



Tier 2: Generic Quantitative Risk Assessment

Project Number: G0174

Project Name: Site 4B East, Great Yarmouth Energy Park, Admiralty
Road, Great Yarmouth

Client: Trent Energy Limited

Date: June 2024

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JIWG CL:AIRE DST worksheets

Discovery Method Statement

1 Introduction

1.1 Authorisation

Geotechnical and Contamination Consulting Limited (GAC Consulting) has been instructed by Farida Hatimi on behalf of Trent Energy Ltd. to conduct a Tier 2: Generic Quantitative Risk Assessment for the proposed development project located at Site 4B East, Great Yarmouth Energy Park, Admiralty Road, Great Yarmouth.

The location of the proposed development is shown on the Site Location Plans presented in the appendix (G0174-DR01).

1.2 Project Background and Development Proposal

It is understood that the proposed project consists of the construction of a new biodiesel from waste oil plant. The development is understood to consist of a main plantroom with a separate office and welfare block, vehicle parking and standalone used cooking oil storage tanks and product (biodiesel and ethanol tanks). The proposed layout is shown in the appendix in drawings G0174-DR02.

The proposed development is summarised in the table below.

Table 1.2; Development Proposals	
Proposed Development	Single storey plantroom with a separate office and welfare block.
Proposed Use	Commercial use with full coverage by building footprints or hardstanding with no soft areas.
Landuse Category*	Commercial
BS8485 Building Type**	Type A
Potable water supply	Mains supply
Notes; * Standard land-uses as defined in Environment Agencies' SR3 (Environment Agency, 2009). ** ; BS 8485:2015+A1:2019	

1.2.1 Previous Reports

This report follows on from the Tier 1: Preliminary Risk Assessment completed by Castledine Environmental dated November 2022.

The PRA identified several potential sources of contamination:

Onsite	Offsite
<ul style="list-style-type: none"> Historical marshland (circa.1883-1905) Development of site with unknown usage buildings (circa.1927) Historical tank on site (circa.1949 SW extent of site) Additional erection of structure on site (circa.1957/58 northern extent) Demolition of structures on site (circa.1988) Erection of new building / depot (circa.1994, eastern boundary) Historical tanks (circa.2003 in NW extent of site) Removal of building (circa.1994-2010, eastern boundary) Contemporary, small tanks (circa.2006, NE extent of site) Tank adj. to interceptor bay (red, small, circa.2006-2017) Contemporary, large tank (adj. to bay, circa.2017-2019) Usage of site as depot & parking of multiple tankers (circa.1999-2017) 	<ul style="list-style-type: none"> Multiple records of potentially contaminative industries (circa.1905 to present including unspecified works, factories, depots, engineering works, net & canning works, electricity works, ice factory – all compass directions) Multiple records of tanks (<150m N, NW, W, E, S & SE) Railway sidings (approx.80m W/NW of site, circa.1906-1949)

The report identified several potential pathways (including ingestion, skin contact, inhalation and leaching to groundwater) that might allow sensitive receptors to be impacted by the potential sources. These receptors included human health, controlled waters and ecological receptors.

Contaminants of concern associated with the potential sources were identified as:

- Metals and metalloids
- Polycyclic aromatic hydrocarbons (PAH's)
- Petroleum hydrocarbons
- Asbestos
- PCB's
- Ground gas

The report completed a qualitative risk assessment of the SPR linkages and concluded that the site presented a maximum **moderate** risk of hazards occurring.

It was recommended that an intrusive Phase 2 Site Investigation be carried out, consisting of both trial pit and boreholes to facilitate an assessment of the ground conditions (i.e. made ground, natural or reworked natural deposits, their nature, extent and depth), the taking of environmental samples for laboratory analysis and integrated ground gas and vapour monitoring, respectively.

1.3 Project objectives

The objective of this investigation was to support discharge of condition 3 of Norfolk County Council planning approval FUL/2023/0022 "Proposed development of an installation for the manufacture of biodiesel from Used Cooking Oil (UCO); erection of a plant room to contain the manufacturing equipment/process; construction of offices, bunded storage for materials and finished products; new vehicular access from Admiralty Road and new exit onto Salmon Road.

Specifically, the report aims to provide a site investigation scheme and a full risk assessment, based on the preliminary risk assessment in order to survey of the extent, scale and nature of contamination and assess the potential risks to those sensitive receptors identified in the Preliminary Risk Assessment.

Where necessary, an options appraisal will be completed.

The planning condition requires the risk assessment must be undertaken by a competent person. The report has been completed by [REDACTED] BSc Hons FGS RSoBRA. [REDACTED] is a SoBRA accredited risk assessor, specialising in human health risk assessment and ground gas with over 15 years' experience in the field and is a former Contaminated Land Officer.

2 Field Investigation

The intrusive investigation was designed to meet the project objectives stated above and to follow the applicable standards and guidance. Where possible, laboratory testing has been undertaken by a UKAS/MCERTS accredited laboratory.

The information gathered and discussed in this report depict subsurface conditions at specific locations at the time of investigation. As no technique is capable of definitively identifying all ground/water conditions, spatially and temporally, ground conditions are necessarily inferred between intrusive locations using professional experience and judgment.

Soils are heterogeneous semi-elastic materials composed of three phases of matter and which have been subjected to geological and geomorphological processes. Though soil boundaries may be represented as plainer surfaces for ease of depiction, in reality their depth and geometry may vary from those shown herein. Soil boundaries are inferred based on non-continuous sampling techniques and are intended to reflect approximate horizons.

2.1 Site Reconnaissance Walkover

A detailed site reconnaissance walkover was completed by Castledine Environmental as part of the Preliminary Risk Assessment.

Since the time of that walkover, the site has been vacated by the previous occupants. The following revised reconnaissance walkover was completed.

Table 2.1; Site Walkover Summary	
Current Site Use	Storage of Trent Energy Ltd. metalwork and pipework.
Housekeeping	Tidy with some litter in boundaries.
Surfacing	Asphalt hardstanding across most of the site with concrete hardstanding to the eastern extent. A small rectangular area of vegetation has grown up to the northwest of the site, indicating an absence of hardstanding in this area. Part of the northern boundary was unmetalled, evidenced by the presence of bushes and low vegetation.
Description of any Buildings	There were no buildings on site.
Contaminative Sources	At the time of the walkover, there were no overt sources of contamination on site. A brick-built bay indicated the possible location of a former tank or structure. It is presumed that this drained to an oil water interceptor located to the southwest, evidenced by a cover. The cover could not be lifted.
Demolished buildings	Though the site is known to have previously had buildings present, no footings or other evidence of demolished buildings was observed.

2.2 Intrusive Investigation

2.2.1 Drilling and Excavation

The intrusive investigation was completed in accordance with HSE Construction (Design and Management) Regulations (CDM 2015) and an in-house Construction Phase Plan (CPP), Risk Assessment and Method Statements. In broad terms the procedure consisted of:

- Compilation of the health and safety documentation,
- Site based identification of the intrusive locations with repositioning as necessary,
- Utilities clearance with locations repositioned as necessary,
- Review of GAC Consulting's Risk Assessment,
- Excavation/drilling/sampling/testing as per GAC Consulting's / third party method statements,
- Quality assurance (QA) check of sample type/quality/containment/documentation.

A summary of the intrusive investigation is presented in Table 2.2.1.

Table 2.2.1; Fieldwork Summary							
Location	Date	Plant	Depth on completion	Comment	X	Y	Z
Cable Percussive Boreholes							
BH01	18/04/2024	Dando 2000	5.0 m	Monitoring Well Installed	652873.7	305568.4	3.334
BH02	18/04/2024		5.0 m	Monitoring Well Installed	652848.1	305577.2	2.984
BH03	19/04/2024		5.0 m	Monitoring Well Installed	652827.6	305578.4	2.765

Table 2.2.1; Fieldwork Summary							
Location	Date	Plant	Depth on completion	Comment	X	Y	Z
Trial Pits							
TP01	18/04/2024	JCB 8T 360	0.2 m	Terminate – concrete	652876.2	305590.7	3.450
TP01a	18/04/2024		0.2	Terminate – concrete	652871.1	305590.1	3.486
TP01b	18/04/2024		0.8 m	Terminate – Asbestos	652872.3	305586.6	3.425
TP02	18/04/2024		2.5 m	Backfilled with arisings	652855.1	305588.9	3.184
TP03	18/04/2024		2.0 m	Backfilled with arisings	652854.3	305561.3	3.214
TP04	18/04/2024		2.5 m	Backfilled with arisings	652831.6	305551.3	3.050

Detailed field records can be found in the appendix.

2.2.2 Monitoring Well Installations

Three boreholes were installed with monitoring wells. A summary of the monitoring well installations is presented in Table 2.2.2.

Table 2.2.2; Monitoring Well Installations				
Location	Well Screen (plain pipe) (m bgl)	Response Zone (slotted pipe) (m bgl)	Filter Gravel (m bgl)	Bentonite (m bgl)
Cable Percussive Boreholes				
BH01	GL – 1.0	1.0 – 5.0	1.0 – 5.0	GL – 1.0
BH02	GL – 1.0	1.0 – 5.0	1.0 – 5.0	GL – 1.0
BH03	GL – 1.0	1.0 – 5.0	1.0 – 5.0	GL – 1.0

In all wells:

- 50mm uPVC pipe was used,
- Slotted pipe had 1.0 mm slots,
- Filter gravel of 2-4 mm was used,
- Filter sock was fitted to the slotted pipe,
- An end cap was fitted to the base of the slotted pipe,
- A gas tap and bung sealed the top of the well,
- Headworks consisted of locked trafficable cover, secured with two bolts.

2.2.3 In Field Monitoring

2.2.3.1 Ground Gas Monitoring and Sampling

Ground gas spot monitoring was completed in BH01, BH02 and BH03 on five occasions between 01/05/2024 and 05/06/2024.

No ground gas samples were collected. Detailed field records are presented in the appendix.

3 Data Analysis

3.1 Ground Conditions

The soils encountered during this investigation have been logged in accordance with current standards and corrected to ensure consistency with subsequent laboratory test results, as required. A detailed description of all the materials and stratum encountered are included in the logs, presented in the appendix.

The geology across the site was reasonably consistent with hardstanding covering made ground which lay over natural sandy soils.

Made ground was encountered in all holes beneath the hardstanding of concrete or asphalt and consisted of gravelly sand with concrete, brick and flint. Locally metal, wood and asphalt were noted. TP01b was terminated at 0.8 m depth due to the presence of suspected asbestos containing cement board. Made ground was generally shallow with a maximum depth of 1.2 m encountered in TP03.

The made ground was underlain in all locations by generally slightly gravelly and locally very gravelly sand. Gravel was of rounded flint.

This material was encountered to the bare of the hole in all locations except BH03 where sandy clay was recorded between 4.9m and 5.0 m bgl.

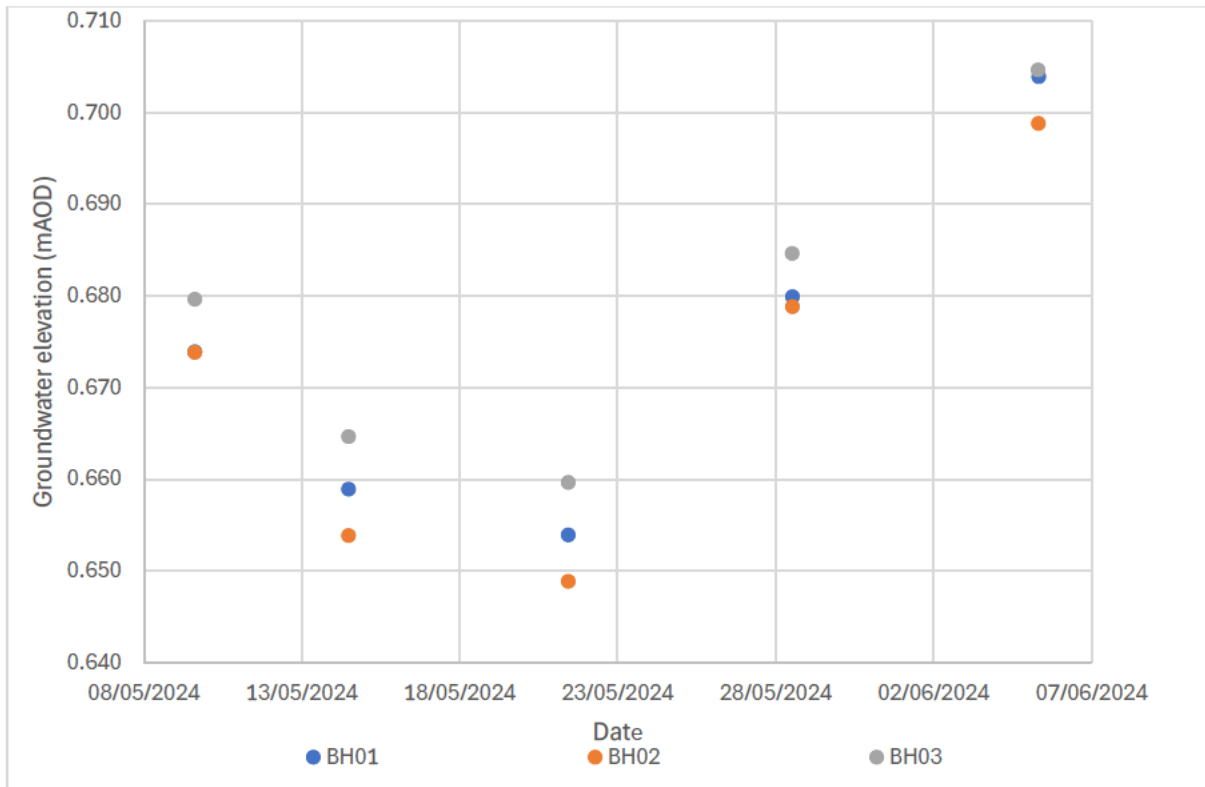
3.2 Groundwater Data

Groundwater levels were recorded on completion of the fieldwork and during subsequent monitoring visits. The ground conditions are summarised in Table 3.2.

Table 3.2; Groundwater Data Summary			
Date	Groundwater Depth (m bgl)		
	BH01	BH02	BH03
During Drilling: Initial Strike	3.0	3.0	3.0
During Drilling: Rose to	2.6	2.8	2.7
09/05/2024	2.66	2.31	2.085
14/05/2024	2.675	2.33	2.10
21/05/2024	2.68	2.335	2.105
28/05/2024	2.654	2.305	2.08
05/06/2024	2.63	2.285	2.06

Table 3.2; Groundwater Data Summary			
Date	Groundwater Elevation (m AOD)		
	BH01	BH02	BH03
During Drilling: Initial Strike	0.33	-0.02	-0.24
During Drilling: Rose to	0.73	0.18	0.06
09/05/2024	0.67	0.67	0.68
14/05/2024	0.659	0.654	0.665
21/05/2024	0.65	0.65	0.66
28/05/2024	0.68	0.68	0.68
05/06/2024	0.70	0.70	0.70

Groundwater monitoring does not appear to show any correlation between the elevation of the groundwater and the state of the tide. Round 5 of monitoring was conducted to coincide with a high tide with monitoring occurring over approximately a 1 hr period. The depth of groundwater did not change during that time. The table below shows the elevation of the groundwater on each visit.



3.3 Photo Ionisation detector (PID) readings

Generally low readings were encountered using the PID with a maximum of 0.3ppm being recorded. These readings indicate negligible levels of volatile compounds.

3.4 Geo-environmental Laboratory Testing

Upon completion of fieldwork and in house QAQC process, selected samples were promptly transported to a UKAS / MCERT accredited chemical testing laboratory.

Testing schedules sent to the laboratory are appended to this report. The samples conveyed to the lab and testing requested are summarised in Table 3.3.

Table 3.3; Laboratory Testing Schedule Summary						
Location	Sample ID	Sample Depth (m bgl)	Analysis Requested			
			GAC Common Contaminates	PCBs	Asbestos	GAC Full EQS Water
Soil Samples						
TP02	ES2	0.4	X	X		
TP03	ES1	0.2	X			
TP04	ES2	0.4	X	X		
BH01	ES1	0.3	X			
BH02	ES1	0.5	X			
BH03	ES1	0.3	X	X		
TP01b	B1	0.8	X		X	
BH02	ES2	2.5	X			
Water Samples						
BH01	W1	2.33 - 5.0				X
BH02	W2	2.68 - 5.0				X
BH03	W3	2.10 - 5.0				X

Site 4B East, Great Yarmouth Energy Park, Admiralty Road, Great Yarmouth

The GAC Common Contaminates Suite consists of:

- As, Cd, Cr (Total and VI), Cu, Ni, Zn, Pb, Hg, Se, B,
- Petroleum Hydrocarbons (TPH-CWG)
- Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)
- Polycyclic Aromatic Hydrocarbons (US EPA 16-speciated PAHs)
- Asbestos screen (with ID where found),
- Inorganics (pH, TOC)

The GAC Full EQS Water Suite consists of:

- As, Cd, Cr, Cu, Ni, Zn, Pb, Hg, B, Se, cyanide (total),
- Polycyclic Aromatic Hydrocarbons (US EPA 16-speciated PAHs)
- phenols (total),
- Total Petroleum Hydrocarbons
- Inorganics (hardness, pH, sulphate, chloride, NH₄ as N, nitrate, conductivity)

The results of the testing are presented in the appendix and the implications discussed below.

3.5 Data Quality Review

3.5.1 Quality Assurance and Quality Control

Well casing materials have the potential to affect the surrounding water quality through both release and sorption of determinants. The following table is based on guidance on the design and installation of groundwater quality monitoring points.

Material selection in the design and installation of groundwater quality monitoring points		
Contaminants	HDPE	uPVC
Free-phase LNAPL	Not ideal	Most Appropriate
Free-phase DNAPL	Most Appropriate	Not ideal
Metals	Appropriate	Appropriate
BTEX	Not ideal	Most Appropriate
PAH	Not ideal	Most Appropriate
Chlorinated Solvents	Most Appropriate	Not ideal
Dissolved PCBs	Appropriate	Appropriate but not ideal

Based on the table above, uPVC pipe was used in the well installations.

All soil samples were handled in accordance with the analytical protocol with respect to holding time, preservation method, storage requirement, and container type.

No duplicate or blank samples were taken during this investigation.

3.5.2 Uncertainty and Sources of Bias

Several sources of uncertainty and potential bias have been identified as being introduced by the investigation methods used:

- Targeted sampling was used to determine probable worst-case conditions at the site. This approach allows specific sources to be targeted and horizons to be sampled. Such samples are representative of hotspots and are not suitable for use in statistical analysis.
- As the potential source of contamination was on site, any resultant plume of contamination is expected to be relatively shallow. As such groundwater sampling depths were selected to be correspondingly shallow. While it is expected that this method will result in probable worst-case conditions being sampled, any DNAPL or deeper LNAPL plume may be missed. Based on the conceptual model established in the PRA, no such plumes are expected.

- Monitoring wells were developed using a bailer during the first monitoring visit. Well development in this way removes any material introduced by the drilling process. Groundwater samples were subsequently collected using a bailer. This method of sampling can cause dissolved volatile contaminants to evaporate, potentially affecting the concentrations of short chain hydrocarbons.
- EQS for metals relate to dissolved concentrations, not total concentrations. Samples should therefore be filtered in the field and fixed using appropriate preservatives. Using a particulate filter prior to sampling into containers with appropriate preservatives is the best way to maintain the concentration of dissolved metals. In the case of this investigation, neither filter nor preservatives were used. It is possible this has led to a small increase in the reported concentration of metals.
- The response zone of the wells were installed to cross stratigraphic boundaries. In order to allow accurate characterisation of both gas and groundwater, well screens should not generally cross from one strata (or aquifer) to another. In this investigation the strata are believed to be acting as together as a single unit and as such, the response zone crossing strata is considered to have had a negligible effect.

Overall, the quality of the field data collected is considered to be sufficient to meet the overall objectives of this assessment.

4 Discussion

4.1 Generic Quantitative Risk Assessment

4.1.1 Soil Contamination

In order to assist risk-based decision making regarding human health, Land Quality Management Limited (LQM) and the Chartered Institute for Environmental Health (CIEH) published 'Suitable 4 Use Levels' (S4UL) based on the Environment Agency's Contaminated Land Exposure Assessment (CLEA) tool, version 1.071. Toxicological data was used along with generic landuse scenarios (with specific assumptions made in each case) to assess the dermal exposure and inhalation of contaminated dust, to provide a combined pathway generic assessment criteria (GAC) screening value. Furthermore, to support decision making regarding a revised Statutory Guidance, designed to address concerns with the real-world application of Part 2A of the Environmental Protection Act 1990 (Part 2A), DEFRA produced Category 4 Screening Levels (C4SL) for six contaminants.

A minimum concentration of total organic carbon (TOC) has been reported as 2.8 %. Soil Organic Matter (SOM) is generally considered to be 0.58% of TOC, giving a conservative quantity of 4.8%. Based on this calculation and in order to remain conservative, screening values for soil assume a SOM of 2.5 %.

A summary of the laboratory test results is presented in the following table. Where the detected concentration exceeds the GAC, the cell is coloured Red.

Table 4.1.1; GQRA GAC Screening for Commercial land at 2.5% SOM								
Analyte	GAC/C4SL	TP02 ES2 0.40 m bgl	TP03 ES1 0.20 m bgl	TP04 ES2 0.40 m bgl	BH01 ES1 0.30 m bgl	BH02 ES1 0.50 m bgl	BH03 ES1 0.30 m bgl	BH02 ES2 2.5 m bgl
TOC	-	3.7	2.8	3.4	3.3	3.3	6.8	< 1.0
Arsenic	640	21	17	17	19	26	32	< 10
Boron	240000	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Cadmium	190	0.6	1.2	0.8	0.5	0.8	1.0	< 0.2
Chromium Total	8600	7.8	16	8.0	6.9	5.9	12	1.9
Chromium VI	33	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4.0
Copper	68000	91	150	69	58	59	85	6.7
Lead	2300	390	69	360	160	150	490	< 2.5
Mercury	See note	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	2.5
Nickel	980	19	43	19	16	16	23	< 8.0
Selenium	12000	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	11
Zinc	730000	150	600	180	91	120	390	< 1.0
Naphthalene	460	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.02
Acenaphthylene	97000	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.02
Acenaphthene	97000	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.28	< 0.02
Fluorene	68000	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.02
Phenanthrene	22000	0.63	0.78	0.53	< 0.20	0.26	1.4	< 0.02
Anthracene	540000	< 0.20	0.26	< 0.20	< 0.20	0.27	0.36	< 0.02
Fluoranthene	23000	1.5	1.5	1.9	0.40	0.50	3.4	< 0.02
Pyrene	54000	1.3	1.3	1.5	0.40	0.44	3.0	< 0.02
Benzo(a)anthracene	170	0.79	0.78	1.1	0.32	0.37	1.8	< 0.02
Chrysene	350	0.88	0.72	1.1	0.34	0.36	1.8	< 0.02
Benzo(b)fluoranthene	44	1.3	0.96	1.3	0.59	0.71	2.6	< 0.02
Benzo(k)fluoranthene	1200	0.49	0.40	0.59	0.27	0.23	1.0	< 0.02
Benzo(a)pyrene	35	0.98	0.80	1.2	0.47	0.54	2.1	< 0.02
Indeno(1,2,3-cd)pyrene	510	0.61	0.45	0.65	0.37	0.42	1.2	< 0.02
Dibenz(a,h)anthracene	3.6	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.30	< 0.02
Benzo(ghi)perylene	4000	0.76	0.59	0.72	0.43	0.50	1.4	< 0.02

Table 4.1.1; GQRA GAC Screening for Commercial land at 2.5% SOM								
Analyte	GAC/C4SL	TP02 ES2	TP03 ES1	TP04 ES2	BH01 ES1	BH02 ES1	BH03 ES1	BH02 ES2
Aliphatic >EC5 - EC6	5900	< 0.06	0.18	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Aliphatic >EC6 - EC8	17000	< 0.06	1.4	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Aliphatic >EC8 - EC10	4800	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Aliphatic >EC10 - EC12	23000	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aliphatic >EC12 - EC16	82000	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aliphatic >EC16 - EC21	1700000	< 10	< 10	< 10	< 10	13	< 10	< 10
Aliphatic >EC21 - EC35	1700000	< 20	63	< 20	130	180	89	< 20
Aliphatic >EC35 - EC44	1700000	< 15	66	< 15	190	290	110	40
Aromatic >EC5 - EC7	46000	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >EC7 - EC8	110000	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >EC8 - EC10	8100	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Aromatic >EC10 - EC12	28000	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic >EC12 - EC16	37000	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic >EC16 - EC21	28000	< 10	< 10	< 10	< 10	14	11	< 10
Aromatic >EC21 - EC35	28000	31	88	25	170	270	110	47
Aromatic >EC35 - EC44	28000	19	130	39	350	580	160	96
Benzene	47	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	110000	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	13000	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
p & m-xylene	14000	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
o-xylene	15000	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Methyl Tertiary Butyl Ether (MTBE)	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Asbestos	-	No asbestos detected	Chrysotile	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Where laboratory test results have returned concentrations below the GAC or limit of detection of the test, there is deemed to be no significant risk to human health. Where concentrations exceed the GAC, or where positive detection is made for an analyte for which no GAC is established, a discussion is provided below.

Asbestos

Chrysotile asbestos fibres were detected in one sample of made ground taken from 0.3 m bgl in TP03 sample ES1.

The Joint Industry Working Group (JIWG) in collaboration with CL:AIRE have developed a tool to help assess the risk from asbestos contamination in soils. This has been used to assess the risk posed from chrysotile asbestos fibres in made ground. While no quantification has been completed, asbestos was not noted in the soil descriptions and as such quantities are suspected to be very low. In order to be conservative, moderate quantities of asbestos fibres have been assumed in the risk assessment. Similarly, no quantification of the respirable fibre index has been completed and so to be conservative, a medium value has been assumed.

The decision support tool concludes an overall risk ranking of negligible from the presence of chrysotile fibres in made ground.

In addition, several fragments of material suspected to be cement bound asbestos were encountered in TP01b at a depth of around 0.8 m. A fragment was sent to the laboratory for testing which reported the presence of amosite.

Based on those same conservative assumptions above, the decision support tool concludes an overall risk ranking of negligible from the presence of cement bound amosite.

Encountering asbestos should be considered as a potential risk to groundworks contractors during development of the site. A discovery method statement is appended to this report to aid groundworks contractors in how to act in the event that unexpected contamination including asbestos is encountered. Groundworks contractors should conduct their own risk assessment and complete any works in accordance with all applicable licencing and other regulations.

The Joint Industry Working Group (JIWG) in collaboration with CL:AIRE have developed a decision support tool to help contractors determine the probable licencing status of working with asbestos contaminated soils. The tool concludes the work will probably fall within non-licenced work. FFP3 RPE should be a suitable minimum standard together with manual/localised dust suppression and basic personal decontamination facilities.

Heavy Metals

Several metals have been detected in concentrations that exceed the limit of detection for the test method.

However, all concentrations of all analytes were below the adopted screening value and as such heavy metals are not believed to present a significant risk to the sensitive receptors identified; specifically Human Health and Environmental receptors.

Polycyclic Aromatic Hydrocarbons (PAH)

Several PAH compounds were detected in concentrations that exceed the limit of detection for the test method.

However, all concentrations of PAHs were below the adopted screening value and as such PAHs are not believed to present a significant risk to the sensitive receptors identified; specifically Human Health and Environmental receptors.

Total Petroleum Hydrocarbons (TPH)

Positive detection of long chain Petroleum Hydrocarbons has been reported in all seven samples tested. However, none of the analytes (aliphatic or aromatic TPH) have been detected in concentrations that exceed the generic assessment criteria screening value. As such, in the concentrations detected, Petroleum Hydrocarbons are not believed to present a significant risk to the sensitive receptors identified; specifically Human Health and Environmental receptors.

4.1.2 Groundwater Contamination

As stated above, the groundwater does not appear to be tidal in nature or if it is, not strongly so or not in all conditions.

By measuring the head of water and distance between each well, it is possible to determine the hydraulic gradient and groundwater flow direction. The hydraulic gradient (i) has been calculated as 0.001890 m/m.

The groundwater flow direction is calculated as 15.78 degrees from north, or north by east, as shown on the fieldwork location plan, G0174-DR03.

Due to the low hydraulic gradient and location of the wells, it is possible that there is error in this proposed flow direction. It is possible that the true flow direction in non-tidal conditions may be as much as 315 degrees from north. In any case, it does not appear to be flowing generally southwest, as was expected during the scoping of the site investigation.

In addition, based on the laboratory testing undertaken, the ground water appears to be relatively fresh with a salinity of only 0.55 to 1.04 g/kg. By comparison sea water is typically between 33 to 38 g/kg.

Based on this, both freshwater and saltwater environmental quality standards have been provided along with the more conservative UK drinking water standard.

A summary of the laboratory test results is presented in the following table

Where laboratory test results have returned concentrations below the GAC or limit of detection of the test, there is deemed to be no significant risk to controlled waters. Where concentrations exceed the GAC, or where positive detection is made for an analyte for which no GAC is established, a discussion is provided below.

Table 4.1.2; GQRA GAC for groundwater samples									
Analyte	Unit	UK Drinking water standard	Fresh water EQS	FW priority hazardous substances EQS	Coastal waters EQS	Coastal waters priority hazardous substances EQS	BH01 W1 2.33 - 5.0 m bgl	BH02 W1 2.68 - 5.0 m bgl	BH03 W1 2.10 - 5.0 m bgl
Hardness (as CaCO ₃)	mg/l		-	-	-	-	790	340	520
Arsenic	µg/l	10	50 AA	-	25 AA	-	7.9	5.0	3.4
Boron	µg/l	1000	2000 AA	-	7000 AA	-	200	200	320
Cadmium*	µg/l	5	1.5 MAC	-	-	0.2 AA	< 2.5	< 2.5	< 2.5
Chromium Total	µg/l	50	32 MAC	-	-	-	< 2.5	< 2.5	< 2.5
Copper (bioavailable)	µg/l	2000	1 AA	-	3.76 AA	-	< 1	< 1	< 1
Lead	µg/l	10	-	14 MAC	-	14 MAC	< 5	< 5	< 5
Mercury	µg/l	1	-	0.07 MAC	-	0.07 MAC	< 1	< 1	< 1
Nickel	µg/l	20	-	34 MAC	-	34 MAC	< 2.5	< 2.5	< 2.5
Selenium	µg/l	10	-	-	-	-	2	< 1	6
Zinc (bioavailable)	µg/l		10.9 AA	-	6.8 AA	-	< 5	< 5	< 5
Cyanide (Total)	ug/l	50	5 MAC	-	-	-	3.0	< 0.5	< 0.5
Naphthalene	µg/l		-	130 MAC	-	130 MAC	0.02	0.02	< 0.01
Acenaphthylene	µg/l		-	-	-	-	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l		-	-	-	-	< 0.01	< 0.01	< 0.01
Fluorene	µg/l		-	-	-	-	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l		-	-	-	-	< 0.01	< 0.01	< 0.01
Anthracene	µg/l		-	0.1 MAC	-	0.1 MAC	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l		-	0.12 MAC	-	0.12 MAC	< 0.01	< 0.01	< 0.01
Pyrene	µg/l		-	-	-	-	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l		-	-	-	-	< 0.01	< 0.01	< 0.01
Chrysene	µg/l		-	-	-	-	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l		-	0.017 MAC	-	0.017 MAC	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l		-	0.017 MAC	-	0.017 MAC	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	-	0.027 MAC	-	0.027 MAC	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l		-	-	-	-	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l		-	-	-	-	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l		-	0.0082 MAC	-	0.0082 MAC	< 0.01	< 0.01	< 0.01

Table 4.1.2; GQRA GAC for groundwater samples									
Analyte	Unit	UK DWS	FW EQS	FW priority hazardous substances EQS	Coastal waters EQS	Coastal waters priority hazardous substances EQS	BH01 W1	BH02 W1	BH03 W1
Total TPH (>C8 to C40)	µg/l		-	-	-	-	< 10	< 10	20
Phenols (Total)	µg/l		46 MAC	-	46 MAC	-	< 1.10	< 1.10	< 1.10
Nitrate (as N)	mgN/l	50	-	-	-	-	15	3.0	21
Nitrate (as NO ₃)	mg/l	50	-	-	-	-	66	13	95
Chloride	mg/l	250000	250000 AA	-	-	-	290	130	270
Sulphate (As SO ₄)	mg/l	250000	400000 AA	-	-	-	580	110	240
Conductivity	µs/cm		-	-	-	-	2130	1050	1890
Salinity	g/kg		-	-	-	-	1.04	0.55	0.98
pH			-	-	-	-	6.9	7.4	7.0
EQS – Environmental Quality Standard AA – Annual Average MAC – Maximum Allowable Concentration * Hardness of > 200mg/l									

Heavy Metals

Several metals have been detected in concentrations that exceed the limit of detection for the test method.

However, all concentrations of all analytes were below the UK DWS, and EQS for fresh water and coastal water.

As such, heavy metals are not believed to present a significant risk to sensitive receptors.

Polycyclic Aromatic Hydrocarbons (PAH)

Only Naphthalene was detected in concentrations that exceed the limit of detection for the test method.

All concentrations of PAHs were below the UK DWS, and EQS for fresh water and coastal water.

As such PAHs are not believed to present a significant risk to the sensitive receptors identified; specifically Human Health and Environmental receptors.

Total Petroleum Hydrocarbons (TPH)

There are no screening values for petroleum hydrocarbons in controlled waters for either UK Freshwater EQS or for UK drinking water standards. CL:AIRE have produced a guide to assessing petroleum hydrocarbons based on EU freshwater EQS.

The CL:AIRE presents the following qualitative water quality target taken from EU EQS;

Petroleum products within freshwater or saltwater must not

- form a visible film on the surface of the water or form coatings on the beds of watercourses and lakes;
- impart a detectable 'hydrocarbon' taste to fish;
- produce harmful effects in fish

The CL:AIRE document proposes a lines of evidence approach to risk assessment. The following can be said of the site.

The site was the location of several above ground fuel tanks assumed to have held petrol, diesel, heating oil and/or kerosene.

The site was used to park road going fuel tankers which likely held petrol, diesel and heating oil.

No free phase was observed on water samples either as a sheen or globules of suspended material.

Positive detection of the following fractions were detected in soils

Aliphatic >EC5 - EC6,

Aliphatic >EC6 - EC8

Aliphatic >EC16 - EC21

Aliphatic >EC21 - EC35

Aliphatic >EC35 – EC44

Aromatic >EC21 - EC35

Aromatic >EC35 – EC44

The concentration of hydrocarbons in the soil are generally very low, particularly in the shorter chain hydrocarbons.

No dissolved phase hydrocarbons were detected in water samples from BH01 or BH02 while BH03 detected a concentration of 20 ug/l.

In soil samples from BH03, positive detection of Aliphatic >EC21 - EC35, Aliphatic >EC35 – EC44, Aromatic >EC21 - EC35 and Aromatic >EC35 – EC44 were reported.

Based on the lines of evidence, Petroleum Hydrocarbons are not believed to present a significant risk to the sensitive receptors.

4.1.3 Ground Gas Risk Assessment

Ground gas spot monitoring data, collected across the whole (un-zoned) site, is summarised in the Table below. Full results are presented in the appendix.

Table 4.1.3; Ground Gas Data Summary										
	Max Atmospheric Pressure	Min Atmospheric Pressure	Differential Pressure	Flow	Max CH4	Max CO2	Min O2	Max CO	Max H2S	Max PID
Unit	(mB)	(mB)	(mB)	(l/hr)	%	%	%	ppm	ppm	Ppm
All Data	1024	1001	5	0.1	0.0	6.2	10.6	0	0	0.1
BH01	1024	1002	0	0.0	0.0	3.6	16.0	0	0	0.1
BH02	1023	1001	0	0.0	0.0	4.9	13.6	0	0	0.0
BH03	1022	1001	5	0.1	0.0	6.2	10.6	0	0	0.0

The second round of gas monitoring was completed during a period when the atmospheric pressure was forecast to be falling. The forecast was for atmospheric pressure to be 1026 mB with the pressure recorded on site at 1022/1024 mB. Low and falling atmospheric pressure is believed to be a major factor driving positive ground gas flow.

During the second round, a maximum flow rate of 0.1 l/hr was recorded.

During the third round of monitoring atmospheric pressure was reported to be relatively low at 1001mB. No flow was recorded during the third round of monitoring.

Ground gas migrates in two ways

- Advective (pressure driven) flow, where the generation of ground gas results in a significant positive differential or relative pressure #
- Diffusive flow occurs where the generation of ground gas results in little or no differential pressure, diffusive flow, with the flow rates controlled by changes in atmospheric pressure.

The ground gas monitoring results recorded the maximum relative pressure at 5 mB during one round in BH03. Otherwise, relative pressure was recorded at 0 mB in each monitoring visit in every well. It is concluded that ground gas was migrating by diffusive flow, controlled by changes in atmospheric pressure.

This is as might be expected from the likely sources of ground gas; made ground or peat soils associated with the Breydon Formation located beneath the surficial cover sand.

Where concentrations of hazardous permanent gases (methane, CH4, and carbon dioxide, CO2) are detected, one method of risk estimation is to calculate the worst-case condition by multiplying the maximum recorded hazardous gas concentration (%) by the maximum recorded flow rate (l/hr).

As no methane was detected, the margin of error of the field equipment (0.1%) has been adopted, resulting in the following Gas Screening Values (GSV);

GSV CH4: $0.1\% * 0.1 \text{ l/hr} = 0.0001 \text{ l/hr}$
 GSV CO2: $6.2\% * 0.1 \text{ l/hr} = 0.0062 \text{ l/hr}$

The proposed building is considered to fall within either Building Type C or D as defined by Table 3 of BS 8485. Due to the potential inclusion of small rooms within the development, building Type C has been adopted in the assessment.

Based on the GSVs calculated above, the site is assessed as falling within Characteristic Situation (CS) 1 as defined in Table 2 of BS 8485. Based on Table 4 of BS 8485, no ground gas protection is required for building Type A in CS1 conditions.

Where methane concentration >1% and/or carbon dioxide concentration >5% are recorded, the guidance suggests considering whether it's necessary to increase the Characteristic Situation from CS1 to CS2. This is done by assessing the likely source of ground gas. The ground gas source is likely to be either the shallow made ground arising from site use and demolition of historical buildings or the alluvium and peat associated with the Breydon Formation beneath the surficial Blown Sands.

Made Ground

It is stated in Ground Gas Information Sheet No 1 'Using ternary plots for interpretation of ground gas monitoring results' if there is any organic, carbonate or pyrite content to the soils or rocks then carbon dioxide could potentially be present at concentrations up to 21%. Soils in the UK where carbon dioxide is commonly encountered at elevated concentrations include Glacial Till, Chalk, and Made Ground. When monitoring wells are installed, oxygen is artificially introduced into the ground resulting in biological respiration of these materials.

The soils encountered have been identified both granular and cohesive made ground with gravel including flint, chalk, brick, coal and shell fragments. No woody material, vegetable matter, cloth, leather, paper, card or other putrescible materials were noted.

Organic Clay and Peat

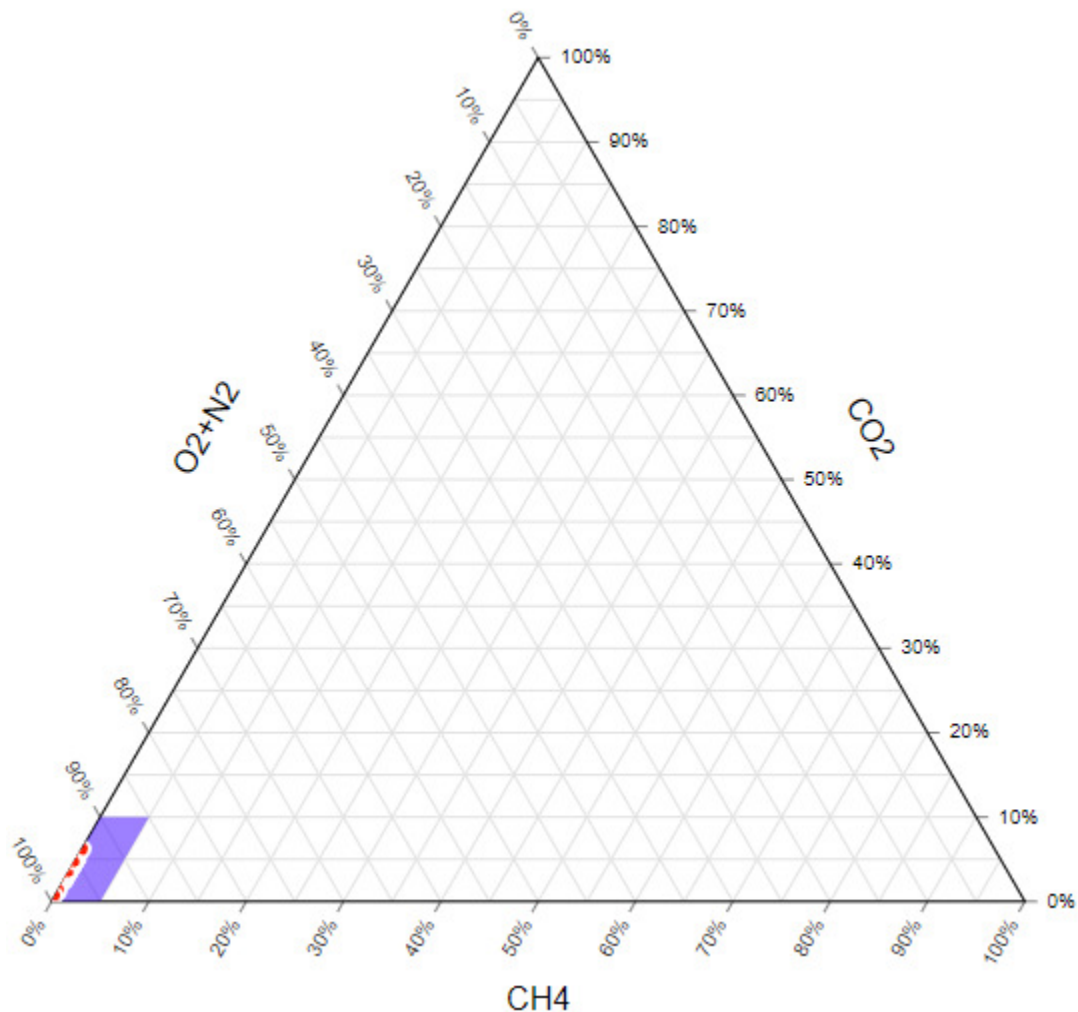
Alluvium and peat do not generally generate significant volumes of gas. These soils are typically saturated with water, producing anaerobic conditions and preventing the diffusion of gas.

Organic material comprising the peat or interred within the clay soils will decay very slowly over very long periods of time. Natural soils that are known to contain methane, for example alluvium and peat, can have pockets of trapped gas that cannot be released quickly.

CL:AIREs Research Bulletin RB17 states that alluvial soils and buried peat can quite often give high concentrations of methane and carbon dioxide in monitoring wells. Historically generated gas is trapped in the pores and migrates slowly by diffusive flow. In such cases there is no, or very little, current gas generation. Methane concentration can appear artificially elevated where carbon dioxide dissolves out of the pore space into the groundwater. In this case, small volumes of gas of relatively high concentration can be recorded.

Ternary Plots can be used to identify trends in gas composition and help in identify ground gas sources.

Ground gas spot monitoring data is presented in the ternary plot below.



As can be seen above, all gas monitoring results fall in the lower left corner of the plot. This area represents the zone of microbial respiration, shown in blue.

Adopting a lines of evidence approach, the following findings are noted:

- The made ground has been in place for >20 years
- The made ground was relatively shallow with a maximum depth of 1.2 m being recorded,
- The local geology consists of generally high permeability granular soils that will promote vertical rather than horizontal gas migration,
- Gas monitoring was conducted during a period of forecast falling pressure,
- Gas monitoring was conducted at low atmospheric pressure of 1001mb
- No methane has been detected,
- Low concentrations of carbon dioxide have been detected (maximum 6.2 %),
- A worst case GSV (maximum recorded hazardous gas concentration multiplied by maximum recorded flow rate) of 0.0001 l/hr has been calculated for methane,
- A worst case GSV (maximum recorded hazardous gas concentration multiplied by maximum recorded flow rate) of 0.0062 l/hr has been calculated for carbon dioxide,
- No carbon monoxide or hydrogen sulphide has been detected,
- The gas concentrations all plot within the zone of normal microbial respiration on the ternary diagram,
- No other significant source of ground gas has been identified.

Based on these calculated GSVs, the ternary diagram and lines of evidence, the site is assessed as falling within Characteristic Situation (CS) 1 as defined in Table 2 of BS 8485.

Based on Table 4 of BS 8485, no ground gas protection is required for building Type C in CS1 conditions.

5 Conclusions and Recommendations

5.1 Conclusions

Soil

Based on the Preliminary Risk Assessment completed by Castledine Environmental in November 2022, several potential sources of contamination were identified as posing a potential risk to the site.

These included:

- Historical marshland made ground arising from demolition of historical buildings.
- Historical tanks on and off site
- Historical industrial landuse both on and off site.

Laboratory testing has reported heavy metals, PAH and TPH contamination in excess of the limit of detection of the various tests but below the relevant generic assessment screening values.

Asbestos contamination has been assessed as posing a negligible risk to end users of the site.

Based on the concentrations reported, the contaminants tested for are not believed to pose a significant risk to sensitive receptors.

Groundwater

Groundwater was found to have a low hydraulic gradient of 0.001890 m/m. The groundwater is not believed to be significantly tidal under most conditions and was relatively fresh with salinity between 0.55 and 1.04 g/kg. The flow direction is believed to be north by east, 15 degrees from north.

Given the calculated groundwater flow direction, any current or historical tanks located north of the site are considered unlikely to impact the site. Historical above ground tanks located on site were generally towards the northern boundary however road going tankers were historically parked across the site.

All analytes were recorded below relevant freshwater and saltwater environmental quality standards and the more conservative UK drinking water standard.

A low concentration of 20 ug/l was recorded in the water sample from BH03. Based on an assessment of the various lines of evidence, this concentration is not considered to pose a significant risk to sensitive receptors.

Ground Gas

The geology and groundwater level are considered to promote vertical rather than lateral migration of ground gas.

Based on the monitoring and a worst-case calculation of GSV, the site is assessed as falling within CS1 with no ground gas protection measures necessary.

5.2 Recommendations

Based on the investigation completed, no significant risk is posed from ground gas or other sources of contamination at the site. No ground gas protection or other remediation is considered necessary.

Site 4B East, Great Yarmouth Energy Park, Admiralty Road, Great Yarmouth
Groundworks contractors should anticipate the possibility of asbestos being encountered in the ground. Appropriate RPE, dust suppression, decontamination, mitigation and waste streams should be adopted. Work with asbestos is likely to fall within non-licenced work.

The site is considered suitable for the proposed development in its current condition without any further investigation or remedial works.

Any previously unexpected contamination should be reported to the local authority. A discovery method statement is appended to this report.

6 Limitations and Closing Statement

This report is prepared for the sole use of the client, as stated above, in accordance with the scope agreed under separate cover. No responsibility or liability is accepted for the use of this report of in whole or in part by third parties. Written authorisation of reliance can be provided under separate cover upon request.

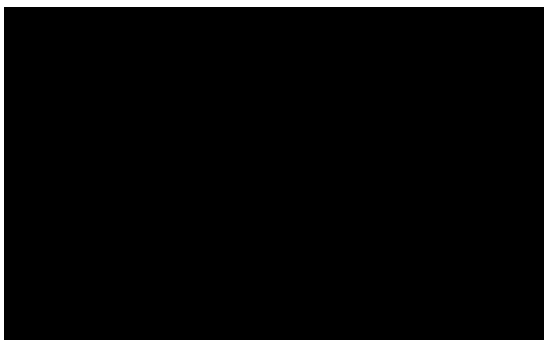
The conclusions presented herein are based on information gathered from multiple sources including but not limited to the client and their representatives, in-house and existing knowledge, third parties (including historical mapping, databased information and public and private online sources) and site visits. Though an effort has been made to use reputable sources and checks made on the validity of information, the information used in this assessment is assumed to be accurate. In the event that the information used is inaccurate or misrepresented, we accept no responsibility for erroneous assessment. Should new information come to light that contradicts or enhances this assessment, we welcome the opportunity to complete a reassessment, to the satisfaction of all parties.

This report assumes the competency of the readership and is intended to facilitate sufficiently experienced and competent individuals and organisations to apply best practice within their professional field of expertise. It is not intended to act as a replacement for experience and competence. We are happy to revise any aspect of this report following discussion with appropriately experienced and competent specialists.

While the investigation completed was proportional to the risk and sufficient to achieve the project objectives, GAC Consulting assumes the readership understands and accepts the limited nature of the investigation, which may materially affect its methodology, conclusions and recommendations.

We trust the findings of this investigation meet the requirements of the project objectives, set out above, to be used in isolation or combination with other such reports to address any outstanding requirements of the project described herein.

For Geotechnical and Contamination Consulting



█ B.Sc., FGS, RSoBRA

References

- Anglian Water (2018). www.anglianwater.co.uk/siteassets/household/services/dwq-standards.pdf
- BSI Standards Publication. (2011). Investigation of potentially contaminated sites. Code of practice. (BS 10175:2011+A2:2017)
- BSI Standards Publication. (2015). Code of practice for ground investigations (BS 5930:2015+A1:2020)
- BSI Standards Publication. (2015). Code of practice for ground investigations. (BS 5930:2015+A1:2020)
- BSI Standards Publication. (2015). Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. (BS 8485:2015+A1:2019)
- BSI Standards Publication. (2018). Geotechnical investigation and testing. Identification and classification of soil - Principles for a classification. (BS EN ISO 14688-2:2018)
- BSI Standards Publication. (2018). Soil quality. Sampling – Strategies. (BS ISO 18400-104:2018)
- CIRIA. (2001). Contaminated Land Risk Assessment. A Guide to Good Practice. (C552)
- CL:AIRE, 2017. Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies. www.claire.co.uk/phg
- Department for Environment, Food and Rural Affairs. (2014). SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document.
- Environment Agency. (2006). Guidance on the design and installation of groundwater quality monitoring points (SC020093)
- Environment Agency. (2009). Updated technical background to the CLEA model. (SC050021/SR3)
- Environment Agency. (2016). Surface water pollution risk assessment for your environmental permit.
- Environment Agency. (2017). New groundwater vulnerability mapping methodology in England and Wales. (SC040016/R)
- Environment Agency. (2019). Land contamination: risk management. (LCRM)
- Environmental Protection Act 1990
- Wilson, Collins and Lavery. (2018). Using ternary plots for interpretation of ground gas monitoring results. (Ground Gas Information Sheet No 1)
- Wildlife & countryside Act 1981
- TernaryPlot.com (2022). <https://www.ternaryplot.com/>
- Environment Agency. 2022. <https://www.gov.uk/guidance/surface-water-pollution-risk-assessment-for-your-environmental-permit#screening-tests-freshwaters>

Appendices

Drawings

Site Location Plan – overview

G0174-DR01

Proposed Layout

G0174-DR02

Fieldwork Location Plan

G0174-DR03

Fieldwork Records

Trial Pit Logs

Cable Percussive Borehole logs

Ground Gas Field Records

Laboratory Testing

Testing Schedules

Laboratory Report

Report 22-44363

Report 24-45257

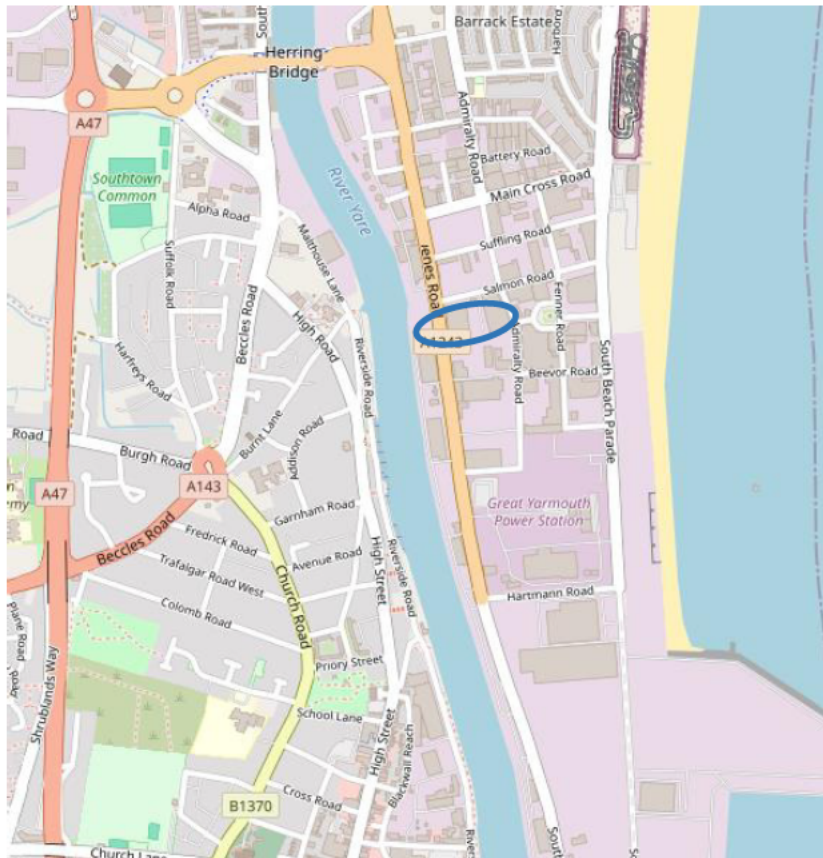
JIWG CL:AIRE DST Worksheets

Discovery Method Statement

Drawings

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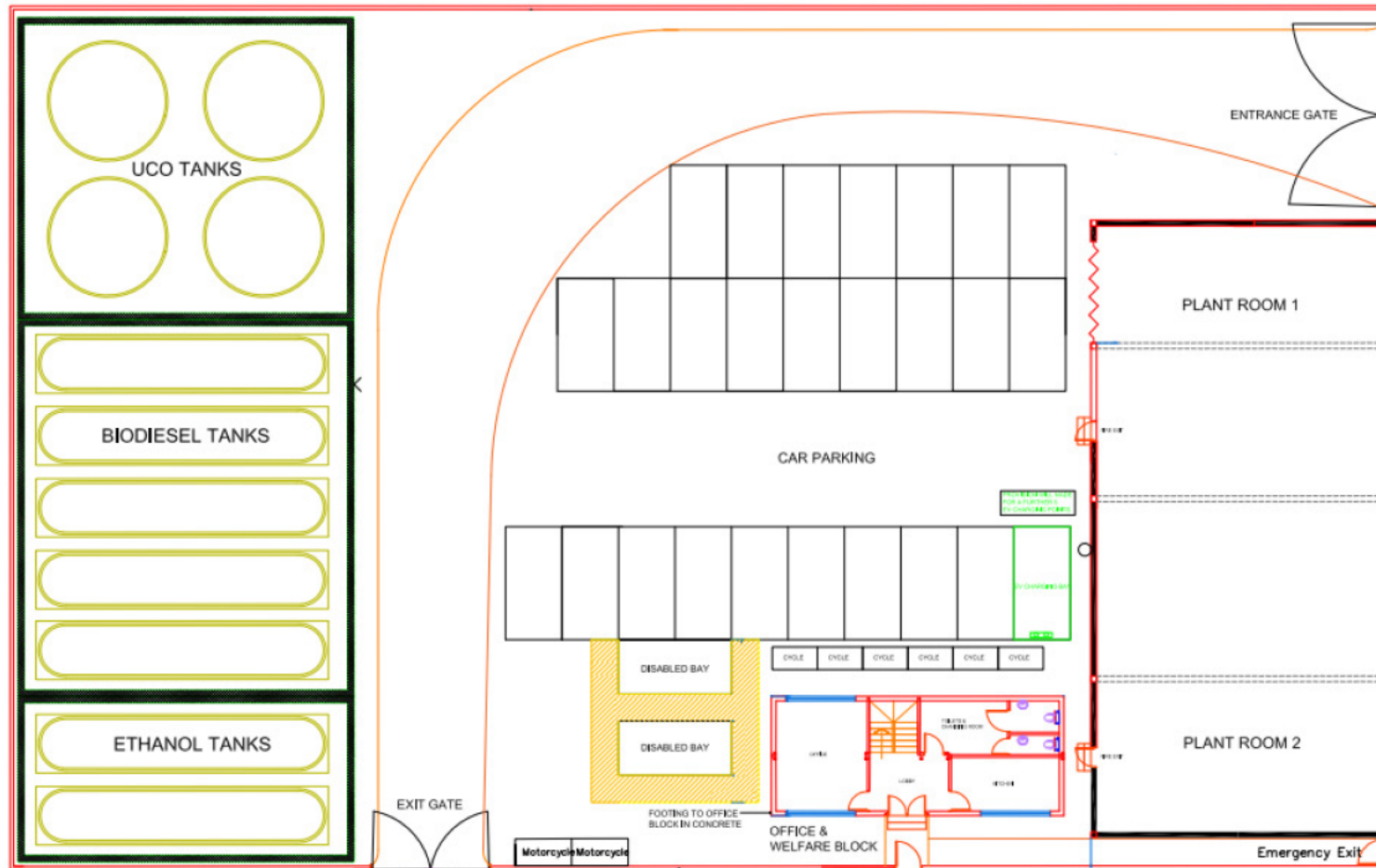
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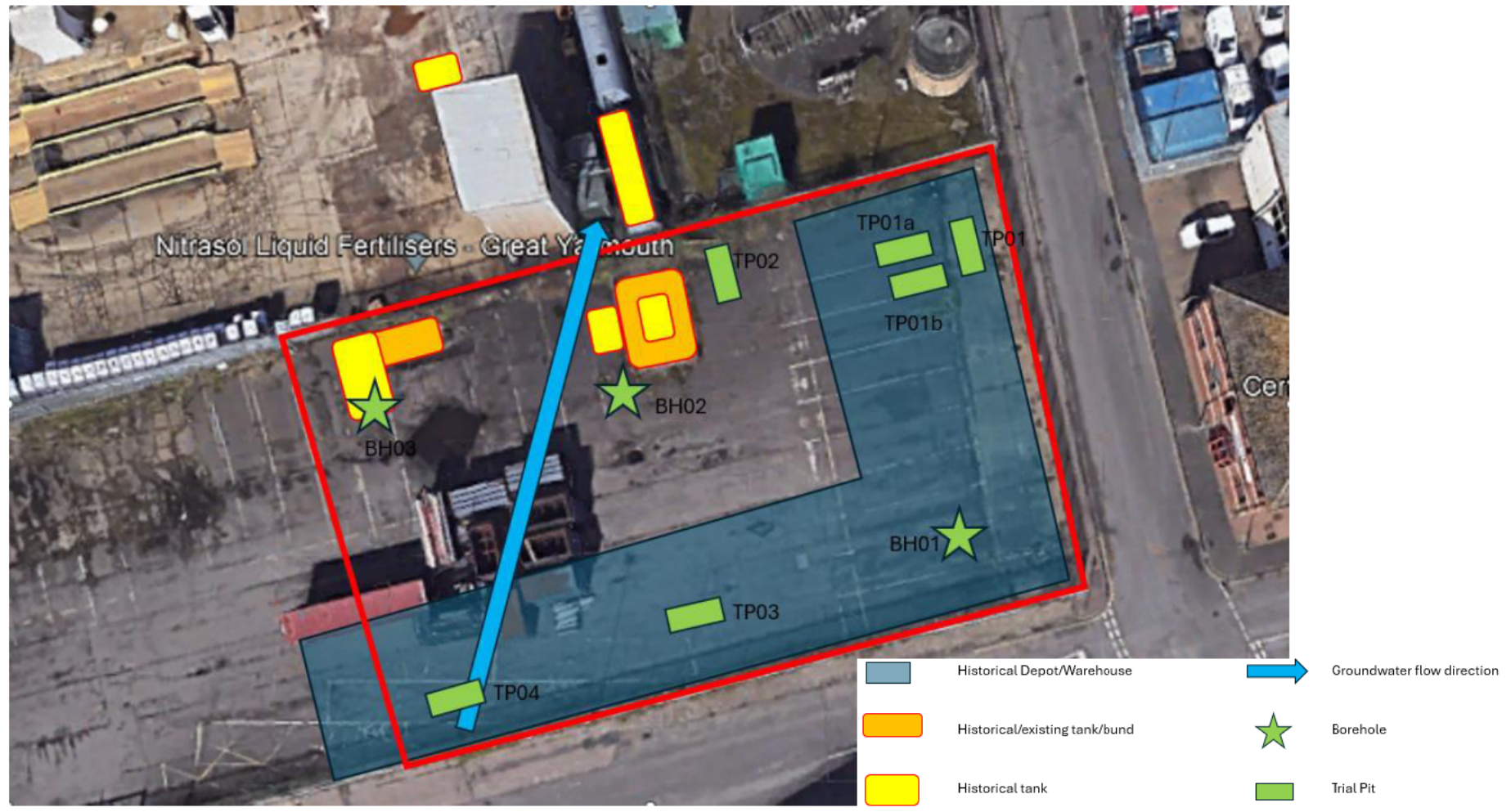
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Drawing Title: Fieldwork Location Plan

Drawing Number: G0174-DR03



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Fieldwork Records



Key to exploratory hole symbols and abbreviations

SAMPLE TYPES

ACM - Asbestos sample	AMAL - Amalgamated sample	B - Bulk disturbed sample
BLK - Block sample	C - Core sample	CBR - CBR test sample
D - Disturbed sample	ES - Environmental sample	EW - Environmental water sample
G - Gas sample	J - Jar sample	L - Liner sample
TW - Pushed thin wall sample	U - Undisturbed sample	UT - Undisturbed thin wall sample
W - Water sample		

IN-SITU TESTS

HV - Hand shear vane	HV(r) - Hand shear vane residual	PID - Photo ionisation detector
PP - Hand penetrometer	SPT - Standard penetration test	


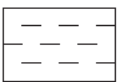
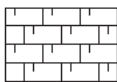
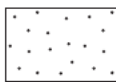
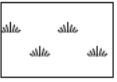


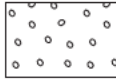
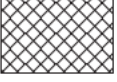
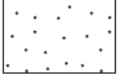

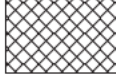
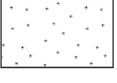

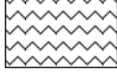



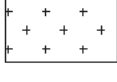





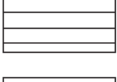


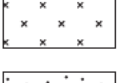


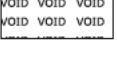
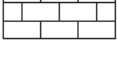

GROUNDWATER

 Groundwater strike	 Groundwater rest level
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ROTARY CORE DETAILS

TCR - Total core recovery (%)	SCR - Solid core recovery (%)	RQD - Rock quality designation (%)
FI - Fracture index	NI - Non-intact core	AZCL - Assumed zone of core loss

LEGEND

 Topsoil	 Clay	 Chalk	 Sand backfill
 Peat	 Silt	 Breccia	 Gravel backfill
 Made ground	 Sand	 Conglomerate	 Arisings
 Concrete	 Gravel	 Metamorphic	 Bentonite
 Wood	 Cobbles	 Igneous	 Concrete
 Brick	 Boulders		 Grout
 Bituminous material	 Mudstone		 Plain pipe
 Gypsum	 Siltstone		
 Coal	 Sandstone		
 Void	 Limestone		 Slotted pipe



Trial Pit

TP01b

Sheet 1 of 1

Hole Type TP	Easting 652872.30	Northing 305586.61	Ground Level (m) 3.42	Scale 1:25
Project Name Salmon Road, Great Yarmouth	Project No. G0174	Start Date 2024-04-18	End Date 2024-04-18	

Client Trent Energy Limited	Contractor	Consultant Geotechnical and Contamination Consulting
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
		0.80	ACM B1		3.32	(0.10) 0.10		Asphalt.
					3.02	(0.30) 0.40		MADE GROUND (Dark grey slightly gravelly SAND. Gravel is fine to coarse rounded flint).
					2.92	(0.10) 0.50		CONCRETE.
					2.62	(0.30) 0.80		MADE GROUND (Dark brown slightly gravelly SAND with a low cobble content. Gravel of fine to coarse brick and flint).
								Possible ACM (0.75 - 0.80m)
								End of Trial Pit at 0.80m

Remarks
 1) Groundwater was not encountered. 2) Terminated at 0.8 m due to suspected ACM

Method, Plant, Stability, Dimensions
 0.00 - 0.80m TP 8 Ton 360
 Unstable
 L = 2.40m
 W = 0.90m

Logger
 P Price

Checked By: PP



Trial Pit

TP02

Sheet 1 of 1

Hole Type TP	Easting 652855.15	Northing 305588.90	Ground Level (m) 3.18	Scale 1:25
Project Name Salmon Road, Great Yarmouth	Project No. G0174	Start Date 2024-04-18	End Date 2024-04-18	

Client Trent Energy Limited	Contractor	Consultant Geotechnical and Contamination Consulting
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
		0.15 0.15	PID ES ES1	0.00	3.08 0.10 0.12	0.10 0.12	Asphalt.	
		0.40 0.40	PID ES ES2	0.10	2.96 0.22	0.22	MADE GROUND (Dark greyish brown gravelly SAND with a low cobble content. Gravel is fine to coarse rounded to angular brick and flint).	
		0.60 0.60	PID ES ES3	0.00	2.68 0.50	0.28	Dark grey SAND.	
		1.10 1.10	PID ES ES4	0.10	2.68 0.50	0.50	Light yellowish grey SAND.	0.5
		2.00 2.00	PID ES ES5	0.10	2.00 2.00	2.00		1.0
					0.68 2.50	2.50	End of Trial Pit at 2.50m	2.0
								2.5
								3.0
								3.5
								4.0
								4.5
								5.0

Remarks 1) Groundwater was not encountered. 2) Terminated at 2.5 m due to collapse	Method, Plant, Stability, Dimensions	Logger
	0.00 - 2.50m TP 8 Ton 360 Unstable L = 2.80m W = 0.90m	P Price

Checked By: PP



Trial Pit

TP03

Sheet 1 of 1

Hole Type TP	Easting 652854.35	Northing 305561.33	Ground Level (m) 3.21	Scale 1:25
Project Name Salmon Road, Great Yarmouth	Project No. G0174	Start Date 2024-04-18	End Date 2024-04-18	

Client Trent Energy Limited	Contractor	Consultant Geotechnical and Contamination Consulting
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
		0.20 0.20	PID ES ES1	0.30	3.11 0.10 0.20	0.10 0.20	Asphalt.	MADE GROUND (Dark greyish brown slightly clayey gravelly SAND. Gravel is fine to coarse rounded to angular concrete, asphalt, brick and flint).
		1.00 1.00	PID ES ES2	0.10	2.91 0.30	0.30		MADE GROUND (Dark grey slightly clayey gravelly SAND. Gravel is fine to coarse rounded to angular brick metal and wood).
		2.00 2.00	PID ES ES3	0.00	2.01 1.20	1.20		Light yellowish grey SAND.
					1.21 2.00	2.00		End of Trial Pit at 2.00m

Remarks
1) Groundwater was not encountered. 2) Terminated at 2.0 m due to collapse

Method, Plant, Stability, Dimensions
0.00 - 2.00m TP 8 Ton 360
Unstable
L = 2.40m
W = 0.90m

Logger
P Price

Checked By: PP



Cable Percussion Log

BH01

Sheet 1 of 1

Hole Type CP	Easting 652873.72	Northing 305568.42	Ground Level (m) 3.33	Scale 1:25
Project Name Salmon Road, Great Yarmouth	Project No. G0174	Start Date 2024-04-18	End Date 2024-04-18	

Client Trent Energy Limited	Contractor	Consultant Geotechnical and Contamination Consulting
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
					3.23	(0.10) 0.10	Asphalt.	
		0.30 0.30	PID ES ES1	0.00		(0.30)	MADE GROUND (Dark grey slightly gravelly SAND. Gravel is fine to coarse rounded flint).	
					2.93	0.40 (0.10)	CONCRETE.	
					2.83	0.50 (0.30)	MADE GROUND (Dark brown slightly gravelly SAND with a low cobble content. Gravel of fine to coarse brick and flint).	0.5
		1.00	D D1		2.53	0.80 (0.40)	Grey slightly gravelly SAND. Gravel is fine to medium rounded flint.	1.0
					2.13	1.20	Orangish brown very gravelly SAND. Gravel is fine to coarse rounded flint.	
		1.50 1.50	PID ES ES2	0.00				1.5
		2.00	D D2					2.0
		2.50 2.50	PID ES ES3	0.00		(2.50)		2.5
		3.00	D D3					3.0
		3.50 3.50	PID ES ES4	0.00				3.5
		4.00	D D4		-0.37	3.70	Yellowish brown SAND.	4.0
		4.50 4.50	PID ES ES5	0.00		(1.30)		4.5
					-1.67	5.00	End of Borehole at 5.00m	5.0

Remarks
1) 150mm casing to 5.0 m. 2) Groundwater struck at 3.0 m rising to 2.6 m. 3) Installed GL to 1.0m plain pipe, 1.0 m to 5.0 m slotted 52 mm ID.

Method, Plant, Stability, Dimensions **Logger**

Checked By: PP



Cable Percussion Log

BH02

Sheet 1 of 1

Hole Type CP	Easting 652848.15	Northing 305577.20	Ground Level (m) 2.98	Scale 1:25
Project Name Salmon Road, Great Yarmouth	Project No. G0174	Start Date 2024-04-18	End Date 2024-04-18	

Client Trent Energy Limited	Contractor	Consultant Geotechnical and Contamination Consulting
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
					2.88	(0.10) 0.10	Asphalt.	
		0.50 0.50	PID ES ES1	0.00		(0.60)	MADE GROUND (Dark grey slightly gravelly SAND. Gravel is fine to coarse rounded flint).	0.5
		1.00 1.00	D D1		2.28	0.70	Grey SAND.	1.0
		1.50 1.50	PID ES ES2	0.00	1.48	1.50	Yellowish brown slightly gravelly SAND. Gravel is fine to medium rounded flint.	1.5
		2.00 2.00	D D2			(2.10)		2.0
		2.50 2.50	PID ES ES3	0.00				2.5
		3.00 3.00	D D3					3.0
		3.50 3.50	PID ES ES4	0.00	-0.62	3.60	Yellowish brown SAND.	3.5
		4.00 4.00	D D4			(1.40)		4.0
		4.50 4.50	PID ES ES5	0.00				4.5
					-2.02	5.00	End of Borehole at 5.00m	5.0

Remarks
1) 150mm casing to 5.0 m. 2) Groundwater struck at 3.0 m rising to 2.8 m. 3) Installed GL to 1.0m plain pipe, 1.0 m to 5.0 m slotted 52 mm ID.

Method, Plant, Stability, Dimensions **Logger**

Checked By: PP



Cable Percussion Log

BH03

Sheet 1 of 1

Hole Type CP	Easting 652827.59	Northing 305578.45	Ground Level (m) 2.76	Scale 1:50
Project Name Salmon Road, Great Yarmouth	Project No. G0174	Start Date 2024-04-19	End Date 2024-04-19	

Client Trent Energy Limited	Contractor	Consultant Geotechnical and Contamination Consulting
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
		0.30	PID ES ES1	0.00	2.56	(0.20) 0.20	Asphalt.	
		0.30				(0.40)	MADE GROUND (Dark grey slightly gravelly SAND. Gravel is fine to coarse rounded flint).	
		1.00	D D1		2.16	0.60	Grey slightly gravelly SAND. Gravel is fine to medium rounded flint.	0.5
		1.50				(0.90)		1.0
		1.50	PID ES ES2	0.00	1.26	1.50	Yellowish brown slightly gravelly SAND. Gravel is fine to medium rounded flint.	1.5
		1.50				(0.40)		
		2.00	D D2		0.86	1.90	Orangish brown very gravelly SAND. Gravel is fine to coarse rounded flint.	2.0
		2.00				(0.40)		
		2.50	PID ES ES3	0.00	0.46	2.30	Yellowish brown SAND.	2.5
		2.50						
		3.00	D D3					3.0
		3.50	PID ES ES4	0.10		(2.60)		3.5
		3.50						
		4.00	D D4					4.0
		4.50	PID ES ES5	0.20				4.5
		4.50						
		5.00	D D5		-2.14 -2.24	(4.90) 5.00	Grey mottled brown very sandy CLAY.	5.0
							End of Borehole at 5.00m	5.0
								5.5
								6.0
								6.5
								7.0
								7.5
								8.0
								8.5
								9.0
								9.5
								10.0

Remarks 1) 150mm casing to 5.0 m. 2) Groundwater struck at 3.0 m rising to 2.7 m. 3) Installed GL to 1.0m plain pipe, 1.0 m to 5.0 m slotted 52 mm ID.	Method, Plant, Stability, Dimensions	Logger
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Checked By: PP



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		01/05/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH01		Reported Pressure		1006		Pressure Trend		Falling			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.00	0.00	21.0	0	0	0.1				
Flow	1006	0	0.0										
30				0.0	2.4	18.0	0	0	0.1			0.00	
60				0.0	2.4	18.0	0	0	0.0				
90				0.0	2.4	18.0	0	0	0.0				
120				0.0	2.4	18.0	0	0	0.0				
150													
180													
210													
240													
270													
300													
330													
360													
390													
420													
450													
480													
510													
540													
570													
600													
Notes													



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		01/05/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH02		Reported Pressure		1006		Pressure Trend		Falling			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.0	21.3	0	0	0.0				
Flow	1005	0	0.0										
30				0.0	4.1	14.4	0	0	0.0			0.00	
60				0.0	4.2	14.3	0	0	0.0				
90				0.0	4.2	14.3	0	0	0.0				
120				0.0	4.2	14.3	0	0	0.0				
150													
180													
210													
240													
270													
300													
330													
360													
390													
420													
450													
480													
510													
540													
570													
600													

Notes



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		01/05/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH03		Reported Pressure		1006		Pressure Trend		Falling			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.0	20.9	0	0	0.0				
Flow	1005	0	0.0										
30				0.0	5.2	11.6	0	0	0.0	Dry	1.97	0.00	
60				0.0	5.2	11.6	0	0	0.0				
90				0.0	5.3	11.5	0	0	0.0				
120				0.0	5.3	11.5	0	0	0.0				
150				0.0	5.3	11.5	0	0	0.0				
180													
210													
240													
270													
300													
330													
360													
390													
420													
450													
480													
510													
540													
570													
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Notes													



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		09/05/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH01		Reported Pressure		1026		Pressure Trend		Falling			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.0	21.0	0.0	0.0	0.0				
Flow	1024	0	0.0										
30				0.0	2.7	18.0	0	0	0.0	2.66	4.82	0.00	@14:46
60				0.0	2.6	17.9	0	0	0.0				Falling tide
90				0.0	2.7	17.8	0	0	0.0				
120				0.0	2.6	17.9	0	0	0.0				
150													
180													
210													
240													
270													
300													
330													
360													
390													
420													
450													
480													
510													
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Notes													



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		09/05/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH02		Reported Pressure		1026		Pressure Trend		Falling			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.1	20.9	0.0	0.0	0.0				
Flow	1023	0	0.0										
30				0.0	4.1	14.9	0	0	0.0	2.31	4.85	0.00	@14:57
60				0.0	4.1	14.8	0	0	0.0				Falling tide
90				0.0	4.1	14.7	0	0	0.0				
120				0.0	4.2	14.7	0	0	0.0				
150				0.0	4.2	14.7	0	0	0.0				
180													
210													
240													
270													
300													
330													
360													
390													
420													
450													
480													
510													
540													
570													
600													
Notes													



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		09/05/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH03		Reported Pressure		1026		Pressure Trend		Falling			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.1	20.9	0.0	0.0	0.0				
Flow	1022	5	0.1										
30				0.0	3.7	14.0	0	0	0.0	2.085	5.1	0.00	@15:13
60				0.0	3.9	13.8	0	0	0.0				Falling tide
90				0.0	4.2	13.5	0	0	0.0				
120				0.0	4.3	13.3	0	0	0.0				
150				0.0	4.5	13.1	0	0	0.0				
180				0.0	4.6	12.9	0	0	0.0				
210				0.0	4.6	12.9	0	0	0.0				
240				0.0	4.7	12.7	0	0	0.0				
270				0.0	4.9	12.5	0	0	0.0				
300				0.0	4.9	12.5	0	0	0.0				
330				0.0	4.9	12.5	0	0	0.0				
360													
390													
420													
450													
480													
510													
540													
570													
600													
Notes													



Geotechnical and Contamination Consulting

Gas Monitoring Results Sheet

Date		14/05/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH01		Reported Pressure		1001		Pressure Trend		Steady			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.0	20.7	0.0	0.0	0.0				
Flow	1002	0	0.0										
30				0.0	3.0	17.4	0.0	0.0	0.0	2.675	4.85	0.00	@11:30
60				0.0	3.1	17.3	0.0	0.0	0.0				Rising tide
90				0.0	3.0	17.3	0.0	0.0	0.0				
120				0.0	3.0	17.3	0.0	0.0	0.0				
150													
180													
210													
240													
270													
300													
330													
360													
390													
420													
450													
480													
510													
540													
570													
600													
Notes													



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		14/05/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH02		Reported Pressure		1001		Pressure Trend		Steady			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.1	20.6	0.0	0.0	0.0				
Flow	1001	0	0.0										
30				0.0	4.7	14.2	0.0	0.0	0.0	2.33	4.815	0.00	@11:26
60				0.0	4.8	14.0	0.0	0.0	0.0				Rising tide
90				0.0	4.8	14.0	0.0	0.0	0.0				
120				0.0	4.8	14.0	0.0	0.0	0.0				
150													
180													
210													
240													
270													
300													
330													
360													
390													
420													
450													
480													
510													
540													
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600													
Notes													



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		14/05/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH03		Reported Pressure		1001		Pressure Trend		Steady			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.1	20.5	0.0	0.0	0.0				
Flow	1001	0	0.0										
30				0.0	1.2	19.2	0.0	0.0	0.0	2.1	5.10	0.00	@11:34
60				0.0	1.2	19.1	0.0	0.0	0.0				Rising tide
90				0.0	1.3	19.0	0.0	0.0	0.0				
120				0.0	1.3	19.0	0.0	0.0	0.0				
150													
180													
210													
240													
270													
300													
330													
360													
390													
420													
450													
480													
510													
540													
570													
600													
Notes													



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		21/05/2024		Project Number		G0174				Project Name		Salmon Rd, Great Yarmouth	
BH ID		BH01		Reported Pressure		1010				Pressure Trend		Steady	
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.0	20.7	0.0	0.0	0.0				
Flow	1010	0	0.0										
30				0.0	3.2	17.0	0.0	0.0	0.0	2.68	4.81	0.00	@10:28
60				0.0	3.3	16.9	0.0	0.0	0.0				Falling tide
90				0.0	3.3	16.9	0.0	0.0	0.0				
120				0.0	3.3	16.9	0.0	0.0	0.0				
150													
180													
210													
240													
270													
300													
330													
360													
390													
420													
450													
480													
510													
540													
570													
600													
Notes													



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		21/05/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH02		Reported Pressure		1010		Pressure Trend		Steady			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.0	20.7	0.0	0.0	0.0				
Flow	1010	0	0.0										
30				0.0	4.9	13.8	0.0	0.0	0.0	2.335	4.85	0.00	@10:40
60				0.0	4.9	13.7	0.0	0.0	0.0				Falling tide
90				0.0	4.9	13.6	0.0	0.0	0.0				
120				0.0	4.9	13.6	0.0	0.0	0.0				
150													
180													
210													
240													
270													
300													
330													
360													
390													
420													
450													
480													
510													
540													
570													
600													
Notes													



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		21/05/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH03		Reported Pressure		1010		Pressure Trend		Steady			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.1	20.5	0.0	0.0	0.0				
Flow	1010	0	0.0										
30				0.0	5.8	11.4	0.0	0.0	0.0	2.105	5.1	0.00	@10:55
60				0.0	6.1	11.2	0.0	0.0	0.0				Falling tide
90				0.0	6.2	11.0	0.0	0.0	0.0				
120				0.0	6.2	10.7	0.0	0.0	0.0				
150				0.0	6.2	10.6	0.0	0.0	0.0				
180				0.0	6.2	10.6	0.0	0.0	0.0				
210													
240													
270													
300													
330													
360													
390													
420													
450													
480													
510													
540													
570													
600													

Notes



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		28/05/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH01		Reported Pressure		1013		Pressure Trend		Falling			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.0	20.6	0.0	0.0	0.0				
Flow	1013	0	0.0										
30				0.0	3.1	16.7	0.0	0.0	0.0	2.654	4.81	0.00	@ 12:50
60				0.0	3.5	16.5	0.0	0.0	0.0				High tide at 12:22 Falling tide
90				0.0	3.6	16.0	0.0	0.0	0.0				
120				0.0	3.6	16.0	0.0	0.0	0.0				
150				0.0	3.6	16.0	0.0	0.0	0.0				
180													
210													
240													
270													
300													
330													
360													
390													
420													
450													
480													
510													
540													
570													
600													
Notes													



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		28/05/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH02		Reported Pressure		1013		Pressure Trend		Falling			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.1	20.6	0.0	0.0	0.0				
Flow	1013	0	0.0										
30				0.0	4.2	14.4	0.0	0.0	0.0	2.305	4.85	0.00	@ 12:44
60				0.0	4.2	14.3	0.0	0.0	0.0				High tide at 12:22 Falling tide
90				0.0	4.4	14.1	0.0	0.0	0.0				
120				0.0	4.4	14.1	0.0	0.0	0.0				
150				0.0	4.4	14.1	0.0	0.0	0.0				
180													
210													
240													
270													
300													
330													
360													
390													
420													
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510													
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Notes													



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		28/05/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH03		Reported Pressure		1013		Pressure Trend		Falling			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.0	20.6	0.0	0.0	0.0				
Flow	1012	0	0.0										
30				0.0	2.2	16.3	0.0	0.0	0.0	2.08	5.1	0.00	@12:32
60				0.0	2.3	15.7	0.0	0.0	0.0				High tide at 12:22 Falling tide
90				0.0	2.6	15.7	0.0	0.0	0.0				
120				0.0	2.6	15.2	0.0	0.0	0.0				
150				0.0	3.2	14.6	0.0	0.0	0.0				
180				0.0	4.7	14.0	0.0	0.0	0.0				
210				0.0	4.7	14.0	0.0	0.0	0.0				
240				0.0	4.7	14.0	0.0	0.0	0.0				
270													
300													
330													
360													
390													
420													
450													
480													
510													
540													
570													
600													

Notes



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		05/06/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH01		Reported Pressure		1011		Pressure Trend		Steady			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.0	20.5	0.0	0.0	0.0				
Flow	1012	0	0.0										
30				0.0	3.4	16.2	0.0	0.0	0.0	2.63	4.81	0.00	@07:54
60				0.0	3.5	16.1	0.0	0.0	0.0				Rising tide
90				0.0	3.5	16.1	0.0	0.0	0.0				
120				0.0	3.5	16.1	0.0	0.0	0.0				
150													
180													
210													
240													
270													
300													
330													
360													
390													
420													
450													
480													
510													
540													
570													
600													
Notes													



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		05/06/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH02		Reported Pressure		1011		Pressure Trend		Steady			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.0	20.5	0.0	0.0	0.0				
Flow	1012	0	0.0										
30				0.0	4.6	14.2	0.0	0.0	0.0	2.285	4.85	0.00	@07:45
60				0.0	4.6	14.1	0.0	0.0	0.0				Rising tide
90				0.0	4.7	13.9	0.0	0.0	0.0				
120				0.0	4.6	13.9	0.0	0.0	0.0				
150				0.0	4.6	13.9	0.0	0.0	0.0				
180													
210													
240													
270													
300													
330													
360													
390													
420													
450													
480													
510													
540													
570													
600													
Notes													



Geotechnical and Contamination Consulting Gas Monitoring Results Sheet

Date		05/06/2024		Project Number		G0174		Project Name		Salmon Rd, Great Yarmouth			
BH ID		BH03		Reported Pressure		1011		Pressure Trend		Steady			
Time (Secs)	Atmospheric Pressure (mb)	Differential Pressure (mB)	Flow (l/hr)	Ch4 (%)	CO2 (%)	O2 (%)	CO (ppm)	H2S (ppm)	PID (ppm)	Depth to Water (m)	Depth To Base (m)	Stick Up (m)	Comments
Ambient Air				0.0	0.0	20.7	0.0	0.0	0.0				
Flow	1011	0	0.0										
30				0.0	0.7	19.8	0.0	0.0	0.0	2.06	5.1	0.00	@07:35
60				0.0	0.7	19.8	0.0	0.0	0.0				Rising tide
90				0.0	0.7	19.8	0.0	0.0	0.0				
120				0.0	0.7	19.8	0.0	0.0	0.0				
150													
180													
210													
240													
270													
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330													
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600													
Notes													

Laboratory Testing



4161



Geotechnical and Contamination Consulting,
The Enterprise Centre, University
of East Anglia
Norwich Research Park, Norwich
NR4 7TJ

Analytical Test Report: L24/03559/GAC - 24-44363

Your Project Reference:	Great Yarmouth G0174		
Your Order Number:	G0174-5	Samples Received / Instructed:	23/04/2024 / 23/04/2024
Report Issue Number:	1	Sample Tested:	23/04 to 01/05/2024
Samples Analysed:	1 other sample, 7 soil samples	Report issued:	01/05/2024



Analytical Services Manager
CTS Group

Notes:

General

Please refer to Methodologies page for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report with the exception of the asbestos test portion which is held for 6 months unless otherwise requested.

Moisture Content was determined in accordance with CTS method statement MS - CL - Sample Prep, oven dried at <30°C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Stone Content was determined in accordance with CTS method statement MS - CL - Sample Prep and refers to the percentage of stones retained on a 10mm BS test sieve.

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

Samples were supplied by customer, results apply to the samples as received.

Asbestos

Please note: Where further analysis is required samples identified as containing asbestos are screened and tested on an as received basis. No correction is made for moisture content and these results are not covered by our accreditation

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

Deviating Samples

On receipt samples are compared against our sample holding and handling protocols, where any deviations have been noted these are reported on our deviating sample page (if present)

Accreditation Key

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited, subUKAS - Subcontracted to a laboratory UKAS accredited for this test, subMCERTS - Subcontracted to a laboratory MCERTS accredited for this test

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Date of Issue: 01.05.2024

Issued by: J. Gane

Issue No: 4

Rev No: 8



L24/03559/GAC - 24-44363

Project Reference - Great Yarmouth G0174

Analytical Test Results - Solid

Lab Reference			357758	357759	357760	357761	357762	357763
Client Sample ID			ES2	ES1	ES2	ES1	ES1	ES1
Client Sample Location			TP02	TP03	TP04	BH01	BH02	BH03
Client Sample Type			ES	ES	ES	ES	ES	ES
Client Sample Number			-	-	-	-	-	-
Depth - Top (m)			0.40	0.20	0.40	0.30	0.50	0.30
Depth - Bottom (m)			0.40	0.20	0.40	0.30	0.50	0.30
Date of Sampling			18/04/2024	18/04/2024	18/04/2024	18/04/2024	18/04/2024	18/04/2024
Time of Sampling			-	-	-	-	-	-
Sample Matrix			Sand	Sand	Sand	Sand	Sand	Sand
Determinant	Units	Accreditation						
Arsenic	(mg/kg)	MCERTS	21	17	17	19	26	32
Boron (w/s)	(mg/kg)	u	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Cadmium	(mg/kg)	MCERTS	0.6	1.2	0.8	0.5	0.8	1.0
Chromium (Total)	(mg/kg)	UKAS	7.8	16	8.0	6.9	5.9	12
Copper	(mg/kg)	MCERTS	91	150	69	58	59	85
Lead	(mg/kg)	MCERTS	390	69	360	160	150	490
Mercury	(mg/kg)	UKAS	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Nickel	(mg/kg)	MCERTS	19	43	19	16	16	23
Selenium	(mg/kg)	u	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
Zinc	(mg/kg)	MCERTS	150	600	180	91	120	390
Chromium (Hexavalent)	(mg/kg)	u	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
pH	pH Units	MCERTS	8.7	7.9	8.7	10.5	10.9	9.2
Acenaphthene	(mg/kg)	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Acenaphthylene	(mg/kg)	UKAS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.28
Anthracene	(mg/kg)	UKAS	< 0.20	0.26	< 0.20	< 0.20	0.27	0.36
Benzo (a) anthracene	(mg/kg)	MCERTS	0.79	0.78	1.1	0.32	0.37	1.8
Benzo (a) pyrene	(mg/kg)	MCERTS	0.98	0.80	1.2	0.47	0.54	2.1
Benzo (b) fluoranthene	(mg/kg)	MCERTS	1.3	0.96	1.3	0.59	0.71	2.6
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	0.76	0.59	0.72	0.43	0.50	1.4
Benzo (k) fluoranthene	(mg/kg)	MCERTS	0.49	0.40	0.59	0.27	0.23	1.0
Chrysene	(mg/kg)	MCERTS	0.88	0.72	1.1	0.34	0.36	1.8
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.30
Fluoranthene	(mg/kg)	MCERTS	1.5	1.5	1.9	0.40	0.50	3.4
Fluorene	(mg/kg)	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	0.61	0.45	0.65	0.37	0.42	1.2
Naphthalene	(mg/kg)	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Phenanthrene	(mg/kg)	MCERTS	0.63	0.78	0.53	< 0.20	0.26	1.4
Pyrene	(mg/kg)	MCERTS	1.3	1.3	1.5	0.40	0.44	3.0
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	11	9.6	12	5.1	5.7	21
TOC	(%)	MCERTS	3.7	2.8	3.4	3.3	3.3	6.8
Asbestos	-	UKAS	No asbestos detected	Chrysotile	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
PCB 28	(mg/kg)	u	< 0.004	-	< 0.004	-	-	< 0.004
PCB 52	(mg/kg)	u	< 0.004	-	< 0.004	-	-	< 0.004
PCB 101	(mg/kg)	u	< 0.004	-	< 0.004	-	-	< 0.004
PCB 118	(mg/kg)	u	< 0.004	-	< 0.004	-	-	< 0.004
PCB 153	(mg/kg)	u	< 0.004	-	< 0.004	-	-	< 0.004
PCB 138	(mg/kg)	u	< 0.004	-	< 0.004	-	-	< 0.004
PCB 180	(mg/kg)	u	< 0.004	-	< 0.004	-	-	< 0.004



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L24/03559/GAC - 24-44363

Project Reference - Great Yarmouth G0174

Analytical Test Results - Solid

Lab Reference			357764	357765
Client Sample ID			B1	ES2
Client Sample Location			TP01b	BH02
Client Sample Type			ES	ES
Client Sample Number			-	-
Depth - Top (m)			0.80	2.50
Depth - Bottom (m)			0.80	2.50
Date of Sampling			18/04/2024	18/04/2024
Time of Sampling			-	-
Sample Matrix			Bulk	Sand
Determinant	Units	Accreditation		
Arsenic	(mg/kg)	MCERTS	-	< 10
Boron (w/s)	(mg/kg)	u	-	< 2.5
Cadmium	(mg/kg)	MCERTS	-	< 0.2
Chromium (Total)	(mg/kg)	UKAS	-	1.9
Copper	(mg/kg)	MCERTS	-	4.0
Lead	(mg/kg)	MCERTS	-	6.7
Mercury	(mg/kg)	UKAS	-	< 2.5
Nickel	(mg/kg)	MCERTS	-	2.5
Selenium	(mg/kg)	u	-	< 8.0
Zinc	(mg/kg)	MCERTS	-	11
Chromium (Hexavalent)	(mg/kg)	u	-	< 1.0
pH	pH Units	MCERTS	-	9.2
Acenaphthene	(mg/kg)	MCERTS	-	< 0.02
Acenaphthylene	(mg/kg)	UKAS	-	< 0.02
Anthracene	(mg/kg)	UKAS	-	< 0.02
Benzo (a) anthracene	(mg/kg)	MCERTS	-	< 0.02
Benzo (a) pyrene	(mg/kg)	MCERTS	-	< 0.02
Benzo (b) fluoranthene	(mg/kg)	MCERTS	-	< 0.02
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	-	< 0.02
Benzo (k) fluoranthene	(mg/kg)	MCERTS	-	< 0.02
Chrysene	(mg/kg)	MCERTS	-	< 0.02
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	-	< 0.02
Fluoranthene	(mg/kg)	MCERTS	-	< 0.02
Fluorene	(mg/kg)	MCERTS	-	< 0.02
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	-	< 0.02
Naphthalene	(mg/kg)	MCERTS	-	< 0.02
Phenanthrene	(mg/kg)	MCERTS	-	< 0.02
Pyrene	(mg/kg)	MCERTS	-	< 0.02
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	-	< 0.32
TOC	(%)	MCERTS	-	< 1.0
Asbestos	-	UKAS	Amosite	No asbestos detected
PCB 28	(mg/kg)	u	-	-
PCB 52	(mg/kg)	u	-	-
PCB 101	(mg/kg)	u	-	-
PCB 118	(mg/kg)	u	-	-
PCB 153	(mg/kg)	u	-	-
PCB 138	(mg/kg)	u	-	-
PCB 180	(mg/kg)	u	-	-



L24/03559/GAC - 24-44363

Project Reference - Great Yarmouth G0174

Analytical Test Results - VPH / EPH

Lab Reference	357758	357759	357760	357761	357762	357763	
Client Sample ID	ES2	ES1	ES2	ES1	ES1	ES1	
Client Sample Location	TP02	TP03	TP04	BH01	BH02	BH03	
Client Sample Type	ES	ES	ES	ES	ES	ES	
Client Sample Number	-	-	-	-	-	-	
Depth - Top (m)	0.40	0.20	0.40	0.30	0.50	0.30	
Depth - Bottom (m)	0.40	0.20	0.40	0.30	0.50	0.30	
Date of Sampling	18/04/2024	18/04/2024	18/04/2024	18/04/2024	18/04/2024	18/04/2024	
Time of Sampling	-	-	-	-	-	-	
Sample Matrix	Sand	Sand	Sand	Sand	Sand	Sand	
Determinant	Units	Accreditation					
Aliphatic >C ₅ to C ₆ [HS_MS_1D_AL]	(mg/kg)	MCERTS	< 0.06	0.18	< 0.06	< 0.06	< 0.06
Aliphatic >C ₆ to C ₈ [HS_MS_1D_AL]	(mg/kg)	MCERTS	< 0.06	1.4	< 0.06	< 0.06	< 0.06
Aliphatic >C ₈ to C ₁₀ [HS_MS_1D_AL]	(mg/kg)	MCERTS	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Aliphatic >C ₁₀ to C ₁₂ [EH_CU_1D_AL]	(mg/kg)	u	< 10	< 10	< 10	< 10	< 10
Aliphatic >C ₁₂ to C ₁₆ [EH_CU_1D_AL]	(mg/kg)	u	< 10	< 10	< 10	< 10	< 10
Aliphatic >C ₁₆ to C ₂₁ [EH_CU_1D_AL]	(mg/kg)	u	< 10	< 10	< 10	13	< 10
Aliphatic >C ₂₁ to C ₃₅ [EH_CU_1D_AL]	(mg/kg)	u	< 20	63	< 20	130	180
Aliphatic >C ₃₅ to C ₄₄ [EH_CU_1D_AL]	(mg/kg)	u	< 15	66	< 15	190	290
Aromatic >C ₅ to C ₇ [HS_MS_1D_AR]	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C ₇ to C ₈ [HS_MS_1D_AR]	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C ₈ to C ₁₀ [HS_MS_1D_AR]	(mg/kg)	MCERTS	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Aromatic >C ₁₀ to C ₁₂ [EH_CU_1D_AR]	(mg/kg)	u	< 10	< 10	< 10	< 10	< 10
Aromatic >C ₁₂ to C ₁₆ [EH_CU_1D_AR]	(mg/kg)	u	< 10	< 10	< 10	< 10	< 10
Aromatic >C ₁₆ to C ₂₁ [EH_CU_1D_AR]	(mg/kg)	u	< 10	< 10	< 10	14	11
Aromatic >C ₂₁ to C ₃₅ [EH_CU_1D_AR]	(mg/kg)	u	31	88	25	170	270
Aromatic >C ₃₅ to C ₄₄ [EH_CU_1D_AR]	(mg/kg)	u	19	130	39	350	580
Total >C ₅ to C ₃₅ [EH_CU+HS_1D_Total]	(mg/kg)	u	< 50	150	< 50	290	480
Benzene	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
m&p Xylene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
o-Xylene	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01



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L24/03559/GAC - 24-44363

Project Reference - Great Yarmouth G0174

Analytical Test Results - VPH / EPH

Lab Reference	357765
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Client Sample ID	ES2
Client Sample Location	BH02
Client Sample Type	ES
Client Sample Number	-
Depth - Top (m)	2.50
Depth - Bottom (m)	2.50
Date of Sampling	18/04/2024
Time of Sampling	-
Sample Matrix	Sand

Determinant	Units	Accreditation	
Aliphatic >C ₅ to C ₆ [HS_MS_1D_AL]	(mg/kg)	MCERTS	< 0.06
Aliphatic >C ₆ to C ₈ [HS_MS_1D_AL]	(mg/kg)	MCERTS	< 0.06
Aliphatic >C ₈ to C ₁₀ [HS_MS_1D_AL]	(mg/kg)	MCERTS	< 0.06
Aliphatic >C ₁₀ to C ₁₂ [EH_CU_1D_AL]	(mg/kg)	u	< 10
Aliphatic >C ₁₂ to C ₁₆ [EH_CU_1D_AL]	(mg/kg)	u	< 10
Aliphatic >C ₁₆ to C ₂₁ [EH_CU_1D_AL]	(mg/kg)	u	< 10
Aliphatic >C ₂₁ to C ₃₅ [EH_CU_1D_AL]	(mg/kg)	u	< 20
Aliphatic >C ₃₅ to C ₄₄ [EH_CU_1D_AL]	(mg/kg)	u	40
Aromatic >C ₅ to C ₇ [HS_MS_1D_AR]	(mg/kg)	MCERTS	< 0.01
Aromatic >C ₇ to C ₈ [HS_MS_1D_AR]	(mg/kg)	MCERTS	< 0.01
Aromatic >C ₈ to C ₁₀ [HS_MS_1D_AR]	(mg/kg)	MCERTS	< 0.06
Aromatic >C ₁₀ to C ₁₂ [EH_CU_1D_AR]	(mg/kg)	u	< 10
Aromatic >C ₁₂ to C ₁₆ [EH_CU_1D_AR]	(mg/kg)	u	< 10
Aromatic >C ₁₆ to C ₂₁ [EH_CU_1D_AR]	(mg/kg)	u	< 10
Aromatic >C ₂₁ to C ₃₅ [EH_CU_1D_AR]	(mg/kg)	u	47
Aromatic >C ₃₅ to C ₄₄ [EH_CU_1D_AR]	(mg/kg)	u	96
Total >C ₅ to C ₃₅ [EH_CU+HS_1D_Total]	(mg/kg)	u	< 50
Benzene	(mg/kg)	MCERTS	< 0.01
Toluene	(mg/kg)	MCERTS	< 0.01
Ethylbenzene	(mg/kg)	MCERTS	< 0.01
m&p Xylene	(mg/kg)	MCERTS	< 0.02
o-Xylene	(mg/kg)	MCERTS	< 0.01
MTBE	(mg/kg)	MCERTS	< 0.01



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L24/03559/GAC - 24-44363

Project Reference - Great Yarmouth G0174

Sample Descriptions

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Description	Moisture Content (%)	Stone Content (%)
357758	ES2	TP02	ES	-	Made Ground- grey gravelly silty sand with rare brick fragments	7.6	6.2
357759	ES1	TP03	ES	-	Made Ground- grey gravelly silty sand with rare brick fragments	10	42
357760	ES2	TP04	ES	-	Grey gravelly silty sand	5.3	10
357761	ES1	BH01	ES	-	Grey gravelly silty sand	5.2	20
357762	ES1	BH02	ES	-	Grey gravelly silty sand	10	11
357763	ES1	BH03	ES	-	Made Ground- grey gravelly silty sand with rare brick fragments	6.9	26
357765	ES2	BH02	ES	-	Grey gravelly silty sand	12	24



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L24/03559/GAC - 24-44363

Project Reference - Great Yarmouth G0174

Sample Comments

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Comments
357758	ES2	TP02	ES	-	1:10 dilution PAH AR VPH/BTEX - Sample taken from container with headspace.
357759	ES1	TP03	ES	-	1:10 dilution PAH AR
357760	ES2	TP04	ES	-	1:10 dilution PAH AR
357761	ES1	BH01	ES	-	1:10 dilution PAH AR
357762	ES1	BH02	ES	-	1:10 dilution PAH AR
357763	ES1	BH03	ES	-	1:10 dilution PAH AR
357765	ES2	BH02	ES	-	VPH/BTEX - Sample taken from container with headspace.



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L24/03559/GAC - 24-44363

Project Reference - Great Yarmouth G0174

Analysis Methodologies

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preparation	Test Details
EPHS	MS - CL - EPH in Soil	As received	Passing 10mm test sieve	Determination of Extractable Petroleum Hydrocarbons in soils via GC-MS
PCB7S	MS - CL - PCB Soils	As received	Passing 10mm test sieve	Determination of PCB's (7 congeners) in soils via GC-MS
PAHASRDS	MS - CL - PAH (As Received)	As received	Passing 10mm test sieve	Determination of Polyaromatic hydrocarbons in soil via GC-MS
CWGS	MS - CL - VPH & MS - CL - EPH	As received	Passing 10mm test sieve	Determination of TPH CWG (Volatile Petroleum Hydrocarbons and Extractable Petroleum Hydrocarbons) in soils via Headspace-GC-MS and GC-MS respectively
TOCS	MS - CL - TOC Eltra	Air Dried	Passing 10mm test sieve	Determination of Total Organic Carbon in soils
VPHS	MS - CL - VPH	As received	Passing 10mm test sieve	Determination of VPH in soils via Headspace-GC-MS
WSBORONS	MS - CL - WS Boron	Air dried	Passing 10mm test sieve	Determination of Water soluble Boron in soils via ICP
SKALARHCS	MS - CL - Hexavalent Chromium by Skalar	As received	Passing 10mm test sieve	Determination of hexavalent chromium in soil using Skalar segmented flow analyser
ICPMETS	MS - CL - ICP Metals	Air dried	Passing 10mm test sieve	Determination of metals in soils via ICP
PHS	MS - CL - pH in Soils	As received	Passing 10mm test sieve	Determination of pH in soils using a pH probe (using a 1:3 soil to water extraction)
ASB	MS - AS - Asbestos	-	-	Fibre identification is in accordance with in house documented methods which are based on the procedure documented in the HSE Document HSG 248 "Asbestos: The analysts guide for sampling, analysis and clearance procedures"
SAMPLEPREP	MS - CL - Sample Preparation	-	-	Preparation of samples (including determination of moisture content) to allow for subsequent analysis



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**L24/03559/GAC - 24-44363****Project Reference - Great Yarmouth G0174****Sample Deviations**

Deviations are listed below against each sample and associated test method, where deviation(s) are noted it means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Observations on receipt

A - No date of sampling provided

C - Received in inappropriate container

H - Contains headspace

T - Temperature on receipt exceeds storage temperature

R - Sample(s) received with less than 96 hours for testing to commence/complete, any result formally classed as deviating will be marked with an X against the applicable test (i.e. RX)

Observations whilst in laboratory

X - Exceeds sampling to extraction or analysis timescales

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Test	Deviations
357758	ES2	TP02	ES	-	MS - CL - VPH	R
357758	ES2	TP02	ES	-	MS - CL - pH in Soils	R
357759	ES1	TP03	ES	-	MS - CL - VPH	R
357759	ES1	TP03	ES	-	MS - CL - pH in Soils	R
357760	ES2	TP04	ES	-	MS - CL - VPH	R
357760	ES2	TP04	ES	-	MS - CL - pH in Soils	R
357761	ES1	BH01	ES	-	MS - CL - VPH	R
357761	ES1	BH01	ES	-	MS - CL - pH in Soils	R
357762	ES1	BH02	ES	-	MS - CL - VPH	R
357762	ES1	BH02	ES	-	MS - CL - pH in Soils	R
357763	ES1	BH03	ES	-	MS - CL - VPH	R
357763	ES1	BH03	ES	-	MS - CL - pH in Soils	R
357765	ES2	BH02	ES	-	MS - CL - VPH	R
357765	ES2	BH02	ES	-	MS - CL - pH in Soils	R



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L24/03559/GAC - 24-44363

Project Reference - Great Yarmouth G0174

HWOL TPH Acronym Index

Acronym	Description
HS	Headspace Analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics and Aromatics
AL	Aliphatics Only
AR	Aromatics Only
2D	GC-GC - Double Coil Gas Chromatography
#1	EH_Total but with humics mathmatically subtracted
#2	EH_Total but with fatty acids mathmatically subtracted
_	Operator - underscore to separate acronyms (except for +)
+	Operator to indicate cumlative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

Geotechnical and Contamination Consulting,
The Enterprise Centre, University
of East Anglia
Norwich Research Park, Norwich
NR4 7TJ

Analytical Test Report: L24/04390/GAC - 24-45257

Your Project Reference: **G0174 Salmon Road, Great Yarmouth**

Your Order Number: PO/G0174/006 Samples Received / Instructed: 14/05/2024 / 14/05/2024

Report Issue Number: 1 Sample Tested: 14/05 to 24/05/2024

Samples Analysed: 3 water samples Report issued: 24/05/2024



CTS Group

Notes:

General

Please refer to Methodologies page for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report unless otherwise requested.

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

Samples were supplied by customer, results apply to the samples as received.

Deviating Samples

On receipt samples are compared against our sample holding and handling protocols, where any deviations have been noted these are reported on our deviating sample page (if present)

Accreditation Key

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited, subUKAS - Subcontracted to a laboratory UKAS accredited for this test, subMCERTS - Subcontracted to a laboratory MCERTS accredited for this test

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Date of Issue: 13.05.2024

Issued by: J. Gane

Issue No: 4

Rev No: 9

L24/04390/GAC - 24-45257

Project Reference - G0174 Salmon Road, Great Yarmouth

Analytical Test Results - Water

Lab Reference			364512	364513	364514
Client Sample ID			-	-	-
Client Sample Location			BH01	BH02	BH03
Client Sample Type			W	W	W
Client Sample Number			1	1	1
Depth (m)			-	-	-
Date of Sampling			09/05/2024	09/05/2024	09/05/2024
Time of Sampling			-	-	-
Sample Matrix			Water	Water	Water
Determinant	Units	Accreditation			
Arsenic	(µg/l)	u	7.9	5.0	3.4
Boron	(µg/l)	u	200	200	320
Cadmium	(µg/l)	u	< 2.5	< 2.5	< 2.5
Chromium	(µg/l)	u	< 2.5	< 2.5	< 2.5
Copper	(µg/l)	u	< 1	< 1	< 1
Lead	(µg/l)	u	< 5	< 5	< 5
Mercury	(µg/l)	u	< 1	< 1	< 1
Nickel	(µg/l)	u	< 2.5	< 2.5	< 2.5
Selenium	(µg/l)	u	2	< 1	6
Zinc	(µg/l)	u	< 5	< 5	< 5
Ammoniacal Nitrogen	(mgN/l)	u	0.80	0.22	0.61
Chloride	(mg/l)	u	290	130	270
Conductivity	(µs/cm)	u	2130	1050	1890
Cyanide (Total)	(mg/l)	u	3.0	< 0.5	< 0.5
Hardness (as CaCO ₃)	(mg/l)	u	790	340	520
Nitrate (as N)	(mgN/l)	u	15	3.0	21
Nitrate (as NO ₃)	(mg/l)	u	66	13	95
pH	pH Units	u	6.9	7.4	7.0
Salinity	(g/kg)	u	1.04	0.55	0.98
Sulphate (As SO ₄)	(mg/l)	u	580	110	240
Acenaphthene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Acenaphthylene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Anthracene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Benzo (a) anthracene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Benzo (a) pyrene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Benzo (b) fluoranthene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Benzo (g, h, i) perylene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Benzo (k) fluoranthene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Chrysene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Dibenzo (a,h) anthracene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Fluoranthene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Fluorene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Indeno (1, 2, 3,-cd) pyrene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Naphthalene	(µg/l)	u	0.02	0.02	< 0.01
Phenanthrene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Pyrene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Total PAH (Sum of USEPA 16)	(µg/l)	u	0.17	0.17	< 0.16
Total TPH (>C ₈ to C ₄₀)	(µg/l)	u	< 10	< 10	20
Phenols (Total)	(µg/l)	u	< 1.10	< 1.10	< 1.10

L24/04390/GAC - 24-45257

Project Reference - G0174 Salmon Road, Great Yarmouth

Analysis Methodologies

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preparation	Test Details
ANIONSW	MS - CL - Anions by Aquakem (Water)	As received	-	Determination of Anions (inc Sulphate, chloride etc.) in waters by Aquakem
PAHSPMEW	MS - CL - PAH SPME	As received	-	Determination of Polyaromatic hydrocarbons in water via GC-MS
TPHW	MS - CL - TPH EPH Waters	As received	-	Determination of Total Petroleum Hydrocarbons in water using GC-FID
CONDW	MS - CL - Conductivity in Waters	As received	-	Determination of conductivity (at 20C) in waters by probe measurement
SKALARCNW	MS - CL - Cyanide by Skalar	As received	-	Determination of cyanide (total / free / complex) in water using a Skalar segmented flow analyser
ICPMETWD	MS - CL - ICP Metals in Waters	As received	-	Determination of dissolved metals in water via ICP
HARDNLIQ	MS - CL - ICP Metals in Waters	As received	-	Determination of metals in water via ICP
PHW	MS - CL - pH in Waters	As received	-	Determination of pH in waters using a pH probe
PHOHHPLCW	MS - CL - Phenol Waters by HPLC	As received	-	Determination of speciated phenols in water using HPLC

L24/04390/GAC - 24-45257

Project Reference - G0174 Salmon Road, Great Yarmouth

HWOL TPH Acronym Index

Acronym	Description
HS	Headspace Analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics and Aromatics
AL	Aliphatics Only
AR	Aromatics Only
2D	GC-GC - Double Coil Gas Chromatography
#1	EH_Total but with humics mathmatically subtracted
#2	EH_Total but with fatty acids mathmatically subtracted
_	Operator - underscore to separate acronyms (except for +)
+	Operator to indicate cumlative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

JIWG CL:AIRE DST Worksheets

Decision Support Tool for Receptor Risk Ranking

Stage 1		Score
Hazard Identification		
Select ACM type (run model for each type to generate 'Worst Case' output)	Loose fibrous asbestos debris	3
Extent of degradation of ACMs	Disaggregated (dominated by loose fibrous material; extreme degradation in ACM and/or free asbestos fibres/fibre bundles)	4
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Friable ACM or ACM with fibres not linked in any matrix (free dispersed fibres/fibre bundles)	4
Distribution of Visible Asbestos Across Affected Area	No visible ACMs/fibre bundles	0
Asbestos fibre type	Chrysotile alone	0
Sub-total		11
Hazard ranking		Medium

No warranty, expressed or implied, or reliance, is provided in relation to the use of this tool.
It is contingent on users to satisfy themselves that the output from the tool is relevant and appropriate to the assessment being made.

Stage 2		Score
Emission Factors		
Amount of asbestos fibre in selected ACM/fibre type as % of host material	Moderate quantities - 0.05 to <0.1 %wt/wt	3
Respirable fibre index for ACM - RIVM report 711701034 (2003)	Medium	3
Activity type and effect on deterioration of ACMs	Minimal disturbance, no deterioration expected	1
Best description of primary host material matrix	Coarse to Fine Sand	2
Sub-total		9
Exposure ranking		Low

Stage 3 Pathway and Receptor Sensitivity		Score	
Receptor category	Commercial/industrial	No score required	
Age of Receptor	Adult (>24 and <60)	1	
Duration of exposure/site occupancy	> 1hr <10 hr daily exposure (e.g. part-time to full time occupational exposure or extended daily recreational exposure)	3	
Receptor ranking		4	Low
Combined hazard, exposure and receptor ranking			Low
Pathway: Distance of Receptor from Source	In or within 10m of area of disturbance	4	
Pathway: Depth to impacted material	Material buried at depth, unlikely to be disturbed except for deeper construction related excavation	B	
Pathway ranking		4B	Very Low
Overall ranking			Negligible

Project Reference	G0174
Site Name	Salmon Road, Great Yarmouth
Client	Trent Energy
Run by	██████████
Date	27-May-24
Reviewed by	
Characterisation of scenario being evaluated	Assessing the risk to end users of the site (employees) of chrysotile asbestos fibre contamination post development of the site assuming 100% hard cover with building footprints or hardstanding as currently exists.
Interpretation of scenario ranking by DST	

Decision Support Tool for Receptor Risk Ranking

Stage 1		Score
Hazard Identification		
Select ACM type (run model for each type to generate 'Worst Case' output)	Bonded ACMs: cement, vinyl, composites, textured decorative coatings, bitumen products	0
Extent of degradation of ACMs	Weathered (Slight degradation in ACM; material still retains its basic integrity)	2
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Non-friable ACM or ACM with fibres firmly linked in a matrix	0
Distribution of Visible Asbestos Across Affected Area	Moderate/frequent occurrences of visible contamination by ACMs	3
Asbestos fibre type	Mainly amosite (and possible trace tremolite/anthophyllite) with/without chrysotile (no crocidolite)	3
Sub-total		8
Hazard ranking		Low

No warranty, expressed or implied, or reliance, is provided in relation to the use of this tool.

It is contingent on users to satisfy themselves that the output from the tool is relevant and appropriate to the assessment being made.

Stage 2		Score
Emission Factors		
Amount of asbestos fibre in selected ACM/fibre type as % of host material	Moderate quantities - 0.05 to <0.1 %wt/wt	3
Respirable fibre index for ACM - RIVM report 711701034 (2003)	Medium	3
Activity type and effect on deterioration of ACMs	Minimal disturbance, no deterioration expected	1
Best description of primary host material matrix	Coarse to Fine Sand	2
Sub-total		9
Exposure ranking		Low

Stage 3 Pathway and Receptor Sensitivity		Score	
Receptor category	Commercial/industrial	No score required	
Age of Receptor	Adult (>24 and <60)	1	
Duration of exposure/site occupancy	> 1hr <10 hr daily exposure (e.g. part-time to full time occupational exposure or extended daily recreational exposure)	3	
Receptor ranking		4	Low
Combined hazard, exposure and receptor ranking			Low
Pathway: Distance of Receptor from Source	In or within 10m of area of disturbance	4	
Pathway: Depth to impacted material	Material buried at depth, unlikely to be disturbed except for deeper construction related excavation	B	
Pathway ranking		4B	Very Low
Overall ranking			Negligible

Project Reference	G0174
Site Name	Salmon Road, Great Yarmouth
Client	Trent Energy
Run by	██████████
Date	27-Aug-24
Reviewed by	
Characterisation of scenario being evaluated	Assessing the risk to end users of the site (employees) of amosite containing cement board contamination post development of the site assuming 100% hard cover with building footprints or hardstanding as currently exists.
Interpretation of scenario ranking by DST	



Joint Industry Working Group
Asbestos in Soil and Construction & Demolition Materials

Project Reference	
Site Name	
Client	
Run by	
Date	
Scenario details	

Decision Support Tool for CAR2012 Work Categories

Stage 1
Hazard Factors

	Score
Select ACM type (run model for each type to generate 'Worst Case' output)	
Extent of degradation of ACMs at outset of work	Bonded ACMs: cement, vinyl, composites, textured decorative coatings, bitumen products 1
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Weathered (Slight degradation in ACM; material still retains its basic integrity) 2
Distribution of Visible Asbestos Across Affected Area	Non-friable ACM or ACM with fibres firmly linked in a matrix 0
Amount of asbestos fibre in selected ACM/fibre type as % of host material	Moderate/frequent occurrences of visible contamination by ACMs 3
	Moderate quantities - >0.05 to <0.1 %wt/wt 3
Sub-total	9
<i>Note: the asbestos licensing regime is unaffected by the type of asbestos fibre present in ACMs</i>	
Hazard ranking	Low

No warranty, expressed or implied, or reliance, is provided in relation to the use of this tool.
It is contingent on users to satisfy themselves that the output from the tool is relevant and appropriate to the assessment being made.

Stage 2

Exposure Factors

Score

Anticipated airborne fibre concentration - Control Limit or SALI?	<0.1 fibres/ml (4 Hr TWA) or <0.6 fibres/ml (10 minute STEL)	2
Anticipated duration of exposure to asbestos	< 2 hours in a 7 day period for all persons involved (e.g. Short Duration Work)	1
Activity type and effect on deterioration of ACMs during work	Not low intensity, significant deterioration expected	4
Best description of primary host material matrix (soil/made ground)	Coarse to Fine Sand	2
Respirable fibre index for ACM - RIVM report 711701034 (2003)	Very low	1
Sub-total		10
Exposure ranking		Low
Combined hazard and exposure ranking	19	Low

Stage 3

Risk Assessment Outputs

Probable Licensing Status	Non-Licensed Work
RPE*	EN149 type FFP3 disposable
Dust Suppression**	Manual/localised dust suppression
Hygiene/Decontamination***	Localised and basic personal decontamination facilities

*Where RPE has to be worn continuously for long periods (e.g. more than 1-hour), then powered RPE may be necessary.

**Reduction in control measures possible if natural mitigation factors are present (e.g. raining, wet ground)

***Guide only; suitability of selected personal hygiene measures may be reviewed on a site/contamination-specific basis

Discovery Method Statement

Discovery Method Statement

Previously unexpected contamination can be encountered on any site. This method statement is intended to be used if such contamination is discovered.

Contaminated land may be encountered when excavating into soil or removing vegetation or hardstanding that previously prevented access.

Contamination may be found in the form of significant odours, discolouration or staining of soils and the presence of an oily sheen or discolouration of groundwater. Fragments of asbestos containing materials may be encountered.

A tool-box talk on discovery of unexpected contamination may be beneficial and could be provided.

If during groundworks, evidence of previously unexpected contamination is encountered, the following actions should be taken:

- Works in the immediate area of the impacted ground should be suspended.
- The area of suspected contamination and any adjoining works should be made safe, limiting the disturbance of the contaminated material as much as is practical.
- GAC Consulting should be contacted and informed of the situation allowing preliminary advice and recommendations that may allow limited works to re-start.
- We will make arrangements to characterise the contamination and its impacts and determine further actions. An assessment may include a walkover with photographs, observations and a review of the impacts (if any),
- It may be advantageous to collect samples. The samples may be subject to initial inspection and field screening. It may be necessary or advantageous to submit samples for laboratory analysis,
- The Local Authority and/or the Environment Agency may be informed,
- Once suitably assessed, a written summary will be produced to document the actions and risk assessment process. It may be required or advantageous to submit the summary to the Local Authority and/or the Environment Agency,
- The summary will include details of work undertaken, analytical results obtained, conclusions and recommendations for any further actions considered necessary,
- Any further actions should reflect the requirements of the relevant regulatory bodies, the constraints of the site and the health & safety requirements.