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Geo-Environmental Investigation

Project: Fairhaven, Kirkby-in-Ashfield

Project No: EGE-24-07-07-01

Client: Lindum BMS

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Report Details

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Quality Control

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1.0 Authorisation, Context and Purpose

1.1 Authorisation

Evolve Geo-Environmental Limited (EGE) was instructed by Lindum BMS (the 'Client') to undertake Geo-Environmental Investigation for Fairhaven, Kirkby-in-Ashfield, NG17 7FW (the 'Site').

1.2 Context and Purpose

This Report is designed in general accordance with:

- Guidance on Land Contamination: Risk Management pages of the GOV.UK web pages;
- The relevant requirements of the National Planning Policy Framework 2024 (NPPF) (paragraphs 187, 196 - 201) National Planning Policy Framework - 15. Conserving and enhancing the natural environment - Guidance - GOV.UK (www.gov.uk); and
- The Planning Practice Guidance (Land Affected by Contamination) https://www.gov.uk/guidance/land-affected-by-contamination.

The aim of the study was to complete geo-environmental assessment of the Site to obtain information regarding ground conditions, from which risks to end-users, the environment and structures have been assessed specific to the proposed development scheme, with remediation and/or mitigation measures recommended, where necessary.

The investigation has also gathered geotechnical information to support preliminary design of foundations and infrastructure. The Report provides recommendations for further work (where appropriate) based on the findings of the investigation.

1.3 Existing Information

EGE has been provided with the following Information:

- Existing Site Plan, Lindum BMS, Drawing No. 31468 665 01, dated September 2023 (Drawing I);
- Proposed Site plan, Lindum BMS, Drawing No. 31468 665 02_Rev. D, dated April 2025 (Drawing II); and
- Topographical Survey, Castle Hill Surveys Ltd, Drawing CHS 25 - 50 - 01 dated 25th March 2025 (Drawing III).

Furthermore, EGE has previously undertaken a PRA for the Site, listed below;

- Evolve Geo-Environmental Limited, Preliminary (Geo-Environmental) Risk Assessment (PRA), Fairhaven, Kirkby-in-Ashfield Reference. EGE-24-07-07-01, Dated 24th April 2025.

1.4 Proposed Development

The Site is proposed for redevelopment with 20 no. residential units with private gardens, access and public open space.

An Existing Site plan is provided as Drawing I and a Proposed Development Plan is included as Drawing II.

1.5 Limitations

Geotechnical investigations were where practical carried out in general accordance with BS EN 1997:2 2007 *'Eurocode 7 - Geotechnical Design - Part 2: Ground Investigation and Testing'*. This Report is deemed to be a Ground Investigation Report (GIR) as set out in BS EN 1997:2. The Geotechnical section of this Report provides geotechnical design values and interpretation, however this Report does not constitute a Geotechnical Design Report as defined in section 2.8 of BS EN 1997-1:2004 *'Eurocode 7 - Geotechnical Design - Part 1: General Rules'.*

The EGE standard limitations are included as Appendix I. In addition, the following limitations also apply to this Assessment:

- This Assessment does not constitute a Flood Risk Assessment (FRA);
- This investigation was not specifically undertaken to advise on the classification of waste materials. Any reference to materials management and disposal of Site generated waste soils is for information purposes only.

Site specific limitations encountered during the investigation included the following:

- Termination of all boreholes between 2.00 and 3.00 [redacted] s. This is not considered to have affected the quality [redacted] te investigation as all the locations were terminated w [redacted] e Formation bedrock.

2.0 Site Details

A summary of the current Site status, environmental setting and key historical features is presented below. This has been summarised from the existing reports listed in Section 1.3, a Site walkover and widely freely available information.

2.1 Site Setting

Co-ordinates, Area and Elevation	▽ National Grid Reference (NGR) 450660, 355270; ▽ Approximately 0.55 Hectares (ha); and ▽ The Site is indicated to be circa 157 meters Above Ordnance Datum (m AOD) in the north east and circa 155 m AOD in the south west. A Client provided topographical survey is provided as Drawing III.
General Site Location	The Site is located circa 1 km south east of Kirkby in Ashfield train station and 6.5 km south west of Mansfield town centre. A Site Location Plan is included as Figure I.
Current Site Use and Walkover Information	A Site walkover was undertaken by an [redacted] 2025. A Relevant Features Plan is in [redacted] photographs. The Site was accessed via a gate on [redacted] southern Site boundary. The souther[redacted] concrete hardstandings associated with[redacted] care home which previously occupied[redacted] southern eastern corner which was oc[redacted] landscaping. The northern half of the Site was predominately soft landscaped areas which formed the garden of the previous care home with the exception of a large concrete slab which was present in the central part of the Site trending north to south associated with the former buildings. The Site sloped from the north east to the south west by circa 2 m. The floor slab in the south western part of the Site was approximately 1 m lower than the remainder of the floor slabs indicating a level difference in the former buildings. No formal retaining structures were noted. A number of manhole covers associated with drainage were noted in areas of hardstanding. No specific potential sources of contamination were noted at the Site.
Adjacent Land use	The Site was bound by the following land uses: ▽ North – Residential land use and allotment gardens; ▽ East – Central Avenue beyond which is residential; ▽ South – Fairhaven, beyond which is residential; and ▽ West – Residential.
Site Setting	*Geology*

	Published British Geological Survey (BGS) mapping indicates the Site is underlain by Lenton Sandstone Formation, with superficial deposits mapped as absent. Given the existing hardstanding, Made Ground is likely to be present, although likely limited in thickness. *Site Specific Geology* No historic borehole records are listed for the Site or on the same geology within 250 m of the Site. *Hydrogeology* The bedrock is classified as a Principal Aquifer. The Site is within a Total Catchment (Zone 3) Source Protection Zone (SPZ). There are no groundwater abstractions located within 1 km of the Site. *Hydrology* The nearest surface water feature is a tributary of the River Erewash located approximately 615 m to the south west. There are no surface water abstractions [redacted] *Site History – on-Site* The Site remained undeveloped until so [redacted] n an approximately 'L' shaped building w [redacted] of the Site. This building is in the same co [redacted] d during the site walk over remaining from [redacted] al connecting annex to the building was [redacted] e Site sometime between 1993 and 199 [redacted] e imagery, the buildings were demolishe [redacted] il 2021 with the building floor slabs remai [redacted] Regulatory Database Review Whilst potential off-Site sources of contamination were identified from the Regulatory Data Review, given the distance from the Site, these were not considered to represent a plausible risk to the Site.
Preliminary Conceptual Site Model (CSM)	*Sources* Potential sources of contamination were identified as follows: ▽ Made Ground associated with former Kirklands nursing home, the slabs and foundations for which remain at the Site; and ▽ Potential unrecorded/ un-mapped on and off-Site sources. *Receptors* Relevant potential receptors were considered to include: ▽ Construction workers; ▽ Underlying Principal Aquifer; ▽ Future Site users and maintenance workers; and ▽ The Built Environment (new buildings and infrastructure / utilities).

	No surface waters were considered plausible receptors for any Site sourced contamination, if present. Pathways The potential pathways were considered to be as follows: ▽ Direct contact, ingestion or inhalation of soil bound contaminants / dust during or following redevelopment; ▽ Inhalation of organic vapours associated with contamination; ▽ Leaching of contamination into groundwater; ▽ Migration of ground gas / vapours into on-site buildings causing asphyxiation or risk of explosion; and ▽ Direct contact between aggressive ground conditions and new infrastructure. **Possible Pollutant Linkages (PPL's) were identified and additional ground investigation was recommended.**

3.0 Ground Investigation

EGE undertook intrusive investigation on 19th March 2025 to assess the PPL's identified in the initial CSM and provide further preliminary geotechnical information.

3.1 Ground Investigation Scope of Works

The scope of works completed were as follows:

- Appointment of a specialist service avoidance contractor to clear intrusive locations for the presence of identifiable services/utilities and provide x, y and z co-ordinates of intrusive locations;
- Supervision and logging of soils in general accordance with BS5930:2015+A1:2020 by an EGE representative on a full-time basis;
- Drilling of 6 no. dynamic sampler boreholes (DS101 – DS106) to a maximum depth of 3.00 m below ground level (bgl), with regular SPTs;
- Excavation of six (6 no.) trial pits (TP101 to TP106) to a maximum depth of 3.00 m bgl. Conversion of two (2 no.) trial pits to BRE365 soaka[redacted]
- Completion of five (5 no.) Lightweight Deflectom[redacted]ts (TP103 to TP106);
- Installation of DS101, DS102 and DS106 as 50 mm[redacted]ls to facilitate groundwater level and ground gas moni[redacted]
- Collection of soil samples for chemical and geotech[redacted]ss the Site;
- Collection of one (1 no.) sample from DS106 to ass[redacted]al tar in existing macadam; and
- Completion of three (3 no.) groundwater level and ground gas monitoring visits at approximately weekly intervals following completion of intrusive works.

An Approximate Intrusive Location Plan is provided as Figure III.

Exploratory hole logs are included as Appendix II.

3.2 Environmental Sample Rationale and Sampling Methodology

The locations were positioned based on the potential sources of contamination identified as part of the desktop assessment previously undertaken by EGE and the available proposed development plan.

Chemical testing was undertaken on selected samples based from on-Site observations during soil sampling and the findings of the EGE desktop assessment.

Soils collected for laboratory analysis were placed in a variety of containers appropriate to the anticipated testing suite. Records of the samples taken as part of the Site investigation works, including their depths and location, are included within the exploratory hole records. All samples were submitted to a UKAS accredited laboratory (I2 Analytical) with testing methodologies for each specific compound contained within the laboratory results included as Appendix III.

3.2.1 Environmental Sampling Rationale

Environmental soil sampling rationale is provided within the table below.

Sample Location	Depth (m bgl)	Justification	Strata	Determinands								
				Total Organic Carbon	Metals in soil	Asbestos identification	BTEX and MTBE	Speciated EPA-16 PAHs	TPHCWG A/A Split	pH in soil	WAC	Coal Tar Suite
DS101	0.20	Site Coverage	Made Ground	✓	✓	✓	✓	✓	✓	✓		
DS102	0.30			✓	✓	✓	✓	✓	✓	✓		
	0.35	WAC									✓	
DS103	0.10	Re-use	Topsoil	✓	[redacted]							
	0.40	Site Coverage	Lenton Sandstone	✓								
DS104	0.20	Re-use	Topsoil	✓								
DS105	0.35			✓								
DS106	0.10	Coal Tar	Tarmac									✓
	0.20	Site Coverage	Made Ground	✓	✓	✓	✓	✓	✓	✓		
	0.40	WAC									✓	
TP102	0.70	Site Coverage	Lenton Sandstone	✓	✓	✓	✓	✓	✓	✓		
	0.90	WAC									✓	
TP103	0.20	Site Coverage	Made Ground	✓	✓	✓	✓	✓	✓	✓		
Total				**9**	**9**	**9**	**9**	**9**	**9**	**9**	**3**	**1**

3.2.2 Monitoring Well Installations

Three (3 no.) boreholes (DS101, DS102 and DS106) were installed as 50 mm internal diameter groundwater level and ground gas monitoring wells, installed within Made Ground and natural soils. The well construction details are included within the exploratory hole logs within Appendix II.

3.3 Geotechnical Sample Rationale and Sampling Methodology

The locations were positioned based on available space on Site, proposed development plan and to provide wider coverage.

Sampling comprised disturbed jar/tub and bulk samples as detailed on the exploratory logs. All samples were submitted to a UKAS accredited laboratory (i2 Analytical) with the specific testing standards contained within the laboratory results included as Appendix III (pH and sulphate) and IV (moisture content, Particle Size Distribution (PSD) and Atterberg limits).

Geotechnical soil sampling rationale is provided within the table below.

Sample Location	Depth (m bgl)	Justification	Strata	Determinands			
				Moisture Content	Atterberg Limits	PSD	pH and sulphate
DS101	2.50	Water Content	Lenton Sandstone (Cohesive				
DS102	1.20 - 2.00	Classification of granular soil	Lenton Sands				
DS103	0.50 - 1.00						
DS104	0.50	Water Content	Lenton Sands (Cohesive				
	1.10 - 2.00		Lenton Sands				
DS105	1.00		Lenton Sands (Cohesive)				
	1.20 - 2.00		Lenton Sandstone	✓			
DS106	0.80	Classification of cohesive soil	Lenton Sandstone (Cohesive)	✓	✓		
	1.20 - 2.00	Water Content	Lenton Sandstone	✓			
TP103	2.30	Classification of cohesive soil	Lenton Sandstone (Cohesive)	✓	✓		
DS101	2.00	Concrete Classification	Lenton Sandstone	✓			✓
DS102	1.00			✓			✓
DS104	1.00		Lenton Sandstone (Cohesive)	✓			✓
DS105	0.80		Lenton Sandstone (Cohesive)	✓			✓
TP103	2.50		Lenton Sandstone	✓			✓
Total				**15**	**2**	**2**	**5**

3.4 In-Situ-Testing

Standard Penetration Tests (SPTs) were undertaken at approximately 1.00 m intervals within all dynamic sampler boreholes.

The results and depths of these tests are presented on the borehole logs, as Appendix II.

A total of five (5 no.) LWDs was undertaken within TP013 to TP106. The results are presented in Appendix V.

Infiltration testing in general accordance BRE365 methodology was undertaken within two (2 no.) locations; SA101 and SA102, the results of which are included as Appendix VI and discussed in Section 6.10 of this Report.

3.5 Monitoring Programme

Three (3 no.) rounds of groundwater level and ground gas monitoring were undertaken between 24th March and 9th April 2025 within DS101, DS102 and DS106.

Measurements of the depth to groundwater within the monitoring wells were taken using an electronic dip meter.

To characterise the ground gas regime at the Site, an infrar[redacted]re gas flow, concentrations of carbon dioxide (CO2), met[redacted]in percentage by volume. Initial and steady state concentratio[redacted]ic pressure before and during monitoring, together with the w[redacted]

The monitoring record sheets are included as Appendix VI[redacted]

4.0 Ground Conditions

The following Sections summarise the soil and groundwater conditions identified during the ground investigation.

4.1 Ground Conditions Summary

A summary of the observed ground conditions during the ground investigation are provided in the table below:

Strata	General Description	Proven Depth Range to Base (m bgl)	Comments
Topsoil	Dark brown gravelly fine to medium sand. Gravel is fine to coarse sub-angular to sub-rounded quartzite and flint. Frequent rootlets.	0.30 – 0.50	DS101, DS103, DS104, DS105, TP101, TP105 and TP106.
Made Ground	Concrete or Macadam.	0.20 0.08	[redacted]
	Beige sandy gravel (possible sub-base).	0.25	
Lenton Sandstone Formation	Variable soils noted to most commonly comprise gravelly sands / clayey gravelly sands / sandy clays / sandy gravelly clays and clays, over; Extremely weak SANDSTONE recovered as reddish brown fine to coarse angular to sub-angular gravel.	Proven to 3.00	Encountered in all locations below Topsoil / Made Ground.

Ground conditions at the Site comprised Topsoil or Made Ground, over the Lenton Sandstone Formation, in all locations.

Topsoil was encountered to depths between 0.30 and 0.50 m bgl, found to comprise ‘Dark brown gravelly fine to medium sand. Gravel is fine to coarse sub-angular to sub-rounded quartzite and flint. Frequent rootlets’.

Made Ground was encountered to depths between 0.25 and 0.65 m bgl (average depth of 0.40 m bgl), found to comprise concrete or macadam, over; ‘MADE GROUND: Beige very sandy fine to coarse subrounded to sub-angular limestone gravel. (POSSIBLE SUB-BASE)’.

The Lenton Sandstone Formation was noted to be variable across the Site, comprising an initial cohesive member in the east (DS104, DS105 and DS106), ‘Soft reddish brown very sandy slightly gravelly CLAY. Gravel is fine to medium rounded to sub-rounded quartzite. Sand

is fine to coarse', underlain by granular deposits; 'Medium dense becoming very dense reddish brown to brown slightly silty fine to medium SAND'. Conversely, across the remaining areas of the Site, the Lenton Sandstone Formation comprised an initial granular member; 'Reddish brown very clayey slightly gravelly fine to medium SAND. Rare rounded to sub-rounded fine to coarse quartzite gravel', underlain in places (DS101, DS103 and TP105) by a cohesive deposit; 'Stiff reddish brown mottled light brown CLAY.', finally followed by bedrock of 'Extremely weak SANDSTONE recovered as reddish brown fine to coarse angular to sub-angular gravel'.

The encountered ground conditions were consistent with the mapped geology for the Site.

4.2 Visual and Olfactory Evidence of Contamination

No visual or olfactory evidence of contamination was identified during the Site investigation. Furthermore, no visual or olfactory evidence of contamination was identified during the return ground gas and groundwater monitoring rounds including the presence of Non-Aqueous Phase Liquid (NAPL).

4.3 Groundwater Strikes during Site Investigation

Groundwater was not encountered during the drilling / exca

4.4 Groundwater Levels during Monitoring

Groundwater levels were monitored on a total of three (3 n ch and 9th April 2025.

Exploratory Hole Location	Groundwater Level – m bgl (m bgl)	Groundwater Level – m bgl (m AOD)	Depth to Base (m bgl)	[redacted]	
DS101	2.19 – 2.52	154.28 – 153.95	2.90	-	Lenton Sandstone Formation
DS102	Dry – 1.91	Dry – 153.65	1.97		
DS106	Dry	Dry	2.01		

Groundwater was recorded within DS101 and DS102 only, with DS106 being dry on all three of the monitoring rounds.

Groundwater levels during the return monitoring period ranged between 1.91 and 2.52 m bgl (153.65 and 153.95 m AOD).

The monitoring record sheets are included as Appendix VI.

5.0 Contaminated Land Assessment

5.1 Background Information

5.1.1 Human Health

The presence of hazardous substances identified as part of the risk assessment is only of concern if an actual or potential unacceptable risk is deemed to be present. Legislation and guidance on the assessment of contaminated sites, requires a tiered risk-based approach.

This Section represents a Generic Quantitative Risk Assessment (GQRA) from information obtained through intrusive Site investigation and a comparison of Site contaminant levels against specific Generic Assessment Criteria (GAC). The general GAC utilised as part of this assessment include:

- Land Quality Management/CIEH S4ULs for Human Health Risk Assessment 2014 (LQM);
- Category 4 Screening Levels (C4SL) by DEFRA; and
- A 5,000 mg/kg maximum value for Total TPH and 5[redacted]n EGE professional opinion given the absence of spe[redacted]

5.1.2 Controlled Waters

Given the 'prevent and limit' approach of the Water Fram[redacted]d the identified receptors, a range of Water Quality Standa[redacted]s Generic Assessment Criteria (GAC), these include:

- Water Framework Directive standards and threshol[redacted]
- Freshwater Environmental Quality Standards (EQS[redacted]
- UK Drinking Water Quality Standards (DWQS);
- WHO Guidelines for Drinking Water Quality; and
- SEPA resource protection values.

The above guidance values have been used as initial conservative GAC to assess whether groundwater contamination requires further assessment or discussion in terms of the risks to controlled waters.

5.2 Human Health Generic Quantitative Risk Assessment

Given the proposed end-use of the Site as 20 no. residential units with private gardens, access and public open space, the risk to Human Health has been assessed against the residential with plan uptake end-use GAC, assuming 1% Soil Organic Matter (SOM),

5.2.1 Site Wide Soil Analytical Summary

A total of nine (9 no.) environmental soil samples were collected from the Site (4 no. from Made Ground, 3 no. from Topsoil and 2 no. from the Lenton Sandstone Formation. These samples were submitted to a UKAS accredited laboratory (i2) for a suite of potential contaminants of concern. A summary of concentrations above laboratory detection limits are provided in the following table.

Contaminant	Max Conc. (mg/kg)	GAC (mg/kg)	GAC Source	No. Exceed GAC / No. of samples	Location of Exceedances (depth) = Concentration (mg/kg)
Asbestos	Not Detected	Detected	N/A	0/9	-
Metals					
Arsenic	10	37	LQM	0/9	-
Cadmium	0.8	11			
Chromium III	18	910			
Copper	54	2,400			
Lead	50	200	C4SL		
Mercury	<0.3	40	LQM		
Nickel	13	130			
Zinc	100	3,700			
Polycyclic Aromatic Hydrocarbons					
Naphthalene	0.05	2.3	LQM	0/9	-
Acenaphthylene	< 0.05	170			
Acenaphthene	< 0.05	210			
Fluorene	< 0.05	170			
Phenanthrene	0.22	95			
Anthracene	< 0.05	2,400			
Fluoranthene	0.37	280			
Pyrene	0.34	620			
Benzo[a]anthracene	0.18	7.2			
Chrysene	0.22	15			
Benzo[b]fluoranthene	0.3	2.6			
Benzo[k]fluoranthene	0.11	77			
Benzo[a]pyrene	0.21	2.2			
Indeno(1,2,3-c,d)pyrene	0.12	27			
Dibenz(a,h)anthracene	< 0.05	0.24			
Benzo[g,h,i]perylene	0.14	320			
Total PAH16	2.21	500	EGE		
Petroleum Hydrocarbons					
Benzene	< 0.005	0.2	C4SL	0/9	
Toluene	< 0.005	130	LQM		
Ethylbenzene	< 0.005	47			
p & m-xylene	< 0.005	56			
o-xylene	< 0.005	60			

Contaminant	Max Conc. (mg/kg)	GAC (mg/kg)	GAC Source	No. Exceed GAC / No. of samples	Location of Exceedances (depth) = Concentration (mg/kg)
MTBE	< 0.005	49	EIC		
Aliphatic TPH >C5-C6	< 0.010	42			
Aliphatic TPH >C6-C8	< 0.010	100			
Aliphatic TPH >C8-C10	< 0.010	27			
Aliphatic TPH >C10-C12	2.8	130			-
Aliphatic TPH >C12-C16	7.5	1,100			
Aliphatic TPH >C16-C21	< 8.0	65,000			
Aliphatic TPH >C21-C35	23		LQM		
Aromatic TPH >C5-C7	< 0.01	70			
Aromatic TPH >C7-C8	< 0.01	130			
Aromatic TPH >C8-C10	< 0.02	34		[redacted]	
Aromatic TPH >C10-C12	< 1.0	74			
Aromatic TPH >C12-C16	< 2.0	140			
Aromatic TPH >C16-C21	< 10	260			
Aromatic TPH >C21-C35	46	1100			
Total TPH	68	5,000	EGE		
Other					
TOC	3.4%	-	-	-	

Notes:

C4SL = Category 4 Screening Levels (C4SLs) published by DEFRA.

LQM = Land Quality Management/CIEH S4Uls for Human Health Risk Assessment, 2014.

EGE = Evolve Geo-Environmental 'in-house' screening value based on professional judgement.

EIC = Guidance Values Produced by the Environmental Industries Commission (EIC), The Association of Geotechnical and Geoenvironmental Specialists (AGS) and Contaminated Land: Application in Real Environments (CL:AIRE) in December 2009.

= Above GAC

Widespread and significant soil contamination has not been identified at the Site.

Asbestos was not identified within any of the samples selected for analysis.

No concentrations of contaminants in soil were identified above the most stringent 'Residential with plant uptake' GAC. However, it is noted that soil concentrations of individual metals, PAHs and TPHs were recorded above their respective laboratory Limits of Detection (LOD).

Evidence of volatile vapours has not been identified.

No evidence of Non-Aqueous Phase Liquid (NAPL) was identified during sampling.

The soil chemical analytical results are included as Appendix III.

5.3 Controlled Waters Generic Quantitative Risk Assessment

The approach adopted to assessing risks to Controlled Waters/Water Environment is based principally on considering the concentrations of contaminants identified within groundwater samples obtained in comparison to relevant GAC.

5.3.1 Groundwater Analytical Summary

Given the absence of significant soil contamination from in-situ soil sampling and absence of visual and olfactory evidence of significant contamination (including NAPL) the risk to Controlled Waters is considered very low and no further works or risk assessment is considered to be required.

5.4 Waste Management

In recent years a number of mechanisms have aimed to change the way in which waste materials have traditionally been managed (i.e. a move away from less sustainable options such as landfill disposal).

In general, the predominant waste material encountered during the construction phase of development schemes will likely be construction waste, predominantly waste soils within any Topsoil, Made Ground and the upper Lenton Sandstone Formation.

This Assessment was not undertaken as a waste classification assessment and has not been undertaken in accordance with WM3. Additional testing is likely to be required to support any initial waste classification assessment for off-Site disposal of waste soils.

In accordance with best practice, sustainability and cos[redacted]e retained on-Site where possible. Additional Waste Accep[redacted]to facilitate any off-Site disposal of soils.

5.4.1 Waste Acceptance Criteria Testing

A total of three (3 no.) WAC tests were collected from the Si[redacted]ed within Appendix III. It is recommended that the results ar[redacted]s/ groundworkers/ disposal facilities to confirm their requir[redacted]te disposal routes and budget costs.

5.4.2 Coal Tar Testing

Additionally, one (1 no.) sample (DS106 at 0.05 m bgl) was collected of the existing macadam and tested at a UKAS accredited laboratory for sPAH17 and leachable phenols to assess the potential for the presence of coal tar.

In summary, elevated concentrations of specific marker compounds including total PAH above the trigger value of 1,000 mg/kg were not identified and as such, it is considered likely that the existing macadam is unlikely to contain coal tar and is likely to bitumen based.

6.0 Geotechnical Assessment

6.1 Background Information

The Site is proposed for redevelopment with 20 no. residential units with private gardens, access and public open space. The following assessment is based on up to 3 storey residential units. Should other development be proposed this assessment may need revising and updating to suit the new development.

An Existing Site plan is provided as Drawing I and a Proposed Development Plan is included as Drawing II.

6.2 Factual Geotechnical Laboratory Data

The table below summarises the results of in-situ and laboratory test data. The geotechnical laboratory data is included as Appendix IV.

Parameter	Unit	Value or Range	Justification
Lenton Sandstone Formation			
w (Water Content)	%	6.2 - 23.1	[redacted]
LL (Liquid Limit)		27 - 52	
PL (Plastic Limit)		17 - 20	
PI (Plasticity Index)		10 - 32	
IP' (Modified Plasticity Index)		10 - 32	
Volume Change Potential	-	Low to Medium	
Particle Size Distribution	%	Gravel - 0 - 6 Sand - 75 - 83 Silt/Clay - 17 - 19	Laboratory Testing
Uncorrected SPT 'N'	Blows	5 - 50	In Situ Testing
California Bearing Ratio	%	2.2 - 34.0	In Situ LWD Testing

6.3 Ground Model Summary

Ground conditions at the Site comprise Topsoil or Made Ground, over the Lenton Sandstone Formation, in all locations.

Topsoil was encountered to depths between 0.30 and 0.50 m bgl, found to comprise 'Dark brown gravelly fine to medium sand. Gravel is fine to coarse sub-angular to sub-rounded quartzite and flint. Frequent rootlets'.

Made Ground was encountered to depths between 0.25 and 0.65 m bgl (average depth of 0.40 m bgl), found to comprise concrete or macadam, over; 'MADE GROUND: Beige very sandy fine to coarse subrounded to sub-angular limestone gravel. (POSSIBLE SUB-BASE)'.

The Lenton Sandstone Formation was noted to be variable across the Site, comprising an initial cohesive member in the east (DS104, DS105 and DS106), 'Soft reddish brown very sandy slightly gravelly CLAY. Gravel is fine to medium rounded to sub-rounded quartzite. Sand is fine to coarse', underlain by granular deposits; 'Medium dense becoming very dense reddish brown to brown slightly silty fine to medium SAND'. Conversely, across the remaining areas

of the Site, the Lenton Sandstone Formation comprised an initial granular member; 'Reddish brown very clayey slightly gravelly fine to medium SAND. Rare rounded to sub-rounded fine to coarse quartzite gravel', underlain in places (DS101, DS103 and TP105) by a cohesive deposit; 'Stiff reddish brown mottled light brown CLAY.', finally followed by bedrock of 'Extremely weak SANDSTONE recovered as reddish brown fine to coarse angular to sub-angular gravel'.

Groundwater was not encountered during the drilling / excavation of intrusive locations.

Groundwater was recorded within DS101 and DS102 only, with DS106 being dry for all three of the monitoring rounds. Groundwater levels during the return monitoring period ranged between 1.91 and 2.52 m bgl (153.65 and 153.95 m AOD).

6.4 Earthworks

The topography of the Site is noted to fall from a high point in the north-east (approximately 158.0 m AOD) to a low, located in the south-west (approximately 155.0 m AOD). As such, it is anticipated that a degree of earthworks is required as part of the proposed development. This may include the use of the existing Made Ground and Lenton Sandstone Formation soils. However, no volumes or models have been provided to EGE at this stage.

Materials used as fill will need to be placed to a suitable [redacted] degree of compaction required, dependent on end usa[redacted] example, a lesser degree of compaction may be suitable[redacted] platforms supporting foundations and ground bearing s[redacted] replacement is to be used should comprise granular fil[redacted] compaction. Validatory testing, such as CBR or settlement[redacted]

Based on the PSD testing undertaken on two (2 no.) sampl[redacted] Formation both samples taken would classify as a Class [redacted] accordance with Series 600 of the Specification for H[redacted] earthworks materials has been assessed on the basis of th[redacted] part of this investigation, additional testing is likely to be required once the full development scheme, levels and loads are known.

Inclement weather or winter working may result in materials being unsuitable for incorporation within the works without modification by lime, cement or other methods. In particular, cohesive soils are very susceptible to 'wet weathering working' and we strongly recommend that consideration should be given to lime and/or cement stabilisation of these materials if the earthworks are undertaken during inclement weather or the winter period.

Unprotected stockpiled materials often deteriorate due to water infiltration and they may become unsuitable for incorporation in the works.

Further earthworks testing will be required prior to completion of a suitably detailed earthworks specification for the works.

6.5 Foundations

6.5.1 Spread Foundations

Earthworks are proposed at the Site and foundation recommendations may need reviewing following finalisation of cut/fill levels.

The Made Ground is considered to be too limited in thickness, weak and compressible in its existing condition to be used as a founding medium for conventional shallow foundations at the Site and as such have been excluded from consideration as potential founding strata.

Traditional strip foundations would need to be founded within the competent granular Lenton Sandstone Formation.

It is understood that the proposed development will comprise 20 no. residential units, ranging between floor areas of 71.5 m^2 and 83.0 m^2 (as per Drawing II).

Based on these proposals, allowable bearing capacities have been calculated across the Site at depths of 1.20 and 2.00 m below existing ground level (m begl). Consideration should be made as to the foundation type should proposals change to include higher design loads.

Should natural undisturbed granular Lenton Sandstone Formation be encountered within economic reach for traditional strip foundations (up to 1 m wide), then for preliminary foundation design purposes the loose to medium dense soils at 1.20 m begl (SPT of 5 or greater) are likely to achieve an allowable bearing capacity of 150 kPa, while the medium dense soils at 2.00 m begl (SPT of 13 or greater) are likely to achieve an allowable bearing capacity of 200 kPa **in dry conditions** (with settlement limited to 25 mm).

However, should bedrock of the natural Lenton Sandstone Formation comprising Sandstone be encountered within economic reach for traditional strip foundations (up to 1x15 m), then for preliminary foundation design purposes the extremely weak to weak rock (SPT of 50 or greater) are likely to achieve an allowable bearing capacity [redacted] settlement limited to 25 mm).

It is noted that a cohesive band is present within the Lent [redacted] 1.90 and 3.00 m begl in the centre and north-west of [redacted] positioned within these cohesive deposits in the central ar [redacted] then for traditional strip foundations (up to 1 m wide), the fi [redacted] or greater) are likely to achieve an allowable bearing cap [redacted] (with settlement limited to 25 mm).

Excavations below the groundwater table are likely to be u [redacted] be ensured that foundations are cast in dry conditions an [redacted] may be required to maintain dry conditions. If foundation excavations cannot be kept dry alternative foundations solutions may be required.

Where foundations span a zone of cohesive and granular soils it is recommended that the lower bearing capacity is used for design. Foundations should be suitably reinforced in variable ground conditions (sand/clay) or founded in one material type where possible i.e., firm clay or medium dense sand in order limit the potential for differential settlement.

All foundation excavations should be inspected by a suitably qualified engineer prior to casting to ensure the appropriate depth, founding medium and strength characteristics have been achieved.

6.5.3 Volume Change Potential

The volume change potential should be considered in any foundation schedule for structures and services located within the influence zone of trees or bushes (proposed, existing or to be removed) and appropriate precautions and/or founding depths should be designed accordingly. In cohesive soils, it is recommended that foundations should be designed in accordance with NHBC Standard Chapter 4.2 "*Building Near Trees*".

Based on the laboratory testing undertaken the cohesive soils within the Lenton Sandstone Formation has a Low to Medium volume change potential.

6.5.5 Piling

If shallow foundations do not provide sufficient bearing capacity, then a piled foundation solution using driven or bored piles transferring loads to competent geology may be suitable for the proposed or anticipated design loads, utilising both skin friction and end bearing capacity.

The precise method of pile installation and applicability of proprietary systems, diameters and depths required would need to be informed based on the results of this investigation, by discussions with a piling contractor with suitable experience, whose design should be warranted.

Normal static and dynamic load testing (including uplift tests) should be considered to achieve satisfactory quality control/assurance in accordance with good practice.

There will be a requirement for the placement of a suitably engineered piling mat, which should be designed and validated by a suitably qualified and experienced engineer.

6.6 Floor Slabs

Ground bearing floor slabs may be suitable for the Site, assuming a maximum floor area of 15 m by 15 m, ground bearing floor slabs should be suitable [redacted] less than 25 mm settlement, reducing to half of that at [redacted] Ground and Topsoil is removed, the Lenton Sandstone Fo[redacted] any soft spots excavated and replaced with well compacte[redacted] suspended ground floor slab would be suitable.

6.7 Groundwater

Groundwater was not encountered during the drilling / exca[redacted]

Groundwater was recorded within DS101 and DS102 only[redacted] of the monitoring rounds. Groundwater levels during the[redacted] between 1.91 and 2.52 m bgl (153.65 and 153.95 m AOD).

As such, groundwater may potentially be encountered during the excavations required as part of the proposed development, however, significant volumes of shallow groundwater (<2.00 m bgl) are not anticipated. Exclusion of groundwater from excavations could be considered through dewatering or cut off walls. It is recommended that specialist advice is sought from a groundworker.

6.8 Roads and Pavements

Five (5 no.) in-situ Lightweight Deflectometer (LWD) tests have been undertaken across the Site. Based on the LWD tests, equivalent CBR results varied between 2.2 % and 34.0 %, within the Lenton Sandstone Formation.

Part 5.1.13 of Nottinghamshire County Council Materials Specification recommends that for design purposes equilibrium CBR is designed from plasticity index. A shallow plasticity index test was undertaken at 0.80 m in DS106 and required a plasticity index of 10 %.

Based on the LWD results and Nottinghamshire County Council Materials Specification Part 5.1 a preliminary design equilibrium CBR of value of 4 % is recommend for the Lenton Sandstone Formation soils.

The operational strength of the subgrade will depend to a large extent on its condition at the time of construction and therefore we recommend these CBR values be utilised for design purposes and reassessed immediately prior to construction.

It should be noted that the CBR value is dependent on the condition of the strata and could be different upon excavation to the formation subject to seasonal conditions. Careful control of the moisture content during the development will be required to ensure the proposed preliminary CBR values are achieved.

Additionally, the CBR value can be impacted by tracking and plant movements and so the finished formation should be suitably protected as soon as possible to avoid degradation. This can be achieved with either granular sub-base material or a capping layer.

6.9 Excavations and Obstructions

It is expected that conventional mechanical excavators will readily remove the encountered soils. Sub-surface obstructions associated with relic foundations, former construction (including redundant services) and concrete slabs may be present at the Site. Obstructions/ Made Ground may be present related to these features that will require breaking out or large excavators.

All faces of near vertically sided excavations put down at the Site should be considered unstable particularly in the Made Ground. Temporary trench support, or battering of excavation sides, should be considered for all excavations that are to be left open for any length of time and will be required where man entry is required. It is r[redacted]ry support is design in accordance with CIRIA R97 Trenching

Particular attention should be paid to excavation at, or clo[redacted]g structures, where collapse of excavation faces could have

A risk assessment of the stability of any open excavation sh[redacted]nt person and appropriate measures adopted to ensure safe w[redacted]en excavations.

There are existing services within the surrounding pavemer[redacted]ed if the new building position conflicts with their existing loca[redacted]e lowered on site.

The services will need to be protected during construction.

6.10 Infiltration Testing

Two (2 no.) soakaway tests were scheduled to be undertaken at the Site, however, the BRE365 infiltration tests undertaken within SA101 failed to soak, with the water levels remaining relatively static over the monitoring period, resulting in failed tests.

Conversely, SA102 achieved a recommended soil infiltration rate of 1.2 x10^{-05} m/s.

The BRE365 Infiltration Test Results are included within Appendix VI.

6.11 Chemical Attack on Buried Concrete

In accordance with the recommendations of BRE Special Digest 1, 'Concrete in Aggressive Ground' 2005, the conditions of the shallow soils at the Site would be classified as Design Sulphate Class DS-1 and ACEC Class AC-1 for soils, when considering the most appropriate type of concrete to be used at the Site in order to resist chemical attack from elevated sulphate present in the soils (assuming mobile groundwater in non-pyritic soils).

7.0 Ground Gas Risk Assessment

7.1 Background Information

Based on the proposed residential end use, the following documents have been consulted when assessing the gas regime at the Site:

- NHBC/RSK Group PLC (2007), Guidance on Evaluation of Development Proposals on Sites where Methane and Carbon Dioxide are Present, Report Edition No. 4;
- CIRIA C665 (2007), Assessing risks posed by hazardous ground gases to buildings;
- British Standards Institute (BSI, 2019): Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, BS:8485:2015+A1:2019; and
- CL:AIRE Research Bulletin 17 (RB17), 2012, 'A Pragmatic Approach to Ground Gas risk Assessment'.

The presence of a source of hazardous gas within the ground does not necessarily indicate a risk will be present. Consideration of recorded gas flows to[redacted]s can allow an initial assessment to be made of the potential b[redacted]nt migration of gas. A Characteristic Situation (CS) is derived[redacted]d gas data and forms the basis of determining mitigation mea[redacted]

7.2 Hazardous Ground Gas Monitoring Programme

Three (3 no.) rounds of ground gas monitoring have be[redacted]ly installed boreholes between 24th March and 9th April 2025 [redacted]

The hazardous ground gas monitoring sheets are included[redacted]

7.3 Hazardous Ground Gas Conceptual Site Model

7.3.1 Sources

Following the desktop assessment undertaken by others and Site investigation works, the following potential and actual sources of hazardous ground gas were identified:

- Made Ground identified locally to a maximum depth of 0.65 m bgl by EGE during the Site investigation; and
- Potential unrecorded/ un-mapped sources.

No significant thickness of deleterious, putrescible, hydrocarbon contamination or organic materials were visually observed during the soil sampling or subsequent laboratory testing.

7.3.2 Pathways

The following plausible pathways are considered applicable to this Assessment:

- Vertical and lateral migration of ground gas through permeable strata;
- Potential for gases to enter current and future buildings through voids in the floor including service entry points and cracks and accumulate in confined spaces; and
- Future maintenance/construction workers may come into contact with hazardous ground gases via entry into below ground confined spaces such as excavations or service entries/inspection points.

7.3.3 Receptors

The principal receptors are considered to be:

- Future Site users; and
- Buildings/ property.

7.4 Ground Gas Screening Value

The Gas Screening Value (GSV - maximum gas concentration as a fraction x maximum recorded flow) is used to provide an initial assessment of risks to future Site users. The GSVs calculated for the monitoring wells are presented in the following table.

Location	Maximum Steady Methane (%v/v)	Maximum Steady Carbon Dioxide (%v/v)	Maximum Steady Flow Rate (l/hr)	GSV/Classification		Flooded?
				GSV	Classification	
DS101	<0.1	1.8	<0.1	0.0018	CS1 (Very Low	N
DS102		2.2		0.002		
DS106		2.0		0.002		

As can be seen from the table above, the hazardous ground[redacted]at the Site would be classified as a CS1 (Very Low Risk), wh[redacted]e findings of the PRA, soil analytical results and on-Site obse[redacted]

As such, ground gas protection measures are not re[redacted]ed development.

7.5 Radon

The property is in a Lower probability radon area (less than[redacted]e at or above the Action Level).

No radon protective measures are necessary in the construction of new dwellings or extensions.

8.0 Revised Conceptual Site Model

A revised CSM is presented in the table below and has been formulated taking into account all of the available data from the EGE assessment and previous PRA report, suitable for a site with a proposed residential end-use.

Source	Pathway(s)	Receptor(s)	Risk Ratings	Justification & Mitigation (if required)
Detectable concentrations of heavy metals, PAH and hydrocarbons above laboratory detection, however, below GAC from across the Site. Unrecorded Sources.	Direct contact/ ingestion and inhalation of dust, vapours and asbestos fibres.	Future Site users. Groundworkers during the redevelopment or during any sub-surface maintenance works.	**Low Risk**	Significant and widespread soil contamination has not been identified following the soil sampling and analysis undertaken at the Site. [redacted]ntaminants have not been identified within [redacted]sulated through the implementation of the [redacted]rising hardstanding and building cover, [redacted]k to Future Site users from the low-level [redacted]e incorporated into the development a clean [redacted]e required. Existing topsoil is considered [redacted]n place during any below surface works for groundworkers to act upon should potential unexpected contamination be identified. Mitigation measures will need to be set out within a Remediation Method Statement. Groundworkers should use appropriate personal protective equipment (PPE) and respiratory protective measures (RPE) to maintain good standards of hygiene to be protected from any soil contamination which may be present.

	Leaching of contamination into groundwater. Vertical and lateral migration of contamination through permeable deposits below the Site.	Principal Aquifer (Lenton Sandstone Formation)	**Very Low Risk**	Widespread and significant groundwater contamination has not been identified at the Site. Given the absence of significant soil contamination from in-situ soil sampling and absence of visual and olfactory evidence of significant contamination (including NAPL) the risk to Controlled Waters is considered very low and no further works or risk assessment is considered to be required. The presence of proposed buildings/ hardstanding will limit infiltration and [redacted] ntamination from soils in the immediately
	Direct infiltration in water supply pipes.	Service conduits.	**Low to Moderate Risk**	PAH and TPH concentrations in soils have [redacted] and upgrading of new water supply pipes assumed at this stage. Report along with the Preliminary Risk GE should be provided to the Local Water requirements for upgraded water supply
Hazardous ground gas (Made Ground).	Accumulation of gas in enclosed spaces and sub-floor voids.	Buildings and future Site users.	**Very Low Risk**	On-Site sources of ground gas identified from the Site investigation are limited to Made Ground and unidentified sources. Based on the results of the preliminary hazardous ground gas monitoring undertaken, the Site has been classified as CS1 – Very Low Risk. No ground gas protection measures are required. Vigilance is required during groundworks for any suspect ground conditions, such as deep Made Ground, organic or deleterious materials and organic contamination which may present a potential source of hazardous ground gas.

Risk Ratings included as Appendix VII.

9.0 Conclusions and Recommendations

Soils	Significant and widespread soil contamination has not been identified following the soil sampling and analysis undertaken at the Site. Significant sources of volatile contaminants have not been identified within soils or groundwater. The Site will be largely encapsulated through the implementation of the proposed development, comprising hardstanding and building cover, limiting the direct exposure risk to Future Site users from the low-level contamination. A clean certified layer of topsoil will be required in garden areas. Existing topsoil is considered suitable for re-use. Mitigation measures will need to be set out within a Remediation Method Statement. Groundworkers should use appropriate personal protective equipment (PPE) and respiratory protective measures (R [redacted] hygiene to be protected from any soil c A 'hotspot' protocol should be in place [redacted] groundworkers to act upon should pot [redacted] identified, however the risk is considere
Groundwater	Widespread and significant groundw [redacted] identified at the Site. Given the absence of significant soil co [redacted] and absence of visual and olfactory e [redacted] (including NAPL) the risk to Controlled [redacted] The presence of proposed buildings/ hardstanding will limit infiltration and subsequent mobilisation of contamination from soils in the immediately underlying Principal Aquifer. On this basis the risk to Controlled Waters is considered **very low** and no further works or risk assessment is considered to be required.
Ground Gas	On-Site sources of ground gas identified from the Site investigation are limited to Made Ground and unidentified sources. Based on the results of the preliminary hazardous ground gas monitoring undertaken, the Site has been classified as **CS1 – Very Low Risk.** **No ground gas protection measures are required.** Vigilance is required during groundworks for any suspect ground conditions, such as deep Made Ground, organic or deleterious materials and organic contamination which may present a potential source of hazardous ground gas. **No radon protective measures are necessary** in the construction of new dwellings or extensions.
Potable Water Pipes	Low level metals, PAH and TPH concentrations in soils have been identified in Made Ground and upgrading of new water supply pipes may be required.

	It is recommended that this Report along with the Preliminary Risk Assessment undertaken by EGE should be provided to the Local Water Provider who will confirm any requirements for upgraded water supply pipes.
Geotechnical Recommendations	Ground conditions at the Site comprise Topsoil or Made Ground, over the Lenton Sandstone Formation, in all locations. Groundwater was not encountered during the drilling / excavation of intrusive locations. Groundwater was recorded within DS101 and DS102 only, with DS106 being dry for all three of the monitoring rounds. Groundwater levels during the return monitoring period ranged between 1.91 and 2.52 m bgl (153.65 and 153.95 m AOD). The Made Ground is considered to be too limited in thickness, weak and compressible in its existing condition to be used as a founding medium for conventional shallow foundations at the Site and as such have been excluded from consideration as potential founding strata. Traditional strip foundations would need to be founded within the competent granular Lenton Sandstone Formation. It is understood that the proposed [redacted] residential units, ranging between floo[redacted]s per Drawing II). Based on these proposals, allowab[redacted] calculated across the Site at depths of 1[redacted] level (m begl). Consideration should [redacted] should proposals change to include hig[redacted] Should natural undisturbed granular[redacted] encountered within economic reach for[redacted] m wide), then for preliminary founda[redacted] medium dense soils at 1.20 m begl (SP[redacted] an allowable bearing capacity of 150 kPa, while the medium dense soils at 2.00 m begl (SPT of 13 or greater) are likely to achieve an allowable bearing capacity of 200 kPa in dry conditions (with settlement limited to 25 mm). However, should bedrock of the natural Lenton Sandstone Formation comprising Sandstone be encountered within economic reach for traditional strip foundations (up to 1x15 m), then for preliminary foundation design purposes the extremely weak to weak rock (SPT of 50 or greater) are likely to achieve an allowable bearing capacity of 500 kPa in dry conditions (with settlement limited to 25 mm). It is noted that a cohesive band is present within the Lenton Sandstone Formation between 1.90 and 3.00 m begl in the centre and north-west of the Site. If foundations are to be positioned within these cohesive deposits in the central and north-western areas of the Site, then for traditional strip foundations (up to 1 m wide), the firm soils at 2.00 m b egl (SPT of 13 or greater) are likely to achieve an allowable bearing capacity of 125 kPa in dry conditions (with settlement limited to 25 mm). Excavations below the groundwater table are likely to be unstable in the long term. It should be ensured that foundations are cast in dry conditions and groundwater exclusion methods may be required to maintain dry conditions. If foundation excavations cannot be kept dry alternative foundations solutions may be required.

	Where foundations span a zone of cohesive and granular soils it is recommended that the lower bearing capacity is used for design. Foundations should be suitably reinforced in variable ground conditions (sand/clay) or founded in one material type where possible i.e., firm clay or medium dense sand in order limit the potential for differential settlement. Ground bearing floor slabs may be suitable for the Site, assuming a maximum floor area of 15 m by 15 m, ground bearing floor slabs should be suitable for floor loads of up to 35 kPa with less than 25 mm settlement, reducing to one quarter of that at in the corners; so long as all Made Ground and Topsoil is removed, the Lenton Sandstone Formation is heavily proof rolled with any soft spots excavated and replaced with well compacted granular material. Alternatively a suspended ground floor slab would be suitable. Based on the LWD results and Nottinghamshire County Council Materials Specification Part 5.1 a preliminary design equilibrium CBR of value of 4 % is recommend for the Lenton Sandstone Formation soils. BRE365 infiltration tests undertaken within SA101 failed to soak, with the water levels remaining relatively static over the monitoring period, resulting in failed tests. Conversely, SA102 achi[redacted] rate of 1.2 x10^{-05} m/s. In accordance with the recommendation[redacted] in Aggressive Ground' 2005, the condit[redacted] classified as Design Sulphate Class DS[redacted]
Recommendations	On the basis of the above, the following[redacted] ▽ A 'Hotspot' Protocol to be in place d[redacted] to act upon should potential contan[redacted] part of this investigation, is identifie[redacted] ▽ All groundworkers to be provided with task specific PPE/RPE; ▽ A clean certified layer of topsoil will be required in garden areas. Existing topsoil is considered suitable for re-use; ▽ Consultation with the Local Water Authority to confirm the requirements of any upgraded potable water pipes; ▽ Soil testing maybe required to support the off-Site disposal of waste soils, including further WAC testing; and ▽ Production of a Remediation Method Statement to support likely planning requirements.

Drawings

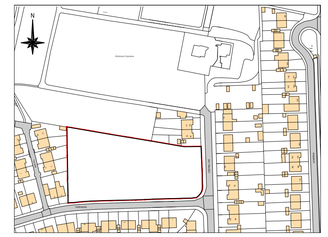
evolve

GEO-ENVIRONMENTAL

Drawing I – Existing Site Plan

evolve

GEO-ENVIRONMENTAL



LOCATION PLAN
1:2500

APPROX TREE SIZES AND LOCATIONS TAKEN FROM HISTORIC INFO

APPROX FOOTPRINT OF FORMER CARE HOME,
NOW DEMOLISHED TO FLOOR SLAB LEVEL

FAIRHAVEN

CENTRAL AVE

Revision	Date	Details	Revised By

LINDUM BMS
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CLIENT
Ashfield District Council

PROJECT
Residential Development At Former Kirklands Care Home,
Fairhaven, Kirkby In Ashfield, Nottingham

DRAWING
Existing Site Plan

DATE	Sept 2023	SCALE	1:200
DRAWN	SR	CHECKED	SIZE A1

DRAWING NUMBER: 31468 665 01
REVISION: -

FEASIBILITY

0mm 10 20 30 40 50 75 100mm

Drawing II – Proposed Development Plan

evolve
GEO-ENVIRONMENTAL

N

EXISTING HEDGEROW TO ALLOTMENTS RETAINED

HEDGEROW RETAINED

P5 - P8

GF 1B/2P 53.7m² FF 2B/3P 67.6m²

GF 1B/2P 53.7m² FF 2B/3P 67.6m²

P1 - P4

GF 1B/2P 53.7m² FF 2B/3P 67.6m²

GF 1B/2P 53.7m² FF 2B/3P 67.6m²

P9 (GARDEN 101.6m²)

3B/4P 83.0m²

3B/4P 83.0m²

P10 (GARDEN 78.3m²)

P11 (GARDEN 70.9m²)

2B/3P 71.5m²

2B/3P 71.5m²

P12 (GARDEN 59.3m²)

P13 (GARDEN 62.9m²)

2B/3P 71.5m²

2B/3P 71.5m²

P14 (GARDEN 54.9m²)

P15 (GARDEN 79.1m²)

P16 (GARDEN 81.7m²)

3B/4P 83.0m²

3B/4P 83.0m²

P17 (GARDEN 81.0m²)

P18 (GARDEN 71.4m²)

P19 (GARDEN 87.1m²)

P20 (GARDEN 90.9m²)

2B/3P 77.1m²

2B/3P 77.1m²

2B/3P 71.5m²

2B/3P 71.5m²

HEDGEROW REMOVED TO FORM NEW DRIVEWAY

HEDGEROW RETAINED

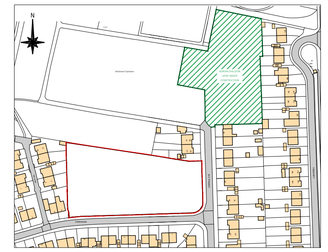
HEDGEROW REMOVED TO FORM NEW DRIVEWAY

HEDGEROW RETAINED

ON-SITE BNG ENHANCEMENT AREA

EXISTING STREETLIGHT TO BE RELOCATED

R6000



LOCATION PLAN
1:2500

▲ EV CHARGING POINT

Revision	Date	Details	Revised By
D	12.05.2025	LAYOUT REVISED	SR
C	29.04.2025	LAYOUT REVISED	SR
B	28.04.2025	LAYOUT REVISED	SR
A	20.11.2024	BUNGALOWS ADDED	SR

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CLIENT
Ashfield District Council

PROJECT
Residential Development At Former Kirklands Care Home, Fairhaven, Kirkby In Ashfield, Nottingham

DRAWING
Proposed Site Plan

PLANNING

DATE	Apr 2025	SCALE	1:200
DRAWN	SR	CHECKED	SIZE A1

DRAWING NUMBER 31468 665 02
REVISION D

0mm 10 20 30 40 50 75 100mm

Drawing III - Topographical Survey

evolve
GEO-ENVIRONMENTAL

ABBREVIATIONS & SYMBOLS

AV	AIR VALVE			OHC	OVERHEAD CABLE
BH	BORE HOLE			PB	POST BOX
BOL	BOLLARD	FFL	FINISHED FLOOR LEVEL	PINV	PIPE INVERT LEVEL
CATV	CABLE TV MH	FP	FLAG POLE	PM	PARKING METER
CCTV	SECURITY CAM	FW	FOUL WATER	PO	POST
CL	COVER LEVEL	GV	GAS VALVE	PT	PIPE TOP LEVEL
CH	CHANNEL	HW	HEADWALL	P/R	POST & RAIL FENCE
COL	COLUMN	IC	INSPECTION COVER	P/W	POST & WIRE FENCE
DC	CABLE TV LID	IL	I NVERT LEVEL	RD	EDGE OF ROAD/NO KERB
DP	DOWN PIPE	KB	KERB BOTTOM	RE	RODDING EYE/POINT
DR	DRAIN	KO	KERB OFFLET	RL	RIDGE LEVEL
EL	EAVES LEVEL	KT	KERB TOP	RP	REFLECTIVE POST
EP	ELECTRIC POLE	LP	LAMP POST	RS	ROAD SIGN
ER	EARTH ROD	LC	LIGHT COLUMN	SLVL	STONE LEVEL
FB	FLOWER BED	MH	MANHOLE	SOFF	SOFFIT LEVEL
FH	FIRE HYDRANT	MP	MARKER POST	SV	VALVE
				SW	SURFACE WATER
				Tac	TACTILE PAVING
				TH	TRIAL HOLE
				TL	TRAFFIC LIGHTS
				TLVL	TARMAC LEVEL
				TOW	TOP OF WALL LVL
				TP	TELEGRAPH POLE
				TRK	TRACK
				UTL	UNABLE TO LIFT
				VP	VENT PIPE
				WL	WATER LEVEL
				WLVL	WATER LEVEL
				WM	WATER METER
				WO	WASH OUT POINT

FENCE, HEDGE, ELECTRIC, BANK EDGE, STORM LINE, FOUL LINE, TELECOM LINE, GAS LINE, LARSON PILES, CHANNELS, WATER MAIN

TREE, BOREHOLE, STATION, TBM, MANHOLE, GULLY, BATTER, WATER LVL, GATE

NOTES :

1. THE POSITION OF THIS SURVEY IS BASED ON GPS OSTN15 GRID
2. ALL LEVELS RELATE TO HGTS TAKEN USING TRIMBLE VRS NOW
3. TREES SPREADS ARE DRAWN TO SCALE AND SHOW THE GENERAL/AVERAGE CANOPY SPREAD.
4. ALL BELOW GROUND LEVEL INFORMATION INCLUDING VOIDS, DRAINAGE & SERVICES HAVE BEEN IDENTIFIED FROM THE SURFACE LEVEL ONLY. THEREFORE PIPE SIZES ETC ARE ESTIMATIONS ONLY. ALL CRITICAL DIMENSIONS SHOULD BE CHECKED PRIOR TO THE COMMENCEMENT OF ANY SITE WORKS
5. EVERY EFFORT HAS BEEN MADE TO LOCATE AND SURVEY ALL VISIBLE FEATURES. IT SHOULD BE NOTED THAT SOME ITEMS MAY HAVE BEEN OBSCURED AT THE TIME OF THE SURVEY AND THEREFORE NOT SHOWN ON THIS DRAWING.
6. PHYSICAL BOUNDARY FEATURES SHOWN ON THIS DRAWING DO NOT NECESSARILY REPRESENT THE ACTUAL LEGAL BOUNDARIES. THIS INFORMATION SHOULD BE CONFIRMED WITH THE RELEVANT DOCUMENTATION.
7. THE CONTRACTOR MUST CHECK AND VERIFY ALL SITE LEVELS, DIMENSIONS, UTILITIES AND DRAINAGE DETAILS PRIOR TO THE COMMENCEMENT OF ANY SITE WORKS. ANY DISCREPANCIES MUST BE NOTIFIED TO CASTLE HILL SURVEYS LTD.
8. ALL SURVEY STATION CONTROL POINTS MUST BE CHECKED BY THE CONTRACTOR PRIOR TO STARTING ANY SITE WORKS.

T = SURVEYED AROUND TREE TRUNK

= TREE TRUNK POSITION ONLY

Point	Easting	Northing	Elevation
ss1	450692.627	355234.458	156.568
ss2	450626.899	355232.270	155.017
9000	450727.019	355304.199	158.384
9001	450728.144	355268.360	157.780
9002	450729.390	355228.958	157.383

REV	AMENDMENTS	DRN	DATE

SURVEY DATE: 05 / 03 / 2025 INITIALS: SRW

Client: LINDUM GROUP

Project Title: LAND TO THE NORTH OF FAIRHAVEN, KIRKBY IN ASHFIELD, NOTTS

Drawing Title: TOPOGRAPHICAL SURVEY

Scale @ A1: 1 : 200

Date: 05 / 03 / 2025

Drawing No: CHS 25-50-01

Rev:

C.A.D.Title: ,lindum fairhaven kirkby in ashfield\topo (chs 25-50-01).mjo

Drawn By: SRW

Checked By: WW

CASTLE HILL SURVEYS LTD

Land Surveying & Site Setting Out Services
Commerce House, Carlton Boulevard,
Lincoln LN2 4WJ Tel : 07710649549
E-mail : castlehillsurveys@outlook.com
Website : www.castlehillsurveys.co.uk

Figures

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Figure I – Site Location Map

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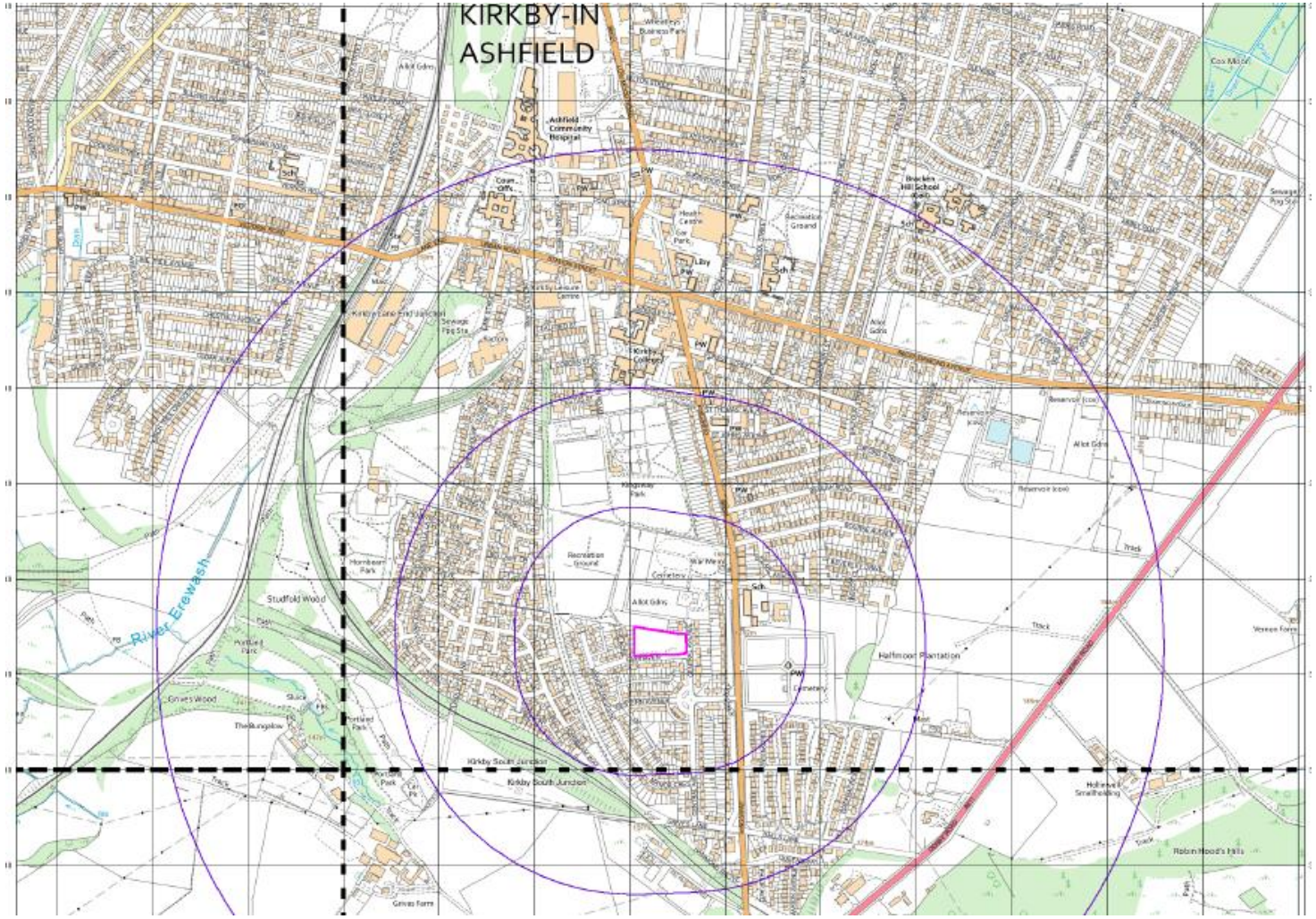

Figure No. and Title	Figure I – Site Location Plan
Project Name	Fairhaven, Kirkby-in-Ashfield, NG17 7FW
Client	Lindum BMS
Service	Geo-Environmental Investigation
Date of Issue	May 2025
Project number	EGE-24-07-07-01

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Figure II – Relevant Features Plan

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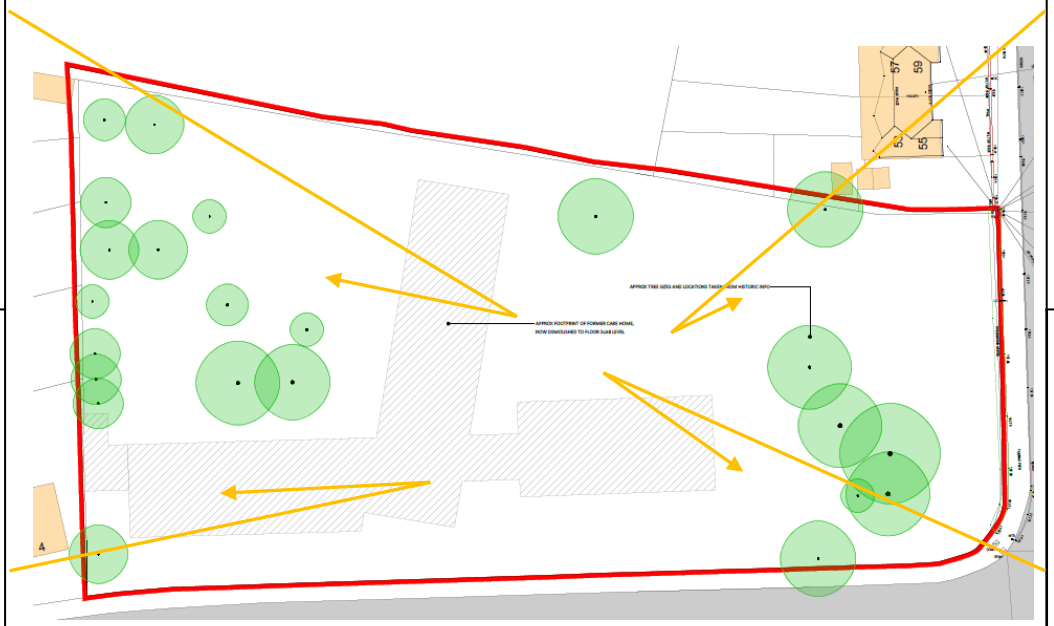

Figure No. and Title	Figure II - Relevant Feature Plan
Project Name	Fairhaven, Kirkby-in-Ashfield, NG17 7FW
Client	Lindum BMS
Service	Geo-Environmental Investigation
Date of Issue	May 2025
Project number	EGE-24-07-07-01

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Figure III - Approximate Intrusive location Plan

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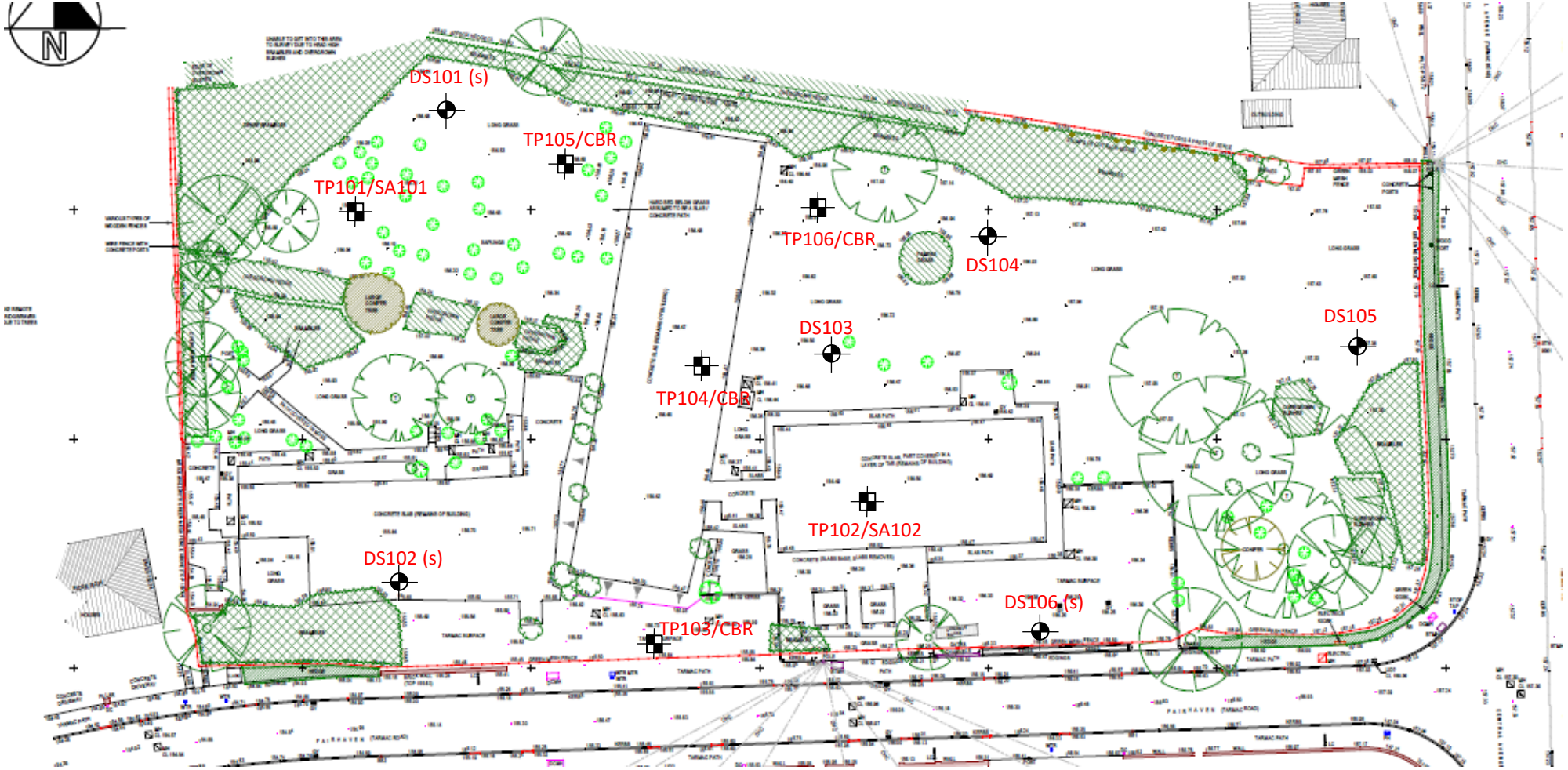

Figure No. and Title	Figure III – Approximate Intrusive Location Plan
Project Name	Fairhaven, Kirkby in Ashfield
Client	Lindum BMS
Service	Geo-Environmental Investigation
Date of Issue	May 2025
Project number	EGE-24-07-07-01

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Appendices

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Appendix I – Standard Limitations

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Limitations

The conclusions and recommendations made in this Report are limited to those that can be made based on the findings of the investigation and in the context of the proposed development.

Where comments are made based on information obtained from third parties, EGE assumes that all third party information is true and correct. No independent action has been undertaken to validate the findings of third parties, unless specifically stated.

This Report has been prepared in accordance with our understanding of current best practice. However changes to best practice, guidance or legislation may necessitate revision of this Report after the date of issue.

EGE has prepared this Report for the sole use and reliance of the Client, in accordance with our Standard Conditions and Limitations issued with the proposal. This Report may not be used or relied upon by any unauthorised third party without the explicit written agreement of EGE. Third parties use the information at their own risk.

Appendix II – Exploratory Hole Logs

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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
SPT(C) - SPT using cone

GROUNDWATER

Groundwater strike
Groundwater rest level

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

Window Sampler

DS101

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	450633.16	355288.71	156.47	1:50

Project Name	Project No.	Start Date	End Date
Fairhaven, Kirkby-in-Ashfield	EGE-24-07-07-01	2025-03-19	2025-03-19

Client
Lindum Group

Consultant
Evolve Geo-Environmental Limited

Contractor
Dynamic Sampling UK and Lindum Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.20	ES ES1			(0.40)		Dark brown gravelly fine to medium sand. Gravel is fine to coarse sub-angular to sub-rounded quartzite and flint. Frequent rootlets. (TOPSOIL)
					156.07	0.40		
		1.20	SPT(C)	N=11 (2,2/2,3,3,3)		(1.80)		Medium dense orangish brown slightly silty gravelly fine to coarse SAND. Gravel is fine to coarse rounded to sub-angular quartzite. (LENTON SANDSTONE FORMATION)
		2.00 2.00	SPT(C) D D1	N=13 (2,3/4,3,3,3)	154.27	2.20		Stiff becoming hard reddish brown mottled light brown CLAY. (POSSIBLE LENTON SANDSTONE FORMATION)
		2.50	D D2			(0.80)		
		3.00	SPT(C)	N=50 for 240mm (7,11/11,14,20,5 for 15mm)	153.47	3.00		*End of Borehole at 3.00m*

Remarks
1. Location cleared for underground utilities by Safe Dig Surveys Limited;
2. Logged in general accordance with BS5930:2015+A1:2020;
3. No groundwater identified; and
4. borehole refused on suspected sandstone.

Method, Plant, Stability, Dimensions		Logger
0.00 - 3.00m	WS Premier 110 Series	Joshua Redmond

Checked By: JJR **Approved By:** PB **Status:** FINAL

Window Sampler

DS102

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	450629.28	355247.88	155.56	1:50

Project Name	Project No.	Start Date	End Date
Fairhaven, Kirkby-in-Ashfield	EGE-24-07-07-01	2025-03-19	2025-03-19

Client
Lindum Group

Consultant
Evolve Geo-Environmental Limited

Contractor
Dynamic Sampling UK and Lindum Plant

Inst/ Backfill	Water Levels	Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Legend	Description
					155.36	(0.20) 0.20		MADE GROUND: Reinforced concrete.
		0.30 0.35	ES ES1 ES WAC		155.16	(0.20) 0.40		MADE GROUND: Brown very clayey slightly silty fine to coarse sand. Rare concrete and brick gravel.
		1.00	ES ES2			(1.10)		Loose brown slightly gravelly fine to coarse SAND. Gravel is fine to coarse rounded to sub-rounded quartzite. (LENTON SANDSTONE FORAMTION)
		1.20 1.20-2.00	SPT(C) B B1	N=5 (1,1/1,1,1,2)				
					154.06	1.50		Dense to very dense orangish brown silty fine to coarse SAND. (LENTON SANDSTONE FORMATION)
						(0.50)		
		2.00	SPT(C)	N=50 for 235mm (5,6/9,17,10,4 for 10mm)	153.56	2.00		*End of Borehole at 2.00m*

Remarks
1. Location cleared for underground utilities by Safe Dig Surveys Limited;
2. Logged in general accordance with BS5930:2015+A1:2020;
3. No groundwater identified; and
4. borehole refused on suspected sandstone.

Method, Plant, Stability, Dimensions **Logger**
0.00 - 2.00m WS Premier 110 Series Joshua Redmond

Checked By: JJR **Approved By:** PB **Status:** FINAL

Window Sampler

DS103

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	450666.56	355268.36	156.43	1:50

Project Name	Project No.	Start Date	End Date
Fairhaven, Kirkby-in-Ashfield	EGE-24-07-07-01	2025-03-19	2025-03-19

Client
Lindum Group

Consultant
Evolve Geo-Environmental Limited

Contractor
Dynamic Sampling UK and Lindum Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.10	ES ES1			(0.30)		Dark brown gravelly fine to medium sand. Gravel is fine to coarse sub-angular to sub-rounded quartzite and flint. Frequent rootlets. (TOPSOIL)
		0.40 0.50-1.00	ES ES2 B B1		156.13	0.30		Medium dense becoming dense orangish brownsilty gravelly fine to coarse SAND. Gravel is fine to coarse rounded to sub-angular quartzite. (LENTON SANDSTONE FORMATION)
		1.20	SPT(C)	N=11 (2,2/2,3,3,3)		(1.60)		
		2.00	SPT(C)	N=50 for 205mm (10,14/16,22,12 for 55mm)	154.53 154.43	1.90 (0.10) 2.00		Stiff reddish brown mottled light brown sandy CLAY. Sand is fine to coarse. (POSSIBLE LENTON SANDSTONE FORMATION) *End of Borehole at 2.00m*

Remarks
1. Location cleared for underground utilities by Safe Dig Surveys Limited;
2. Logged in general accordance with BS5930:2015+A1:2020;
3. No groundwater identified; and
4. borehole refused on suspected sandstone.

Method, Plant, Stability, Dimensions **Logger**
0.00 - 2.00m WS Premier 110 Series Joshua Redmond

Checked By: JJR **Approved By:** PB **Status:** FINAL

Window Sampler

DS104

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	450679.90	355278.29	156.89	1:50

Project Name	Project No.	Start Date	End Date
Fairhaven, Kirkby-in-Ashfield	EGE-24-07-07-01	2025-03-19	2025-03-19

Client
Lindum Group

Consultant
Evolve Geo-Environmental Limited

Contractor
Dynamic Sampling UK and Lindum Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.20	ES ES1		156.54	(0.35) 0.35		Dark brown gravelly fine to medium sand. Gravel is fine to coarse sub-angular to sub-rounded quartzite and flint. Frequent rootlets. (TOPSOIL)
		0.50	D D1			(0.75)		Soft reddish brown very sandy slightly gravelly CLAY. Gravel is fine to medium rounded to sub-rounded quartzite. Sand is fine to coarse. (LENTON SANDSTONE FORMATION)
		1.00 1.10-2.00 1.20	ES ES2 B B1 SPT(C)	N=14 (2,2/3,3,3,5)	155.79	1.10		Medium dense becoming very dense reddish brown mottled brown slightly silty fine to medium SAND. (LENTON SANDSTONE FORMATION)
		2.00	SPT(C)	N=50 for 210mm (9,12/14,19,17 for 60mm)	154.89	(0.90) 2.00		*End of Borehole at 2.00m*

Remarks
1. Location cleared for underground utilities by Safe Dig Surveys Limited;
2. Logged in general accordance with BS5930:2015+A1:2020;
3. No groundwater identified; and
4. borehole refused on suspected sandstone.

Method, Plant, Stability, Dimensions **Logger**
0.00 - 2.00m WS Premier 110 Series Joshua Redmond

Checked By: JJR **Approved By:** PB **Status:** FINAL

Window Sampler

DS105

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	450711.45	355269.40	157.30	1:50

Project Name	Project No.	Start Date	End Date
Fairhaven, Kirkby-in-Ashfield	EGE-24-07-07-01	2025-03-19	2025-03-19

Client
Lindum Group

Consultant
Evolve Geo-Environmental Limited

Contractor
Dynamic Sampling UK and Lindum Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
						(0.40)		Dark brown gravelly fine to medium sand. Gravel is fine to coarse sub-angular to sub-rounded quartzite and flint. Frequent rootlets. (TOPSOIL)
		0.35	ES ES1		156.90	0.40		
		0.80	ES ES2			(0.80)		Firm reddish brown very sandy slightly gravelly CLAY. Gravel is fine to medium rounded to sub-rounded quartzite. Sand is fine to coarse. (LENTON SANDSTONE FORMATION)
		1.00	D D1					
		1.20 1.20-2.00	SPT(C) B B1	N=20 (3,3/4,5,5,6)	156.10	1.20		
						(0.80)		Medium dense becoming very dense reddish brown to brown slightly silty fine to medium SAND. (LENTON SANDSTONE FORMATION)
		2.00	SPT(C)	N=50 for 155mm (13,12/20,27,3 for 5mm)	155.30	2.00		
								End of Borehole at 2.00m

Remarks
1. Location cleared for underground utilities by Safe Dig Surveys Limited;
2. Logged in general accordance with BS5930:2015+A1:2020;
3. No groundwater identified; and
4. borehole refused on suspected sandstone.

Method, Plant, Stability, Dimensions **Logger**
0.00 - 2.00m WS Premier 110 Series Joshua Redmond

Checked By: JJR **Approved By:** PB **Status:** FINAL

Window Sampler

DS106

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	450684.09	355244.52	156.29	1:50

Project Name	Project No.	Start Date	End Date
Fairhaven, Kirkby-in-Ashfield	EGE-24-07-07-01	2025-03-19	2025-03-19

Client
Lindum Group

Consultant
Evolve Geo-Environmental Limited

Contractor
Dynamic Sampling UK and Lindum Plant

Inst/ Backfill	Water Levels	Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Legend	Description
		0.05	ES CT1		156.21	(0.08) 0.08		MADE GROUND: Macadam
		0.20	ES ES1			(0.42)		MADE GROUND: Beige very sandy fine to coarse subrounded to sub-angular limestone gravel. (POSSIBLE SUB-BASE)
		0.40	ES WAC		155.79	0.50		
		0.80	D D1			(0.70)		Soft reddish brown very sandy slightly gravelly CLAY. Gravel is fine to medium rounded to sub-rounded quartzite. Sand is fine to coarse. (LENTON SANDSTONE FORMATION)
		1.20 1.20-2.00	SPT(C) B B1	N=22 (2,3/4,5,5,8)	155.09	1.20		Medium dense becoming very dense reddish brown to brown slightly gravelly fine to medium SAND. Gravel is fine to medium rounded to sub-rounded quartzite. (LENTON SANDSTONE FORMATION)
		2.00	SPT(C)	N=50 for 95mm (15,10/37,13 for 20mm)	154.29	(0.80) 2.00		*End of Borehole at 2.00m*

Remarks
1. Location cleared for underground utilities by Safe Dig Surveys Limited;
2. Logged in general accordance with BS5930:2015+A1:2020;
3. No groundwater identified; and
4. borehole refused on suspected sandstone.

Method, Plant, Stability, Dimensions **Logger**
0.00 - 2.00m WS Premier 110 Series Joshua Redmond

Checked By: JJR **Approved By:** PB **Status:** FINAL

Trial Pit

TP101/SA101

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	450625.66	355279.86	156.13	1:25

Project Name	Project No.	Start Date	End Date
Fairhaven, Kirkby-in-Ashfield	EGE-24-07-07-01	2025-03-19	2025-03-19

Client
Lindum Group

Consultant
Evolve Geo-Environmental Limited

Contractor
Dynamic Sampling UK and Lindum Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.50)		Dark brown gravelly fine to medium sand. Gravel is fine to coarse sub-angular to sub-rounded quartzite and flint. Frequent rootlets. (TOPSOIL)
					155.63	0.50		Reddish brown very clayey fine to medium SAND. Rare rounded to sub-rounded fine to coarse quartzite gravel. (LENTON SANDSTONE FORMATION)
						(0.94)		
					154.69	1.44		*End of Trial Pit at 1.44m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Remarks
1. Location cleared for underground utilities by Safe Dig Surveys Limited;
2. Logged in general accordance with BS5930:2015+A1:2020;
3. No groundwater identified;
4. BRE365 infiltration test undertaken between 1.10 m bgl and 1.44 m bgl; and
5. Trial backfilled with arisings and nominally compacted.

Method, Plant, Stability, Dimensions
0.00 - 1.44m TP JCB 3CX
Stable throughout
L = 2.00m
W = 0.60m

Logger
Paul Huteson

Checked By: JJR **Approved By:** PB **Status:** FINAL

Trial Pit

TP102/SA102

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	450669.85	355255.84	156.43	1:25

Project Name	Project No.	Start Date	End Date
Fairhaven, Kirkby-in-Ashfield	EGE-24-07-07-01	2025-03-19	2025-03-19

Client
Lindum Group

Consultant
Evolve Geo-Environmental Limited

Contractor
Dynamic Sampling UK and Lindum Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.30)		MADE GROUND: Well reinforced concrete.
					156.13	0.30		
						(0.35)		MADE GROUND: Beige very sandy fine to coarse subrounded to sub-angular limestone gravel. (POSSIBLE SUB-BASE)
					155.78	0.65		
		0.70	ES ES1					Reddish brown slightly gravelly fine to coarse SAND. Gravel is fine to coarse rounded to sub-angular quartzite. (LENTON SANDSTONE FORMATION)
		0.90	ES WAC					
						(0.95)		
					154.83	1.60		*End of Trial Pit at 1.60m*

0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0

Remarks
1. Location cleared for underground utilities by Safe Dig Surveys Limited;
2. Logged in general accordance with BS5930:2015+A1:2020;
3. No groundwater identified;
4. BRE365 infiltration test undertaken between 0.80 m bgl and 1.45 m bgl; and
5. Trial backfilled with arisings and nominally compacted.

Method, Plant, Stability, Dimensions
0.00 - 1.45m TP JCB 3CX
Stable throughout
L = 1.60m
W = 0.60m

Logger
Paul Huteson

Checked By: JJR **Approved By:** PB **Status:** FINAL

Trial Pit

TP103

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	450651.45	355242.73	155.67	1:25

Project Name	Project No.	Start Date	End Date
Fairhaven, Kirkby-in-Ashfield	EGE-24-07-07-01	2025-03-19	2025-03-19

Client
Lindum Group

Consultant
Evolve Geo-Environmental Limited

Contractor
Dynamic Sampling UK and Lindum Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
					155.57	(0.10) 0.10		MADE GROUND: Macadam
		0.20	ES ES1		155.42	(0.15) 0.25		MADE GROUND: Beige very sandy fine to coarse subrounded to sub-angular limestone gravel. (POSSIBLE SUB-BASE)
					155.07	(0.35) 0.60		Orangish brown very clayey gravelly fine to coarse SAND. Gravel is fine to coarse rounded to sub-angular quartzite (LENTON SANDSTONE FORMATION)
					154.57	(0.50) 1.10		Orangish brown silty fine to coarse SAND. (LENTON SANDSTONE FORMATION)
					153.57	(1.00) 2.10		Reddish brown fine to medium SAND. (LENTON SANDSTONE FORMATION)
		2.50	ES ES2		153.17	(0.40) 2.50		Extremely weak SANDSTONE recovered as reddish brown fine to coarse angular to sub-angular gravel (LENTON SANDSTONE FORMATION)
								End of Trial Pit at 2.50m

Remarks
1. Location cleared for underground utilities by Safe Dig Surveys Limited;
2. Logged in general accordance with BS5930:2015+A1:2020;
3. No groundwater identified;
4. LWD test undertaken at 0.40 m bgl;
5. Trial pit refusewd on sandstone; and
6. Trial backfilled with arisings and nominally compacted ...

Method, Plant, Stability, Dimensions
0.00 - 2.50m TP JCB 3CX
Stable throughout
L = 2.00m
W = 0.70m

Logger
Joshua Redmond

Checked By: JJR **Approved By:** PB **Status:** FINAL

Trial Pit

TP104

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	450654.85	355267.18	156.38	1:25

Project Name	Project No.	Start Date	End Date
Fairhaven, Kirkby-in-Ashfield	EGE-24-07-07-01	2025-03-19	2025-03-19

Client
Lindum Group

Consultant
Evolve Geo-Environmental Limited

Contractor
Dynamic Sampling UK and Lindum Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.20)		MADE GROUND: Reinforced concrete.
					156.18	0.20		
						(0.40)		Brown clayey gravelly fine to coarse SAND. Gravel is fine to coarse rounded to sub-rounded quartzite. (LENTON SANDSTONE FORMATION)
					155.78	0.60		
						(0.40)		Orangish brown clayey gravelly fine to coarse SAND. Gravel is fine to coarse rounded to sub-rounded quartzite. (LENTON SANDSTONE FORMATION)
					155.38	1.00		
						(1.20)		Orangish brown silty fine to coarse SAND. (LENTON SANDSTONE FORMATION)
					154.18	2.20		
						(0.80)		Extremely weak SANDSTONE recovered as reddish brown fine to coarse angular to sub-angular gravel (LENTON SANDSTONE FORMATION)
					153.38	3.00		*End of Trial Pit at 3.00m*

Remarks
1. Location cleared for underground utilities by Safe Dig Surveys Limited;
2. Logged in general accordance with BS5930:2015+A1:2020;
3. No groundwater identified;
4. LWD test undertaken at 0.40 m bgl;
5. Trial pit refusewd on sandstone; and
6. Trial backfilled with arisings and nominally compacted ...

Method, Plant, Stability, Dimensions
0.00 - 3.00m TP JCB 3CX
Stable throughout
L = 2.00m
W = 0.70m

Logger
Joshua Redmond

Checked By: JJR **Approved By:** PB **Status:** FINAL

Trial Pit

TP105

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	450643.98	355284.12	156.55	1:25

Project Name	Project No.	Start Date	End Date
Fairhaven, Kirkby-in-Ashfield	EGE-24-07-07-01	2025-03-19	2025-03-19

Client
Lindum Group

Consultant
Evolve Geo-Environmental Limited

Contractor
Dynamic Sampling UK and Lindum Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.35)		Dark brown gravelly fine to medium sand. Gravel is fine to coarse sub-angular to sub-rounded quartzite and flint. Frequent rootlets. (TOPSOIL)
					156.20	0.35		Reddish brown very clayey slightly gravelly fine to medium SAND. Rare rounded to sub-rounded fine to coarse quartzite gravel. (LENTON SANDSTONE FORMATION)
						(1.75)		
		2.30	D D1		154.45	2.10		Stiff reddish brown mottled light brown CLAY. (POSSIBLE LENTON SANDSTONE FORMATION)
						(0.50)		
					153.95	2.60		Extremely weak SANDSTONE recovered as reddish brown fine to coarse angular to sub-angular gravel (LENTON SANDSTONE FORMATION)
						(0.40)		
					153.55	3.00		*End of Trial Pit at 3.00m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Remarks
1. Location cleared for underground utilities by Safe Dig Surveys Limited;
2. Logged in general accordance with BS5930:2015+A1:2020;
3. No groundwater identified;
4. LWD test undertaken at 0.40 m bgl;
5. Trial pit refusewd on sandstone; and
6. Trial backfilled with arisings and nominally compacted ...

Checked By: JJR **Approved By:** PB **Status:** FINAL

Method, Plant, Stability, Dimensions **Logger**
0.00 - 3.00m TP JCB 3CX Joshua Redmond
Stable throughout
L = 2.20m
W = 0.70m

Trial Pit

TP106

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	450665.05	355280.89	156.68	1:25

Project Name	Project No.	Start Date	End Date
Fairhaven, Kirkby-in-Ashfield	EGE-24-07-07-01	2025-03-19	2025-03-19

Client
Lindum Group

Consultant
Evolve Geo-Environmental Limited

Contractor
Dynamic Sampling UK and Lindum Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.30)		Dark brown gravelly fine to medium sand. Gravel is fine to coarse sub-angular to sub-rounded quartzite and flint. Frequent rootlets. (TOPSOIL)
					156.38	0.30		
						(0.40)		Reddish brown very clayey fine to medium SAND. Rare rounded to sub-rounded fine to coarse quartzite gravel. (LENTON SANDSTONE FORMATION)
					155.98	0.70		
						(0.80)		Orangish brown fine to medium SAND. Rare rounded to sub-rounded fine to coarse quartzite gravel. (LENTON SANDSTONE FORMATION)
					155.18	1.50		
						(0.50)		orangish brown silty fine to medium SAND. Rare rounded to sub-rounded fine to coarse quartzite gravel. (LENTON SANDSTONE FORMATION)
					154.68	2.00		
						(1.00)		Extremely weak SANDSTONE recovered as reddish brown fine to coarse angular to sub-angular gravel (LENTON SANDSTONE FORMATION)
					153.68	3.00		*End of Trial Pit at 3.00m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Remarks
1. Location cleared for underground utilities by Safe Dig Surveys Limited;
2. Logged in general accordance with BS5930:2015+A1:2020;
3. No groundwater identified;
4. LWD test undertaken at 0.40 m bgl;
5. Trial pit refusewd on sandstone; and
6. Trial backfilled with arisings and nominally compacted ...

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

0.00 - 3.00m TP JCB 3CX Joshua Redmond
Stable throughout
L = 2.40m
W = 0.70m

Checked By: JJR **Approved By:** PB **Status:** FINAL

Appendix III – Chemical Analytical Results

evolve
GEO-ENVIRONMENTAL

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i2 Analytical Ltd.
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Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
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e: reception@i2analytical.com

Analytical Report Number : 25-014292

Project / Site name:	Fairhaven	**Samples received on:**	20/03/2025
Your job number:		**Samples instructed on/ Analysis started on:**	20/03/2025
Your order number:		**Analysis completed by:**	28/03/2025
Report Issue Number:	1	**Report issued on:**	28/03/2025
Samples Analysed:	15 soil samples		

Signed:

Rafał Szczepańczyk
Technical Reviewer
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting
air	- once the analysis is complete

Excel copies of reports are only valid when accompanied by this PDF certificate.

Retention period for records and reports is minimum 6 years from the date of issue of the final report.
Some records may be kept for longer according to other legal/best practice requirements.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 25-014292
Project / Site name: Fairhaven

Lab Sample Number				488931	488932	488933	488934	488935
Sample Reference				DS101	DS101	DS102	DS102	DS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A	N/A
Depth (m)				0.20	2.00	0.30	1.00	0.10
Date Sampled				19/03/2025	19/03/2025	19/03/2025	19/03/2025	19/03/2025
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	20.2	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	15	13	8.8	13
Total mass of sample received	kg	0.1	NONE	0.9	0.6	0.7	0.8	0.8
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	-	Not-detected	-	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	MJN	-	MJN	-	MJN
Analysis completed	N/A	N/A	N/A	28/03/2025	-	28/03/2025	-	28/03/2025
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	7	8.2	7.1	7.5	7.3
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	37	-	33	-
Water Soluble SO_4 16hr extraction (2:1)	mg/l	1.25	MCERTS	-	18.6	-	16.6	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.7	-	1.1	-	1.7
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	-	-	-
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.12	-	0.07	-	0.14
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.34	-	0.14	-	0.34
Pyrene	mg/kg	0.05	MCERTS	0.3	-	0.1	-	0.29
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.16	-	0.07	-	0.14
Chrysene	mg/kg	0.05	MCERTS	0.22	-	0.08	-	0.19
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.26	-	0.11	-	0.24
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.11	-	< 0.05	-	0.11
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.21	-	< 0.05	-	0.2
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.11	-	< 0.05	-	0.1
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.12	-	< 0.05	-	0.13
Coronene	mg/kg	0.05	NONE	-	-	-	-	-
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	1.95	-	< 0.80	-	1.89
Total WAC-17 PAHs	mg/kg	0.85	NONE	-	-	-	-	-

Analytical Report Number: 25-014292
Project / Site name: Fairhaven

Lab Sample Number				488931	488932	488933	488934	488935
Sample Reference				DS101	DS101	DS102	DS102	DS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A	N/A
Depth (m)				0.20	2.00	0.30	1.00	0.10
Date Sampled				19/03/2025	19/03/2025	19/03/2025	19/03/2025	19/03/2025
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	-	9.8	-	9.1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	0.2	-	0.3
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	-	< 1.8	-	< 1.8
Chromium (III)	mg/kg	1	NONE	16	-	18	-	16
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	-	19	-	17
Copper (aqua regia extractable)	mg/kg	1	MCERTS	50	-	54	-	25
Lead (aqua regia extractable)	mg/kg	1	MCERTS	50	-	38	-	39
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	12	-	11	-	11
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	69	-	58	-	52
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >EC5 - EC6 $_{HS\_1D\_AL}$	mg/kg	0.01	MCERTS	< 0.010	-	< 0.010	-	< 0.010
TPHCWG - Aliphatic >EC6 - EC8 $_{HS\_1D\_AL}$	mg/kg	0.01	MCERTS	< 0.010	-	< 0.010	-	< 0.010
TPHCWG - Aliphatic >EC8 - EC10 $_{HS\_1D\_AL}$	mg/kg	0.01	MCERTS	< 0.010	-	< 0.010	-	< 0.010
TPHCWG - Aliphatic >EC10 - EC12 $_{EH\_CU\_1D\_AL}$	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
TPHCWG - Aliphatic >EC12 - EC16 $_{EH\_CU\_1D\_AL}$	mg/kg	2	MCERTS	< 2.0	-	< 2.0	-	< 2.0
TPHCWG - Aliphatic >EC16 - EC21 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	< 8.0	-	< 8.0	-	< 8.0
TPHCWG - Aliphatic >EC21 - EC35 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	< 8.0	-	< 8.0	-	< 8.0
TPHCWG - Aliphatic >EC5 - EC35 $_{EH\_CU+HS\_1D\_AL}$	mg/kg	10	NONE	< 10	-	< 10	-	< 10
TPHCWG - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	mg/kg	0.01	MCERTS	< 0.010	-	< 0.010	-	< 0.010
TPHCWG - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	mg/kg	0.01	MCERTS	< 0.010	-	< 0.010	-	< 0.010
TPHCWG - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	mg/kg	0.02	MCERTS	< 0.020	-	< 0.020	-	< 0.020
TPHCWG - Aromatic >EC10 - EC12 $_{EH\_CU\_1D\_AR}$	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
TPHCWG - Aromatic >EC12 - EC16 $_{EH\_CU\_1D\_AR}$	mg/kg	2	MCERTS	< 2.0	-	< 2.0	-	< 2.0
TPHCWG - Aromatic >EC16 - EC21 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	< 10	-	< 10	-	< 10
TPHCWG - Aromatic >EC21 - EC35 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	12	-	< 10	-	11
TPHCWG - Aromatic >EC5 - EC35 $_{EH\_CU+HS\_1D\_AR}$	mg/kg	10	NONE	12	-	< 10	-	11
VOCs								
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	MCERTS	< 5.0	-	< 5.0	-	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	-	< 5.0	-	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	-	< 5.0	-	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	-	< 5.0	-	< 5.0
p & m-Xylene	µg/kg	8	MCERTS	< 8.0	-	< 8.0	-	< 8.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	-	< 5.0	-	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 25-014292
Project / Site name: Fairhaven

Lab Sample Number				488936	488937	488938	488939	488940
Sample Reference				DS103	DS104	DS104	DS105	DS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A	N/A
Depth (m)				0.40	0.20	1.00	0.35	0.80
Date Sampled				19/03/2025	19/03/2025	19/03/2025	19/03/2025	19/03/2025
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	22.5	< 0.1	10.7	< 0.1
Moisture Content	%	0.01	NONE	11	15	17	21	15
Total mass of sample received	kg	0.1	NONE	0.7	0.8	0.7	0.8	0.9
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	-	Not-detected	-
Asbestos Analyst ID	N/A	N/A	N/A	MJN	MJN	-	MJN	-
Analysis completed	N/A	N/A	N/A	28/03/2025	28/03/2025	-	28/03/2025	-
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	8.2	6.5	7.4	6.4	6.7
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	-	54	-	50
Water Soluble SO_4 16hr extraction (2:1)	mg/l	1.25	MCERTS	-	-	27.2	-	25
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.3	1.7	-	1.9	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	-	-	-
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	-
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.13	-	0.17	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.31	-	0.37	-
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.27	-	0.34	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.16	-	0.18	-
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.19	-	0.22	-
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.23	-	0.3	-
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.11	-	0.1	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.19	-	0.21	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.09	-	0.12	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.1	-	0.14	-
Coronene	mg/kg	0.05	NONE	-	-	-	-	-
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	1.77	-	2.21	-
Total WAC-17 PAHs	mg/kg	0.85	NONE	-	-	-	-	-

Analytical Report Number: 25-014292
Project / Site name: Fairhaven

Lab Sample Number				488936	488937	488938	488939	488940
Sample Reference				DS103	DS104	DS104	DS105	DS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A	N/A
Depth (m)				0.40	0.20	1.00	0.35	0.80
Date Sampled				19/03/2025	19/03/2025	19/03/2025	19/03/2025	19/03/2025
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	4.6	9.1	-	7.9	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.3	-	< 0.2	-
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	-	< 1.8	-
Chromium (III)	mg/kg	1	NONE	14	18	-	17	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	20	-	18	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	6.2	19	-	17	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	9.4	45	-	41	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13	13	-	12	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	30	57	-	49	-
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >EC5 - EC6 $_{HS\_1D\_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	-	< 0.010	-
TPHCWG - Aliphatic >EC6 - EC8 $_{HS\_1D\_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	-	< 0.010	-
TPHCWG - Aliphatic >EC8 - EC10 $_{HS\_1D\_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	-	< 0.010	-
TPHCWG - Aliphatic >EC10 - EC12 $_{EH\_CU\_1D\_AL}$	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	-
TPHCWG - Aliphatic >EC12 - EC16 $_{EH\_CU\_1D\_AL}$	mg/kg	2	MCERTS	< 2.0	< 2.0	-	< 2.0	-
TPHCWG - Aliphatic >EC16 - EC21 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	< 8.0	< 8.0	-	< 8.0	-
TPHCWG - Aliphatic >EC21 - EC35 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	< 8.0	< 8.0	-	< 8.0	-
TPHCWG - Aliphatic >EC5 - EC35 $_{EH\_CU+HS\_1D\_AL}$	mg/kg	10	NONE	< 10	< 10	-	< 10	-
TPHCWG - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	-	< 0.010	-
TPHCWG - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	-	< 0.010	-
TPHCWG - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	mg/kg	0.02	MCERTS	< 0.020	< 0.020	-	< 0.020	-
TPHCWG - Aromatic >EC10 - EC12 $_{EH\_CU\_1D\_AR}$	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	-
TPHCWG - Aromatic >EC12 - EC16 $_{EH\_CU\_1D\_AR}$	mg/kg	2	MCERTS	< 2.0	< 2.0	-	< 2.0	-
TPHCWG - Aromatic >EC16 - EC21 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	< 10	< 10	-	< 10	-
TPHCWG - Aromatic >EC21 - EC35 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	< 10	< 10	-	< 10	-
TPHCWG - Aromatic >EC5 - EC35 $_{EH\_CU+HS\_1D\_AR}$	mg/kg	10	NONE	< 10	< 10	-	< 10	-
VOCs								
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	MCERTS	< 5.0	< 5.0	-	< 5.0	-
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	-	< 5.0	-
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	-	< 5.0	-
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	-	< 5.0	-
p & m-Xylene	µg/kg	8	MCERTS	< 8.0	< 8.0	-	< 8.0	-
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	-	< 5.0	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 25-014292
Project / Site name: Fairhaven

Lab Sample Number				488941	488942	488943	488944	488945
Sample Reference				DS106	DS106	TP102	TP103	TP103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A	N/A
Depth (m)				0.05	0.20	0.70	0.20	2.50
Date Sampled				19/03/2025	19/03/2025	19/03/2025	19/03/2025	19/03/2025
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	45.2	< 0.1	60.1	< 0.1
Moisture Content	%	0.01	NONE	0.07	7.3	8.4	6.3	12
Total mass of sample received	kg	0.1	NONE	0.6	0.7	0.7	0.8	0.6
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	-	Not-detected	Not-detected	Not-detected	-
Asbestos Analyst ID	N/A	N/A	N/A	-	MJN	MJN	MJN	-
Analysis completed	N/A	N/A	N/A	-	28/03/2025	28/03/2025	28/03/2025	-
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	-	8.8	8.2	9.1	8
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	-	-	-	47
Water Soluble SO_4 16hr extraction (2:1)	mg/l	1.25	MCERTS	-	-	-	-	23.3
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	-	0.3	< 0.1	0.5	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	-	-	-
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	0.21	< 0.05	< 0.05	< 0.05	-
Fluorene	mg/kg	0.05	MCERTS	0.29	< 0.05	< 0.05	< 0.05	-
Phenanthrene	mg/kg	0.05	MCERTS	2.8	< 0.05	< 0.05	0.08	-
Anthracene	mg/kg	0.05	MCERTS	0.98	< 0.05	< 0.05	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	2	< 0.05	< 0.05	0.1	-
Pyrene	mg/kg	0.05	MCERTS	1.9	< 0.05	< 0.05	0.1	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	-
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.24	< 0.05	< 0.05	< 0.05	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.5	< 0.05	< 0.05	< 0.05	-
Coronene	mg/kg	0.05	NONE	< 0.05	-	-	-	-
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	-	< 0.80	< 0.80	< 0.80	-
Total WAC-17 PAHs	mg/kg	0.85	NONE	9.01	-	-	-	-

Analytical Report Number: 25-014292
Project / Site name: Fairhaven

Lab Sample Number				488941	488942	488943	488944	488945
Sample Reference				DS106	DS106	TP102	TP103	TP103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A	N/A
Depth (m)				0.05	0.20	0.70	0.20	2.50
Date Sampled				19/03/2025	19/03/2025	19/03/2025	19/03/2025	19/03/2025
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	2.4	2.8	6.4	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	0.8	-
Chromium (hexavalent)	mg/kg	1.8	MCERTS	-	< 1.8	< 1.8	< 1.8	-
Chromium (III)	mg/kg	1	NONE	-	8.1	9.7	12	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	8.3	10	12	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	5.9	4.7	15	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	21	3.8	18	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	5.2	11	7.9	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	27	21	100	-
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >EC5 - EC6 $_{HS\_1D\_AL}$	mg/kg	0.01	MCERTS	-	< 0.010	< 0.010	< 0.010	-
TPHCWG - Aliphatic >EC6 - EC8 $_{HS\_1D\_AL}$	mg/kg	0.01	MCERTS	-	< 0.010	< 0.010	< 0.010	-
TPHCWG - Aliphatic >EC8 - EC10 $_{HS\_1D\_AL}$	mg/kg	0.01	MCERTS	-	< 0.010	< 0.010	< 0.010	-
TPHCWG - Aliphatic >EC10 - EC12 $_{EH\_CU\_1D\_AL}$	mg/kg	1	MCERTS	-	< 1.0	2.8	< 1.0	-
TPHCWG - Aliphatic >EC12 - EC16 $_{EH\_CU\_1D\_AL}$	mg/kg	2	MCERTS	-	< 2.0	7.5	< 2.0	-
TPHCWG - Aliphatic >EC16 - EC21 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	-	< 8.0	< 8.0	< 8.0	-
TPHCWG - Aliphatic >EC21 - EC35 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	-	23	14	22	-
TPHCWG - Aliphatic >EC5 - EC35 $_{EH\_CU+HS\_1D\_AL}$	mg/kg	10	NONE	-	23	24	22	-
TPHCWG - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	mg/kg	0.01	MCERTS	-	< 0.010	< 0.010	< 0.010	-
TPHCWG - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	mg/kg	0.01	MCERTS	-	< 0.010	< 0.010	< 0.010	-
TPHCWG - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	mg/kg	0.02	MCERTS	-	< 0.020	< 0.020	< 0.020	-
TPHCWG - Aromatic >EC10 - EC12 $_{EH\_CU\_1D\_AR}$	mg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	-
TPHCWG - Aromatic >EC12 - EC16 $_{EH\_CU\_1D\_AR}$	mg/kg	2	MCERTS	-	< 2.0	< 2.0	< 2.0	-
TPHCWG - Aromatic >EC16 - EC21 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	-	< 10	< 10	< 10	-
TPHCWG - Aromatic >EC21 - EC35 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	-	34	< 10	46	-
TPHCWG - Aromatic >EC5 - EC35 $_{EH\_CU+HS\_1D\_AR}$	mg/kg	10	NONE	-	34	< 10	46	-
VOCs								
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	MCERTS	-	< 5.0	< 5.0	< 5.0	-
Benzene	µg/kg	5	MCERTS	-	< 5.0	< 5.0	< 5.0	-
Toluene	µg/kg	5	MCERTS	-	< 5.0	< 5.0	< 5.0	-
Ethylbenzene	µg/kg	5	MCERTS	-	< 5.0	< 5.0	< 5.0	-
p & m-Xylene	µg/kg	8	MCERTS	-	< 8.0	< 8.0	< 8.0	-
o-Xylene	µg/kg	5	MCERTS	-	< 5.0	< 5.0	< 5.0	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 25-014292
Project / Site name: Fairhaven

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
488931	DS101	None Supplied	0.2	Brown loam and sand with gravel and vegetation
488932	DS101	None Supplied	2	Brown sand with gravel and vegetation
488933	DS102	None Supplied	0.3	Brown loam and sand with gravel and vegetation
488934	DS102	None Supplied	1	Brown sand with gravel
488935	DS103	None Supplied	0.1	Brown loam and sand with gravel and vegetation
488936	DS103	None Supplied	0.4	Brown sandy loam with gravel and vegetation
488937	DS104	None Supplied	0.2	Brown loam and sand with gravel and vegetation
488938	DS104	None Supplied	1	Brown clay and sand with gravel and vegetation
488939	DS105	None Supplied	0.35	Brown loam and sand with gravel and vegetation
488940	DS105	None Supplied	0.8	Brown clay and sand with gravel and vegetation
488941	DS106	None Supplied	0.05	Non Soil. *g
488942	DS106	None Supplied	0.2	Brown sand with gravel and stones
488943	TP102	None Supplied	0.7	Brown sand with gravel
488944	TP103	None Supplied	0.2	Brown loam and gravel with vegetation and stones
488945	TP103	None Supplied	2.5	Brown sandy clay

Analytical Report Number : 25-014292
Project / Site name: Fairhaven

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)
Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L076B/L088-PL	D/W	MCERTS
Chromium III in soil	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080-PL/L130B	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080-PL	W	MCERTS
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099-PL	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

*g - Unaccredited sample matrix.

Sample Deviation Report

Analytical Report Number : 25-014292
Project / Site name: Fairhaven

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
DS106	N/A	S	488941	b	Monohydric phenols in soil	L080-PL	b
DS106	N/A	S	488941	b	Speciated PAHs and/or Semi-volatile organic compounds in soil	L064B	b

Appendix IV – Geotechnical Laboratory Results

evolve
GEO-ENVIRONMENTAL

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

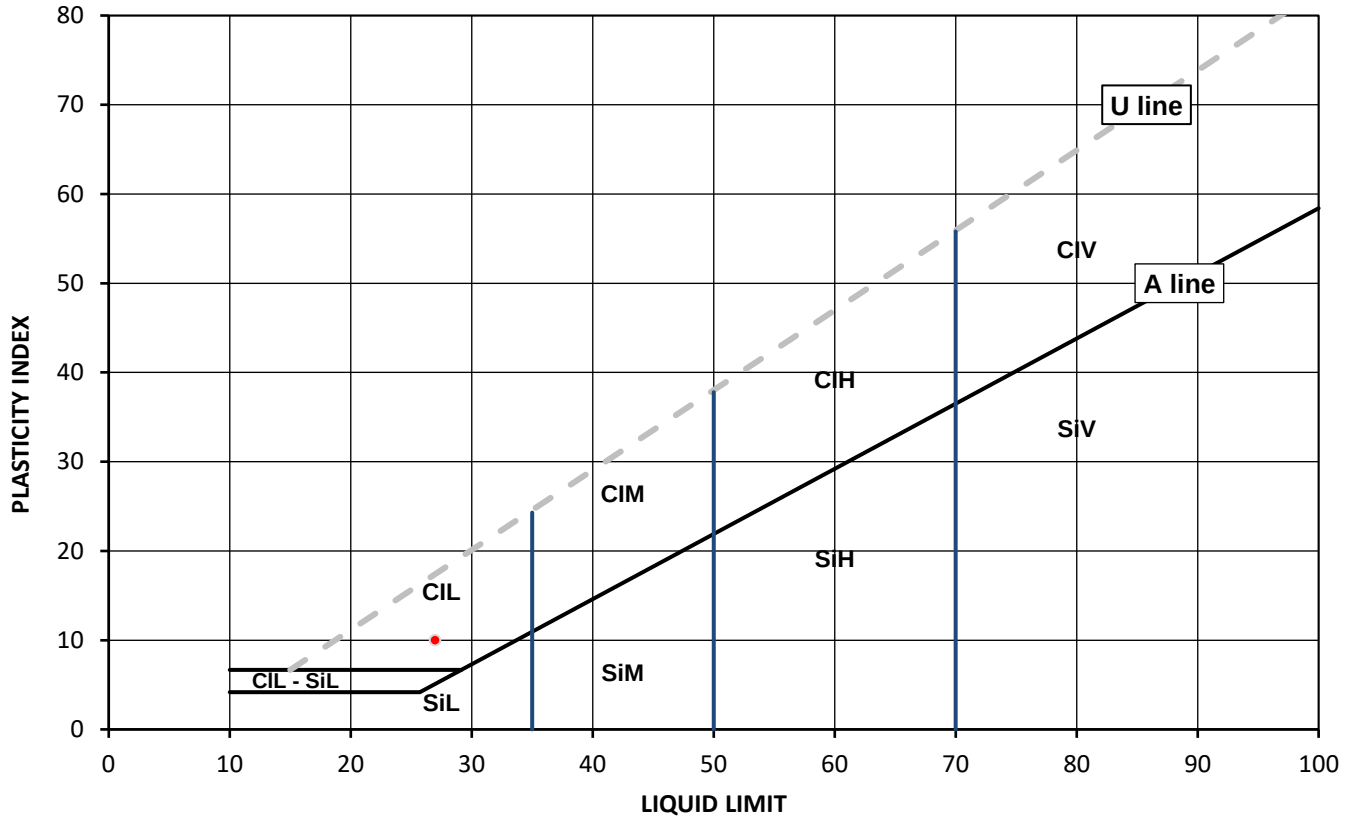
Client:	Evolve Geo-Environmental Limited	Client Reference:	Not Given
Client Address:	15 Newland, Lincoln, Lincolnshire	Job Number:	25-014317-1
		Date Sampled:	Not Given
		Date Received:	20/03/2025
Contact:	Paul Huteson	Date Tested:	28/03/2025
Site Address:	Fairhaven	Sampled By:	Client - PH

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	489088	Depth Top [m]:	0.80
Hole No.:	DS106	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Reddish brown very sandy CLAY		
Sample Preparation:	Tested in natural condition; The water content in the sample was increased		
Cone Type:	80g/30deg		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
20.3	27	17	10	0.30	0.70	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN ISO 17892-1:2014+A1:2022, BS 1377-2:2022; # Non accredited

Remarks:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 10/04/2025

GF 337.14

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

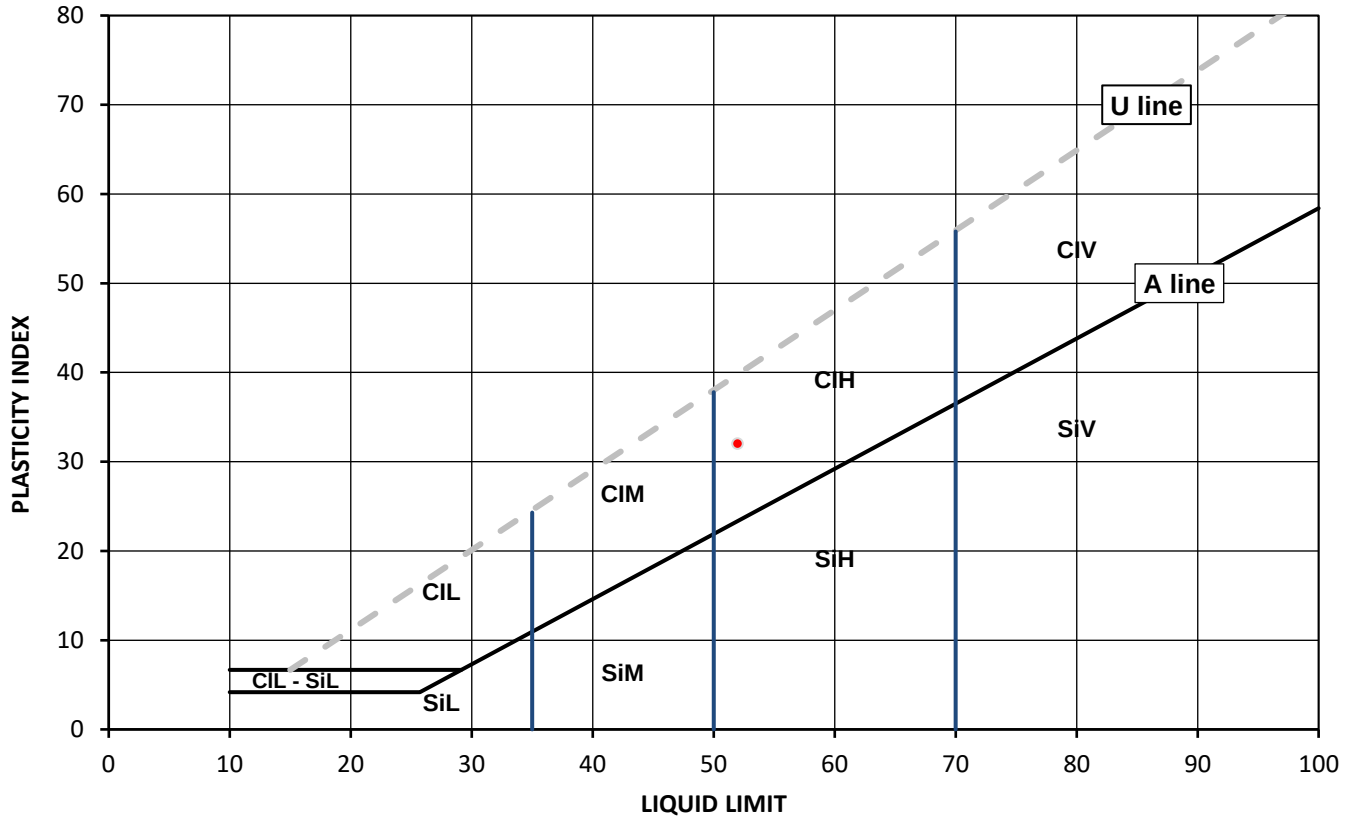
Client:	Evolve Geo-Environmental Limited	Client Reference:	Not Given
Client Address:	15 Newland, Lincoln, Lincolnshire	Job Number:	25-014317-1
		Date Sampled:	Not Given
		Date Received:	20/03/2025
Contact:	Paul Huteson	Date Tested:	28/03/2025
Site Address:	Fairhaven	Sampled By:	Client - PH

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	489090	Depth Top [m]:	2.30
Hole No.:	TP103	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Reddish brown slightly sandy CLAY		
Sample Preparation:	Tested in natural condition; The water content in the sample was increased		
Cone Type:	80g/30deg		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
18.3	52	20	32	-0.06	1.06	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN ISO 17892-1:2014+A1:2022, BS 1377-2:2022; # Non accredited

Remarks:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 10/04/2025

GF 337.14

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client: Evolve Geo-Environmental Limited

Client Address: 15 Newland, Lincoln, Lincolnshire

Contact: Paul Huteson

Site Address: Fairhaven

BS EN ISO 17892-12:2018+A2:2022 cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6. W by BS EN ISO 17892-1:2014+A1:2022.

Client Reference: Not Given
Job Number: 25-014317-1
Date Sampled: Not Given
Date Received: 20/03/2025
Date Tested: 28/03/2025
Sampled By: Client - PH

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	W	Liquid & Plastic Limit							Density		
		Reference	Depth Top m	Depth Base m	Type			%	% Passing 425um %	WL* %	Correlation Factor	Wp %	Ip %	Cone type	Sample Preparation	bulk Mg/m3	dry Mg/m3	PD Mg/m3
489081	DS101	Not Given	2.50	Not Given	D	Reddish brown CLAY		20.6										
489082	DS102	Not Given	1.20	2.00	B	Orangish brown clayey SAND		18.3										
489083	DS103	Not Given	0.50	1.00	B	Orangish brown gravelly clayey SAND		11.9										
489084	DS104	Not Given	0.50	Not Given	D	Reddish brown slightly gravelly sandy silty CLAY		23.1										
489085	DS104	Not Given	1.10	2.00	B	Reddish brown sandy silty CLAY		17.0										
489086	DS105	Not Given	1.00	Not Given	D	Reddish brown CLAY		19.0										
489087	DS105	Not Given	1.20	2.00	B	Reddish brown slightly clayey SAND		14.1										
489088	DS106	Not Given	0.80	Not Given	D	Reddish brown very sandy CLAY	Atterberg 4 Point	20.3	100	27	-	17	10	80g/30 deg	N / I			
489089	DS106	Not Given	1.20	2.00	B	Reddish brown SAND		6.2										
489090	TP103	Not Given	2.30	Not Given	D	Reddish brown slightly sandy CLAY	Atterberg 4 Point	18.3	100	52	-	20	32	80g/30 deg	N / I			

Note: # Non accredited; NP - Non plastic; N - Tested in natural condition, R - Tested after >0,425mm removed by hand, WR - Tested after washing to remove >425mm; I - The water content in the sample was increased , D - The water content in the sample was decreased; * - One point liquid limit corrected as per the report Correlation Factor by Clayton C.R.I and Jukes A.W (1978)

Comments:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 10/04/2025 **GF 362.16**

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS EN ISO 17892-1:2014+A1:2022, BS 1377-2: 2022, clause 4.1

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client: Evolve Geo-Environmental Limited

Client Address: 15 Newland, Lincoln, Lincolnshire

Contact: Paul Huteson

Site Address: Fairhaven

Client Reference: Not Given
Job Number: 25-014317-1
Date Sampled: Not Given
Date Received: 20/03/2025
Date Tested: 28/03/2025
Sampled By: Client - PH

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC											
		Reference	Depth Top m	Depth Base m	Type			%											
489081	DS101	Not Given	2.50	Not Given	D	Reddish brown CLAY		20.6											
489082	DS102	Not Given	1.20	2.00	B	Orangish brown clayey SAND		18.3											
489083	DS103	Not Given	0.50	1.00	B	Orangish brown gravelly clayey SAND		11.9											
489084	DS104	Not Given	0.50	Not Given	D	Reddish brown slightly gravelly sandy silty CLAY		23.1											
489085	DS104	Not Given	1.10	2.00	B	Reddish brown sandy silty CLAY		17.0											
489086	DS105	Not Given	1.00	Not Given	D	Reddish brown CLAY		19.0											
489087	DS105	Not Given	1.20	2.00	B	Reddish brown slightly clayey SAND		14.1											
489088	DS106	Not Given	0.80	Not Given	D	Reddish brown very sandy CLAY		20.3											
489089	DS106	Not Given	1.20	2.00	B	Reddish brown SAND		6.2											
489090	TP103	Not Given	2.30	Not Given	D	Reddish brown slightly sandy CLAY		18.3											

Comments:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 10/04/2025

TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS EN ISO 17892-4:2016, BS 1377-2:2022 cl. 10

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

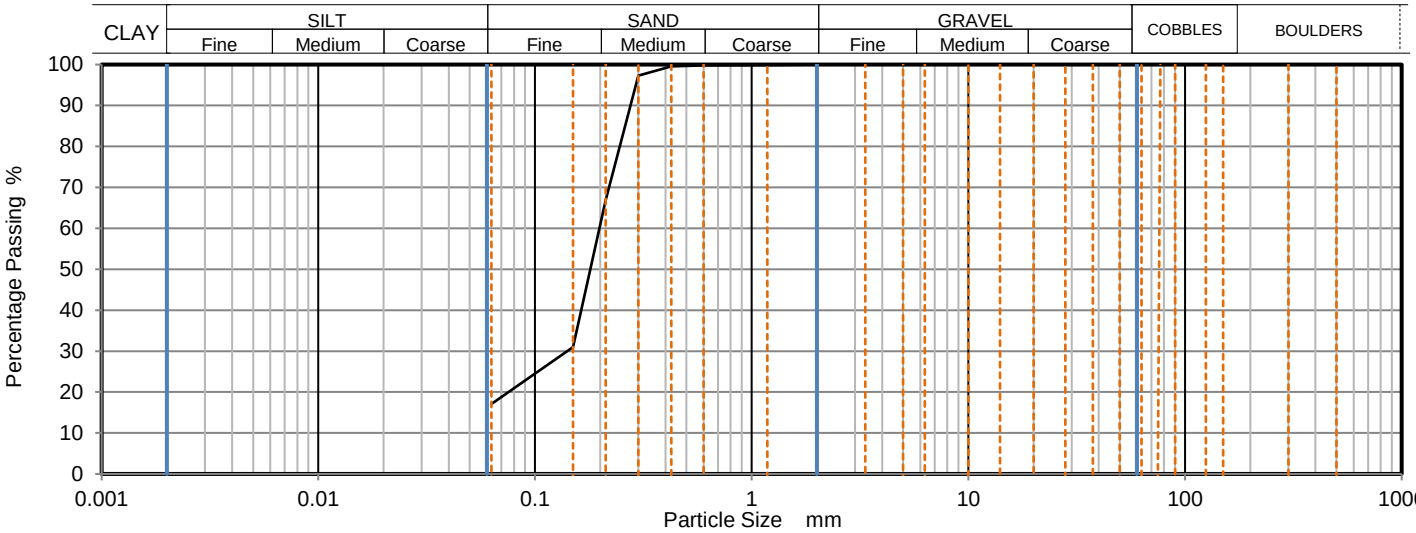
4041

Client:	Evolve Geo-Environmental Limited	Client Reference:	Not Given
Client Address:	15 Newland, Lincoln, Lincolnshire	Job Number:	25-014317-1
		Date Sampled:	Not Given
		Date Received:	20/03/2025
Contact:	Paul Huteson	Date Tested:	28/03/2025
Site Address:	Fairhaven	Sampled By:	Client - PH

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	489082	Depth Top [m]:	1.20
Hole No.:	DS102	Depth Base [m]:	2.00
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Orangish brown clayey SAND		
Sample Preparation:	Sample was quartered, oven dried at 107.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	97		
0.212	67		
0.15	31		
0.063	17		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	83
Fines <0.063 mm	17

Grading Analysis		
D100	mm	2
D60	mm	0.198
D30	mm	0.141
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with ISO 17892 -4, by sieving on as received or wet sample

Remarks:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 10/04/2025

GF 366.12

4041

TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS EN ISO 17892-4:2016, BS 1377-2:2022 cl. 10

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

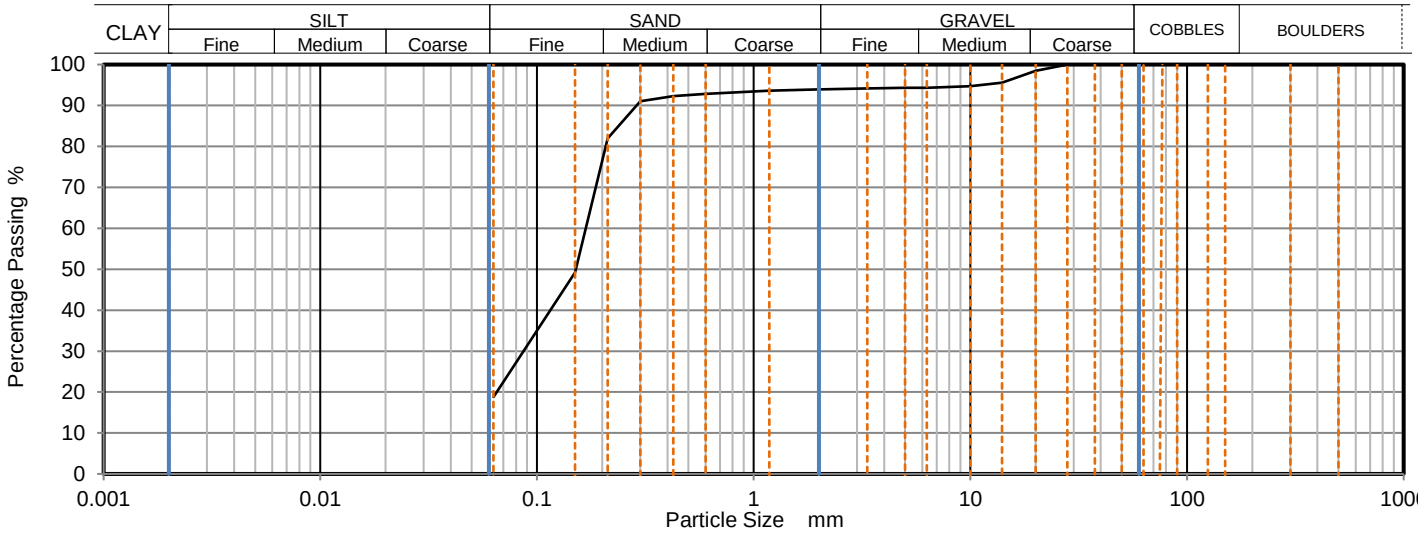
Environmental Science

Client:	Evolve Geo-Environmental Limited	Client Reference:	Not Given
Client Address:	15 Newland, Lincoln, Lincolnshire	Job Number:	25-014317-1
		Date Sampled:	Not Given
		Date Received:	20/03/2025
Contact:	Paul Huteson	Date Tested:	28/03/2025
Site Address:	Fairhaven	Sampled By:	Client - PH

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	489083	Depth Top [m]:	0.50
Hole No.:	DS103	Depth Base [m]:	1.00
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Orangish brown gravelly clayey SAND		
Sample Preparation:	Sample was quartered, oven dried at 107.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	96		
10	95		
6.3	94		
5	94		
3.35	94		
2	94		
1.18	94		
0.6	93		
0.425	92		
0.3	91		
0.212	82		
0.15	49		
0.063	19		

Sample Proportions	% dry mass
Very coarse	0
Gravel	6
Sand	75
Fines <0.063 mm	19

Grading Analysis		
D100	mm	28
D60	mm	0.168
D30	mm	0.0868
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with ISO 17892 -4, by sieving on as received or wet sample

Remarks:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 10/04/2025

GF 366.12

Appendix V – Lightweight Deflectometer CBR Test Results

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Evolve Geo-Environmental Limited
C/O 15 Newland, Lincoln LN1 1 XG
www.evolvegeo-env.co.uk

Certificate for the Determination of the Nominal California Bearing Ratio (CBR) of Pavement Material Tested by Lightweight Deflectometer

In accordance with DMRB CD225 Design of new pavement foundations, BS 1924-2:2018 and the LWD manufacturer's User Manual

Report No:	EGE-24-07-07-01	Report Date:	01/05/25
Client:	Lindum Group	Date of Test:	19/03/25
Address:	Jubilee Place, Station Road	Plate Radius (mm):	300
	North Hykeham, Lincoln	Poisson's Ratio:	0.35
		LWD Serial No:	3032-3367
Correlation Date:	09/09/2024	Correlation Adjustment Factor:	1.152
Site:	Fairhaven, Kirkby in Ashfield		

Test Results

Location	Depth	Material	Force (kN)	Maximum Deflection (mm)	Pulse (ms)	Surface Modulus (Eo, MPa)	Converted Nominal CBR (%)	Converted Nominal Mean CBR (%)
TP103	0.40	Orangish brown/ brownish red clayey, silty gravelly SAND.	7.12	609.832	22.8	130.45	28.5	28.5
			7.14	620.803	22.8	128.55	27.9	
			7.27	615.048	22.5	131.97	29.1	
TP104	0.40		4.74	2071.210	26.0	25.59	2.2	2.2
			4.70	2081.497	25.8	25.23	2.2	
			4.72	2076.784	25.8	25.39	2.2	
TP105	0.40		6.87	2346.802	24.0	32.72	3.3	3.0
			6.81	2460.025	24.3	30.92	3.0	
			6.77	2550.025	24.3	29.64	2.8	
TP106	0.50		7.23	2053.028	23.0	39.34	4.4	4.5
			7.57	2092.966	23.0	40.41	4.6	
			7.52	2099.421	22.8	40.02	4.5	
TP106	1.00		7.42	586.878	22.3	141.20	32.3	34.0
			7.44	572.436	22.0	145.23	33.7	
			7.43	547.546	22.0	151.60	36.1	
Condition:	The results apply only to the location tested and the material was tested in an 'as found' condition							

For and on Behalf of Evolve Geo-Environmental Ltd

Quality Control

Revision	Date	Prepared By		Authorised By	
0	01/05/25	Joshua Redmond		Paul Huteson	

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Appendix VI – BRE365 Soakaways Results, Ground Gas and Groundwater Level Monitoring Sheets

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BOREHOLE LOCATION/DATA		PID (ppm)	CH_4	CO_2	O_2	Mb	Peak Flow	Flow l/Hr	Pa	LEL	DTW	DTB
R1	DS101	<0.1	<0.1	1.4	17.0	1001	<0.1	<0.1	0	<0.1	2.19	2.90
	DS102	0.8	<0.1	<0.1	16.6	1002	<0.1	<0.1	0	<0.1	1.91	1.97
	DS106	1.2	<0.1	1.1	16.4	1002	<0.1	<0.1	0	<0.1	DRY	2.01

Comments: No comments.

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Site: 11 Fairhaven, Sutton in Ashfield

Date: 24th March 2025

Client: Lindum BMS

Weather: 11:50 am - 12:30 pm
10 degC (Dry)
1019 mbar (Risigin)
4 mph (NW)

BOREHOLE LOCATION/DATA		PID (ppm)	CH_4	CO_2	O_2	Mb	Peak Flow	Flow l/Hr	Pa	LEL	DTW	DTB
R2	DS101	<0.1	<0.1	1.8	16.8	1006	0	0	0	0	2.24	2.90
	DS102	0.4	<0.1	1.9	16.7	1007	0	0	0	0	dry	1.97
	DS106	0.1	<0.1	2.0	16.1	1006	0	0	0	0	dry	2.01

Comments: No comments.

evolve GEO-ENVIRONMENTAL

Site: 11 Fairhaven, Sutton in Ashfield

Date: 2nd April 2024

Client: Lindum BMS

Weather: 3.00 pm - 3:30 pm
16 degC (Dry)
1020 mbar (Rising)
10 mph (NE)

BOREHOLE LOCATION/DATA		PID (ppm)	CH_4	CO_2	O_2	Mb	Peak Flow	Flow l/Hr	Pa	LEL	DTW	DTB
R3	DS101	<0.1	<0.1	1.7	15.8	1012	<0.1	<0.1	0	<0.1	2.52	2.90
	DS102	<0.1	<0.1	2.2	15.4	1012	<0.1	<0.1	0	<0.1	dry	1.97
	DS106	<0.1	<0.1	1.9	16.0	1012	<0.1	<0.1	0	<0.1	dry	2.01

Comments: No comments.

evolve
GEO-ENVIRONMENTAL

Site: 11 Fairhaven, Sutton in Ashfield

Date: 9th April 2025

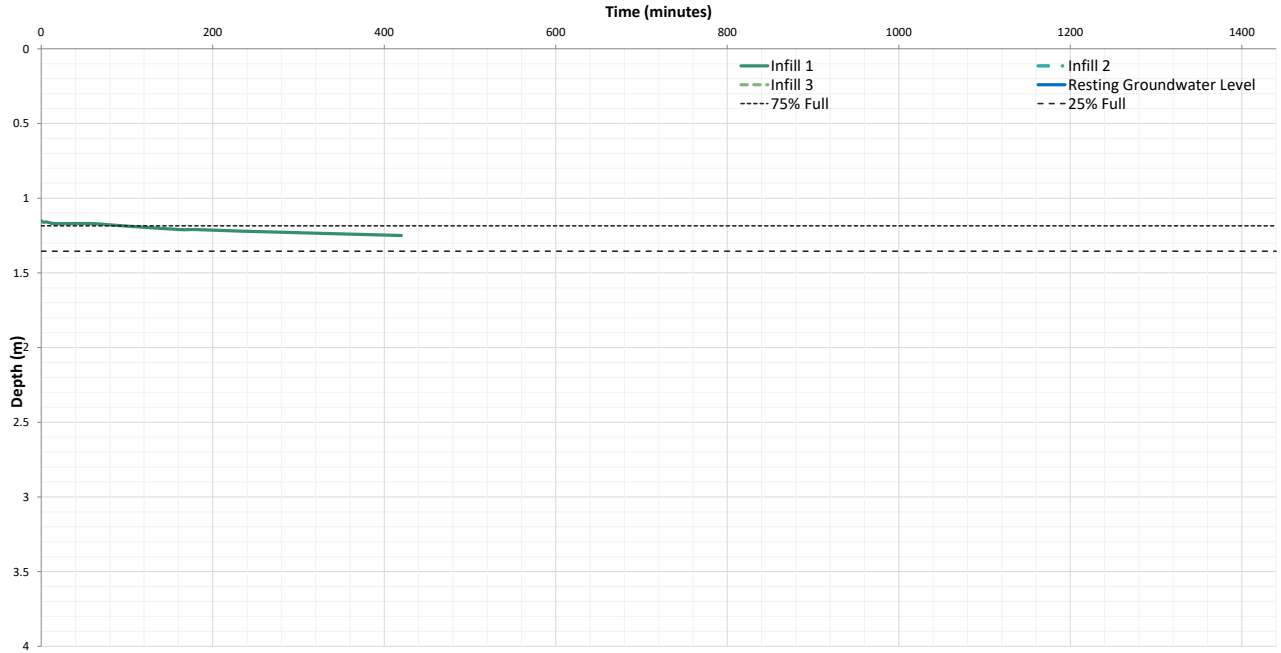
Client: Lindum BMS

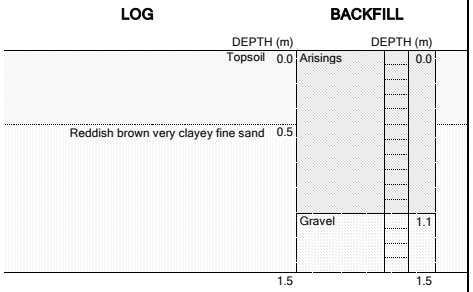
Weather: 10:00 am - 10:30 pm
6 degC (Dry)
Overcast
8 mph (S)

	units	Infill 1	Infill 2	Infill 3
Length	m		2.00	
Width	m		0.60	
Depth	m		1.44	
Gravel type			20mm single size	
Voids ratio			0.40	
Resting groundwater level at time of testing	m		5.00	
Depth of first reading	m	1.15	0.00	0.00
Depth of final reading	m	1.25	0.00	0.00
Did soakage test reach 25% of maximum fill depth?		No	No	No
Did soakage test reach near empty?		No	No	No
Depth at 75% full/effective depth	m	1.18	0.00	0.00
Depth at 25% full/effective depth	m	1.23	0.00	0.00
Time at 75% full/effective depth	mins	71.00	#N/A	#N/A
Time at 25% full/effective depth	mins	261.67	#N/A	#N/A
Vp75 - 25 (volume outflowing between 75% and 25% full/effective depth)	m^3	0.02	0.00	0.00
Mean surface area for outflow (50% full/effective depth)	m^2	1.46	1.20	1.20
tp75 (time for the water level to fall from 75% to 25% full/effective depth)	mins	190.67	#N/A	#N/A
Soil infiltration rate, f =	m/s	Failed Test	Failed Test	Failed Test
or	m/s	Failed Test	Failed Test	Failed Test

Recommended soil infiltration rate	
Failed Test	m/s

Note:
Where water level reaches nearly empty (5% full), soil infiltration based on 'Full' depth. Where water level did not reach nearly empty (5% full), soil infiltration rate is based on 'Effective' drainage achieved only. Where water level did not fall below 25% of the maximum fill level, this is considered to be a 'Failed' test.





evolve GEO-ENVIRONMENTAL

TITLE: Soakaway Test Results
Fairhaven, Kirkby in Ashfield
Lindum Group

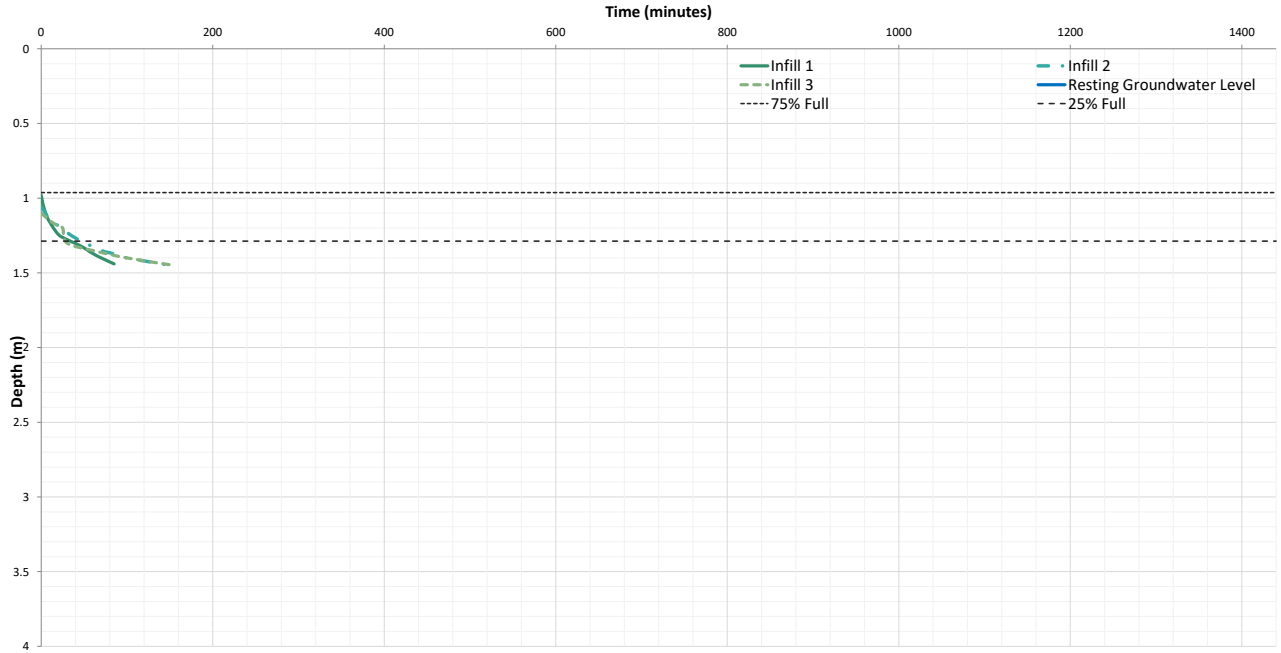
In general accordance with BRE Digest 365 (2016)

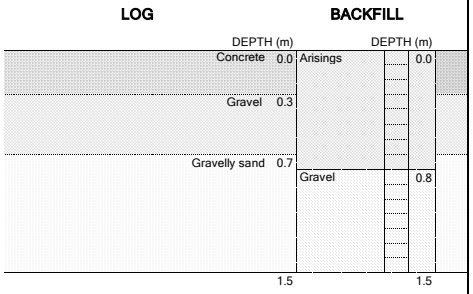
DRAWN BY: PH	SCALE: Not to Scale	PROJECT NUMBER: EGE-24-07-07-01
CHECKED BY: PB	REVISION: 1	SOAKAWAY NUMBER: TP101/SA101
DATE: 19/03/2025		

	units	Infill 1	Infill 2	Infill 3
Length	m		1.60	
Width	m		0.60	
Depth	m		1.45	
Gravel type			20mm single size	
Voids ratio			0.40	
Resting groundwater level at time of testing	m		5.00	
Depth of first reading	m	0.98	1.06	1.10
Depth of final reading	m	1.44	1.45	1.45
Did soakage test reach 25% of maximum fill depth?		Yes	Yes	Yes
Did soakage test reach near empty?		Yes	Yes	Yes
Depth at 75% full/effective depth	m	1.10	1.16	1.19
Depth at 25% full/effective depth	m	1.33	1.35	1.36
Time at 75% full/effective depth	mins	4.87	14.50	20.63
Time at 25% full/effective depth	mins	49.50	71.62	70.00
Vp75 - 25 (volume outflowing between 75% and 25% full/effective depth)	m^3	0.09	0.07	0.07
Mean surface area for outflow (50% full/effective depth)	m^2	1.99	1.82	1.73
tp75 (time for the water level to fall from 75% to 25% full/effective depth)	mins	44.63	57.12	49.38
Soil infiltration rate, f =	m/s	0.00001690	0.00001202	0.00001311
or	m/s	1.7E-05	1.2E-05	1.3E-05

Recommended soil infiltration rate	
1.2E-05	m/s

Note:
Where water level reaches nearly empty (5% full), soil infiltration based on 'Full' depth. Where water level did not reach nearly empty (5% full), soil infiltration rate is based on 'Effective' drainage achieved only. Where water level did not fall below 25% of the maximum fill level, this is considered to be a 'Failed' test.





evolve GEO-ENVIRONMENTAL

TITLE: Soakaway Test Results
Fairhaven, Kirkby in Ashfield
Lindum Group

In general accordance with BRE Digest 365 (2016)

DRAWN BY: PH	SCALE: Not to Scale	PROJECT NUMBER: EGE-24-07-07-01
CHECKED BY: PB	REVISION: 1	SOAKAWAY NUMBER: TP102/SA102
DATE: 19/03/2025		

Appendix VII – Risk Ratings

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Risk Definitions	
Significance Level	Definition/Comments
Very High Risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term. Likely contaminated land situation, risk assessment and action recommended.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term. Plausible contaminated land situation, risk assessment and possible action recommended.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild. Unlikely contaminated land situation, possible risk assessment and possible action.
Very Low Risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe. Negligible risk, no action recommended except vigilance for changes in conditions.