethion	<0.00001	<0.00001	<0.00002	<0.00002	-
Carbophenothion	<0.00001	<0.00001	<0.00002	<0.00002	-
Triazophos	<0.00001	<0.00001	<0.00002	<0.00002	-
Phosalone	<0.00001	<0.00001	<0.00002	<0.00002	-
Azinphos methyl	<0.00002	<0.00002	<0.00004	<0.00004	-
Azinphos ethyl	<0.00002	<0.00002	<0.00004	<0.00004	-

TPH CWG (W)

GRO TOT (C5-C12)	<0.05	<0.05	<0.1	<0.1	-
MTBE GC-FID	<0.003	<0.003	<0.006	<0.006	-
Benzene by GC	<0.007	<0.007	<0.014	<0.014	-
Toluene by GC	<0.004	<0.004	<0.008	<0.008	-
Ethylbenzene by GC	<0.005	<0.005	<0.01	<0.01	-
m & p Xylene by GC	<0.008	<0.008	<0.016	<0.016	-
o Xylene by GC	<0.003	<0.003	<0.006	<0.006	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.022	<0.022	-
Sum of BTEX by GC	<0.028	<0.028	<0.056	<0.056	-

Leach Test Information

Date Prepared 29-Jun-2019

pH (pH Units) 6.00

Conductivity (µS/cm) 128.00

Temperature (°C) 18.90

Volume Leachant (Litres) 0.309

Volume of Eluate VE1 (Litres)

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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.216

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 23.5

Dry Matter Content (%) 81

Case

SDG 190628-5

Lab Sample Number(s) 20237632

Sampled Date 20-Jun-2019

Customer Sample Ref. TP08 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Concⁿ in 2:1
eluate (mg/l)

2:1 concⁿ
leached (mg/kg)

Limit values for compliance leaching test
using BS EN 12457-3 at L/S 10 l/kg

TPH CWG (W)

	Result	Limit of Detection	Result	Limit of Detection	
GRO_bandC (>C7-C8)	<0.01	<0.01	<0.02	<0.02	-
GRO_bandC (C5-C6)	<0.01	<0.01	<0.02	<0.02	-
GRO_bandC (>C6-C7)	<0.01	<0.01	<0.02	<0.02	-
GRO_bandC (>C8-C10)	<0.01	<0.01	<0.02	<0.02	-
GRO (C10-C12)	<0.01	<0.01	<0.02	<0.02	-

Leach Test Information

Date Prepared 29-Jun-2019

pH (pH Units) 6.00

Conductivity (µS/cm) 128.00

Temperature (°C) 18.90

Volume Leachant (Litres) 0.309

Volume of Eluate VE1 (Litres)

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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.206

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 17.6

Dry Matter Content (%) 85

Case

SDG 190628-5

Lab Sample Number(s) 20237638

Sampled Date 20-Jun-2019

Customer Sample Ref. TP06 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00107	<0.0005	0.00214	<0.001	0.5	2	25
Barium	-	-	-	-	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	<0.001	<0.001	<0.002	<0.002	0.5	10	70
Copper	0.00621	<0.0003	0.0124	<0.0006	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.00002	<0.00002	0.01	0.2	2
Molybdenum	-	-	-	-	0.5	10	30
Nickel	0.00142	<0.0004	0.00284	<0.0008	0.4	10	40
Lead	<0.0002	<0.0002	<0.0004	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	<0.001	<0.001	<0.002	<0.002	0.1	0.5	7
Zinc	0.00405	<0.001	0.0081	<0.002	4	50	200
Chloride	6.2	<2	12.4	<4	800	15000	25000
Fluoride	-	-	-	-	10	150	500
Sulphate (soluble)	-	-	-	-	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.032	1	-	-
Dissolved Organic Carbon	7.41	<3	14.8	<6	500	800	1000

Leach Test Information

Date Prepared 29-Jun-2019

pH (pH Units) 6.93

Conductivity (µS/cm) 161.00

Temperature (°C) 15.60

Volume Leachant (Litres) 0.319

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.206

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 17.6

Dry Matter Content (%) 85

Case

SDG 190628-5

Lab Sample Number(s) 20237638

Sampled Date 20-Jun-2019

Customer Sample Ref. TP06 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-
pH Value of Filtered Water	8.2	<0.001	16	<0.002	-
EPH (DRO) (C10-C40)	<0.1	<0.1	<0.2	<0.2	-
Total Ammonia as NH3	<0.2	<0.2	<0.4	<0.4	-
Total Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-
Total EPH (C6-C40)	<0.1	<0.1	<0.2	<0.2	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-
Phenol by HPLC (W)	<0.002	<0.002	<0.004	<0.004	-
Cresols by HPLC (W)	<0.006	<0.006	<0.012	<0.012	-
Thiocyanate (W)	<0.05	<0.05	<0.1	<0.1	-
Xylenols by HPLC (W)	<0.008	<0.008	<0.016	<0.016	-
Boron	0.0226	<0.01	0.0452	<0.02	-
DNOC	<0.0001	<0.0001	<0.0002	<0.0002	-
Clpyralid	<0.00004	<0.00004	<0.00008	<0.00008	-
MCPA	<0.00005	<0.00005	<0.0001	<0.0001	-
Mecoprop	<0.00004	<0.00004	<0.00008	<0.00008	-
Dicamba	<0.00004	<0.00004	<0.00008	<0.00008	-
MCPB	<0.00005	<0.00005	<0.0001	<0.0001	-
2,4-DB	<0.0001	<0.0001	<0.0002	<0.0002	-
2,3,6-TBA	<0.00005	<0.00005	<0.0001	<0.0001	-
Trifluralin	<0.00001	<0.00001	<0.00002	<0.00002	-
alpha-HCH	<0.00001	<0.00001	<0.00002	<0.00002	-

Leach Test Information

Date Prepared 29-Jun-2019

pH (pH Units) 6.93

Conductivity (µS/cm) 161.00

Temperature (°C) 15.60

Volume Leachant (Litres) 0.319

Volume of Eluate VE1 (Litres)

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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.206

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 17.6

Dry Matter Content (%) 85

Case

SDG 190628-5

Lab Sample Number(s) 20237638

Sampled Date 20-Jun-2019

Customer Sample Ref. TP06 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Dichloroprop	<0.0001	<0.0001	<0.0002	<0.0002	-
gamma-HCH (Lindane)	<0.00001	<0.00001	<0.00002	<0.00002	-
Triclopyr	<0.00005	<0.00005	<0.0001	<0.0001	-
Fenoprop (Silvex)	<0.0001	<0.0001	<0.0002	<0.0002	-
Heptachlor	<0.00001	<0.00001	<0.00002	<0.00002	-
2,4-Dichlorophenoxyacetic acid	<0.00005	<0.00005	<0.0001	<0.0001	-
Aldrin	<0.00001	<0.00001	<0.00002	<0.00002	-
2,4,5-Trichlorophenoxyacetic acid	<0.00005	<0.00005	<0.0001	<0.0001	-
beta-HCH	<0.00001	<0.00001	<0.00002	<0.00002	-
Bromoxynil	<0.00004	<0.00004	<0.00008	<0.00008	-
Isodrin	<0.00001	<0.00001	<0.00002	<0.00002	-
Benazolin	<0.00004	<0.00004	<0.00008	<0.00008	-
delta-HCH	<0.00001	<0.00001	<0.00002	<0.00002	-
EPH Band C10-C12	<0.1	<0.1	<0.2	<0.2	-
Heptachlor epoxide	<0.00001	<0.00001	<0.00002	<0.00002	-
Ioxynil	<0.00005	<0.00005	<0.0001	<0.0001	-
EPH Band C12-C16	<0.1	<0.1	<0.2	<0.2	-
o,p-DDE	<0.00001	<0.00001	<0.00002	<0.00002	-
Pentachlorophenol	<0.00004	<0.00004	<0.00008	<0.00008	-
Endosulphan I	<0.00001	<0.00001	<0.00002	<0.00002	-
EPH Band C16-C21	<0.1	<0.1	<0.2	<0.2	-
Fluroxypyr	<0.0001	<0.0001	<0.0002	<0.0002	-

Leach Test Information

Date Prepared 29-Jun-2019

pH (pH Units) 6.93

Conductivity (µS/cm) 161.00

Temperature (°C) 15.60

Volume Leachant (Litres) 0.319

Volume of Eluate VE1 (Litres)

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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.206

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 17.6

Dry Matter Content (%) 85

Case

SDG 190628-5

Lab Sample Number(s) 20237638

Sampled Date 20-Jun-2019

Customer Sample Ref. TP06 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

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Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
trans-Chlordane	<0.00001	<0.00001	<0.00002	<0.00002	-
cis-Chlordane	<0.00001	<0.00001	<0.00002	<0.00002	-
p,p-DDE	<0.00001	<0.00001	<0.00002	<0.00002	-
1,3,5-Trichlorobenzene	<0.00001	<0.00001	<0.00002	<0.00002	-
Dieldrin	<0.00001	<0.00001	<0.00002	<0.00002	-
EPH Band C21-C28	<0.1	<0.1	<0.2	<0.2	-
Hexachlorobutadiene	<0.00001	<0.00001	<0.00002	<0.00002	-
o,p-DDD (TDE)	<0.00001	<0.00001	<0.00002	<0.00002	-
1,2,4-Trichlorobenzene	<0.00001	<0.00001	<0.00002	<0.00002	-
Endrin	<0.00001	<0.00001	<0.00002	<0.00002	-
1,2,3-Trichlorobenzene	<0.00001	<0.00001	<0.00002	<0.00002	-
o,p-DDT	<0.00001	<0.00001	<0.00002	<0.00002	-
Dichlorvos	<0.00001	<0.00001	<0.00002	<0.00002	-
EPH Band C35-C40	<0.1	<0.1	<0.2	<0.2	-
p,p-DDD (TDE)	<0.00001	<0.00001	<0.00002	<0.00002	-
Dichlobenil	<0.00001	<0.00001	<0.00002	<0.00002	-
Endosulphan II	<0.00002	<0.00002	<0.00004	<0.00004	-
Calcium (Dis.Filt) mg/l	20.9	<0.2	41.8	<0.4	-
EPH Band C28-C35	<0.1	<0.1	<0.2	<0.2	-
Mevinphos	<0.00001	<0.00001	<0.00002	<0.00002	-
p,p-DDT	<0.00001	<0.00001	<0.00002	<0.00002	-
Iron (Dis.Filt) mg/l	0.65	<0.019	1.3	<0.038	-

Leach Test Information

Date Prepared 29-Jun-2019

pH (pH Units) 6.93

Conductivity (µS/cm) 161.00

Temperature (°C) 15.60

Volume Leachant (Litres) 0.319

Volume of Eluate VE1 (Litres)

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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.206

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 17.6

Dry Matter Content (%) 85

Case

SDG 190628-5

Lab Sample Number(s) 20237638

Sampled Date 20-Jun-2019

Customer Sample Ref. TP06 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
o,p-Methoxychlor	<0.00001	<0.00001	<0.00002	<0.00002	-
Tecnazene	<0.00001	<0.00001	<0.00002	<0.00002	-
Hexachlorobenzene	<0.00001	<0.00001	<0.00002	<0.00002	-
p,p-Methoxychlor	<0.00001	<0.00001	<0.00002	<0.00002	-
Demeton-S-methyl	<0.00001	<0.00001	<0.00002	<0.00002	-
Endosulphan Sulphate	<0.00002	<0.00002	<0.00004	<0.00004	-
Permethrin I	<0.00001	<0.00001	<0.00002	<0.00002	-
Phorate	<0.00001	<0.00001	<0.00002	<0.00002	-
Diazinon	<0.00001	<0.00001	<0.00002	<0.00002	-
Permethrin II	<0.00001	<0.00001	<0.00002	<0.00002	-
Triallate	<0.00001	<0.00001	<0.00002	<0.00002	-
Atrazine	<0.00001	<0.00001	<0.00002	<0.00002	-
Simazine	<0.00001	<0.00001	<0.00002	<0.00002	-
Disulfoton	<0.00001	<0.00001	<0.00002	<0.00002	-
Propetamphos	<0.00001	<0.00001	<0.00002	<0.00002	-
Chlorpyrifos-methyl	<0.00001	<0.00001	<0.00002	<0.00002	-
Dimethoate	<0.00001	<0.00001	<0.00002	<0.00002	-
Pirimiphos-methyl	<0.00001	<0.00001	<0.00002	<0.00002	-
Chlorpyrifos	<0.00001	<0.00001	<0.00002	<0.00002	-
Methyl Parathion	<0.00001	<0.00001	<0.00002	<0.00002	-
Malathion	<0.00001	<0.00001	<0.00002	<0.00002	-
Fenthion	<0.00001	<0.00001	<0.00002	<0.00002	-

Leach Test Information

Date Prepared 29-Jun-2019

pH (pH Units) 6.93

Conductivity (µS/cm) 161.00

Temperature (°C) 15.60

Volume Leachant (Litres) 0.319

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

10/07/2019 10:56:01

10:55:46 10/07/2019



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.206

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 17.6

Dry Matter Content (%) 85

Case

SDG 190628-5

Lab Sample Number(s) 20237638

Sampled Date 20-Jun-2019

Customer Sample Ref. TP06 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Fenitrothion	<0.00001	<0.00001	<0.00002	<0.00002	-
Triadimefon	<0.00001	<0.00001	<0.00002	<0.00002	-
Pendimethalin	<0.00001	<0.00001	<0.00002	<0.00002	-
Parathion	<0.00001	<0.00001	<0.00002	<0.00002	-
Chlorfenvinphos	<0.00001	<0.00001	<0.00002	<0.00002	-
trans-Chlordane	<0.00001	<0.00001	<0.00002	<0.00002	-
cis-Chlordane	<0.00001	<0.00001	<0.00002	<0.00002	-
Ethion	<0.00001	<0.00001	<0.00002	<0.00002	-
Carbophenothion	<0.00001	<0.00001	<0.00002	<0.00002	-
Triazophos	<0.00001	<0.00001	<0.00002	<0.00002	-
Phosalone	<0.00001	<0.00001	<0.00002	<0.00002	-
Azinphos methyl	<0.00002	<0.00002	<0.00004	<0.00004	-
Azinphos ethyl	<0.00002	<0.00002	<0.00004	<0.00004	-

TPH CWG (W)

GRO TOT (C5-C12)	<0.05	<0.05	<0.1	<0.1	-
MTBE GC-FID	<0.003	<0.003	<0.006	<0.006	-
Benzene by GC	<0.007	<0.007	<0.014	<0.014	-
Toluene by GC	<0.004	<0.004	<0.008	<0.008	-
Ethylbenzene by GC	<0.005	<0.005	<0.01	<0.01	-
m & p Xylene by GC	<0.008	<0.008	<0.016	<0.016	-
o Xylene by GC	<0.003	<0.003	<0.006	<0.006	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.022	<0.022	-
Sum of BTEX by GC	<0.028	<0.028	<0.056	<0.056	-

Leach Test Information

Date Prepared 29-Jun-2019

pH (pH Units) 6.93

Conductivity (µS/cm) 161.00

Temperature (°C) 15.60

Volume Leachant (Litres) 0.319

Volume of Eluate VE1 (Litres)

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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.206

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 17.6

Dry Matter Content (%) 85

Case

SDG 190628-5

Lab Sample Number(s) 20237638

Sampled Date 20-Jun-2019

Customer Sample Ref. TP06 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Concⁿ in 2:1
eluate (mg/l)

2:1 concⁿ
leached (mg/kg)

Limit values for compliance leaching test
using BS EN 12457-3 at L/S 10 l/kg

TPH CWG (W)

	Result	Limit of Detection	Result	Limit of Detection	
GRO_bandC (>C7-C8)	<0.01	<0.01	<0.02	<0.02	-
GRO_bandC (C5-C6)	<0.01	<0.01	<0.02	<0.02	-
GRO_bandC (>C6-C7)	<0.01	<0.01	<0.02	<0.02	-
GRO_bandC (>C8-C10)	<0.01	<0.01	<0.02	<0.02	-
GRO (C10-C12)	<0.01	<0.01	<0.02	<0.02	-

Leach Test Information

Date Prepared 29-Jun-2019

pH (pH Units) 6.93

Conductivity (µS/cm) 161.00

Temperature (°C) 15.60

Volume Leachant (Litres) 0.319

Volume of Eluate VE1 (Litres)

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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.226

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 29.2

Dry Matter Content (%) 77.4

Case

SDG 190628-5

Lab Sample Number(s) 20237641

Sampled Date 24-Jun-2019

Customer Sample Ref. BH03 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00242	<0.0005	0.00484	<0.001	0.5	2	25
Barium	-	-	-	-	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	<0.001	<0.001	<0.002	<0.002	0.5	10	70
Copper	0.0153	<0.0003	0.0306	<0.0006	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.00002	0.01	0.2	2
Molybdenum	-	-	-	-	0.5	10	30
Nickel	0.00335	<0.0004	0.0067	<0.0008	0.4	10	40
Lead	<0.0002	<0.0002	<0.0004	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	<0.001	<0.001	<0.002	<0.002	0.1	0.5	7
Zinc	0.241	<0.001	0.482	<0.002	4	50	200
Chloride	32.6	<2	65.2	<4	800	15000	25000
Fluoride	-	-	-	-	10	150	500
Sulphate (soluble)	-	-	-	-	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.032	1	-	-
Dissolved Organic Carbon	10.1	<3	20.2	<6	500	800	1000

Leach Test Information

Date Prepared 04-Jul-2019

pH (pH Units) 7.99

Conductivity (µS/cm) 446.00

Temperature (°C) 19.40

Volume Leachant (Litres) 0.299

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

10/07/2019 10:56:01

10:55:46 10/07/2019



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.226

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 29.2

Dry Matter Content (%) 77.4

Case

SDG 190628-5

Lab Sample Number(s) 20237641

Sampled Date 24-Jun-2019

Customer Sample Ref. BH03 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-
pH Value of Filtered Water	8.4	<0.001	17	<0.002	-
EPH (DRO) (C10-C40)	<0.1	<0.1	<0.2	<0.2	-
Total Ammonia as NH3	<0.2	<0.2	<0.4	<0.4	-
Total Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-
Total EPH (C6-C40)	<0.1	<0.1	<0.2	<0.2	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-
Phenol by HPLC (W)	<0.002	<0.002	<0.004	<0.004	-
Cresols by HPLC (W)	<0.006	<0.006	<0.012	<0.012	-
Thiocyanate (W)	<0.05	<0.05	<0.1	<0.1	-
Xylenols by HPLC (W)	<0.008	<0.008	<0.016	<0.016	-
Boron	0.291	<0.01	0.582	<0.02	-
EPH Band C10-C12	<0.1	<0.1	<0.2	<0.2	-
EPH Band C12-C16	<0.1	<0.1	<0.2	<0.2	-
EPH Band C16-C21	<0.1	<0.1	<0.2	<0.2	-
EPH Band C21-C28	<0.1	<0.1	<0.2	<0.2	-
EPH Band C35-C40	<0.1	<0.1	<0.2	<0.2	-
Calcium (Dis.Filt) mg/l	78.6	<0.2	157	<0.4	-
EPH Band C28-C35	<0.1	<0.1	<0.2	<0.2	-
Iron (Dis.Filt) mg/l	<0.019	<0.019	<0.038	<0.038	-
SVOC MS (W) - Aqueous					
1,2,4-Trichlorobenzene	<0.001	<0.001	<0.002	<0.002	-
1,2-Dichlorobenzene	<0.001	<0.001	<0.002	<0.002	-

Leach Test Information

Date Prepared 04-Jul-2019

pH (pH Units) 7.99

Conductivity (µS/cm) 446.00

Temperature (°C) 19.40

Volume Leachant (Litres) 0.299

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

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10:55:46 10/07/2019



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.226

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 29.2

Dry Matter Content (%) 77.4

Case

SDG 190628-5

Lab Sample Number(s) 20237641

Sampled Date 24-Jun-2019

Customer Sample Ref. BH03 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Concⁿ in 2:1
eluate (mg/l)

2:1 concⁿ
leached (mg/kg)

Limit values for compliance leaching test
using BS EN 12457-3 at L/S 10 l/kg

SVOC MS (W) - Aqueous

	Result	Limit of Detection	Result	Limit of Detection	
1,3-Dichlorobenzene	<0.001	<0.001	<0.002	<0.002	-
1,4-Dichlorobenzene	<0.001	<0.001	<0.002	<0.002	-
2,4,5-Trichlorophenol	<0.001	<0.001	<0.002	<0.002	-
2,4,6-Trichlorophenol	<0.001	<0.001	<0.002	<0.002	-
2,4-Dichlorophenol	<0.001	<0.001	<0.002	<0.002	-
2,4-Dimethylphenol	<0.001	<0.001	<0.002	<0.002	-
2,4-Dinitrotoluene	<0.001	<0.001	<0.002	<0.002	-
2,6-Dinitrotoluene	<0.001	<0.001	<0.002	<0.002	-
2-Chloronaphthalene	<0.001	<0.001	<0.002	<0.002	-
2-Chlorophenol	<0.001	<0.001	<0.002	<0.002	-
2-Methylnaphthalene	<0.001	<0.001	<0.002	<0.002	-
2-Methylphenol	<0.001	<0.001	<0.002	<0.002	-
2-Nitroaniline	<0.001	<0.001	<0.002	<0.002	-
2-Nitrophenol	<0.001	<0.001	<0.002	<0.002	-
3-Nitroaniline	<0.001	<0.001	<0.002	<0.002	-
4-Bromophenylphenylether	<0.001	<0.001	<0.002	<0.002	-
4-Chloro-3-methylphenol	<0.001	<0.001	<0.002	<0.002	-
4-Chloroaniline	<0.001	<0.001	<0.002	<0.002	-
4-Chlorophenylphenylether	<0.001	<0.001	<0.002	<0.002	-
4-Methylphenol	<0.001	<0.001	<0.002	<0.002	-
4-Nitroaniline	<0.001	<0.001	<0.002	<0.002	-
4-Nitrophenol	<0.001	<0.001	<0.002	<0.002	-

Leach Test Information

Date Prepared 04-Jul-2019

pH (pH Units) 7.99

Conductivity (µS/cm) 446.00

Temperature (°C) 19.40

Volume Leachant (Litres) 0.299

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

10/07/2019 10:56:01

10:55:46 10/07/2019



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.226

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 29.2

Dry Matter Content (%) 77.4

Case

SDG 190628-5

Lab Sample Number(s) 20237641

Sampled Date 24-Jun-2019

Customer Sample Ref. BH03 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Concⁿ in 2:1
eluate (mg/l)

2:1 concⁿ
leached (mg/kg)

Limit values for compliance leaching test
using BS EN 12457-3 at L/S 10 l/kg

SVOC MS (W) - Aqueous

	Result	Limit of Detection	Result	Limit of Detection	
Azobenzene	<0.001	<0.001	<0.002	<0.002	-
Acenaphthylene	<0.001	<0.001	<0.002	<0.002	-
Acenaphthene	<0.001	<0.001	<0.002	<0.002	-
Anthracene	<0.001	<0.001	<0.002	<0.002	-
Bis(2-chloroethyl)ether	<0.001	<0.001	<0.002	<0.002	-
Bis(2-chloroethoxy)methane	<0.001	<0.001	<0.002	<0.002	-
Bis(2-ethylhexyl) phthalate	<0.002	<0.002	<0.004	<0.004	-
Butylbenzyl phthalate	<0.001	<0.001	<0.002	<0.002	-
Benzo(a)anthracene	<0.001	<0.001	<0.002	<0.002	-
Benzo(b)fluoranthene	<0.001	<0.001	<0.002	<0.002	-
Benzo(k)fluoranthene	<0.001	<0.001	<0.002	<0.002	-
Benzo(a)pyrene	<0.001	<0.001	<0.002	<0.002	-
Benzo(ghi)perylene	<0.001	<0.001	<0.002	<0.002	-
Carbazole	<0.001	<0.001	<0.002	<0.002	-
Chrysene	<0.001	<0.001	<0.002	<0.002	-
Dibenzofuran	<0.001	<0.001	<0.002	<0.002	-
Di-n-butyl phthalate	<0.001	<0.001	<0.002	<0.002	-
Diethyl phthalate	<0.001	<0.001	<0.002	<0.002	-
Dibenzo(a,h)anthracene	<0.001	<0.001	<0.002	<0.002	-
Dimethyl phthalate	<0.001	<0.001	<0.002	<0.002	-
Di-n-Octyl phthalate	<0.005	<0.005	<0.01	<0.01	-
Fluoranthene	<0.001	<0.001	<0.002	<0.002	-

Leach Test Information

Date Prepared 04-Jul-2019

pH (pH Units) 7.99

Conductivity (µS/cm) 446.00

Temperature (°C) 19.40

Volume Leachant (Litres) 0.299

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

10/07/2019 10:56:01

10:55:46 10/07/2019



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.226

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 29.2

Dry Matter Content (%) 77.4

Case

SDG 190628-5

Lab Sample Number(s) 20237641

Sampled Date 24-Jun-2019

Customer Sample Ref. BH03 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Concⁿ in 2:1
eluate (mg/l)

2:1 concⁿ
leached (mg/kg)

Limit values for compliance leaching test
using BS EN 12457-3 at L/S 10 l/kg

SVOC MS (W) - Aqueous

	Result	Limit of Detection	Result	Limit of Detection	
Fluorene	<0.001	<0.001	<0.002	<0.002	-
Hexachlorobenzene	<0.001	<0.001	<0.002	<0.002	-
Hexachlorobutadiene	<0.001	<0.001	<0.002	<0.002	-
Pentachlorophenol	<0.001	<0.001	<0.002	<0.002	-
Phenol	<0.001	<0.001	<0.002	<0.002	-
N-nitrosodi-n-propylamine	<0.001	<0.001	<0.002	<0.002	-
Hexachloroethane	<0.001	<0.001	<0.002	<0.002	-
Nitrobenzene	<0.001	<0.001	<0.002	<0.002	-
Naphthalene	<0.001	<0.001	<0.002	<0.002	-
Isophorone	<0.001	<0.001	<0.002	<0.002	-
Hexachlorocyclopentadiene	<0.001	<0.001	<0.002	<0.002	-
Phenanthrene	<0.001	<0.001	<0.002	<0.002	-
Indeno (1,2,3-cd) Pyrene	<0.001	<0.001	<0.002	<0.002	-
Pyrene	<0.001	<0.001	<0.002	<0.002	-

TPH CWG (W)

GRO TOT (C5-C12)	<0.05	<0.05	<0.1	<0.1	-
MTBE GC-FID	<0.003	<0.003	<0.006	<0.006	-
Benzene by GC	<0.007	<0.007	<0.014	<0.014	-
Toluene by GC	<0.004	<0.004	<0.008	<0.008	-
Ethylbenzene by GC	<0.005	<0.005	<0.01	<0.01	-
m & p Xylene by GC	<0.008	<0.008	<0.016	<0.016	-
o Xylene by GC	<0.003	<0.003	<0.006	<0.006	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.022	<0.022	-

Leach Test Information

Date Prepared 04-Jul-2019

pH (pH Units) 7.99

Conductivity (µS/cm) 446.00

Temperature (°C) 19.40

Volume Leachant (Litres) 0.299

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

10/07/2019 10:56:01

10:55:46 10/07/2019



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.226

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 29.2

Dry Matter Content (%) 77.4

Case

SDG 190628-5

Lab Sample Number(s) 20237641

Sampled Date 24-Jun-2019

Customer Sample Ref. BH03 ES1

Depth (m) 0.20 - 0.20

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Concⁿ in 2:1
eluate (mg/l)

2:1 concⁿ
leached (mg/kg)

Limit values for compliance leaching test
using BS EN 12457-3 at L/S 10 l/kg

TPH CWG (W)

	Result	Limit of Detection	Result	Limit of Detection	
Sum of BTEX by GC	<0.028	<0.028	<0.056	<0.056	-
GRO_bandC (>C7-C8)	<0.01	<0.01	<0.02	<0.02	-
GRO_bandC (C5-C6)	<0.01	<0.01	<0.02	<0.02	-
GRO_bandC (>C6-C7)	<0.01	<0.01	<0.02	<0.02	-
GRO_bandC (>C8-C10)	<0.01	<0.01	<0.02	<0.02	-
GRO (C10-C12)	<0.01	<0.01	<0.02	<0.02	-

Leach Test Information

Date Prepared 04-Jul-2019

pH (pH Units) 7.99

Conductivity (µS/cm) 446.00

Temperature (°C) 19.40

Volume Leachant (Litres) 0.299

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

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CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.216

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 23.5

Dry Matter Content (%) 81

Case

SDG 190628-5

Lab Sample Number(s) 20237650

Sampled Date 20-Jun-2019

Customer Sample Ref. TP07 ES4

Depth (m) 0.40 - 0.40

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	<0.0005	<0.0005	<0.001	<0.001	0.5	2	25
Barium	-	-	-	-	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	<0.001	<0.001	<0.002	<0.002	0.5	10	70
Copper	0.00317	<0.0003	0.00634	<0.0006	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.00002	<0.00002	0.01	0.2	2
Molybdenum	-	-	-	-	0.5	10	30
Nickel	0.000848	<0.0004	0.0017	<0.0008	0.4	10	40
Lead	0.00122	<0.0002	0.00244	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	<0.001	<0.001	<0.002	<0.002	0.1	0.5	7
Zinc	0.00373	<0.001	0.00746	<0.002	4	50	200
Chloride	8.3	<2	16.6	<4	800	15000	25000
Fluoride	-	-	-	-	10	150	500
Sulphate (soluble)	-	-	-	-	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.032	<0.032	1	-	-
Dissolved Organic Carbon	4.91	<3	9.82	<6	500	800	1000

Leach Test Information

Date Prepared 29-Jun-2019

pH (pH Units) 6.83

Conductivity (µS/cm) 150.00

Temperature (°C) 18.20

Volume Leachant (Litres) 0.309

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

10/07/2019 10:56:01

10:55:46 10/07/2019



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.216

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 23.5

Dry Matter Content (%) 81

Case

SDG 190628-5

Lab Sample Number(s) 20237650

Sampled Date 20-Jun-2019

Customer Sample Ref. TP07 ES4

Depth (m) 0.40 - 0.40

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg
	Result	Limit of Detection	Result	Limit of Detection	
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-
pH Value of Filtered Water	8.3	<0.001	17	<0.002	-
EPH (DRO) (C10-C40)	<0.1	<0.1	<0.2	<0.2	-
Total Ammonia as NH3	<0.2	<0.2	<0.4	<0.4	-
Total Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-
Total EPH (C6-C40)	<0.1	<0.1	<0.2	<0.2	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-
Phenol by HPLC (W)	<0.002	<0.002	<0.004	<0.004	-
Cresols by HPLC (W)	<0.006	<0.006	<0.012	<0.012	-
Thiocyanate (W)	<0.05	<0.05	<0.1	<0.1	-
Xylenols by HPLC (W)	<0.008	<0.008	<0.016	<0.016	-
Boron	0.024	<0.01	0.048	<0.02	-
EPH Band C10-C12	<0.1	<0.1	<0.2	<0.2	-
EPH Band C12-C16	<0.1	<0.1	<0.2	<0.2	-
EPH Band C16-C21	<0.1	<0.1	<0.2	<0.2	-
EPH Band C21-C28	<0.1	<0.1	<0.2	<0.2	-
EPH Band C35-C40	<0.1	<0.1	<0.2	<0.2	-
Calcium (Dis.Filt) mg/l	26.4	<0.2	52.8	<0.4	-
EPH Band C28-C35	<0.1	<0.1	<0.2	<0.2	-
Iron (Dis.Filt) mg/l	<0.019	<0.019	<0.038	<0.038	-
TPH CWG (W)					
GRO TOT (C5-C12)	<0.05	<0.05	<0.1	<0.1	-
MTBE GC-FID	<0.003	<0.003	<0.006	<0.006	-

Leach Test Information

Date Prepared 29-Jun-2019

pH (pH Units) 6.83

Conductivity (µS/cm) 150.00

Temperature (°C) 18.20

Volume Leachant (Litres) 0.309

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

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10:55:46 10/07/2019



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.216

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 23.5

Dry Matter Content (%) 81

Case

SDG 190628-5

Lab Sample Number(s) 20237650

Sampled Date 20-Jun-2019

Customer Sample Ref. TP07 ES4

Depth (m) 0.40 - 0.40

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Concⁿ in 2:1
eluate (mg/l)

2:1 concⁿ
leached (mg/kg)

Limit values for compliance leaching test
using BS EN 12457-3 at L/S 10 l/kg

TPH CWG (W)

	Result	Limit of Detection	Result	Limit of Detection	
Benzene by GC	<0.007	<0.007	<0.014	<0.014	-
Toluene by GC	<0.004	<0.004	<0.008	<0.008	-
Ethylbenzene by GC	<0.005	<0.005	<0.01	<0.01	-
m & p Xylene by GC	<0.008	<0.008	<0.016	<0.016	-
o Xylene by GC	<0.003	<0.003	<0.006	<0.006	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.022	<0.022	-
Sum of BTEX by GC	<0.028	<0.028	<0.056	<0.056	-
GRO_bandC (>C7-C8)	<0.01	<0.01	<0.02	<0.02	-
GRO_bandC (C5-C6)	<0.01	<0.01	<0.02	<0.02	-
GRO_bandC (>C6-C7)	<0.01	<0.01	<0.02	<0.02	-
GRO_bandC (>C8-C10)	<0.01	<0.01	<0.02	<0.02	-
GRO (C10-C12)	<0.01	<0.01	<0.02	<0.02	-

Leach Test Information

Date Prepared 29-Jun-2019

pH (pH Units) 6.83

Conductivity (µS/cm) 150.00

Temperature (°C) 18.20

Volume Leachant (Litres) 0.309

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

10/07/2019 10:56:01

10:55:46 10/07/2019



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5 Client Reference: E9014-19 Report Number: 513665
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report: 513660

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
SUB		Subcontracted Test
TM024	Method 4500A & B, AWWA/APHA, 20th Ed., 1999	Determination of Exchangeable Ammonium and Ammoniacal Nitrogen as N by titration on solids
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM073	MEWAM BOOK 60 1980,95 1985, HMSO / Modified: US EPA Method 8081A & 8141A	Determination of organochlorine and organophosphorous pesticides by GCMS
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990:BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM157	HP 6890 Gas Chromatograph (GC) system and HP 5973 Mass Selective Detector (MSD).	Determination of SVOC in Soils by GC-MS extracted by sonication in DCM/Acetone
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID
TM176	EPA 8270D Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of SVOCs in Water by GCMS
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM343	EPA 8270D - Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of Selected Pesticides (Suite I) in Liquids by GCMS
TM344	EPA 8270D – Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of selected pesticides (Suite II) by GCMS
TM411	Acid_Herbs_GCMS	Acid Herbs in Water by GCMS

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 190628-5
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 513665
Superseded Report: 513660

Test Completion Dates

Lab Sample No(s)	20237641	20237642	20237630	20237626	20237627	20237635	20237647	20237638	20237639	20237649
Customer Sample Ref.	BH03	BH03	TP01	TP03	TP03	TP04	TP05	TP06	TP06	TP07
AGS Ref.	ES1	ES4	ES4	ES1	ES4	ES1	ES4	ES1	ES4	ES1
Depth	0.20 - 0.20	0.40 - 0.40	0.40 - 0.40	0.20 - 0.20	0.40 - 0.40	0.20 - 0.20	0.40 - 0.40	0.20 - 0.20	0.40 - 0.40	0.20 - 0.20
Type	Unspecified So	Unspecified So	Unspecified So	Unspecified So	Unspecified So	Unspecified So	Unspecified So	Unspecified So	Unspecified So	Unspecified So
Acid Herbicides by GCMS								05-Jul-2019		
Acid herbicides*					10-Jul-2019					10-Jul-2019
Ammoniacal Nitrogen	08-Jul-2019			02-Jul-2019				02-Jul-2019		
Ammonium Soil by Titration		08-Jul-2019	02-Jul-2019		02-Jul-2019	02-Jul-2019	02-Jul-2019		02-Jul-2019	02-Jul-2019
Anions by Kone (w)	06-Jul-2019			03-Jul-2019				03-Jul-2019		
Asbestos ID in Solid Samples		05-Jul-2019	02-Jul-2019		02-Jul-2019	02-Jul-2019	02-Jul-2019		03-Jul-2019	02-Jul-2019
CEN 2:1 Leachate (1 Stage)	04-Jul-2019			29-Jun-2019				29-Jun-2019		
CEN Readings	05-Jul-2019			02-Jul-2019				02-Jul-2019		
Cyanide Comp/Free/Total/Thiocyanate	08-Jul-2019	08-Jul-2019	03-Jul-2019		04-Jul-2019	03-Jul-2019	03-Jul-2019		04-Jul-2019	03-Jul-2019
Dissolved Metals by ICP-MS	08-Jul-2019			05-Jul-2019				05-Jul-2019		
Dissolved Organic/Inorganic Carbon	07-Jul-2019			03-Jul-2019				03-Jul-2019		
EPH (DRO) (C10-C40) Aqueous (W)	08-Jul-2019			04-Jul-2019				04-Jul-2019		
EPH CWG (Aliphatic) GC (S)			05-Jul-2019						05-Jul-2019	
EPH CWG (Aromatic) GC (S)			05-Jul-2019						05-Jul-2019	
GRO by GC-FID (S)			05-Jul-2019						04-Jul-2019	
GRO by GC-FID (W)	08-Jul-2019			02-Jul-2019				02-Jul-2019		
Hexavalent Chromium (s)		08-Jul-2019	03-Jul-2019		03-Jul-2019	03-Jul-2019	04-Jul-2019		04-Jul-2019	04-Jul-2019
Hexavalent Chromium (w)	08-Jul-2019			02-Jul-2019				02-Jul-2019		
Mercury Dissolved	08-Jul-2019			03-Jul-2019				03-Jul-2019		
Metals in solid samples by OES		08-Jul-2019	03-Jul-2019		03-Jul-2019	03-Jul-2019	03-Jul-2019		03-Jul-2019	03-Jul-2019
OC, OP Pesticides and Triazine Herb					04-Jul-2019					04-Jul-2019
PAH by GCMS						02-Jul-2019				
PAH in waters by GC-MS (diss.filt)				04-Jul-2019						
Pesticides (Suite I) by GCMS								05-Jul-2019		
Pesticides (Suite II) by GCMS								08-Jul-2019		
pH		05-Jul-2019	02-Jul-2019		02-Jul-2019	03-Jul-2019	02-Jul-2019		02-Jul-2019	02-Jul-2019
pH Value of Filtered Water	08-Jul-2019			02-Jul-2019				02-Jul-2019		
Phenols by HPLC (S)		08-Jul-2019	02-Jul-2019		01-Jul-2019	02-Jul-2019	02-Jul-2019		01-Jul-2019	02-Jul-2019
Phenols by HPLC (W)	08-Jul-2019			03-Jul-2019				03-Jul-2019		
Sample description	04-Jul-2019	28-Jun-2019	28-Jun-2019	28-Jun-2019	28-Jun-2019	28-Jun-2019	28-Jun-2019	28-Jun-2019	28-Jun-2019	28-Jun-2019
Semi Volatile Organic Compounds		08-Jul-2019								
SVOC MS (W) - Aqueous	08-Jul-2019									
Total EPH (aq)	08-Jul-2019			04-Jul-2019				04-Jul-2019		
Total Organic Carbon		04-Jul-2019	03-Jul-2019		03-Jul-2019	03-Jul-2019	03-Jul-2019		04-Jul-2019	03-Jul-2019
TPH CWG GC (S)			05-Jul-2019						05-Jul-2019	
VOC MS (S)			03-Jul-2019						03-Jul-2019	

Lab Sample No(s)	20237650	20237632	20237634
Customer Sample Ref.	TP07	TP08	TP08
AGS Ref.	ES4	ES1	ES7
Depth	0.40 - 0.40	0.20 - 0.20	1.20 - 1.20
Type	Unspecified So	Unspecified So	Unspecified So
Acid Herbicides by GCMS		05-Jul-2019	
Ammoniacal Nitrogen	02-Jul-2019	02-Jul-2019	
Ammonium Soil by Titration			02-Jul-2019
Anions by Kone (w)	03-Jul-2019	03-Jul-2019	
Asbestos ID in Solid Samples			02-Jul-2019
CEN 2:1 Leachate (1 Stage)	29-Jun-2019	29-Jun-2019	
CEN Readings	01-Jul-2019	01-Jul-2019	
Cyanide Comp/Free/Total/Thiocyanate	04-Jul-2019	04-Jul-2019	03-Jul-2019
Dissolved Metals by ICP-MS	05-Jul-2019	05-Jul-2019	
Dissolved Organic/Inorganic Carbon	03-Jul-2019	03-Jul-2019	
EPH (DRO) (C10-C40) Aqueous (W)	05-Jul-2019	05-Jul-2019	
GRO by GC-FID (W)	02-Jul-2019	02-Jul-2019	
Hexavalent Chromium (s)			03-Jul-2019
Hexavalent Chromium (w)	02-Jul-2019	02-Jul-2019	
Mercury Dissolved	03-Jul-2019	03-Jul-2019	
Metals in solid samples by OES			03-Jul-2019
Pesticides (Suite I) by GCMS		05-Jul-2019	
Pesticides (Suite II) by GCMS		08-Jul-2019	
pH			03-Jul-2019
pH Value of Filtered Water	02-Jul-2019	02-Jul-2019	
Phenols by HPLC (S)			02-Jul-2019
Phenols by HPLC (W)	03-Jul-2019	03-Jul-2019	
Sample description	28-Jun-2019	28-Jun-2019	28-Jun-2019
Total EPH (aq)	05-Jul-2019	05-Jul-2019	
Total Organic Carbon			03-Jul-2019



CERTIFICATE OF ANALYSIS

Work Order	: PR1969444	Issue Date	: 10-Jul-2019
Customer	: ALS Life Sciences Ltd	Laboratory	: ALS Czech Republic, s.r.o.
Contact	: Reporting	Contact	: Client Service
Address	: Unit 7-8 Hawarden Business Park Manor Road, Hawarden CH5 3US Deeside United Kingdom	Address	: Na Harfe 336/9 Prague 9 - Vysocany 190 00 Czech Republic
E-mail	: euhdnsbconresults@ALSGlobal.com	E-mail	: customer.support@alsglobal.com
Telephone	: ----	Telephone	: +420 226 226 228
Project	: 190628-5	Page	: 1 of 2
Order number	: 190628-5	Date Samples Received	: 03-Jul-2019
		Quote number	: PR2018ALSAL-GB0004 (CZ-256-18-0022)
Site	: ----	Date of test	: 04-Jul-2019 - 10-Jul-2019
Sampled by	: client	QC Level	: ALS CR Standard Quality Control Schedule

General Comments

This report shall not be reproduced except in full, without prior written approval from the laboratory.
The laboratory declares that the test results relate only to the listed samples.

Responsible for accuracy

Testing Laboratory No. 1163
Accredited by CAI according to
CSN EN ISO/IEC 17025:2005

Signatories

Zdeněk Jiráček

Position

Environmental Business Unit
Manager





Analytical Results

Sub-Matrix: SOIL

Client sample ID
Laboratory sample ID
Client sampling date / time

				20245095		20247878		----	
				PR1969444-001		PR1969444-002		----	
				25-Jun-2019 00:00		20-Jun-2019 00:00		----	
Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU
Physical Parameters									
Dry matter @ 105°C	S-DRY-GRCI	0.10	%	76.6	± 6.0%	83.7	± 6.0%	----	----
Pesticides									
2.4.5-T	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
2.4.5-TP	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
2.4-D	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
2.4-DB	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
2.4-DP (isomers)	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
4-CPP	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Bentazone	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Dinoseb	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Fluroxypyr	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
MCPA	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
MCPB	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
MCPP (isomers)	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Acifluorfen	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Bromoxynil	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
DNOC	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Dicamba	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Diclofop	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Ioxynil	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Propoxycarbazone-sodium	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Triclopyr	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Triclosan	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, delivery date in brackets without a time component will be displayed instead. Measurement uncertainty is expressed as expanded measurement uncertainty with coverage factor k = 2, representing 95% confidence level.

Key: LOR = Limit of reporting; MU = Measurement Uncertainty

The end of result part of the certificate of analysis

Brief Method Summaries

Analytical Methods	Method Descriptions
Location of test performance: Na Harfe 336/9 Prague 9 - Vysocany Czech Republic 190 00	
S-DRY-GRCI	CZ_SOP_D06_01_045 (CSN ISO 11465, CSN EN 12880, CSN EN 14346), CZ_SOP_D06_07_046 (CSN ISO 11465, CSN EN 12880, CSN EN 14346, CSN 46 5735) Determination of dry matter by gravimetry and determination of moisture by calculation from measured values.
S-PESLMSA1	CZ_SOP_D06_03_182.B (CSN EN 15637, US EPA 1694) Determination of acidic herbicides and drug residues by liquid chromatography method with MS/MS detection.

A "*" symbol preceding any method indicates laboratory or subcontractor non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited. Please refer to General Comment section on front page for information. If the report contains subcontracted analysis, those are made in a subcontracted laboratory outside the laboratories ALS Czech Republic, s.r.o.

The calculation methods of summation parameters are available on request in the client service.



CERTIFICATE OF ANALYSIS

Work Order	: PR1970014	Issue Date	: 10-Jul-2019
Customer	: ALS Life Sciences Ltd	Laboratory	: ALS Czech Republic, s.r.o.
Contact	: Reporting	Contact	: Client Service
Address	: Unit 7-8 Hawarden Business Park Manor Road, Hawarden CH5 3US Deeside United Kingdom	Address	: Na Harfe 336/9 Prague 9 - Vysocany 190 00 Czech Republic
E-mail	: euhdnsbconresults@ALSGlobal.com	E-mail	: customer.support@alsglobal.com
Telephone	: ----	Telephone	: +420 226 226 228
Project	: 190628-5	Page	: 1 of 2
Order number	: ----	Date Samples Received	: 05-Jul-2019
		Quote number	: PR2018ALSAL-GB0001 (CZ-256-17-1008)
Site	: ----	Date of test	: 05-Jul-2019 - 10-Jul-2019
Sampled by	: client	QC Level	: ALS CR Standard Quality Control Schedule

General Comments

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The laboratory declares that the test results relate only to the listed samples.

Responsible for accuracy

Testing Laboratory No. 1163
Accredited by CAI according to
CSN EN ISO/IEC 17025:2005

Signatories

Zdeněk Jiráček

Position

Environmental Business Unit
Manager





Analytical Results

Sub-Matrix: SOIL

Client sample ID
Laboratory sample ID
Client sampling date / time

Sub-Matrix: SOIL				Client sample ID		20259165		----		----		
				Laboratory sample ID		PR1970014-001		----		----		
				Client sampling date / time		20-Jun-2019 00:00		----		----		
Parameter		Method	LOR	Unit	Result		MU		Result		MU	
Physical Parameters												
Dry matter @ 105°C		S-DRY-GRCI	0.10	%	81.2		± 6.0%		----		----	
Pesticides												
2.4.5-T		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
2.4.5-TP		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
2.4-D		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
2.4-DB		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
2.4-DP (isomers)		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
4-CPP		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
Bentazone		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
Dinoseb		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
Fluroxypyr		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
MCPA		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
MCPB		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
MCPP (isomers)		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
Acifluorfen		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
Bromoxynil		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
DNOC		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
Dicamba		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
Diclofop		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
Ioxynil		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
Propoxycarbazone-sodium		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
Triclopyr		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	
Triclosan		S-PESLMSA1	0.0100	mg/kg DW	<0.0100		----		----		----	

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S-PESLMSA1	CZ_SOP_D06_03_182.B (CSN EN 15637, US EPA 1694) Determination of acidic herbicides and drug residues by liquid chromatography method with MS/MS detection.

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The calculation methods of summation parameters are available on request in the client service.



CERTIFICATE OF ANALYSIS

SDG:	190628-5	Client Reference:	E9014-19	Report Number:	513665
Location:	OLBEACH GROUND INVESTIG	Order Number:		Superseded Report:	513660

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2107).

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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Manor Road (off Manor Lane)
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Deeside
CH5 3US

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Website: www.alsenvironmental.co.uk

SOCOTEC
Unit 4
Gainsborough Trading Estate
Leamington Road
Southam
Warwickshire
CV47 1RB

Attention: Giuseppe Melosu

CERTIFICATE OF ANALYSIS

Date of report Generation:	09 July 2019
Customer:	SOCOTEC
Sample Delivery Group (SDG):	190703-43
Your Reference:	E9014-19
Location:	FEZ HOLBEACH GROUND INVESTIGATION
Report No:	513594

We received 2 samples on Wednesday July 03, 2019 and 2 of these samples were scheduled for analysis which was completed on Tuesday July 09, 2019. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 190703-43

Client Reference: E9014-19

Report Number: 513594

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
20263256	TP02	ES1	0.20 - 0.20	19/06/2019
20263257	TP02	ES7	1.20 - 1.20	19/06/2019

Maximum Sample/Coolbox Temperature (°C) :

16.2

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 190703-43 Client Reference: E9014-19 Report Number: 513594
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report:

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

20263256
20263257

Customer Sample Reference

TP02
TP02

AGS Reference

ES1
ES7

Depth (m)

0.20 - 0.20
1.20 - 1.20

Container

1kg TUB
1kg TUB

Sample Type

S
S

Ammonium Soil by Titration

All

NDPs: 0
Tests: 2

X
X

Asbestos ID in Solid Samples

All

NDPs: 0
Tests: 2

X
X

Cyanide Comp/Free/Total/Thiocyanate

All

NDPs: 0
Tests: 2

X
X

Hexavalent Chromium (s)

All

NDPs: 0
Tests: 2

X
X

Metals in solid samples by OES

All

NDPs: 0
Tests: 2

X
X

pH

All

NDPs: 0
Tests: 2

X
X

Phenols by HPLC (S)

All

NDPs: 0
Tests: 2

X
X

Sample description

All

NDPs: 0
Tests: 2

X
X

Total Organic Carbon

All

NDPs: 0
Tests: 2

X
X



CERTIFICATE OF ANALYSIS

Validated

SDG: 190703-43

Client Reference: E9014-19

Report Number: 513594

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
-----------	----------	------	-----------------	--------	-------------	--------	------------	-------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
20263256	TP02	0.20 - 0.20	Dark Brown	Sandy Silt Loam	Vegetation	None
20263257	TP02	1.20 - 1.20	Dark Brown	Sand	None	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

Validated

SDG: 190703-43

Client Reference: E9014-19

Report Number: 513594

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report:

Asbestos Identification - Solid Samples

Results Legend

ISO17025 accredited.
M mCERTS accredited.
* Subcontracted test.
(F) Trigger breach confirmed
1-5&*\$@ Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP02ES1 0.20 - 0.20 SOLID 19/06/2019 00:00:00 03/07/2019 06:00:00 190703-43 20263256 TM048	04/07/2019	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP02ES7 1.20 - 1.20 SOLID 19/06/2019 00:00:00 03/07/2019 06:00:00 190703-43 20263257 TM048	04/07/2019	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

Validated

SDG: 190703-43

Client Reference: E9014-19

Report Number: 513594

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM024	Method 4500A & B, AWWA/APHA, 20th Ed., 1999	Determination of Exchangeable Ammonium and Ammoniacal Nitrogen as N by titration on solids
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 190703-43

Client Reference: E9014-19

Report Number: 513594

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report:

Test Completion Dates

Lab Sample No(s)	20263256	20263257
Customer Sample Ref.	TP02	TP02
AGS Ref.	ES1	ES7
Depth	0.20 - 0.20	1.20 - 1.20
Type	Soil/Solid (S)	Soil/Solid (S)
Ammonium Soil by Titration	09-Jul-2019	09-Jul-2019
Asbestos ID in Solid Samples	04-Jul-2019	04-Jul-2019
Cyanide Comp/Free/Total/Thiocyanate	09-Jul-2019	09-Jul-2019
Hexavalent Chromium (s)	04-Jul-2019	04-Jul-2019
Metals in solid samples by OES	09-Jul-2019	09-Jul-2019
pH	05-Jul-2019	05-Jul-2019
Phenols by HPLC (S)	05-Jul-2019	05-Jul-2019
Sample description	03-Jul-2019	03-Jul-2019
Total Organic Carbon	09-Jul-2019	09-Jul-2019



CERTIFICATE OF ANALYSIS

SDG: 190703-43 Client Reference: E9014-19 Report Number: 513594
Location: OLBEACH GROUND INVESTIG Order Number: Superseded Report:

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2107)*.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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SOCOTEC
Unit 4
Gainsborough Trading Estate
Leamington Road
Southam
Warwickshire
CV47 1RB

Attention: Giuseppe Melosu

CERTIFICATE OF ANALYSIS

Date of report Generation:	30 July 2019
Customer:	SOCOTEC
Sample Delivery Group (SDG):	190720-67
Your Reference:	E9014-19
Location:	FEZ HOLBEACH GROUND INVESTIGATION
Report No:	516121

We received 3 samples on Saturday July 20, 2019 and 3 of these samples were scheduled for analysis which was completed on Tuesday July 30, 2019. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-67 Client Reference: E9014-19 Report Number: 516121
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
20372382	BH1	EW44		19/07/2019
20372383	BH2	EW58		19/07/2019
20372385	BH4	EW55		19/07/2019

Maximum Sample/Coolbox Temperature (°C) :

5.6

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-67

Client Reference: E9014-19

Report Number: 516121

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report:

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
 UNS - Unspecified Solid
 GW - Ground Water
 SW - Surface Water
 LE - Land Leachate
 PL - Prepared Leachate
 PR - Process Water
 SA - Saline Water
 TE - Trade Effluent
 TS - Treated Sewage
 US - Untreated Sewage
 RE - Recreational Water
 DW - Drinking Water Non-regulatory
 UNL - Unspecified Liquid
 SL - Sludge
 G - Gas
 OTH - Other

Lab Sample No(s)

Customer Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

Acid Herbicides by GCMS

All

NDPs: 0
Tests: 1

X

Ammoniacal Nitrogen

All

NDPs: 0
Tests: 3

X

X

X

Anions by Kone (w)

All

NDPs: 0
Tests: 3

X

X

X

Cyanide Comp/Free/Total/Thiocyanate

All

NDPs: 0
Tests: 3

X

X

X

Dissolved Metals by ICP-MS

All

NDPs: 0
Tests: 3

X

X

X

Dissolved Organic/Inorganic Carbon

All

NDPs: 0
Tests: 3

X

X

X

EPH (DRO) (C10-C40) Aqueous (W)

All

NDPs: 0
Tests: 3

X

X

X

GRO by GC-FID (W)

All

NDPs: 0
Tests: 3

X

X

X

Hexavalent Chromium (w)

All

NDPs: 0
Tests: 3

X

X

X

Mercury Dissolved

All

NDPs: 0
Tests: 3

X

X

X

Pesticides (Suite I) by GCMS

All

NDPs: 0
Tests: 1

X

Pesticides (Suite II) by GCMS

All

NDPs: 0
Tests: 1

X

pH Value

All

NDPs: 0
Tests: 3

X

X

X

Phenols by HPLC (W)

All

NDPs: 0
Tests: 3

X

X

X

SVOC MS (W) - Aqueous

All

NDPs: 0
Tests: 2

X

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-67

Client Reference: E9014-19

Report Number: 516121

Location: FEZ HOLBEACH GROUND Order Number:

Superseded Report:

Results Legend



Test



No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

Customer
Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

20372382

20372383

20372385

BH1

BH2

BH4

EW44

EW58

EW55

1000ml glass bottle
(ALE220)

Vial (ALE297)

1000ml glass bottle
(ALE220)

Vial (ALE297)

1000ml glass bottle
(ALE220)

Vial (ALE297)

1000ml glass bottle
(ALE220)

Vial (ALE297)

GW

GW

GW

GW

GW

GW

Total EPH (aq)

All

NDPs: 0
Tests: 3

X

X

X

Total Metals by ICP-MS

All

NDPs: 0
Tests: 3

X

X

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-67 Client Reference: E9014-19 Report Number: 516121
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report:

Results Legend		Customer Sample Ref.	BH1	BH2	BH4			
#	ISO17025 accredited.							
M	mCERTS accredited.							
sq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3*5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Carbon, Organic (diss.filt)	<3 mg/l	TM090	15.9	5.64	4.29			
Ammoniacal Nitrogen as NH3	<0.2 mg/l	TM099	<0.2	<0.2	<0.2			
			2 #	2 #	2 #			
Arsenic (diss.filt)	<0.5 µg/l	TM152	2.19	1.09	0.534			
			2 #	2 #	2 #			
Boron (diss.filt)	<10 µg/l	TM152	430	130	295			
			2 #	2 #	2 #			
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08	<0.08	<0.08			
			2 #	2 #	2 #			
Chromium (diss.filt)	<1 µg/l	TM152	<1	<1	<1			
			2 #	2 #	2 #			
Copper (diss.filt)	<0.3 µg/l	TM152	<0.3	<0.3	<0.3			
			2 #	2 #	2 #			
Lead (diss.filt)	<0.2 µg/l	TM152	<0.2	<0.2	<0.2			
			2 #	2 #	2 #			
Nickel (diss.filt)	<0.4 µg/l	TM152	5.27	3.52	2.77			
			2 #	2 #	2 #			
Selenium (diss.filt)	<1 µg/l	TM152	2.7	<1	<1			
			2 #	2 #	2 #			
Zinc (diss.filt)	<1 µg/l	TM152	444	1.36	4.95			
			2 #	2 #	2 #			
Calcium (Dis.Filt)	<0.2 mg/l	TM152	90	116	179			
			2 #	2 #	2 #			
Iron (Dis.Filt)	<0.019 mg/l	TM152	<0.019	0.154	<0.019			
			2 #	2 #	2 #			
Iron (Tot. Unfilt.)	<0.024 mg/l	TM152	275	15.6	3.62			
			#	#	#			
Hardness, Total as CaCO3 unfiltered	<0.35 mg/l	TM152	1690	504	788			
EPH Range >C10 - C40 (aq)	<100 µg/l	TM172	2740	172	213			
Total EPH (C6-C40) (aq)	<100 µg/l	TM172	2740	172	213			
EPH Band >C10-C12 (aq)	<100 µg/l	TM172	<1000	<100	<100			
EPH Band >C12-C16 (aq)	<100 µg/l	TM172	<1000	<100	<100			
EPH Band >C16-C21 (aq)	<100 µg/l	TM172	<1000	<100	<100			
EPH Band >C21-C28 (aq)	<100 µg/l	TM172	1090	<100	<100			
EPH Band >C35-C40 (aq)	<100 µg/l	TM172	<1000	<100	<100			
EPH Band >C28-C35 (aq)	<100 µg/l	TM172	<1000	<100	<100			
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01	<0.01	<0.01			
			2 #	2 #	2 #			
Chloride	<2 mg/l	TM184	648	137	777			
			#	#	#			
Nitrate as NO3	<0.3 mg/l	TM184	1.86	<0.3	7.97			
			@	@	@			
Cyanide, Total	<0.05 mg/l	TM227	<0.05	<0.05	<0.05			
			2 #	2 #	2 #			
Cyanide, Free	<0.05 mg/l	TM227	<0.05	<0.05	<0.05			
			2 #	2 #	2 #			
Thiocyanate	<0.05 mg/l	TM227	<0.05	<0.05	<0.05			
			2 #	2 #	2 #			
Chromium, Hexavalent	<0.03 mg/l	TM241	<0.03	<0.03	<0.03			
			#	#	#			
pH	<1 pH Units	TM256	7.83	7.51	7.48			
			#	#	#			
Phenol	<0.002 mg/l	TM259	<0.002	<0.002	<0.002			
			2 #	2 #	2 #			
Cresols	<0.006 mg/l	TM259	<0.006	<0.006	<0.006			
			2 #	2 #	2 #			



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-67 Client Reference: E9014-19 Report Number: 516121
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report:

Results Legend		Customer Sample Ref. Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	BH1	BH2	BH4			
#	ISO17025 accredited.		Ground Water (GW) 19/07/2019 20/07/2019 190720-67 20372382 EW44	Ground Water (GW) 19/07/2019 20/07/2019 190720-67 20372383 EW58	Ground Water (GW) 19/07/2019 20/07/2019 190720-67 20372385 EW55			
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3*5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Xylenols	<0.008 mg/l	TM259	<0.008 2 #	<0.008 2 #	<0.008 2 #			
Phenols, Total Detected monohydric	<0.016 mg/l	TM259	<0.016 2 #	<0.016 2 #	<0.016 2 #			
Trifluralin	<0.01 µg/l	TM343	<0.01					
alpha-HCH	<0.01 µg/l	TM343	<0.01					
gamma-HCH (Lindane)	<0.01 µg/l	TM343	<0.01					
Heptachlor	<0.01 µg/l	TM343	<0.01					
Aldrin	<0.01 µg/l	TM343	<0.01					
beta-HCH	<0.01 µg/l	TM343	<0.01					
Isodrin	<0.01 µg/l	TM343	<0.01					
delta-HCH	<0.01 µg/l	TM343	<0.01					
Heptachlor epoxide	<0.01 µg/l	TM343	<0.01					
o,p'-DDE	<0.01 µg/l	TM343	<0.01					
Endosulphan I	<0.01 µg/l	TM343	<0.01					
trans-Chlordane	<0.01 µg/l	TM343	<0.01					
cis-Chlordane	<0.01 µg/l	TM343	<0.01					
p,p'-DDE	<0.01 µg/l	TM343	0.0536					
Dieldrin	<0.01 µg/l	TM343	<0.01					
o,p'-DDD (TDE)	<0.01 µg/l	TM343	<0.01					
Endrin	<0.01 µg/l	TM343	<0.01					
o,p'-DDT	<0.01 µg/l	TM343	<0.01					
p,p'-DDD (TDE)	<0.01 µg/l	TM343	<0.01					
Endosulphan II	<0.02 µg/l	TM343	<0.02					
p,p'-DDT	<0.01 µg/l	TM343	<0.01					
o,p'-Methoxychlor	<0.01 µg/l	TM343	<0.01					
p,p'-Methoxychlor	<0.01 µg/l	TM343	<0.01					
Endosulphan Sulphate	<0.02 µg/l	TM343	<0.02					
Permethrin I	<0.01 µg/l	TM343	<0.01					
Permethrin II	<0.01 µg/l	TM343	<0.01					
1,3,5-Trichlorobenzene	<0.01 µg/l	TM344	<0.01					
Hexachlorobutadiene	<0.01 µg/l	TM344	<0.01					
1,2,4-Trichlorobenzene	<0.01 µg/l	TM344	<0.01					
1,2,3-Trichlorobenzene	<0.01 µg/l	TM344	<0.01					



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-67
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 516121
Superseded Report:

Results Legend		Customer Sample Ref.	BH1	BH2	BH4			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3*5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Dichlorvos	<0.01 µg/l	TM344	<0.01					
Dichlobenil	<0.01 µg/l	TM344	<0.01					
Mevinphos	<0.01 µg/l	TM344	<0.01					
Tecnazene	<0.01 µg/l	TM344	<0.01					
Hexachlorobenzene	<0.01 µg/l	TM344	<0.01					
Demeton-S-methyl	<0.01 µg/l	TM344	<0.01					
Phorate	<0.01 µg/l	TM344	<0.01					
Diazinon	<0.01 µg/l	TM344	<0.01					
Triallate	<0.01 µg/l	TM344	0.0317					
Atrazine	<0.01 µg/l	TM344	0.276					
Simazine	<0.01 µg/l	TM344	<0.01					
Disulfoton	<0.01 µg/l	TM344	<0.01					
Propetamphos	<0.01 µg/l	TM344	<0.01					
Chlorpyrifos-methyl	<0.01 µg/l	TM344	<0.01					
Dimethoate	<0.01 µg/l	TM344	<0.01					
Pirimiphos-methyl	<0.01 µg/l	TM344	<0.01					
Chlorpyrifos	<0.01 µg/l	TM344	<0.01					
Methyl Parathion	<0.01 µg/l	TM344	<0.01					
Malathion	<0.01 µg/l	TM344	<0.01					
Fenthion	<0.01 µg/l	TM344	<0.01					
Fenitrothion	<0.01 µg/l	TM344	<0.01					
Triadimefon	<0.01 µg/l	TM344	<0.01					
Pendimethalin	<0.01 µg/l	TM344	<0.01					
Parathion	<0.01 µg/l	TM344	<0.01					
Chlorfenvinphos	<0.01 µg/l	TM344	<0.01					
trans-Chlordane	<0.01 µg/l	TM344	<0.01					
cis-Chlordane	<0.01 µg/l	TM344	<0.01					
Ethion	<0.01 µg/l	TM344	<0.01					
Carbophenothion	<0.01 µg/l	TM344	<0.01					
Triazophos	<0.01 µg/l	TM344	<0.01					
Phosalone	<0.01 µg/l	TM344	<0.01					
Azinphos methyl	<0.02 µg/l	TM344	<0.02					



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-67 Client Reference: E9014-19 Report Number: 516121
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report:

SVOC MS (W) - Aqueous

Results Legend			Customer Sample Ref.		BH2	BH4				
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference							
M	mCERTS accredited.									
aq	Aqueous / settled sample.									
dis.filt	Dissolved / filtered sample.									
tot.unfilt	Total / unfiltered sample.									
*	Subcontracted - refer to subcontractor report for accreditation status.									
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery									
(F)	Trigger breach confirmed									
1-3+5@	Sample deviation (see appendix)									
Component	LOD/Units	Method								
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
2,4-Dichlorophenol (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
2,4-Dimethylphenol (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
2-Chloronaphthalene (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
2-Chlorophenol (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
2-Methylnaphthalene (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
2-Methylphenol (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
2-Nitroaniline (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
2-Nitrophenol (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
3-Nitroaniline (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
4-Bromophenylphenylether (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
4-Chloroaniline (aq)	<1 µg/l	TM176			<2	<1				
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
4-Methylphenol (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
4-Nitroaniline (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
4-Nitrophenol (aq)	<1 µg/l	TM176			<2	<1				
Azobenzene (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
Acenaphthylene (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
Acenaphthene (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
Anthracene (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176			<4	<2				
					#	#				
Butylbenzyl phthalate (aq)	<1 µg/l	TM176			<2	<1				
					#	#				
Benzo(a)anthracene (aq)	<1 µg/l	TM176			<2	<1				
					#	#				



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-67
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 516121
Superseded Report:

SVOC MS (W) - Aqueous

Results Legend		Customer Sample Ref.	BH2	BH4				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3*5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Benzo(b)fluoranthene (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Benzo(k)fluoranthene (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Benzo(a)pyrene (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Benzo(g,h,i)perylene (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Carbazole (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Chrysene (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Dibenzofuran (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
n-Dibutyl phthalate (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Diethyl phthalate (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Dibenzo(a,h)anthracene (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Dimethyl phthalate (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
n-Dioctyl phthalate (aq)	<5 µg/l	TM176	<10	<5				
			#	#				
Fluoranthene (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Fluorene (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Hexachlorobenzene (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Hexachlorobutadiene (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Pentachlorophenol (aq)	<1 µg/l	TM176	<2	<1				
Phenol (aq)	<1 µg/l	TM176	<2	<1				
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Hexachloroethane (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Nitrobenzene (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Naphthalene (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Isophorone (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176	<2	<1				
Phenanthrene (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Indeno(1,2,3-cd)pyrene (aq)	<1 µg/l	TM176	<2	<1				
			#	#				
Pyrene (aq)	<1 µg/l	TM176	<2	<1				
			#	#				



CERTIFICATE OF ANALYSIS

SDG: 190720-67

Client Reference: E9014-19

Report Number: 516121

Location: FEZ HOLBEACH GROUND Order Number:

Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM176	EPA 8270D Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of SVOCs in Water by GCMS
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM343	EPA 8270D - Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of Selected Pesticides (Suite I) in Liquids by GCMS
TM344	EPA 8270D – Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of selected pesticides (Suite II) by GCMS
TM411	Acid_Herbs_GCMS	Acid Herbs in Water by GCMS

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-67

Client Reference: E9014-19

Report Number: 516121

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report:

Test Completion Dates

Lab Sample No(s)	20372382	20372383	20372385
Customer Sample Ref.	BH1	BH2	BH4
AGS Ref.	EW44	EW58	EW55
Depth			
Type	Ground Water	Ground Water	Ground Water
Acid Herbicides by GCMS	25-Jul-2019		
Ammoniacal Nitrogen	26-Jul-2019	26-Jul-2019	26-Jul-2019
Anions by Kone (w)	30-Jul-2019	30-Jul-2019	30-Jul-2019
Cyanide Comp/Free/Total/Thiocyanate	30-Jul-2019	26-Jul-2019	26-Jul-2019
Dissolved Metals by ICP-MS	30-Jul-2019	30-Jul-2019	30-Jul-2019
Dissolved Organic/Inorganic Carbon	26-Jul-2019	25-Jul-2019	25-Jul-2019
EPH (DRO) (C10-C40) Aqueous (W)	30-Jul-2019	30-Jul-2019	30-Jul-2019
GRO by GC-FID (W)	25-Jul-2019	25-Jul-2019	25-Jul-2019
Hexavalent Chromium (w)	24-Jul-2019	24-Jul-2019	24-Jul-2019
Mercury Dissolved	24-Jul-2019	25-Jul-2019	25-Jul-2019
Nitrite by Kone (w)	25-Jul-2019	25-Jul-2019	25-Jul-2019
Pesticides (Suite I) by GCMS	29-Jul-2019		
Pesticides (Suite II) by GCMS	29-Jul-2019		
pH Value	26-Jul-2019	26-Jul-2019	26-Jul-2019
Phenols by HPLC (W)	26-Jul-2019	26-Jul-2019	26-Jul-2019
SVOC MS (W) - Aqueous		29-Jul-2019	29-Jul-2019
Total EPH (aq)	30-Jul-2019	30-Jul-2019	30-Jul-2019
Total Metals by ICP-MS	30-Jul-2019	29-Jul-2019	30-Jul-2019



CERTIFICATE OF ANALYSIS

SDG: 190720-67 Client Reference: E9014-19 Report Number: 516121
Location: OLBEACH GROUND INVESTIG Order Number: Superseded Report:

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2107).

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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Website: www.alsenvironmental.co.uk

SOCOTEC
Unit 4
Gainsborough Trading Estate
Leamington Road
Southam
Warwickshire
CV47 1RB

Attention: Giuseppe Melosu

CERTIFICATE OF ANALYSIS

Date of report Generation: 01 August 2019
Customer: SOCOTEC
Sample Delivery Group (SDG): 190720-70
Your Reference: E9014-19
Location: FEZ HOLBEACH GROUND INVESTIGATION
Report No: 516459

This report has been revised and directly supersedes 516016 in its entirety.

We received 4 samples on Saturday July 20, 2019 and 4 of these samples were scheduled for analysis which was completed on Thursday August 01, 2019. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70

Client Reference: E9014-19

Report Number: 516459

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report: 516016

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
20372507	BH01	ES1	0.20 - 0.20	19/07/2019
20372508	BH01	ES4	0.40 - 0.40	19/07/2019
20372509	BH04	ES1	0.20 - 0.20	19/07/2019
20372511	BH04	ES4	0.40 - 0.40	19/07/2019

Maximum Sample/Coolbox Temperature (°C) :

7.6

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70

Client Reference: E9014-19

Report Number: 516459

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report: 516016

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

Customer Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

Acid Herbicides by GCMS

All

NDPs: 0
Tests: 1

X

Acid herbicides*

All

NDPs: 0
Tests: 2

X

X

Ammoniacal Nitrogen

All

NDPs: 0
Tests: 2

X

X

Ammonium Soil by Titration

All

NDPs: 0
Tests: 2

X

X

Anions by Kone (w)

All

NDPs: 0
Tests: 2

X

X

Asbestos ID in Solid Samples

All

NDPs: 0
Tests: 2

X

X

CEN Readings

All

NDPs: 0
Tests: 2

X

X

Cyanide Comp/Free/Total/Thiocyanate

All

NDPs: 0
Tests: 4

X

X

X

X

Dissolved Metals by ICP-MS

All

NDPs: 0
Tests: 2

X

X

Dissolved Organic/Inorganic Carbon

All

NDPs: 0
Tests: 2

X

X

EPH (DRO) (C10-C40) Aqueous (W)

All

NDPs: 0
Tests: 2

X

X

EPH CWG (Aliphatic) Filtered GC (W)

All

NDPs: 0
Tests: 1

X

EPH CWG (Aliphatic) GC (S)

All

NDPs: 0
Tests: 1

X

EPH CWG (Aromatic) Filtered GC (W)

All

NDPs: 0
Tests: 1

X

EPH CWG (Aromatic) GC (S)

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70

Client Reference: E9014-19

Report Number: 516459

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report: 516016

Results Legend



Test


No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

Customer
Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

GRO by GC-FID (S)	All	NDPs: 0 Tests: 1				X	
GRO by GC-FID (W)	All	NDPs: 0 Tests: 2		X			X
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 2	X		X		
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 2		X			X
Mercury Dissolved	All	NDPs: 0 Tests: 2		X			X
Metals in solid samples by OES	All	NDPs: 0 Tests: 2	X		X		
OC, OP Pesticides and Triazine Herb	All	NDPs: 0 Tests: 2	X		X		
Pesticides (Suite I) by GCMS	All	NDPs: 0 Tests: 1		X			
Pesticides (Suite II) by GCMS	All	NDPs: 0 Tests: 1		X			
pH	All	NDPs: 0 Tests: 2	X		X		
pH Value of Filtered Water	All	NDPs: 0 Tests: 2		X			X
Phenols by HPLC (S)	All	NDPs: 0 Tests: 2	X		X		
Phenols by HPLC (W)	All	NDPs: 0 Tests: 2		X			X
Sample description	All	NDPs: 0 Tests: 4	X	X	X	X	
Semi Volatile Organic Compounds	All	NDPs: 0 Tests: 1	X				



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70

Client Reference: E9014-19

Report Number: 516459

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report: 516016

Results Legend



Test



No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

Customer
Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

Total EPH (aq)

All

NDPs: 0
Tests: 2

Total Organic Carbon

All

NDPs: 0
Tests: 2

TPH CWG Filtered (W)

All

NDPs: 0
Tests: 1

TPH CWG GC (S)

All

NDPs: 0
Tests: 1

VOC MS (S)

All

NDPs: 0
Tests: 1

20372507

20372508

20372509

20372511

BH01

BH01

BH04

BH04

ES1

ES4

ES1

ES4

0.20 - 0.20

0.40 - 0.40

0.20 - 0.20

0.40 - 0.40

1kg TUB

1kg TUB

1kg TUB

1kg TUB

S

S

S

S

X

X

X

X

X

X

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70

Client Reference: E9014-19

Report Number: 516459

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report: 516016

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
-----------	----------	------	-----------------	--------	-------------	--------	------------	-------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
20372507	BH01	0.20 - 0.20	Light Brown	Clay Loam	Vegetation	None
20372508	BH01	0.40 - 0.40	Light Brown	Silty Clay Loam	Vegetation	None
20372509	BH04	0.20 - 0.20	Light Brown	Clay	Vegetation	None
20372511	BH04	0.40 - 0.40	Light Brown	Clay Loam	Vegetation	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 516459
Superseded Report: 516016

Results Legend		Customer Sample Ref.	BH01	BH01	BH04	BH04		
#	ISO17025 accredited.							
M	mCERTS accredited.							
sq	Aqueous / settled sample.							
dis.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3+5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	14	15	10	11		
2,4,5-Trichlorophenol (2,4,5-T)*	<0.01 mg/kg	SUB	<0.01		<0.01			
2,4,5-TP (Fenoprop)*	<0.01 mg/kg	SUB	<0.01		<0.01			
2,4-D*	<0.01 mg/kg	SUB	<0.01		<0.01			
2,4-DB*	<0.01 mg/kg	SUB	<0.01		<0.01			
2,4-Dichloroprop (2,4 DP)*	<0.01 mg/kg	SUB	<0.01		<0.01			
4-Chlorophenoxyacetic acid (4-CPA)*	<0.01 mg/kg	SUB	<0.01		<0.01			
Acifluorfen*	<0.01 mg/kg	SUB	<0.01		<0.01			
Bentazone*	<0.01 mg/kg	SUB	<0.01		<0.01			
Bromoxynil*	<0.01 mg/kg	SUB	<0.01		<0.01			
Dicamba*	<0.01 mg/kg	SUB	<0.01		<0.01			
Diclofop*	<0.01 mg/kg	SUB	<0.01		<0.01			
Dinoseb*	<0.01 mg/kg	SUB	<0.01		<0.01			
DNOC*	<0.01 mg/kg	SUB	<0.01		<0.01			
Fluroxypyr*	<0.01 mg/kg	SUB	<0.01		<0.01			
Ioxynil*	<0.01 mg/kg	SUB	<0.01		<0.01			
2-methyl-4-Chlorophenoxyacetic acid (MCPA)*	<0.01 mg/kg	SUB	<0.01		<0.01			
4-(4-Chloro-o-tolyloxy) butyric acid (MCPB)*	<0.01 mg/kg	SUB	<0.01		<0.01			
Mecoprop (MCP)*	<0.01 mg/kg	SUB	<0.01		<0.01			
Propoxycarbazone-sodium*	<0.01 mg/kg	SUB	<0.01		<0.01			
Triclopyr*	<0.01 mg/kg	SUB	<0.01		<0.01			
Triclosan*	<0.01 mg/kg	SUB	<0.01		<0.01			
Exchangeable Ammonia as NH4	<15 mg/kg	TM024	51.1		<15			
Phenol	<0.01 mg/kg	TM062 (S)	<0.01		<0.01			
Cresols	<0.01 mg/kg	TM062 (S)	<0.01		<0.01			
Xylenols	<0.015 mg/kg	TM062 (S)	<0.015		<0.015			
Phenols, Total Detected monohydric	<0.035 mg/kg	TM062 (S)	<0.035		<0.035			
Fraction Organic Carbon (FOC)	<0.002	TM132	0.00835		0.00947			
Soil Organic Matter (SOM)	<0.35 %	TM132	1.44		1.63			
pH	1 pH Units	TM133	8.31		8.43			
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6		<0.6			
Cyanide, Total	<1 mg/kg	TM153	<1		<1			
Cyanide, Free	<1 mg/kg	TM153	<1		<1			



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 516459
Superseded Report: 516016

OC, OP Pesticides and Triazine Herb

Results Legend		Customer Sample Ref.	BH01	BH04				
#	ISO17025 accredited.							
M	mCERTS accredited.							
sq	Aqueous / settled sample.							
dis.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3*5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Dichlorvos	<50 µg/kg	TM073	<50	<50				
Mevinphos	<50 µg/kg	TM073	<50	<50				
Phorate	<50 µg/kg	TM073	<50	<50				
alpha-Hexachlorocyclohexane (HCH)	<50 µg/kg	TM073	<50	<50				
Diazinon	<50 µg/kg	TM073	<50	<50				
gamma-Hexachlorocyclohexane (HCH / Lindane)	<50 µg/kg	TM073	<50	<50				
Disulfoton	<50 µg/kg	TM073	<50	<50				
Heptachlor	<50 µg/kg	TM073	<50	<50				
Aldrin	<50 µg/kg	TM073	<50	<50				
beta-Hexachlorocyclohexane (HCH)	<50 µg/kg	TM073	<50	<50				
Methyl parathion	<50 µg/kg	TM073	<50	<50				
Malathion	<50 µg/kg	TM073	<50	<50				
Fenitrothion	<50 µg/kg	TM073	<50	<50				
Heptachlor epoxide	<50 µg/kg	TM073	<50	<50				
Parathion	<50 µg/kg	TM073	<50	<50				
Endosulphan I	<50 µg/kg	TM073	<50	<50				
p,p-DDE	<50 µg/kg	TM073	<50	<50				
Dieldrin	<50 µg/kg	TM073	<50	<50				
Endrin	<50 µg/kg	TM073	<50	<50				
p,p-TDE (DDD)	<50 µg/kg	TM073	<50	<50				
Ethion	<50 µg/kg	TM073	<50	<50				
Endosulphan II	<50 µg/kg	TM073	<50	<50				
p,p-DDT	<50 µg/kg	TM073	<50	<50				
p,p-Methoxychlor	<50 µg/kg	TM073	<50	<50				
Endosulphan sulphate	<50 µg/kg	TM073	<50	<50				
Azinphos-methyl	<50 µg/kg	TM073	<50	<50				



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 516459
Superseded Report: 516016

Semi Volatile Organic Compounds

Results Legend		Customer Sample Ref.	BH01				
#	ISO17025 accredited.						
M	mCERTS accredited.						
sq	Aqueous / settled sample.						
dis.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted - refer to subcontractor report for accreditation status.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-3*§@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Phenol	<100 µg/kg	TM157	<100				
Pentachlorophenol	<100 µg/kg	TM157	<100				
n-Nitroso-n-dipropylamine	<100 µg/kg	TM157	<100				
Nitrobenzene	<100 µg/kg	TM157	<100				
Isophorone	<100 µg/kg	TM157	<100				
Hexachloroethane	<100 µg/kg	TM157	<100				
Hexachlorocyclopentadiene	<100 µg/kg	TM157	<100				
Hexachlorobutadiene	<100 µg/kg	TM157	<100				
Hexachlorobenzene	<100 µg/kg	TM157	<100				
n-Dioctyl phthalate	<100 µg/kg	TM157	<100				
Dimethyl phthalate	<100 µg/kg	TM157	<100				
Diethyl phthalate	<100 µg/kg	TM157	<100				
n-Dibutyl phthalate	<100 µg/kg	TM157	<100				
Dibenzofuran	<100 µg/kg	TM157	<100				
Carbazole	<100 µg/kg	TM157	<100				
Butylbenzyl phthalate	<100 µg/kg	TM157	<100				
bis(2-Ethylhexyl) phthalate	<100 µg/kg	TM157	<100				
bis(2-Chloroethoxy)methane	<100 µg/kg	TM157	<100				
bis(2-Chloroethyl)ether	<100 µg/kg	TM157	<100				
Azobenzene	<100 µg/kg	TM157	<100				
4-Nitrophenol	<100 µg/kg	TM157	<100				
4-Nitroaniline	<100 µg/kg	TM157	<100				
4-Methylphenol	<100 µg/kg	TM157	<100				
4-Chlorophenylphenylether	<100 µg/kg	TM157	<100				
4-Chloroaniline	<100 µg/kg	TM157	<100				
4-Chloro-3-methylphenol	<100 µg/kg	TM157	<100				
4-Bromophenylphenylether	<100 µg/kg	TM157	<100				
3-Nitroaniline	<100 µg/kg	TM157	<100				
2-Nitrophenol	<100 µg/kg	TM157	<100				
2-Nitroaniline	<100 µg/kg	TM157	<100				
2-Methylphenol	<100 µg/kg	TM157	<100				
1,2,4-Trichlorobenzene	<100 µg/kg	TM157	<100				
2-Chlorophenol	<100 µg/kg	TM157	<100				



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 516459
Superseded Report: 516016

Semi Volatile Organic Compounds

Results Legend		Customer Sample Ref.	BH01				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.20 - 0.20				
M	mCERTS accredited.		Soil/Solid (S)				
aq	Aqueous / settled sample.		19/07/2019				
diss.filt	Dissolved / filtered sample.		.				
tot.unfilt	Total / unfiltered sample.		20/07/2019				
*	Subcontracted - refer to subcontractor report for accreditation status.		190720-70				
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		20372507				
(F)	Trigger breach confirmed		ES1				
1-3*5@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
2,6-Dinitrotoluene	<100 µg/kg	TM157	<100				
2,4-Dinitrotoluene	<100 µg/kg	TM157	<100				
2,4-Dimethylphenol	<100 µg/kg	TM157	<100				
2,4-Dichlorophenol	<100 µg/kg	TM157	<100				
2,4,6-Trichlorophenol	<100 µg/kg	TM157	<100				
2,4,5-Trichlorophenol	<100 µg/kg	TM157	<100				
1,4-Dichlorobenzene	<100 µg/kg	TM157	<100				
1,3-Dichlorobenzene	<100 µg/kg	TM157	<100				
1,2-Dichlorobenzene	<100 µg/kg	TM157	<100				
2-Chloronaphthalene	<100 µg/kg	TM157	<100				
2-Methylnaphthalene	<100 µg/kg	TM157	<100				
Acenaphthylene	<100 µg/kg	TM157	<100				
Acenaphthene	<100 µg/kg	TM157	<100				
Anthracene	<100 µg/kg	TM157	<100				
Benzo(a)anthracene	<100 µg/kg	TM157	<100				
Benzo(b)fluoranthene	<100 µg/kg	TM157	<100				
Benzo(k)fluoranthene	<100 µg/kg	TM157	<100				
Benzo(a)pyrene	<100 µg/kg	TM157	<100				
Benzo(g,h,i)perylene	<100 µg/kg	TM157	<100				
Chrysene	<100 µg/kg	TM157	<100				
Fluoranthene	<100 µg/kg	TM157	<100				
Fluorene	<100 µg/kg	TM157	<100				
Indeno(1,2,3-cd)pyrene	<100 µg/kg	TM157	<100				
Phenanthrene	<100 µg/kg	TM157	<100				
Pyrene	<100 µg/kg	TM157	<100				
Naphthalene	<100 µg/kg	TM157	<100				
Dibenzo(a,h)anthracene	<100 µg/kg	TM157	<100				
Bis(2-chloroisopropyl) ether	<100 µg/kg	TM157	<100				



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70

Client Reference: E9014-19

Report Number: 516459

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report: 516016

Asbestos Identification - Solid Samples

Results Legend

ISO17025 accredited.
M mCERTS accredited.
* Subcontracted test.
(F) Trigger breach confirmed
1-5&*%@ Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH01ES1 0.20 - 0.20 SOLID 19/07/2019 00:00:00 20/07/2019 09:30:00 190720-70 20372507 TM048	22/07/2019	Barbara Urbanek-Wals h	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH04ES1 0.20 - 0.20 SOLID 19/07/2019 00:00:00 20/07/2019 09:30:00 190720-70 20372509 TM048	22/07/2019	Agnieszka Chelmowska	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 516459
Superseded Report: 516016

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference	
Mass Sample taken (kg)	0.106
Mass of dry sample (kg)	0.090
Particle Size <4mm	>95%

Site Location	FEZ HOLBEACH GROUND INVES
Natural Moisture Content (%)	17.6
Dry Matter Content (%)	85

Case

SDG	190720-70
Lab Sample Number(s)	20372508
Sampled Date	19-Jul-2019
Customer Sample Ref.	BH01 ES4
Depth (m)	0.40 - 0.40

Eluate Analysis	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Hexavalent Chromium	<0.03	<0.03	<0.3	<0.3	-	-	-
Chloride	2.1	<2	21	<20	-	-	-
Dissolved Organic Carbon	6.17	<3	61.7	<30	-	-	-
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
EPH (DRO) (C10-C40)	<0.1	<0.1	<1	<1	-	-	-
Total Ammonia as NH ₃	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Total EPH (C6-C40)	<0.1	<0.1	<1	<1	-	-	-
Arsenic	0.0116	<0.0005	0.116	<0.005	-	-	-
Free Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Cresols by HPLC (W)	<0.006	<0.006	<0.06	<0.06	-	-	-
Thiocyanate (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Xylenols by HPLC (W)	<0.008	<0.008	<0.08	<0.08	-	-	-
Boron	0.023	<0.01	0.23	<0.1	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	-	-	-
Chromium	0.00109	<0.001	0.0109	<0.01	-	-	-
Copper	0.0123	<0.0003	0.123	<0.003	-	-	-
Lead	<0.0002	<0.0002	<0.002	<0.002	-	-	-
Nickel	0.00277	<0.0004	0.0277	<0.004	-	-	-
DNOC	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Clopyralid	<0.00004	<0.00004	<0.0004	<0.0004	-	-	-
MCPA	<0.00005	<0.00005	<0.0005	<0.0005	-	-	-
Mecoprop	<0.00004	<0.00004	<0.0004	<0.0004	-	-	-
Dicamba	<0.00004	<0.00004	<0.0004	<0.0004	-	-	-
MCPB	<0.00005	<0.00005	<0.0005	<0.0005	-	-	-
2,4-DB	<0.0001	<0.0001	<0.001	<0.001	-	-	-
2,3,6-TBA	<0.00005	<0.00005	<0.0005	<0.0005	-	-	-
Trifluralin	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Zinc	0.00124	<0.001	0.0124	<0.01	-	-	-
alpha-HCH	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Dichloroprop	<0.0001	<0.0001	<0.001	<0.001	-	-	-
gamma-HCH (Lindane)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-

Leach Test Information

Date Prepared	22-Jul-2019
pH (pH Units)	8.33
Conductivity (µS/cm)	80.50
Temperature (°C)	23.40
Volume Leachant (Litres)	0.884



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 516459
Superseded Report: 516016

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference	
Mass Sample taken (kg)	0.106
Mass of dry sample (kg)	0.090
Particle Size <4mm	>95%

Site Location	FEZ HOLBEACH GROUND INVES
Natural Moisture Content (%)	17.6
Dry Matter Content (%)	85

Case

SDG	190720-70
Lab Sample Number(s)	20372508
Sampled Date	19-Jul-2019
Customer Sample Ref.	BH01 ES4
Depth (m)	0.40 - 0.40

Eluate Analysis

	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Triclopyr	<0.00005	<0.00005	<0.0005	<0.0005	-	-	-
Fenoprop (Silvex)	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Heptachlor	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
2,4-Dichlorophenoxyacetic acid	<0.00005	<0.00005	<0.0005	<0.0005	-	-	-
Aldrin	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
2,4,5-Trichlorophenoxyacetic acid	<0.00005	<0.00005	<0.0005	<0.0005	-	-	-
beta-HCH	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Bromoxynil	<0.00004	<0.00004	<0.0004	<0.0004	-	-	-
Isodrin	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Benazolin	<0.00004	<0.00004	<0.0004	<0.0004	-	-	-
delta-HCH	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
EPH Band C10-C12	<0.1	<0.1	<1	<1	-	-	-
Heptachlor epoxide	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Ioxynil	<0.00005	<0.00005	<0.0005	<0.0005	-	-	-
EPH Band C12-C16	<0.1	<0.1	<1	<1	-	-	-
o,p-DDE	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Pentachlorophenol	<0.00004	<0.00004	<0.0004	<0.0004	-	-	-
Endosulphan I	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
EPH Band C16-C21	<0.1	<0.1	<1	<1	-	-	-
Fluroxypyr	<0.0001	<0.0001	<0.001	<0.001	-	-	-
trans-Chlordane	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
cis-Chlordane	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
p,p-DDE	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
1,3,5-Trichlorobenzene	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Dieldrin	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
EPH Band C21-C28	<0.1	<0.1	<1	<1	-	-	-
Hexachlorobutadiene	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
o,p-DDD (TDE)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
1,2,4-Trichlorobenzene	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Endrin	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
1,2,3-Trichlorobenzene	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
o,p-DDT	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Dichlorvos	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
EPH Band C35-C40	<0.1	<0.1	<1	<1	-	-	-
p,p-DDD (TDE)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-

Leach Test Information

Date Prepared	22-Jul-2019
pH (pH Units)	8.33
Conductivity (µS/cm)	80.50
Temperature (°C)	23.40
Volume Leachant (Litres)	0.884



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 516459
Superseded Report: 516016

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference	
Mass Sample taken (kg)	0.106
Mass of dry sample (kg)	0.090
Particle Size <4mm	>95%

Site Location	FEZ HOLBEACH GROUND INVES
Natural Moisture Content (%)	17.6
Dry Matter Content (%)	85

Case

SDG	190720-70
Lab Sample Number(s)	20372508
Sampled Date	19-Jul-2019
Customer Sample Ref.	BH01 ES4
Depth (m)	0.40 - 0.40

Eluate Analysis

	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Dichlobenil	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Endosulphan II	<0.00002	<0.00002	<0.0002	<0.0002	-	-	-
Calcium (Dis.Filt) mg/l	13.8	<0.2	138	<2	-	-	-
EPH Band C28-C35	<0.1	<0.1	<1	<1	-	-	-
Mevinphos	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
p,p-DDT	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Iron (Dis.Filt) mg/l	0.579	<0.019	5.79	<0.19	-	-	-
o,p-Methoxychlor	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Tecnazene	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Hexachlorobenzene	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
p,p-Methoxychlor	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Demeton-S-methyl	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Endosulphan Sulphate	<0.00002	<0.00002	<0.0002	<0.0002	-	-	-
Permethrin I	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Phorate	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Diazinon	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Permethrin II	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Triallate	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Atrazine	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Simazine	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Disulfoton	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Propetamphos	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Chlorpyrifos-methyl	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Dimethoate	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Pirimiphos-methyl	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Chlorpyrifos	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Methyl Parathion	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Malathion	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Fenthion	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Fenitrothion	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Triadimefon	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Pendimethalin	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Parathion	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Chlorfenvinphos	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
trans-Chlordane	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-

Leach Test Information

Date Prepared	22-Jul-2019
pH (pH Units)	8.33
Conductivity (µS/cm)	80.50
Temperature (°C)	23.40
Volume Leachant (Litres)	0.884



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 516459
Superseded Report: 516016

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.106

Mass of dry sample (kg) 0.090

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 17.6

Dry Matter Content (%) 85

Case

SDG 190720-70

Lab Sample Number(s) 20372508

Sampled Date 19-Jul-2019

Customer Sample Ref. BH01 ES4

Depth (m) 0.40 - 0.40

Eluate Analysis

	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
cis-Chlordane	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Ethion	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Carbophenothion	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Triazophos	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Phosalone	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Azinphos methyl	<0.00002	<0.00002	<0.0002	<0.0002	-	-	-
Azinphos ethyl	<0.00002	<0.00002	<0.0002	<0.0002	-	-	-
TPH CWG (W)							
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-
GRO_bandC (>C7-C8)	<0.01	<0.01	<0.1	<0.1	-	-	-
GRO_bandC (C5-C6)	<0.01	<0.01	<0.1	<0.1	-	-	-
GRO_bandC (>C6-C7)	<0.01	<0.01	<0.1	<0.1	-	-	-
GRO_bandC (>C8-C10)	<0.01	<0.01	<0.1	<0.1	-	-	-
GRO (C10-C12)	<0.01	<0.01	<0.1	<0.1	-	-	-

Leach Test Information

Date Prepared 22-Jul-2019
pH (pH Units) 8.33
Conductivity (µS/cm) 80.50
Temperature (°C) 23.40
Volume Leachant (Litres) 0.884



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 516459
Superseded Report: 516016

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.101

Mass of dry sample (kg) 0.090

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 12.4

Dry Matter Content (%) 89

Case

SDG 190720-70

Lab Sample Number(s) 20372511

Sampled Date 19-Jul-2019

Customer Sample Ref. BH04 ES4

Depth (m) 0.40 - 0.40

Eluate Analysis

	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Hexavalent Chromium	<0.03	<0.03	<0.3	<0.3	-	-	-
Chloride	3.5	<2	35	<20	-	-	-
Dissolved Organic Carbon	5.49	<3	54.9	<30	-	-	-
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
EPH (DRO) (C10-C40)	<0.1	<0.1	<1	<1	-	-	-
Total Ammonia as NH ₃	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Total EPH (C6-C40)	<0.1	<0.1	<1	<1	-	-	-
Arsenic	0.00662	<0.0005	0.0662	<0.005	-	-	-
Free Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Cresols by HPLC (W)	<0.006	<0.006	<0.06	<0.06	-	-	-
Thiocyanate (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Xylenols by HPLC (W)	<0.008	<0.008	<0.08	<0.08	-	-	-
Boron	0.0249	<0.01	0.249	<0.1	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Copper	0.0107	<0.0003	0.107	<0.003	-	-	-
Lead	<0.0002	<0.0002	<0.002	<0.002	-	-	-
Nickel	0.00199	<0.0004	0.0199	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.00373	<0.001	0.0373	<0.01	-	-	-
EPH Band C10-C12	<0.1	<0.1	<1	<1	-	-	-
EPH Band C12-C16	<0.1	<0.1	<1	<1	-	-	-

Leach Test Information

Date Prepared 22-Jul-2019
pH (pH Units) 8.03
Conductivity (µS/cm) 106.00
Temperature (°C) 23.10
Volume Leachant (Litres) 0.889



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 516459
Superseded Report: 516016

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.101

Mass of dry sample (kg) 0.090

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 12.4

Dry Matter Content (%) 89

Case

SDG 190720-70

Lab Sample Number(s) 20372511

Sampled Date 19-Jul-2019

Customer Sample Ref. BH04 ES4

Depth (m) 0.40 - 0.40

Eluate Analysis

	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
EPH Band C16-C21	<0.1	<0.1	<1	<1	-	-	-
EPH Band C21-C28	<0.1	<0.1	<1	<1	-	-	-
EPH Band C35-C40	<0.1	<0.1	<1	<1	-	-	-
Calcium (Dis.Filt) mg/l	12.8	<0.2	128	<2	-	-	-
EPH Band C28-C35	<0.1	<0.1	<1	<1	-	-	-
Iron (Dis.Filt) mg/l	0.36	<0.019	3.6	<0.19	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-
GRO_bandC (>C7-C8)	<0.01	<0.01	<0.1	<0.1	-	-	-
GRO_bandC (C5-C6)	<0.01	<0.01	<0.1	<0.1	-	-	-

Leach Test Information

Date Prepared	22-Jul-2019
pH (pH Units)	8.03
Conductivity (µS/cm)	106.00
Temperature (°C)	23.10
Volume Leachant (Litres)	0.889



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70

Client Reference: E9014-19

Report Number: 516459

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report: 516016

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.101

Mass of dry sample (kg) 0.090

Particle Size <4mm >95%

Site Location

FEZ HOLBEACH GROUND INVES

Natural Moisture Content (%) 12.4

Dry Matter Content (%) 89

Case

SDG 190720-70

Lab Sample Number(s) 20372511

Sampled Date 19-Jul-2019

Customer Sample Ref. BH04 ES4

Depth (m) 0.40 - 0.40

Eluate Analysis

C ₂	Conc ⁿ in 10:1 eluate (mg/l)		A ₂	10:1 conc ⁿ leached (mg/kg)	
	Result	Limit of Detection		Result	Limit of Detection

TPH CWG (W)

GRO_bandC (>C6-C7)	<0.01	<0.01	<0.1	<0.1	-	-	-
GRO_bandC (>C8-C10)	<0.01	<0.01	<0.1	<0.1	-	-	-
GRO (C10-C12)	<0.01	<0.01	<0.1	<0.1	-	-	-

Leach Test Information

Date Prepared 22-Jul-2019

pH (pH Units) 8.03

Conductivity (µS/cm) 106.00

Temperature (°C) 23.10

Volume Leachant (Litres) 0.889



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70 Client Reference: E9014-19 Report Number: 516459
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report: 516016

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
SUB		Subcontracted Test
TM024	Method 4500A & B, AWWA/APHA, 20th Ed., 1999	Determination of Exchangeable Ammonium and Ammoniacal Nitrogen as N by titration on solids
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM073	MEWAM BOOK 60 1980,95 1985, HMSO / Modified: US EPA Method 8081A & 8141A	Determination of organochlorine and organophosphorous pesticides by GCMS
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990:BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM157	HP 6890 Gas Chromatograph (GC) system and HP 5973 Mass Selective Detector (MSD).	Determination of SVOC in Soils by GC-MS extracted by sonication in DCM/Acetone
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM343	EPA 8270D - Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of Selected Pesticides (Suite I) in Liquids by GCMS
TM344	EPA 8270D – Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of selected pesticides (Suite II) by GCMS
TM411	Acid_Herbs_GCMS	Acid Herbs in Water by GCMS

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 190720-70

Client Reference: E9014-19

Report Number: 516459

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report: 516016

Test Completion Dates

Lab Sample No(s)	20372507	20372508	20372509	20372511
Customer Sample Ref.	BH01	BH01	BH04	BH04
AGS Ref.	ES1	ES4	ES1	ES4
Depth	0.20 - 0.20	0.40 - 0.40	0.20 - 0.20	0.40 - 0.40
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Acid Herbicides by GCMS		25-Jul-2019		
Acid herbicides*	01-Aug-2019		01-Aug-2019	
Ammoniacal Nitrogen		24-Jul-2019		24-Jul-2019
Ammonium Soil by Titration	29-Jul-2019		29-Jul-2019	
Anions by Kone (w)		25-Jul-2019		25-Jul-2019
Asbestos ID in Solid Samples	25-Jul-2019		25-Jul-2019	
CEN 10:1 Leachate (1 Stage)		23-Jul-2019		23-Jul-2019
CEN Readings		24-Jul-2019		24-Jul-2019
Cyanide Comp/Free/Total/Thiocyanate	26-Jul-2019	26-Jul-2019	26-Jul-2019	26-Jul-2019
Dissolved Metals by ICP-MS		26-Jul-2019		26-Jul-2019
Dissolved Organic/Inorganic Carbon		26-Jul-2019		26-Jul-2019
EPH (DRO) (C10-C40) Aqueous (W)		26-Jul-2019		26-Jul-2019
EPH CWG (Aliphatic) Filtered GC (W)				27-Jul-2019
EPH CWG (Aliphatic) GC (S)			23-Jul-2019	
EPH CWG (Aromatic) Filtered GC (W)				27-Jul-2019
EPH CWG (Aromatic) GC (S)			23-Jul-2019	
GRO by GC-FID (S)			26-Jul-2019	
GRO by GC-FID (W)		25-Jul-2019		25-Jul-2019
Hexavalent Chromium (s)	25-Jul-2019		25-Jul-2019	
Hexavalent Chromium (w)		25-Jul-2019		25-Jul-2019
Mercury Dissolved		25-Jul-2019		25-Jul-2019
Metals in solid samples by OES	26-Jul-2019		25-Jul-2019	
OC, OP Pesticides and Triazine Herb	29-Jul-2019		29-Jul-2019	
Pesticides (Suite I) by GCMS		29-Jul-2019		
Pesticides (Suite II) by GCMS		29-Jul-2019		
pH	29-Jul-2019		29-Jul-2019	
pH Value of Filtered Water		25-Jul-2019		25-Jul-2019
Phenols by HPLC (S)	25-Jul-2019		25-Jul-2019	
Phenols by HPLC (W)		26-Jul-2019		26-Jul-2019
Sample description	21-Jul-2019	21-Jul-2019	21-Jul-2019	21-Jul-2019
Semi Volatile Organic Compounds	25-Jul-2019			
Total EPH (aq)		26-Jul-2019		26-Jul-2019
Total Organic Carbon	26-Jul-2019		26-Jul-2019	
TPH CWG Filtered (W)				30-Jul-2019
TPH CWG GC (S)			26-Jul-2019	
VOC MS (S)			29-Jul-2019	



CERTIFICATE OF ANALYSIS

Work Order	: PR1976489	Issue Date	: 01-Aug-2019
Customer	: ALS Life Sciences Ltd	Laboratory	: ALS Czech Republic, s.r.o.
Contact	: Reporting	Contact	: Client Service
Address	: Unit 7-8 Hawarden Business Park Manor Road, Hawarden CH5 3US Deeside United Kingdom	Address	: Na Harfe 336/9 Prague 9 - Vysocany 190 00 Czech Republic
E-mail	: euhdnsbconresults@ALSGlobal.com	E-mail	: customer.support@alsglobal.com
Telephone	: ----	Telephone	: +420 226 226 228
Project	: 190720-70	Page	: 1 of 2
Order number	: 190720-70	Date Samples Received	: 23-Jul-2019
		Quote number	: PR2018ALSAL-GB0001 (CZ-256-17-1008)
Site	: ----	Date of test	: 25-Jul-2019 - 01-Aug-2019
Sampled by	: Client	QC Level	: ALS CR Standard Quality Control Schedule

General Comments

This report shall not be reproduced except in full, without prior written approval from the laboratory.
The laboratory declares that the test results relate only to the listed samples.

Responsible for accuracy

Testing Laboratory No. 1163
Accredited by CAI according to
CSN EN ISO/IEC 17025:2005

Signatories

Zdeněk Jiráček

Position

Environmental Business Unit
Manager





Analytical Results

Sub-Matrix: SOIL

Client sample ID

20374835
BH01

20374812
BH04

Laboratory sample ID

PR1976489-001

PR1976489-002

Client sampling date / time

19-Jul-2019 00:00

19-Jul-2019 00:00

Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU
Physical Parameters									
Dry matter @ 105°C	S-DRY-GRCI	0.10	%	83.4	± 6.0%	87.9	± 6.0%	----	----
Pesticides									
2.4.5-T	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
2.4.5-TP	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
2.4-D	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
2.4-DB	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
2.4-DP (isomers)	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
4-CPP	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Bentazone	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Dinoseb	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Fluroxypyr	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
MCPA	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
MCPB	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
MCPB (isomers)	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Acifluorfen	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Bromoxynil	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
DNOC	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Dicamba	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Diclofop	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Ioxynil	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Propoxycarbazone-sodium	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Triclopyr	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----
Triclosan	S-PESLMSA1	0.0100	mg/kg DW	<0.0100	----	<0.0100	----	----	----

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, delivery date in brackets without a time component will be displayed instead. Measurement uncertainty is expressed as expanded measurement uncertainty with coverage factor k = 2, representing 95% confidence level.

Key: LOR = Limit of reporting; MU = Measurement Uncertainty

The end of result part of the certificate of analysis

Brief Method Summaries

Analytical Methods	Method Descriptions
Location of test performance: Na Harfe 336/9 Prague 9 - Vysocany Czech Republic 190 00	
S-DRY-GRCI	CZ_SOP_D06_01_045 (CSN ISO 11465, CSN EN 12880, CSN EN 14346), CZ_SOP_D06_07_046 (CSN ISO 11465, CSN EN 12880, CSN EN 14346, CSN 46 5735) Determination of dry matter by gravimetry and determination of moisture by calculation from measured values.
S-PESLMSA1	CZ_SOP_D06_03_182.B (CSN EN 15637, US EPA 1694) Determination of acidic herbicides and drug residues by liquid chromatography method with MS/MS detection.

A ** symbol preceding any method indicates laboratory or subcontractor non-accredited test. In the case when a procedure belonging to an accredited method was used for non-accredited matrix, would apply that the reported results are non-accredited. Please refer to General Comment section on front page for information. If the report contains subcontracted analysis, those are made in a subcontracted laboratory outside the laboratories ALS Czech Republic, s.r.o.

The calculation methods of summation parameters are available on request in the client service.



CERTIFICATE OF ANALYSIS

SDG:	190720-70	Client Reference:	E9014-19	Report Number:	516459
Location:	OLBEACH GROUND INVESTIG	Order Number:		Superseded Report:	516016

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2107).

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
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Deeside
CH5 3US

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Website: www.alsenvironmental.co.uk

SOCOTEC
Unit 4
Gainsborough Trading Estate
Leamington Road
Southam
Warwickshire
CV47 1RB

Attention: Giuseppe Melosu

CERTIFICATE OF ANALYSIS

Date of report Generation:	07 August 2019
Customer:	SOCOTEC
Sample Delivery Group (SDG):	190726-24
Your Reference:	E9014-19
Location:	FEZ HOLBEACH GROUND INVESTIGATION
Report No:	517011

We received 4 samples on Friday July 26, 2019 and 4 of these samples were scheduled for analysis which was completed on Wednesday August 07, 2019. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 190726-24

Client Reference: E9014-19

Report Number: 517011

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
20405776	BH01	EW45		25/07/2019
20405778	BH02	EW59		25/07/2019
20405779	BH03	EW51		25/07/2019
20405781	BH04	EW56		25/07/2019

Maximum Sample/Coolbox Temperature (°C) :

13.2

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 190726-24 Client Reference: E9014-19 Report Number: 517011
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report:

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

<div>Results Legend</div> <div><div>X</div> Test</div> <div><div>N</div> No Determination Possible</div> <div>Sample Types -</div> <div>S - Soil/Solid</div> <div>UNS - Unspecified Solid</div> <div>GW - Ground Water</div> <div>SW - Surface Water</div> <div>LE - Land Leachate</div> <div>PL - Prepared Leachate</div> <div>PR - Process Water</div> <div>SA - Saline Water</div> <div>TE - Trade Effluent</div> <div>TS - Treated Sewage</div> <div>US - Untreated Sewage</div> <div>RE - Recreational Water</div> <div>DW - Drinking Water Non-regulatory</div> <div>UNL - Unspecified Liquid</div> <div>SL - Sludge</div> <div>G - Gas</div> <div>OTH - Other</div>	Lab Sample No(s)																																																																																																																																																																																																																																																																																																																																																																																											
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	Container		HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. 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PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)	HNO3 Filtered (ALE204)	H2SO4 (ALE244)	330ml plastic bottle (ALE503)	250ml Amber Gl. 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PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	Vial (ALE297)	NaOH (ALE245)

[illegible]

20405781	BH04	EW56		Vial (ALE297)	GW														
				NaOH (ALE245)	GW														
				HNO3 Filtered (ALE204)	GW														
				H2SO4 (ALE244)	GW		X												
				330ml plastic bottle (ALE503)	GW														
				250ml Amber Gl. PTFE/PE (ALE219)	GW														
				0.5l glass bottle (ALE227)	GW														
				Vial (ALE297)	GW					X									
				NaOH (ALE245)	GW														
20405779	BH03	EW51																	



CERTIFICATE OF ANALYSIS

Validated

SDG: 190726-24 **Client Reference:** E9014-19 **Report Number:** 517011
Location: FEZ HOLBEACH GROUND **Order Number:** **Superseded Report:**

Results Legend		Customer Sample Ref.	BH01	BH02	BH03	BH04		
#	ISO17025 accredited.							
M	mCERTS accredited.							
sq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3+5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Carbon, Organic (diss.filt)	<3 mg/l	TM090	8.52	6.69	15.5	3.27		
Ammoniacal Nitrogen as NH3	<0.2 mg/l	TM099	<0.2	0.332	0.41	<0.2		
Arsenic (diss.filt)	<0.5 µg/l	TM152	1.5	4.65	7.85	0.74		
Boron (diss.filt)	<10 µg/l	TM152	158	139	483	270		
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08	<0.08	<0.08	<0.08		
Chromium (diss.filt)	<1 µg/l	TM152	<1	<1	<1	<1		
Copper (diss.filt)	<0.3 µg/l	TM152	<0.3	0.48	1.05	0.683		
Lead (diss.filt)	<0.2 µg/l	TM152	<0.2	0.302	0.451	<0.2		
Nickel (diss.filt)	<0.4 µg/l	TM152	5.08	5.51	7.51	2.96		
Selenium (diss.filt)	<1 µg/l	TM152	1.09	<1	1.14	<1		
Zinc (diss.filt)	<1 µg/l	TM152	30.1	5.08	17.5	13.8		
Calcium (Dis.Filt)	<0.2 mg/l	TM152	83.5	135	<1.57	165		
Iron (Dis.Filt)	<0.019 mg/l	TM152	0.0888	0.23	11.1	0.0306		
Iron (Tot. Unfilt.)	<0.024 mg/l	TM152	57.9	30.4	132	42.9		
Hardness, Total as CaCO3 unfiltered	<0.35 mg/l	TM152	605	1200	2140	842		
EPH Range >C10 - C40 (aq)	<100 µg/l	TM172	309	1720	2100	622		
Total EPH (C6-C40) (aq)	<100 µg/l	TM172	309	1720	2100	622		
EPH Band >C10-C12 (aq)	<100 µg/l	TM172	<100	<100	<100	<100		
EPH Band >C12-C16 (aq)	<100 µg/l	TM172	<100	182	<100	<100		
EPH Band >C16-C21 (aq)	<100 µg/l	TM172	<100	297	287	<100		
EPH Band >C21-C28 (aq)	<100 µg/l	TM172	115	796	1150	253		
EPH Band >C35-C40 (aq)	<100 µg/l	TM172	<100	109	139	<100		
EPH Band >C28-C35 (aq)	<100 µg/l	TM172	<100	297	409	215		
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01	<0.01	<0.01	<0.01		
Chloride	<2 mg/l	TM184	489	130	2180	603		
Nitrate as NO3	<0.3 mg/l	TM184	11.8	760	<0.3	14.3		
Phenol	<0.5 µg/l	TM205	<4		<6.5			
2-methylphenol	<0.5 µg/l	TM205	<0.5		<0.5			
3-methylphenol	<0.5 µg/l	TM205	<0.5		<0.5			
4-methylphenol	<0.5 µg/l	TM205	<0.5		<0.5			
2-chlorophenol	<0.5 µg/l	TM205	<0.5		<0.5			
2,4-dimethylphenol	<0.5 µg/l	TM205	<0.5		<0.5			
4-chloro-3-methylphenol	<0.5 µg/l	TM205	<0.5		<0.5			



CERTIFICATE OF ANALYSIS

Validated

SDG: 190726-24 Client Reference: E9014-19 Report Number: 517011
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report:

Results Legend			Customer Sample Ref.	BH01	BH02	BH03	BH04		
#	ISO17025 accredited.			Ground Water (GW) 25/07/2019	Ground Water (GW) 25/07/2019	Ground Water (GW) 25/07/2019	Ground Water (GW) 25/07/2019		
M	mCERTS accredited.								
aq	Aqueous / settled sample.								
diss.filt	Dissolved / filtered sample.								
tot.unfilt	Total / unfiltered sample.								
*	Subcontracted - refer to subcontractor report for accreditation status.								
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery								
(F)	Trigger breach confirmed								
1-3&@	Sample deviation (see appendix)								
		Lab Sample No.(s) AGS Reference							
Component	LOD/Units	Method							
2,6-dichlorophenol	<0.5 µg/l	TM205	<0.5		<0.5				
4-Chlorophenol	<0.5 µg/l	TM205	<0.5		<0.5				
2,4-dichlorophenol	<0.5 µg/l	TM205	<0.5		<0.5				
2-nitrophenol	<0.5 µg/l	TM205	<0.5		<0.5				
2,4,6-trichlorophenol	<0.5 µg/l	TM205	<0.5		<0.5				
2,4,5-trichlorophenol	<0.5 µg/l	TM205	<0.5		<0.5				
4-nitrophenol	<0.5 µg/l	TM205	<0.5		<0.5				
2,3,5,6-tetrachlorophenol	<0.5 µg/l	TM205	<0.5		<0.5				
2,3,4,6-tetrachlorophenol	<0.5 µg/l	TM205	<0.5		<0.5				
2,4-dinitrophenol	<2.5 µg/l	TM205	<2.5		<2.5				
DNOC	<3 µg/l	TM205	<3		<3				
Pentachlorophenol	<2 µg/l	TM205	<2		<2				
Dinoseb	<4 µg/l	TM205	<4		<4				
Cyanide, Total	<0.05 mg/l	TM227	<0.05	<0.05	<0.05	<0.05			
			#	#	#	#			
Cyanide, Free	<0.05 mg/l	TM227	<0.05	<0.05	<0.05	<0.05			
			#	#	#	#			
Thiocyanate	<0.05 mg/l	TM227	<0.05	<0.05	<0.05	<0.05			
			#	#	#	#			
Chromium, Hexavalent	<0.03 mg/l	TM241	<0.03	<0.03	<0.03	<0.03			
			#	#	#	#			
pH	<1 pH Units	TM256	7.58	7.27	7.13	7.21			
			#	#	#	#			
Phenol	<0.002 mg/l	TM259	<0.002	0.01	0.01	<0.002			
			#	#	#	#			
Cresols	<0.006 mg/l	TM259	<0.006	<0.006	<0.006	<0.006			
			#	#	#	#			
Xylenols	<0.008 mg/l	TM259	<0.008	<0.008	<0.008	<0.008			
			#	#	#	#			
Phenols, Total Detected monohydric	<0.016 mg/l	TM259	<0.016	<0.016	<0.016	<0.016			
			#	#	#	#			
Trifluralin	<0.01 µg/l	TM343		<0.01					
alpha-HCH	<0.01 µg/l	TM343		<0.01					
gamma-HCH (Lindane)	<0.01 µg/l	TM343		<0.01					
Heptachlor	<0.01 µg/l	TM343		<0.01					
Aldrin	<0.01 µg/l	TM343		<0.01					
beta-HCH	<0.01 µg/l	TM343		<0.01					
Isodrin	<0.01 µg/l	TM343		<0.01					
delta-HCH	<0.01 µg/l	TM343		<0.01					
Heptachlor epoxide	<0.01 µg/l	TM343		<0.01					
o,p'-DDE	<0.01 µg/l	TM343		<0.01					



CERTIFICATE OF ANALYSIS

Validated

SDG: 190726-24 Client Reference: E9014-19 Report Number: 517011
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report:

Results Legend		Customer Sample Ref.	BH01	BH02	BH03	BH04		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3*5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Endosulphan I	<0.01 µg/l	TM343		<0.01				
trans-Chlordane	<0.01 µg/l	TM343		<0.01				
cis-Chlordane	<0.01 µg/l	TM343		<0.01				
p,p'-DDE	<0.01 µg/l	TM343		<0.01				
Dieldrin	<0.01 µg/l	TM343		<0.01				
o,p'-DDD (TDE)	<0.01 µg/l	TM343		<0.01				
Endrin	<0.01 µg/l	TM343		<0.01				
o,p'-DDT	<0.01 µg/l	TM343		<0.01				
p,p'-DDD (TDE)	<0.01 µg/l	TM343		<0.01				
Endosulphan II	<0.02 µg/l	TM343		<0.02				
p,p'-DDT	<0.01 µg/l	TM343		<0.01				
o,p'-Methoxychlor	<0.01 µg/l	TM343		<0.01				
p,p'-Methoxychlor	<0.01 µg/l	TM343		<0.01				
Endosulphan Sulphate	<0.02 µg/l	TM343		<0.02				
Permethrin I	<0.01 µg/l	TM343		<0.01				
Permethrin II	<0.01 µg/l	TM343		<0.01				
1,3,5-Trichlorobenzene	<0.01 µg/l	TM344		<0.01				
Hexachlorobutadiene	<0.01 µg/l	TM344		<0.01				
1,2,4-Trichlorobenzene	<0.01 µg/l	TM344		<0.01				
1,2,3-Trichlorobenzene	<0.01 µg/l	TM344		<0.01				
Dichlorvos	<0.01 µg/l	TM344		<0.01				
Dichlobenil	<0.01 µg/l	TM344		<0.01				
Mevinphos	<0.01 µg/l	TM344		<0.01				
Tecnazene	<0.01 µg/l	TM344		<0.01				
Hexachlorobenzene	<0.01 µg/l	TM344		<0.01				
Demeton-S-methyl	<0.01 µg/l	TM344		<0.01				
Phorate	<0.01 µg/l	TM344		<0.01				
Diazinon	<0.01 µg/l	TM344		<0.01				
Triallate	<0.01 µg/l	TM344		<0.01				
Atrazine	<0.01 µg/l	TM344		<0.01				
Simazine	<0.01 µg/l	TM344		<0.01				
Disulfoton	<0.01 µg/l	TM344		<0.01				



CERTIFICATE OF ANALYSIS

Validated

SDG: 190726-24 Client Reference: E9014-19 Report Number: 517011
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report:

Results Legend		Customer Sample Ref.	BH01	BH02	BH03	BH04		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3*5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Propetamphos	<0.01 µg/l	TM344		<0.01				
Chlorpyrifos-methyl	<0.01 µg/l	TM344		<0.01				
Dimethoate	<0.01 µg/l	TM344		<0.01				
Pirimiphos-methyl	<0.01 µg/l	TM344		<0.01				
Chlorpyrifos	<0.01 µg/l	TM344		<0.01				
Methyl Parathion	<0.01 µg/l	TM344		<0.01				
Malathion	<0.01 µg/l	TM344		<0.01				
Fenthion	<0.01 µg/l	TM344		<0.01				
Fenitrothion	<0.01 µg/l	TM344		<0.01				
Triadimefon	<0.01 µg/l	TM344		<0.01				
Pendimethalin	<0.01 µg/l	TM344		<0.01				
Parathion	<0.01 µg/l	TM344		<0.01				
Chlorfenvinphos	<0.01 µg/l	TM344		<0.01				
trans-Chlordane	<0.01 µg/l	TM344		<0.01				
cis-Chlordane	<0.01 µg/l	TM344		<0.01				
Ethion	<0.01 µg/l	TM344		<0.01				
Carbophenothion	<0.01 µg/l	TM344		<0.01				
Triazophos	<0.01 µg/l	TM344		<0.01				
Phosalone	<0.01 µg/l	TM344		<0.01				
Azinphos methyl	<0.02 µg/l	TM344		<0.02				
Azinphos ethyl	<0.02 µg/l	TM344		<0.02				
Dinitro-o-cresol	<0.1 µg/l	TM411		3.99				
Clopyralid	<0.04 µg/l	TM411		<0.2				
MCPA	<0.05 µg/l	TM411		<0.25				
Mecoprop	<0.04 µg/l	TM411		<0.2				
Dicamba	<0.04 µg/l	TM411		<0.2				
MCPB	<0.05 µg/l	TM411		<0.25				
2,4-DB	<0.1 µg/l	TM411		<0.5				
2,3,6-Trichlorobenzoic acid	<0.05 µg/l	TM411		<0.25				
Dichlorprop	<0.1 µg/l	TM411		<0.5				
Triclopyr	<0.05 µg/l	TM411		<0.25				
Fenoprop (Silvex)	<0.1 µg/l	TM411		<0.5				



CERTIFICATE OF ANALYSIS

Validated

SDG: 190726-24
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 517011
Superseded Report:

TPH CWG (W)

Results Legend			Customer Sample Ref.	BH01	BH03				
#	ISO17025 accredited.								
M	mCERTS accredited.								
sq	Aqueous / settled sample.								
dis.filt	Dissolved / filtered sample.								
tot.unfilt	Total / unfiltered sample.								
*	Subcontracted - refer to subcontractor report for accreditation status.								
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery								
(F)	Trigger breach confirmed								
1-3+5@	Sample deviation (see appendix)								
Component	LOD/Units	Method							
GRO Surrogate % recovery**	%	TM245	119	111					
GRO >C5-C12	<50 µg/l	TM245	<50	<50					
Methyl tertiary butyl ether (MTBE)	<3 µg/l	TM245	<3	3					
Benzene	<7 µg/l	TM245	<7	<7					
Toluene	<4 µg/l	TM245	<4	6					
Ethylbenzene	<5 µg/l	TM245	<5	<5					
m,p-Xylene	<8 µg/l	TM245	<8	<8					
o-Xylene	<3 µg/l	TM245	<3	3					
Sum of detected Xylenes	<11 µg/l	TM245	<11	<11					
Sum of detected BTEX	<28 µg/l	TM245	<28	<28					
Aliphatics >C5-C6	<10 µg/l	TM245	<10	<10					
Aliphatics >C6-C8	<10 µg/l	TM245	<10	<10					
Aliphatics >C8-C10	<10 µg/l	TM245	<10	<10					
Aliphatics >C10-C12	<10 µg/l	TM245	<10	<10					
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174	<10	<10					
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174	<10	49					
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174	84	380					
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174	84	429					
Aromatics >EC5-EC7	<10 µg/l	TM245	<10	<10					
Aromatics >EC7-EC8	<10 µg/l	TM245	<10	<10					
Aromatics >EC8-EC10	<10 µg/l	TM245	<10	12					
Aromatics >EC10-EC12	<10 µg/l	TM245	<10	<10					
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174	<10	15					
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174	<10	77					
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174	<10	134					
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174	<10	226					
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174	84	674					
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174	84	429					
GRO >C7-C8	<10 µg/l	TM245	<10	<10					
GRO >C5-C6	<10 µg/l	TM245	<10	<10					
GRO >C6-C7	<10 µg/l	TM245	<10	<10					
GRO >C8-C10	<10 µg/l	TM245	<10	12					
GRO >C10-C12	<10 µg/l	TM245	<10	<10					



CERTIFICATE OF ANALYSIS

Validated

SDG: 190726-24

Client Reference: E9014-19

Report Number: 517011

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM205		Determination of Phenols in Waste Waters using Solid Phase Extraction, Acetylation, Gas Chromatography and Mass Selective Detection
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM343	EPA 8270D - Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of Selected Pesticides (Suite I) in Liquids by GCMS
TM344	EPA 8270D – Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of selected pesticides (Suite II) by GCMS
TM411	Acid_Herbs_GCMS	Acid Herbs in Water by GCMS

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 190726-24

Client Reference: E9014-19

Report Number: 517011

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report:

Test Completion Dates

Lab Sample No(s)	20405776	20405778	20405779	20405781
Customer Sample Ref.	BH01	BH02	BH03	BH04
AGS Ref.	EW45	EW59	EW51	EW56
Depth				
Type	Ground Water	Ground Water	Ground Water	Ground Water
Acid Herbicides by GCMS		02-Aug-2019		
Anions by Kone (w)	05-Aug-2019	05-Aug-2019	05-Aug-2019	05-Aug-2019
Cyanide Comp/Free/Total/Thiocyanate	01-Aug-2019	01-Aug-2019	01-Aug-2019	01-Aug-2019
Dissolved Metals by ICP-MS	05-Aug-2019	06-Aug-2019	06-Aug-2019	06-Aug-2019
Dissolved Organic/Inorganic Carbon	02-Aug-2019	02-Aug-2019	02-Aug-2019	02-Aug-2019
EPH (DRO) (C10-C40) Aqueous (W)	06-Aug-2019	05-Aug-2019	06-Aug-2019	05-Aug-2019
EPH CWG (Aliphatic) Aqueous GC (W)	05-Aug-2019		05-Aug-2019	
EPH CWG (Aromatic) Aqueous GC (W)	05-Aug-2019		05-Aug-2019	
GRO by GC-FID (W)	01-Aug-2019	01-Aug-2019	01-Aug-2019	01-Aug-2019
Hexavalent Chromium (w)	31-Jul-2019	31-Jul-2019	31-Jul-2019	31-Jul-2019
Mercury Dissolved	31-Jul-2019	31-Jul-2019	31-Jul-2019	31-Jul-2019
Nitrite by Kone (w)	01-Aug-2019	01-Aug-2019	01-Aug-2019	01-Aug-2019
Pesticides (Suite I) by GCMS		05-Aug-2019		
Pesticides (Suite II) by GCMS		06-Aug-2019		
pH Value	04-Aug-2019	04-Aug-2019	04-Aug-2019	04-Aug-2019
Phenols by HPLC (W)	01-Aug-2019	01-Aug-2019	01-Aug-2019	01-Aug-2019
Phenols by ms (w)	07-Aug-2019		07-Aug-2019	
Total EPH (aq)	06-Aug-2019	05-Aug-2019	06-Aug-2019	05-Aug-2019
Total Metals by ICP-MS	03-Aug-2019	03-Aug-2019	06-Aug-2019	03-Aug-2019
TPH CWG (W)	05-Aug-2019		05-Aug-2019	



CERTIFICATE OF ANALYSIS

SDG: 190726-24 Client Reference: E9014-19 Report Number: 517011
Location: OLBEACH GROUND INVESTIG Order Number: Superseded Report:

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2107).

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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Website: www.alsenvironmental.co.uk

SOCOTEC
Unit 4
Gainsborough Trading Estate
Leamington Road
Southam
Warwickshire
CV47 1RB

Attention: Giuseppe Melosu

CERTIFICATE OF ANALYSIS

Date of report Generation:	07 August 2019
Customer:	SOCOTEC
Sample Delivery Group (SDG):	190731-43
Your Reference:	E9014-19
Location:	FEZ HOLBEACH GROUND INVESTIGATION
Report No:	517151

We received 1 sample on Wednesday July 31, 2019 and 1 of these samples were scheduled for analysis which was completed on Wednesday August 07, 2019. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 190731-43

Client Reference: E9014-19

Report Number: 517151

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
20430299	BH03	EW50		19/07/2019

Maximum Sample/Coolbox Temperature (°C) :

4.2

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 190731-43

Client Reference: E9014-19

Report Number: 517151

Location: FEZ HOLBEACH GROUND Order Number:

Superseded Report:

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

20430299

Customer Sample Reference

BH03

AGS Reference

EW50

Depth (m)

Container

1000ml glass bottle (ALE220)

1l plastic (ALE221)

Vial (ALE297)

Sample Type

GW

GW

GW

Acid Herbicides by GCMS

All

NDPs: 0
Tests: 1

X

Ammoniacal Nitrogen

All

NDPs: 0
Tests: 1

X

Anions by Kone (w)

All

NDPs: 0
Tests: 1

X

Cyanide Comp/Free/Total/Thiocyanate

All

NDPs: 0
Tests: 1

X

Dissolved Metals by ICP-MS

All

NDPs: 0
Tests: 1

X

Dissolved Organic/Inorganic Carbon

All

NDPs: 0
Tests: 1

X

EPH (DRO) (C10-C40) Aqueous (W)

All

NDPs: 0
Tests: 1

X

GRO by GC-FID (W)

All

NDPs: 0
Tests: 1

X

Hexavalent Chromium (w)

All

NDPs: 0
Tests: 1

X

Mercury Dissolved

All

NDPs: 0
Tests: 1

X

Pesticides (Suite I) by GCMS

All

NDPs: 0
Tests: 1

X

Pesticides (Suite II) by GCMS

All

NDPs: 0
Tests: 1

X

pH Value

All

NDPs: 0
Tests: 1

X

Phenols by HPLC (W)

All

NDPs: 0
Tests: 1

X

Total EPH (aq)

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 190731-43

Client Reference: E9014-19

Report Number: 517151

Location: FEZ HOLBEACH GROUND Order Number:

Superseded Report:

Results Legend



Test



No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

20430299

Customer
Sample Reference

BH03

AGS Reference

EW50

Depth (m)

Container

1000ml glass bottle
(ALE220)

1l plastic (ALE221)

Vial (ALE297)

Sample Type

GW

GW

GW

Total Metals by ICP-MS

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 190731-43 Client Reference: E9014-19 Report Number: 517151
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report:

Results Legend		Customer Sample Ref.	BH03				
#	ISO17025 accredited.						
M	mCERTS accredited.						
sq	Aqueous / settled sample.						
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted - refer to subcontractor report for accreditation status.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-3*5@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Carbon, Organic (diss.filt)	<3 mg/l	TM090	18.9				
Ammoniacal Nitrogen as NH3	<0.2 mg/l	TM099	0.658				
			2 #				
Arsenic (diss.filt)	<0.5 µg/l	TM152	3.75				
			2 #				
Boron (diss.filt)	<10 µg/l	TM152	563				
			2 #				
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08				
			2 #				
Chromium (diss.filt)	<1 µg/l	TM152	<1				
			2 #				
Copper (diss.filt)	<0.3 µg/l	TM152	<0.3				
			2 #				
Lead (diss.filt)	<0.2 µg/l	TM152	<0.2				
			2 #				
Nickel (diss.filt)	<0.4 µg/l	TM152	2.94				
			2 #				
Selenium (diss.filt)	<1 µg/l	TM152	2.19				
			2 #				
Zinc (diss.filt)	<1 µg/l	TM152	<1				
			2 #				
Calcium (Dis.Filt)	<0.2 mg/l	TM152	225				
			2 #				
Iron (Dis.Filt)	<0.019 mg/l	TM152	0.83				
			2 #				
Iron (Tot. Unfilt.)	<0.024 mg/l	TM152	30.8				
			2 #				
Hardness, Total as CaCO3 unfiltered	<0.35 mg/l	TM152	1220				
			2				
EPH Range >C10 - C40 (aq)	<100 µg/l	TM172	392				
Total EPH (C6-C40) (aq)	<100 µg/l	TM172	392				
EPH Band >C10-C12 (aq)	<100 µg/l	TM172	<100				
EPH Band >C12-C16 (aq)	<100 µg/l	TM172	<100				
EPH Band >C16-C21 (aq)	<100 µg/l	TM172	<100				
EPH Band >C21-C28 (aq)	<100 µg/l	TM172	156				
EPH Band >C35-C40 (aq)	<100 µg/l	TM172	<100				
EPH Band >C28-C35 (aq)	<100 µg/l	TM172	<100				
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01				
			2 #				
Chloride	<2 mg/l	TM184	2170				
			#				
Nitrate as NO3	<0.3 mg/l	TM184	<0.3				
			@				
Cyanide, Total	<0.05 mg/l	TM227	<0.05				
			2 #				
Cyanide, Free	<0.05 mg/l	TM227	<0.05				
			2 #				
Thiocyanate	<0.05 mg/l	TM227	<0.05				
			2 #				
Chromium, Hexavalent	<0.03 mg/l	TM241	<0.03				
			#				
pH	<1 pH Units	TM256	7.55				
			#				
Phenol	<0.002 mg/l	TM259	<0.002				
			2 #				
Cresols	<0.006 mg/l	TM259	<0.006				
			2 #				



CERTIFICATE OF ANALYSIS

Validated

SDG: 190731-43
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 517151
Superseded Report:

Results Legend		Customer Sample Ref.	BH03				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	Ground Water (GW) 19/07/2019 31/07/2019 190731-43 20430299 EW50				
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted - refer to subcontractor report for accreditation status.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-3*5@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Xylenols	<0.008 mg/l	TM259	<0.008	2 #			
Phenols, Total Detected monohydric	<0.016 mg/l	TM259	<0.016	2 #			
Trifluralin	<0.01 µg/l	TM343	<0.01				
alpha-HCH	<0.01 µg/l	TM343	<0.01				
gamma-HCH (Lindane)	<0.01 µg/l	TM343	<0.01				
Heptachlor	<0.01 µg/l	TM343	<0.01				
Aldrin	<0.01 µg/l	TM343	<0.01				
beta-HCH	<0.01 µg/l	TM343	<0.01				
Isodrin	<0.01 µg/l	TM343	<0.01				
delta-HCH	<0.01 µg/l	TM343	<0.01				
Heptachlor epoxide	<0.01 µg/l	TM343	<0.01				
o,p'-DDE	<0.01 µg/l	TM343	<0.01				
Endosulphan I	<0.01 µg/l	TM343	<0.01				
trans-Chlordane	<0.01 µg/l	TM343	<0.01				
cis-Chlordane	<0.01 µg/l	TM343	<0.01				
p,p'-DDE	<0.01 µg/l	TM343	<0.01				
Dieldrin	<0.01 µg/l	TM343	<0.01				
o,p'-DDD (TDE)	<0.01 µg/l	TM343	<0.01				
Endrin	<0.01 µg/l	TM343	<0.01				
o,p'-DDT	<0.01 µg/l	TM343	<0.01				
p,p'-DDD (TDE)	<0.01 µg/l	TM343	<0.01				
Endosulphan II	<0.02 µg/l	TM343	<0.02				
p,p'-DDT	<0.01 µg/l	TM343	<0.01				
o,p'-Methoxychlor	<0.01 µg/l	TM343	<0.01				
p,p'-Methoxychlor	<0.01 µg/l	TM343	<0.01				
Endosulphan Sulphate	<0.02 µg/l	TM343	<0.02				
Permethrin I	<0.01 µg/l	TM343	<0.01				
Permethrin II	<0.01 µg/l	TM343	<0.01				
1,3,5-Trichlorobenzene	<0.01 µg/l	TM344	<0.01				
Hexachlorobutadiene	<0.01 µg/l	TM344	<0.01				
1,2,4-Trichlorobenzene	<0.01 µg/l	TM344	<0.01				
1,2,3-Trichlorobenzene	<0.01 µg/l	TM344	<0.01				



CERTIFICATE OF ANALYSIS

Validated

SDG: 190731-43 Client Reference: E9014-19 Report Number: 517151
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report:

Results Legend		Customer Sample Ref.	BH03				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	Ground Water (GW) 19/07/2019 31/07/2019 190731-43 20430299 EW50				
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted - refer to subcontractor report for accreditation status.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-3*5@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Dichlorvos	<0.01 µg/l	TM344	<0.01				
Dichlobenil	<0.01 µg/l	TM344	<0.01				
Mevinphos	<0.01 µg/l	TM344	<0.01				
Tecnazene	<0.01 µg/l	TM344	<0.01				
Hexachlorobenzene	<0.01 µg/l	TM344	<0.01				
Demeton-S-methyl	<0.01 µg/l	TM344	<0.01				
Phorate	<0.01 µg/l	TM344	<0.01				
Diazinon	<0.01 µg/l	TM344	<0.01				
Triallate	<0.01 µg/l	TM344	<0.035				
Atrazine	<0.01 µg/l	TM344	<0.01				
Simazine	<0.01 µg/l	TM344	<0.01				
Disulfoton	<0.01 µg/l	TM344	<0.01				
Propetamphos	<0.01 µg/l	TM344	<0.01				
Chlorpyrifos-methyl	<0.01 µg/l	TM344	<0.01				
Dimethoate	<0.01 µg/l	TM344	<0.01				
Pirimiphos-methyl	<0.01 µg/l	TM344	<0.01				
Chlorpyrifos	<0.01 µg/l	TM344	<0.01				
Methyl Parathion	<0.01 µg/l	TM344	<0.01				
Malathion	<0.01 µg/l	TM344	<0.01				
Fenthion	<0.01 µg/l	TM344	<0.01				
Fenitrothion	<0.01 µg/l	TM344	<0.01				
Triadimefon	<0.01 µg/l	TM344	<0.01				
Pendimethalin	<0.01 µg/l	TM344	<0.01				
Parathion	<0.01 µg/l	TM344	<0.01				
Chlorfenvinphos	<0.01 µg/l	TM344	<0.01				
trans-Chlordane	<0.01 µg/l	TM344	<0.01				
cis-Chlordane	<0.01 µg/l	TM344	<0.01				
Ethion	<0.01 µg/l	TM344	<0.01				
Carbophenothion	<0.01 µg/l	TM344	<0.01				
Triazophos	<0.01 µg/l	TM344	<0.01				
Phosalone	<0.01 µg/l	TM344	<0.01				
Azinphos methyl	<0.02 µg/l	TM344	<0.02				



CERTIFICATE OF ANALYSIS

Validated

SDG: 190731-43

Client Reference: E9014-19

Report Number: 517151

Location: FEZ HOLBEACH GROUND Order Number:

Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM343	EPA 8270D - Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of Selected Pesticides (Suite I) in Liquids by GCMS
TM344	EPA 8270D – Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of selected pesticides (Suite II) by GCMS
TM411	Acid_Herbs_GCMS	Acid Herbs in Water by GCMS

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 190731-43

Client Reference: E9014-19

Report Number: 517151

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report:

Test Completion Dates

Lab Sample No(s)	20430299
Customer Sample Ref.	BH03
AGS Ref.	EW50
Depth	
Type	Ground Water

Acid Herbicides by GCMS	07-Aug-2019
Ammoniacal Nitrogen	31-Jul-2019
Anions by Kone (w)	01-Aug-2019
Cyanide Comp/Free/Total/Thiocyanate	01-Aug-2019
Dissolved Metals by ICP-MS	07-Aug-2019
Dissolved Organic/Inorganic Carbon	31-Jul-2019
EPH (DRO) (C10-C40) Aqueous (W)	02-Aug-2019
GRO by GC-FID (W)	31-Jul-2019
Hexavalent Chromium (w)	31-Jul-2019
Mercury Dissolved	01-Aug-2019
Nitrite by Kone (w)	01-Aug-2019
Pesticides (Suite I) by GCMS	05-Aug-2019
Pesticides (Suite II) by GCMS	07-Aug-2019
pH Value	31-Jul-2019
Phenols by HPLC (W)	01-Aug-2019
Total EPH (aq)	02-Aug-2019
Total Metals by ICP-MS	07-Aug-2019



CERTIFICATE OF ANALYSIS

SDG: 190731-43 Client Reference: E9014-19 Report Number: 517151
Location: OLBEACH GROUND INVESTIG Order Number: Superseded Report:

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2107).

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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SOCOTEC
Unit 4
Gainsborough Trading Estate
Leamington Road
Southam
Warwickshire
CV47 1RB

Attention: Giuseppe Melosu

CERTIFICATE OF ANALYSIS

Date of report Generation:	15 August 2019
Customer:	SOCOTEC
Sample Delivery Group (SDG):	190807-47
Your Reference:	E9014-19
Location:	FEZ HOLBEACH GROUND INVESTIGATION
Report No:	518155

We received 4 samples on Wednesday August 07, 2019 and 4 of these samples were scheduled for analysis which was completed on Thursday August 15, 2019. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 190807-47

Client Reference: E9014-19

Report Number: 518155

Location: FEZ HOLBEACH GROUND

Order Number:

Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
20471911	BH01	EW46		06/08/2019
20471912	BH02	EW60		06/08/2019
20471913	BH03	EW52		06/08/2019
20471914	BH04	EW57		06/08/2019

Maximum Sample/Coolbox Temperature (°C) :

14.8

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 190807-47 Client Reference: E9014-19 Report Number: 518155
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report:

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Results Legend	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	20471911	BH01	EW46						330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	GW
	20471912	BH02	EW60						330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	GW
	20471913	BH03	EW62						330ml plastic bottle (ALE503)	250ml Amber Gl. PTFE/PE (ALE219)	0.5l glass bottle (ALE227)	GW
									NaOH (ALE245)	HN03 Filtered (ALE204)	H2SO4 (ALE244)	GW
									NaOH (ALE245)	HN03 Filtered (ALE204)	H2SO4 (ALE244)	GW
Acid Herbicides by GCMS	All	NDPs: 0 Tests: 1										
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 4										
Anions by Kone (w)	All	NDPs: 0 Tests: 4										
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 4										
Dissolved Metals by ICP-MS	All	NDPs: 2 Tests: 4										
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 4										
EPH (DRO) (C10-C40) Aqueous (W)	All	NDPs: 0 Tests: 4										
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 2										
EPH CWG (Aromatic) Aqueous GC (W)	All	NDPs: 0 Tests: 2										
GRO by GC-FID (W)	All	NDPs: 0 Tests: 4										
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 4										
Mercury Dissolved	All	NDPs: 0 Tests: 4										
Pesticides (Suite I) by GCMS	All	NDPs: 0 Tests: 1										
Pesticides (Suite II) by GCMS	All	NDPs: 0 Tests: 1										
pH Value	All	NDPs: 0 Tests: 4										



CERTIFICATE OF ANALYSIS

Validated

SDG: 190807-47 Client Reference: E9014-19 Report Number: 518155
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report:

Results Legend		Customer Sample Ref.	BH01	BH02	BH03	BH04		
#	ISO17025 accredited.							
M	mCERTS accredited.							
sq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3*5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Carbon, Organic (diss.filt)	<3 mg/l	TM090	6.84	5.45	14.5	4.37		
Ammoniacal Nitrogen as NH3	<0.2 mg/l	TM099	<0.2	<0.2	0.325	<0.2		
Arsenic (diss.filt)	<0.5 µg/l	TM152	1.89	7.19	7.94	0.84		
Boron (diss.filt)	<10 µg/l	TM152	138	128	388	246		
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08	<0.08	<0.08	<0.08		
Chromium (diss.filt)	<1 µg/l	TM152	<1	<1	<1	<1		
Copper (diss.filt)	<0.3 µg/l	TM152	0.549	0.625	<0.3	0.506		
Lead (diss.filt)	<0.2 µg/l	TM152	0.24	<0.2	<0.2	<0.2		
Nickel (diss.filt)	<0.4 µg/l	TM152	3.68	4.67	6.86	2.93		
Selenium (diss.filt)	<1 µg/l	TM152	<1	<1	<1	<1		
Zinc (diss.filt)	<1 µg/l	TM152	14.5	12.9	7.41	8.35		
Calcium (Dis.Filt)	<0.2 mg/l	TM152	85.2	112	239	140		
Iron (Dis.Filt)	<0.019 mg/l	TM152		2.75		0.0813		
Iron (Tot. Unfilt.)	<0.024 mg/l	TM152	13.7	3.26	19.6	6.69		
Hardness, Total as CaCO3 unfiltered	<0.35 mg/l	TM152	242	407	1160	808		
EPH Range >C10 - C40 (aq)	<100 µg/l	TM172	272	260	252	744		
Total EPH (C6-C40) (aq)	<100 µg/l	TM172	272	260	252	744		
EPH Band >C10-C12 (aq)	<100 µg/l	TM172	<100	<100	<100	<100		
EPH Band >C12-C16 (aq)	<100 µg/l	TM172	<100	<100	<100	<100		
EPH Band >C16-C21 (aq)	<100 µg/l	TM172	<100	<100	<100	<100		
EPH Band >C21-C28 (aq)	<100 µg/l	TM172	107	<100	<100	313		
EPH Band >C35-C40 (aq)	<100 µg/l	TM172	<100	<100	<100	<100		
EPH Band >C28-C35 (aq)	<100 µg/l	TM172	<100	<100	<100	242		
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01	<0.01	<0.01	<0.01		
Chloride	<2 mg/l	TM184	297	93.1	1540	451		
Nitrate as NO3	<0.3 mg/l	TM184	40.7	0.641	<0.3	13.7		
Cyanide, Total	<0.05 mg/l	TM227	<0.05	<0.05	<0.05	<0.05		
Cyanide, Free	<0.05 mg/l	TM227	<0.05	<0.05	<0.05	<0.05		
Thiocyanate	<0.05 mg/l	TM227	<0.05	<0.05	<0.05	<0.05		
Chromium, Hexavalent	<0.03 mg/l	TM241	<0.03	<0.03	<0.03	<0.03		
pH	<1 pH Units	TM256	7.88	9.14	6.8	8.17		
Phenol	<0.002 mg/l	TM259	<0.002	0.01	<0.002	<0.002		
Cresols	<0.006 mg/l	TM259	<0.006	<0.006	<0.006	<0.006		



CERTIFICATE OF ANALYSIS

Validated

SDG: 190807-47 Client Reference: E9014-19 Report Number: 518155
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report:

Results Legend		Customer Sample Ref.	BH01	BH02	BH03	BH04		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3*5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Xylenols	<0.008 mg/l	TM259	<0.008	<0.008	<0.008	<0.008		
			#	#	#	#		
2,3,5-Trimethylphenol	<0.003 mg/l	TM259		<0.003		<0.003		
				#		#		
2-Isopropylphenol	<0.006 mg/l	TM259		<0.006		<0.006		
				#		#		
Phenols, Total Detected monohydric	<0.016 mg/l	TM259	<0.016	<0.016	<0.016	<0.016		
			#	#	#	#		
Phenols, Total Detected 5 speciated	<0.025 mg/l	TM259		<0.025		<0.025		
Trifluralin	<0.01 µg/l	TM343				<0.01		
alpha-HCH	<0.01 µg/l	TM343				<0.01		
gamma-HCH (Lindane)	<0.01 µg/l	TM343				<0.01		
Heptachlor	<0.01 µg/l	TM343				<0.01		
Aldrin	<0.01 µg/l	TM343				<0.01		
beta-HCH	<0.01 µg/l	TM343				<0.01		
Isodrin	<0.01 µg/l	TM343				<0.01		
delta-HCH	<0.01 µg/l	TM343				<0.01		
Heptachlor epoxide	<0.01 µg/l	TM343				<0.01		
o,p'-DDE	<0.01 µg/l	TM343				<0.01		
Endosulphan I	<0.01 µg/l	TM343				<0.01		
trans-Chlordane	<0.01 µg/l	TM343				<0.01		
cis-Chlordane	<0.01 µg/l	TM343				<0.01		
p,p'-DDE	<0.01 µg/l	TM343				<0.01		
Dieldrin	<0.01 µg/l	TM343				<0.01		
o,p'-DDD (TDE)	<0.01 µg/l	TM343				<0.01		
Endrin	<0.01 µg/l	TM343				<0.01		
o,p'-DDT	<0.01 µg/l	TM343				<0.01		
p,p'-DDD (TDE)	<0.01 µg/l	TM343				<0.01		
Endosulphan II	<0.02 µg/l	TM343				<0.02		
p,p'-DDT	<0.01 µg/l	TM343				<0.01		
o,p'-Methoxychlor	<0.01 µg/l	TM343				<0.01		
p,p'-Methoxychlor	<0.01 µg/l	TM343				<0.01		
Endosulphan Sulphate	<0.02 µg/l	TM343				<0.02		
Permethrin I	<0.01 µg/l	TM343				<0.01		
Permethrin II	<0.01 µg/l	TM343				<0.01		
1,3,5-Trichlorobenzene	<0.01 µg/l	TM344				<0.01		



CERTIFICATE OF ANALYSIS

Validated

SDG: 190807-47 Client Reference: E9014-19 Report Number: 518155
Location: FEZ HOLBEACH GROUND Order Number: Superseded Report:

Results Legend			Customer Sample Ref.	BH01	BH02	BH03	BH04			
#	ISO17025 accredited.									
M	mCERTS accredited.									
aq	Aqueous / settled sample.									
diss.filt	Dissolved / filtered sample.									
tot.unfilt	Total / unfiltered sample.									
*	Subcontracted - refer to subcontractor report for accreditation status.									
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery									
(F)	Trigger breach confirmed									
1-3*5@	Sample deviation (see appendix)									
Component	LOD/Units	Method								
Hexachlorobutadiene	<0.01 µg/l	TM344					<0.01			
1,2,4-Trichlorobenzene	<0.01 µg/l	TM344					<0.01			
1,2,3-Trichlorobenzene	<0.01 µg/l	TM344					<0.01			
Dichlorvos	<0.01 µg/l	TM344					<0.01			
Dichlobenil	<0.01 µg/l	TM344					<0.01			
Mevinphos	<0.01 µg/l	TM344					<0.01			
Tecnazene	<0.01 µg/l	TM344					<0.01			
Hexachlorobenzene	<0.01 µg/l	TM344					<0.01			
Demeton-S-methyl	<0.01 µg/l	TM344					<0.01			
Phorate	<0.01 µg/l	TM344					<0.01			
Diazinon	<0.01 µg/l	TM344					<0.01			
Triallate	<0.01 µg/l	TM344					0.0315			
Atrazine	<0.01 µg/l	TM344					0.083			
Simazine	<0.01 µg/l	TM344					<0.01			
Disulfoton	<0.01 µg/l	TM344					<0.01			
Propetamphos	<0.01 µg/l	TM344					<0.01			
Chlorpyriphos-methyl	<0.01 µg/l	TM344					<0.01			
Dimethoate	<0.01 µg/l	TM344					<0.01			
Pirimiphos-methyl	<0.01 µg/l	TM344					<0.01			
Chlorpyriphos	<0.01 µg/l	TM344					<0.01			
Methyl Parathion	<0.01 µg/l	TM344					<0.01			
Malathion	<0.01 µg/l	TM344					<0.01			
Fenthion	<0.01 µg/l	TM344					<0.01			
Fenitrothion	<0.01 µg/l	TM344					<0.01			
Triadimefon	<0.01 µg/l	TM344					<0.01			
Pendimethalin	<0.01 µg/l	TM344					<0.01			
Parathion	<0.01 µg/l	TM344					<0.01			
Chlorfenvinphos	<0.01 µg/l	TM344					<0.01			
trans-Chlordane	<0.01 µg/l	TM344					<0.01			
cis-Chlordane	<0.01 µg/l	TM344					<0.01			
Ethion	<0.01 µg/l	TM344					<0.01			
Carbophenothion	<0.01 µg/l	TM344					<0.01			



CERTIFICATE OF ANALYSIS

Validated

SDG: 190807-47
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 518155
Superseded Report:

SVOC MS (W) - Aqueous

Results Legend			Customer Sample Ref.	BH01	BH03				
#	ISO17025 accredited.								
M	mCERTS accredited.								
aq	Aqueous / settled sample.								
dis.filt	Dissolved / filtered sample.								
tot.unfilt	Total / unfiltered sample.								
*	Subcontracted - refer to subcontractor report for accreditation status.								
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery								
(F)	Trigger breach confirmed								
1-3*§@	Sample deviation (see appendix)								
Component	LOD/Units	Method							
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
2,4-Dichlorophenol (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
2,4-Dimethylphenol (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
2-Chloronaphthalene (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
2-Chlorophenol (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
2-Methylnaphthalene (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
2-Methylphenol (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
2-Nitroaniline (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
2-Nitrophenol (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
3-Nitroaniline (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
4-Bromophenylphenylether (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
4-Chloroaniline (aq)	<1 µg/l	TM176	<20	<10					
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
4-Methylphenol (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
4-Nitroaniline (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
4-Nitrophenol (aq)	<1 µg/l	TM176	<20	<10					
Azobenzene (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
Acenaphthylene (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
Acenaphthene (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
Anthracene (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176	<40	<20					
			#	#					
Butylbenzyl phthalate (aq)	<1 µg/l	TM176	<20	<10					
			#	#					
Benzo(a)anthracene (aq)	<1 µg/l	TM176	<20	<10					
			#	#					



CERTIFICATE OF ANALYSIS

Validated

SDG: 190807-47
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 518155
Superseded Report:

SVOC MS (W) - Aqueous

Results Legend		Customer Sample Ref.	BH01	BH03				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3*5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Benzo(b)fluoranthene (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Benzo(k)fluoranthene (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Benzo(a)pyrene (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Benzo(g,h,i)perylene (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Carbazole (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Chrysene (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Dibenzofuran (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
n-Dibutyl phthalate (aq)	<1 µg/l	TM176	<20	10.6				
			#	#				
Diethyl phthalate (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Dibenzo(a,h)anthracene (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Dimethyl phthalate (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
n-Dioctyl phthalate (aq)	<5 µg/l	TM176	<100	<50				
			#	#				
Fluoranthene (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Fluorene (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Hexachlorobenzene (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Hexachlorobutadiene (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Pentachlorophenol (aq)	<1 µg/l	TM176	<20	<10				
Phenol (aq)	<1 µg/l	TM176	<20	<10				
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Hexachloroethane (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Nitrobenzene (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Naphthalene (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Isophorone (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176	<20	<10				
Phenanthrene (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Indeno(1,2,3-cd)pyrene (aq)	<1 µg/l	TM176	<20	<10				
			#	#				
Pyrene (aq)	<1 µg/l	TM176	<20	<10				
			#	#				



CERTIFICATE OF ANALYSIS

Validated

SDG: 190807-47
Location: FEZ HOLBEACH GROUND

Client Reference: E9014-19
Order Number:

Report Number: 518155
Superseded Report:

TPH CWG (W)

Results Legend			Customer Sample Ref.		BH02	BH04				
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference							
M	mCERTS accredited.									
sq	Aqueous / settled sample.									
dis.filt	Dissolved / filtered sample.									
tot.unfilt	Total / unfiltered sample.									
*	Subcontracted - refer to subcontractor report for accreditation status.									
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery									
(F)	Trigger breach confirmed									
1-3+5@	Sample deviation (see appendix)									
Component			LOD/Units	Method						
GRO Surrogate % recovery**			%	TM245	115	114				
GRO >C5-C12			<50 µg/l	TM245	<50	<50				
Methyl tertiary butyl ether (MTBE)			<3 µg/l	TM245	<3	<3				
Benzene			<7 µg/l	TM245	<7	<7				
Toluene			<4 µg/l	TM245	<4	<4				
Ethylbenzene			<5 µg/l	TM245	<5	<5				
m,p-Xylene			<8 µg/l	TM245	<8	<8				
o-Xylene			<3 µg/l	TM245	<3	<3				
Sum of detected Xylenes			<11 µg/l	TM245	<11	<11				
Sum of detected BTEX			<28 µg/l	TM245	<28	<28				
Aliphatics >C5-C6			<10 µg/l	TM245	<10	<10				
Aliphatics >C6-C8			<10 µg/l	TM245	<10	<10				
Aliphatics >C8-C10			<10 µg/l	TM245	<10	<10				
Aliphatics >C10-C12			<10 µg/l	TM245	<10	<10				
Aliphatics >C12-C16 (aq)			<10 µg/l	TM174	<10	<10				
Aliphatics >C16-C21 (aq)			<10 µg/l	TM174	15	16				
Aliphatics >C21-C35 (aq)			<10 µg/l	TM174	57	430				
Total Aliphatics >C12-C35 (aq)			<10 µg/l	TM174	72	446				
Aromatics >EC5-EC7			<10 µg/l	TM245	<10	<10				
Aromatics >EC7-EC8			<10 µg/l	TM245	<10	<10				
Aromatics >EC8-EC10			<10 µg/l	TM245	<10	<10				
Aromatics >EC10-EC12			<10 µg/l	TM245	<10	<10				
Aromatics >EC12-EC16 (aq)			<10 µg/l	TM174	<10	<10				
Aromatics >EC16-EC21 (aq)			<10 µg/l	TM174	<10	<10				
Aromatics >EC21-EC35 (aq)			<10 µg/l	TM174	11	25				
Total Aromatics >EC12-EC35 (aq)			<10 µg/l	TM174	11	25				
Total Aliphatics & Aromatics >C5-35 (aq)			<10 µg/l	TM174	84	472				
Aliphatics >C16-C35 Aqueous			<10 µg/l	TM174	72	446				
GRO >C7-C8			<10 µg/l	TM245	<10	<10				
GRO >C5-C6			<10 µg/l	TM245	<10	<10				
GRO >C6-C7			<10 µg/l	TM245	<10	<10				
GRO >C8-C10			<10 µg/l	TM245	<10	<10				
GRO >C10-C12			<10 µg/l	TM245	<10	<10				



CERTIFICATE OF ANALYSIS

Validated

SDG: 190807-47 **Client Reference:** E9014-19 **Report Number:** 518155
Location: FEZ HOLBEACH GROUND **Order Number:** **Superseded Report:**

Notification of NDPs (No determination possible)

Date Received : 07/08/2019 06:31:59

Sample No	Customer Sample Ref.	Depth (m)	Test	Comment
20471913	BH03 EW52		Dissolved Metals by ICP-MS	Insufficient Sample
20471911	BH01 EW46		Dissolved Metals by ICP-MS	Insufficient Sample



CERTIFICATE OF ANALYSIS

Validated

SDG: 190807-47

Client Reference: E9014-19

Report Number: 518155

Location: FEZ HOLBEACH GROUND Order Number:

Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM176	EPA 8270D Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of SVOCs in Water by GCMS
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM343	EPA 8270D - Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of Selected Pesticides (Suite I) in Liquids by GCMS
TM344	EPA 8270D – Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of selected pesticides (Suite II) by GCMS
TM411	Acid_Herbs_GCMS	Acid Herbs in Water by GCMS

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 190807-47

Client Reference: E9014-19

Report Number: 518155

Location: FEZ HOLBEACH GROUND

Superseded Report:

Test Completion Dates

Lab Sample No(s)	20471911	20471912	20471913	20471914
Customer Sample Ref.	BH01	BH02	BH03	BH04
AGS Ref.	EW46	EW60	EW52	EW57
Depth				
Type	Ground Water	Ground Water	Ground Water	Ground Water
Acid Herbicides by GCMS				14-Aug-2019
Ammoniacal Nitrogen	11-Aug-2019	11-Aug-2019	11-Aug-2019	11-Aug-2019
Anions by Kone (w)	14-Aug-2019	14-Aug-2019	14-Aug-2019	14-Aug-2019
Cyanide Comp/Free/Total/Thiocyanate	12-Aug-2019	12-Aug-2019	12-Aug-2019	12-Aug-2019
Dissolved Metals by ICP-MS	13-Aug-2019	15-Aug-2019	13-Aug-2019	15-Aug-2019
Dissolved Organic/Inorganic Carbon	12-Aug-2019	12-Aug-2019	13-Aug-2019	12-Aug-2019
EPH (DRO) (C10-C40) Aqueous (W)	15-Aug-2019	14-Aug-2019	15-Aug-2019	15-Aug-2019
EPH CWG (Aliphatic) Aqueous GC (W)		14-Aug-2019		15-Aug-2019
EPH CWG (Aromatic) Aqueous GC (W)		14-Aug-2019		15-Aug-2019
GRO by GC-FID (W)	13-Aug-2019	13-Aug-2019	13-Aug-2019	13-Aug-2019
Hexavalent Chromium (w)	12-Aug-2019	12-Aug-2019	12-Aug-2019	12-Aug-2019
Mercury Dissolved	09-Aug-2019	09-Aug-2019	09-Aug-2019	09-Aug-2019
Nitrite by Kone (w)	09-Aug-2019	09-Aug-2019	09-Aug-2019	09-Aug-2019
Pesticides (Suite I) by GCMS				15-Aug-2019
Pesticides (Suite II) by GCMS				15-Aug-2019
pH Value	13-Aug-2019	13-Aug-2019	13-Aug-2019	13-Aug-2019
Phenols by HPLC (W)	13-Aug-2019	13-Aug-2019	13-Aug-2019	13-Aug-2019
SVOC MS (W) - Aqueous	15-Aug-2019		12-Aug-2019	
Total EPH (aq)	15-Aug-2019	14-Aug-2019	15-Aug-2019	15-Aug-2019
Total Metals by ICP-MS	15-Aug-2019	15-Aug-2019	15-Aug-2019	15-Aug-2019
TPH CWG (W)		14-Aug-2019		15-Aug-2019



CERTIFICATE OF ANALYSIS

SDG: 190807-47 Client Reference: E9014-19 Report Number: 518155
Location: OLBEACH GROUND INVESTIG Order Number: Superseded Report:

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2107).

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Appendix B – Human Health Risk Assessment

DRAFT

Tier 1 Analysis (Soil)
FEZ Holbeach
Lincolnshire County Council

Location	BH01	BH02		BH03	BH04	TP01	TP02		TP03	TP04	TP05	TP06	TP07	TP08
Date	19/07/2019	16/06/2019		25/06/2019	19/07/2019	20/06/2019	19/06/2019			20/06/2019	20/06/2019		20/06/2019	
Sample Depth	0.2	0.2	3.0	0.4	0.2	0.4	0.2	1.2	0.4	0.2	0.4	0.4	0.2	1.2
Matrix Description	Topsoil	Topsoil	Tidal Flat Deposits	Tidal Flat Deposits	Topsoil	Tidal Flat Deposits	Topsoil	Tidal Flat Deposits	Tidal Flat Deposits	Topsoil	Tidal Flat Deposits	Tidal Flat Deposits	Topsoil	Tidal Flat Deposits

Parameter	Units	Method Detection Limit	Tier 1 GAC														
EPHCWG																	
>C5-C6 Aliphatics	mg/kg	0.01	2.000 ^{#3}	-	-	-	-	<0.01	<0.01	-	-	-	-	-	<0.01	-	-
>C6-C8 Aliphatics	mg/kg	0.01	4.300 ^{#3}	-	-	-	-	<0.01	<0.01	-	-	-	-	-	<0.01	-	-
>C8-C10 Aliphatics	mg/kg	0.01	1.000 ^{#3}	-	-	-	-	<0.01	<0.01	-	-	-	-	-	0.0133	-	-
>C10-C12 Aliphatics	mg/kg	0.01	5.000 ^{#3}	-	-	-	-	<0.01	<0.01	-	-	-	-	-	0.0121	-	-
>C12-C16 Aliphatics	mg/kg	0.1	37.000 ^{#3}	-	-	-	-	<0.1	<0.1	-	-	-	-	-	<0.1	-	-
>C16-C21 Aliphatics	mg/kg	0.1		-	-	-	-	<0.1	<0.1	-	-	-	-	-	<0.1	-	-
>C21-C35 Aliphatics	mg/kg	0.1		-	-	-	-	0.806	<0.1	-	-	-	-	-	<0.1	-	-
>C35-C44 Aliphatics	mg/kg	0.1	1.400.000 ^{#3}	-	-	-	-	<0.1	<0.1	-	-	-	-	-	<0.1	-	-
>C12-C44 Aliphatics	mg/kg	0.1		-	-	-	-	0.806	<0.1	-	-	-	-	-	<0.1	-	-
>EC5-EC7 Aromatics	mg/kg	0.01	12.000 ^{#3}	-	-	-	-	<0.01	<0.01	-	-	-	-	-	<0.01	-	-
>EC7-EC8 Aromatics	mg/kg	0.01	28.000 ^{#3}	-	-	-	-	<0.01	<0.01	-	-	-	-	-	<0.01	-	-
>EC8-EC10 Aromatics	mg/kg	0.01	1.800 ^{#3}	-	-	-	-	<0.01	<0.01	-	-	-	-	-	<0.01	-	-
>EC10-EC12 Aromatics	mg/kg	0.01	9.100 ^{#3}	-	-	-	-	<0.01	<0.01	-	-	-	-	-	<0.01	-	-
>EC12-EC16 Aromatics	mg/kg	0.1	34.000 ^{#3}	-	-	-	-	0.433	<0.1	-	-	-	-	-	<0.1	-	-
>EC16-EC21 Aromatics	mg/kg	0.1	28.000 ^{#3}	-	-	-	-	0.233	<0.1	-	-	-	-	-	<0.1	-	-
>EC21-EC35 Aromatics	mg/kg	0.1	28.000 ^{#3}	-	-	-	-	5.26	<0.1	-	-	-	-	-	<0.1	-	-
>EC35-EC44 Aromatics	mg/kg	0.1	28.000 ^{#3}	-	-	-	-	2.12	<0.1	-	-	-	-	-	<0.1	-	-
>EC40-EC44 Aromatics	mg/kg	0.1		-	-	-	-	0.562	<0.1	-	-	-	-	-	<0.1	-	-
>EC12-EC44 Aromatics	mg/kg	0.1		-	-	-	-	8.05	<0.1	-	-	-	-	-	<0.1	-	-
>C5-C44 Aliphatics/Aromatics	mg/kg	0.1		-	-	-	-	8.85	<0.1	-	-	-	-	-	<0.1	-	-
HERBPEST																	
Aldrin	mg/kg	0.05	170 ^{#3}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Dieldrin	mg/kg	0.05	160 ^{#3}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Endosulfan I	mg/kg	0.05	4.200 ^{#3}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Endosulfan II	mg/kg	0.05	5.200 ^{#3}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Endosulfan sulphate	mg/kg	0.05	4.900 ^{#1}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Endrin	mg/kg	0.05	250 ^{#1}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Heptachlor	mg/kg	0.05	0.63 ^{#1}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
4,4-DDE	mg/kg	0.05	9.3 ^{#1}	<0.05	0.114	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
DDT	mg/kg	0.05	8.5 ^{#1}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Methoxychlor	mg/kg	0.05	4.100 ^{#1}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Azinophos methyl	mg/kg	0.05	2.500 ^{#1}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Diazinon	mg/kg	0.05	570 ^{#1}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Dichlorvos	mg/kg	0.05	140 ^{#3}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Ethion	mg/kg	0.05	410 ^{#1}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Parathion	mg/kg	0.05	4.900 ^{#1}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Fenitrothion	mg/kg	0.05		<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Malathion	mg/kg	0.05	16.000 ^{#1}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Methyl parathion	mg/kg	0.05	210 ^{#1}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Mevinphos (Phosdrin)	mg/kg	0.05		<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Disulfoton	mg/kg	0.05	33 ^{#1}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
Phorate	mg/kg	0.05	160 ^{#1}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	-	-	<0.05	-
INORGANICS																	
Cyanide Total	mg/kg	1	150 ^{#1}	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ammoniacal Nitrogen as NH4	mg/kg	15		51.1	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15
Soil Organic Matter	%	0.35		1.44	1.58	<0.35	0.928	1.63	<0.35	1.86	0.655	0.836	0.728	0.631	0.876	1.67	<0.35
pH (Lab)	pH Units	1		8.31	8.33	8.61	8.74	8.43	8.98	8.7	8.85	8.69	8.72	8.76	8.7	7.96	8.71
Thiocyanate	mg/kg	1	230 ^{#1}	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cyanide (Free)	mg/kg	1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
METALS																	
Arsenic	mg/kg	0.6	640 ^{#3}	15.9	15	5.45	6.11	13.8	3.53	16.7	4.29	9.54	5.58	7.49	13.1	10.5	5.44
Boron	mg/kg	0.7	240.000 ^{#3}	11.8	10.7	2.94	9.93	11.1	4.86	11.4	6.13	8.37	5.09	8.55	17	10.2	3.92
Cadmium	mg/kg	0.02	190 ^{#3}	0.221	0.0565	<0.02	<0.02	0.197	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chromium (III+VI)	mg/kg	0.9	Use CrIII or CrVI ^{#3}	16.1	14.8	3.19	9.24	13.3	7.08	17.2	8.97	10.5	7.75	9.83	17.6	12.5	5.71
Chromium (hexavalent)	mg/kg	0.6	33 ^{#3}	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Copper	mg/kg	1.4	68.000 ^{#3}	19.1	21.2	<1.4	6	20.3	3.35	23	5.08	9.02	3.73	4.5	8.59	9.21	2.38
Iron	mg/kg	1,000	820.000 ^{#1}	18,800	18,400	8,730	13,100	18,900	9,340	20,600	11,600	16,000	10,300	15,000	21,100	18,400	9,070
Lead	mg/kg	0.7	2.300 ^{#2}	19	24.6	2.61	11.5	21	5.21	21.9	6.38	9.99	5.08	6.57	13	15.5	4.09
Mercury	mg/kg	0.14		<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
Nickel	mg/kg	0.2	980 ^{#3}	16.6	15.9	4.49	10.4	15.5	8	17.7	10.8	12.8	10.7	11.9	21.9	15.1	7.54
Selenium	mg/kg	1	12.000 ^{#3}	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zinc	mg/kg	1.9	730.000 ^{#3}	48.1	52.7	15.1	35	51.8	24.3	53.2	29.1	35.2	26.5	30.9	53.4	44	20.6
PAH																	
Naphthalene	mg/kg	0.009	90 ^{#3}	-	-	-	-	-	-	-	-	-	<0.009	-	-	-	-
Acenaphthylene	mg/kg	0.012	72.000 ^{#3}	-	-	-	-	-	-	-	-	-	<0.012	-	-	-	-
Acenaphthene	mg/kg	0.008	71.000 ^{#3}	-	-	-	-	-	-	-	-	-	<0.008	-	-	-	-
Fluorene	mg/kg	0.01	59.000 ^{#3}	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-
Phenanthrene	mg/kg	0.015	22.000 ^{#3}	-	-	-	-	-	-	-	-	-	<0.015	-	-	-	-
Anthracene	mg/kg	0.016	520.000 ^{#3}	-	-	-	-	-	-	-	-	-	<0.016	-	-	-	-
Fluoranthene	mg/kg	0.017	23.000 ^{#3}	-	-	-	-	-	-	-	-	-	<0.017	-	-	-	-
Pyrene	mg/kg	0.015	54.000 ^{#3}	-	-	-	-	-	-	-	-	-	<0.015	-	-	-	-
Benz(a)anthracene	mg/kg	0.014	170 ^{#3}	-	-	-	-	-	-	-	-	-	<0.014	-	-	-	-
Chrysene	mg/kg	0.01	350 ^{#3}	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-
Benzo(a) pyrene	mg/kg	0.015	35 ^{#3}	-	-	-	-	-	-	-	-	-	<0.015	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg	0.018	510 ^{#3}	-	-	-	-	-	-	-	-	-	<0.018	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.023	3.5 ^{#3}	-	-	-	-	-	-	-	-	-	<0.023	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.024	3.900 ^{#3}	-	-	-	-	-	-	-	-	-	<0.024	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.015	45 ^{#3}	-	-	-	-	-	-	-	-	-	<0.015	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.014	1.200 ^{#3}	-	-	-	-	-	-	-	-	-	<0.014	-	-	-	-
PAH 16 Total	mg/kg	0.118		-	-	-	-	-	-	-	-	-	<0.118	-	-	-	-

Tier 1 Analysis (Soil)
FEZ Holbeach
Lincolnshire County Council

Location	BH01	BH02		BH03	BH04	TP01	TP02		TP03	TP04	TP05	TP06	TP07	TP08
Date	19/07/2019	16/06/2019		25/06/2019	19/07/2019	20/06/2019	19/06/2019			20/06/2019	20/06/2019		20/06/2019	
Sample Depth	0.2	0.2	3.0	0.4	0.2	0.4	0.2	1.2	0.4	0.2	0.4	0.4	0.2	1.2
Matrix Description	Topsoil	Topsoil	Tidal Flat Deposits	Tidal Flat Deposits	Topsoil	Tidal Flat Deposits	Topsoil	Tidal Flat Deposits	Tidal Flat Deposits	Topsoil	Tidal Flat Deposits	Tidal Flat Deposits	Topsoil	Tidal Flat Deposits

Parameter	Units	Method Detection Limit	Tier 1 GAC												
PHENOLS HPLC															
Phenol	mg/kg	0.01	370 ^{#3}	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cresol Total	mg/kg	0.01	157,000 ^{#4}	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Monohydric Phenols (S) Corrected	mg/kg	0.035		<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035
Xylenols	mg/kg	0.015		<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
SVOC															
Acenaphthylene	mg/kg	0.1	72,000 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	0.1	71,000 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Fluorene	mg/kg	0.1	59,000 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	0.1	22,000 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Anthracene	mg/kg	0.1	520,000 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	0.1	23,000 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Pyrene	mg/kg	0.1	54,000 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Chrysene	mg/kg	0.1	350 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Benzo(a) pyrene	mg/kg	0.1	35 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	510 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.1	3,5 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.1	3,900 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.1	45 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1	1,200 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
1,3-dichlorobenzene	mg/kg	0.1	14 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
1,4-dichlorobenzene	mg/kg	0.1	2,000 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
1,2-dichlorobenzene	mg/kg	0.1	930 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
1,2,4-trichlorobenzene	mg/kg	0.1	98 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
2-chlorophenol	mg/kg	0.1	5,800 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
2-methylphenol	mg/kg	0.1	41,000 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
2-nitrophenol	mg/kg	0.1		<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
2,4-dichlorophenol	mg/kg	0.1	2,500 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
2,4-dimethylphenol	mg/kg	0.1	12,300 ^{#4}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
2,4,5-trichlorophenol	mg/kg	0.1	82,000 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
2,4,6-trichlorophenol	mg/kg	0.1	210 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
4-chloro-3-methylphenol	mg/kg	0.1	82,000 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
4-methylphenol	mg/kg	0.1	82,000 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
4-nitrophenol	mg/kg	0.1		<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Pentachlorophenol	mg/kg	0.1	400 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
2-chloronaphthalene	mg/kg	0.1	187 ^{#4}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
2-methylnaphthalene	mg/kg	0.1	3,000 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Bis(2-ethylhexyl) phthalate	mg/kg	0.1	85,200 ^{#4}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.1	941,000 ^{#4}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Di-n-butyl phthalate	mg/kg	0.1	15,400 ^{#4}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Di-n-octyl phthalate	mg/kg	0.1	89,100 ^{#4}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Diethylphthalate	mg/kg	0.1	113,000 ^{#4}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Dimethyl phthalate	mg/kg	0.1		<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
2-nitroaniline	mg/kg	0.1	8,000 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	0.1	3,740 ^{#4}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
2,6-dinitrotoluene	mg/kg	0.1	1,850 ^{#4}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
3-nitroaniline	mg/kg	0.1		<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
4-chloroaniline	mg/kg	0.1	11 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
4-chlorophenyl phenyl ether	mg/kg	0.1		<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
4-nitroaniline	mg/kg	0.1	110 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Azobenzene	mg/kg	0.1	26 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Bis(2-chloroethoxy) methane	mg/kg	0.1	2,500 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.1	1 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Carbazole	mg/kg	0.1		<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Dibenzofuran	mg/kg	0.1	1,000 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.1	86 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	mg/kg	0.1	7,5 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Hexachloroethane	mg/kg	0.1	9,99 ^{#4}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
Isophorone	mg/kg	0.1	2,400 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-
N-nitrosodi-n-propylamine	mg/kg	0.1	0.33 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-

Tier 1 Analysis (Soil)
FEZ Holbeach
Lincolnshire County Council

Location	BH01	BH02		BH03	BH04	TP01	TP02		TP03	TP04	TP05	TP06	TP07	TP08
Date	19/07/2019	16/06/2019		25/06/2019	19/07/2019	20/06/2019	19/06/2019			20/06/2019	20/06/2019		20/06/2019	
Sample Depth	0.2	0.2	3.0	0.4	0.2	0.4	0.2	1.2	0.4	0.2	0.4	0.4	0.2	1.2
Matrix Description	Topsoil	Topsoil	Tidal Flat Deposits	Tidal Flat Deposits	Topsoil	Tidal Flat Deposits	Topsoil	Tidal Flat Deposits	Tidal Flat Deposits	Topsoil	Tidal Flat Deposits	Tidal Flat Deposits	Topsoil	Tidal Flat Deposits

Parameter	Units	Method Detection Limit	Tier 1 GAC											
SVOC GCMS														
Naphthalene	mg/kg	0.1	90 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-
Benz(a)anthracene	mg/kg	0.1	170 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1	14 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-
Phenol	mg/kg	0.1	370 ^{#3}	<0.1	-	-	<0.1	-	-	-	-	-	-	-
4-bromophenyl phenyl ether	mg/kg	0.1		<0.1	-	-	<0.1	-	-	-	-	-	-	-
Nitrobenzene	mg/kg	0.1	22 ^{#1}	<0.1	-	-	<0.1	-	-	-	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1		<0.1	-	-	<0.1	-	-	-	-	-	-	-
UNK														
Triclosan	mg/kg	0.01		<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
gamma-HCH	mg/kg	0.05		<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	<0.05
2,4,5-trichlorophenol	mg/kg	0.01	82,000 ^{#1}	<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
a-BHC	mg/kg	0.05	160 ^{#3}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	<0.05
b-BHC	mg/kg	0.05	65 ^{#3}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	<0.05
Heptachlor epoxide	mg/kg	0.05	0.33 ^{#1}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	<0.05
DDD	mg/kg	0.05	9.6 ^{#1}	<0.05	<0.05	-	-	<0.05	-	-	-	<0.05	-	<0.05
Bentazone	mg/kg	0.01	25,000 ^{#1}	<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
Bromoxynil	mg/kg	0.01	22 ^{#1}	<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
4-Chlorophenoxy acetic acid	mg/kg	0.01		<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
Hedonal	mg/kg	0.01	9,600 ^{#1}	<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
2,4-DB	mg/kg	0.01		<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
Dicamba	mg/kg	0.01	25,000 ^{#1}	<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
2,4-Dichlorprop	mg/kg	0.01		<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
Diclofop	mg/kg	0.01		<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
2,4,5-TP (Silvex)	mg/kg	0.01	6,600 ^{#1}	<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
Actril (Ioxynil)	mg/kg	0.01		<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
2-Methyl-4-chlorophenoxyacetic acid	mg/kg	0.01	410 ^{#1}	<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
2-Methyl-4-Chlorophenoxy Butanoic Acid	mg/kg	0.01	3,600 ^{#1}	<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
Triclopyr	mg/kg	0.01		<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
4,6-Dinitro-2-methylphenol	mg/kg	0.01	66 ^{#1}	<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
Acifluorfen	mg/kg	0.01		<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
Dinoseb	mg/kg	0.01	820 ^{#1}	<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
Fluroxypyr	mg/kg	0.01		<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
Mecoprop	mg/kg	0.01	820 ^{#1}	<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
Propoxycarbazone-sodium*	mg/kg	0.01		<0.01	<0.01	-	-	<0.01	-	-	-	<0.01	-	<0.01
VOC														
Total BTEX	mg/kg	0.04		-	-	-	-	<0.04	-	-	-	-	-	-
MTBE	mg/kg	0.01	3340 ^{#4}	-	-	-	-	<0.01	<0.01	-	-	-	<0.01	-
Benzene	mg/kg	0.009	12 ^{#3}	-	-	-	-	<0.009	<0.009	-	-	-	<0.009	-
Toluene	mg/kg	0.007	28000 ^{#3}	-	-	-	-	<0.007	<0.007	-	-	-	<0.007	-
Ethylbenzene	mg/kg	0.004	2700 ^{#3}	-	-	-	-	<0.004	<0.004	-	-	-	<0.004	-
Xylene Total	mg/kg	0.02	2700 ^{#3}	-	-	-	-	<0.02	<0.02	-	-	-	<0.02	-
Xylene (m & p)	mg/kg	0.01		-	-	-	-	<0.01	<0.01	-	-	-	<0.01	-
Xylene (o)	mg/kg	0.01	3100 ^{#3}	-	-	-	-	<0.01	<0.01	-	-	-	<0.01	-

Comments
#1 USEPA RSL (May 2019)
#2 Defra C4SL 12/2014
#3 AECOM (modified LQM/CIEH S4ULs)
#4 AECOM (modified EIC)
GAC: Generic Assessment Criteria
(blank): No assessment criteria available
- : Not analysed

Key
XXX Exceedance of HH Soil. Commercial/Industrial. Sand. TOC >=0.58 to <1.45%

Appendix C – Controlled Waters Risk Assessment

DRAFT

Tier 1 Analysis (Soil Leachate)
FEZ Holbeach
Lincolnshire County Council

Location	BH01	BH02	BH03	BH04	TP03	TP06	TP07	TP08
Date	19/07/2019	16/06/2019	24/06/2019	19/07/2019	20/06/2019	20/06/2019	20/06/2019	20/06/2019
Sample Depth	0.4	0.8	0.2	0.4	0.2	0.2	0.4	0.2
Matrix Description	Tidal Flat Deposits	Tidal Flat Deposits	Topsoil	Tidal Flat Deposits	Topsoil	Topsoil	Tidal Flat Deposits	Topsoil

Parameter	Units	Method Detection Limit	Tier 1 GAC (DWS)	Tier 1 GAC (EQS-Fresh)								
CARBON												
Dissolved Organic Carbon	mg/L	3			6.17	4.51	10.1	5.49	6.92	7.41	4.91	6.54
EPH												
EPH >C10-C12	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100
EPH >C12-C16	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100
EPH >C16-C21	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100
EPH >C21-C28	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100
EPH >C28-C35	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100
EPH >C35-C40	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100
EPH >C6-C40	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100
EPH >C10-C40	µg/L	100			<100	<100	<100	<100	<100	<100	<100	<100
EPHCWG												
>C5-C6 Aliphatics	µg/L	10	15000 ^{#2}		-	-	-	<10	-	-	-	-
>C6-C8 Aliphatics	µg/L	10	15000 ^{#2}		-	-	-	<10	-	-	-	-
>C8-C10 Aliphatics	µg/L	10	300 ^{#2}		-	-	-	<10	-	-	-	-
>C10-C12 Aliphatics	µg/L	10	300 ^{#2}		-	-	-	<10	-	-	-	-
>C12-C16 Aliphatics	µg/L	10	300 ^{#2}		-	-	-	<10	-	-	-	-
>C16-C21 Aliphatics	µg/L	10	300 ^{#2}		-	-	-	<10	-	-	-	-
>C21-C35 Aliphatics	µg/L	10	300 ^{#2}		-	-	-	<10	-	-	-	-
>C12-C35 Aliphatics	µg/L	10			-	-	-	<10	-	-	-	-
>EC5-EC7 Aromatics	µg/L	10	1 ^{#1}	10 ^{#6}	-	-	-	<10	-	-	-	-
>EC7-EC8 Aromatics	µg/L	10	700 ^{#2}	74 ^{#7}	-	-	-	<10	-	-	-	-
>EC8-EC10 Aromatics	µg/L	10	300 ^{#2}		-	-	-	<10	-	-	-	-
>EC10-EC12 Aromatics	µg/L	10	90 ^{#2}		-	-	-	<10	-	-	-	-
>EC12-EC16 Aromatics	µg/L	10	90 ^{#2}		-	-	-	<10	-	-	-	-
>EC16-EC21 Aromatics	µg/L	10	90 ^{#2}		-	-	-	<10	-	-	-	-
>EC16-EC35 Aromatics	µg/L	10			-	-	-	<10	-	-	-	-
>EC21-EC35 Aromatics	µg/L	10	90 ^{#2}		-	-	-	<10	-	-	-	-
>EC12-EC35 Aromatics	µg/L	10			-	-	-	<10	-	-	-	-
>C5-C35 Aliphatics & Aromatics	µg/L	10			-	-	-	<10	-	-	-	-
GRO												
GRO >C5-C12	µg/L	50			<50	<50	<50	<50	<50	<50	<50	<50
GRO >C5-C6	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10
GRO >C6-C7	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10
GRO >C7-C8	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10
GRO >C8-C10	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10
GRO >C10-C12	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10
MTBE	µg/L	3	1800 ^{#15}	5100 ^{#13}	<3	<3	<3	<3	<3	<3	<3	<3
Benzene	µg/L	7	1 ^{#1}	10 ^{#6}	<7	<7	<7	<7	<7	<7	<7	<7
Toluene	µg/L	4	700 ^{#3}	74 ^{#7}	<4	<4	<4	<4	<4	<4	<4	<4
Ethylbenzene	µg/L	5	300 ^{#3}	20 ^{#12}	<5	<5	<5	<5	<5	<5	<5	<5
Xylene (m & p)	µg/L	8			<8	<8	<8	<8	<8	<8	<8	<8
Xylene Total	µg/L	11	500 ^{#3}	30 ^{#12}	<11	<11	<11	<11	<11	<11	<11	<11
Xylene (o)	µg/L	3	190 ^{#10}		<3	<3	<3	<3	<3	<3	<3	<3
Total BTEX	µg/L	28			<28	<28	<28	<28	<28	<28	<28	<28
HERBPEST												
a-BHC	µg/L	0.01	0.0072 ^{#10}		<0.01	-	-	-	-	<0.01	-	<0.01
b-BHC	µg/L	0.01	0.025 ^{#10}		<0.01	-	-	-	-	<0.01	-	<0.01
Chlordane (cis)	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Endosulfan I	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Endosulfan II	µg/L	0.02	0.1 ^{#1}		<0.02	-	-	-	-	<0.02	-	<0.02
Endosulfan sulphate	µg/L	0.02	0.1 ^{#1}		<0.02	-	-	-	-	<0.02	-	<0.02
g-BHC (Lindane)	µg/L	0.01	2 ^{#3}		<0.01	-	-	-	-	<0.01	-	<0.01
Heptachlor epoxide	µg/L	0.01	0.03 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
o,p'-DDE	µg/L	0.01			-	-	-	-	-	<0.01	-	<0.01
2,4-DDT	µg/L	0.01			<0.01	-	-	-	-	<0.01	-	<0.01
o,p'-Methoxychlor	µg/L	0.01			<0.01	-	-	-	-	<0.01	-	<0.01
4,4-DDE	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
DDT	µg/L	0.01	0.1 ^{#1}	0.01 ^{#6}	<0.01	-	-	-	-	<0.01	-	<0.01
Methoxychlor	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Permethrin II	µg/L	0.01			<0.01	-	-	-	-	<0.01	-	<0.01
Chlordane (trans)	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
INORGANICS												
Chloride	mg/L	2	250 ^{#1}	250 ^{#12}	2.1	4.1	32.6	3.5	6.4	6.2	8.3	4.6
Cyanide (Free)	mg/L	0.05	0.05 ^{#1}	0.001 ^{#12}	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cyanide Total	mg/L	0.05	0.05 ^{#1}	0.001 ^{#7}	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Thiocyanate	mg/L	0.05	0.004 ^{#10}		<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Ammonia as NH3	mg/L	0.2			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
METALS												
Arsenic	µg/L	0.5	10 ^{#1}	50 ^{#7}	11.6	<0.5	2.42	6.62	2.75	1.07	<0.5	2.87
Boron	µg/L	10	1000 ^{#1}	2000 ^{#12}	23	28.1	291	24.9	30.7	22.6	24	47
Cadmium	µg/L	0.08	5 ^{#1}	0.03 ^{#6}	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Calcium	mg/L	0.2			13.8	26.9	78.6	12.8	25	20.9	26.4	21.3
Chromium (III+VI)	µg/L	1	50 ^{#1}		1.09	<1	<1	<1	1.09	<1	<1	<1
Chromium (hexavalent)	µg/L	30	50	3.4 ^{#7}	<30	<30	<30	<30	<30	<30	<30	<30
Copper	µg/L	0.3	2000 ^{#1}	1 ^{#7}	12.3	1.28	15.3	10.7	10.9	6.21	3.17	6.13
Iron	µg/L	19	200 ^{#1}	1000 ^{#7}	579	<19	<19	360	208	650	<19	<19
Lead	µg/L	0.2	10 ^{#1}	1.2 ^{#6}	<0.2	<0.2	<0.2	<0.2	0.643	<0.2	1.22	<0.2
Mercury	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	µg/L	0.4	20 ^{#1}	4 ^{#6}	2.77	<0.4	3.35	1.99	1.81	1.42	0.848	1.97
Selenium	µg/L	1	10 ^{#1}		<1	<1	<1	<1	<1	<1	<1	<1
Zinc	µg/L	1	6000 ^{#10}	10.9 ^{#7}	1.24	3.65	241	3.73	5.33	4.05	3.73	2.15
PAH												
Naphthalene	µg/L	0.01	6 ^{#15}	2 ^{#6}	-	-	-	-	<0.01	-	-	-
Acenaphthene	µg/L	0.005	18 ^{#15}		-	-	-	-	<0.005	-	-	-
Acenaphthylene	µg/L	0.005	18 ^{#15}		-	-	-	-	<0.005	-	-	-
Fluorene	µg/L	0.005	12 ^{#15}		-	-	-	-	<0.005	-	-	-
Phenanthrene	µg/L	0.005	4 ^{#15}		-	-	-	-	0.0197	-	-	-
Anthracene	µg/L	0.005	90 ^{#15}	0.1 ^{#6}	-	-	-	-	<0.005	-	-	-
Fluoranthene	µg/L	0.005	4 ^{#3}	0.0063 ^{#6}	-	-	-	-	0.0245	-	-	-
Pyrene	µg/L	0.005	9 ^{#15}		-	-	-	-	0.0187	-	-	-
Benz(a)anthracene	µg/L	0.005	3.5 ^{#15}		-	-	-	-	<0.005	-	-	-
Chrysene	µg/L	0.005	7 ^{#15}		-	-	-	-	<0.005	-	-	-
Benzo(a) pyrene	µg/L	0.002	0.01 ^{#1}	0.00017 ^{#6}	-	-	-	-	<0.002	-	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	0.005	0.1	0.00017 ^{#9}	-	-	-	-	<0.005	-	-	-
Dibenz(a,h)anthracene	µg/L	0.005	0.07 ^{#15}		-	-	-	-	<0.005	-	-	-
Benzo(b)fluoranthene	µg/L	0.005	0.1#1	0.017 ^{#6}	-	-	-	-	<0.005	-	-	-
Benzo(k)fluoranthene	µg/L	0.005	0.1#1	0.017 ^{#6}	-	-	-	-	<0.005	-	-	-
PAH 16 Total	µg/L	0.082			-	-	-	-	<0.082	-	-	-

Tier 1 Analysis (Soil Leachate)
FEZ Holbeach
Lincolnshire County Council

Location	BH01	BH02	BH03	BH04	TP03	TP06	TP07	TP08
Date	19/07/2019	16/06/2019	24/06/2019	19/07/2019	20/06/2019	20/06/2019	20/06/2019	20/06/2019
Sample Depth	0.4	0.8	0.2	0.4	0.2	0.2	0.4	0.2
Matrix Description	Tidal Flat Deposits	Tidal Flat Deposits	Topsoil	Tidal Flat Deposits	Topsoil	Topsoil	Tidal Flat Deposits	Topsoil

Parameter	Units	Method Detection Limit	Tier 1 GAC (DWS)	Tier 1 GAC (EQS-Fresh)								
PHENOLS HPLC												
Phenol	µg/L	2	5800 ^{#10}	7.7 ^{#7}	<2	<2	<2	<2	<2	<2	<2	<2
Cresol Total	µg/L	6	1500 ^{#10}		<6	<6	<6	<6	10	<6	<6	<6
Total Monohydric Phenols (S) Corrected	µg/L	16			<16	<16	<16	<16	<16	<16	<16	<16
Xylenols	µg/L	8			<8	<8	<8	<8	<8	<8	<8	<8
SVOC												
Benzo(a) pyrene	µg/L	1	0.01 ^{#1}	0.00017 ^{#8}	-	-	<1	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	1	0.1 ^{#1}	0.00017 ^{#9}	-	-	<1	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	1	0.07 ^{#15}		-	-	<1	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	1	0.1 ^{#1}	0.0082 ^{#6}	-	-	<1	-	-	-	-	-
1,3-dichlorobenzene	µg/L	1			-	-	<1	-	-	-	-	-
1,4-dichlorobenzene	µg/L	1	300 ^{#3}		-	-	<1	-	-	-	-	-
1,2-dichlorobenzene	µg/L	1	1000 ^{#3}		-	-	<1	-	-	-	-	-
1,2,4-trichlorobenzene	µg/L	1	0.1 ^{#1}	0.4 ^{#9}	-	-	<1	-	-	-	-	-
2-chlorophenol	µg/L	1	91 ^{#10}	50 ^{#12}	-	-	<1	-	-	-	-	-
2-methylphenol	µg/L	1	930 ^{#10}		-	-	<1	-	-	-	-	-
2-nitrophenol	µg/L	1			-	-	<1	-	-	-	-	-
2,4-dichlorophenol	µg/L	1	46 ^{#10}	4.2 ^{#7}	-	-	<1	-	-	-	-	-
2,4-dimethylphenol	µg/L	1	360 ^{#10}		-	-	<1	-	-	-	-	-
2,4,5-trichlorophenol	µg/L	1	1200 ^{#10}		-	-	<1	-	-	-	-	-
2,4,6-trichlorophenol	µg/L	1	200 ^{#3}		-	-	<1	-	-	-	-	-
4-chloro-3-methylphenol	µg/L	1	1400 ^{#10}	40 ^{#12}	-	-	<1	-	-	-	-	-
4-methylphenol	µg/L	1	1900 ^{#10}		-	-	<1	-	-	-	-	-
4-nitrophenol	µg/L	1			-	-	<1	-	-	-	-	-
2-chloronaphthalene	µg/L	1	750 ^{#10}		-	-	<1	-	-	-	-	-
2-methylnaphthalene	µg/L	1	36 ^{#10}		-	-	<1	-	-	-	-	-
Butyl benzyl phthalate	µg/L	1	16 ^{#10}	7.5 ^{#7}	-	-	<1	-	-	-	-	-
Di-n-octyl phthalate	µg/L	5	200 ^{#10}	20 ^{#12}	-	-	<5	-	-	-	-	-
Diethylphthalate	µg/L	1	15000 ^{#10}	200 ^{#12}	-	-	<1	-	-	-	-	-
2-nitroaniline	µg/L	1	190 ^{#10}		-	-	<1	-	-	-	-	-
2,6-dinitrotoluene	µg/L	1	0.049 ^{#10}		-	-	<1	-	-	-	-	-
3-nitroaniline	µg/L	1			-	-	<1	-	-	-	-	-
4-bromophenyl phenyl ether	µg/L	1			-	-	<1	-	-	-	-	-
4-chloroaniline	µg/L	1	0.37 ^{#10}		-	-	<1	-	-	-	-	-
4-chlorophenyl phenyl ether	µg/L	1			-	-	<1	-	-	-	-	-
4-nitroaniline	µg/L	1	3.8 ^{#10}		-	-	<1	-	-	-	-	-
Bis(2-chloroethoxy) methane	µg/L	1	59 ^{#10}		-	-	<1	-	-	-	-	-
Naphthalene	µg/L	1	6 ^{#15}	2 ^{#8}	-	-	<1	-	-	-	-	-
Acenaphthylene	µg/L	1	18 ^{#15}		-	-	<1	-	-	-	-	-
Acenaphthene	µg/L	1	18 ^{#15}		-	-	<1	-	-	-	-	-
Fluorene	µg/L	1	12 ^{#15}		-	-	<1	-	-	-	-	-
Phenanthrene	µg/L	1	4 ^{#15}		-	-	<1	-	-	-	-	-
Anthracene	µg/L	1	90 ^{#15}	0.1 ^{#8}	-	-	<1	-	-	-	-	-
Fluoranthene	µg/L	1	4 ^{#3}	0.0063 ^{#8}	-	-	<1	-	-	-	-	-
Pyrene	µg/L	1	9 ^{#15}		-	-	<1	-	-	-	-	-
Benzo(a)anthracene	µg/L	1	3.5 ^{#15}		-	-	<1	-	-	-	-	-
Chrysene	µg/L	1	7 ^{#15}		-	-	<1	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	1	0.1 ^{#1}	0.017 ^{#6}	-	-	<1	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	1	0.1 ^{#1}	0.017 ^{#6}	-	-	<1	-	-	-	-	-
Hexachlorobutadiene	µg/L	1	0.1 ^{#1}	0.6 ^{#6}	-	-	<1	-	-	-	-	-
Pentachlorophenol	µg/L	1	9 ^{#3}	0.4 ^{#8}	-	-	<1	-	-	-	-	-
Phenol	µg/L	1	5800 ^{#10}	7.7 ^{#7}	-	-	<1	-	-	-	-	-
Bis(2-ethylhexyl) phthalate	µg/L	2	8 ^{#3}	1.3 ^{#8}	-	-	<2	-	-	-	-	-
Di-n-butyl phthalate	µg/L	1	900 ^{#10}	8 ^{#12}	-	-	<1	-	-	-	-	-
Dimethyl phthalate	µg/L	1		800 ^{#12}	-	-	<1	-	-	-	-	-
2,4-Dinitrotoluene	µg/L	1	0.24 ^{#10}		-	-	<1	-	-	-	-	-
Azobenzene	µg/L	1	0.12 ^{#10}		-	-	<1	-	-	-	-	-
Bis(2-chloroethyl)ether	µg/L	1	0.014 ^{#10}		-	-	<1	-	-	-	-	-
Carbazole	µg/L	1			-	-	<1	-	-	-	-	-
Dibenzofuran	µg/L	1	7.9 ^{#10}		-	-	<1	-	-	-	-	-
Hexachlorobenzene	µg/L	1	0.1 ^{#1}	0.05 ^{#5}	-	-	<1	-	-	-	-	-
Hexachlorocyclopentadiene	µg/L	1	0.41 ^{#10}		-	-	<1	-	-	-	-	-
Hexachloroethane	µg/L	1	0.33 ^{#10}		-	-	<1	-	-	-	-	-
Isophorone	µg/L	1	78 ^{#10}		-	-	<1	-	-	-	-	-
N-nitrosodi-n-propylamine	µg/L	1	0.011 ^{#10}		-	-	<1	-	-	-	-	-
Nitrobenzene	µg/L	1	8 ^{#3}		-	-	<1	-	-	-	-	-

Tier 1 Analysis (Soil Leachate)
FEZ Holbeach
Lincolnshire County Council

Location	BH01	BH02	BH03	BH04	TP03	TP06	TP07	TP08
Date	19/07/2019	16/06/2019	24/06/2019	19/07/2019	20/06/2019	20/06/2019	20/06/2019	20/06/2019
Sample Depth	0.4	0.8	0.2	0.4	0.2	0.2	0.4	0.2
Matrix Description	Tidal Flat Deposits	Tidal Flat Deposits	Topsoil	Tidal Flat Deposits	Topsoil	Topsoil	Tidal Flat Deposits	Topsoil

Parameter	Units	Method Detection Limit	Tier 1 GAC (DWS)	Tier 1 GAC (EQS-Fresh)								
UNK												
Permethrin I	µg/L	0.01		0.001	<0.01	-	-	-	-	<0.01	-	<0.01
1,3,5-Trichlorobenzene	µg/L	0.01	0.1 ^{#1}	0.1 ^{#9}	<0.01	-	-	-	-	<0.01	-	<0.01
Benzo(g,h,i)perylene	µg/L	0.005	0.1 ^{#1}	0.0082 ^{#6}	-	-	-	-	<0.005	-	-	-
1,2,4-trichlorobenzene	µg/L	0.01	0.1 ^{#1}	0.1 ^{#9}	<0.01	-	-	-	-	<0.01	-	<0.01
Hexachlorobutadiene	µg/L	0.01	0.1 ^{#1}	0.6 ^{#6}	<0.01	-	-	-	-	<0.01	-	<0.01
1,2,3-trichlorobenzene	µg/L	0.01	0.1 ^{#1}	0.1 ^{#9}	<0.01	-	-	-	-	<0.01	-	<0.01
Pentachlorophenol	µg/L	0.04	9 ^{#3}	0.4 ^{#6}	<0.04	-	-	-	-	<0.04	-	<0.04
Hexachlorobenzene	µg/L	0.01	0.1 ^{#1}	0.05 ^{#6}	<0.01	-	-	-	-	<0.01	-	<0.01
Aldrin	µg/L	0.01	0.03 ^{#1}	0.01	<0.01	-	-	-	-	<0.01	-	<0.01
Chlordane (cis)	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Dieldrin	µg/L	0.01	0.03 ^{#1}	0.01	<0.01	-	-	-	-	<0.01	-	<0.01
Endrin	µg/L	0.01	0.1 ^{#1}	0.01	<0.01	-	-	-	-	<0.01	-	<0.01
Heptachlor	µg/L	0.01	0.03 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Isodrin	µg/L	0.01	0.1 ^{#1}	0.01	<0.01	-	-	-	-	<0.01	-	<0.01
o,p'-DDE	µg/L	0.01			<0.01	-	-	-	-	-	-	-
o,p-DDD	µg/L	0.01			-	-	-	-	-	<0.01	-	<0.01
DDD	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Pendimethalin	µg/L	0.01	0.1 ^{#1}	0.3 ^{#7}	<0.01	-	-	-	-	<0.01	-	<0.01
Tecnazene	mg/L	0.00001	0.00001 ^{#1}	0.001 ^{#12}	<0.00001	-	-	-	-	<0.00001	-	<0.00001
Chlordane (trans)	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Triadimefon	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Triallate	µg/L	0.01	0.1 ^{#1}	0.25 ^{#12}	<0.01	-	-	-	-	<0.01	-	<0.01
Trifluralin	µg/L	0.01	0.1 ^{#1}	0.03 ^{#8}	<0.01	-	-	-	-	<0.01	-	<0.01
d-BHC	µg/L	0.01			<0.01	-	-	-	-	-	-	-
Azinphos Ethyl	µg/L	0.02	0.1 ^{#1}		<0.02	-	-	-	-	<0.02	-	<0.02
Azinophos methyl	µg/L	0.02	0.1 ^{#1}	0.01 ^{#12}	<0.02	-	-	-	-	<0.02	-	<0.02
Carbophenothion	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Chlorfenvinphos	µg/L	0.01	0.1 ^{#1}	0.1 ^{#6}	<0.01	-	-	-	-	<0.01	-	<0.01
Chlorpyrifos	µg/L	0.01	0.1 ^{#1}	0.03 ^{#8}	<0.01	-	-	-	-	<0.01	-	<0.01
Chlorpyrifos-methyl	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Diazinon	µg/L	0.01	0.1 ^{#1}	0.01 ^{#7}	<0.01	-	-	-	-	<0.01	-	<0.01
Dichlorvos	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Dimethoate	µg/L	0.01	0.1 ^{#1}	0.48 ^{#7}	<0.01	-	-	-	-	<0.01	-	<0.01
Ethion	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Parathion	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Fenitrothion	µg/L	0.01	0.1 ^{#1}	0.01 ^{#12}	<0.01	-	-	-	-	<0.01	-	<0.01
Fenthion	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Malathion	µg/L	0.01	0.1 ^{#1}	0.01 ^{#12}	<0.01	-	-	-	-	<0.01	-	<0.01
Methyl parathion	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Mevinphos (Phosdrin)	µg/L	0.01	0.1 ^{#1}	0.02 ^{#11}	<0.01	-	-	-	-	<0.01	-	<0.01
Phosalone	mg/L	0.00001	0.00001 ^{#1}		<0.00001	-	-	-	-	<0.00001	-	<0.00001
Pirimiphos-methyl	µg/L	0.01	0.1 ^{#1}	0.015 ^{#12}	<0.01	-	-	-	-	<0.01	-	<0.01
Propetamphos	mg/L	0.00001	0.00001 ^{#1}	0.00003 ^{#12}	<0.00001	-	-	-	-	<0.00001	-	<0.00001
Triazophos	mg/L	0.00001	0.00001 ^{#1}	0.000005 ^{#12}	<0.00001	-	-	-	-	<0.00001	-	<0.00001
Disulfoton	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Phorate	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Demeton-S-methyl	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Benazolin	µg/L	0.04			<0.04	-	-	-	-	<0.04	-	<0.04
Bromoxnifl	µg/L	0.04	0.61 ^{#10}	100 ^{#12}	<0.04	-	-	-	-	<0.04	-	<0.04
Clopyralid	µg/L	0.04			<0.04	-	-	-	-	<0.04	-	<0.04
Hedonal	µg/L	0.05	30 ^{#3}	0.3 ^{#7}	<0.05	-	-	-	-	<0.05	-	<0.05
2,4-DB	µg/L	0.1			-	-	-	-	-	<0.1	-	<0.1
Dicamba	µg/L	0.04	570 ^{#10}		<0.04	-	-	-	-	<0.04	-	<0.04
2,4-Dichlorprop	µg/L	0.1	100 ^{#3}		<0.1	-	-	-	-	<0.1	-	<0.1
2,4,5-TP (Silvex)	µg/L	0.1	110 ^{#10}		<0.1	-	-	-	-	<0.1	-	<0.1
Actril (loxynil)	mg/L	0.00005		0.01 ^{#12}	<0.00005	-	-	-	-	<0.00005	-	<0.00005
2-Methyl-4-chlorophenoxyacetic acid	µg/L	0.05	700 ^{#3}	12 ^{#12}	<0.05	-	-	-	-	<0.05	-	<0.05
2-Methyl-4-Chlorophenoxy Butanoic Acid	µg/L	0.05	65 ^{#10}		<0.05	-	-	-	-	<0.05	-	<0.05
2,4,5-Trichlorophenoxy Acetic Acid	µg/L	0.05	9 ^{#3}		<0.05	-	-	-	-	<0.05	-	<0.05
Triclopyr	µg/L	0.05			<0.05	-	-	-	-	<0.05	-	<0.05
Atrazine	µg/L	0.01	0.1 ^{#1}	0.6 ^{#6}	<0.01	-	-	-	-	<0.01	-	<0.01
Simazine	µg/L	0.01	0.1 ^{#1}	1 ^{#6}	<0.01	-	-	-	-	<0.01	-	<0.01
2,3,6-Trichlorobenzoic acid	µg/L	0.05			<0.05	-	-	-	-	<0.05	-	<0.05
4,6-Dinitro-2-methylphenol	µg/L	0.1	1.5 ^{#10}		<0.1	-	-	-	-	<0.1	-	<0.1
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	µg/L	0.1	450 ^{#10}		<0.1	-	-	-	-	-	-	-
Dichlobenil	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	-	<0.01	-	<0.01
Fluroxypyr	µg/L	0.1			<0.1	-	-	-	-	<0.1	-	<0.1
Mecoprop	µg/L	0.04	10 ^{#3}	18 ^{#7}	<0.04	-	-	-	-	<0.04	-	<0.04
HCH -delta	µg/L	0.01	0.1 ^{#1}		-	-	-	-	-	<0.01	-	<0.01

Comments
#1 WS Regs 2016 (Eng/Wal)
#2 WHO Petroleum DWG 2008
#3 WHO DWG 2017
#4 WHO 2017 - Taste
#5 WHO 2017 - Odour
#6 WFD England/Wales, 2015 - MAC-EQS Inland
#7 WFD England/Wales, 2015 - Freshwater Standards
#8 WFD England/Wales, 2015 - AA-EQS Inland
#9 Water Env't Regs (Scotland) 2015, AA-EQS Inland
#10 USEPA RSL (tapwater) [May 2019]
#11 SEPA WAT-SG-53 Fresh EQS - MAC - 2015
#12 SEPA WAT-SG-53 Fresh EQS - AA - 2015
#13 PNEC (EU REACH) - Freshwater
#14 California Draft health protective concentration
#15 AECOM DWG (WHO method)
GAC: Generic Assessment Criteria
(blank): No assessment criteria available
- : Not analysed

Key	
XXX	Exceedance of CW/WE Water, DWS - England/Wales
XXX	Exceedance of CW/WE Water, Aquatic Toxicity - England/Wales - Freshwater

Tier 1 Analysis (Groundwater)
FEZ Holbeach
Lincolnshire County Council

Location	BH01			BH02			BH03			BH04		
Date	19/07/2019	25/07/2019	06/08/2019	19/07/2019	25/07/2019	06/08/2019	19/07/2019	25/07/2019	06/08/2019	19/07/2019	25/07/2019	06/08/2019
Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Matrix Type	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Monitoring_Round	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits
	1	2	3	1	2	3	1	2	3	1	2	3

Parameter	Units	Method Detection Limit	Tier 1 GAC (DWS)	Tier 1 GAC (EQS-Fresh)												
CARBON																
Dissolved Organic Carbon	mg/L	3			15.9	8.52	6.84	5.64	6.69	5.45	18.9	15.5	14.5	4.29	3.27	4.37
EPH_FID																
EPH>C10-C12	µg/L	100			<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
EPH>C12-C16	µg/L	100			<1,000	<100	<100	<100	182	<100	<100	<100	<100	<100	<100	<100
EPH>C16-C21	µg/L	100			<1,000	<100	<100	<100	297	<100	<100	287	<100	<100	<100	<100
EPH>C21-C28	µg/L	100			1,090	115	107	<100	796	<100	156	1,150	<100	<100	253	313
EPH>C28-C35	µg/L	100			<1,000	<100	<100	<100	297	<100	<100	409	<100	<100	215	242
EPH>C35-C40	µg/L	100			<1,000	<100	<100	<100	109	<100	<100	139	<100	<100	<100	<100
EPH>C6-C40	µg/L	100			2,740	309	272	172	1,720	260	392	2,100	252	213	622	744
EPH>C10-C40	µg/L	100			2,740	309	272	172	1,720	260	392	2,100	252	213	622	744
EPHCWG																
>C5-C6 Aliphatics	µg/L	10	15,000 ^{#2}		-	<10	-	-	-	<10	-	<10	-	-	-	<10
>C6-C8 Aliphatics	µg/L	10	15,000 ^{#2}		-	<10	-	-	-	<10	-	<10	-	-	-	<10
>C8-C10 Aliphatics	µg/L	10	300 ^{#2}		-	<10	-	-	-	<10	-	<10	-	-	-	<10
>C10-C12 Aliphatics	µg/L	10	300 ^{#2}		-	<10	-	-	-	<10	-	<10	-	-	-	<10
>C12-C16 Aliphatics	µg/L	10	300 ^{#2}		-	<10	-	-	-	<10	-	<10	-	-	-	<10
>C16-C21 Aliphatics	µg/L	10	300 ^{#2}		-	<10	-	-	-	15	-	49	-	-	-	16
>C16-C35 Aliphatics	µg/L	10			-	84	-	-	-	72	-	429	-	-	-	446
>C21-C35 Aliphatics	µg/L	10	300 ^{#2}		-	84	-	-	-	57	-	380	-	-	-	430
>C12-C35 Aliphatics	µg/L	10			-	84	-	-	-	72	-	429	-	-	-	446
>EC5-EC7 Aromatics	µg/L	10	1 ^{#1}	10 ^{#6}	-	<10	-	-	-	<10	-	<10	-	-	-	<10
>EC7-EC8 Aromatics	µg/L	10	700 ^{#2}	74 ^{#7}	-	<10	-	-	-	<10	-	<10	-	-	-	<10
>EC8-EC10 Aromatics	µg/L	10	300 ^{#2}		-	<10	-	-	-	<10	-	12	-	-	-	<10
>EC10-EC12 Aromatics	µg/L	10	90 ^{#2}		-	<10	-	-	-	<10	-	<10	-	-	-	<10
>EC12-EC16 Aromatics	µg/L	10	90 ^{#2}		-	<10	-	-	-	<10	-	15	-	-	-	<10
>EC16-EC21 Aromatics	µg/L	10	90 ^{#2}		-	<10	-	-	-	<10	-	77	-	-	-	<10
>EC21-EC35 Aromatics	µg/L	10	90 ^{#2}		-	<10	-	-	-	11	-	134	-	-	-	25
>EC12-EC35 Aromatics	µg/L	10			-	<10	-	-	-	11	-	226	-	-	-	25
>C5-C35 Aliphatics & Aromatics	µg/L	10			-	84	-	-	-	84	-	674	-	-	-	472
GRO																
GRO >C5-C6	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
GRO >C5-C12	µg/L	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
GRO >C6-C7	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
GRO >C7-C8	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
GRO >C8-C10	µg/L	10			<10	<10	<10	<10	<10	<10	12	12	<10	<10	<10	<10
MTBE	µg/L	3	1,800 ^{#15}	5,100 ^{#13}	<3	<3	<3	<3	<3	<3	4	3	<3	<3	<3	<3
Benzene	µg/L	7	1 ^{#1}	10 ^{#6}	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Toluene	µg/L	4	700 ^{#3}	74 ^{#7}	<4	<4	<4	<4	<4	<4	6	4	<4	<4	<4	<4
Ethylbenzene	µg/L	5	300 ^{#3}	20 ^{#12}	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Xylene (m & p)	µg/L	8			<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8
Xylene Total	µg/L	11	500 ^{#3}	30 ^{#12}	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
Xylene (o)	µg/L	3	190 ^{#10}		<3	<3	<3	<3	<3	<3	4	3	<3	<3	<3	<3
Total BTEX	µg/L	28			<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28

Tier 1 Analysis (Groundwater)
FEZ Holbeach
Lincolnshire County Council

Location	BH01			BH02			BH03			BH04		
Date	19/07/2019	25/07/2019	06/08/2019	19/07/2019	25/07/2019	06/08/2019	19/07/2019	25/07/2019	06/08/2019	19/07/2019	25/07/2019	06/08/2019
Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Matrix Type	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Monitoring Unit	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits
Monitoring Round	1	2	3	1	2	3	1	2	3	1	2	3

Parameter		Units	Method Detection Limit	Tier 1 GAC (DWS)	Tier 1 GAC (EQS-Fresh)												
HERBPEST																	
a-BHC	µg/L	0.01		0.0072 ^{#10}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	<0.01	
b-BHC	µg/L	0.01		0.025 ^{#10}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	<0.01	
Chlordane (cis)	µg/L	0.01		0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	<0.01	
Endosulfan I	µg/L	0.01		0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	<0.01	
Endosulfan II	µg/L	0.02		0.1 ^{#1}		<0.02	-	-	-	<0.02	-	<0.02	-	-	-	<0.02	
Endosulfan sulphate	µg/L	0.02		0.1 ^{#1}		<0.02	-	-	-	<0.02	-	<0.02	-	-	-	<0.02	
g-BHC (Lindane)	µg/L	0.01		2 ^{#9}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	<0.01	
Heptachlor epoxide	µg/L	0.01		0.03 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	<0.01	
o,p'-DDE	µg/L	0.01				<0.01	-	-	-	<0.01	-	<0.01	-	-	-	<0.01	
2,4-DDT	µg/L	0.01				<0.01	-	-	-	<0.01	-	<0.01	-	-	-	<0.01	
o,p'-Methoxychlor	µg/L	0.01				<0.01	-	-	-	<0.01	-	<0.01	-	-	-	<0.01	
4,4-DDE	µg/L	0.01		0.1 ^{#1}		0.0536	-	-	-	<0.01	-	<0.01	-	-	-	<0.01	
DDT	µg/L	0.01		0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	<0.01	
Methoxychlor	µg/L	0.01		0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	<0.01	
Permethrin II	µg/L	0.01				<0.01	-	-	-	<0.01	-	<0.01	-	-	-	<0.01	
Chlordane (trans)	µg/L	0.01		0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	<0.01	
INORGANICS																	
Chloride	mg/L	2		250 ^{#1}		648	489	297	137	130	93.1	2,170	2,180	1,540	777	603	451
Cyanide (Free)	mg/L	0.05		0.05 ^{#1}		0.001 ^{#12}	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cyanide Total	mg/L	0.05		0.05 ^{#1}		0.001 ^{#7}	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hardness as CaCO3	mg/L	0.35				1,690	605	242	504	1,200	407	1,220	2,140	1,160	788	842	808
Nitrate (as NO3-)	mg/L	0.3		50 ^{#1}		1.86	11.8	40.7	<0.3	760	0.641	<0.3	<0.3	<0.3	7.97	14.3	13.7
pH (Lab)	pH Units	1				7.83	7.58	7.88	7.51	7.27	9.14	7.55	7.13	6.8	7.48	7.21	8.17
Thiocyanate	mg/L	0.05		0.004 ^{#10}		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Ammonia as NH3	mg/L	0.2				<0.2	<0.2	<0.2	<0.2	0.332	<0.2	0.658	0.41	0.325	<0.2	<0.2	<0.2
METALS ICP																	
Arsenic (Filtered)	µg/L	0.5		10 ^{#1}		2.19	1.5	1.89	1.09	4.65	7.19	3.75	7.85	7.94	0.534	0.74	0.84
Boron (Filtered)	µg/L	10		1,000 ^{#1}		430	158	138	130	139	128	563	483	388	295	270	246
Cadmium (Filtered)	µg/L	0.08		5 ^{#1}		<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Calcium (Filtered)	mg/L	0.2				90	83.5	85.2	116	135	112	225	<1.57	239	179	165	140
Chromium (III+VI) (Filtered)	µg/L	1		50 ^{#1}		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium (hexavalent)	µg/L	30		50		<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
Copper (Filtered)	µg/L	0.3		2,000 ^{#1}		1 ^{#7}	<0.3	0.549	<0.3	0.48	0.625	<0.3	<0.3	1.05	<0.3	0.683	0.506
Iron	µg/L	24		200 ^{#1}		1,000 ^{#7}	275,000	57,900	13,700	15,600	30,400	3,260	30,800	132,000	19,600	3,620	42,900
Iron (Filtered)	µg/L	19		200 ^{#1}		<19	88.8	-	154	230	2,750	830	11,100	-	<19	30.6	81.3
Lead (Filtered)	µg/L	0.2		10 ^{#1}		<0.2	<0.2	0.24	<0.2	0.302	<0.2	<0.2	0.451	<0.2	<0.2	<0.2	<0.2
Mercury (Filtered)	µg/L	0.01				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel (Filtered)	µg/L	0.4		20 ^{#1}		5.27	5.08	3.68	3.52	5.51	4.67	2.94	7.51	6.86	2.77	2.96	2.93
Selenium (Filtered)	µg/L	1		10 ^{#1}		2.7	1.09	<1	<1	<1	<1	2.19	1.14	<1	<1	<1	<1
Zinc (Filtered)	µg/L	1		6,000 ^{#10}		444	30.1	14.5	1.36	5.08	12.9	<1	17.5	7.41	4.95	13.8	8.35
PHENOL																	
2,3,5,6-Tetrachlorophenol	µg/L	0.5				-	<0.5	-	-	-	-	-	<0.5	-	-	-	-
2-chlorophenol	µg/L	0.5		91 ^{#10}		50 ^{#12}	<0.5	-	-	-	-	-	<0.5	-	-	-	-
2-methylphenol	µg/L	0.5		930 ^{#10}		-	<0.5	-	-	-	-	-	<0.5	-	-	-	-
2-nitrophenol	µg/L	0.5				-	<0.5	-	-	-	-	-	<0.5	-	-	-	-
2,4-dichlorophenol	µg/L	0.5		46 ^{#10}		4.2 ^{#7}	<0.5	-	-	-	-	-	<0.5	-	-	-	-
2,4-dimethylphenol	µg/L	0.5		360 ^{#10}		-	<0.5	-	-	-	-	-	<0.5	-	-	-	-
2,4,5-trichlorophenol	µg/L	0.5		1,200 ^{#10}		-	<0.5	-	-	-	-	-	<0.5	-	-	-	-
2,4,6-trichlorophenol	µg/L	0.5		200 ^{#9}		-	<0.5	-	-	-	-	-	<0.5	-	-	-	-
4-chloro-3-methylphenol	µg/L	0.5		1,400 ^{#10}		40 ^{#12}	<0.5	-	-	-	-	-	<0.5	-	-	-	-
4-methylphenol	µg/L	0.5		1,900 ^{#10}		-	<0.5	-	-	-	-	-	<0.5	-	-	-	-
4-nitrophenol	µg/L	0.5				-	<0.5	-	-	-	-	-	<0.5	-	-	-	-
Pentachlorophenol	µg/L	2		9 ^{#9}		0.4 ^{#8}	<2	-	-	-	-	-	<2	-	-	-	-
Phenol	µg/L	4		5,800 ^{#10}		7.7 ^{#7}	<4	-	-	-	-	-	<6.5	-	-	-	-
2,4-dinitrophenol	µg/L	2.5		39 ^{#10}		-	<2.5	-	-	-	-	-	<2.5	-	-	-	-
3-Methylphenol	µg/L	0.5		930 ^{#10}		-	<0.5	-	-	-	-	-	<0.5	-	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	3		1.5 ^{#10}		-	<3	-	-	-	-	-	<3	-	-	-	-
4-chlorophenol	µg/L	0.5				-	<0.5	-	-	-	-	-	<0.5	-	-	-	-
2,3,5-trimethyl phenol (Filtered)	µg/L	3				-	-	-	-	-	<3	-	-	-	-	-	<3
2-isopropylphenol (Filtered)	µg/L	6				-	-	-	-	-	<6	-	-	-	-	-	<6
Dinoseb	µg/L	4		15 ^{#10}		-	<4	-	-	-	-	-	<4	-	-	-	-
PHENOLS HPLC																	
Phenol	µg/L	2		5,800 ^{#10}		7.7 ^{#7}	<2	<2	<2	<2	10	10	<2	10	<2	<2	<2
Cresol Total	µg/L	6		1,500 ^{#10}		<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
Phenols Total of 5 Speciated by HPLC (W) (Filtered)	µg/L	25				-	-	-	-	-	<25	-	-	-	-	-	<25
Total Monohydric Phenols (S) Corrected	µg/L	16				<16	<16	<16	<16	<16	<16	<16	<16	<16	<16	<16	<16
Xylenols	µg/L	8				<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8

Tier 1 Analysis (Groundwater)
FEZ Holbeach
Lincolnshire County Council

Location	BH01			BH02			BH03			BH04		
Date	19/07/2019	25/07/2019	06/08/2019	19/07/2019	25/07/2019	06/08/2019	19/07/2019	25/07/2019	06/08/2019	19/07/2019	25/07/2019	06/08/2019
Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Matrix Type	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Monitoring Unit	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits
Monitoring Round	1	2	3	1	2	3	1	2	3	1	2	3

Parameter	Units	Method Detection Limit	Tier 1 GAC (DWS)	Tier 1 GAC (EQS-Fresh)												
SVOC																
Naphthalene	µg/L	1	6 ^{#15}	2 ^{#8}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
Acenaphthylene	µg/L	1	18 ^{#15}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Acenaphthene	µg/L	1	18 ^{#15}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Fluorene	µg/L	1	12 ^{#15}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Phenanthrene	µg/L	1	4 ^{#15}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Anthracene	µg/L	1	90 ^{#15}	0.1 ^{#8}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
Fluoranthene	µg/L	1	4 ^{#9}	0.0063 ^{#8}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
Pyrene	µg/L	1	9 ^{#15}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Benz(a)anthracene	µg/L	1	3.5 ^{#15}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Chrysene	µg/L	1	7 ^{#15}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Benzo(a) pyrene	µg/L	1	0.01 ^{#1}	0.00017 ^{#8}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	1	0.1 ^{#1}	0.01 ^{#9}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
Dibenz(a,h)anthracene	µg/L	1	0.07 ^{#15}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Benzo(g,h,i)perylene	µg/L	1	0.1 ^{#1}	0.0082 ^{#6}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
Benzo(b)fluoranthene	µg/L	1	0.1 ^{#1}	0.017 ^{#6}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
Benzo(k)fluoranthene	µg/L	1	0.1 ^{#1}	0.017 ^{#6}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
1,3-dichlorobenzene	µg/L	1			-	-	<20	<2	-	-	-	-	<10	<1	-	-
1,4-dichlorobenzene	µg/L	1	300 ^{#3}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
1,2-dichlorobenzene	µg/L	1	1,000 ^{#3}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
1,2,4-trichlorobenzene	µg/L	1	0.1 ^{#1}	0.4 ^{#9}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
Hexachlorobutadiene	µg/L	1	0.1 ^{#1}	0.6 ^{#8}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
2-chlorophenol	µg/L	1	91 ^{#10}	50 ^{#12}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
2-methylphenol	µg/L	1	930 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
2-nitrophenol	µg/L	1			-	-	<20	<2	-	-	-	-	<10	<1	-	-
2,4-dichlorophenol	µg/L	1	46 ^{#10}	4.2 ^{#7}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
2,4-dimethylphenol	µg/L	1	360 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
2,4,5-trichlorophenol	µg/L	1	1,200 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
2,4,6-trichlorophenol	µg/L	1	200 ^{#3}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
4-chloro-3-methylphenol	µg/L	1	1,400 ^{#10}	40 ^{#12}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
4-methylphenol	µg/L	1	1,900 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
4-nitrophenol	µg/L	1			-	-	<20	<2	-	-	-	-	<10	<1	-	-
Pentachlorophenol	µg/L	1	9 ^{#3}	0.4 ^{#8}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
Phenol	µg/L	1	5,800 ^{#10}	7.7 ^{#7}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
2-chloronaphthalene	µg/L	1	750 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
2-methylnaphthalene	µg/L	1	36 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Bis(2-ethylhexyl) phthalate	µg/L	2	8 ^{#9}	1.3 ^{#8}	-	-	<40	<4	-	-	-	-	<20	<2	-	-
Butyl benzyl phthalate	µg/L	1	16 ^{#10}	7.5 ^{#7}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
Di-n-butyl phthalate	µg/L	1	900 ^{#10}	8 ^{#12}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
Di-n-octyl phthalate	µg/L	5	200 ^{#10}	20 ^{#12}	-	-	<100	<10	-	-	-	-	<50	<5	-	-
Diethylphthalate	µg/L	1	15,000 ^{#10}	200 ^{#12}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
Dimethyl phthalate	µg/L	1		800 ^{#12}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
2-nitroaniline	µg/L	1	190 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
2,4-Dinitrotoluene	µg/L	1	0.24 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
2,6-dinitrotoluene	µg/L	1	0.049 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
3-nitroaniline	µg/L	1			-	-	<20	<2	-	-	-	-	<10	<1	-	-
4-bromophenyl phenyl ether	µg/L	1			-	-	<20	<2	-	-	-	-	<10	<1	-	-
4-chloroaniline	µg/L	1	0.37 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
4-chlorophenyl phenyl ether	µg/L	1			-	-	<20	<2	-	-	-	-	<10	<1	-	-
4-nitroaniline	µg/L	1	3.8 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Azobenzene	µg/L	1	0.12 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Bis(2-chloroethoxy) methane	µg/L	1	59 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Bis(2-chloroethyl)ether	µg/L	1	0.014 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Carbazole	µg/L	1			-	-	<20	<2	-	-	-	-	<10	<1	-	-
Dibenzofuran	µg/L	1	7.9 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Hexachlorobenzene	µg/L	1	0.1 ^{#1}	0.05 ^{#8}	-	-	<20	<2	-	-	-	-	<10	<1	-	-
Hexachlorocyclopentadiene	µg/L	1	0.41 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Hexachloroethane	µg/L	1	0.33 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Isophorone	µg/L	1	78 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
N-nitrosodi-n-propylamine	µg/L	1	0.011 ^{#10}		-	-	<20	<2	-	-	-	-	<10	<1	-	-
Nitrobenzene	µg/L	1	8 ^{#3}		-	-	<20	<2	-	-	-	-	<10	<1	-	-

Tier 1 Analysis (Groundwater)
FEZ Holbeach
Lincolnshire County Council

Location	BH01			BH02			BH03			BH04		
Date	19/07/2019	25/07/2019	06/08/2019	19/07/2019	25/07/2019	06/08/2019	19/07/2019	25/07/2019	06/08/2019	19/07/2019	25/07/2019	06/08/2019
Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Matrix Type	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Monitoring Unit	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits	Tidal Flat Deposits
Monitoring Round	1	2	3	1	2	3	1	2	3	1	2	3

Parameter	Units	Method Detection Limit	Tier 1 GAC (DWS)	Tier 1 GAC (EQS-Fresh)												
UNK																
Permethrin I	µg/L	0.01			<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
1,3,5-Trichlorobenzene	µg/L	0.01	0.1 ^{#1}	0.4 ^{#3}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
1,2,4-trichlorobenzene	µg/L	0.01	0.1 ^{#1}	0.4 ^{#3}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Hexachlorobutadiene	µg/L	0.01	0.1 ^{#1}	0.6 ^{#6}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
1,2,3-trichlorobenzene	µg/L	0.01	0.1 ^{#1}	0.4 ^{#3}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Pentachlorophenol	µg/L	0.04	9 ^{#3}	0.4 ^{#6}	<0.08	-	-	-	<0.2	-	<0.04	-	-	-	-	<0.2
Hexachlorobenzene	µg/L	0.01	0.1 ^{#1}	0.05 ^{#6}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Aldrin	µg/L	0.01	0.03 ^{#1}	0.01 ^{#6}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Chlordane (cis)	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Dieldrin	µg/L	0.01	0.03 ^{#1}	0.01 ^{#6}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Endrin	µg/L	0.01	0.1 ^{#1}	0.01 ^{#6}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Heptachlor	µg/L	0.01	0.03 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Isodrin	µg/L	0.01	0.1 ^{#1}	0.01 ^{#6}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
o,p-DDD	µg/L	0.01			<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
DDD	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Pendimethalin	µg/L	0.01	0.1 ^{#1}	0.3 ^{#7}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Tecnazene	mg/L	0.00001	0.0001 ^{#1}	0.001 ^{#12}	<0.00001	-	-	-	<0.00001	-	<0.00001	-	-	-	-	<0.00001
Chlordane (trans)	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Triadimefon	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Triallate	µg/L	0.01	0.1 ^{#1}	0.25 ^{#12}	0.0317	-	-	-	<0.01	-	<0.035	-	-	-	-	0.0315
Trifluralin	µg/L	0.01	0.1 ^{#1}	0.03 ^{#6}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
d-BHC	µg/L	0.01			<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Azinphos Ethyl	µg/L	0.02	0.1 ^{#1}		<0.02	-	-	-	<0.02	-	<0.02	-	-	-	-	<0.02
Azinphos methyl	µg/L	0.02	0.1 ^{#1}	0.01 ^{#12}	<0.02	-	-	-	<0.02	-	<0.02	-	-	-	-	<0.05
Carbophenothion	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Chlorfenvinphos	µg/L	0.01	0.1 ^{#1}	0.1 ^{#6}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Chlorpyrifos	µg/L	0.01	0.1 ^{#1}	0.03 ^{#6}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Chlorpyrifos-methyl	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Diazinon	µg/L	0.01	0.1 ^{#1}	0.01 ^{#7}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Dichlorvos	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Dimethoate	µg/L	0.01	0.1 ^{#1}	0.48 ^{#7}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Ethion	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Parathion	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Fenitrothion	µg/L	0.01	0.1 ^{#1}	0.01 ^{#12}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Fenthion	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Malathion	µg/L	0.01	0.1 ^{#1}	0.01 ^{#12}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Methyl parathion	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Mevinphos (Phosdrin)	µg/L	0.01	0.1 ^{#1}	0.02 ^{#11}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Phosalone	mg/L	0.00001	0.0001 ^{#1}		<0.00001	-	-	-	<0.00001	-	<0.00001	-	-	-	-	<0.00001
Pririmphos-methyl	µg/L	0.01	0.1 ^{#1}	0.015 ^{#12}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Propetamphos	mg/L	0.00001	0.0001 ^{#1}	0.00003 ^{#12}	<0.00001	-	-	-	<0.00001	-	<0.00001	-	-	-	-	<0.00001
Triazophos	mg/L	0.00001	0.0001 ^{#1}	0.000005 ^{#12}	<0.00001	-	-	-	<0.00001	-	<0.00001	-	-	-	-	<0.00001
Disulfoton	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Phorate	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Demeton-S-methyl	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Benazolin	µg/L	0.04			<0.08	-	-	-	<0.2	-	<0.04	-	-	-	-	<0.2
Bromoxynil	µg/L	0.04	0.61 ^{#10}	100 ^{#12}	<0.08	-	-	-	<0.2	-	<0.04	-	-	-	-	<0.2
Clopyralid	µg/L	0.04			<0.08	-	-	-	<0.2	-	<0.04	-	-	-	-	<0.2
Hedonal	µg/L	0.05	30 ^{#3}		<0.1	-	-	-	<0.25	-	<0.05	-	-	-	-	<0.25
2,4-DB	µg/L	0.1			<0.2	-	-	-	<0.5	-	<0.1	-	-	-	-	<0.5
Dicamba	µg/L	0.04	570 ^{#10}		<0.08	-	-	-	<0.2	-	<0.04	-	-	-	-	<0.2
2,4-Dichlorprop	µg/L	0.1	100 ^{#3}		<0.2	-	-	-	<0.5	-	<0.1	-	-	-	-	<0.5
2,4,5-TP (Silvex)	µg/L	0.1	110 ^{#10}		-	-	-	-	<0.5	-	<0.1	-	-	-	-	<0.5
Actril (loxynil)	mg/L	0.00005		0.01 ^{#12}	<0.0001	-	-	-	<0.00025	-	<0.00005	-	-	-	-	<0.00025
2-Methyl-4-chlorophenoxyacetic acid	µg/L	0.05	700 ^{#3}	12 ^{#12}	<0.1	-	-	-	<0.25	-	<0.05	-	-	-	-	<0.25
2-Methyl-4-Chlorophenoxy Butanoic Acid	µg/L	0.05	65 ^{#10}		<0.1	-	-	-	<0.25	-	<0.05	-	-	-	-	<0.25
2,4,5-Trichlorophenoxy Acetic Acid	µg/L	0.05	9 ^{#3}		<0.1	-	-	-	<0.25	-	<0.05	-	-	-	-	<0.25
Triclopyr	µg/L	0.05			<0.1	-	-	-	<0.25	-	<0.05	-	-	-	-	<0.25
Atrazine	µg/L	0.01	0.1 ^{#1}	0.6 ^{#6}	0.276	-	-	-	<0.01	-	<0.01	-	-	-	-	0.083
Simazine	µg/L	0.01	0.1 ^{#1}	1 ^{#6}	<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
2,3,6-Trichlorobenzoic acid	µg/L	0.05			<0.1	-	-	-	<0.25	-	<0.05	-	-	-	-	<0.25
4,6-Dinitro-2-methylphenol	µg/L	0.1	1.5 ^{#10}		1.4	-	-	-	3.99	-	1.06	-	-	-	-	1.55
Dichlobenil	µg/L	0.01	0.1 ^{#1}		<0.01	-	-	-	<0.01	-	<0.01	-	-	-	-	<0.01
Fluroxypyr	µg/L	0.1			0.249	-	-	-	<0.5	-	0.134	-	-	-	-	<0.5
Mecoprop	µg/L	0.04	10 ^{#3}	18 ^{#7}	<0.08	-	-	-	<0.2	-	<0.04	-	-	-	-	<0.2
Fenoprop	µg/L	0.2	9 ^{#3}		<0.2	-	-	-	-	-	-	-	-	-	-	-

Comments
#1 WS Regs 2016 (Eng/Wal)
#2 WHO Petroleum DWG 2008
#3 WHO DWG 2017
#4 WHO 2017 - Taste
#5 WHO 2017 - Odour
#6 WFD England/Wales. 2015 - MAC-EQS Inland
#7 WFD England/Wales. 2015 - Freshwater Standards
#8 WFD England/Wales. 2015 - AA-EQS Inland
#9 Water Env't Regs (Scotland) 2015. AA-EQS Inland
#10 USEPA RSL (tapwater) [May 2019]
#11 SEPA WAT-SG-53 Fresh EQS - MAC - 2015
#12 SEPA WAT-SG-53 Fresh EQS - AA - 2015
#13 PNEC (EU REACH) - Freshwater
#14 California Draft health protective concentration
#15 AECOM DWG (WHO method)
GAC: Generic Assessment Criteria
(blank): No assessment criteria available
-: Not analysed

Key	
XXX	Exceedance of CW/WE Water. DWS - England/Wales
XXX	Exceedance of CW/WE Water. Aquatic Toxicity - England/Wales - Freshwater

Appendix D – Ground Gas Monitoring Results

DRAFT

Location	Monitoring Round	Date	Atmospheric Pressure (mB)	Max CH ₄ (%)	Max CO ₂ (%)	Min O ₂ (%)	Max H ₂ S (ppm)	Max CO (ppm)	Max Flow Rate (l/hr)	Max LEL (%)	GSV CH ₄ (l of CH ₄ /hr)	GSV CO ₂ (l of CO ₂ /hr)
BH01	1	19/07/2019	1010	0.1	0.7	18.8	0.1	0.1	0.1	0.1	0.0001	0.0007
	2	25/07/2019	1006	0.1	13.9	1.7	0.1	0.1	0.1	0.1	0.0001	0.0139
	3	06/08/2019	1004	0.1	18.2	1.1	0.1	0.1	0.1	0.1	0.0001	0.0182
BH02	1	19/07/2019	1010	0.1	5.3	5.6	0.1	0.1	0.1	0.1	0.0001	0.0053
	2	25/07/2019	1010	0.2	5.1	4.6	0.1	0.1	0.1	0.1	0.0002	0.0051
	3	06/08/2019	1004	0.1	17.4	1.4	0.1	0.1	0.1	0.1	0.0001	0.0174
BH03	1	19/07/2019	1010	0.1	6.4	5.6	0.1	0.1	0.1	0.1	0.0001	0.0064
	2	25/07/2019	1007	0.1	11.1	5.1	0.1	0.1	0.1	0.1	0.0001	0.0111
	3	06/08/2019	1004	0.1	18.7	0.6	0.1	0.1	0.1	0.1	0.0001	0.0187
BH04	1	19/07/2019	1010	0.1	6.0	5.3	0.1	0.1	0.1	0.1	0.0001	0.006
	2	25/07/2019	1005	0.1	14.3	2.3	0.1	0.1	0.1	0.1	0.0001	0.0143
	3	06/08/2019	1004	0.1	15.2	2.9	0.1	0.1	0.1	0.1	0.0001	0.0152

Key

0.1 = less than detection limit

Appendix E – Settlement Analysis Results

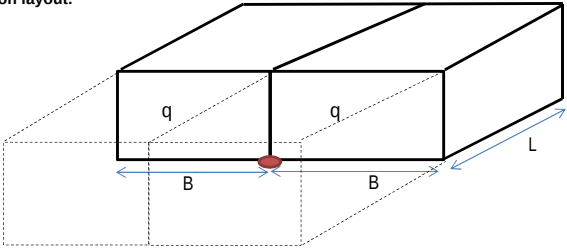
DRAFT

SETTLEMENT CALCULATION
CENTRE OF A RECTANGULAR LOADED AREA

Project :	FEZ Holbeach	Revision :	
Calculation :	Detailed Calculation of Settlement	Chkd By :	
Job No :		Date :	
Input by :	DT	Checked by :	
Date :	25-Sep-19	Date :	

Foundation length, L (m) =	0.40
Foundation breadth, B (m) =	0.40
Applied Load, q_o (kN/m ²) =	150.00
Will loads fluctuate?	NO
Design Life (years)	50
Is drainage at base of problem Open or Closed?	CLOSED
cv of cohesive materials (m ² /year)	1
alpha	0.0%

Foundation layout:



Designer's Comments:

Settlement of building with pad foundation on 15m of Tidal Flat Deposits overlying weathered West Walton Formation

TIME DEPENDENT SETTLEMENT

Time of interest (years)	0.5
Creep start (years)	0.1

LAYER	LAYER THICKNESS (m)	SOIL DESCRIPTION	SOIL TYPE	DEPTH TO BTM OF LAYER (m)	CHANGE IN s_v (kN/m ²)	GRANULAR	COHESIVE			IMMEDIATE SETTLEMENT (mm)	LONG TERM SETTLEMENT (mm)	CREEP SETTLEMENT (mm)	TOTAL SETTLEMENT (mm)
						E' (Mpa)	Eu (Mpa)	μ_g	m_v (m ² /MN)				
1	1.0	Tidal Flat Deposits	Granular	1.00	87.6	6.1				14.4		7.8	22.2
2	1.0	Tidal Flat Deposits	Granular	2.00	18.2	6.1				3.0		1.6	4.6
3	1.0	Tidal Flat Deposits	Granular	3.00	7.0	7.9				0.9		0.5	1.4
4	1.0	Tidal Flat Deposits	Granular	4.00	3.7	7.9				0.5		0.3	0.7
5	1.0	Tidal Flat Deposits	Granular	5.00	2.2	7.9				0.3		0.2	0.4
6	1.0	Tidal Flat Deposits	Granular	6.00	1.5	11.8				0.1		0.1	0.2
7	1.0	Tidal Flat Deposits	Granular	7.00	1.1	16.1				0.1		0.0	0.1
8	2.0	Tidal Flat Deposits	Granular	9.00	0.7	28.4				0.1		0.0	0.1
9	2.0	Tidal Flat Deposits	Granular	11.00	0.5	28.4				0.0		0.0	0.0
10	2.0	Tidal Flat Deposits	Granular	13.00	0.3	42.4				0.0		0.0	0.0
11	2.0	Tidal Flat Deposits	Granular	15.00	0.2	58.0				0.0		0.0	0.0
12	2.0	West Walton Formation	Cohesive	17.00	0.2		21.3	1.0	0.16	0.0	0.1		0.1
13	2.0	West Walton Formation	Cohesive	19.00	0.1		32.0	1.0	0.16	0.0	0.0		0.1
14	2.0	West Walton Formation	Cohesive	21.00	0.1		37.3	1.0	0.16	0.0	0.0		0.0
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
						TOTAL				19	0	11	30

LONG TERM SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT REMAINING (mm)
3	22	8

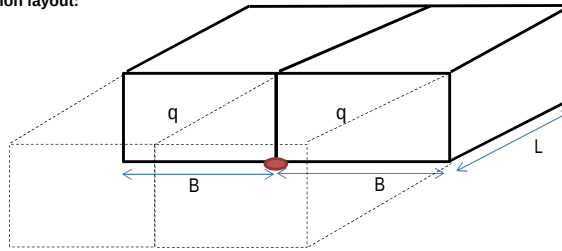
TOTAL

NOTE: Time dependent settlement is calculated assumin that all adjoining cohesive materials act as a single layer i accordance with Terzaghi's method.

SETTLEMENT CALCULATION
CENTRE OF A RECTANGULAR LOADED AREA

Project :	FEZ Holbeach	Revision :	
Calculation :	Detailed Calculation of Settlement	Chkd By :	
Job No :		Date :	
Input by :	DT	Checked by :	
Date :	25-Sep-19	Date :	

Foundation layout:



Foundation length, L (m) =	0.50
Foundation breadth, B (m) =	0.50
Applied Load, q_0 (kN/m ²) =	150.00
Will loads fluctuate?	NO
Design Life (years)	50
Is drainage at base of problem Open or Closed?	CLOSED
cv of cohesive materials (m ² /year)	1
alpha	0.0%

Designer's Comments:

Settlement of building with pad foundation on 15m of Tidal Flat Deposits overlying weathered West Walton Formation

TIME DEPENDENT SETTLEMENT

Time of interest (years)	0.5
Creep start (years)	0.1

LAYER	LAYER THICKNESS (m)	SOIL DESCRIPTION	SOIL TYPE	DEPTH TO BTM OF LAYER (m)	CHANGE IN s_v (kN/m ²)	GRANULAR	COHESIVE			IMMEDIATE SETTLEMENT (mm)	LONG TERM SETTLEMENT (mm)	CREEP SETTLEMENT (mm)	TOTAL SETTLEMENT (mm)
						E' (Mpa)	Eu (Mpa)	μ_g	m_v (m ² /MN)				
1	1.0	Tidal Flat Deposits	Granular	1.00	105.1	6.1				17.3		9.4	26.6
2	1.0	Tidal Flat Deposits	Granular	2.00	26.8	6.1				4.4		2.4	6.8
3	1.0	Tidal Flat Deposits	Granular	3.00	10.7	7.9				1.4		0.7	2.1
4	1.0	Tidal Flat Deposits	Granular	4.00	5.7	7.9				0.7		0.4	1.1
5	1.0	Tidal Flat Deposits	Granular	5.00	3.5	7.9				0.4		0.2	0.7
6	1.0	Tidal Flat Deposits	Granular	6.00	2.3	11.8				0.2		0.1	0.3
7	1.0	Tidal Flat Deposits	Granular	7.00	1.7	16.1				0.1		0.1	0.2
8	2.0	Tidal Flat Deposits	Granular	9.00	1.1	28.4				0.1		0.0	0.1
9	2.0	Tidal Flat Deposits	Granular	11.00	0.7	28.4				0.1		0.0	0.1
10	2.0	Tidal Flat Deposits	Granular	13.00	0.5	42.4				0.0		0.0	0.0
11	2.0	Tidal Flat Deposits	Granular	15.00	0.4	58.0				0.0		0.0	0.0
12	2.0	West Walton Formation	Cohesive	17.00	0.3		21.3	1.0	0.16	0.0	0.1		0.1
13	2.0	West Walton Formation	Cohesive	19.00	0.2		32.0	1.0	0.16	0.0	0.1		0.1
14	2.0	West Walton Formation	Cohesive	21.00	0.2		37.3	1.0	0.16	0.0	0.1		0.1
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
						TOTAL				25	0	13	38

LONG TERM SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT REMAINING (mm)
4	28	10
TOTAL		

NOTE: Time dependent settlement is calculated assumin that all adjoining cohesive materials act as a single layer i accordance with Terzaghi's method.

SETTLEMENT CALCULATION
CENTRE OF A RECTANGULAR LOADED AREA

Project :

FEZ Holbeach

Revision :

Calculation :

Detailed Calculation of Settlement

Chkd By :

Job No :

Date :

Input by :

DT

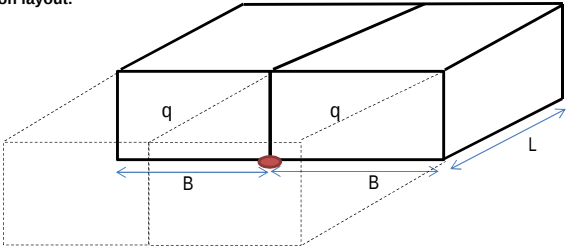
Checked by :

Date :

25-Sep-19

Date :

Foundation layout:



Foundation length, L (m) =

0.75

Foundation breadth, B (m) =

0.75

Applied Load, q_o (kN/m²) =

150.00

Will loads fluctuate?

NO

Design Life (years)

50

Is drainage at base of problem Open or Closed?

CLOSED

cv of cohesive materials (m²/year)

1

alpha

0.0%

Designer's Comments:

Settlement of building with pad foundation on 15m of Tidal Flat Deposits overlying weathered West Walton Formation

LAYER	LAYER THICKNESS (m)	SOIL DESCRIPTION	SOIL TYPE	DEPTH TO BTM OF LAYER (m)	CHANGE IN s _v (kN/m ²)	GRANULAR	COHESIVE			IMMEDIATE SETTLEMENT (mm)	LONG TERM SETTLEMENT (mm)	CREEP SETTLEMENT (mm)	TOTAL SETTLEMENT (mm)
						E' (Mpa)	Eu (Mpa)	μ _g	m _v (m ² /MN)				
1	1.0	Tidal Flat Deposits	Granular	1.00	129.4	6.1				21.2		11.6	32.8
2	1.0	Tidal Flat Deposits	Granular	2.00	50.4	6.1				8.3		4.5	12.8
3	1.0	Tidal Flat Deposits	Granular	3.00	22.4	7.9				2.8		1.6	4.4
4	1.0	Tidal Flat Deposits	Granular	4.00	12.2	7.9				1.6		0.8	2.4
5	1.0	Tidal Flat Deposits	Granular	5.00	7.6	7.9				1.0		0.5	1.5
6	1.0	Tidal Flat Deposits	Granular	6.00	5.2	11.8				0.4		0.2	0.7
7	1.0	Tidal Flat Deposits	Granular	7.00	3.7	16.1				0.2		0.1	0.4
8	2.0	Tidal Flat Deposits	Granular	9.00	2.5	28.4				0.2		0.1	0.3
9	2.0	Tidal Flat Deposits	Granular	11.00	1.6	28.4				0.1		0.1	0.2
10	2.0	Tidal Flat Deposits	Granular	13.00	1.1	42.4				0.1		0.0	0.1
11	2.0	Tidal Flat Deposits	Granular	15.00	0.8	58.0				0.0		0.0	0.0
12	2.0	West Walton Formation	Cohesive	17.00	0.6		21.3	1.0	0.16	0.1	0.2		0.3
13	2.0	West Walton Formation	Cohesive	19.00	0.5		32.0	1.0	0.16	0.0	0.2		0.2
14	2.0	West Walton Formation	Cohesive	21.00	0.4		37.3	1.0	0.16	0.0	0.1		0.2
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
						TOTAL				36	0	20	56

TIME DEPENDENT SETTLEMENT	
Time of interest (years)	0.5
Creep start (years)	0.1

LONG TERM SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT REMAINING (mm)
5	41	15
TOTAL		

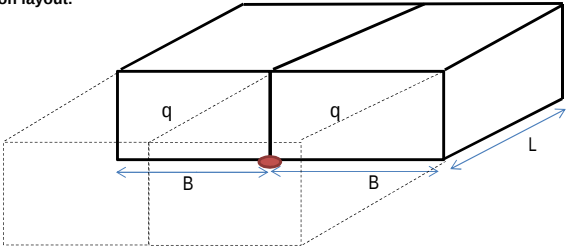
NOTE: Time dependent settlement is calculated assumin that all adjoining cohesive materials act as a single layer i accordance with Terzaghi's method.

SETTLEMENT CALCULATION
CENTRE OF A RECTANGULAR LOADED AREA

Project :	FEZ Holbeach	Revision :	
Calculation :	Detailed Calculation of Settlement	Chkd By :	
Job No :		Date :	
Input by :	DT	Checked by :	
Date :	25-Sep-19	Date :	

Foundation length, L (m) =	5.00
Foundation breadth, B (m) =	5.00
Applied Load, q_o (kN/m ²) =	15.00
Will loads fluctuate?	NO
Design Life (years)	50
Is drainage at base of problem Open or Closed?	CLOSED
cv of cohesive materials (m ² /year)	1
alpha	0.0%

Foundation layout:



Designer's Comments:

Settlement of building with raft foundation on 15m of Tidal Flat Deposits overlying weathered West Walton Formation

TIME DEPENDENT SETTLEMENT

Time of interest (years)	0.5
Creep start (years)	0.1

LAYER	LAYER THICKNESS (m)	SOIL DESCRIPTION	SOIL TYPE	DEPTH TO BTM OF LAYER (m)	CHANGE IN s_v (kN/m ²)	GRANULAR	COHESIVE			IMMEDIATE SETTLEMENT (mm)	LONG TERM SETTLEMENT (mm)	CREEP SETTLEMENT (mm)	TOTAL SETTLEMENT (mm)
						E' (Mpa)	Eu (Mpa)	μ_g	m_v (m ² /MN)				
1	1.0	Tidal Flat Deposits	Granular	1.00	15.0	6.1				2.5		1.3	3.8
2	1.0	Tidal Flat Deposits	Granular	2.00	14.7	6.1				2.4		1.3	3.7
3	1.0	Tidal Flat Deposits	Granular	3.00	13.9	7.9				1.8		1.0	2.7
4	1.0	Tidal Flat Deposits	Granular	4.00	12.7	7.9				1.6		0.9	2.5
5	1.0	Tidal Flat Deposits	Granular	5.00	11.3	7.9				1.4		0.8	2.2
6	1.0	Tidal Flat Deposits	Granular	6.00	9.8	11.8				0.8		0.5	1.3
7	1.0	Tidal Flat Deposits	Granular	7.00	8.4	16.1				0.5		0.3	0.8
8	2.0	Tidal Flat Deposits	Granular	9.00	6.7	28.4				0.5		0.3	0.7
9	2.0	Tidal Flat Deposits	Granular	11.00	5.0	28.4				0.4		0.2	0.5
10	2.0	Tidal Flat Deposits	Granular	13.00	3.9	42.4				0.2		0.1	0.3
11	2.0	Tidal Flat Deposits	Granular	15.00	3.0	58.0				0.1		0.1	0.2
12	2.0	West Walton Formation	Cohesive	17.00	2.4		21.3	1.0	0.16	0.2	0.8		1.0
13	2.0	West Walton Formation	Cohesive	19.00	2.0		32.0	1.0	0.16	0.1	0.6		0.7
14	2.0	West Walton Formation	Cohesive	21.00	1.6		37.3	1.0	0.16	0.1	0.5		0.6
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
						TOTAL				13	2	7	21

LONG TERM SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT REMAINING (mm)
2	15	7
TOTAL		

NOTE: Time dependent settlement is calculated assumin that all adjoining cohesive materials act as a single layer i accordance with Terzaghi's method.

SETTLEMENT CALCULATION
CENTRE OF A RECTANGULAR LOADED AREA

Project : FEZ Holbeach

Revision :

Calculation : Detailed Calculation of Settlement

Chkd By :

Job No :

Date :

Input by : DT

Checked by :

Date : 25-Sep-19

Date :

Foundation length, L (m) = 4.00

Foundation breadth, B (m) = 0.20

Applied Load, q_o (kN/m²) = 125.00

Will loads fluctuate? NO

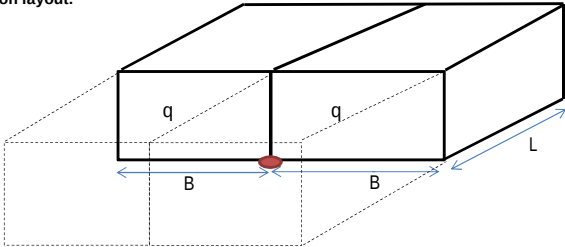
Design Life (years) 50

Is drainage at base of problem Open or Closed? CLOSED

cv of cohesive materials (m²/year) 1

alpha 0.0%

Foundation layout:



Designer's Comments:

Settlement of building with strip foundation on 15m of Tidal Flat Deposits overlying weathered West Walton Formation

LAYER	LAYER THICKNESS (m)	SOIL DESCRIPTION	SOIL TYPE	DEPTH TO BTM OF LAYER (m)	CHANGE IN s _v (kN/m ²)	GRANULAR	COHESIVE			IMMEDIATE SETTLEMENT (mm)	LONG TERM SETTLEMENT (mm)	CREEP SETTLEMENT (mm)	TOTAL SETTLEMENT (mm)
						E' (Mpa)	E _u (Mpa)	μ _g	m _v (m ² /MN)				
1	1.0	Tidal Flat Deposits	Granular	1.00	57.7	6.1				9.5		5.2	14.6
2	1.0	Tidal Flat Deposits	Granular	2.00	20.8	6.1				3.4		1.9	5.3
3	1.0	Tidal Flat Deposits	Granular	3.00	12.3	7.9				1.6		0.8	2.4
4	1.0	Tidal Flat Deposits	Granular	4.00	8.3	7.9				1.1		0.6	1.6
5	1.0	Tidal Flat Deposits	Granular	5.00	6.0	7.9				0.8		0.4	1.2
6	1.0	Tidal Flat Deposits	Granular	6.00	4.5	11.8				0.4		0.2	0.6
7	1.0	Tidal Flat Deposits	Granular	7.00	3.5	16.1				0.2		0.1	0.3
8	2.0	Tidal Flat Deposits	Granular	9.00	2.5	28.4				0.2		0.1	0.3
9	2.0	Tidal Flat Deposits	Granular	11.00	1.7	28.4				0.1		0.1	0.2
10	2.0	Tidal Flat Deposits	Granular	13.00	1.2	42.4				0.1		0.0	0.1
11	2.0	Tidal Flat Deposits	Granular	15.00	0.9	58.0				0.0		0.0	0.0
12	2.0	West Walton Formation	Cohesive	17.00	0.7		21.3	1.0	0.16	0.1	0.2		0.3
13	2.0	West Walton Formation	Cohesive	19.00	0.6		32.0	1.0	0.16	0.0	0.2		0.2
14	2.0	West Walton Formation	Cohesive	21.00	0.5		37.3	1.0	0.16	0.0	0.1		0.2
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
						TOTAL				17	1	9	27

TIME DEPENDENT SETTLEMENT

Time of interest (years)	0.5
Creep start (years)	0.1

LONG TERM SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT REMAINING (mm)
3	20	7
TOTAL		

NOTE: Time dependent settlement is calculated assumin that all adjoining cohesive materials act as a single layer i accordance with Terzaghi's method.

SETTLEMENT CALCULATION
CENTRE OF A RECTANGULAR LOADED AREA

Project : FEZ Holbeach

Revision :

Calculation : Detailed Calculation of Settlement

Chkd By :

Job No :

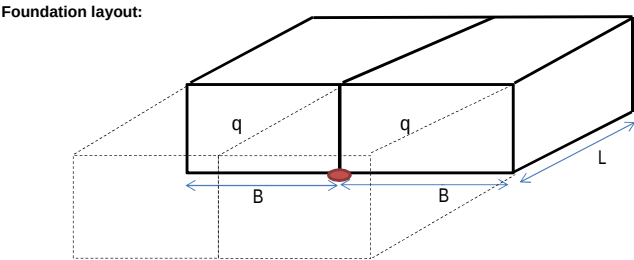
Date :

Input by : DT

Checked by :

Date : 25-Sep-19

Date :



Foundation length, L (m) =

4.00

Foundation breadth, B (m) =

0.25

Applied Load, q_o (kN/m²) =

100.00

Will loads fluctuate?

NO

Design Life (years)

50

Is drainage at base of problem Open or Closed?

CLOSED

cv of cohesive materials (m²/year)

1

alpha

0.0%

Designer's Comments:

Settlement of building with strip foundation on 15m of Tidal Flat Deposits overlying weathered West Walton Formation

LAYER	LAYER THICKNESS (m)	SOIL DESCRIPTION	SOIL TYPE	DEPTH TO BTM OF LAYER (m)	CHANGE IN s _v (kN/m ²)	GRANULAR	COHESIVE			IMMEDIATE SETTLEMENT (mm)	LONG TERM SETTLEMENT (mm)	CREEP SETTLEMENT (mm)	TOTAL SETTLEMENT (mm)
						E' (Mpa)	E _u (Mpa)	μ _g	m _v (m ² /MN)				
1	1.0	Tidal Flat Deposits	Granular	1.00	55.0	6.1				9.0		4.9	13.9
2	1.0	Tidal Flat Deposits	Granular	2.00	20.7	6.1				3.4		1.9	5.2
3	1.0	Tidal Flat Deposits	Granular	3.00	12.2	7.9				1.6		0.8	2.4
4	1.0	Tidal Flat Deposits	Granular	4.00	8.3	7.9				1.1		0.6	1.6
5	1.0	Tidal Flat Deposits	Granular	5.00	6.0	7.9				0.8		0.4	1.2
6	1.0	Tidal Flat Deposits	Granular	6.00	4.5	11.8				0.4		0.2	0.6
7	1.0	Tidal Flat Deposits	Granular	7.00	3.5	16.1				0.2		0.1	0.3
8	2.0	Tidal Flat Deposits	Granular	9.00	2.5	28.4				0.2		0.1	0.3
9	2.0	Tidal Flat Deposits	Granular	11.00	1.7	28.4				0.1		0.1	0.2
10	2.0	Tidal Flat Deposits	Granular	13.00	1.2	42.4				0.1		0.0	0.1
11	2.0	Tidal Flat Deposits	Granular	15.00	0.9	58.0				0.0		0.0	0.0
12	2.0	West Walton Formation	Cohesive	17.00	0.7		21.3	1.0	0.16	0.1	0.2		0.3
13	2.0	West Walton Formation	Cohesive	19.00	0.6		32.0	1.0	0.16	0.0	0.2		0.2
14	2.0	West Walton Formation	Cohesive	21.00	0.5		37.3	1.0	0.16	0.0	0.1		0.2
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
						delete shaded red text	TOTAL			17	1	9	27

TIME DEPENDENT SETTLEMENT

Time of interest (years)	0.5
Creep start (years)	0.1

LONG TERM SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT REMAINING (mm)
2	19	7

NOTE: Time dependent settlement is calculated assumin that all adjoining cohesive materials act as a single layer i accordance with Terzaghi's method.

SETTLEMENT CALCULATION
CENTRE OF A RECTANGULAR LOADED AREA

Project : FEZ Holbeach

Revision :

Calculation : Detailed Calculation of Settlement

Chkd By :

Job No :

Date :

Input by : DT

Checked by :

Date : 25-Sep-19

Date :

Foundation length, L (m) = 4.00

Foundation breadth, B (m) = 0.30

Applied Load, q_o (kN/m²) = 85.00

Will loads fluctuate? NO

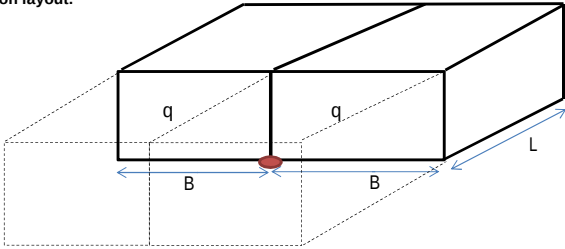
Design Life (years) 50

Is drainage at base of problem Open or Closed? CLOSED

cv of cohesive materials (m²/year) 1

alpha 0.0%

Foundation layout:



Designer's Comments:

Settlement of building with strip foundation on 15m of Tidal Flat Deposits overlying weathered West Walton Formation

LAYER	LAYER THICKNESS (m)	SOIL DESCRIPTION	SOIL TYPE	DEPTH TO BTM OF LAYER (m)	CHANGE IN s _v (kN/m ²)	GRANULAR	COHESIVE			IMMEDIATE SETTLEMENT (mm)	LONG TERM SETTLEMENT (mm)	CREEP SETTLEMENT (mm)	TOTAL SETTLEMENT (mm)
						E' (Mpa)	E _u (Mpa)	μ _g	m _v (m ² /MN)				
1	1.0	Tidal Flat Deposits	Granular	1.00	53.1	6.1				8.7		4.7	13.5
2	1.0	Tidal Flat Deposits	Granular	2.00	21.0	6.1				3.4		1.9	5.3
3	1.0	Tidal Flat Deposits	Granular	3.00	12.4	7.9				1.6		0.9	2.4
4	1.0	Tidal Flat Deposits	Granular	4.00	8.5	7.9				1.1		0.6	1.7
5	1.0	Tidal Flat Deposits	Granular	5.00	6.1	7.9				0.8		0.4	1.2
6	1.0	Tidal Flat Deposits	Granular	6.00	4.6	11.8				0.4		0.2	0.6
7	1.0	Tidal Flat Deposits	Granular	7.00	3.6	16.1				0.2		0.1	0.3
8	2.0	Tidal Flat Deposits	Granular	9.00	2.5	28.4				0.2		0.1	0.3
9	2.0	Tidal Flat Deposits	Granular	11.00	1.7	28.4				0.1		0.1	0.2
10	2.0	Tidal Flat Deposits	Granular	13.00	1.2	42.4				0.1		0.0	0.1
11	2.0	Tidal Flat Deposits	Granular	15.00	0.9	58.0				0.0		0.0	0.0
12	2.0	West Walton Formation	Cohesive	17.00	0.7		21.3	1.0	0.16	0.1	0.2		0.3
13	2.0	West Walton Formation	Cohesive	19.00	0.6		32.0	1.0	0.16	0.0	0.2		0.2
14	2.0	West Walton Formation	Cohesive	21.00	0.5		37.3	1.0	0.16	0.0	0.2		0.2
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
						delete shaded red text	TOTAL			17	1	9	26

TIME DEPENDENT SETTLEMENT

Time of interest (years)	0.5
Creep start (years)	0.1

LONG TERM SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT REMAINING (mm)
2	19	7
TOTAL		

NOTE: Time dependent settlement is calculated assumin that all adjoining cohesive materials act as a single layer i accordance with Terzaghi's method.

Appendix F – Bearing Capacity Analysis

DRAFT

		BEARING CAPACITY				
Project:		FEZ Holbeach				
		Shallow Pad Foundation				
JEN:		60505563		Date	27/09/2019	
Originator		Checked	Revision	Suffix		Orig
D Thornton				Date		Check

1) Assumptions and Notes:

2) Loads from Structure		Units	Unfactored	DA 1-1	DA 1-2	Notes
Vertical Permanent Load	$V_{\text{permanent}}$	kN	15000	20250	15000	Indicative loads only. Please refer to Technical Note for applied loads.
Vertical Variable Load	V_{variable}	kN	1000	1500	1300	
Total Vertical Load	V_{total}	kN	16000	21750	16300	
Horizontal Load in Direction of Breadth (Permanent)	$H_{B,\text{permanent}}$	kN	0	0	0	
Horizontal Load in Direction of Breadth (Variable)	$H_{B,\text{variable}}$	kN	0	0	0	
Horizontal Load from Retained Earth	$H_{B,\text{earth}}$	kN	0	0	0	
Total Horizontal Load In Direction of Breadth	$H_{B,\text{total}}$	kN	0	0	0	
Lever Arm of Horizontal Load, H_1	h_1	m	0.00	0.00	0.00	
Moment from Horizontal Load	$M_1 = H_1 \cdot h_1$	kNm	0	0	0	
Moment from Retained Earth	M_{Earth}	kNm	0	0	0	
Moment in Direction of Breadth (Permanent)	$M_{B,\text{permanent}}$	kNm	0	0	0	
Moment in Direction of Breadth (Variable)	$M_{B,\text{variable}}$	kNm	0	0	0	
Total Moment in Direction of Breadth	$M_{B,\text{total}}$	kNm	0	0	0	
Moment in Direction of Length (Permanent)	$M_{L,\text{permanent}}$	kNm	0	0	0	
Moment in Direction of Length (Variable)	$M_{L,\text{variable}}$	kNm	0	0	0	
Total Moment in Direction of Length	$M_{L,\text{total}}$	kNm	0	0	0	
Angle of Resultant from Vertical	$\Theta = \tan^{-1}(H/V)$	°	0.00	0.00	0.00	

2) Dimensions		Units	Unfactored	DA 1-1	DA 1-2	Notes
Width of Footing	B	m	0.80	0.80	0.80	
Length of Footing	L	m	0.80	0.80	0.80	
Depth to Founding Level (distance finished ground level to foundation level)	D	m	0.5	0.5	0.5	
Inclination of Base from Horizontal	η	°	0.0	0.0	0.0	
Sloping Surface Angle	β	°	0.0	0.0	0.0	
Eccentricity b	$e_B = M_{B,\text{total}} / V_{\text{total}}$	m	0.000	0.000	0.000	
Eccentricity l	$e_L = M_{L,\text{total}} / V_{\text{total}}$	m	0.000	0.000	0.000	
Check Eccentricity in B	$B/6 - e_B > 0$	m	0.13	0.13	0.13	
Check Eccentricity in L	$L/6 - e_L > 0$	m	0.13	0.13	0.13	
Effective Width of Footing	$B' = B - 2 \cdot e_B$	m	0.80	0.80	0.80	
Effective Length of Footing	$L' = L - 2 \cdot e_L$	m	0.80	0.80	0.80	
Effective Area of Footing	$A' = B' \cdot L'$	m ²	0.64	0.64	0.64	

3) Geotechnical parameters		Units	Unfactored	DA 1-1	DA 1-2	Notes
Angle of Friction	ϕ'	°	27.0	27.0	22.2	
Effective Cohesion	c'	kN/m ²	5.0	5.0	4.0	
Undrained Cohesion	c_u	kN/m ²		0.0	0.0	
Unit Weight Below Footing	γ	kN/m ³	19.0	19.0	19.0	
Water level (below finished ground level)		m	2.0	2.0	2.0	
Effective Overburden Pressure at Footing Level	q_0	kN/m ²	9.5	9.5	9.5	
Total Overburden Pressure at Footing Level	q	kN/m ²	9.5	9.5	9.5	
Effective Overburden Pressure due to Build Up	q_{obuild}	kN/m ²				

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Project:		FEZ Holbeach				
		Shallow Pad Foundation				
JEN:		60505563		Date	27/09/2019	
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D Thornton				Date		Check
1) Assumptions and Notes:						
2) Loads from Structure						
		Units	Unfactored	DA 1-1	DA 1-2	Notes
Vertical Permanent Load	$V_{\text{permanent}}$	kN	15000	20250	15000	Indicative loads only. Please refer to Technical Note for applied loads.
Vertical Variable Load	V_{variable}	kN	1000	1500	1300	
Total Vertical Load	V_{total}	kN	16000	21750	16300	
Horizontal Load in Direction of Breadth (Permanent)	$H_{B,\text{permanent}}$	kN	0	0	0	
Horizontal Load in Direction of Breadth (Variable)	$H_{B,\text{variable}}$	kN	0	0	0	
Horizontal Load from Retained Earth	$H_{B,\text{earth}}$	kN	0	0	0	
Total Horizontal Load In Direction of Breadth	$H_{B,\text{total}}$	kN	0	0	0	
Lever Arm of Horizontal Load, H_1	h_1	m	0.00	0.00	0.00	
Moment from Horizontal Load	$M_1 = H_1 \cdot h_1$	kNm	0	0	0	
Moment from Retained Earth	M_{Earth}	kNm	0	0	0	
Moment in Direction of Breadth (Permanent)	$M_{B,\text{permanent}}$	kNm	0	0	0	
Moment in Direction of Breadth (Variable)	$M_{B,\text{variable}}$	kNm	0	0	0	
Total Moment in Direction of Breadth	$M_{B,\text{total}}$	kNm	0	0	0	
Moment in Direction of Length (Permanent)	$M_{L,\text{permanent}}$	kNm	0	0	0	
Moment in Direction of Length (Variable)	$M_{L,\text{variable}}$	kNm	0	0	0	
Total Moment in Direction of Length	$M_{L,\text{total}}$	kNm	0	0	0	
Angle of Resultant from Vertical	$\Theta = \tan^{-1}(H/V)$	°	0.00	0.00	0.00	
2) Dimensions						
		Units	Unfactored	DA 1-1	DA 1-2	Notes
Width of Footing	B	m	1.00	1.00	1.00	
Length of Footing	L	m	1.00	1.00	1.00	
Depth to Founding Level (distance finished ground level to foundation level)	D	m	0.5	0.5	0.5	
Inclination of Base from Horizontal	η	°	0.0	0.0	0.0	
Sloping Surface Angle	β	°	0.0	0.0	0.0	
Eccentricity b	$e_B = M_{B,\text{total}} / V_{\text{total}}$	m	0.000	0.000	0.000	
Eccentricity l	$e_L = M_{L,\text{total}} / V_{\text{total}}$	m	0.000	0.000	0.000	
Check Eccentricity in B	$B/6 - e_B > 0$	m	0.17	0.17	0.17	
Check Eccentricity in L	$L/6 - e_L > 0$	m	0.17	0.17	0.17	
Effective Width of Footing	$B' = B - 2 \cdot e_B$	m	1.00	1.00	1.00	
Effective Length of Footing	$L' = L - 2 \cdot e_L$	m	1.00	1.00	1.00	
Effective Area of Footing	$A' = B' \cdot L'$	m ²	1.00	1.00	1.00	
3) Geotechnical parameters						
		Units	Unfactored	DA 1-1	DA 1-2	Notes
Angle of Friction	ϕ'	°	27.0	27.0	22.2	
Effective Cohesion	c'	kN/m ²	5.0	5.0	4.0	
Undrained Cohesion	c_u	kN/m ²		0.0	0.0	
Unit Weight Below Footing	γ	kN/m ³	19.0	19.0	19.0	
Water level (below finished ground level)		m	2.0	2.0	2.0	
Effective Overburden Pressure at Footing Level	q_0	kN/m ²	9.5	9.5	9.5	
Total Overburden Pressure at Footing Level	q	kN/m ²	9.5	9.5	9.5	
Effective Overburden Pressure due to Build Up	q_{obuild}	kN/m ²				

		BEARING CAPACITY				
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D Thornton				Date		Check
1) Assumptions and Notes:						
2) Loads from Structure						
		Units	Unfactored	DA 1-1	DA 1-2	Notes
Vertical Permanent Load	$V_{\text{permanent}}$	kN	15000	20250	15000	Indicative loads only. Please refer to Technical Note for applied loads.
Vertical Variable Load	V_{variable}	kN	1000	1500	1300	
Total Vertical Load	V_{total}	kN	16000	21750	16300	
Horizontal Load in Direction of Breadth (Permanent)	$H_{B,\text{permanent}}$	kN	0	0	0	
Horizontal Load in Direction of Breadth (Variable)	$H_{B,\text{variable}}$	kN	0	0	0	
Horizontal Load from Retained Earth	$H_{B,\text{earth}}$	kN	0	0	0	
Total Horizontal Load In Direction of Breadth	$H_{B,\text{total}}$	kN	0	0	0	
Lever Arm of Horizontal Load, H_1	h_1	m	0.00	0.00	0.00	
Moment from Horizontal Load	$M_1 = H_1 \cdot h_1$	kNm	0	0	0	
Moment from Retained Earth	M_{Earth}	kNm	0	0	0	
Moment in Direction of Breadth (Permanent)	$M_{B,\text{permanent}}$	kNm	0	0	0	
Moment in Direction of Breadth (Variable)	$M_{B,\text{variable}}$	kNm	0	0	0	
Total Moment in Direction of Breadth	$M_{B,\text{total}}$	kNm	0	0	0	
Moment in Direction of Length (Permanent)	$M_{L,\text{permanent}}$	kNm	0	0	0	
Moment in Direction of Length (Variable)	$M_{L,\text{variable}}$	kNm	0	0	0	
Total Moment in Direction of Length	$M_{L,\text{total}}$	kNm	0	0	0	
Angle of Resultant from Vertical	$\Theta = \tan^{-1}(H/V)$	°	0.00	0.00	0.00	
2) Dimensions						
		Units	Unfactored	DA 1-1	DA 1-2	Notes
Width of Footing	B	m	1.50	1.50	1.50	
Length of Footing	L	m	1.50	1.50	1.50	
Depth to Founding Level (distance finished ground level to foundation level)	D	m	0.5	0.5	0.5	
Inclination of Base from Horizontal	η	°	0.0	0.0	0.0	
Sloping Surface Angle	β	°	0.0	0.0	0.0	
Eccentricity b	$e_B = M_{B,\text{total}} / V_{\text{total}}$	m	0.000	0.000	0.000	Red cells are NOT OK Blue cells are OK
Eccentricity l	$e_L = M_{L,\text{total}} / V_{\text{total}}$	m	0.000	0.000	0.000	
Check Eccentricity in B	$B/6 - e_B > 0$	m	0.25	0.25	0.25	
Check Eccentricity in L	$L/6 - e_L > 0$	m	0.25	0.25	0.25	
Effective Width of Footing	$B' = B - 2 \cdot e_B$	m	1.50	1.50	1.50	
Effective Length of Footing	$L' = L - 2 \cdot e_L$	m	1.50	1.50	1.50	
Effective Area of Footing	$A' = B' \cdot L'$	m ²	2.25	2.25	2.25	
3) Geotechnical parameters						
		Units	Unfactored	DA 1-1	DA 1-2	Notes
Angle of Friction	ϕ'	°	27.0	27.0	22.2	
Effective Cohesion	c'	kN/m ²	5.0	5.0	4.0	
Undrained Cohesion	c_u	kN/m ²		0.0	0.0	
Unit Weight Below Footing	γ	kN/m ³	19.0	19.0	19.0	
Water level (below finished ground level)		m	2.0	2.0	2.0	
Effective Overburden Pressure at Footing Level	q_0	kN/m ²	9.5	9.5	9.5	
Total Overburden Pressure at Footing Level	q	kN/m ²	9.5	9.5	9.5	
Effective Overburden Pressure due to Build Up	q_{obuild}	kN/m ²				

		BEARING CAPACITY				
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		Shallow Pad Foundation				
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D Thornton				Date		Check
1) Assumptions and Notes:						
2) Loads from Structure						
		Units	Unfactored	DA 1-1	DA 1-2	Notes
Vertical Permanent Load	$V_{\text{permanent}}$	kN	15000	20250	15000	Indicative loads only. Please refer to Technical Note for applied loads.
Vertical Variable Load	V_{variable}	kN	1000	1500	1300	
Total Vertical Load	V_{total}	kN	16000	21750	16300	
Horizontal Load in Direction of Breadth (Permanent)	$H_{B,\text{permanent}}$	kN	0	0	0	
Horizontal Load in Direction of Breadth (Variable)	$H_{B,\text{variable}}$	kN	0	0	0	
Horizontal Load from Retained Earth	$H_{B,\text{earth}}$	kN	0	0	0	
Total Horizontal Load In Direction of Breadth	$H_{B,\text{total}}$	kN	0	0	0	
Lever Arm of Horizontal Load, H_1	h_1	m	0.00	0.00	0.00	
Moment from Horizontal Load	$M_1 = H_1 \cdot h_1$	kNm	0	0	0	
Moment from Retained Earth	M_{Earth}	kNm	0	0	0	
Moment in Direction of Breadth (Permanent)	$M_{B,\text{permanent}}$	kNm	0	0	0	
Moment in Direction of Breadth (Variable)	$M_{B,\text{variable}}$	kNm	0	0	0	
Total Moment in Direction of Breadth	$M_{B,\text{total}}$	kNm	0	0	0	
Moment in Direction of Length (Permanent)	$M_{L,\text{permanent}}$	kNm	0	0	0	
Moment in Direction of Length (Variable)	$M_{L,\text{variable}}$	kNm	0	0	0	
Total Moment in Direction of Length	$M_{L,\text{total}}$	kNm	0	0	0	
Angle of Resultant from Vertical	$\Theta = \tan^{-1}(H/V)$	°	0.00	0.00	0.00	
2) Dimensions						
		Units	Unfactored	DA 1-1	DA 1-2	Notes
Width of Footing	B	m	10.00	10.00	10.00	
Length of Footing	L	m	10.00	10.00	10.00	
Depth to Founding Level (distance finished ground level to foundation level)	D	m	0.5	0.5	0.5	
Inclination of Base from Horizontal	η	°	0.0	0.0	0.0	
Sloping Surface Angle	β	°	0.0	0.0	0.0	
Eccentricity b	$e_B = M_{B,\text{total}} / V_{\text{total}}$	m	0.000	0.000	0.000	
Eccentricity l	$e_L = M_{L,\text{total}} / V_{\text{total}}$	m	0.000	0.000	0.000	
Check Eccentricity in B	$B/6 - e_B > 0$	m	1.67	1.67	1.67	
Check Eccentricity in L	$L/6 - e_L > 0$	m	1.67	1.67	1.67	Red cells are NOT OK Blue cells are OK
Effective Width of Footing	$B' = B - 2 \cdot e_B$	m	10.00	10.00	10.00	
Effective Length of Footing	$L' = L - 2 \cdot e_L$	m	10.00	10.00	10.00	
Effective Area of Footing	$A' = B' \cdot L'$	m ²	100.00	100.00	100.00	
3) Geotechnical parameters						
		Units	Unfactored	DA 1-1	DA 1-2	Notes
Angle of Friction	ϕ'	°	27.0	27.0	22.2	
Effective Cohesion	c'	kN/m ²	5.0	5.0	4.0	
Undrained Cohesion	c_u	kN/m ²		0.0	0.0	
Unit Weight Below Footing	γ	kN/m ³	19.0	19.0	19.0	
Water level (below finished ground level)		m	2.0	2.0	2.0	
Effective Overburden Pressure at Footing Level	q_0	kN/m ²	9.5	9.5	9.5	
Total Overburden Pressure at Footing Level	q	kN/m ²	9.5	9.5	9.5	
Effective Overburden Pressure due to Build Up	q_{obuild}	kN/m ²				

		BEARING CAPACITY				
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1) Assumptions and Notes:						
2) Loads from Structure						
		Units	Unfactored	DA 1-1	DA 1-2	Notes
Vertical Permanent Load	$V_{\text{permanent}}$	kN	15000	20250	15000	Indicative loads only. Please refer to Technical Note for applied loads.
Vertical Variable Load	V_{variable}	kN	1000	1500	1300	
Total Vertical Load	V_{total}	kN	16000	21750	16300	
Horizontal Load in Direction of Breadth (Permanent)	$H_{B,\text{permanent}}$	kN	0	0	0	
Horizontal Load in Direction of Breadth (Variable)	$H_{B,\text{variable}}$	kN	0	0	0	
Horizontal Load from Retained Earth	$H_{B,\text{earth}}$	kN	0	0	0	
Total Horizontal Load In Direction of Breadth	$H_{B,\text{total}}$	kN	0	0	0	
Lever Arm of Horizontal Load, H_1	h_1	m	0.00	0.00	0.00	
Moment from Horizontal Load	$M_1 = H_1 \cdot h_1$	kNm	0	0	0	
Moment from Retained Earth	M_{Earth}	kNm	0	0	0	
Moment in Direction of Breadth (Permanent)	$M_{B,\text{permanent}}$	kNm	0	0	0	
Moment in Direction of Breadth (Variable)	$M_{B,\text{variable}}$	kNm	0	0	0	
Total Moment in Direction of Breadth	$M_{B,\text{total}}$	kNm	0	0	0	
Moment in Direction of Length (Permanent)	$M_{L,\text{permanent}}$	kNm	0	0	0	
Moment in Direction of Length (Variable)	$M_{L,\text{variable}}$	kNm	0	0	0	
Total Moment in Direction of Length	$M_{L,\text{total}}$	kNm	0	0	0	
Angle of Resultant from Vertical	$\Theta = \tan^{-1}(H/V)$	°	0.00	0.00	0.00	
2) Dimensions						
		Units	Unfactored	DA 1-1	DA 1-2	Notes
Width of Footing	B	m	0.40	0.40	0.40	
Length of Footing	L	m	8.00	8.00	8.00	
Depth to Founding Level (distance finished ground level to foundation level)	D	m	0.5	0.5	0.5	
Inclination of Base from Horizontal	η	°	0.0	0.0	0.0	
Sloping Surface Angle	β	°	0.0	0.0	0.0	
Eccentricity b	$e_B = M_{B,\text{total}} / V_{\text{total}}$	m	0.000	0.000	0.000	
Eccentricity l	$e_L = M_{L,\text{total}} / V_{\text{total}}$	m	0.000	0.000	0.000	
Check Eccentricity in B	$B/6 - e_B > 0$	m	0.07	0.07	0.07	
Check Eccentricity in L	$L/6 - e_L > 0$	m	1.33	1.33	1.33	Red cells are NOT OK Blue cells are OK
Effective Width of Footing	$B' = B - 2 \cdot e_B$	m	0.40	0.40	0.40	
Effective Length of Footing	$L' = L - 2 \cdot e_L$	m	8.00	8.00	8.00	
Effective Area of Footing	$A' = B' \cdot L'$	m ²	3.20	3.20	3.20	
3) Geotechnical parameters						
		Units	Unfactored	DA 1-1	DA 1-2	Notes
Angle of Friction	ϕ'	°	27.0	27.0	22.2	
Effective Cohesion	c'	kN/m ²	5.0	5.0	4.0	
Undrained Cohesion	c_u	kN/m ²		0.0	0.0	
Unit Weight Below Footing	γ	kN/m ³	19.0	19.0	19.0	
Water level (below finished ground level)		m	2.0	2.0	2.0	
Effective Overburden Pressure at Footing Level	q_0	kN/m ²	9.5	9.5	9.5	
Total Overburden Pressure at Footing Level	q	kN/m ²	9.5	9.5	9.5	
Effective Overburden Pressure due to Build Up	q_{obuild}	kN/m ²				

	BEARING CAPACITY						
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1) Assumptions and Notes:							
2) Loads from Structure							
		Units	Unfactored	DA 1-1	DA 1-2	Notes	
Vertical Permanent Load	$V_{\text{permanent}}$	kN	15000	20250	15000	Indicative loads only. Please refer to Technical Note for applied loads.	
Vertical Variable Load	V_{variable}	kN	1000	1500	1300		
Total Vertical Load	V_{total}	kN	16000	21750	16300		
Horizontal Load in Direction of Breadth (Permanent)	$H_{B,\text{permanent}}$	kN	0	0	0		
Horizontal Load in Direction of Breadth (Variable)	$H_{B,\text{variable}}$	kN	0	0	0		
Horizontal Load from Retained Earth	$H_{B,\text{earth}}$	kN	0	0	0		
Total Horizontal Load In Direction of Breadth	$H_{B,\text{total}}$	kN	0	0	0		
Lever Arm of Horizontal Load, H_1	h_1	m	0.00	0.00	0.00		
Moment from Horizontal Load	$M_1 = H_1 \cdot h_1$	kNm	0	0	0		
Moment from Retained Earth	M_{Earth}	kNm	0	0	0		
Moment in Direction of Breadth (Permanent)	$M_{B,\text{permanent}}$	kNm	0	0	0		
Moment in Direction of Breadth (Variable)	$M_{B,\text{variable}}$	kNm	0	0	0		
Total Moment in Direction of Breadth	$M_{B,\text{total}}$	kNm	0	0	0		
Moment in Direction of Length (Permanent)	$M_{L,\text{permanent}}$	kNm	0	0	0		
Moment in Direction of Length (Variable)	$M_{L,\text{variable}}$	kNm	0	0	0		
Total Moment in Direction of Length	$M_{L,\text{total}}$	kNm	0	0	0		
Angle of Resultant from Vertical	$\Theta = \text{atan}(H/V)$	°	0.00	0.00	0.00		
2) Dimensions							
		Units	Unfactored	DA 1-1	DA 1-2	Notes	
Width of Footing	B	m	0.50	0.50	0.50		
Length of Footing	L	m	8.00	8.00	8.00		
Depth to Founding Level (distance finished ground level to foundation level)	D	m	0.5	0.5	0.5		
Inclination of Base from Horizontal	η	°	0.0	0.0	0.0		
Sloping Surface Angle	β	°	0.0	0.0	0.0		
Eccentricity b	$e_B = M_{B,\text{total}} / V_{\text{total}}$	m	0.000	0.000	0.000		
Eccentricity l	$e_L = M_{L,\text{total}} / V_{\text{total}}$	m	0.000	0.000	0.000		
Check Eccentricity in B	$B/6 - e_B > 0$	m	0.08	0.08	0.08	Red cells are NOT OK Blue cells are OK	
Check Eccentricity in L	$L/6 - e_L > 0$	m	1.33	1.33	1.33		
Effective Width of Footing	$B' = B - 2 \cdot e_B$	m	0.50	0.50	0.50		
Effective Length of Footing	$L' = L - 2 \cdot e_L$	m	8.00	8.00	8.00		
Effective Area of Footing	$A' = B' \cdot L'$	m ²	4.00	4.00	4.00		
3) Geotechnical parameters							
		Units	Unfactored	DA 1-1	DA 1-2	Notes	
Angle of Friction	ϕ'	°	27.0	27.0	22.2		
Effective Cohesion	c'	kN/m ²	5.0	5.0	4.0		
Undrained Cohesion	c_u	kN/m ²		0.0	0.0		
Unit Weight Below Footing	γ	kN/m ³	19.0	19.0	19.0		
Water level (below finished ground level)		m	2.0	2.0	2.0		
Effective Overburden Pressure at Footing Level	q_0	kN/m ²	9.5	9.5	9.5		
Total Overburden Pressure at Footing Level	q	kN/m ²	9.5	9.5	9.5		
Effective Overburden Pressure due to Build Up	q_{obuild}	kN/m ²					

		BEARING CAPACITY				AECOM
Project:		FEZ Holbeach				
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D Thornton				Date		Check
1) Assumptions and Notes:						
2) Loads from Structure						
		Units	Unfactored	DA 1-1	DA 1-2	Notes
Vertical Permanent Load	$V_{\text{permanent}}$	kN	15000	20250	15000	Indicative loads only. Please refer to Technical Note for applied loads.
Vertical Variable Load	V_{variable}	kN	1000	1500	1300	
Total Vertical Load	V_{total}	kN	16000	21750	16300	
Horizontal Load in Direction of Breadth (Permanent)	$H_{B,\text{permanent}}$	kN	0	0	0	
Horizontal Load in Direction of Breadth (Variable)	$H_{B,\text{variable}}$	kN	0	0	0	
Horizontal Load from Retained Earth	$H_{B,\text{earth}}$	kN	0	0	0	
Total Horizontal Load In Direction of Breadth	$H_{B,\text{total}}$	kN	0	0	0	
Lever Arm of Horizontal Load, H_1	h_1	m	0.00	0.00	0.00	
Moment from Horizontal Load	$M_1 = H_1 \cdot h_1$	kNm	0	0	0	
Moment from Retained Earth	M_{Earth}	kNm	0	0	0	
Moment in Direction of Breadth (Permanent)	$M_{B,\text{permanent}}$	kNm	0	0	0	
Moment in Direction of Breadth (Variable)	$M_{B,\text{variable}}$	kNm	0	0	0	
Total Moment in Direction of Breadth	$M_{B,\text{total}}$	kNm	0	0	0	
Moment in Direction of Length (Permanent)	$M_{L,\text{permanent}}$	kNm	0	0	0	
Moment in Direction of Length (Variable)	$M_{L,\text{variable}}$	kNm	0	0	0	
Total Moment in Direction of Length	$M_{L,\text{total}}$	kNm	0	0	0	
Angle of Resultant from Vertical	$\Theta = \tan^{-1}(H/V)$	°	0.00	0.00	0.00	
2) Dimensions						
		Units	Unfactored	DA 1-1	DA 1-2	Notes
Width of Footing	B	m	0.60	0.60	0.60	
Length of Footing	L	m	8.00	8.00	8.00	
Depth to Founding Level (distance finished ground level to foundation level)	D	m	0.5	0.5	0.5	
Inclination of Base from Horizontal	η	°	0.0	0.0	0.0	
Sloping Surface Angle	β	°	0.0	0.0	0.0	
Eccentricity b	$e_B = M_{B,\text{total}} / V_{\text{total}}$	m	0.000	0.000	0.000	
Eccentricity l	$e_L = M_{L,\text{total}} / V_{\text{total}}$	m	0.000	0.000	0.000	
Check Eccentricity in B	$B/6 - e_B > 0$	m	0.10	0.10	0.10	
Check Eccentricity in L	$L/6 - e_L > 0$	m	1.33	1.33	1.33	Red cells are NOT OK Blue cells are OK
Effective Width of Footing	$B' = B - 2 \cdot e_B$	m	0.60	0.60	0.60	
Effective Length of Footing	$L' = L - 2 \cdot e_L$	m	8.00	8.00	8.00	
Effective Area of Footing	$A' = B' \cdot L'$	m ²	4.80	4.80	4.80	
3) Geotechnical parameters						
		Units	Unfactored	DA 1-1	DA 1-2	Notes
Angle of Friction	ϕ'	°	27.0	27.0	22.2	
Effective Cohesion	c'	kN/m ²	5.0	5.0	4.0	
Undrained Cohesion	c_u	kN/m ²		0.0	0.0	
Unit Weight Below Footing	γ	kN/m ³	19.0	19.0	19.0	
Water level (below finished ground level)		m	2.0	2.0	2.0	
Effective Overburden Pressure at Footing Level	q_0	kN/m ²	9.5	9.5	9.5	
Total Overburden Pressure at Footing Level	q	kN/m ²	9.5	9.5	9.5	
Effective Overburden Pressure due to Build Up	q_{obuild}	kN/m ²				

**SETTLEMENT CALCULATION
CENTRE OF A RECTANGULAR LOADED AREA**

Project : FEZ Holbeach

Revision :

Calculation : Detailed Calculation of Settlement

Chkd By :

Job No :

Date :

Input by : DT

Checked by :

Date : 25-Sep-19

Date :

Foundation length, L (m) = 0.40

Foundation breadth, B (m) = 0.40

Applied Load, q_0 (kN/m²) = 125.00

Will loads fluctuate? NO

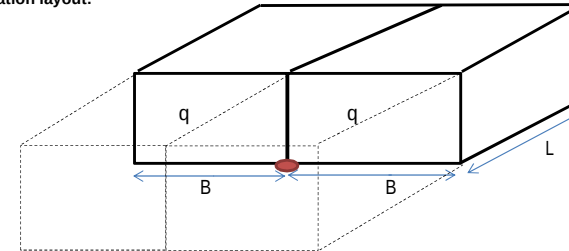
Design Life (years) = 50

Is drainage at base of problem Open or Closed? CLOSED

cv of cohesive materials (m²/year) = 1

alpha = 0.0%

Foundation layout:



Designer's Comments:

Settlement of building with pad foundation on 15m of Tidal Flat Deposits overlying weathered West Walton Formation

TIME DEPENDENT SETTLEMENT

Time of interest (years)

1

Creep start (years)

0.1

LAYER	LAYER THICKNESS (m)	SOIL DESCRIPTION	SOIL TYPE	DEPTH TO BTM OF LAYER (m)	CHANGE IN s_v (kN/m ²)	GRANULAR E' (Mpa)	COHESIVE Eu (Mpa)	μ_g	m_v (m ² /MN)	IMMEDIATE SETTLEMENT (mm)	LONG TERM SETTLEMENT (mm)	CREEP SETTLEMENT (mm)	TOTAL SETTLEMENT (mm)
1	1.0	Tidal Flat Deposits	Granular	1.00	73.0	6.1				12.0		6.5	18.5
2	1.0	Tidal Flat Deposits	Granular	2.00	15.2	6.1				2.5		1.4	3.8
3	1.0	Tidal Flat Deposits	Granular	3.00	5.9	7.9				0.7		0.4	1.2
4	1.0	Tidal Flat Deposits	Granular	4.00	3.1	7.9				0.4		0.2	0.6
5	1.0	Tidal Flat Deposits	Granular	5.00	1.9	7.9				0.2		0.1	0.4
6	1.0	Tidal Flat Deposits	Granular	6.00	1.3	11.8				0.1		0.1	0.2
7	1.0	Tidal Flat Deposits	Granular	7.00	0.9	16.1				0.1		0.0	0.1
8	2.0	Tidal Flat Deposits	Granular	9.00	0.6	28.4				0.0		0.0	0.1
9	2.0	Tidal Flat Deposits	Granular	11.00	0.4	28.4				0.0		0.0	0.0
10	2.0	Tidal Flat Deposits	Granular	13.00	0.3	42.4				0.0		0.0	0.0
11	2.0	Tidal Flat Deposits	Granular	15.00	0.2	58.0				0.0		0.0	0.0
12	2.0	West Walton Formation	Cohesive	17.00	0.1		21.3	1.0	0.16	0.0	0.0		0.1
13	2.0	West Walton Formation	Cohesive	19.00	0.1		32.0	1.0	0.16	0.0	0.0		0.0
14	2.0	West Walton Formation	Cohesive	21.00	0.1		37.3	1.0	0.16	0.0	0.0		0.0
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
						TOTAL				16	0	9	25

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LONG TERM SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT REMAINING (mm)
3	19	6

TOTAL

NOTE: Time dependent settlement is calculated assuming that all adjoining cohesive materials act as a single layer in accordance with Terzaghi's method.

SETTLEMENT CALCULATION CENTRE OF A RECTANGULAR LOADED AREA

Project : FEZ Holbeach

Revision :

Calculation : Detailed Calculation of Settlement

Chkd By :

Job No :

Date :

Input by : DT

Checked by :

Date : 25-Sep-19

Date :

Foundation length, L (m) = 0.50

Foundation breadth, B (m) = 0.50

Applied Load, q_0 (kN/m²) = 100.00

Will loads fluctuate? NO

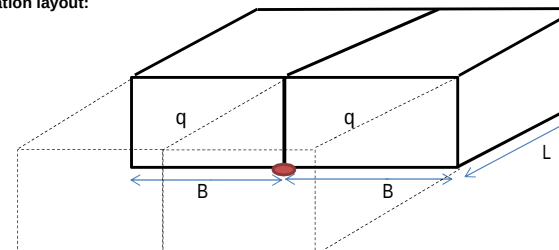
Design Life (years) = 50

Is drainage at base of problem Open or Closed? CLOSED

cv of cohesive materials (m²/year) = 1

alpha = 0.0%

Foundation layout:



Designer's Comments:

Settlement of building with pad foundation on 15m of Tidal Flat Deposits overlying weathered West Walton Formation

TIME DEPENDENT SETTLEMENT

Time of interest (years)

1

Creep start (years)

0.1

LAYER	LAYER THICKNESS (m)	SOIL DESCRIPTION	SOIL TYPE	DEPTH TO BTM OF LAYER (m)	CHANGE IN s_v (kN/m ²)	GRANULAR E' (Mpa)	COHESIVE			IMMEDIATE SETTLEMENT (mm)	LONG TERM SETTLEMENT (mm)	CREEP SETTLEMENT (mm)	TOTAL SETTLEMENT (mm)
							Eu	μ_g	m_v (m ² /MN)				
1	1.0	Tidal Flat Deposits	Granular	1.00	70.1	6.1				11.5		6.3	17.8
2	1.0	Tidal Flat Deposits	Granular	2.00	17.9	6.1				2.9		1.6	4.5
3	1.0	Tidal Flat Deposits	Granular	3.00	7.2	7.9				0.9		0.5	1.4
4	1.0	Tidal Flat Deposits	Granular	4.00	3.8	7.9				0.5		0.3	0.7
5	1.0	Tidal Flat Deposits	Granular	5.00	2.3	7.9				0.3		0.2	0.5
6	1.0	Tidal Flat Deposits	Granular	6.00	1.6	11.8				0.1		0.1	0.2
7	1.0	Tidal Flat Deposits	Granular	7.00	1.1	16.1				0.1		0.0	0.1
8	2.0	Tidal Flat Deposits	Granular	9.00	0.7	28.4				0.1		0.0	0.1
9	2.0	Tidal Flat Deposits	Granular	11.00	0.5	28.4				0.0		0.0	0.1
10	2.0	Tidal Flat Deposits	Granular	13.00	0.3	42.4				0.0		0.0	0.0
11	2.0	Tidal Flat Deposits	Granular	15.00	0.2	58.0				0.0		0.0	0.0
12	2.0	West Walton Formation	Cohesive	17.00	0.2		21.3	1.0	0.16	0.0	0.1		0.1
13	2.0	West Walton Formation	Cohesive	19.00	0.1		32.0	1.0	0.16	0.0	0.0		0.1
14	2.0	West Walton Formation	Cohesive	21.00	0.1		37.3	1.0	0.16	0.0	0.0		0.0
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
						TOTAL				16	0	9	26

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LONG TERM SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT REMAINING (mm)
3	20	6
TOTAL		

NOTE: Time dependent settlement is calculated assuming that all adjoining cohesive materials act as a single layer in accordance with Terzaghi's method.

SETTLEMENT CALCULATION CENTRE OF A RECTANGULAR LOADED AREA

Project : FEZ Holbeach

Revision :

Calculation : Detailed Calculation of Settlement

Chkd By :

Job No :

Date :

Input by : DT

Checked by :

Date : 25-Sep-19

Date :

Foundation length, L (m) = 0.75

Foundation breadth, B (m) = 0.75

Applied Load, q_0 (kN/m²) = 65.00

Will loads fluctuate? NO

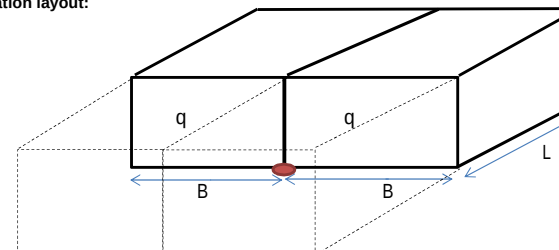
Design Life (years) = 50

Is drainage at base of problem Open or Closed? CLOSED

cv of cohesive materials (m²/year) = 1

alpha = 0.0%

Foundation layout:



Designer's Comments:

Settlement of building with pad foundation on 15m of Tidal Flat Deposits overlying weathered West Walton Formation

TIME DEPENDENT SETTLEMENT

Time of interest (years)

1

Creep start (years)

0.1

LAYER	LAYER THICKNESS (m)	SOIL DESCRIPTION	SOIL TYPE	DEPTH TO BTM OF LAYER (m)	CHANGE IN s_v (kN/m ²)	GRANULAR E' (Mpa)	COHESIVE Eu (Mpa)	μ_g	m_v (m ² /MN)	IMMEDIATE SETTLEMENT (mm)	LONG TERM SETTLEMENT (mm)	CREEP SETTLEMENT (mm)	TOTAL SETTLEMENT (mm)
1	1.0	Tidal Flat Deposits	Granular	1.00	56.1	6.1				9.2		5.0	14.2
2	1.0	Tidal Flat Deposits	Granular	2.00	21.8	6.1				3.6		2.0	5.5
3	1.0	Tidal Flat Deposits	Granular	3.00	9.7	7.9				1.2		0.7	1.9
4	1.0	Tidal Flat Deposits	Granular	4.00	5.3	7.9				0.7		0.4	1.0
5	1.0	Tidal Flat Deposits	Granular	5.00	3.3	7.9				0.4		0.2	0.6
6	1.0	Tidal Flat Deposits	Granular	6.00	2.2	11.8				0.2		0.1	0.3
7	1.0	Tidal Flat Deposits	Granular	7.00	1.6	16.1				0.1		0.1	0.2
8	2.0	Tidal Flat Deposits	Granular	9.00	1.1	28.4				0.1		0.0	0.1
9	2.0	Tidal Flat Deposits	Granular	11.00	0.7	28.4				0.0		0.0	0.1
10	2.0	Tidal Flat Deposits	Granular	13.00	0.5	42.4				0.0		0.0	0.0
11	2.0	Tidal Flat Deposits	Granular	15.00	0.4	58.0				0.0		0.0	0.0
12	2.0	West Walton Formation	Cohesive	17.00	0.3		21.3	1.0	0.16	0.0	0.1		0.1
13	2.0	West Walton Formation	Cohesive	19.00	0.2		32.0	1.0	0.16	0.0	0.1		0.1
14	2.0	West Walton Formation	Cohesive	21.00	0.2		37.3	1.0	0.16	0.0	0.1		0.1
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
						TOTAL				16	0	8	24

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LONG TERM SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT REMAINING (mm)
3	19	5

TOTAL

NOTE: Time dependent settlement is calculated assuming that all adjoining cohesive materials act as a single layer in accordance with Terzaghi's method.

SETTLEMENT CALCULATION CENTRE OF A RECTANGULAR LOADED AREA

Project : FEZ Holbeach

Revision :

Calculation : Detailed Calculation of Settlement

Chkd By :

Job No :

Date :

Input by : DT

Checked by :

Date : 25-Sep-19

Date :

Foundation length, L (m) = 5.00

Foundation breadth, B (m) = 5.00

Applied Load, q_0 (kN/m²) = 18.00

Will loads fluctuate? NO

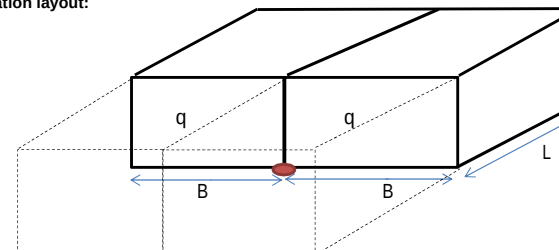
Design Life (years) = 50

Is drainage at base of problem Open or Closed? CLOSED

cv of cohesive materials (m²/year) = 1

alpha = 0.0%

Foundation layout:



Designer's Comments:

Settlement of building with raft foundation on 15m of Tidal Flat Deposits overlying weathered West Walton Formation

TIME DEPENDENT SETTLEMENT

Time of interest (years)

1

Creep start (years)

0.1

LAYER	LAYER THICKNESS (m)	SOIL DESCRIPTION	SOIL TYPE	DEPTH TO BTM OF LAYER (m)	CHANGE IN s_v (kN/m ²)	GRANULAR E' (Mpa)	COHESIVE			IMMEDIATE SETTLEMENT (mm)	LONG TERM SETTLEMENT (mm)	CREEP SETTLEMENT (mm)	TOTAL SETTLEMENT (mm)
							Eu	μ_g	m_v (m ² /MN)				
1	1.0	Tidal Flat Deposits	Granular	1.00	18.0	6.1				3.0		1.6	4.6
2	1.0	Tidal Flat Deposits	Granular	2.00	17.7	6.1				2.9		1.6	4.5
3	1.0	Tidal Flat Deposits	Granular	3.00	16.7	7.9				2.1		1.2	3.3
4	1.0	Tidal Flat Deposits	Granular	4.00	15.3	7.9				1.9		1.1	3.0
5	1.0	Tidal Flat Deposits	Granular	5.00	13.5	7.9				1.7		0.9	2.7
6	1.0	Tidal Flat Deposits	Granular	6.00	11.7	11.8				1.0		0.5	1.5
7	1.0	Tidal Flat Deposits	Granular	7.00	10.1	16.1				0.6		0.3	1.0
8	2.0	Tidal Flat Deposits	Granular	9.00	8.1	28.4				0.6		0.3	0.9
9	2.0	Tidal Flat Deposits	Granular	11.00	6.0	28.4				0.4		0.2	0.7
10	2.0	Tidal Flat Deposits	Granular	13.00	4.6	42.4				0.2		0.1	0.3
11	2.0	Tidal Flat Deposits	Granular	15.00	3.6	58.0				0.1		0.1	0.2
12	2.0	West Walton Formation	Cohesive	17.00	2.9		21.3	1.0	0.16	0.3	0.9		1.2
13	2.0	West Walton Formation	Cohesive	19.00	2.3		32.0	1.0	0.16	0.1	0.8		0.9
14	2.0	West Walton Formation	Cohesive	21.00	1.9		37.3	1.0	0.16	0.1	0.6		0.7
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
						TOTAL				15	2	8	25

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LONG TERM SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT REMAINING (mm)
3	19	7

TOTAL

NOTE: Time dependent settlement is calculated assuming that all adjoining cohesive materials act as a single layer in accordance with Terzaghi's method.

**SETTLEMENT CALCULATION
CENTRE OF A RECTANGULAR LOADED AREA**

Project : FEZ Holbeach

Revision :

Calculation : Detailed Calculation of Settlement

Chkd By :

Job No :

Date :

Input by : DT

Checked by :

Date : 25-Sep-19

Date :

Foundation length, L (m) = 4.00

Foundation breadth, B (m) = 0.20

Applied Load, q_0 (kN/m²) = 115.00

Will loads fluctuate? NO

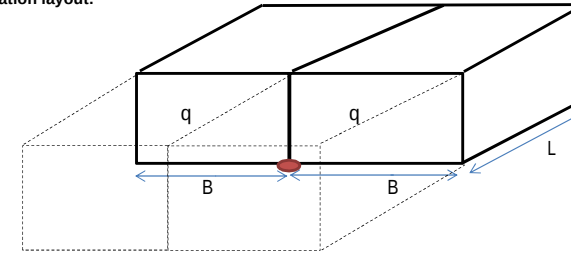
Design Life (years) = 50

Is drainage at base of problem Open or Closed? CLOSED

cv of cohesive materials (m²/year) = 1

alpha = 0.0%

Foundation layout:



Designer's Comments:

Settlement of building with strip foundation on 15m of Tidal Flat Deposits overlying weathered West Walton Formation

TIME DEPENDENT SETTLEMENT

Time of interest (years)

1

Creep start (years)

0.1

LAYER	LAYER THICKNESS (m)	SOIL DESCRIPTION	SOIL TYPE	DEPTH TO BTM OF LAYER (m)	CHANGE IN s_v (kN/m ²)	GRANULAR E' (Mpa)	COHESIVE Eu (Mpa)	μ_g	m_v (m ² /MN)	IMMEDIATE SETTLEMENT (mm)	LONG TERM SETTLEMENT (mm)	CREEP SETTLEMENT (mm)	TOTAL SETTLEMENT (mm)
1	1.0	Tidal Flat Deposits	Granular	1.00	53.1	6.1				8.7		4.7	13.5
2	1.0	Tidal Flat Deposits	Granular	2.00	19.2	6.1				3.1		1.7	4.9
3	1.0	Tidal Flat Deposits	Granular	3.00	11.3	7.9				1.4		0.8	2.2
4	1.0	Tidal Flat Deposits	Granular	4.00	7.6	7.9				1.0		0.5	1.5
5	1.0	Tidal Flat Deposits	Granular	5.00	5.5	7.9				0.7		0.4	1.1
6	1.0	Tidal Flat Deposits	Granular	6.00	4.2	11.8				0.4		0.2	0.5
7	1.0	Tidal Flat Deposits	Granular	7.00	3.2	16.1				0.2		0.1	0.3
8	2.0	Tidal Flat Deposits	Granular	9.00	2.3	28.4				0.2		0.1	0.2
9	2.0	Tidal Flat Deposits	Granular	11.00	1.6	28.4				0.1		0.1	0.2
10	2.0	Tidal Flat Deposits	Granular	13.00	1.1	42.4				0.1		0.0	0.1
11	2.0	Tidal Flat Deposits	Granular	15.00	0.8	58.0				0.0		0.0	0.0
12	2.0	West Walton Formation	Cohesive	17.00	0.7		21.3	1.0	0.16	0.1	0.2		0.3
13	2.0	West Walton Formation	Cohesive	19.00	0.5		32.0	1.0	0.16	0.0	0.2		0.2
14	2.0	West Walton Formation	Cohesive	21.00	0.4		37.3	1.0	0.16	0.0	0.1		0.2
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
						TOTAL				16	1	9	25

delete shaded red text

LONG TERM SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT REMAINING (mm)
3	19	6

TOTAL

NOTE: Time dependent settlement is calculated assuming that all adjoining cohesive materials act as a single layer in accordance with Terzaghi's method.

SETTLEMENT CALCULATION CENTRE OF A RECTANGULAR LOADED AREA

Project : FEZ Holbeach

Revision :

Calculation : Detailed Calculation of Settlement

Chkd By :

Job No :

Date :

Input by : DT

Checked by :

Date : 25-Sep-19

Date :

Foundation length, L (m) = 4.00

Foundation breadth, B (m) = 0.25

Applied Load, q_0 (kN/m²) = 95.00

Will loads fluctuate? NO

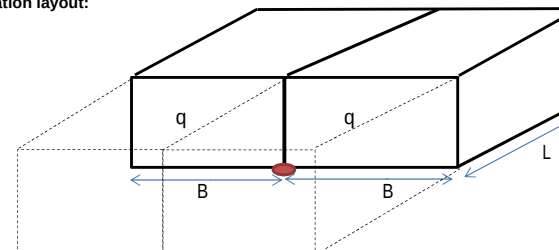
Design Life (years) = 50

Is drainage at base of problem Open or Closed? CLOSED

cv of cohesive materials (m²/year) = 1

alpha = 0.0%

Foundation layout:



Designer's Comments:

Settlement of building with strip foundation on 15m of Tidal Flat Deposits overlying weathered West Walton Formation

TIME DEPENDENT SETTLEMENT

Time of interest (years)

1

Creep start (years)

0.1

LAYER	LAYER THICKNESS (m)	SOIL DESCRIPTION	SOIL TYPE	DEPTH TO BTM OF LAYER (m)	CHANGE IN s_v (kN/m ²)	GRANULAR E' (Mpa)	COHESIVE			IMMEDIATE SETTLEMENT (mm)	LONG TERM SETTLEMENT (mm)	CREEP SETTLEMENT (mm)	TOTAL SETTLEMENT (mm)
							Eu	μ_g	m_v (m ² /MN)				
1	1.0	Tidal Flat Deposits	Granular	1.00	52.2	6.1				8.6		4.7	13.2
2	1.0	Tidal Flat Deposits	Granular	2.00	19.7	6.1				3.2		1.8	5.0
3	1.0	Tidal Flat Deposits	Granular	3.00	11.6	7.9				1.5		0.8	2.3
4	1.0	Tidal Flat Deposits	Granular	4.00	7.9	7.9				1.0		0.5	1.5
5	1.0	Tidal Flat Deposits	Granular	5.00	5.7	7.9				0.7		0.4	1.1
6	1.0	Tidal Flat Deposits	Granular	6.00	4.3	11.8				0.4		0.2	0.6
7	1.0	Tidal Flat Deposits	Granular	7.00	3.3	16.1				0.2		0.1	0.3
8	2.0	Tidal Flat Deposits	Granular	9.00	2.4	28.4				0.2		0.1	0.3
9	2.0	Tidal Flat Deposits	Granular	11.00	1.6	28.4				0.1		0.1	0.2
10	2.0	Tidal Flat Deposits	Granular	13.00	1.2	42.4				0.1		0.0	0.1
11	2.0	Tidal Flat Deposits	Granular	15.00	0.9	58.0				0.0		0.0	0.0
12	2.0	West Walton Formation	Cohesive	17.00	0.7		21.3	1.0	0.16	0.1	0.2		0.3
13	2.0	West Walton Formation	Cohesive	19.00	0.5		32.0	1.0	0.16	0.0	0.2		0.2
14	2.0	West Walton Formation	Cohesive	21.00	0.4		37.3	1.0	0.16	0.0	0.1		0.2
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
TOTAL										16	1	9	25

delete shaded red text

LONG TERM SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT REMAINING (mm)
3	19	6

TOTAL

NOTE: Time dependent settlement is calculated assuming that all adjoining cohesive materials act as a single layer in accordance with Terzaghi's method.

**SETTLEMENT CALCULATION
CENTRE OF A RECTANGULAR LOADED AREA**

Project : FEZ Holbeach

Revision :

Calculation : Detailed Calculation of Settlement

Chkd By :

Job No :

Date :

Input by : DT

Checked by :

Date : 25-Sep-19

Date :

Foundation length, L (m) = 4.00

Foundation breadth, B (m) = 0.30

Applied Load, q_0 (kN/m²) = 80.00

Will loads fluctuate? NO

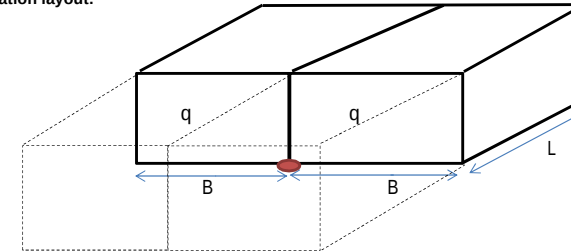
Design Life (years) = 50

Is drainage at base of problem Open or Closed? CLOSED

cv of cohesive materials (m²/year) = 1

alpha = 0.0%

Foundation layout:



Designer's Comments:

Settlement of building with strip foundation on 15m of Tidal Flat Deposits overlying weathered West Walton Formation

TIME DEPENDENT SETTLEMENT

Time of interest (years)

1

Creep start (years)

0.1

LAYER	LAYER THICKNESS (m)	SOIL DESCRIPTION	SOIL TYPE	DEPTH TO BTM OF LAYER (m)	CHANGE IN s_v (kN/m ²)	GRANULAR	COHESIVE			IMMEDIATE SETTLEMENT (mm)	LONG TERM SETTLEMENT (mm)	CREEP SETTLEMENT (mm)	TOTAL SETTLEMENT (mm)
						E' (Mpa)	Eu (Mpa)	μ_g	m_v (m ² /MN)				
1	1.0	Tidal Flat Deposits	Granular	1.00	50.0	6.1				8.2		4.5	12.7
2	1.0	Tidal Flat Deposits	Granular	2.00	19.7	6.1				3.2		1.8	5.0
3	1.0	Tidal Flat Deposits	Granular	3.00	11.7	7.9				1.5		0.8	2.3
4	1.0	Tidal Flat Deposits	Granular	4.00	8.0	7.9				1.0		0.6	1.6
5	1.0	Tidal Flat Deposits	Granular	5.00	5.8	7.9				0.7		0.4	1.1
6	1.0	Tidal Flat Deposits	Granular	6.00	4.3	11.8				0.4		0.2	0.6
7	1.0	Tidal Flat Deposits	Granular	7.00	3.4	16.1				0.2		0.1	0.3
8	2.0	Tidal Flat Deposits	Granular	9.00	2.4	28.4				0.2		0.1	0.3
9	2.0	Tidal Flat Deposits	Granular	11.00	1.6	28.4				0.1		0.1	0.2
10	2.0	Tidal Flat Deposits	Granular	13.00	1.2	42.4				0.1		0.0	0.1
11	2.0	Tidal Flat Deposits	Granular	15.00	0.9	58.0				0.0		0.0	0.0
12	2.0	West Walton Formation	Cohesive	17.00	0.7		21.3	1.0	0.16	0.1	0.2		0.3
13	2.0	West Walton Formation	Cohesive	19.00	0.5		32.0	1.0	0.16	0.0	0.2		0.2
14	2.0	West Walton Formation	Cohesive	21.00	0.4		37.3	1.0	0.16	0.0	0.1		0.2
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						TOTAL				16	1	9	25

delete shaded red text

LONG TERM SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT OCCURRED (mm)	TOTAL SETTLEMENT REMAINING (mm)
3	19	6
TOTAL		

NOTE: Time dependent settlement is calculated assuming that all adjoining cohesive materials act as a single layer in accordance with Terzaghi's method.

