

CCG-C-23-13833

**PHASE II GEOENVIRONMENTAL REPORT
FOR LAND AT THE FORMER COACH ROAD FARM
CUT LANE
KIRKBY
KNOWSLEY
L33 3AJ
MAY 2023**

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1.0 INTRODUCTION

CC GEOTECHNICAL LIMITED (CCG) is providing consultancy services to **Mr. M. GROVES (ORMSKIRK SKIPS RECYCLING LIMITED)** (the *Client*) in connection with the proposed redevelopment of land at Coach Road Farm, Cut Lane, Kirkby, Knowsley, L33.

It is understood that an existing agricultural storage barn is to be modified / converted for residential use together with the construction of a detached garage and the creation of access drive and other associated external landscaping works. The existing and proposed site layouts are shown on architectural drawings contained herein.

The proposed development falls within the administrative jurisdiction of **KNOWSLEY METROPOLITAN BOROUGH COUNCIL**, administered under Planning Application Reference No. 22-00299-FUL.

2.0 PREVIOUS STUDIES

The development site was the subject of a Phase I Desk Study Report prepared by **CCG** under report Reference No. **CCG-C-23-13717**, dated February 2023 which concluded that a Phase II intrusive investigation was required, and made recommendations on the scope of the Phase II investigation.

This report documents the findings of the Phase II investigation.

This report should be read in conjunction with **CCG** Desk Study Report No. **CCG-C-23-13717**, and with the Notes on Limitations, given in Appendix J.

3.0 PURPOSE & AIMS OF THE PHASE II INTRUSIVE INVESTIGATION

The primary purpose of the Phase II intrusive investigation was to confirm the indications of the desk study with respect to:

- The collation of data on soil and groundwater contamination, as far as they may adversely impact on human and/or environmental receptors.
- The collation of data on the properties of the substrata, insofar as they relate to the design and construction of house foundations, ground slabs, and development infrastructure.

4.0 SITE DATA

The site is situated within an agricultural context and comprises an irregular shaped parcel of land located immediately to the southeast of Cut Lane, Knowsley, L33 3AQ as shown on CCG Drawing No. CCG-C-23-13833-1 and Aerial Plate No. CCG-C-23-13833-2 contained herein. The **ORDNANCE SURVEY** coordinates for the approximate site centre are 345573, 397399.

The site extends to the approximate dimensions of c.62m x 58m; its long axis being on a north-south alignment. It is bound to the north by single track extending along Cut Lane, beyond which lies extensive parcels of agricultural land, and to the south by a 2-storey former farmhouse. Its remaining boundaries have an open aspect.

Structures occupying the site include a steel framed Dutch Barn, comprising part timber cladding, part block work elevations under pitched asbestos roofing materials, a single storey former piggery, comprising brick and dressed sandstone elevations under pitched slate roofing materials, and a barn and associated extension constructed of dressed sandstone and red brick elevations under pitched slate roofing materials.

The surface topography across the site was seen to be generally flat with surface cover largely comprising gravels and cobbles, set within a sandy clayey matrix with areas of mixed perennial herbs and grasses, particularly around the former piggery.

At the time of undertaking the walkover survey, it was evident that the 2nr silos, as shown on **CCG** Drawing No. CCG-C-23-13717-3 contained herein, and formerly located within the eastern section of the overall site had recently been removed.

Given that the site is currently serving as agricultural buildings, it is assumed that buried services (*i.e. water / gas / electricity etc.*) associated with these development may be present beneath the site.

There was no visual evidence of the presence of native and/or non-native plant species within, or adjoining, the site boundary.

Vehicle and pedestrian access can be made *via* Cut Lane to the north.

4.1 Published Geology

The geology of the site was researched by reference to Tonks L.H et.al (1938) '*Memoirs of the Geological Survey England and Wales: Explanation of Sheet 84: The Geology of Wigan District*', the **BRITISH GEOLOGICAL SURVEY** (BGS) 1:50, 000 scale Sheet 084 Wigan (2011), and 1:10, 000 scale (Solid and Drift Editions) geological mapping data.

The **BGS** 1:10, 000 Scale Drift Geological map indicate that the overall site is underlain with natural drift deposits comprising impermeable diamicton (*boulder clay*) comprising gravel sand silt and clay deposits of glacial origin (*Pleistocene Epoch - Late Quaternary - Devensian Sub Age*).

The documented solid geology comprises the Rossendale Formation (*formerly the Rough Rock Grit Group*) of the Millstone Grit Group comprising interbedded fine- to very coarse-grained and pebbly feldspathic sandstone, interbedded with grey siltstone and argillaceous mudstone and subordinate marine black shales, thin coals and seatearths associated with the Lower - Upper Carboniferous Period (*Namurian Stage: Yeadonian Sub Age*).

The nearest geological line of weakness (fold axis), extending on an east – west alignment lies c. 187m south of the study site

The 'Indicative Atlas of Radon in England and Wales' (Miles. J.C.H et.al, 2007) Map 13 '*Northern Welsh Marches and Liverpool*', shows the site to be situated within an area where it is believed that less than 1% of the properties within the area are affected by Radon and therefore no Radon Protection Measures will be required for new structures in contact with the ground.

As with many previously developed sites superficial made ground deposits of an unknown composition thickness and extent associated with the development of the site and its immediate environs may underlie the site.

4.2 Hydrogeology & Hydrology

Information pertaining to hydrogeological and hydrological features of the site may be summarised as follows:

- Superficial made ground deposits, if present, are classified as an Unproductive Aquifer
- The underlying diamicton (boulder clay) classifies as a Secondary Undifferentiated (unproductive) Aquifer
- The solid geology (Rossendale Formation) is classified as a Secondary A Aquifer
- There are no records pertaining to Ground Water Abstraction Licences within 1000m of the site
- There are no records pertaining to the presence of Surface Water Abstraction points within 1000m of the study site
- There are no records pertaining to the presence of Portable Water Abstraction points within 1000m of the study site
- The site is not located within a designated Source Protection Zone
- The site is not located within an Environment Agency Zone II Flood Plain
- The site is not located within an Environment Agency Zone III Flood Plain

5.0 PRELIMINARY CONCEPTUAL MODEL

5.1 Introduction

The risk assessment methodologies adopted by **CCG** are based on current available guidance from several sources and are included in Appendix I.

A Tier 1 Risk Assessment and Preliminary Conceptual Model (PCM) were formulated using the information collated in the Phase I Desk Study and based on the following assumptions:

- It is understood that an existing agricultural property is to be modified / converted for residential land use together with the construction of a detached garage and the creation of access and other associated works.
- Drinking water will be from a mains supply.

In constructing the Preliminary Conceptual Model (PCM), **CCG** applied the guidance contained in CIRIA C552: 2001. This recommends use of a Risk Matrix which classifies risk based on the product of Probability of a source being present, and the Consequence of receptors being exposed to the source. Guidance tables setting out the classifications of probability and consequence together with a risk matrix are given in Tables 1-3 hereunder. In using this approach **CCG** recommends actual intrusive investigation of any Risk Classification of “*Moderate*” or over.

Table 1: Matrix of consequences against probability to gain a risk classification [CIRIA C552, 2001]

		CONSEQUENCE			
		SEVERE	MEDIUM	MILD	MINOR
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very Low Risk	Very Low Risk

Table 2: Classification Definitions (C552 CIRIA, 2001)

CLASSIFICATION	DEFINITION
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard. Or there is evidence that server 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	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.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either unlikely that such harm would be server, or if any harm were to occur it is more likely that harm would be relatively mild. Investigation (if not undertaken already) is normally required to clarify the risk and to determine to potential liability. Some remedial works may be required in the longer term.
Moderate / Low	-
Low	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
Very Low	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 server.

5.2 Preliminary Conceptual Model

By application of the risk assessment methodology outlined above, the following PCM was constructed.

Table 3: Preliminary Conceptual Model (PCM)

POLLUTANT LINKAGE	SOURCE	PATHWAY	RECEPTOR	PROBABILITY	CONSEQUENCE	RISK RATING
1	Broad spectrum of heavy metals, aggressive pH, hydrocarbons, PAH's associated with the agricultural uses, piggery, site development and maintenance, materials storage etc	Soil and / or soil dust ingestion	Construction workers Future residents (adults / children) Offsite receptors	Likely	Medium	Moderate
2	Asbestos containing materials (ACM) in made ground soils associated with the development of the site (i.e. Dutch Barn) & adjoining area	Fibre Inhalation	Construction workers Future residents (adults / children) Offsite receptors	Likely	Severe (ACM)	High
3	Inhalation of vapours associated with potential made ground deposits etc.	Inhalation	Future residents	Unlikely	Medium	Low
4	Inhalation of ground gases from onsite or offsite sources i.e. made ground deposits & nearby pond, piggery waste	Inhalation	Future residents	Unlikely	Medium	Low
5	pH & Sulphate attack on concrete	Future building	Future building	Likely	Mild	Moderate / Low
6	Organic contamination associated with former land uses and agricultural machinery oils and lubricants etc.	Direct contact with water mains	Potable water supply	Unlikely	Medium	Low

The contaminants of concern associated with those risks which require intrusive investigation were researched by reference to published industry profiles, and are summarised hereunder:

Table 4: Summary of Contaminants of Concern based on PCM

LINKAGE NO.	METALS	NON-METALS	ORGANICS	GASES	OTHERS
PL1, PL2 PL5, PL6	Be, Cd, Cr (total and VI), Ni, Cu, Pb, Hg, Se,	As, sulphates,	TPHCWG, PAH's, BTEX, Volatiles (by PID), PCB's Pesticides, herbicides	-	pH Asbestos
PL3 & PL4	-	-	-	CH ₄ , CO ₂ , H ₂ S	-
PL1-PL6	Be, Cd, Cr (total and VI), Ni, Cu, Pb, Hg,	As, sulphates, Se,	TPHCWG, BTEX, PCB's PAH's, Volatiles (by PID) Pesticides, herbicides,	CH ₄ , CO ₂ , H ₂ S	pH Asbestos

5.3 Summary of Risks

The foregoing analysis identified a considerable number of potential risks, and if present, these could adversely impact on human or environmental receptors. Given the sensitivity of the proposed end use, an intrusive phase of investigation was undertaken to determine whether the postulated pollutant linkages are present on site.

6.0 FIELDWORK

6.1 Introduction

A programme of fieldwork investigation was undertaken in March 2023. The programme comprised:

- The manual excavation and CAT scanning of 4nr borehole service avoidance pits, each extending to 1.2mbngl
- The subsampling of borehole starter pit arisings for soil contamination analyses
- The advancement of boreholes from the base of the service avoidance pits using light dynamic boring methods
- The logging and sampling of borehole arisings for laboratory testing
- Installation of 50mm HDPE plain and slotted well-tube and associated headworks, complete with non-lime pea gravel surround and bentonite seals at 3nr borehole positions
- The instigation of a programme of groundwater / gas monitoring comprising 6nr rounds distributed over a 3-month period

The fieldwork was planned in accordance with BSEN 1997-1 (2007) Eurocode 7, BS10175: 2011, BS5930: 1999, and the sampling and monitoring methodologies employed by **CCG** as presented in Appendix B, as far as they related to the scope of the investigation.

The layout of the proposed intrusive investigation is as annotated on **CCG** Drawing No. **CCG** Drawing No's. CCG-C-23-13833-3 'Site Investigation Layout Plan' contained herein.

6.2 Borehole Drilling & Monitoring Installations

6.2.1 Light Dynamic Sampling

In accordance with the ground investigation plan, 4nr boreholes were sunk using light dynamic sampling methods using a Dando Terrier 2000 rig deploying 100mm casings and associated tools.

Each borehole location was positioned clear of all overhead services and scanned for buried electrical services using CAT cable avoidance scanner before and during hand excavation of a starter pit extending to 1.2mbgl.

Boring tools were decontaminated prior to commencement.

In this method of investigation samples of subsoils are recovered by driving and extracting a series of reducing diameter 1m long steel tubes. Standard penetration test's (SPT's) were undertaken at regular depth increments with hand shear vane (HSV) tests being undertaken on recovered cohesive soils. This method of sampling recovers relatively "undisturbed" soil profiles in Perspex tubes, which are used to line the steel tubes. The Perspex tubes were split and carefully logged and subsampled. Subsamples for potential chemical analysis were removed at appropriate positions from the profile and transferred to chilled amber glass jars and vials for laboratory analysis.

The logs of the light dynamic sampling boreholes, annotated with sampling details, SPT 'N' and *in-lab* HSV (Cu-(kN/m²) values and details of standpipe construction, are presented in Appendix C.

Logs associated with dynamic probing are presented alongside their corresponding borehole log in Appendix C.

6.2.2 Monitoring Installations

Standpipes comprising 50mm diameter HDPE plain and slotted well tube set in bentonite and non-limestone pea gravel surround were installed at 3nr borehole positions. Each standpipe was fitted with a gas valve connector and was protected by a flush cover set in concrete. Details of standpipe installations are provided on the relevant borehole logs in Appendix C and summarised in the tabulation hereunder:

Table 5: Borehole Installation Details

BOREHOLE	DEPTH OF BOREHOLE (mbgl)	DEPTH OF STANDPIPE [mbgl]	RESPONSE ZONE (mbgl)	
			FROM	TO
WS01	5.0m	3.5m	0.5m	3.5m
WS03	5.0m	3.5m	0.5m	3.5m
WS04	5.0m	3.5m	0.5m	3.5m

The standpipe installations were periodically monitored for flow rate and composition of ground gas using a Geotechnical Instruments GA 2000 infra-red analyser. The installations were also monitored for standing water levels with an electronic dip meter.

The results of the gas and groundwater monitoring, together with calibration certificates of the instruments used are given in Appendix D.

7.0 OBSERVED STRATIGRAPHY

The stratigraphy of the boreholes was consistent with the documented geology. The succession may be generalised as tabulated hereunder:

Table 6: Observed Stratigraphy

Location	STRATIGRAPHY
WS01	Made ground deposits comprising grey sand and gravel overlying dark brown reworked clay deposits extending to 0.8mbgl. Thereafter the sequence continues in natural drift deposits comprising firm becoming stiff brown boulder clay with occasional thin sand horizons, proven to 5mbgl. Borehole dry on completion
WS02	Superficial made ground deposits comprising brown sandy gravel extending to 0.3mbgl. Thereafter the sequence continues in natural drift deposits comprising firm becoming stiff brown boulder clay with occasional thin sand horizons, proven to 5mbgl. Borehole dry on completion
WS03	Superficial made ground deposits comprising dark brown slightly gravelly sand extending to 0.55mbgl. Thereafter the sequence continues in natural drift deposits comprising firm becoming stiff brown boulder clay with occasional thin sand horizons, proven to 5mbgl. Borehole dry on completion
WS04	Superficial made ground deposits comprising dark brown clayey sand to 0.2mbgl, overlying dark brown reworked clay deposits to 0.55mbgl. Thereafter the sequence continues in natural drift deposits comprising firm becoming stiff brown boulder clay with occasional thin sand horizons, proven to 5mbgl. Borehole dry on completion

There was no visual and/or olfactory evidence of contamination and/or biodegradable materials affecting the made ground mass and/or the natural underlying drift deposits at any sampling position.

7.0 GROUNDWATER REGIME

Slight seepages were recorded at all exploratory sampling positions during the intrusive investigation works, with monitored standing water levels being in the order of 0.48m – 0.59mmbgl during the initial round of groundwater monitoring. These observations are indicative of a perched body of water resting on the underlying stiff clay.

8.0 LABORATORY TESTING

8.1 Soil Engineering Test

A programme of soil engineering testing was undertaken at a UKAS / MCERTS accredited laboratory associated with **CCG**. The programme comprised:

- Determination of soil moisture content in accordance with BS: 1377: Part 2: 1990
- Determination of Atterberg Limits in accordance with BS: 1377: Part 2: 1990
- Determination of soil pH and water-soluble sulphate content

The soil classification test results are presented in Appendix E.

8.2 Contamination Analyses

A programme of soil chemical analyses was undertaken at a UKAS / MCERTS accredited laboratory:

- 4nr subsamples of made ground soils were analysed to a broad range of contaminants including metals, non-metals, speciated PAH's, BTEX compounds and hydrocarbons to the TPHCWG methodology
- 4nr subsamples of made ground were screened for asbestos containing materials (ACM's)
- 4nr subsamples of made ground soils were analysed for OrganoChlorine Pesticides (OCP) compounds
- 4nr subsamples of made ground were analysed for herbicides
- A leachate prepared on soil recovered from WS02 was analysed for a broad range of contaminants including metals, non-metals, speciated PAHs, and hydrocarbons to the TPHCWG methodology

The soil / soil leachate contamination test results and certificates are presented in Appendix F.

9.0 ASSESSMENT OF RISKS TO THE BUILT ENVIRONMENT

9.1 Specification of Buried Concrete

The data obtained in the investigations was assessed against the guidance given in BRE Special Digest 1: 2005, as summarised hereunder:

Table 7: Design Chemical Class Based on Soil Data

CONCRETE SPECIFICATION DATA SHEET		
Is the site Brownfield or Greenfield?	Brownfield	
Is the water table static or mobile?	Static	
Highest water-soluble Sulphate results	100mg/l	Design Sulphate Class of DS-1 Class of AC-1s
Lowest pH result	6.3	
Intended Working Life	50 years	Adopt Design Chemical Classification of DC-1

Based on the foregoing assessments, concrete in the ground should be specified to conform to the compositional requirements of Design Chemical Class **DC 1**, as defined in BRE Special Digest 1: 2005.

9.2 New Water Mains Supply

The assessment of requirements for new water mains within the investigation area was based on the criteria specified in Paper 10/WM/03/21 'Guidance for the selection of Water Supply Pipes to be used in Brownfield Sites' published by UK Water Industry Research (UKWIR) January 2011.

The preliminary findings indicate that the soil concentrations of pertinent hydrocarbon contaminant species are below the threshold concentrations specified by the UKWIR, indicating that PE mains may be deployed. Good practice requires that mains be laid in a remediated alignment comprising of clean granular fill extending to 600mm + pipe diameter and to 300mm below pipe underside.

Pipes should be laid in accordance with BS EN 12201-2 'Plastic piping systems for water supply and for drainage and sewerage under pressure' as stated in UKWIR guidance.

It should be noted that this recommendation is subject to the opinion of the water supplier, and in this instance the local water authority (**UNITED UTILITIES**) must be consulted to confirm that the proposals above accord with their interpretation of current guidance.

9.3 Assessment of Risk from Ground Gases

Using the data gathered in the monitoring programme, a gas risk assessment was undertaken in accordance with the ground gas risk assessment methodology (See Appendix I) employed by **CCG**. The ground gas risk assessment methodology conforms to current UK guidance on the assessment of risks posed by ground gases.

The potential sources of gas identified in the desk study were considered as sources of "Low" generation potential, but since the development is of high sensitivity, a programme of monitoring comprising of 6 rounds distributed over a 3-month period was adopted.

A gas risk assessment was undertaken in accordance with current UK guidelines set out in CIRCA C665 2007 “Assessing Risk Posed by Hazardous Gases to Buildings”. The CIRIA risk assessment methodology uses typical maximum soil gas concentrations and worse case borehole flow rates to define a “Characteristic Situation” for the shallow gas regime.

The volumetric gas flow rate used by the risk assessment is termed “Gas Screening Value (GSV)” in the guidance and is defined below.

Table 8: Gas Monitoring Data

Position	WS01	WS03	WS04
No Monitoring Visits	4	4	4
CH ₄ (%)	Nil	Nil	Nil
CO ₂ (%)	0.9	1.1	0.2
O ₂ (%)	20.0	20.5	20.4
H ₂ S (ppm)	Nil	Nil	Nil
CO (ppm)	Nil	Nil	Nil
Flow (l/hr)	<0.1	<0.1	<0.1
Water Levels (m)	0.59	0.54	0.48
PID response	0.0	0.0	0.0
Pressure Range (mb)	986-1028mbar		

After 4nr rounds of monitoring, a preliminary Gas Screening Value (GSV) of 0.00011l/hrs is calculated for CO₂, and <0.0001l/hr for CH₄.

Using these GSV values, the risk to the proposed development was assessed in line with Situation A as defined in CIRIA C665, and on this basis the site complies with Characteristic Situation 1 (CS1) and based on this classification gas protection measures are not required.

Notwithstanding the above, it must be borne in mind that a further 2nr rounds of monitoring are required to complete the ongoing gas-groundwater monitoring programme.

10.0 HUMAN HEALTH RISK ASSESSMENT

10.1 Legislative Background to Contaminated Land Assessment

Current approaches (CLR11- ‘Model Procedures for the Management of Land Contamination’ and Part IIA of the Environmental Protection Act 1990) to risk assessment of contaminated land suggest the construction of a Preliminary Conceptual Model. The purpose of this model is to define all possible complete pollution linkages, where the requisite source – pathway – target elements are present; these elements being defined as:

- A contaminant (source) is a hazardous substance or agent, present at levels that have the potential to cause harm or damage a receptor
- A pathway is the means by or through which a contaminant meets, or otherwise affects, the receptor
- A receptor (target) is an entity (human being, aquatic environment, flora, and fauna etc) that is vulnerable to the adverse effects of the contaminant

This relationship is termed a “pollution linkage.” It should be recognised that for a health or environmental risk to exist, all three elements of the relationship or linkage must be present, *i.e.*

- If there is no contaminant, or contaminant present at levels below those considered to be harmful or damaging to a receptor, then there can be no adverse effect on a receptor
- If there is no receptor present that can be adversely affected by a contaminant, no harm or damage can arise
- Even where both a contaminant and a receptor are present, no harm or damage will occur if there is no pathway by or through which a linkage between the two can be established

10.2 Risk Assessment Methodologies

The risk assessment methodologies employed by **CCG** are based on the use of CLEA 1.06 and are detailed in Appendix I.

10.3 Basis of Assessment of Risk to Human Health

The Human Health Risk Assessment was carried out in accordance with the **CCG** methodology for assessing soil contamination data as contained in Appendix I, and since it is proposed that the site be redeveloped for residential land use, the assessment was based on criteria contained in publication LQM/CIEH S4UL's for Human Health Risk Assessment (2015) (**CCG** Licence No. S4UL3233), applicable to the "Residential" land use With plant uptake scenario. This document does not provide criteria for Lead, for which the results were compared to the C4SL (200mg/kg) published by DEFRA SP1010 Development of Category 4 Screening Levels.

10.4 Assessment of Contamination Data

Based on a Soil Organic Matter content of an average 2.5%, an assessment of the soil data was undertaken as summarised in the tabulations hereunder, and presented on the worksheets in Appendix G.

10.4.1 Assessment of Metal Data

The assessment of the metal data is presented hereunder:

Table 9: Assessment of Metal Data

Contaminant	LQM / CIEH S4UL (mg/kg)	Maximum (mg/kg)	Exceedances	
			(mg/kg)	Location
Cadmium	11	<0.5		
Chromium	910	42.5		
Copper	2400	48.6		
Lead	200	131		
Mercury	1.2	<0.5		
Nickel	180	40.1		
Zinc	3700	240		

The above assessment confirms that no contaminant exceeds its respective guideline criterion. Hence, no risk to human health is indicated.

10.4.2 Assessment of Non-Metal Data

The assessment of the non-metal data is presented hereunder:

Table 10: Assessment of Non-Metal Data

Contaminant	LQM / CIEH S4UL (mg/kg)	Maximum (mg/kg)	Exceedances	
			(mg/kg)	Location
Arsenic	37	13.9		
Selenium	250	<1		
Free Cyanide	22	<1		

The above assessment confirms that no contaminant exceeds its respective guideline criterion. Hence, no risk to human health is indicated.

10.4.3 Assessment of PAH Data

The assessment of the non-metal data is presented hereunder:

Table 11: Assessment of PAH Data

Contaminant	LQM / CIEH S4UL (mg/kg)	Maximum (mg/kg)	Exceedances	
			(mg/kg)	Location
Naphthalene	5.6	<0.02		
Acenaphthylene	420	0.04		
Acenaphthene	510	0.03		
Fluorene	400	0.05		
Phenanthrene	220	0.59		
Anthracene	5400	0.19		
Fluoranthene	560	1.25		
Pyrene	1200	1.15		
Benz(a)anthracene	11	0.66		
Chrysene	22	0.67		
Benzo(b)fluoranthene	3.3	0.74		
Benzo(k)fluoranthene	93	0.28		
Benzo(a)pyrene	2.7	0.61		
Indeno(123-cd)pyrene	36	0.4		
Dibenz(ah)anthracene	0.28	0.07		
Benzo(ghi)perylene	340	0.35		

The above assessment confirms that no contaminant exceeds its respective guideline criterion. Hence, no risk to human health is indicated.

10.4.4 Assessment of Petroleum Hydrocarbon Data

The assessment of the Petroleum Hydrocarbon (TPH) data is presented hereunder:

Table 12: Assessment of Hydrocarbon Data

Contaminant	LQM / CIEH S4UL (mg/kg)	Maximum (mg/kg)	Exceedances	
			(mg/kg)	Location
Aromatic EC5-EC7	140	<0.01		
Aromatic EC7-EC8	290	<0.01		
Aromatic EC8-EC10	83	<0.01		
Aromatic EC10-EC12	180	<1		
Aromatic EC12-EC16	330	<1		
Aromatic EC16-EC21	540	<1		
Aromatic EC21-EC35	1500	12.1		
Aliphatic EC5-EC6	78	<0.01		
Aliphatic EC6-EC8	230	<0.01		
Aliphatic EC8-EC10	65	<0.01		
Aliphatic EC10-EC12	330	<1		
Aliphatic EC12-EC16	2400	<1		
Aliphatic EC16-EC35	92000	7.88		

The above assessment confirms that no contaminant exceeds its respective guideline criterion. Hence, no risk to human health is indicated.

10.4.5 Assessment of Asbestos Data

Asbestos containing materials (ACM's) were not detected in any sample analysed and therefore no risk to human health is indicated.

10.4.6 Assessment of BTEX Data

The appended laboratory contamination results confirm that all BTEX compounds are below their limit of detection (LOD) and therefore no risk to human health is indicated.

10.4.7 Assessment of Organo-Chlorine Pesticides

The appended laboratory contamination report confirms that Organo-Chlorine Pesticide fractions are below their LOD. Hence no risk to human health is indicated.

10.4.8 Assessment of Herbicides

The appended laboratory contamination report confirms the presence of 3-Amino-s-triazole (0.88mg/kg) in the sample from WS03. A review of current LQM/CIEH S4ULs, CL:Aire 'Soil Generic Assessment Criteria form Human Health Risk Assessment', WHO, and **CCG** in-house assessment criteria confirms that there are no current guideline values associated with the above contaminant. Hence it is concluded that the risk posed to human health is insignificant.

10.4.9 Summary of Human Health Assessment

The above human health risk assessment confirms that no soil contaminant exceeds its respective soil guideline criteria for residential land use. Hence no risk to human health is indicated.

Notwithstanding the above assessment, it is recommended that site levels in all new areas of proposed soft landscaping be reduced by a minimum of 300mm below proposed finished garden level, are to the surface of undisturbed natural drift deposits, whichever is the lesser, with site levels being reconstructed by the placement of clean imported topsoil, placed under a strict validation regime comprising 1nr analyses per 50m³, with a minimum of 4nr analyses per source material.

In addition to the above, contractors must remain aware that disturbance of the ground may uncover unanticipated features which may give rise to considerations of contamination as far as the exposed conditions may have the potential to impact on receptors including inter alia humans, animals, controlled waters, or the fabric of buildings. Any such encounters will require the contractor to halt work, isolate the risk area, and summon **CCG** to site to determine the nature of the exposure and to determine an appropriate course of action. Any such incidents will be fully documented in a detailed site Remediation Report.

11.0 CONTROLLED WATERS RISK ASSESSMENT

11.1 Assessment of Soil Leachate Metals, Non-Metals & Polycyclic Aromatic Hydrocarbon (PAH) Data

In the absence of adequate quantities or perched and/or natural groundwater, leachates prepared on soil recovered from 1nr borehole position (WS0) were analysed for a broad range of contaminants including metals, non-metals, speciated PAH and TPH concentrations. The results were assessed against Environmental Quality Standards (AA-EQS) for freshwater as shown hereunder.

Table 13: Assessment of Soil Leachate Data

Contaminant	WS02 Result (ug/l)	AA-EQS (ug/l)
Naphthalene	0.02	2.4
Lead	<5	20
Fluoranthene	0.35	0.1
Phenanthrene	0.10	-
Anthracene	0.03	-
Acenaphthylene	0.03	-
Pyrene	0.37	-
Chrysene	0.35	-
Fluorene	0.01	-
Nickel	<5	150
Indeno(123-cd)pyrene	0.21	0.02
Benzo(ghi)perylene	0.27	0.02
Copper	<5	40
Benzo[a]pyrene	0.31	0.05
Benzo[a]anthracene	0.25	0.05
Benzo[k]fluoranthene	0.35	0.03
Benzo[b]fluoranthene	0.34	0.03
Boron	21	1000
Cyanide	<5	-
Arsenic	<5	25
Mercury	<0.1	1
Selenium	<5	-
Cadmium	<1	5
pH	8.7	-
Sulphate	20	400000

The above assessment confirms the presence of some PAH contaminants. Hence a potential risk to controlled waters is indicated.

11.2 Assessment of Soil Leachate Hydrocarbon Data

Speciated hydrocarbon results were assessed by comparison with AA-EQS values for inland waters. In case of determinants not covered by AA-EQS values, results were compared to EQS Freshwater Criteria values or where no EQS Freshwater Criterion is available, then WHO guidelines for Drinking Water are adopted.

Table 14: Assessment of Soil Leachate Hydrocarbon Data

Contaminant	WS02 Result (ug/l)	AA-EQS (ug/l)	WHO ug/l
Aromatic EC5-EC7 (benzene)	<1	-	10
Aromatic EC7-EC8 (toluene)	<1	-	700
Aromatic EC8-EC10 (ethyl benzene)	11.8	-	300
Aromatic EC10-EC12	<5	-	100
Aromatic EC12-EC16	<5	-	100
Aromatic EC16-EC21	8.7	-	90
Aromatic EC21-EC35	137	-	90
Aliphatic EC5-EC6	<1	-	15000
Aliphatic EC6-EC8	<1	-	15000
Aliphatic EC8-EC10	<5	-	300
Aliphatic EC10-EC12	<5	-	300
Aliphatic EC12-EC16	14.6	-	300
Aliphatic EC16-EC21	26.1	-	(300)*
Aliphatic EC21-EC35	204	-	(300)*

The above assessment confirms the presence of an elevated concentration of Aromatic EC21-EC35 which exceeds its respective WHO guideline criteria. Hence potential risk to controlled waters and/or human health is indicated.

11.3 Summary of Controlled Waters Risk Assessment

The above controlled water risk assessment confirms the presence of some leachable PAH contaminants, and Aromatic EC21-EC35 in soils recovered from borehole WS02. Hence potential risk to controlled waters and/or human health is indicated.

Notwithstanding the above, given the absence of nearby sensitive receptors (*i.e.*, *source protection zone*, *water abstraction points etc.*), and given the underlying solid geology is overlain by a thick clay aquiclude, it is concluded that the risk posed to the wider aquatic environment and/or human health is insignificant.

12.0 POST INVESTIGATION CONCEPTUAL MODEL

Based on the findings of the investigation, a post investigation conceptual model may be constructed illustrating proven pollution linkages and summarising the conceptual remediation recommendations discussed above, as tabulated hereunder.

Table 15: Post Investigation Conceptual Model

Source	Pathway	Receptor	Remedial Options
The above human health risk assessment confirms that no soil contaminant exceeds its respective soil guideline criteria for residential land use. Hence no risk to human health is indicated.	-	-	Notwithstanding that there is no evidence of soil contamination, it is recommended that site levels in all new areas of proposed soft landscaping be reduced by a minimum of 300mm below proposed finished garden level, are to the surface of undisturbed natural drift deposits, whichever is the lesser, with site levels being reconstructed by the placement of clean imported topsoil, placed under a strict validation regime comprising 1nr analyses per 50m³, with a minimum of 4nr analyses per source material. In addition to the above, contractors must remain aware that disturbance of the ground may uncover unanticipated features which may give rise to considerations of contamination as far as the exposed conditions may have the potential to impact on receptors including inter alia humans, animals, controlled waters, or the fabric of buildings. Any such encounters will require the contractor to halt work, isolate the risk area, and summon CCG to site to determine the nature of the exposure and to determine an appropriate course of action. Any such incidents will be fully documented in a detailed site Remediation Report.

13.0 PRELIMINARY WASTE CLASSIFICATION

A waste classification exercise was undertaken in relation to potential offsite disposal of excavation arisings. The first stage entailed the assessment of the basic soil contamination data via the **HAZWASTE** online program. The output data from this basic assessment is provided in Appendix H. This program generates the baseline 'Hazardous / Non-Hazardous' classification of soils.

The appended **HAZWASTE** report classifies all soils analysed classify as being 'Non-Hazardous Waste.' and therefore surplus spoil for off-site disposal from these positions may be disposed at a suitably licenced 'Non-Hazardous Waste' landfill facility.

It should be noted that the final decision on waste classification is at the discretion of the accepting landfill, and it is recommended that consultation with landfill operators be undertaken during the development of the waste management plan.

14.0 GEOTECHNICAL ASSESSMENT

14.1 Introduction

It is understood that an existing agricultural storage barn is to be modified / converted for residential use together with the construction of a detached garage and the creation of access drive and other associated external landscaping works. The existing and proposed site layouts are shown on a series of architectural drawings contained herein.

14.2 Observed Ground Conditions

This intrusive ground investigation confirms the presence of made ground deposits comprising generally brown locally grey sands and gravel, locally reworked clay deposits extending to depths varying between 0.2m > 0.8mbgl. The sequence thereafter continues in natural drift deposits comprising firm becoming stiff brown boulder clay, locally interbedded with thin sand horizons, proven to 5mbgl.

There was no visual and/or olfactory evidence of contamination and/or biodegradable materials affecting the made ground mass at any sampling position.

Slight seepages were recorded at all exploratory sampling positions during the intrusive investigation works, with monitored standing water levels being in the order of 0.48m – 0.59mbgl during the initial round of groundwater monitoring.

14.3 Foundations and Floor Slab Construction

In the observed ground conditions, for any future developments, traditional strip (spread) foundations may be adopted with foundations bearing on the underlying firm varying to stiff clay strata standing at a notional depth of c. 1.2mbgl. Foundations set at this depth may be designed on a Presumed Bearing Value of 100kN/m² with a minimum strip width of 750mm. All foundation strips should be a minimum 225mm thick and be reinforced with A393 mesh in the bottom third.

It is important that all foundation excavations be inspected by a competent ground engineer to ensure that the predicted founding strata has been encountered.

The appended soil engineering test results confirm the clay strata is of '*Low – Intermediate*' plasticity and hence '*Low – Intermediate*' shrinkability. Should tree planting/removal be planned, then foundation depths may require adjustment to comply with the guidance contained in NHBC Standards Chapter 4.2.

Where placement of structural concrete does not immediately follow trench excavation, the clay formations should be protected by placement of blinding concrete to prevent deterioration.

In the observed ground condition, ground bearing slabs may be adopted, subject to rigorous preparation of the subgrade: Such preparation should include as a minimum:

- Reduction in ground levels to 450mm below slab underside, ensuring all organic soils has been removed
- Thorough compaction under walking supervision at reduced level with any areas exhibiting excessive deflection being grubbed out in 200mm increments and in-filled with thoroughly compacted DTp Type 1 subbase
- Placement and compaction of 3 x 150mm layers DTp Type 1 subbase
- Construction of blinding sand, dpm, slab, screed, and finishes.

As an alternative, fully suspended, passively vented, block and beam floors may be adopted.

14.4 Excavations

Excavations in the observed made ground and natural drift soils may be undertaken by light hydraulic excavators.

Excavations in excess of 1.2mbgl will require side support.

14.5 Groundwater Management

Slight seepages were recorded at all exploratory sampling positions during the intrusive investigation works, with monitored standing water levels being in the order of 0.48m – 0.59mbgl during the initial round of groundwater monitoring.

Taking into account the above groundwater observations, a prudent contractor would allow for pumping to maintain dry working conditions during foundation construction and/or service installations, particularly during periods of heavy / prolonged periods of precipitation.

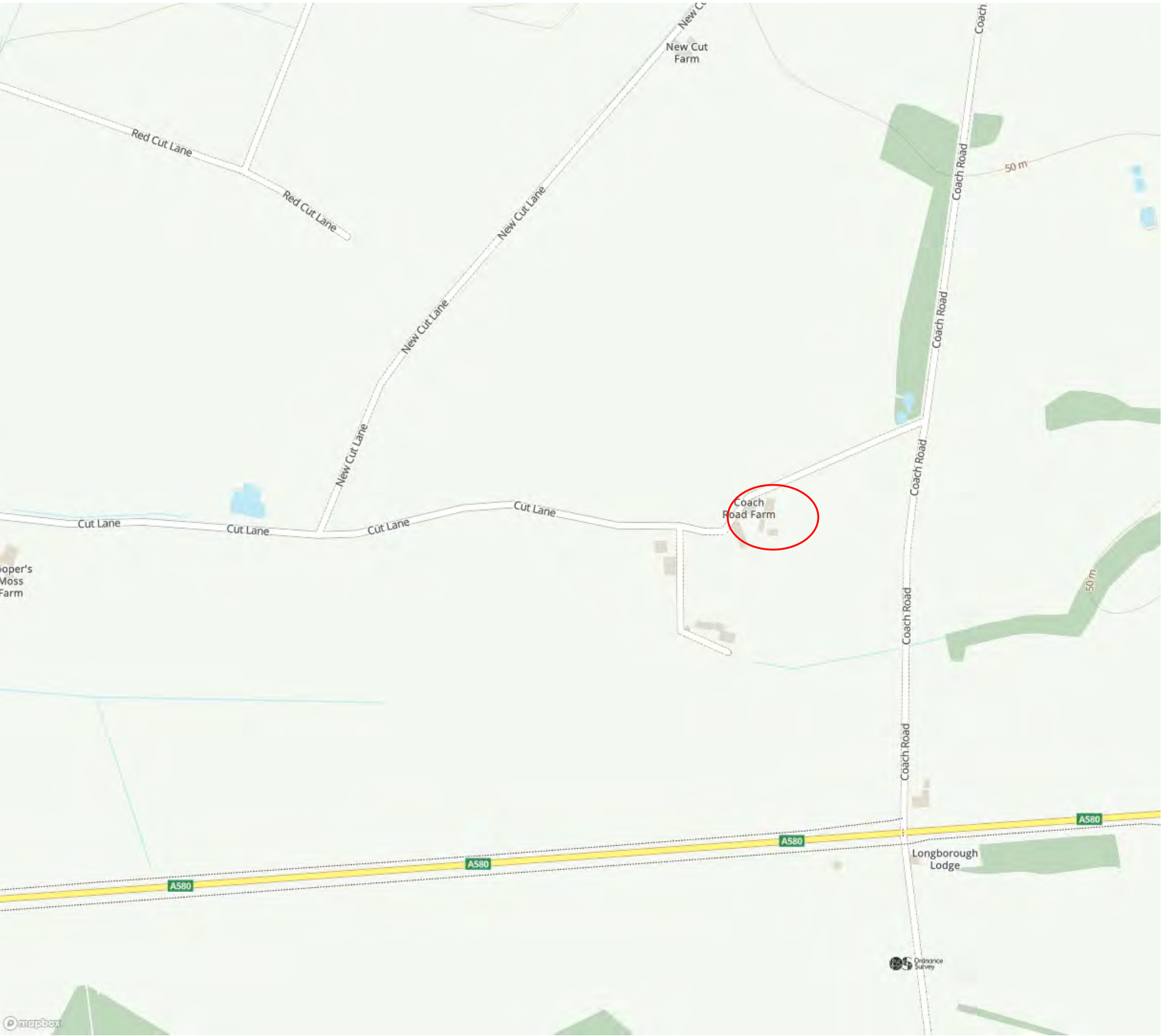
15.0 SUMMARY CONCLUSIONS

The recommendations hereunder are based on the salient sections of the report and should not be referred to in isolation of the relevant sections of the report. All recommendations are subject to Regulatory Local Authority review.

Table 16: Summary of Conclusions

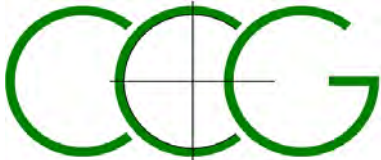
Soil Contamination & Remediation	The above human health risk assessment confirms that no soil contaminant exceeds its respective soil guideline criteria for residential land use. Hence no risk to human health is indicated.
	Notwithstanding the above assessment, it is recommended that site levels in all new areas of proposed soft landscaping be reduced by a minimum of 300mm below proposed finished garden level, are to the surface of undisturbed natural drift deposits, whichever is the lesser, with site levels being reconstructed by the placement of clean imported topsoil, placed under a strict validation regime comprising 1nr analyses per 50m ³ , with a minimum of 4nr analyses per source material.
	In addition to the above, contractors must remain aware that disturbance of the ground may uncover unanticipated features which may give rise to considerations of contamination as far as the exposed conditions may have the potential to impact on receptors including inter alia humans, animals, controlled waters, or the fabric of buildings. Any such encounters will require the contractor to halt work, isolate the risk area, and summon CCG to site to determine the nature of the exposure and to determine an appropriate course of action. Any such incidents will be fully documented in a detailed site Remediation Report.
Controlled Waters	The above controlled water risk assessment confirms the presence of some leachable PAH contaminants, and Aromatic EC21-EC35 in soils recovered from borehole WS02. Hence potential risk to controlled waters and/or human health is indicated.
	Notwithstanding the above, given the absence of nearby sensitive receptors (<i>i.e.</i> , <i>source protection zone</i> , <i>water abstraction points etc.</i>), and given the underlying solid geology is overlain by a thick clay aquiclude, it is concluded that the risk posed to the wider aquatic environment and/or human health is insignificant.
Water Mains	The preliminary findings indicate that the soil concentrations of pertinent hydrocarbon contaminant species are below the threshold concentrations specified by the UKWIR, indicating that PE mains may be deployed. Good practice requires that mains be laid in a remediated alignment comprising of clean granular fill extending to 600mm + pipe diameter and to 300mm below pipe underside.
	Pipes should be laid in accordance with BS EN 12201-2 'Plastic piping systems for water supply, and for drainage and sewerage under pressure as stated in UKWIR guidance.
Preliminary Waste Classification	It should be noted that this recommendation is subject to the opinion of the water supplier, and in this instance the local water authority (United Utilities) must be consulted to confirm that the proposals above accord with their interpretation of current guidance.
Concrete specification	The appended Hazwaste report classifies all soils analysed classify as being ' <i>Non-Hazardous Waste</i> .' and therefore surplus spoil for off-site disposal from these positions may be disposed at a suitably licenced ' <i>Non-Hazardous Waste</i> ' landfill facility.
	Concrete in the ground should be specified to conform to the compositional requirements of DC-1 as defined in BRE Special Digest 1: 2005
Gas Risk Assessment	After 4nr rounds of monitoring, a preliminary Gas Screening Value (GSV) of 0.00011l/hrs is calculated for CO ₂ , and <0.0001l/hr for CH ₄ .
	Using these GSV values, the risk to the proposed development was assessed in line with Situation A as defined in CIRIA C665, and on this basis the site complies with Characteristic Situation 1 (CS1) and based on this classification gas protection measures are not required.
Foundation Design	Notwithstanding the above, it must be borne in mind that a further 2nr rounds of monitoring are required to complete the ongoing gas- groundwater monitoring programme.
	See Section 15.0 for fuller discussion
Floor Slabs	See Section 15.0 for fuller discussion
Groundwater Control	Slight seepages were recorded at all exploratory sampling positions during the intrusive investigation works, with monitored standing water levels being in the order of 0.48m – 0.59mbgl during the initial round of groundwater monitoring.
	Taking into account the above groundwater observations, a prudent contractor would allow for pumping to maintain dry working conditions during foundation construction and/or service installations, particularly during periods of heavy / prolonged periods of precipitation.
Excavations	Excavations in the observed made ground and natural drift soils may be undertaken by light hydraulic excavators.
	Excavations in excess of 1.2mbgl will require side support.
Further work	• Complete the ongoing gas – groundwater monitoring programme • Update gas risk assessment • Prepare Phase III Remediation Strategy Report • Prepare Phase IV Validation Report

APPENDIX A: DRAWINGS



DO NOT SCALE

Notes: Study Site



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UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

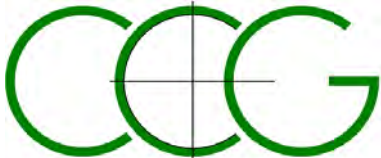
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Project: Coach Road Farm, Cut Lane, Knowsley, L33	
Title: Aerial Photograph	
Scale: NTS	Issue: 01
Drawn by: DG	Date: May 2023
Project No. CCG-C-23-13833	Drawing No. 01

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DO NOT SCALE

Notes: Study Site

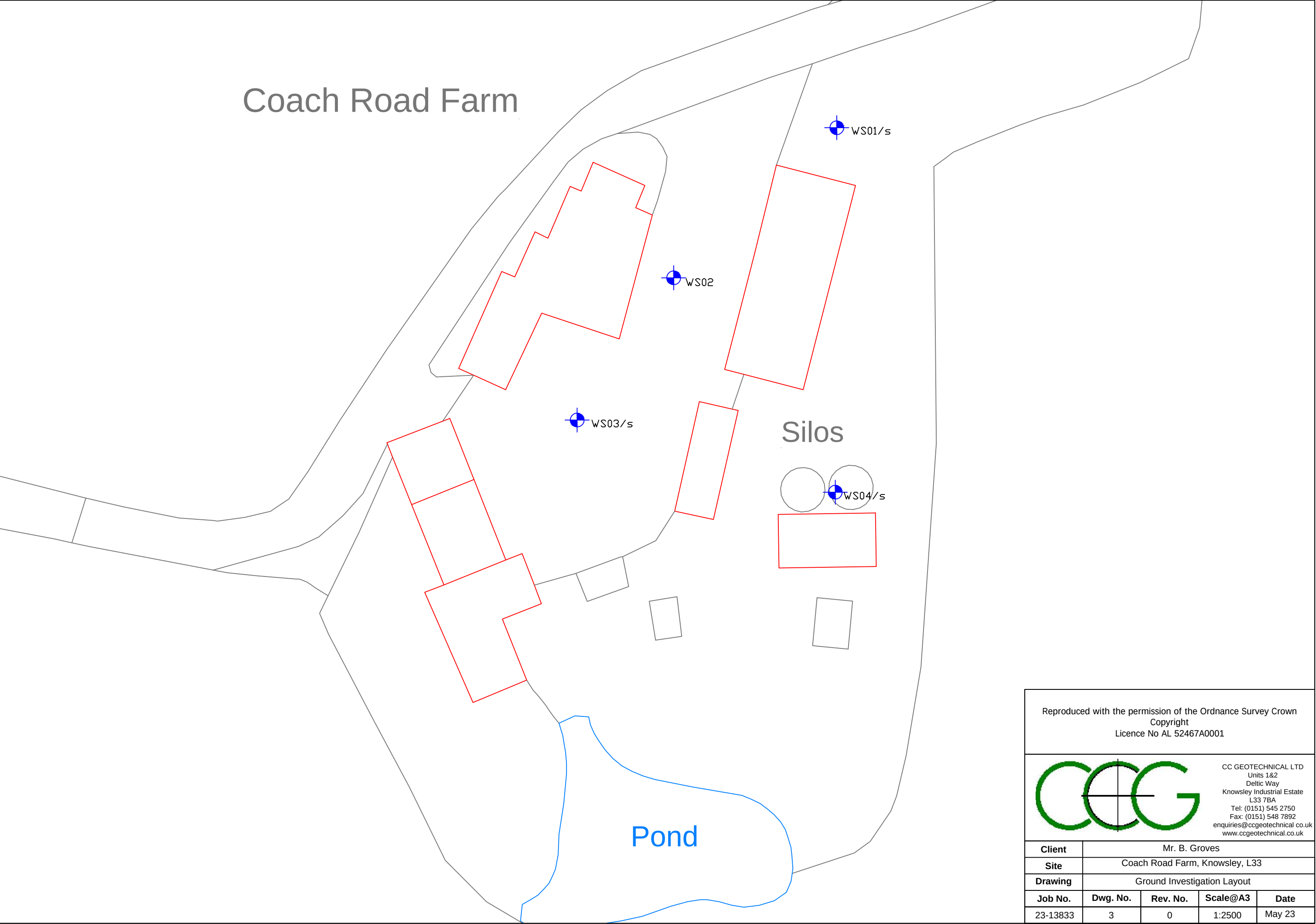


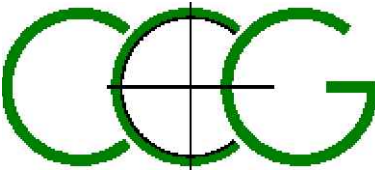
CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

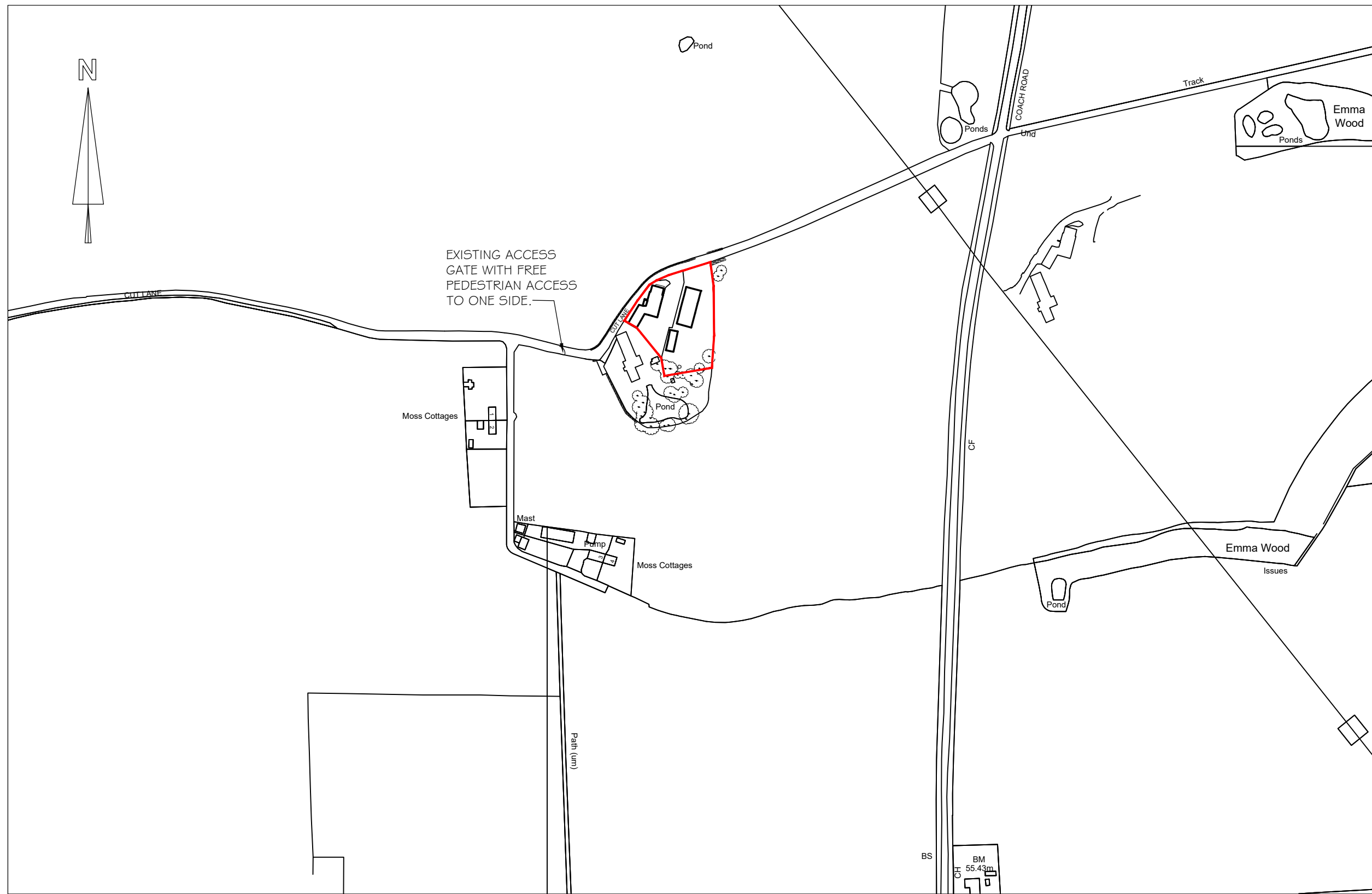
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Project: Coach House Farm, Cut Lane, Knowsley, L33	
Title: Aerial Photograph	
Scale: NTS	Issue: 01
Drawn by: DG	Date: May 2023
Project No. CCG-C-23-13833	Drawing No. 02

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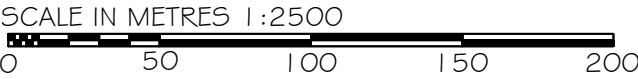
Coach Road Farm



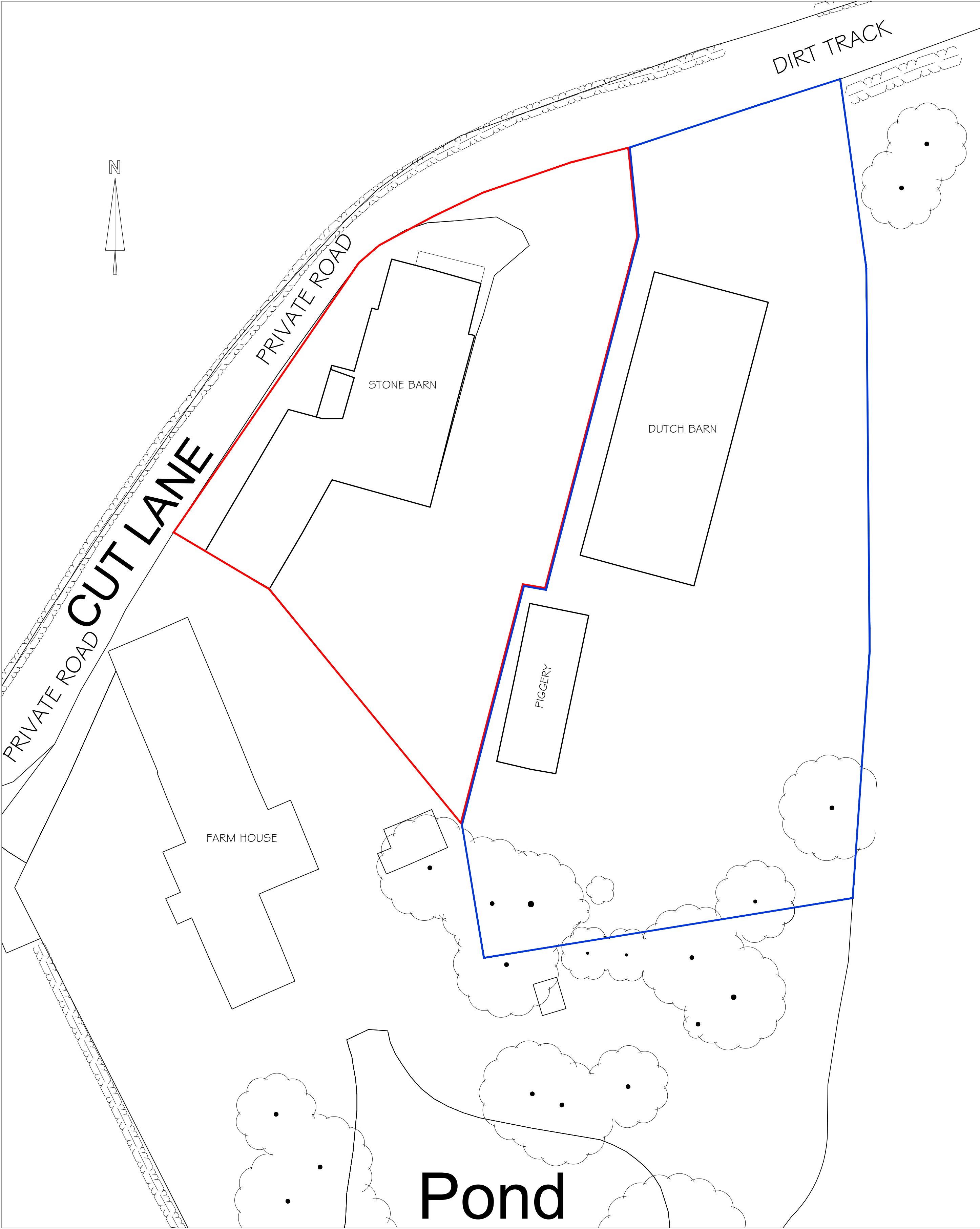
Reproduced with the permission of the Ordnance Survey Crown Copyright Licence No AL 52467A0001				
		CC GEOTECHNICAL LTD Units 1&2 Deltic Way Knowsley Industrial Estate L33 7BA Tel: (0151) 545 2750 Fax: (0151) 548 7892 enquiries@ccgeotechnical.co.uk www.ccgeotechnical.co.uk		
Client	Mr. B. Groves			
Site	Coach Road Farm, Knowsley, L33			
Drawing	Ground Investigation Layout			
Job No.	Dwg. No.	Rev. No.	Scale@A3	Date
23-13833	3	0	1:2500	May 23



LOCATION PLAN (1:2500)



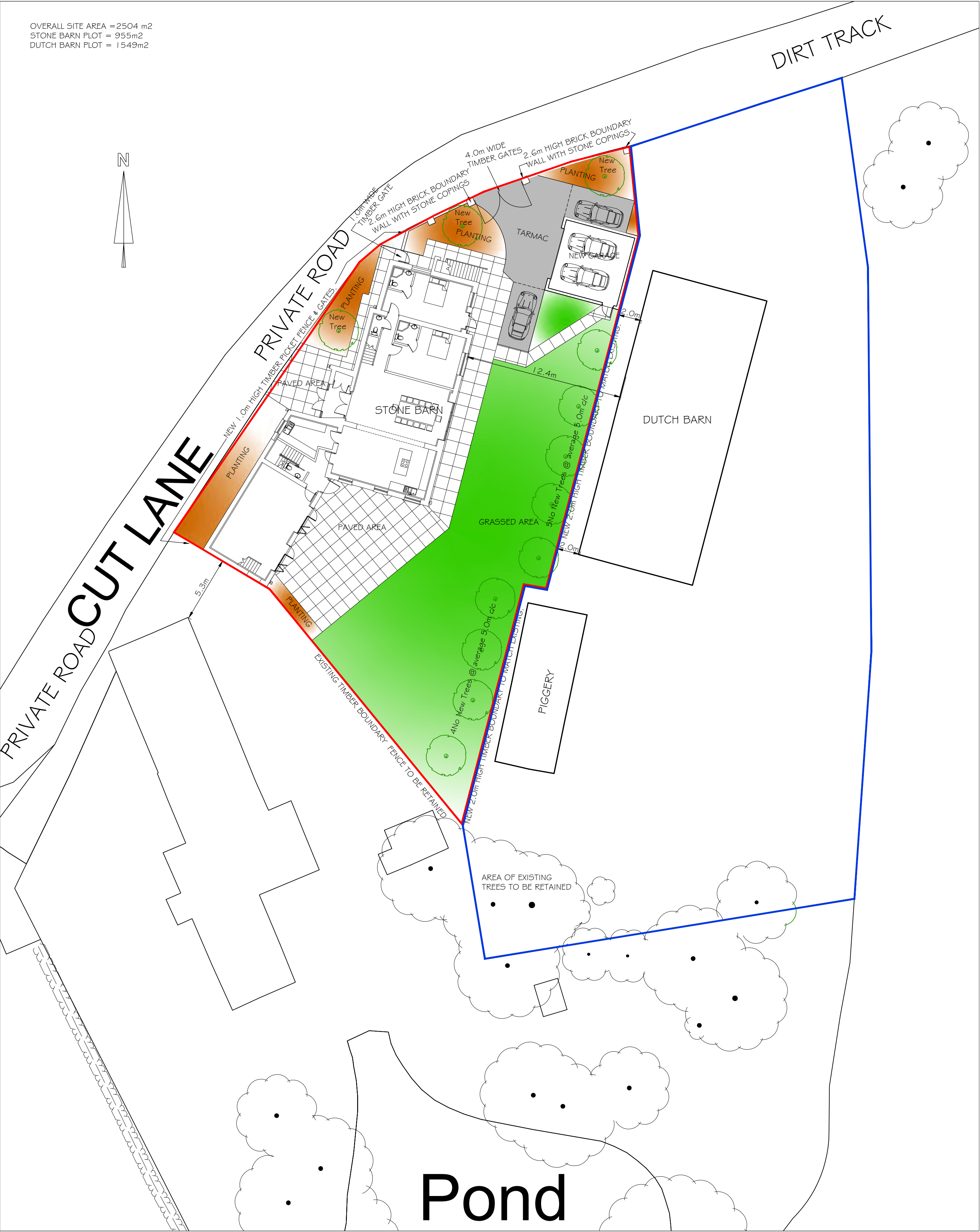
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		Date MAY 2022
Plan	LOCATION PLAN	Drg.No MG2022/01C



EXISTING BLOCK PLAN (1:200)



NOTES
EXACT DETAIL OF ALL BOUNDARY TREATMENTS TO BE AGREED SEE DRAWING 03 FOR INDICATIVE DETAILS
ALL NEW TREES TO BE 3m STANDARD OF NATIVE SPECIES 14No NEW TREES WITH 1 No. EXISTING DAMAGED TREE TO BE REMOVED.
TYPE AND SPACING OF TREES TO BE AGREED.
SEE DRAWING 03 FOR TREE PLANTING DETAIL.

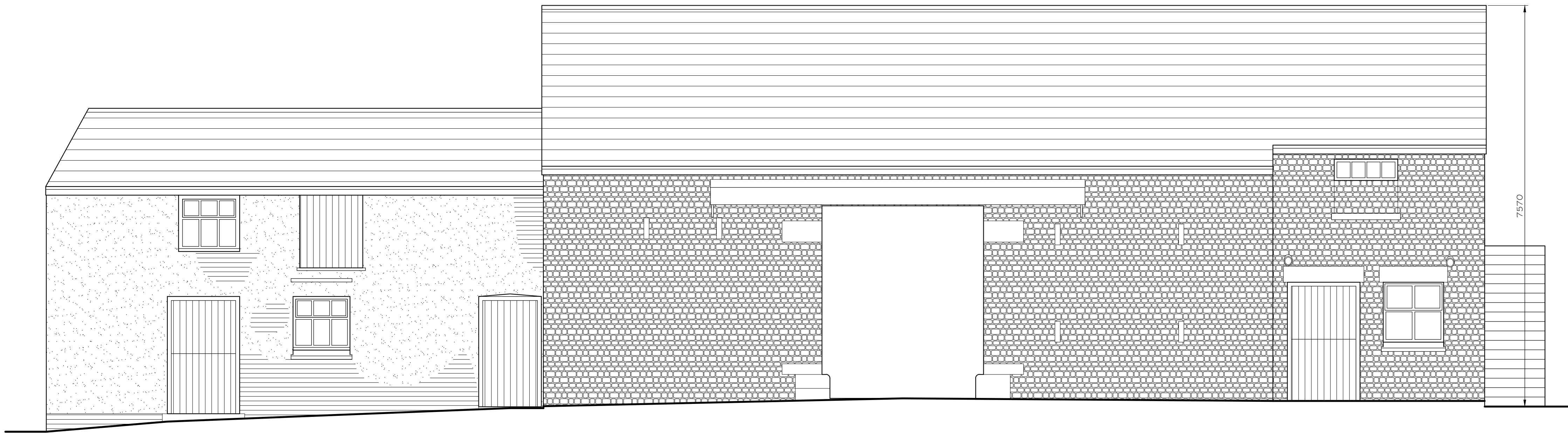


PROPOSED BLOCK PLAN (1:200)

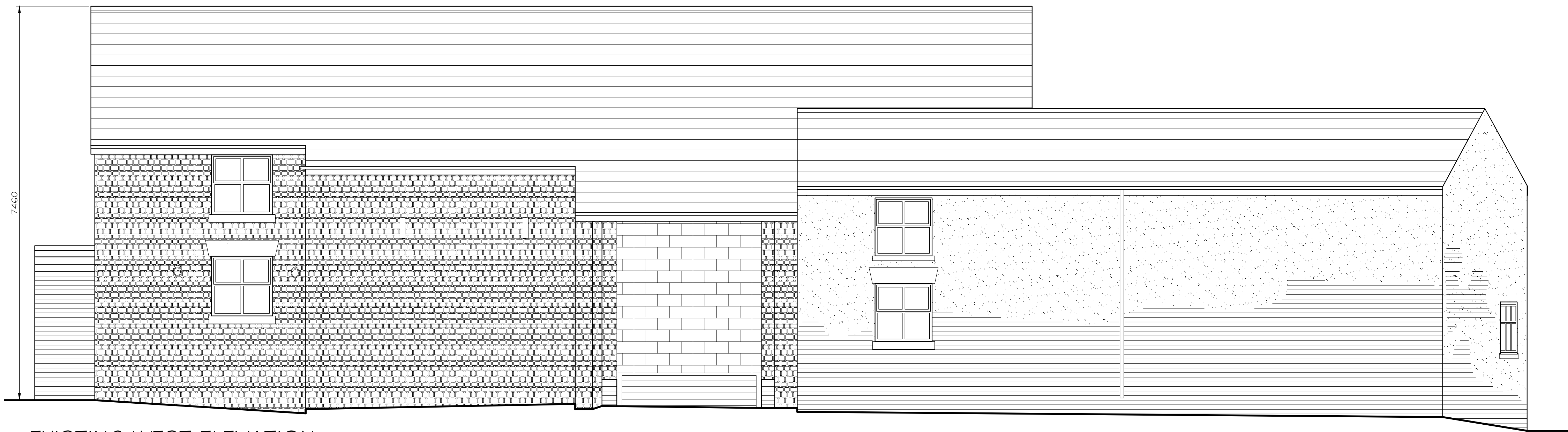


REVISION A - DUTCH BARN & PIGGERY OMITTED FROM APPLICATION # MAIN TITLE CHANGED TO REFLECT SAME. - Sept 2022

Project	PROPOSED CONVERSION OF EXISTING STONE BARN LAND AT FORMER COACH ROAD FARM CUT LANE KNOWSLEY L33 3AQ	Scale	1:200 @ A1
		Date	MAY 2022
Plan	EXISTING & PROPOSED SITE PLANS	Drwg.No	MG2022/02 A



EXISTING EAST ELEVATION (1:50)



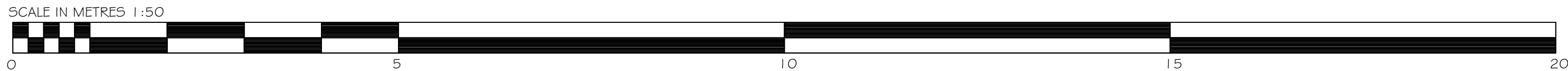
EXISTING WEST ELEVATION (1:50)



EXISTING NORTH ELEVATION (1:50)



EXISTING SOUTH ELEVATION (1:50)



REVISION A - DUTCH BARN & PIGGERY OMITTED FROM APPLICATION & MAIN TITLE CHANGED TO REFLECT SAME. - Sept 2022

Project PROPOSED CONVERSION OF EXISTING STONE BARN LAND AT FORMER COACH ROAD FARM CUT LANE KNOWSLEY L33 3AQ	Scale 1:50 @ A1
	Date MAY 2022
	Drwg No MG2022/06 A
Plan	EXISTING ELEVATIONS OF STONE BARN



PROPOSED EAST ELEVATION (1:50)



PROPOSED WEST ELEVATION (1:50)



PROPOSED NORTH ELEVATION (1:50)



PROPOSED SOUTH ELEVATION (1:50)

NOTES:-

ROOF -

EXISTING ROOF TIMBERS TO BE RETAINED & REPAIRED AS NECESSARY & LEFT EXPOSED

EXISTING SLATE TO BE TAKEN OFF AND RAISED TO ALLOW NECESSARY INSULATION LAYER, ANY NEW SLATE TO BE NATURAL SLATE.

FASCIA BOARDS

EXISTING ROTTEN/MISSING FASCIA BOARDS TO BE REMOVED.

NEW FASCIA BOARDS PVC COLOUR TBA.

WALLS

EXISTING WALLS TO 1757 BARN BE REPAIRED AS NECESSARY USING RECLAIMED STONE AND NEW STONE TO MATCH EXISTING.

WALLS TO LATER EXTENSION CURRENTLY RENDERED TO BE REPAIRED/ REBUILT AS NECESSARY USING RECLAIMED AND NEW BRICK TO MATCH EXISTING AND RENDERED TO MATCH EXISTING COLOUR TBA.

ALL EXISTING EXTERNAL WALLS TO BE DRY LINED WITH INSULATED PLASTERBOARD TO PROVIDE NECESSARY INSULATION.

RAINWATER GOODS

PPC ALUMINIUM TO MATCH EXISTING - PROFILE/COLOUR TBA

WINDOWS/DOORS

NEW WINDOWS TO BE PPC ALUMINIUM COLOUR ANTHRACITE GREY TO MATCH EXISTING STYLE.

NEW STONE CILLS AND LINTELS TO MATCH EXISTING COLOUR & PROFILE

ROOF LIGHTS

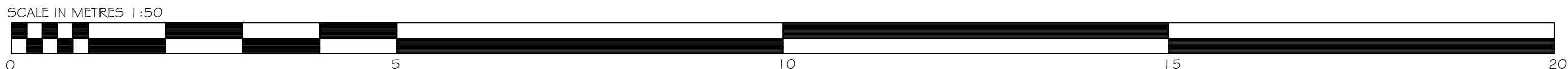
NEW ROOF LIGHTS TO BE VELUX OR SIMILAR APPROVED CONSERVATION TYPE

ROOF LIGHTS

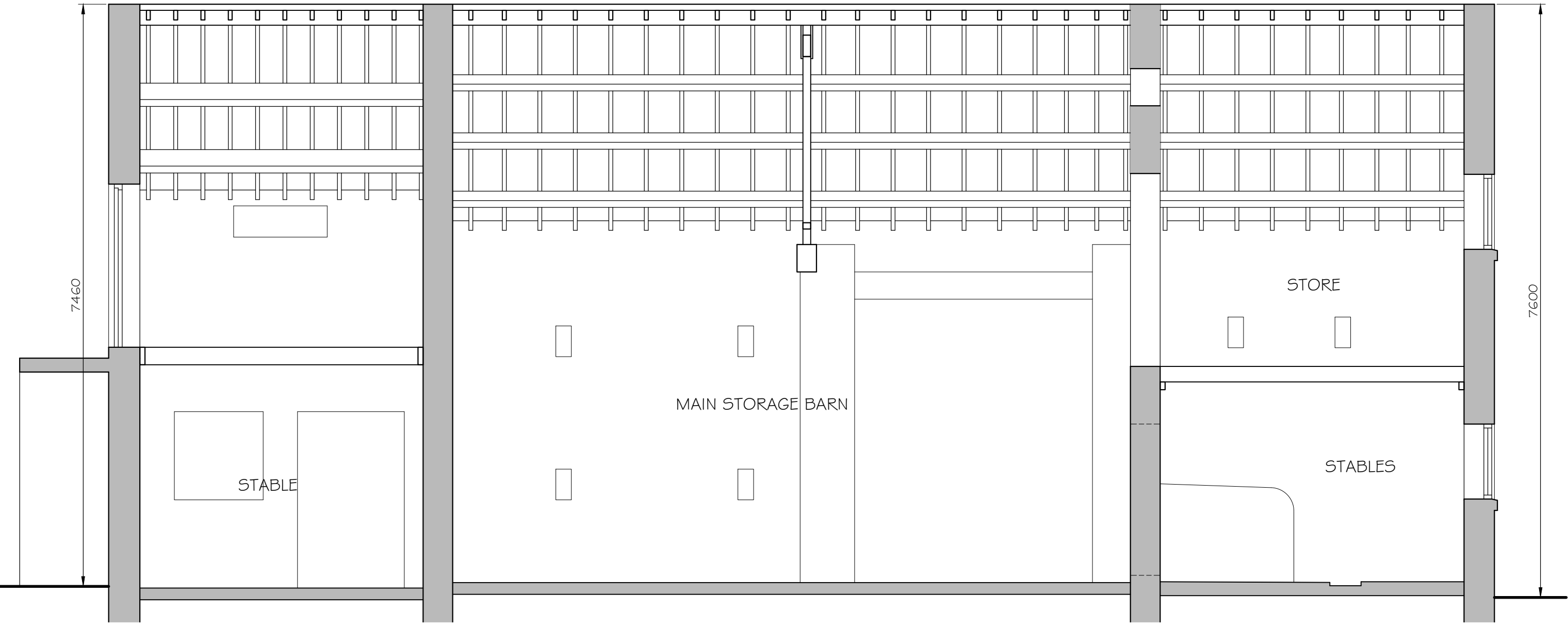
NEW FLOORS

NEW UPPER FLOORS TO UTILISE EXISTING TIMBER STRUCTURE WHERE POSSIBLE, NEW UPPER FLOORS TO BE TIMBER FLOORS

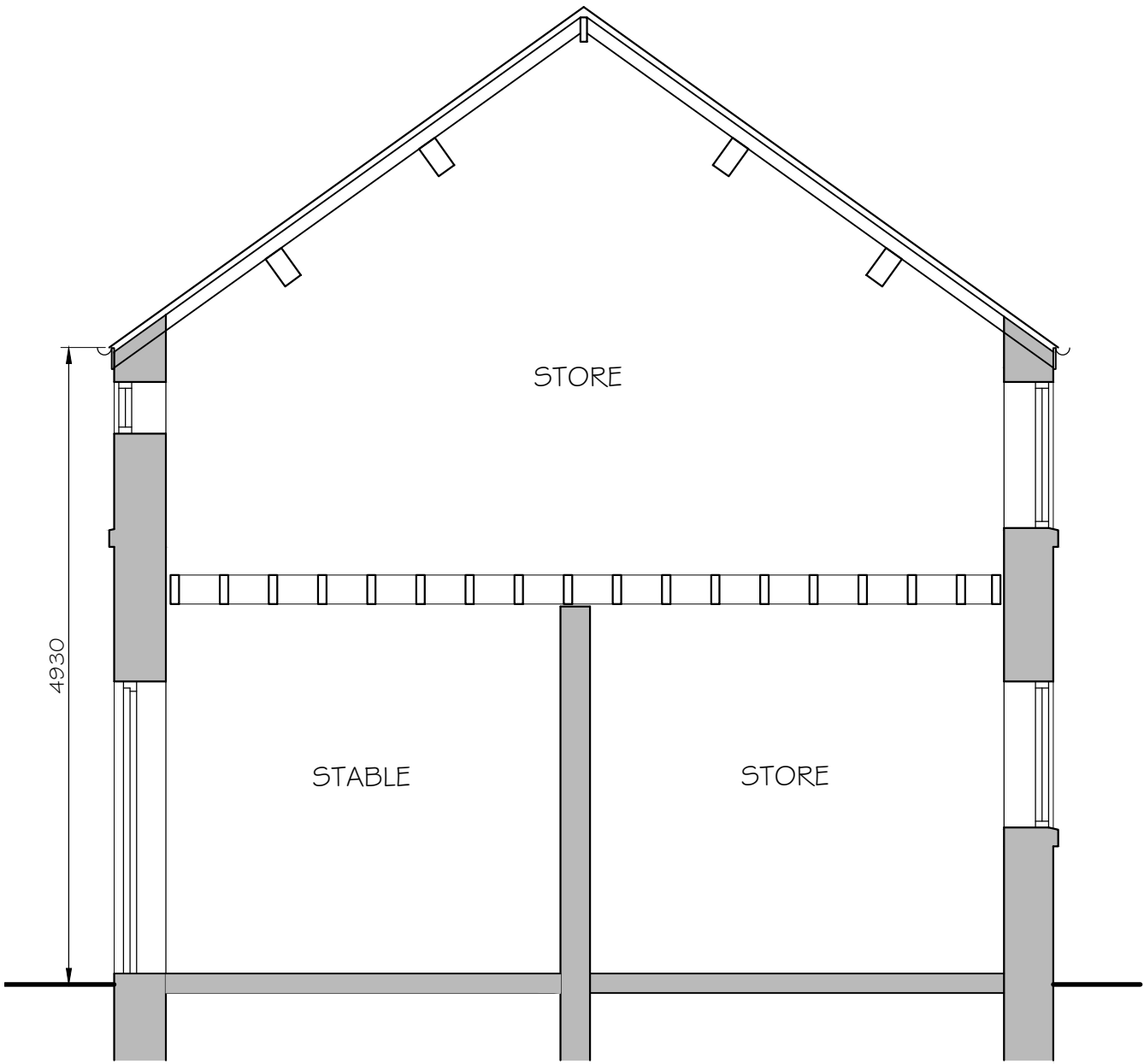
GROUND FLOOR FLOORS TO BE OVER LAID WITH INSULATION AND SAND/CEMENT SCREED.



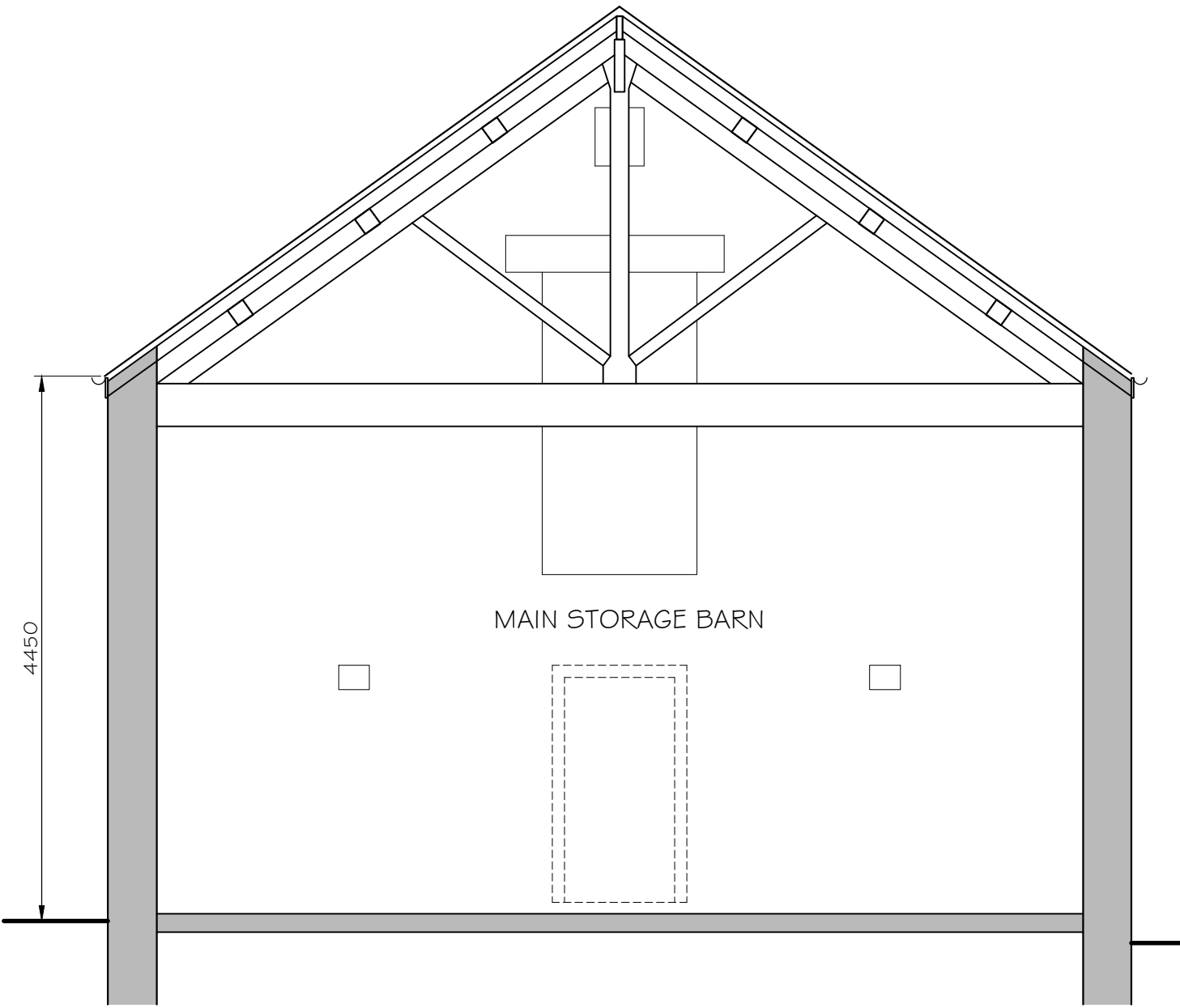
REVISION A - 13/09/2022 - HATCH TO NEW WALLS AMENDED, DOORS AND WINDOWS CHANGED TO ALLOW ALL VENTS & 100mm DIA WEEP PIPES TO BE RETAINED, ALL OPENINGS TO BE BLOCKED SHOWN RECESSED MIN 100mm, DOOR, WINDOW AND BLOCKED OPENINGS NUMBERED.	
REVISION B - DUTCH BARN & FIGGERY OMITTED FROM APPLICATION & MAIN TITLE CHANGED TO REFLECT SAME. - Sept 2022	
Project	PROPOSED CONVERSION OF EXISTING STONE BARN
Land	LAND AT FORMER COACH ROAD FARM
Knowsley	CUT LANE
L33 3AQ	KNOWSLEY
Scale	1:50 @ A1
Date	MAY 2022
Plan	PROPOSED ELEVATIONS OF STONE BARN
Draw No	MG2022/09 B



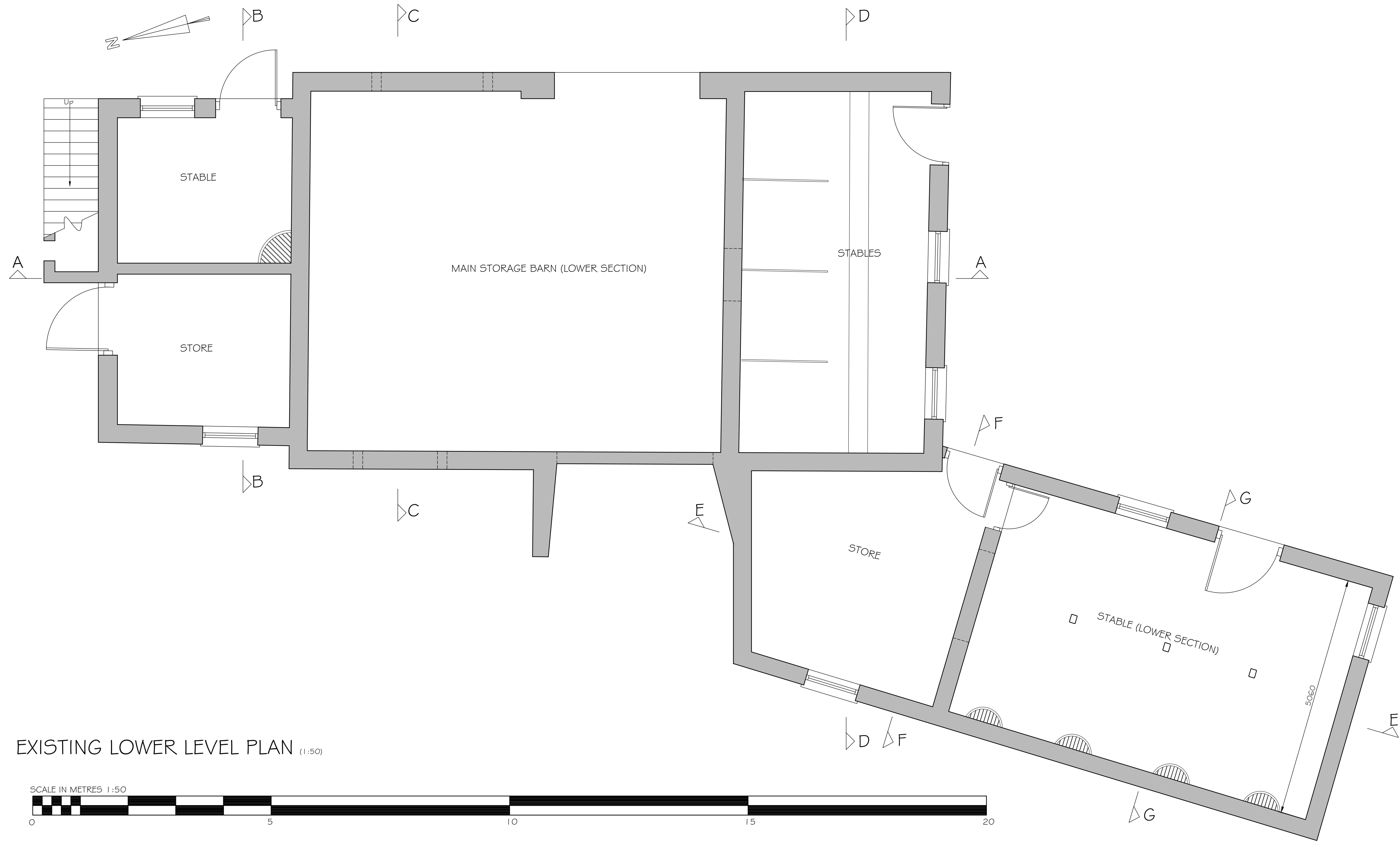
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EXISTING SECTION B-B (1:50)

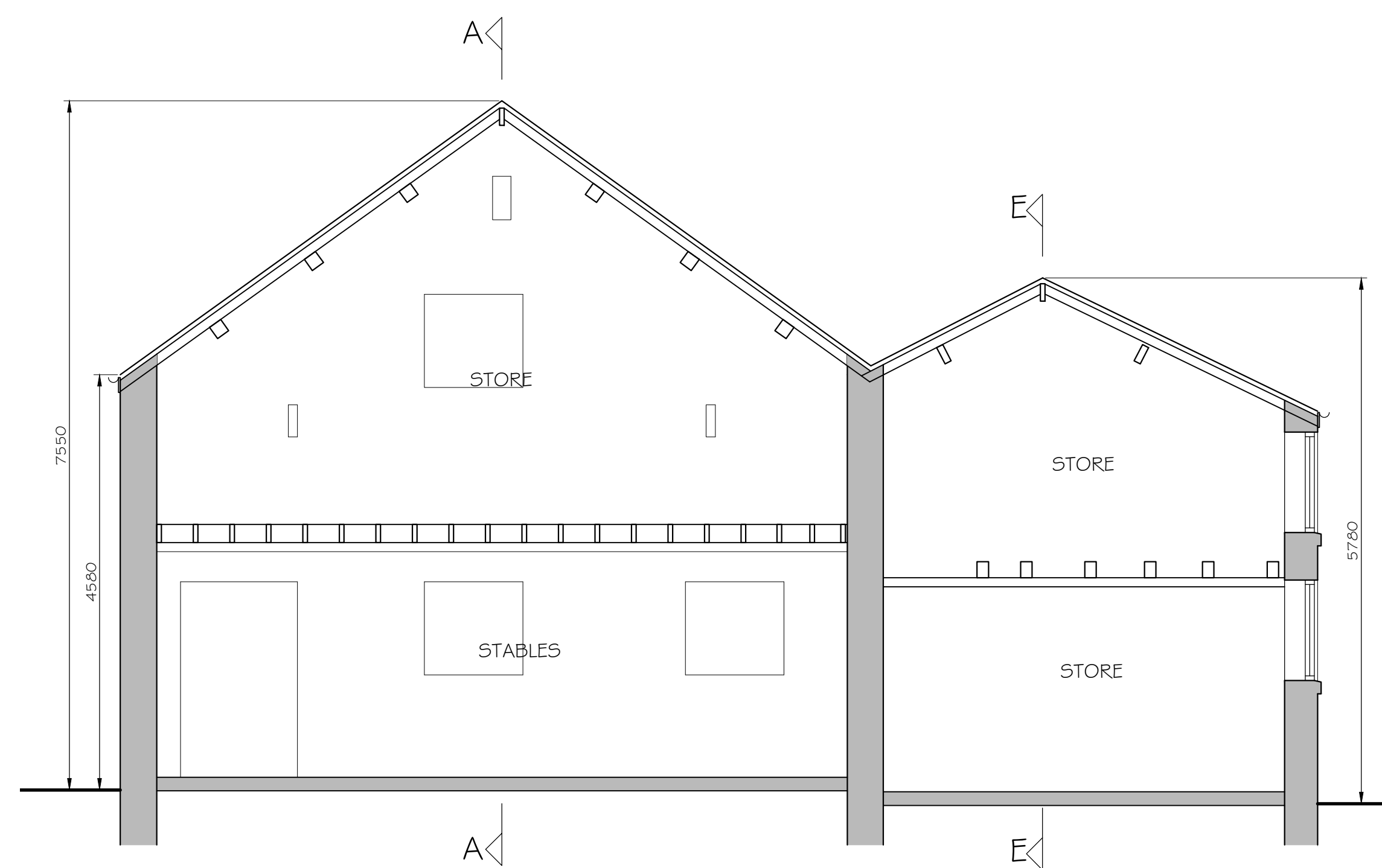


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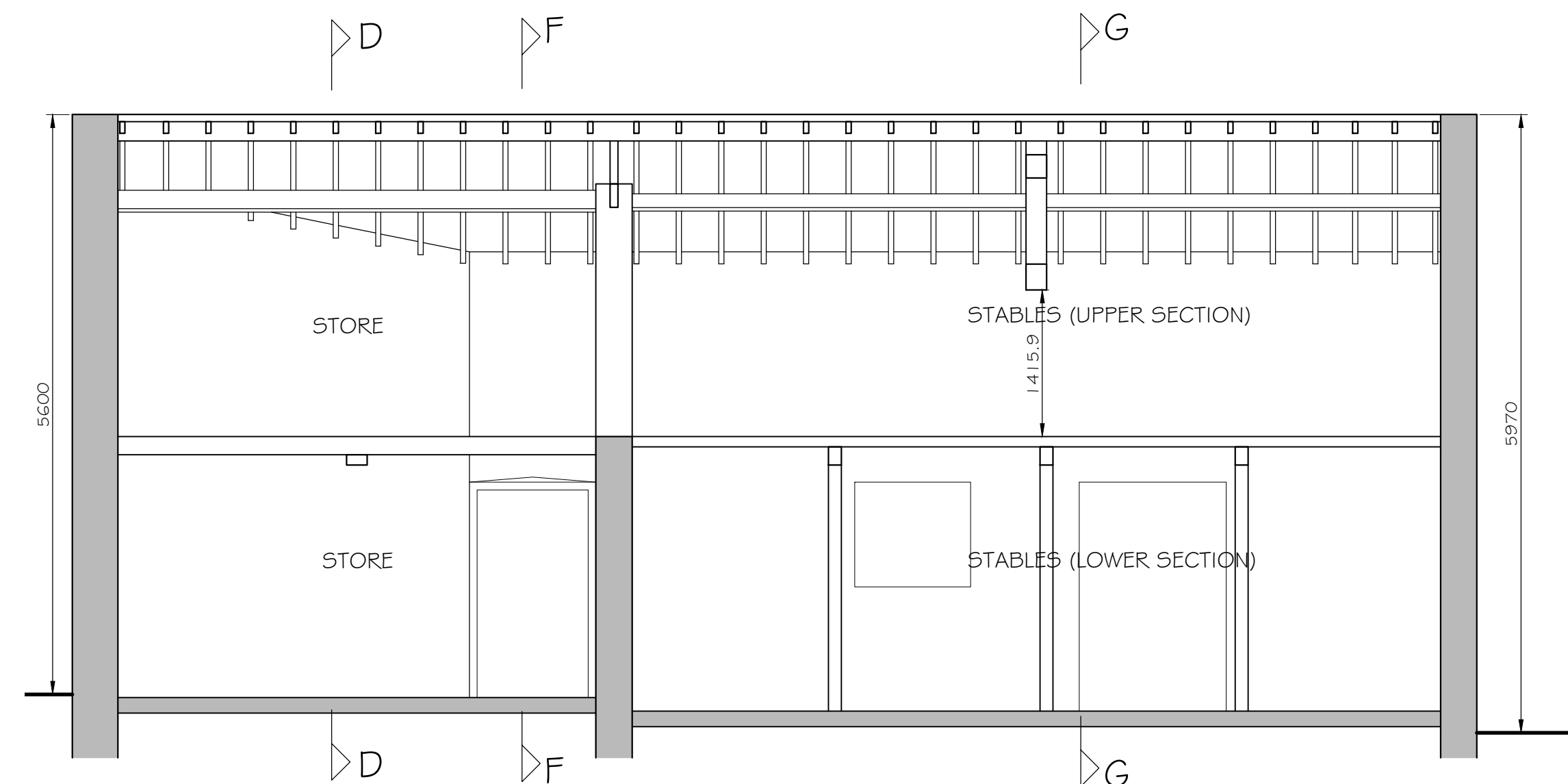


EXISTING LOWER LEVEL PLAN (1:50)

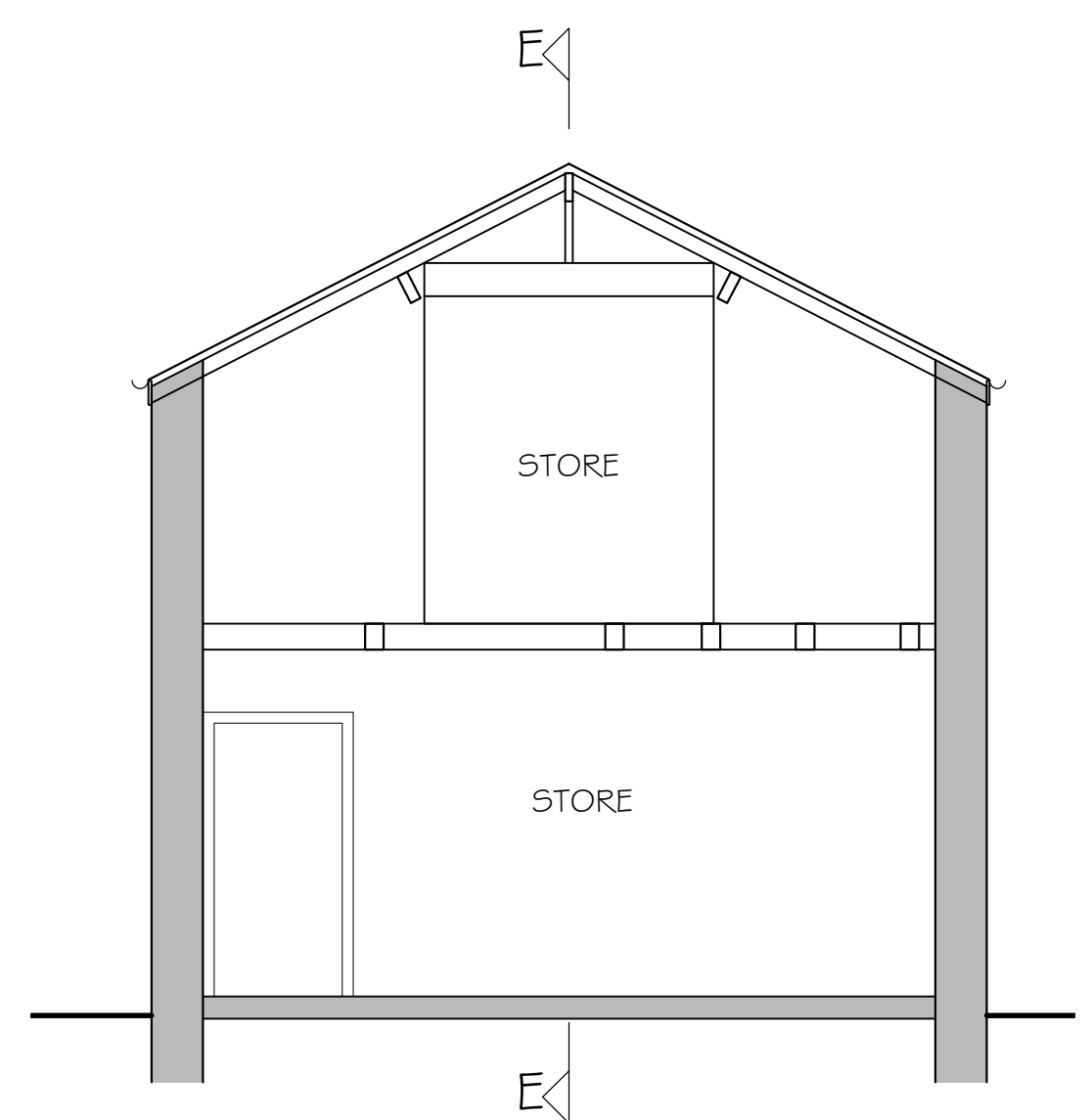
REVISION A - DUTCH BARN & PIGGERY OMITTED FROM APPLICATION & MAIN TITLE CHANGED TO REFLECT SAME. - Sept 2022	
Project	PROPOSED CONVERSION OF EXISTING STONE BARN LAND AT FORMER COACH ROAD FARM CUT LANE KNOWSLEY L33 3AQ
Scale	1:50 @ A1
Date	MAY 2022
Plan	EXISTING LOWER LEVEL PLAN AND SECTIONS AA, BB, CC & DD TO STONE BARN
Dwg.No	MG2022/04 A



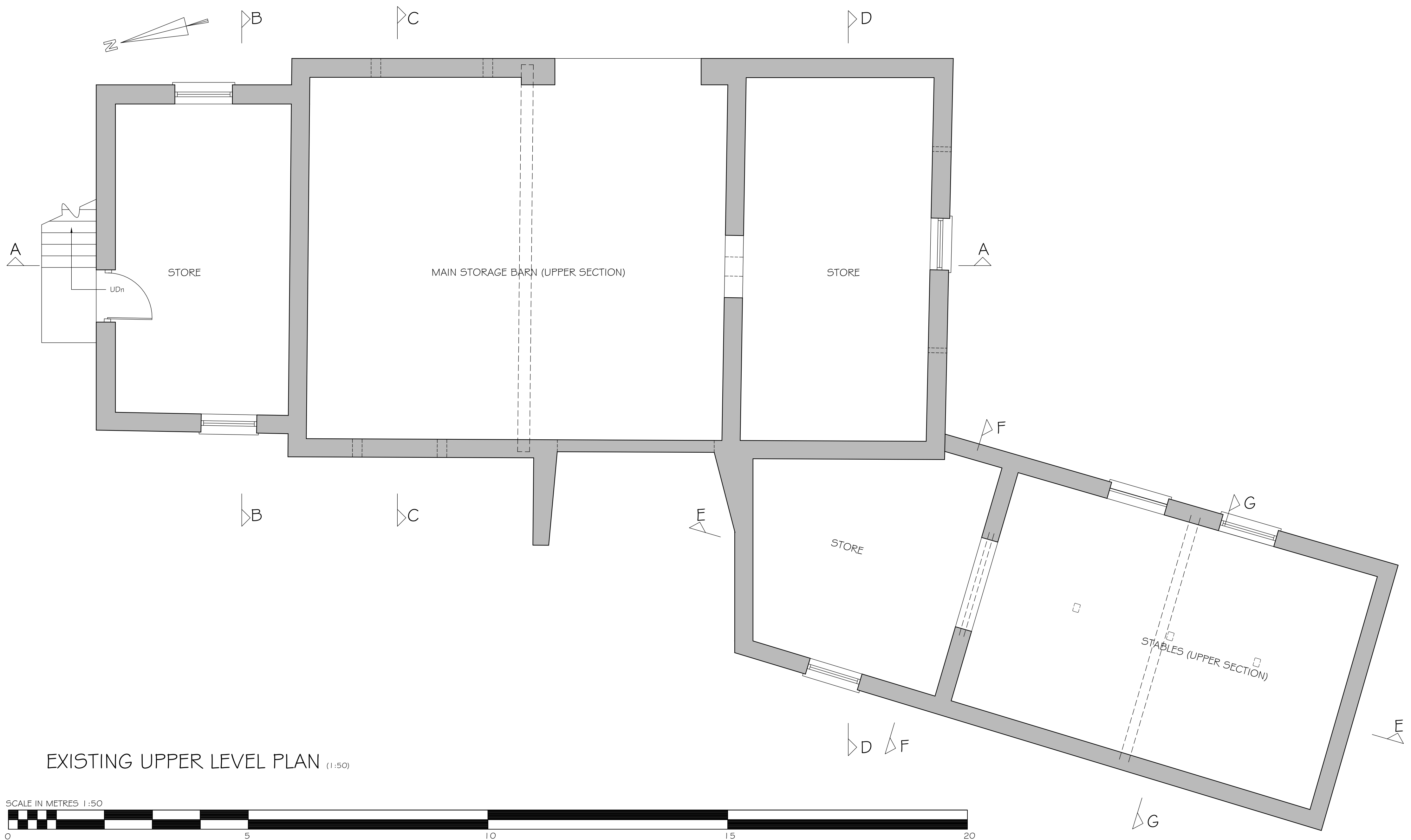
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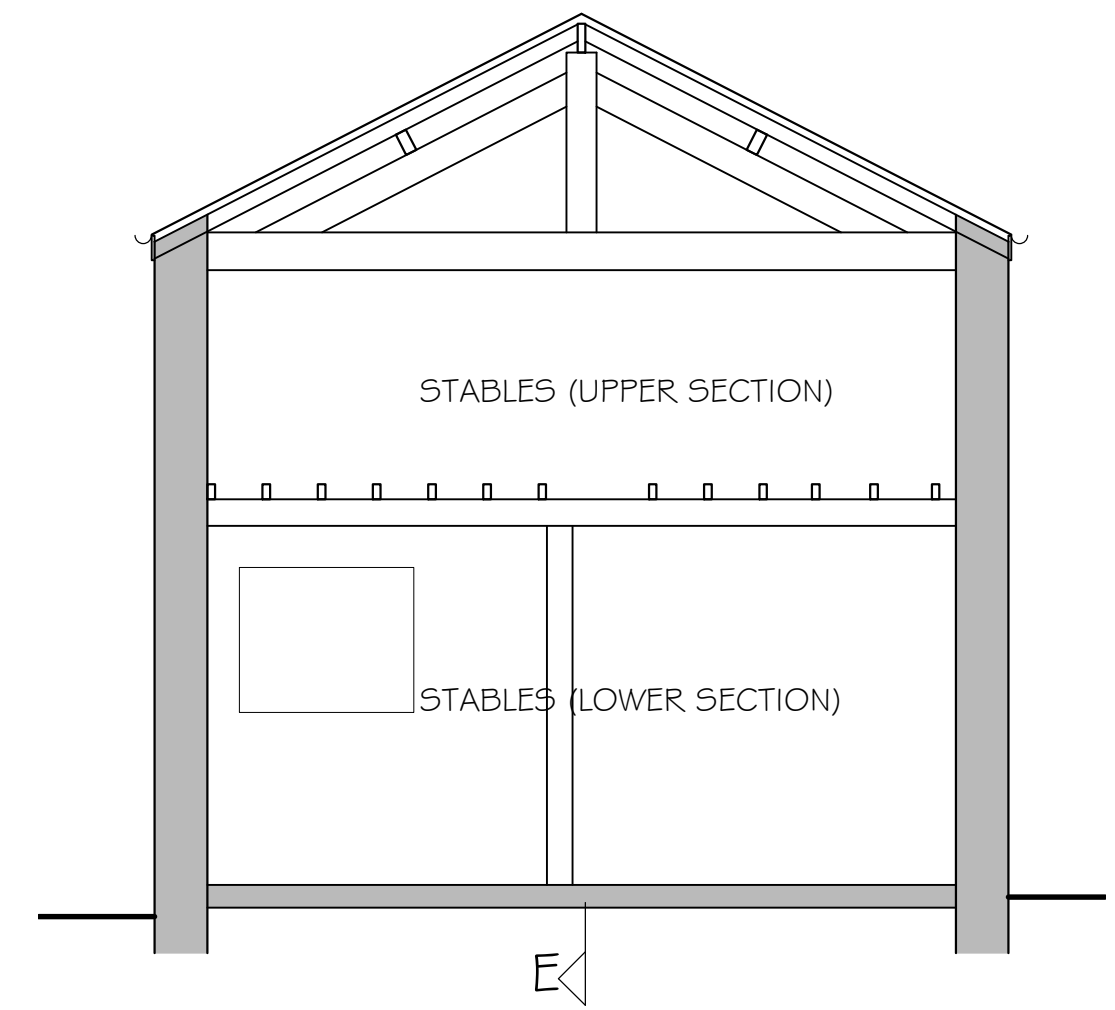
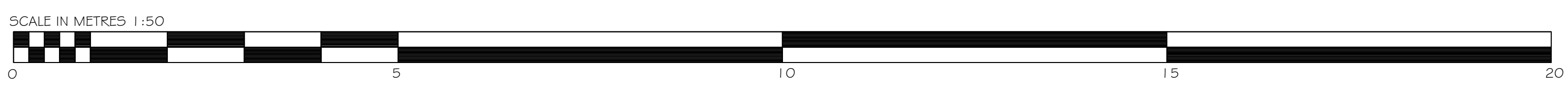
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EXISTING SECTION F-F (1:50)

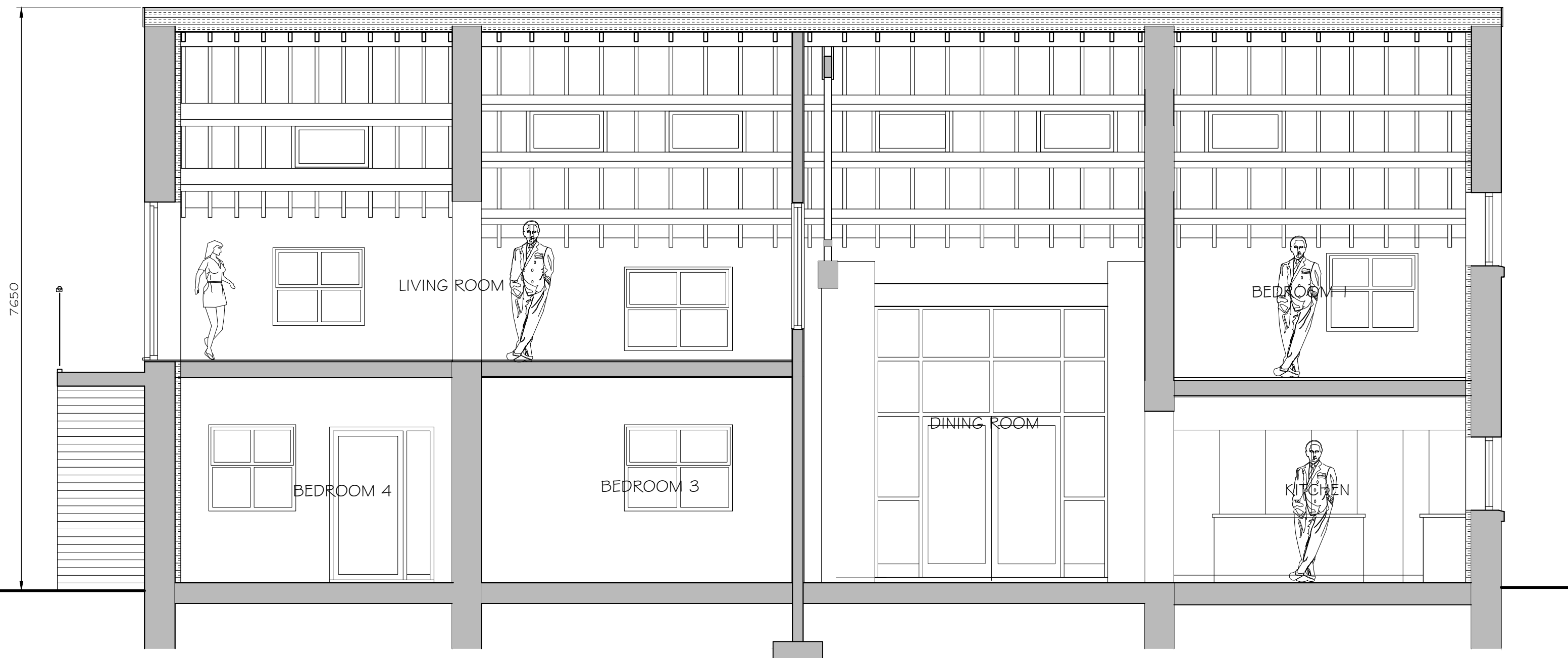


EXISTING UPPER LEVEL PLAN (1:50)

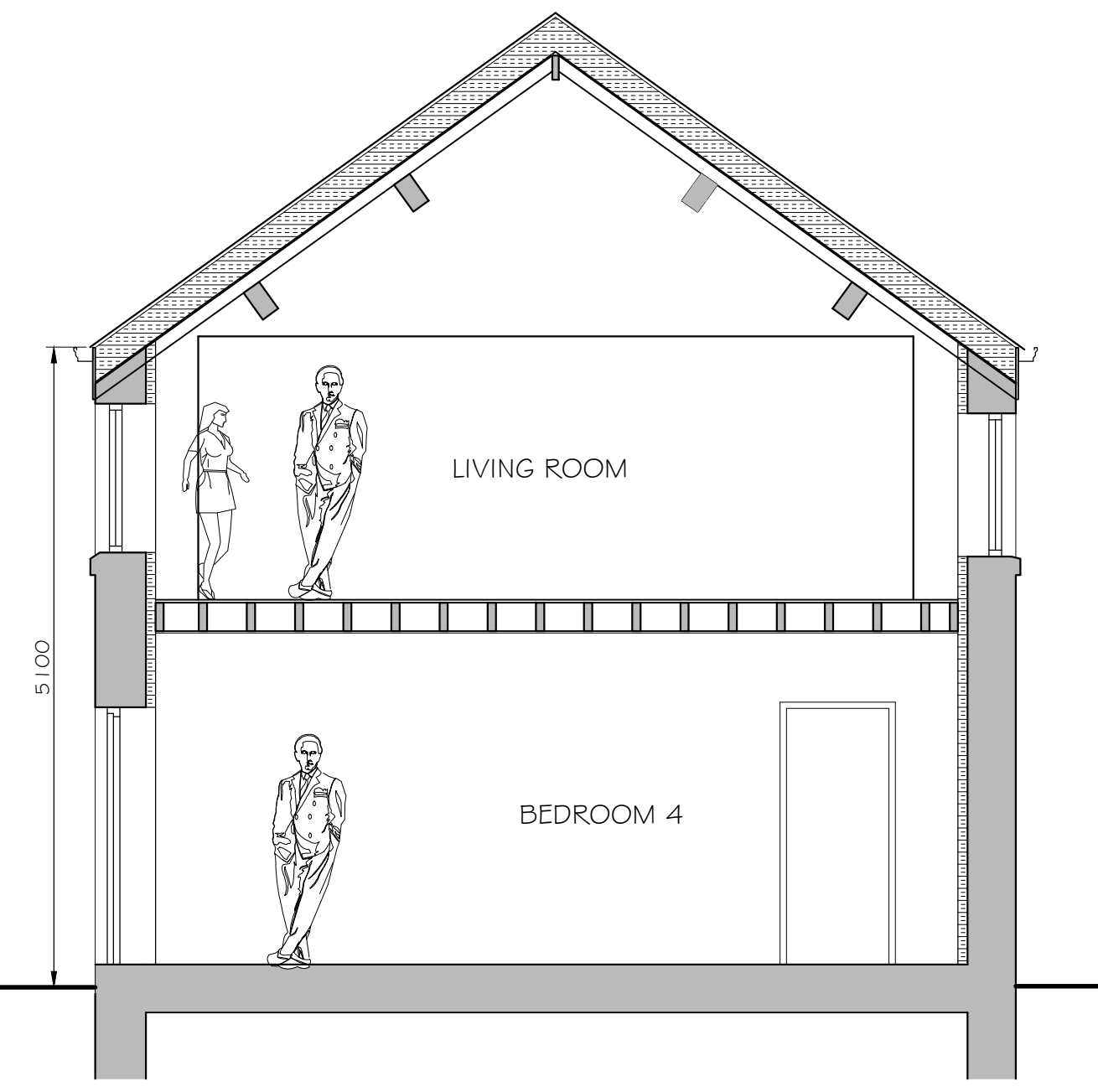


EXISTING SECTION G-G (1:50)

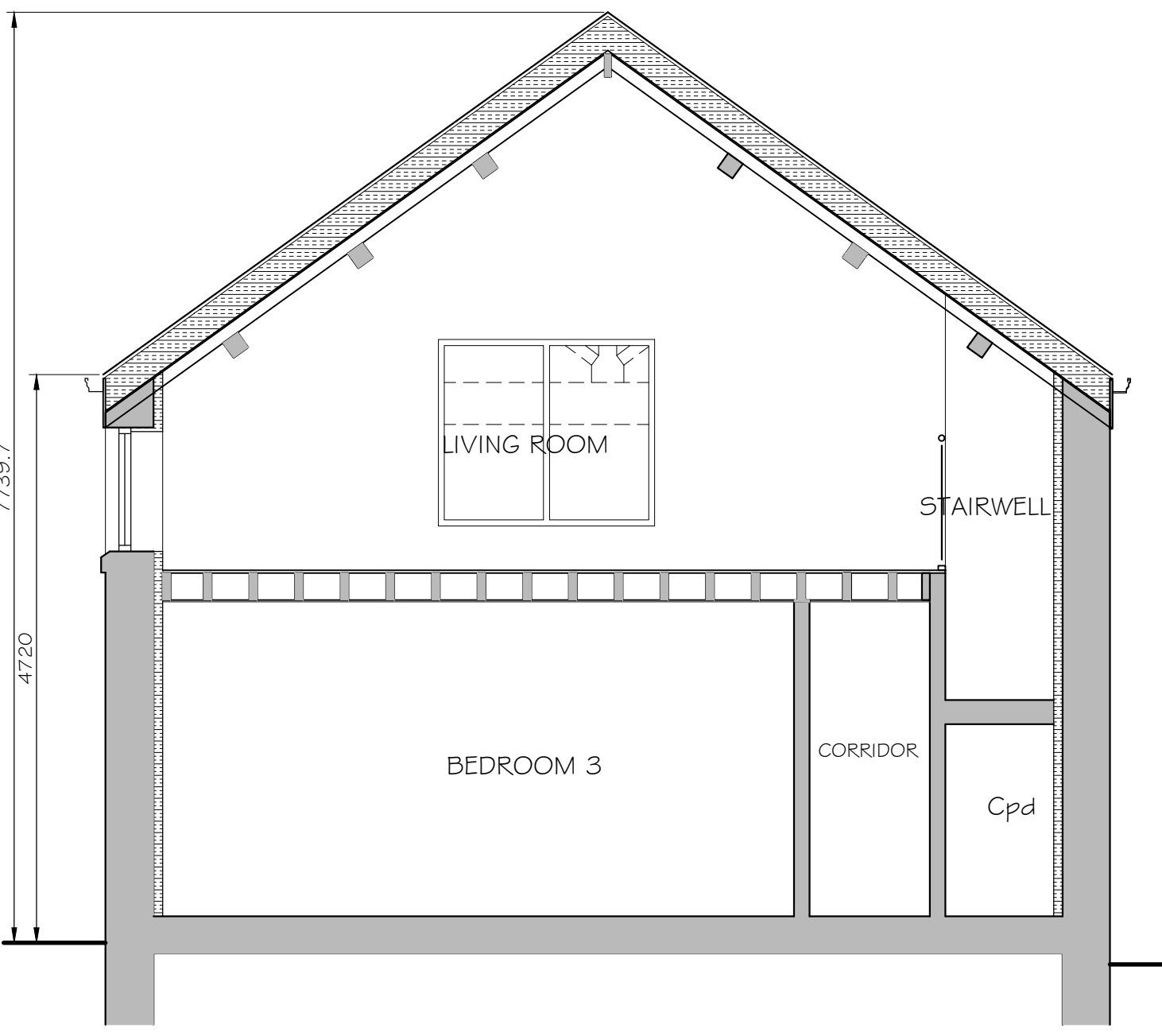
REVISION A - DUTCH BARN & PIGGERY OMITTED FROM APPLICATION & MAIN TITLE CHANGED TO REFLECT SAME. - Sept 2022	
Project	PROPOSED CONVERSION OF EXISTING STONE BARN LAND AT FORMER COACH ROAD FARM CUT LANE KNOWSLEY L33 3AQ
Scale	1:50 @ A1
Date	MAY 2022
Plan	EXISTING UPPER LEVEL PLAN AND SECTIONS DD, EE, FF & GG TO STONE BARN
Dwg.No	MG2022/05 A



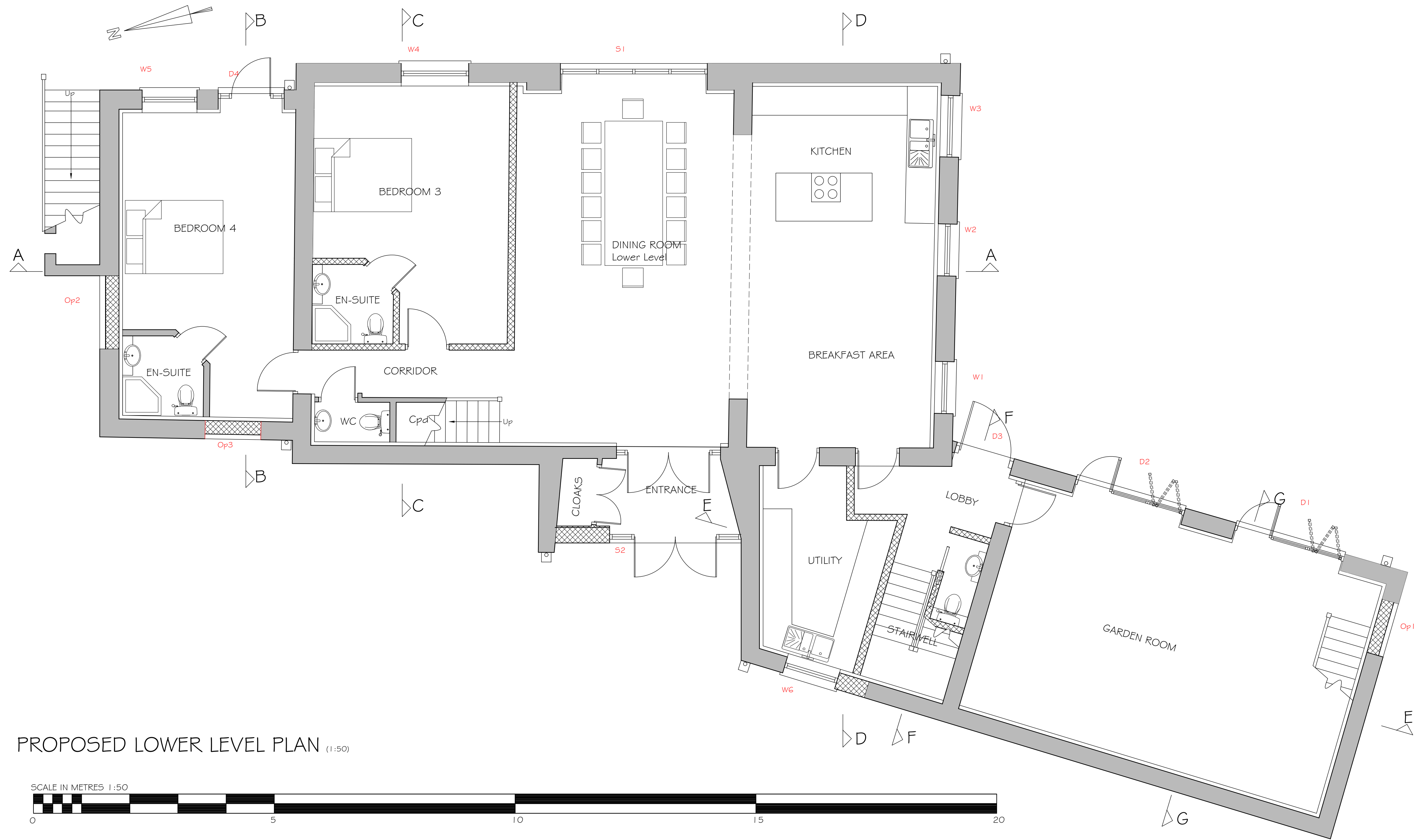
PROPOSED SECTION A-A (1:50)



PROPOSED SECTION B-B (1:50)



PROPOSED SECTION C-C (1:50)



PROPOSED LOWER LEVEL PLAN (1:50)

NOTES:-

ROOF -

EXISTING ROOF TIMBERS TO BE RETAINED & REPAIRED AS NECESSARY & LEFT EXPOSED
EXISTING SLATE TO BE TAKEN OFF AND RAISED TO ALLOW NECESSARY INSULATION LAYER, ANY NEW SLATE TO BE NATURAL SLATE.

FASCIA BOARDS
EXISTING ROTTEN/MISSING FASCIA BOARDS TO BE REMOVED.
NEW FASCIA BOARDS PVC COLOUR TBA.

WALLS
EXISTING WALLS TO 1757 BARN BE REPAIRED AS NECESSARY USING RECLAIMED STONE AND NEW STONE TO MATCH EXISTING.
WALLS TO LATER EXTENSION CURRENTLY RENDERED TO BE REPAIRED/ REBUILT AS NECESSARY USING RECLAIMED AND NEW BRICK TO MATCH EXISTING AND RENDERED TO MATCH EXISTING COLOUR TBA.

ALL EXISTING EXTERNAL WALLS TO BE DRY LINED WITH INSULATED PLASTERBOARD TO PROVIDE NECESSARY INSULATION.

RAINWATER GOODS
PPC ALUMINIUM TO MATCH EXISTING STYLE - COLOUR TBA

WINDOWS/DOORS
NEW WINDOWS TO BE PPC ALUMINIUM COLOUR ANTHRACITE GREY TO MATCH EXISTING STYLE.
NEW STONE GILLS AND LINTELS TO MATCH EXISTING COLOUR & PROFILE

ROOF LIGHTS
NEW ROOF LIGHTS TO BE VELUX OR SIMILAR APPROVED CONSERVATION TYPE ROOF LIGHTS

NEW FLOORS
NEW UPPER FLOORS TO UTILISE EXISTING TIMBER STRUCTURE WHERE POSSIBLE, NEW UPPER FLOORS TO BE TIMBER FLOORS
GROUND FLOOR FLOORS TO BE OVER LAID WITH INSULATION AND SAND/CEMENT SCREED.

REVISION A - 13/09/2022 - HATCH TO NEW WALLS AMENDED, DOORS AND WINDOWS CHANGED TO ALLOW ALL VENTS & 100mm DIA WEEP PIPES TO BE RETAINED. ALL OPENINGS TO BE BLOCKED SHOWN RECESSED MIN 100mm, DOOR, WINDOW AND BLOCKED OPENINGS NUMBERED.
REVISION B - DUTCH BARN & PIGGERY OMITTED FROM APPLICATION & MAIN TITLE CHANGED TO REFLECT SAME. - Sept 2022

Project	PROPOSED CONVERSION OF EXISTING STONE BARN LAND AT FORMER COACH ROAD FARM CUT LANE KNOWSLEY L33 3AQ	Scale	1:50 @ A1
Plan	PROPOSED LOWER LEVEL PLAN AND SECTIONS AA, BB & CC TO STONE BARN	Date	MAY 2022
		Dwg.No	MG2022/07B

View 1



View 2



View 3



View 4



View 5



View 6



View 7



View 8



View 9



View 10



View 11



View 12



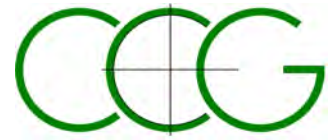
View 13



View 14



APPENDIX B: SAMPLING METHODOLOGIES



SAMPLING, SAMPLE TRANSPORTATION, AND FIELD MONITORING PROTOCOLS

Soil, water and gas sampling and monitoring methodologies employed by **CC GEOTECHNICAL LTD** are presented hereunder.

SAMPLING OF SOIL FOR CHEMICAL ANALYSIS

Soil samples may be recovered from a variety of intrusive investigation methods including *inter alia* dynamic sampling boreholes, cable percussion boreholes, machine or manual excavation of trial pits.

All equipment which has the potential to introduce extraneous materials into soils – borehole casings, sampling drilling rods, borehole sampling tools, hand tools such as trowels and spades etc. – must be cleaned by jet washing before initial use and between sampling positions.

Cable Percussion Boreholes

In this method of investigation disturbed bulk and small disturbed samples are recovered at regular depth increments throughout the length of the borehole. Each bulk/small disturbed sample is uniquely labelled with the Project Name / Project No / Borehole No / Depth / Date. Where possible, samples are immediately scanned by PID.

Light Dynamic Sampling Boreholes

In this method of investigation samples are recovered in relatively undisturbed 1m long Perspex liners. Each liner is uniquely labelled with the Project Name / Project No / Borehole No / Depth / Date. The liner tubes are sealed by air tight caps fitted at each end, and are temporarily stored out of sunlight. Where possible, samples are immediately split, scanned by PID, logged and subsampled. In the event that splitting and logging on site is not practicable, then the liners are immediately transported to the laboratory where they are immediately split, scanned by PID, logged and subsampled.

Trial Pits

Samples are to be taken from the bucket of an excavator and placed in appropriate airtight containers. Each container is uniquely labelled with the Project No / Trial Pit No / Depth / Date. The samples are then immediately placed in a cool box chilled by ice packs, and the boxes are sealed for transportation to the chemical laboratory.

Sampling Containers

Containers used to store soil samples are selected dependant on the required analysis. The testing laboratory will be consulted should there be any doubt as to the correct sampling container. Typically, a minimum of 1nr 1kg plastic tub, 1nr 500g plastic tub, 1nr 250g amber glass jar and 2nr glass vials are taken at each sample depth. Samples held on site awaiting same day courier collection are stored at 4°C in a cool box. Only in circumstances where same day collection cannot be arranged are samples held overnight, and in this event all samples are refrigerated at 4 °C either on site (if a refrigerator is available) or at CC GEOTECHNICAL soil laboratory. Courier collection is then arranged for immediate pick up the following day.

Chain of Custody records

A Chain of Custody Record (CoC) is to be sent with each batch of samples submitted to the testing laboratory. A copy of the CoC will be made available for inspection by the client, their agents, or any requesting regulatory authority.

HEADSPACE ANALYSES

Duplicate subsamples of all soil samples selected for laboratory analysis may be taken for headspace analyses.

Headspace analysis is undertaken using a MiniRae 2000 Photo Ionisation Detector (PID). In the test method, an amber glass jar is half filled with soil, and the lid is sealed with aluminium foil secured by an elastic band. The jar and contents are agitated for 30 seconds and left for a minimum of 30 minutes out of direct sunlight for the headspace to achieve equilibrium. The PID then pierces the seal and the maximum reading is recorded. Prevailing weather conditions and ambient air temperature are also recorded.

The PID headspace results are recorded on the exploratory borehole or trial pit logs.

PID headspace data is then used to inform the chemical testing schedule for volatile organic compounds analyses.

SAMPLING OF GROUNDWATER FOR CHEMICAL ANALYSIS

Groundwater is sampled from standpipes or piezometers installed during borehole drilling. On completion of the construction of the standpipe, the installation is initially developed by removing up to 10 x the internal volume of the

installation. The volume of water purged is recorded. The installation is then typically left for a week for hydraulic equilibrium to be restored.

Prior to sampling the standpipe, the depth to the water table, and the depth to the base of the installation are monitored using an electronic dipmeter. In circumstances where free phase product is suspected to be present, then an 'Interface Meter' is used to determine the free phase film thickness.

A minimum of 3 x the installation volume is then removed. The pH of the water is then monitored and the sample is taken when the change in pH between any two consecutive extracts is less than 10%. The volume of water removed is recorded.

A sample comprises of a minimum of 3 litres. Two litres are taken in amber glass bottles, and one litre in a plastic bottle.

To avoid cross-contamination one bailer is used per position.

The samples are uniquely labelled with Project Name / Project No / Borehole No / Depth / Date Sampled. They are placed in a cool box chilled by ice packs, and the containers are sealed for transportation to the laboratory.

Once the samples are received in the **CC GEOTECHNICAL LTD** laboratory, the samples are stored in a refrigerator and returned to the cool boxes once collected.

Water taken from the installations are taken back to the **CC GEOTECHNICAL LTD** laboratory and disposed.

Other data recorded in the sampling comprises:

- Volume of water removed during development of well
- Volume of water removed during purging of the well
- Results of on-site pH analyses
- Sample appearance – colour, suspended solids

MONITORING OF GAS

Prior to embarking on a gas-monitoring round, all equipment is checked for functionality and the calibration status is confirmed.

At the commencement of the monitoring round, the prevailing weather conditions, air temperature, barometric pressure and direction of movement of barometric pressure are recorded.

The flow meter is first attached to the standpipe valve, and the flow rate is measured (peak and steady flow) for 1 minute. The results are recorded in l.hr^{-1} . The flow meter tube is protected from the effects of wind by aligning the exhaust downwind.

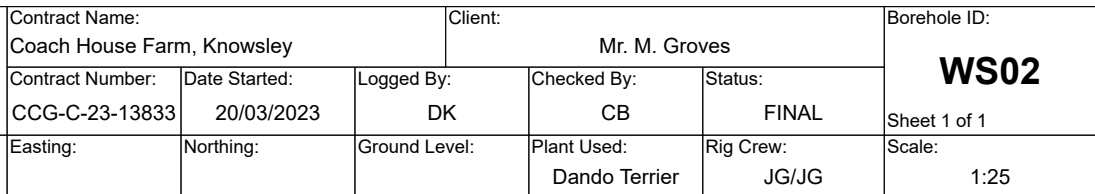
Following measurement of borehole flow rate, the installation is left for a minimum of 10 minutes for the headspace to restore equilibrium.

Once the gas in the installation has regained equilibrium, the gas analyser is connected and monitoring commences. The peak and steady state readings for CH_4 , CO_2 , CO , H_2S and CO are recorded. The steady state is monitored for a minimum of one minute, and possibly up to a maximum of 10 minutes where fluctuations continue.

When the monitoring is complete, the depth to the water table, and the depth to the base of the well are monitored using an electronic dipmeter. In circumstances where free phase product is suspected to be present, then an 'Interface Meter' is used to determine the free phase film thickness.

APPENDIX C: BOREHOLE LOGS

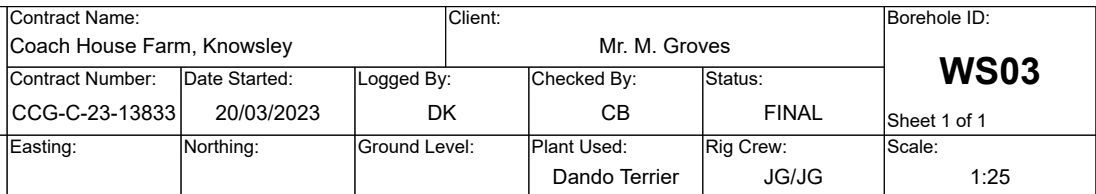
	Contract Name: Coach House Farm, Knowsley				Client: Mr. M. Groves				Borehole ID: WS01					
	Contract Number: CCG-C-23-13833		Date Started: 20/03/2023		Logged By: DK		Checked By: CB		Status: FINAL					
	Easting:		Northing:		Ground Level:		Plant Used: Dando Terrier		Rig Crew: JG/JG					
Dynamic Sampling Borehole Log										Scale: 1:25				
Weather: Dry				Termination:				SPT Hammer: N/R, Energy Ratio: N/R						
Samples & In Situ Testing				Strata Details						Groundwater				
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill/ Installation			
0.00 - 1.00	U			0.15		Grey slightly silty SAND and GRAVEL. Gravel is fine to coarse of brick sandstone and concrete (MADE GROUND)								
0.50	ES			(0.65)		Dark brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse of brick and sandstone (MADE GROUND)								
1.00 - 2.00	U	SPT(S)N=6 (1,1/2,1,2,1)		0.80		Firm stiff brown slightly gravelly slightly sandy silty CLAY with occasional thin sand horizons. Gravel is fine to coarse of various angularities and lithologies				1				
2.00 - 3.00	U	SPT(S)N=11 (2,2/2,3,3,3)								2				
3.00 - 4.00	U	SPT(S)N=13 (2,3/3,3,4,3)								3				
4.00 - 5.00	U	SPT(S)N=15 (2,2/3,4,4,4)								4				
		SPT(S)N=14 (2,3/3,3,4,4)		5.00		End of Borehole at 5.00m				5				
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1hr hand digging CAT scanning borehole starter pit GL-1.2mbgl & sub-sampling					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00	0.50	PLAIN	50						
					0.50	3.50	SLOTTED	50						
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com														



Samples & In Situ Testing	Strata Details	Groundwater
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Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.00 - 1.00	U			(0.30)		Brown slightly sandy GRAVEL. Gravel is fine to coarse angular to subround of brick and concrete (MADE GROUND)		
0.25	ES			0.30		Soft to firm becoming firm then stiff brown slightly gravelly slightly sandy silty CLAY with occasional thin sand horizons. Gravel is fine to coarse of various angularities and lithologies		
1.00 - 2.00	U	HVP=110 SPT(S)N=8 (1,1/1,2,2,3)					1	
2.00 - 3.00	U	HVP=110 SPT(S)N=8 (2,2/2,2,2,2)					2	
3.00 - 4.00	U	HVP=110 SPT(S)N=11 (2,2/2,3,3,3)		(4.70)			3	
4.00 - 5.00	U	HVP=100 SPT(S)N=13 (2,3/3,3,3,4)					4	
		HVP=100 SPT(S)N=13 (2,3/3,3,3,4)		5.00		End of Borehole at 5.00m	5	

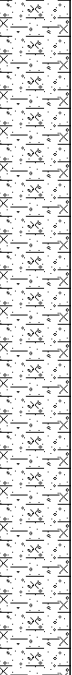
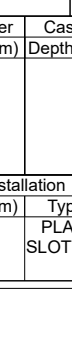
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1hr hand digging CAT scanning borehole starter pit GL-1.2mbgl & sub-sampling					
Chiselling					Installation				Water Strikes					
									Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)						
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com														



Samples & In Situ Testing	Strata Details	Groundwater
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Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.00 - 1.00	U			(0.55)		Dark brown slightly gravelly silty fine and medium grained SAND. Gravel is fine to coarse angular to subround of brick and sandstone (MADE GROUND)		
0.45	ES			0.55		Soft to firm becoming stiff brown slightly gravelly slightly sandy silty CLAY with occasional thin sand horizons. Gravel is fine to coarse of various angularities and lithologies		
1.00 - 2.00	U	HVP=100 SPT(S)N=8 (1,1/2,2,2,2)					1	
2.00 - 3.00	U	HVP=110 SPT(S)N=15 (2,2/3,4,4,4)					2	
3.00 - 4.00	U	HVP=110 SPT(S)N=15 (1,2/3,4,4,4)		(4.45)			3	
4.00 - 5.00	U	HVP=110 SPT(S)N=17 (2,3/4,4,4,5)					4	
		HVP=100 SPT(S)N=16 (2,3/4,4,4,4)		5.00		End of Borehole at 5.00m	5	

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1hr hand digging CAT scanning borehole starter pit GL-1.2mbgl & sub-sampling					
Chiselling					Installation				Water Strikes					
									Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)						
					0.00	0.50	PLAIN	50						
					0.50	3.50	SLOTTED	50						
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com														

	Contract Name: Coach House Farm, Knowsley				Client: Mr. M. Groves			Borehole ID: WS04					
	Contract Number: CCG-C-23-13833		Date Started: 20/03/2023		Logged By: DK	Checked By: CB	Status: FINAL	Sheet 1 of 1					
	Easting:		Northing:		Ground Level:	Plant Used: Dando Terrier	Rig Crew: JG/JG	Scale: 1:25					
Dynamic Sampling Borehole Log					Weather: Dry					Termination:		SPT Hammer: N/R, Energy Ratio: N/R	
Samples & In Situ Testing					Strata Details						Groundwater		
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill/ Installation		
0.00 - 1.00	U			0.20		Dark brown silty clayey SAND with frequent rootlets							
0.50	ES	HVP=90		(0.35)		Dark brown varying to brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular to subround of brick sandstone and slate (MADE GROUND)							
				0.55		Firm varying to stiff brown slightly gravelly slightly sandy silty CLAY with occasional thin sand horizons. Gravel is fine to coarse of various angularities and lithologies							
1.00 - 2.00	U	SPT(S)N=9 (2,2/2,2,2,3)		(4.45)						1			
		HVP=110											
2.00 - 3.00	U	SPT(S)N=14 (2,2/3,3,4,4)								2			
3.00 - 4.00	U	SPT(S)N=13 (2,2/2,3,4,4)								3			
		HVP=110											
4.00 - 5.00	U	SPT(S)N=12 (2,3/3,3,3,3)								4			
		HVP=85											
		HVP=100											
		SPT(S)N=13 (2,3/3,3,3,4)		5.00		End of Borehole at 5.00m				5			
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:				
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1hr hand digging CAT scanning borehole starter pit GL-1.2mbgl & sub-sampling				
Chiselling					Installation				Water Strikes				
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
				0.00	0.50	PLAIN	50						
				0.50	3.50	SLOTTED	50						
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com													

APPENDIX D: GAS – GROUNDWATER MONITORING

GAS AND WATER MONITORING RESULTS



	Date:	24-Mar-23	03-Apr-23	17-Apr-23	04-May-23								
	Visit Number	1	2	3	4								
	Atmos Press mb	986	1025	1028	1011								
	Pressure Trend	Steady	Steady	Steady	Steady								
	Air Temp °C	12	8	10	9								
	Cloud cover	High white cloud	Clear	Cloudy	High white cloud								
	Wind velocity	Light breeze	Breezy	Light breeze	Windy								
	Precipitation	Dry	Dry	Dry	Dry								
	State of Ground	Dry	Dry	Dry	Dry								
WS01	CH ₄ (%):	Nil	Nil	Nil	Nil								
	CO ₂ (%):	0.9	0.2	0.2	0.5								
	O ₂ (%):	19.4	20.0	19.8	19.6								
	H ₂ S (ppm):	Nil	Nil	Nil	Nil								
	CO (ppm):	Nil	Nil	Nil	Nil								
	PID (ppm):	0.0	0.0	0.0	0.00								
	Flow (l/hr):	<0.1	<0.1	<0.1	<0.1								
WS03	Water Level (mbgl):	0.59	0.59	0.61	0.82								
	CH ₄ (%):	Nil	Nil	Nil	Nil								
	CO ₂ (%):	1.1	<0.1	<0.1	0.1								
	O ₂ (%):	18.3	20.5	20.4	20.2								
	H ₂ S (ppm):	Nil	Nil	Nil	Nil								
	CO (ppm):	Nil	Nil	Nil	Nil								
	PID (ppm):	0.0	0.0	0.0	0.00								
WS04	Flow (l/hr):	<0.1	<0.1	<0.1	<0.1								
	Water Level (mbgl):	0.54	0.55	0.56	0.65								
	CH ₄ (%):	Nil	Nil	Nil	Nil								
	CO ₂ (%):	0.2	<0.1	<0.1	<0.1								
	O ₂ (%):	20.1	20.4	20.2	19.9								
	H ₂ S (ppm):	Nil	Nil	Nil	Nil								
	CO (ppm):	Nil	Nil	Nil	Nil								
	PID (ppm):	0.0	0.0	0.0	0.00								
	Flow (l/hr):	<0.1	<0.1	<0.1	<0.1								
	Water Level (mbgl):	0.48	0.49	0.51	0.58								

CCG-CMS-FO-129

Issue 2

Job No: CCG-C-23-13833

Site: Coach House Farm, Knowsley

Instrument:

GFM436

TEST DATE AND CONDITIONS			
Date		13/02/2023	
Atmospheric Pressure		1013	mB
Ambient Temperature		19.7	°C
EnviroNics Serial No.		5089	

**GFM436 Final Inspection & Calibration
Check Certificate**

GAS DATA LTD	
Unit 4, Fairfield Court	
Seven Stars Estate	
Wheler Rd	
Coventry	
CV3 4LJ	
Tel 02476303311	Fax 02476307711



GAS DATA
LISTEN • ANALYSE • INFORM

Customer	C C Geotechnical
Certificate Number	123929
Order Number	333366

Serial Number	12667
Software Version	G436-00.0027/0010

Recalibration DUE Date
13/02/24

Instrument Checks					
Keyboard	✓		Display Contrast	✓	
Pump Flow In	450	Accept > 200 cc/min	Pump Flow @ -200mB	250	Accept > 200 cc/min
Clock Set / Running	✓		Labels Fitted	✓	

Gas Checks						
Sensor	CH ₄		CO ₂		O ₂	
	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %
	Readings %		Readings %		Readings %	
	60.2	60	40.2	40	20.9	20.9
	Accept ±3.0		Accept ±3.0		Accept ±0.5	
	4.9	5	4.9	5	6.0	6
	Accept ±0.3		Accept ±0.3		Accept ±0.3	
Zero Reading 100% N2	0.0	0	0.0	0	0.0	0
	Accept ±0.0		Accept ±0.0		Accept ±0.1	

Optional Gas Checks						
Applied Gas & Range		Concentration Tested @ (ppm)	Instrument Readings (ppm)			
Gas Type	Range (ppm)		Zero Reading		Instrument Gas Reading	
H2S	5000	1500	0	Accept ±0.0	1500	Accept ±5.0
CO	2000	1000	0	Accept ±0.0	1000	Accept ±5.0
Hexane	2.0%	2.0%	0	Accept ±0.0	1.99	Accept ±10.0

Cross Gas Effects									
Applied Gas (ppm)		Instrument Readings (ppm)							
Gas Type	Concentration	Toxic 1:	H2S	Toxic 2:	CO	Toxic 3:	HEX		
H2S	1500	1500		0		0			
CO	1000	70		1000		0			
Hexane	2.0%	0		0		1.99			

Pressure Checks			
Atmospheric Pressure [AP] (mB)			
Current Atmospheric Pressure (mB)		Instrument Atmospheric Pressure Reading (mB)	
AP Open Ports		1013	Accept ± 2.0
AP Port (Internal)	+800 mB	800	Accept ± 5.0
	+1200mb	1200	Accept ± 5.0

Flow Checks					
Borehole Flow			Differential Pressure		
Applied Reading (l/h)	Instrument Reading (l/h)		Applied Pressure (Pa)	Instrument Reading (Pa)	
-30	-30.6	Accept ± 3.0	-423	-435	Accept ± 50
-3	-3.0	Accept ± 1.0	-17	-18	Accept ± 6.0
0	0.0	Accept ± 0.0	0	0	Accept ± 0.5
3	3.0	Accept ± 0.5	14	13	Accept ± 3.0
30	30.4	Accept ± 3.0	318	325	Accept ± 50
60	59.6	Accept ± 6.0	968	955	Accept ± 130
90	90.1	Accept ± 9.0	1925	1956	Accept ± 250

Temperature Checks		
Calibration Temperature	Instrument Temperature Reading $^{\circ}\text{C}$	
Applied Temperature $^{\circ}\text{C}$		
-10	-10.0	Accept ± 2.0
0	0.0	Accept ± 1.0
30	30.0	Accept ± 1.0
60	60.0	Accept ± 1.0
100	100.0	Accept ± 1.0

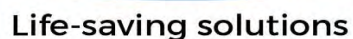
Technician:
<i>Jack Rutland</i>

Date Tested:
13/02/2023

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015, BS EN ISO14001:2015, BS EN ISO45001:2018 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated.

The results displayed on the instrument at each stage are recorded above.

Gas Data Ltd is certified to BS EN ISO9001:2015, BS EN ISO14001:2015, BS EN ISO45001:2018.



CUSTOMER: CC Geotechnical Ltd

FIRMWARE: 5.12
UPGRADED TO: 6.1

[illegible]

TESTS	Pre Service	Post Service
Charger Test		OK
Battery charge Test		OK
Lamp Test		OK
Air Flow Test ≥ 220ml/min		269ml/min
Block Flow Test ≤ 15ml/min		10ml/min
Moisture Sensitivity = 0.0ppm		0.00ppm
Switch Test		OK
Sensor Test		OK
Alarm Test		OK
PC Comms Test		OK
Datalog Test		OK
Display Test		OK
Physical Inspection		OK
PAT Test		OK
Firmware Upgrade		OK
Software Upgrade (usb)	N/A	
Function Test		OK
Run time		39hrs51mins

Firmware upgraded to latest version V6.1
Replaced LT stack, sensor seal, inlet/outlet filters and PTFE filter as per service
Cleaned lamp with aluminium oxide
Flow rate 269ml/min, Block 10ml/min
Instrument calibrated and bump tested
Power supply PAT tested, Charging cradle function tested

~~Ted~~

DATE: 24-May-22



Life-saving solutions

CERTIFICATE OF CALIBRATION

Phocheck Tiger

CALIBRATION CERTIFICATE NO:

73754

ISSUED BY: SHAWCITY LIMITED

DATE: 24-May-22

APPROVED SIGNATORY:

NAME: Joe Herbert

CUSTOMER: CC Geotechnical Ltd

INSTRUMENT: PhoCheck Tiger

SERIAL NUMBER: T-110194

CALIBRATION METHOD: CM03

AMBIENT CONDITIONS: 20°C $\pm$ 2°C and 50% ($\pm$ 20%) RH

Prior to calibration the instrument was allowed to stabilise in the laboratory for at least 30 minutes.

The instrument was calibrated by exposing the sensor to known values of gas concentrations.

All gases were sampled through the complete probe and in line filter, where applicable.

The reference value is that generated by the certified source and the indicated value is that measured by the instrument.

CALIBRATION RESULTS

GAS	LOT No	REF. VALUE	INDICATED VALUE
Isobutylene	WO347195-1	100 ppm	100 ppm
Isobutylene	WO188023-1	5000ppm	5000ppm

COMMENTS:

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor of $k=2$.

This provides a level of confidence of uncertainty of approximately 95%.

The uncertainty of measurement is $\pm 2\%$

The results indicate that the instrument conforms to the applicable parts of the published specification.

HEALTH & SAFETY, OCCUPATIONAL HYGIENE AND ENVIRONMENTAL MONITORING INSTRUMENTS

Tel: 01793 780622

www.shawcity.co.uk

Instrument House, 91-92 Shrivenham Hundred Business Park

Watchfield, Oxfordshire, SN6 8TY

Fax: 01793 784466

service@shawcity.co.uk

APPENDIX E: SOIL CLASSIFICATION RESPORT

Units 1 & 2
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Deltic Way
Knowsley Industrial Estate
Liverpool
L33 7BU

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Fax: (0151) 548 7892
Email: enquiries@ccgeotechnical.com
www.ccgeotechnical.com



LABORATORY REPORT

CONTRACT NUMBER: CCG-C-23-13833

CONTRACT TITLE: COACH ROAD FARM, KNOWSLEY

CLIENT: ORMSKIRK SKIPS

DATE RECEIVED: 21/03/23
DATE COMMENCED: 21/03/23
DATE COMPLETED: 12/04/23
REPORT DATE: 22/04/23

Test Description	Qty
Determination of Moisture Content BS 1377-2:1990 (a)	8
Determination of Liquid & Plastic Limits BS 1377-2:1990 (a)	8

Notes: Observations and interpretations are not accredited by UKAS
All testing undertaken at laboratory permanent facilities
denotes non-accredited test
a denotes UKAS accredited test
s denotes test undertaken by approved subcontractor
Test results only relate to the samples tested

This report is issued in accordance with the requirements of the United Kingdom Accreditation Services and EN ISO/IEC 17025:2017. The results reported herein relate only to the material supplied to the laboratory. This report shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved Signatories: Chris Bolan (Managing Director) – Daniel Kerfoot (Laboratory Manager)

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Shear Strength (kN/m ²)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
WS01	WS	1.10	1.10	19	-	-	-	35	16	19	93	CL / CI	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded mudstone. (BS1377Pt2:3.2,4,4,5)
WS01	WS	2.30	2.30	14	-	-	-	31	15	16	91	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded mudstone. (BS1377Pt2:3.2,4,4,5)
WS02	WS	1.10	1.10	14	-	-	-	31	14	17	93	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded mudstone. (BS1377Pt2:3.2,4,4,5)
WS02	WS	2.20	2.20	13	-	-	-	27	14	13	90	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded mudstone. (BS1377Pt2:3.2,4,4,5)
WS03	WS	1.10	1.10	20	-	-	-	36	17	19	95	CI	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded mudstone. (BS1377Pt2:3.2,4,4,5)
WS03	WS	2.20	2.20	14	-	-	-	28	14	14	88	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded mudstone. (BS1377Pt2:3.2,4,4,5)
WS04	WS	1.20	1.20	14	-	-	-	30	15	15	91	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded mudstone. (BS1377Pt2:3.2,4,4,5)
WS04	WS	2.20	2.20	13	-	-	-	29	14	15	86	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded mudstone. (BS1377Pt2:3.2,4,4,5)

SITE: COACH ROAD FARM, KNOWSLEY (CCG-C-23-13833)
CLIENT: ORMSKIRK SKIPS

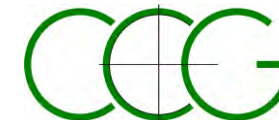
DATE: 22.04.23

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample

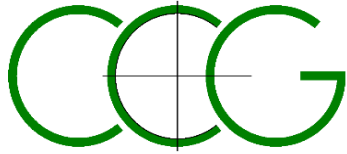
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic

(* Denotes Hand Shear Vane test result)

Sample description not accredited by UKAS



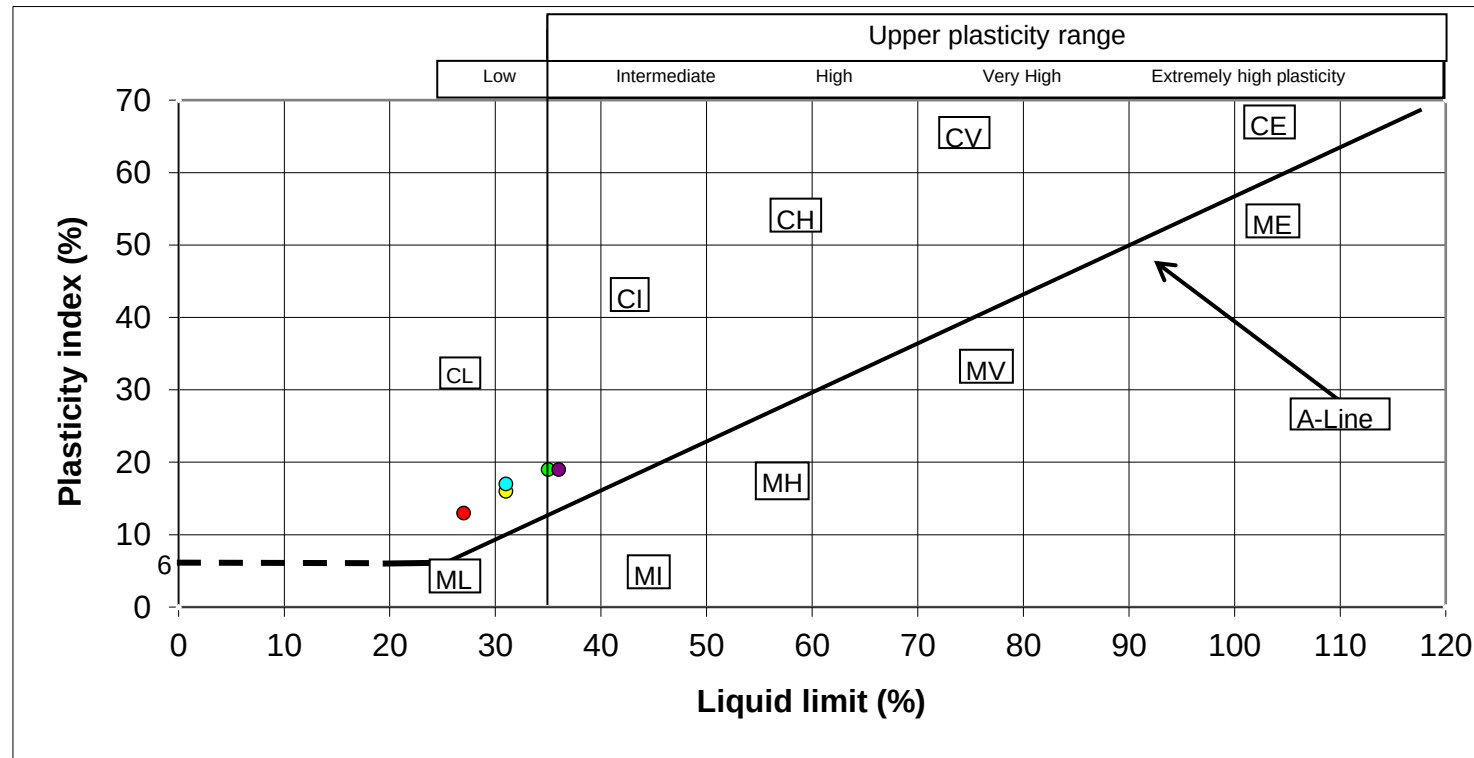
13833 RES.xls



ATTERBERG TEST RESULT SHEET

BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.

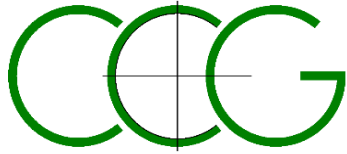


BH	Sample Depth	Liquid limit	Plasticity index
WS01	1.10	35.0	19.0
WS01	2.30	31.0	16.0
WS02	1.10	31.0	17.0
WS02	2.20	27.0	13.0
WS03	1.10	36.0	19.0



APPROVED BY DK

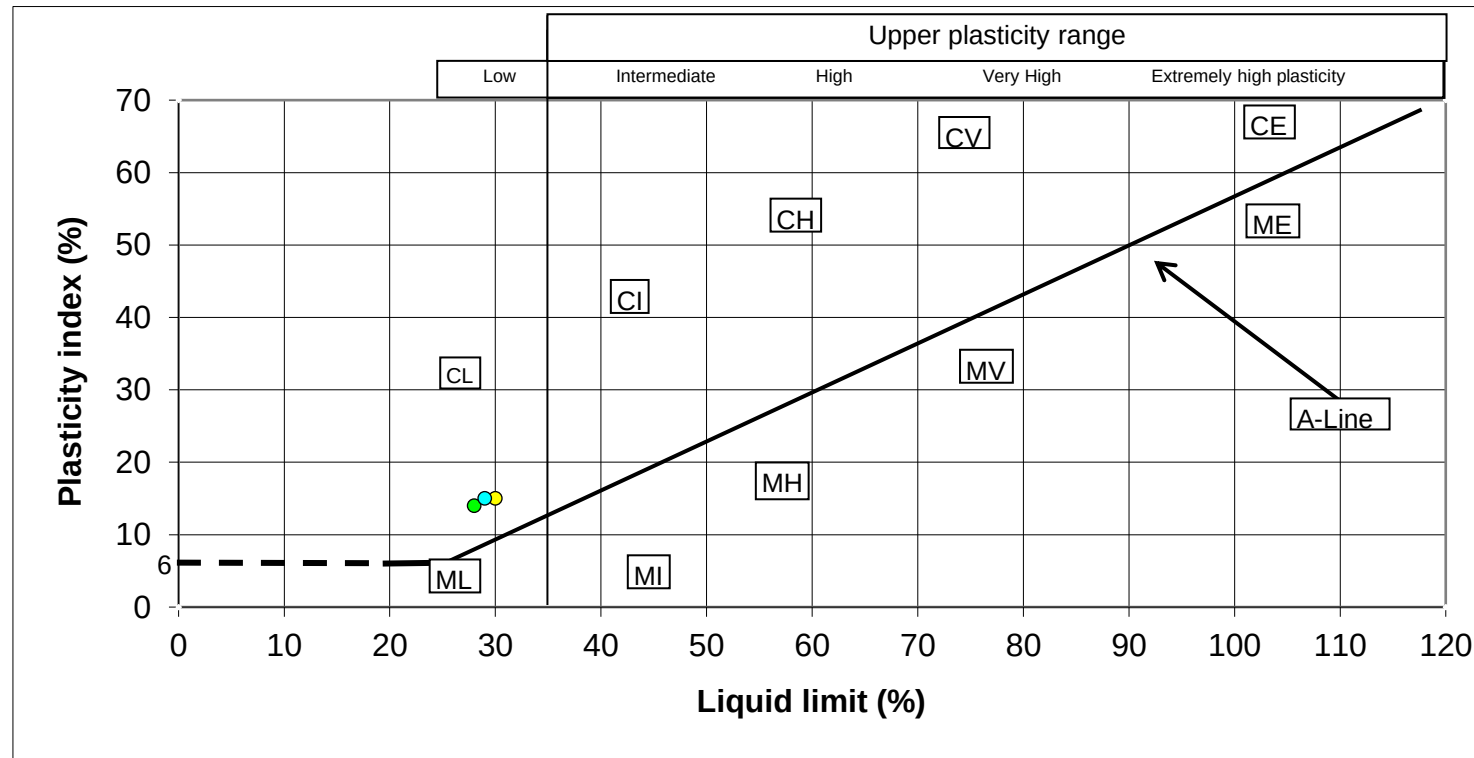
CLIENT: ORMSKIRK SKIPS SITE: COACH ROAD FARM, KNOWSLEY (CCG-C-23-13833)



ATTERBERG TEST RESULT SHEET

BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
WS03	2.20	28.0	14.0
WS04	1.20	30.0	15.0
WS04	2.20	29.0	15.0



APPROVED BY DK

CLIENT: ORMSKIRK SKIPS SITE: COACH ROAD FARM, KNOWSLEY (CCG-C-23-13833)

APPENDIX F: SOIL / GROUNDWATER CONTAMINATION RESPORT



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TN38 9BY
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info@elab-uk.co.uk

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 23-47325

Issue: 1

Date of Issue: 04/04/2023

Contact: Tony Gerrard

Customer Details: CC Geotechnical Ltd
Unit 1 & 2 Deltic Place
Deltic Way
Liverpool
Merseyside L33 7BA

Quotation No: Q22-03450

Order No: CCG-C-23-13833

Customer Reference: CCG-C-23-13833

Date Received: 22/03/2023

Date Approved: 04/04/2023

Details: Coach Road Farm, Knowsley

Approved by:

Mike Varley, General Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)

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Sample Summary

Report No.: 23-47325, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
315794	WS01 0.50	20/03/2023	22/03/2023	Sandy silty loam	
315795	WS02 0.25	20/03/2023	22/03/2023	Sandy clayey loam	
315796	WS03 0.45	20/03/2023	22/03/2023	Sand	
315797	WS04 0.50	20/03/2023	22/03/2023	Silty loam	

Results Summary

Report No.: 23-47325, issue number 1

ELAB Reference	315794	315795	315796	315797
Customer Reference				
Sample ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sample Location	WS01	WS02	WS03	WS04
Sample Depth (m)	0.50	0.25	0.45	0.50
Sampling Date	20/03/2023	20/03/2023	20/03/2023	20/03/2023

Determinand	Codes	Units	LOD				
Soil sample preparation parameters							
Moisture Content	N	%	0.1	17.0	14.7	14.4	19.0
Material removed	N	%	0.1	13.8	13.7	< 0.1	< 0.1
Description of Inert material removed	N		0	Stones	Stones	None	None
Metals							
Antimony	N	mg/kg	2.5	< 2.5	< 2.5	< 2.5	< 2.5
Arsenic	M	mg/kg	1	13.9	11.4	4.8	5.2
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	27.0	42.5	14.3	29.6
Copper	M	mg/kg	5	48.6	22.7	13.6	13.9
Lead	M	mg/kg	5	131	29.6	24.2	18.5
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Molybdenum	N	mg/kg	0.5	1.1	1.3	1.2	< 0.5
Nickel	M	mg/kg	5	23.0	40.1	11.7	27.5
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	5	132	54.1	34.1	240
Anions							
Water Soluble Sulphate	M	g/l	0.02	< 0.02	0.10	0.03	< 0.02
Inorganics							
Free Cyanide	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8
Total Sulphide	N	mg/kg	2	< 2	< 2	< 2	< 2
Acid Soluble Sulphate (SO4)	U	%	0.02	< 0.02	0.03	< 0.02	< 0.02
Water Soluble Boron	N	mg/kg	0.5	0.9	0.8	0.5	1.8
Miscellaneous							
pH	M	pH units	0.1	8.0	8.7	8.0	6.3
Soil Organic Matter	U	%	0.1	2.4	0.8	1.4	3.3
Polyaromatic hydrocarbons							
Naphthalene	SM	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene	SM	mg/kg	0.02	< 0.02	0.04	< 0.02	< 0.02
Acenaphthene	SM	mg/kg	0.02	< 0.02	0.03	< 0.02	< 0.02
Fluorene	S	mg/kg	0.02	< 0.02	0.05	< 0.02	< 0.02
Phenanthrene	SM	mg/kg	0.02	< 0.02	0.59	< 0.02	< 0.02
Anthracene	S	mg/kg	0.02	< 0.02	0.19	< 0.02	< 0.02
Fluoranthene	SM	mg/kg	0.02	< 0.02	1.25	< 0.02	< 0.02
Pyrene	SM	mg/kg	0.02	< 0.02	1.15	< 0.02	< 0.02
Benzo(a)anthracene	S	mg/kg	0.02	< 0.02	0.66	< 0.02	< 0.02
Chrysene	SM	mg/kg	0.02	< 0.02	0.67	< 0.02	< 0.02
Benzo(b)fluoranthene	SM	mg/kg	0.02	< 0.02	0.74	< 0.02	< 0.02
Benzo(k)fluoranthene	SM	mg/kg	0.03	< 0.03	0.28	< 0.03	< 0.03
Benzo(a)pyrene	S	mg/kg	0.02	< 0.02	0.61	< 0.02	< 0.02
Indeno(1,2,3-cd)pyrene	SM	mg/kg	0.02	< 0.02	0.40	< 0.02	< 0.02
Dibenzo(a,h)anthracene	SM	mg/kg	0.02	< 0.02	0.07	< 0.02	< 0.02
Benzo[g,h,i]perylene	SM	mg/kg	0.02	< 0.02	0.35	< 0.02	< 0.02
Total PAH(16)	NS	mg/kg	0.34	< 0.34	7.09	< 0.34	< 0.34

Results Summary

Report No.: 23-47325, issue number 1

ELAB Reference	315794	315795	315796	315797
Customer Reference				
Sample ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sample Location	WS01	WS02	WS03	WS04
Sample Depth (m)	0.50	0.25	0.45	0.50
Sampling Date	20/03/2023	20/03/2023	20/03/2023	20/03/2023

Determinand	Codes	Units	LOD				
BTEX							
Benzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Xylenes	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
MTBE	U	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
OrganoChlorine Pesticides							
alpha-HCH	N	ug/kg	10	< 10	< 10	< 10	< 10
beta_HCH	N	ug/kg	10	< 10	< 10	< 10	< 10
gamma-HCH	N	ug/kg	10	< 10	< 10	< 10	< 10
delta-HCH	N	ug/kg	10	< 10	< 10	< 10	< 10
Heptachlor	N	ug/kg	10	< 10	< 10	< 10	< 10
Aldrin	N	ug/kg	10	< 10	< 10	< 10	< 10
Heptachlor epoxide	N	ug/kg	10	< 10	< 10	< 10	< 10
trans-Chlordane	N	ug/kg	10	< 10	< 10	< 10	< 10
alpha cis-Chlordane	N	ug/kg	10	< 10	< 10	< 10	< 10
p,p-DDE	N	ug/kg	10	< 10	< 10	< 10	< 10
Dieldrin	N	ug/kg	10	< 10	< 10	< 10	< 10
Endrin	N	ug/kg	10	< 10	< 10	< 10	< 10
p,p-DDD	N	ug/kg	10	< 10	< 10	< 10	< 10
Endosulfan II	N	ug/kg	10	< 10	< 10	< 10	< 10
Endrin aldehyde	N	ug/kg	10	< 10	< 10	< 10	< 10
p,p-DDT	N	ug/kg	10	< 10	< 10	< 10	< 10
Endosulphan sulphate	N	ug/kg	10	< 10	< 10	< 10	< 10
Methoxychlor	N	ug/kg	10	< 10	< 10	< 10	< 10
Endrin ketone	N	ug/kg	10	< 10	< 10	< 10	< 10



2683



Results Summary

Report No.: 23-47325, issue number 1

ELAB Reference	315794	315795	315796	315797
Customer Reference				
Sample ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sample Location	WS01	WS02	WS03	WS04
Sample Depth (m)	0.50	0.25	0.45	0.50
Sampling Date	20/03/2023	20/03/2023	20/03/2023	20/03/2023

Determinand	Codes	Units	LOD				
SVOCTIC							
Various	N	mg/kg	0.01	None Detected	None Detected	See below	None Detected
TIC							
3-Amino-s-triazole	N	mg/kg	0.01			0.88	

Results Summary

Report No.: 23-47325, issue number 1

ELAB Reference	315795
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	WS02
Sample Depth (m)	0.25
Sampling Date	20/03/2023

Determinand	Codes	Units	LOD	
Metals				
Arsenic 10:1 extract	N	ug/l	5	< 5
Boron 10:1 extract	N	ug/l	5	21
Cadmium 10:1 extract	N	ug/l	1	< 1
Calcium 10:1 extract	N	ug/l	100	11000
Chromium 10:1 extract	N	ug/l	5	< 5
Copper 10:1 extract	N	ug/l	5	< 5
Lead 10:1 extract	N	ug/l	5	< 5
Magnesium 10:1 extract	N	ug/l	100	1390
Mercury 10:1 extract	N	ug/l	0.1	< 0.1
Nickel 10:1 extract	N	ug/l	5	< 5
Selenium 10:1 extract	N	ug/l	5	< 5
Zinc 10:1 extract	N	ug/l	5	12
Anions				
Sulphate 10:1 extract	N	mg/l	1	20
Inorganics				
Free Cyanide	N	ug/l	5	< 5
Sulphide 10:1 extract	N	mg/l	0.1	< 0.1
Miscellaneous				
Dissolved organic carbon	N	mg/l	1.5	8.7
pH (10:1 extract)	N	pH units	0.1	8.7
Hardness (CaCO ₃)	N	mg/l CaCO ₃	0.1	33
Polyaromatic hydrocarbons				
Naphthalene Leachate GCMS	N	ug/l	0.01	0.02
Acenaphthylene Leachate GCMS	N	ug/l	0.01	0.03
Acenaphthene Leachate GCMS	N	ug/l	0.01	0.02
Fluorene Leachate GCMS	N	ug/l	0.01	0.01
Phenanthrene Leachate GCMS	N	ug/l	0.01	0.10
Anthracene Leachate GCMS	N	ug/l	0.01	0.03
Fluoranthene Leachate GCMS	N	ug/l	0.01	0.35
Pyrene Leachate GCMS	N	ug/l	0.01	0.37
Benzo (a) anthracene Leachate GCMS	N	ug/l	0.01	0.25
Chrysene Leachate GCMS	N	ug/l	0.01	0.35
Benzo (b) fluoranthene Leachate GCMS	N	ug/l	0.01	0.34
Benzo (k) fluoranthene Leachate GCMS	N	ug/l	0.01	0.35
Benzo (a) pyrene Leachate GCMS	N	ug/l	0.01	0.31
Indeno (1,2,3-cd) pyrene Leachate GCMS	N	ug/l	0.01	0.21
Dibenzo(a,h)anthracene Leachate GCMS	N	ug/l	0.01	0.09
Benzo(ghi)perylene Leachate GCMS	N	ug/l	0.01	0.27
Total PAH(16) Leachate GCMS	N	ug/l	0.01	3.09



2683



Results Summary

Report No.: 23-47325, issue number 1

ELAB Reference	315795
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	WS02
Sample Depth (m)	0.25
Sampling Date	20/03/2023

Determinand	Codes	Units	LOD	
TPH CWG				
>C5-C6 Aliphatic in Leachate (HS_1D_MS)	N	ug/l	1	< 1.0
>C6-C8 Aliphatic in Leachate (HS_1D_MS)	N	ug/l	1	< 1.0
>C8-C10 Aliphatic Leachate (EH_CU_1D_AL)	N	ug/l	5	< 5.0
>C10-C12 Aliphatic Leachate (EH_CU_1D_AL)	N	ug/l	5	< 5.0
>C12-C16 Aliphatic Leachate (EH_CU_1D_AL)	N	ug/l	5	14.6
>C16-C21 Aliphatic Leachate (EH_CU_1D_AL)	N	ug/l	5	26.1
>C21-C35 Aliphatic Leachate (EH_CU_1D_AL)	N	ug/l	5	204
>C35-C40 Aliphatic Leachate (EH_CU_1D_AL)	N	ug/l	5	31.9
Total (>C5-C40) Aliphatic Leachate (HS_1D_MS+EH_CU_1D_AL)	N	ug/l	5	277
>C5-C7 Aromatic in Leachate (HS_1D_MS)	N	ug/l	1	< 1.0
>C7-C8 Aromatic in Leachate (HS_1D_MS)	N	ug/l	1	< 1.0
>C8-C10 Aromatic Leachate (EH_CU_1D_AR)	N	ug/l	5	11.8
>C10-C12 Aromatic Leachate (EH_CU_1D_AR)	N	ug/l	5	< 5.0
>C12-C16 Aromatic Leachate (EH_CU_1D_AR)	N	ug/l	5	< 5.0
>C16-C21 Aromatic Leachate (EH_CU_1D_AR)	N	ug/l	5	8.7
>C21-C35 Aromatic Leachate (EH_CU_1D_AR)	N	ug/l	5	137
>C35-C40 Aromatic Leachate (EH_CU_1D_AR)	N	ug/l	5	< 5.0
Total (>C5-C40) Aromatic Leachate (HS_1D_MS+EH_CU_1D_AR)	N	ug/l	5	157
Total (>C5-C40) Ali/Aro Leachate (HS_1D_MS+EH_CU_1D_Total)	N	ug/l	5	434



Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards on Sea, East Sussex, TN38 9BY
Tel: +44 (0)1424 718618, Email: info@elab-uk.co.uk, Web: www.elab-uk.co.uk

Results Summary
Report No.: 23-47325, issue number 1

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
315794	0.50	WS01	Brown Sandy Soil	No asbestos detected	n/t	n/t	n/t	n/t
315795	0.25	WS02	Brown Soil	No asbestos detected	n/t	n/t	n/t	n/t
315796	0.45	WS03	Brown Sandy Soil	No asbestos detected	n/t	n/t	n/t	n/t
315797	0.50	WS04	Brown Sandy Soil	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 23-47325, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Aliphatic hydrocarbons in leachate	N		28/03/2023		GC-FID
Aliphatic/Aromatic hydrocarbons in leach	N		29/03/2023		GC-FID
Aromatic hydrocarbons in leachate	N		29/03/2023		GC-FID
Carbon in leachates	N		29/03/2023		IR
Leachate cyanide 10:1 extract	N		27/03/2023		Colorimetry
Leachate sulphide 10:1 extract	N		28/03/2023		Colorimetry
pH of leachates	N		27/03/2023		Electromeric
Leachate metals 10:1 extract	N		27/03/2023	101	ICPMS
Free cyanide	N	As submitted sample	24/03/2023	107	Colorimetry
Sulphide	N	As submitted sample	23/03/2023	109	Colorimetry
Hexavalent chromium	N	As submitted sample	23/03/2023	110	Colorimetry
pH	M	Air dried sample	24/03/2023	113	Electromeric
Acid Soluble Sulphate	U	Air dried sample	24/03/2023	115	Ion Chromatography
Aqua regia extractable metals	M	Air dried sample	23/03/2023	118	ICPMS
PAHs and/or PCBs in leachates	N		27/03/2023	135	GC-MS
SVOC in solids	N	As submitted sample	24/03/2023	167	GC-MS
Water soluble anions	M	Air dried sample	23/03/2023	172	Ion Chromatography
Organochlorine Pesticides in solids	N	As submitted sample	24/03/2023	173	GC-MS
Low range Aliphatic hydrocarbons soil	N	As submitted sample	24/03/2023	181	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	24/03/2023	181	GC-MS
BTEX in solids	M	As submitted sample	24/03/2023	181A	GC-MS
Low range Aliphatic hydrocarbons leachat	N		27/03/2023	200	GC-MS
Low range Aromatic hydrocarbons leachate	N		27/03/2023	200	GC-MS
Water soluble boron	N	Air dried sample	23/03/2023	202	Colorimetry
Asbestos identification	U	Air dried sample	27/03/2023	281	Microscopy
Anions in leachates	N		27/03/2023	305	Ion Chromatography
Soil organic matter	U	Air dried sample	27/03/2023	BS1377:P3	Titrimetry
Water					
Hardness in soil leachates	N		28/03/2023	APHA	ICPMS

Tests marked N are not UKAS accredited

Report Information

Report No.: 23-47325, issue number 1

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination. Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed. ELAB are unable to provide an interpretation or opinion on the content of this report. The results relate only to the sample received. PCB congener results may include any coeluting PCBs Uncertainty of measurement for the determinands tested are available upon request Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
 All water samples will be retained for 7 days following the date of the test report
 Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry



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The Environmental Laboratory Ltd
Unit A2, Windmill Road
Ponswood Industrial Estate
St. Leonards on Sea
East Sussex
TN38 9BY

Attention: Customer Services

CERTIFICATE OF ANALYSIS

Date of report Generation:	31 March 2023
Customer:	The Environmental Laboratory Ltd
Sample Delivery Group (SDG):	230327-13
Your Reference:	23-47325
Location:	Not Specified
Report No:	684252
Order Number:	11233

We received 4 samples on Friday March 24, 2023 and 4 of these samples were scheduled for analysis which was completed on Friday March 31, 2023. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden.

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

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

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

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 230327-13
Client Ref.: 23-47325

Report Number: 684252
Location: Not Specified

Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
27745735	315794/WS01		0.50	20/03/2023
27745736	315795/WS02		0.25	20/03/2023
27745737	315796/WS03		0.45	20/03/2023
27745738	315797/WS04		0.50	20/03/2023

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



CERTIFICATE OF ANALYSIS

SDG: 230327-13
Client Ref.: 23-47325Report Number: 684252
Location: Not Specified

Superseded Report:

Results Legend



Test

No Determination
Possible

Sample Types -

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

Lab Sample No(s)

Customer
Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

27745738
27745737
27745736
27745735315797WMS04
315796WMS03
315795WMS02
315794WMS010.50
0.45
0.25
0.50125g Glass Jar
125g Glass Jar
125g Glass Jar
125g Glass JarS
S
S
S

EPH CWG GC (S)

All

NDPs: 0
Tests: 4

X X X X

GRO by GC-FID (S)

All

NDPs: 0
Tests: 4

X X X X

Sample description

All

NDPs: 0
Tests: 4

X X X X

TPH CWG GC (S)

All

NDPs: 0
Tests: 4

X X X X

VOC MS (S)

All

NDPs: 0
Tests: 4

X X X X



CERTIFICATE OF ANALYSIS

Validated

SDG: 230327-13
Client Ref.: 23-47325

Report Number: 684252
Location: Not Specified

Superseded Report:

Sample Descriptions

Grain Sizes

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

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
27745735	315794/WS01	0.50	Dark Brown	Sandy Loam	Stones	None
27745736	315795/WS02	0.25	Dark Brown	Silty Clay	Stones	None
27745737	315796/WS03	0.45	Dark Brown	Loamy Sand	Stones	None
27745738	315797/WS04	0.50	Dark Brown	Silty Clay	Stones	None

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

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

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 230327-13
Client Ref.: 23-47325

Report Number: 684252
Location: Not Specified

Superseded Report:

Table of Results - Appendix

Method No	Description
PM024	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM089	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM116	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM414	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden (Method codes TM).



CERTIFICATE OF ANALYSIS

Validated

SDG: 230327-13
Client Ref.: 23-47325

Report Number: 684252
Location: Not Specified

Superseded Report:

Test Completion Dates

Lab Sample No(s)	27745735	27745736	27745737	27745738
Customer Sample Ref.	315794/WS01	315795/WS02	315796/WS03	315797/WS04
AGS Ref.				
Depth	0.50	0.25	0.45	0.50
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
EPH CWG GC (S)	31-Mar-2023	31-Mar-2023	31-Mar-2023	31-Mar-2023
GRO by GC-FID (S)	30-Mar-2023	30-Mar-2023	30-Mar-2023	30-Mar-2023
Sample description	29-Mar-2023	29-Mar-2023	29-Mar-2023	29-Mar-2023
TPH CWG GC (S)	31-Mar-2023	31-Mar-2023	31-Mar-2023	31-Mar-2023
VOC MS (S)	30-Mar-2023	30-Mar-2023	30-Mar-2023	30-Mar-2023



CERTIFICATE OF ANALYSIS

SDG: 230327-13
Client Ref: 23-47325

Report Number: 684252
Location: Not Specified

Superseded Report:

Appendix

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

2. If sufficient sample is received a sub sample will be retained free of charge for 15 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

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

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

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

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

7. Results relate only to the items tested.

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

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

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

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

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury.

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

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

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

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

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

General

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

19. Sample Deviations

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

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

20. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials and soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

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

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

Visual Estimation Of Fibre Content

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

Respirable Fibres

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

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

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

APPENDIX G: SOIL CONTAMINATION SUMMARY TABLES

SOIL ASSESSMENT CRITERIA FOR RESIDENTIAL LAND USE (WITH HOMEGROWN PRODUCE)

(Updated: January 2023)



Contaminant	Assessment Criteria for Residential at 1% SOM (mg/kg)	Assessment Criteria for Residential at 2.5% SOM (mg/kg)	Assessment Criteria for Residential at 6% SOM (mg/kg)
Metals			
Arsenic	37	37	37
Boron	290	290	290
Cadmium	11	11	11
Chromium III	910	910	910
Chromium VI	6	6	6
Copper	2400	2400	2400
*Lead	200	200	200
Mercury	1.2	1.2	1.2
Nickel	130	130	130
Selenium	250	250	250
Vanadium	410	410	410
Zinc	3700	3700	3700
Non-Metals			
Phenol	120	200	380
Polyaromatic Hydrocarbons (PAH)			
Acenaphthene	210	510	1100
Acenaphthylene	170	420	920
Anthracene	2400	5400	11000
Benz[a]anthracene	7.2	11	13
Benzo[a]pyrene	2.2	2.7	3.0
Benzo[b]fluoranthene	2.6	3.3	3.7
Benzo[ghi]perylene	320	340	350
Benzo[k]fluoranthene	77	93	100
Chrysene	15	22	27
Dibenz[ah]anthracene	0.24	0.28	0.3
Fluoranthene	280	560	890
Fluorene	170	400	860
Indeno[123-cd]pyrene	27	36	41
Naphthalene	2.3	5.6	13
Phenanthrene	95	220	440
Pyrene	620	1200	2000
Coal Tar [Bap as surrogate marker]	0.79	0.98	1.1
Petroleum Hydrocarbons			
Aliphatic EC 5-6	42	78	160
Aliphatic EC >6-8	100	230	530
Aliphatic EC >8-10	27	65	150
Aliphatic EC >10-12	130	330	760
Aliphatic EC >12-16	1100	2400	4300
Aliphatic EC >16-35	65000	92000	110000
Aliphatic EC >35-44	65000	92000	110000
Aromatic EC 5-7 (Benzene)	70	140	300
Aromatic EC >7-8 (Toluene)	130	290	660
Aromatic EC >8-10	34	83	190
Aromatic EC >10-12	74	180	380
Aromatic EC >12-16	140	330	660
Aromatic EC >16-21	260	540	930
Aromatic EC >21-35	1100	1500	1700
Aromatic EC >35-44	1100	1500	1700
Aliphatic – Aromatic EC >44-70	1600	1800	1900
Other			
Asbestos Containing Materials (ACM)	No Detection	No Detection	No Detection

Copyright: Land Quality Management Limited (LQM)

The above is based on criteria contained in publication LQM/CIEH S4UL's for Human Health Risk Assessment (2015) (CCG Licence No. S4UL3233), applicable to the "Residential" land use (with home grown produce) scenario for soil organic matter (SOM) content of 1% - 6%.

*This document does not provide criteria for Lead, for which the results were compared to the C4SL published by DEFRA SP1010 Development of Category 4 Screening Levels.

**METALS DATA SUMMARY AND RISK ASSESSMENT SHEET**Job number: **23-13833**Site name: **Coach Road Farm, Knowsley**Prepared by: **TG**Authorised by: **CB**Proposed land use: **Residential with plant uptake**SOM % used: **2.5**= **Threshold exceeded**= **Below Limit of detection**= **Not tested**

			Metals							
Contaminants			Cadmium	Chromium III	Chromium VI	Copper	Lead	Mercury (elemental)	Nickel	Zinc
Units			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Limit of Detection			0.5	5.0	0.8	5.0	5.0	0.5	5.0	5.0
Human Health Risk Assessment (GAC)			11	910	6	2400	200	1.2	180	3700
Sample Location	Sample Depth (m)	Sample type								
WS01	0.50	SOIL	< 0.5	27	< 0.8	48.6	131	< 0.5	23	132
WS02	0.25	SOIL	< 0.5	42.5	< 0.8	22.7	29.6	< 0.5	40.1	54.1
WS03	0.45	SOIL	< 0.5	14.3	< 0.8	13.6	24.2	< 0.5	11.7	34.1
WS04	0.50	SOIL	< 0.5	29.6	< 0.8	13.9	18.5	< 0.5	27.5	240
Human Health Risk Assessment (GAC)			11	910	6	2400	200	1.2	180	3700



SEMI-METALS, NON-METALS, INORGANICS AND OTHER DATA SUMMARY AND RISK ASSESSMENT SHEET

Job number: **23-13833**

Site name: **Coach Road Farm, Knowsley**

Prepared by: **TG**

Authorised by: **CB**

Proposed land use: **Residential with plant uptake**

SOM % used: **2.5**

 = **Threshold exceeded**

 = **Below Limit of detection**

n/t = **Not tested**

			Semi/non-metals		Inorganics			Other		
Contaminants			Arsenic	Boron	Selenium	Cyanide (free)	Sulphate (water soluble)	Sulphate (water soluble)	pH (units)	Soil Organic Matter %
Units			mg/kg	mg/kg	mg/kg	mg/kg	g/l	mg/l	units	units
Limit of Detection			1.0	0.5	1.0	1.0	0.02	20.0	0.1	0.1
Human Health Risk Assessment (GAC)			37	290	250	22	NA	NA	NA	NA
Sample Location	Sample Depth (m)	Sample type								
WS01	0.50	SOIL	13.9	0.9	< 1.0	< 1.0	< 0.02	n/t	8	2.4
WS02	0.25	SOIL	11.4	0.8	< 1.0	< 1.0	0.10	n/t	8.7	0.8
WS03	0.45	SOIL	4.8	0.5	< 1.0	< 1.0	0.03	n/t	8	1.4
WS04	0.50	SOIL	5.2	1.8	< 1.0	< 1.0	< 0.02	n/t	6.3	3.3
Human Health Risk Assessment (GAC)			37	290	11	22	NA	NA	NA	NA



SPECIATED PAH'S DATA SUMMARY AND RISK ASSESSMENT SHEET

Job number: 23-13833

Site name: Coach Road Farm, Knowsley

Prepared by: TG

Authorised by: CB

Proposed land use: Residential with plant uptake

SOM % used: 2.5

 = Threshold exceeded

 = Below Limit of detection

 n/t = Not tested

Contaminants

PAH's

Units

Limit of Detection

Human Health Risk Assessment (GAC)

Sample Location

Sample
Depth (m)

Sample type

Acenaphthene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[ghi]perylene	Benzo[k]fluoranthene	Chrysene	Dibenzo[ah]anthracene	fluoranthene	fluorene	Indeno[123-cd]pyrene	Napthalene	Pheanthrene	Pyrene	Total PAH's
mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4
510	420	5400	11	2.7	3.3	340	93	22	0.28	560	400	36	5.6	220	1200	NA
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.03	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.34
0.03	0.04	0.19	0.66	0.61	0.74	0.35	0.28	0.67	0.07	1.25	0.05	0.4	< 0.02	0.59	1.15	7.09
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.03	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.34
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.03	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.34
510	420	11	11	2.7	3.3	340	93	22	0.28	560	400	36	5.6	220	1200	NA



SPECIATED TPH'S DATA SUMMARY AND RISK ASSESSMENT SHEET

Job number: 23-13833

Site name: Coach Road Farm, Knowsley

Prepared by: TG

Authorised by: CB

Proposed land use: Residential with plant uptake

SOM % used: 2.5

 	=	Threshold exceeded
 	=	Below Limit of detection
n/t	=	Not tested

			Speciated TPH's															
			Aromatics							Aliphatics								
Contaminants			EC5-7	EC7-8	EC8-10	EC10-12	EC12-16	EC16-21	EC21-35	EC35-44	EC5-6	EC6-8	EC8-10	EC10-12	EC12-16	EC16-35	EC35-44	TOTAL TPH'S
Units			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Limit of Detection			0.01	0.01	1.0	1.0	1.0	1.0	1.0	1.0	0.01	0.01	1.0	1.0	1.0	1.0	1.0	1.0
Human Health Risk Assessment (GAC)			140	290	83	180	330	540	1500	1500	78	230	65	330	2400	92000	92000	NA
Sample Location	Sample Depth (m)	Sample type																
WS01	0.50	SOIL	<0.01	<0.01	<0.01	<1	<1	<1	7.39	1.38	<0.01	<0.01	<0.01	<1	<1	3.78	<1	12.64
WS02	0.25	SOIL	<0.01	<0.01	<0.01	<1	<1	<1	9.92	1.08	<0.01	<0.01	<0.01	<1	<1	7.88	<1	18.88
WS03	0.45	SOIL	<0.01	<0.01	<0.01	<1	<1	<1	12.1	1.84	<0.01	<0.01	<0.01	<1	<1	6.12	<1	20.06
WS04	0.50	SOIL	<0.01	<0.01	<0.01	<1	<1	<1	2.46	<1	<0.01	<0.01	<0.01	<1	<1	<1	<1	2.46
Human Health Risk Assessment (GAC)			140	290	11	180	330	540	1500	1500	78	230	65	330	2400	92000	92000	NA



BTEX DATA SUMMARY AND RISK ASSESSMENT SHEET

Job number: **23-13833**

Site name: **Coach Road Farm, Knowsley**

Prepared by: **TG**

Authorised by: **CB**

Proposed land use: **Residential with plant uptake**

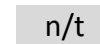
SOM % used: **2.5**



= **Threshold exceeded**



= **Below Limit of detection**



= **Not tested**

			BTEX			
Contaminants			Benzene	Toluene	Ethylbenzene	Total Xylenes
Units			µg/kg	µg/kg	µg/kg	µg/kg
Limit of Detection			10	10	10	10
Human Health Risk Assessment (GAC)			170	290000	110000	130000
Sample Location	Sample Depth (m)	Sample type				
WS01	0.50	SOIL	< 10.0	< 10.0	< 10.0	< 10.0
WS02	0.25	SOIL	< 10.0	< 10.0	< 10.0	< 10.0
WS03	0.45	SOIL	< 10.0	< 10.0	< 10.0	< 10.0
WS04	0.50	SOIL	< 10.0	< 10.0	< 10.0	< 10.0
Human Health Risk Assessment (GAC)			170	11	110000	130000



CC GEOTECHNICAL LIMITED

Consulting Geotechnical and Geoenvironmental Engineers

ASBESTOS ASSESSMENT SHEET

Job number: 23-13833

Site name: Coach Road Farm, Knowsley

Prepared by: TG

Authorised by: CB

Sample Location	Sample Depth (m)	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)	Assessment
WS01	0.50	No asbestos detected	n/t	n/t	n/t	n/t	No asbestos detected
WS02	0.25	No asbestos detected	n/t	n/t	n/t	n/t	No asbestos detected
WS03	0.45	No asbestos detected	n/t	n/t	n/t	n/t	No asbestos detected
WS04	0.50	No asbestos detected	n/t	n/t	n/t	n/t	No asbestos detected

APPENDIX H: PRELIMINARY WASTE CLASSIFICATION REPORT



Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

- understand the origin of the waste
- select the correct List of Waste code(s)
- confirm that the list of determinands, results and sampling plan are fit for purpose
- select and justify the chosen metal species (Appendix B)
- correctly apply moisture correction and other available corrections
- add the meta data for their user-defined substances (Appendix A)
- check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)



FLSS5-JVTDN-W7907

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

Job name

Coach Road Farm, Knowsley

Description/Comments

Project

Coach Road Farm, Knowsley

Site

Coach Road Farm, Knowsley

Classified by

Name: **Tony Gerrard**
Date: **03 May 2023 14:47 GMT**
Telephone: **0151 545 2750**

Company: **CC Geotechnical Ltd**

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification:

Course
Hazardous Waste Classification

Date

Purpose of classification

2 - Material Characterisation

Address of the waste

Coach Road Farm, Knowsley

Post Code N/A

SIC for the process giving rise to the waste

Description of industry/producer giving rise to the waste

Residential redevelopment

Description of the specific process, sub-process and/or activity that created the waste

Surplus spoil generated for off site disposal

Description of the waste

Granular spoil



Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	WS01	0.50	Non Hazardous		3
2	WS02	0.25	Non Hazardous		8
3	WS03	0.45	Non Hazardous		13
4	WS04	0.50	Non Hazardous		18

Related documents

#	Name	Description
1	CCG SOIL A 2020	waste stream template used to create this Job

Report

Created by: Tony Gerrard

Created date: 03 May 2023 14:47 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	23
Appendix B: Rationale for selection of metal species	26
Appendix C: Version	27



Classification of sample: WS01

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

Sample details

Sample name: **WS01** LoW Code: **17: Construction and Demolition Wastes (including excavated soil from contaminated sites)**
Sample Depth: **0.50 m** Chapter: **17 05 04 (Soil and stones other than those mentioned in 17 05 03)**
Entry:

Hazard properties

None identified

Determinands

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

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				13.9	mg/kg	1.32	18.353	mg/kg	0.00184 %		
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				<0.5	mg/kg	1.142	<0.571	mg/kg	<0.0000571 %		<LOD
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				27	mg/kg	1.462	39.462	mg/kg	0.00395 %		
		215-160-9	1308-38-9									
4	copper { dicopper oxide; copper (I) oxide }				48.6	mg/kg	1.126	54.718	mg/kg	0.00547 %		
	029-002-00-X	215-270-7	1317-39-1									
5	lead { lead chromate }			1	131	mg/kg	1.56	204.336	mg/kg	0.0131 %		
	082-004-00-2	231-846-0	7758-97-6									
6	mercury { mercury dichloride }				<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
7	nickel { nickel chromate }				23	mg/kg	2.976	68.454	mg/kg	0.00685 %		
	028-035-00-7	238-766-5	14721-18-7									
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8											
9	zinc { zinc chromate }				132	mg/kg	2.774	366.187	mg/kg	0.0366 %		
	024-007-00-3	236-878-9	13530-65-9									
10	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
	006-007-00-5											
11	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.8	mg/kg	1.923	<1.538	mg/kg	<0.000154 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
12	boron { diboron trioxide; boric oxide }				0.9	mg/kg	3.22	2.898	mg/kg	0.00029 %		
	005-008-00-8	215-125-8	1303-86-2									
13	pH				8	pH		8	pH	8pH		
			PH									
14	phenol				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	604-001-00-2	203-632-7	108-95-2									
15	naphthalene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
	601-052-00-2	202-049-5	91-20-3									



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
16	acenaphthylene	205-917-1	208-96-8		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
17	acenaphthene	201-469-6	83-32-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
18	fluorene	201-695-5	86-73-7		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
19	phenanthrene	201-581-5	85-01-8		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
20	anthracene	204-371-1	120-12-7		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
21	fluoranthene	205-912-4	206-44-0		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
22	pyrene	204-927-3	129-00-0		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
23	benzo[a]anthracene	601-033-00-9	200-280-6		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
24	chrysene	601-048-00-0	205-923-4		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
25	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
26	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
27	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
28	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
29	dibenz[a,h]anthracene	601-041-00-2	200-181-8		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
30	benzo[ghi]perylene	205-883-8	191-24-2		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
31	benzene	601-020-00-8	200-753-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
32	toluene	601-021-00-3	203-625-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
33	ethylbenzene	601-023-00-4	202-849-4		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
34	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
35	TPH (C6 to C40) petroleum group		TPH		12.64 mg/kg		12.64 mg/kg	0.00126 %		
36	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
37	polychlorobiphenyls; PCB	602-039-00-4	215-648-1		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
38	asbestos	650-013-00-6	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
39	antimony { antimony trioxide }	051-005-00-X	215-175-0		<0.1 mg/kg	1.197	<0.12 mg/kg	<0.000012 %		<LOD
40	beryllium { beryllium oxide }	004-003-00-8	215-133-1		<0.1 mg/kg	2.775	<0.278 mg/kg	<0.0000278 %		<LOD



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
41	manganese { manganese sulphate }				<0.1 mg/kg	2.749	<0.275 mg/kg	<0.0000275 %		<LOD
	025-003-00-4	232-089-9	7785-87-7							
42	molybdenum { molybdenum(VI) oxide }				<0.1 mg/kg	1.5	<0.15 mg/kg	<0.000015 %		<LOD
	042-001-00-9	215-204-7	1313-27-5							
43	1,1-dichloroethane and 1,2-dichloroethane (combined)				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		203-458-1, 200-863-5	107-06-2, 75-34-3							
44	tetrachloroethylene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-028-00-4	204-825-9	127-18-4							
45	carbon tetrachloride; tetrachloromethane				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-008-00-5	200-262-8	56-23-5							
46	trichloroethylene; trichloroethene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-027-00-9	201-167-4	79-01-6							
47	vinyl chloride; chloroethylene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-023-00-7	200-831-0	75-01-4							
48	DDT (ISO); clofenotane (INN); dicophane; 1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane; dichlorodiphenyltrichloroethane				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-045-00-7	200-024-3	50-29-3							
49	chlordan (ISO); 1,2,4,5,6,7,8,8-octachloro-3a,4,7,7a-tetrahydro-4,7-methanoindan				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-047-00-8	200-349-0	57-74-9							
50	hexachlorocyclohexanes, including lindane				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-043-00-6	210-168-9, 200-401-2, 206-270-8, 206-271-3	58-89-9, 319-84-6, 319-85-7, 608-73-1							
51	dieldrin (ISO)				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-049-00-9	200-484-5	60-57-1							
52	endrin (ISO); 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4,5,8-dimethanonaphthalene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-051-00-X	200-775-7	72-20-8							
53	heptachlor (ISO); 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-4,7-methanoindene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-046-00-2	200-962-3	76-44-8							
54	hexachlorobenzene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-065-00-6	204-273-9	118-74-1							
55	chlordecone (ISO); perchloropentacyclo[5,3,0,02,6,03,9,04,8]decan-5-one; decachloropentacyclo[5,2,1,02,6,03,9,05,8]decan-4-one				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	606-019-00-6	205-601-3	143-50-0							
56	aldrin (ISO)				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-048-00-3	206-215-8	309-00-2							
57	pentachlorobenzene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-074-00-5	210-172-0	608-93-5							
58	dodecachloropentacyclo[5.2.1.02,6.03,9.05,8]decane; mirex				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-077-00-1	219-196-6	2385-85-5							
59	camphechlor (ISO); toxaphene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-044-00-1	232-283-3	8001-35-2							
60	hexabromobiphenyl				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		252-994-2	36355-01-8							
61	2,3,7,8-TeCDD				<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
		217-122-7	1746-01-6							
62	1,2,3,7,8-PeCDD				<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
			40321-76-4							
63	1,2,3,4,7,8-HxCDD				<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
			39227-28-6							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
64	1,2,3,6,7,8-HxCDD		57653-85-7		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
65	1,2,3,7,8,9-HxCDD		19408-74-3		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
66	1,2,3,4,6,7,8-HpCDD		35822-46-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
67	OCDD		3268-87-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
68	2,3,7,8-TeCDF		51207-31-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
69	1,2,3,7,8-PeCDF		57117-41-6		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
70	2,3,4,7,8-PeCDF		57117-31-4		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
71	1,2,3,4,7,8-HxCDF		70648-26-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
72	1,2,3,6,7,8-HxCDF		57117-44-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
73	1,2,3,7,8,9-HxCDF		72918-21-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
74	2,3,4,6,7,8-HxCDF		60851-34-5		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
75	1,2,3,4,6,7,8-HpCDF		67562-39-4		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
76	1,2,3,4,7,8,9-HpCDF		55673-89-7		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
77	OCDF		39001-02-0		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
78	petrol (gasoline) petroleum group				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
79	diesel petroleum group		68334-30-5; 68476-34-6; 94114-59-7; 1159170-26-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
80	heavy/residual fuel oils petroleum group				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
81	crude oils petroleum group				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
82	kerosine petroleum group including kerosine (petroleum); kerosine (petroleum) hydrosulphurised; kerosine (petroleum) sweetened	232-366-4; 265-184-9; 294-799-5	8008-20-6; 64742-81-0; 91770-15-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
Total:								0.0703 %		

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

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because Concentrations too low to be considered flammable risk



Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00126%)



Classification of sample: WS02

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

Sample details

Sample name:	LoW Code:
WS02	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.25 m	

Hazard properties

None identified

Determinands

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

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				11.4	mg/kg	1.32	15.052	mg/kg	0.00151 %		
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				<0.5	mg/kg	1.142	<0.571	mg/kg	<0.0000571 %		<LOD
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				42.5	mg/kg	1.462	62.116	mg/kg	0.00621 %		
		215-160-9	1308-38-9									
4	copper { dicopper oxide; copper (I) oxide }				22.7	mg/kg	1.126	25.558	mg/kg	0.00256 %		
	029-002-00-X	215-270-7	1317-39-1									
5	lead { lead chromate }			1	29.6	mg/kg	1.56	46.171	mg/kg	0.00296 %		
	082-004-00-2	231-846-0	7758-97-6									
6	mercury { mercury dichloride }				<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
7	nickel { nickel chromate }				40.1	mg/kg	2.976	119.348	mg/kg	0.0119 %		
	028-035-00-7	238-766-5	14721-18-7									
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8											
9	zinc { zinc chromate }				54.1	mg/kg	2.774	150.081	mg/kg	0.015 %		
	024-007-00-3	236-878-9	13530-65-9									
10	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
	006-007-00-5											
11	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.8	mg/kg	1.923	<1.538	mg/kg	<0.000154 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
12	boron { diboron trioxide; boric oxide }				0.8	mg/kg	3.22	2.576	mg/kg	0.000258 %		
	005-008-00-8	215-125-8	1303-86-2									
13	pH				8.7	pH		8.7	pH	8.7 pH		
			PH									
14	phenol				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	604-001-00-2	203-632-7	108-95-2									
15	naphthalene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
	601-052-00-2	202-049-5	91-20-3									



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
16	acenaphthylene	205-917-1	208-96-8		0.04 mg/kg		0.04 mg/kg	0.000004 %		
17	acenaphthene	201-469-6	83-32-9		0.03 mg/kg		0.03 mg/kg	0.000003 %		
18	fluorene	201-695-5	86-73-7		0.05 mg/kg		0.05 mg/kg	0.000005 %		
19	phenanthrene	201-581-5	85-01-8		0.59 mg/kg		0.59 mg/kg	0.000059 %		
20	anthracene	204-371-1	120-12-7		0.19 mg/kg		0.19 mg/kg	0.000019 %		
21	fluoranthene	205-912-4	206-44-0		1.25 mg/kg		1.25 mg/kg	0.000125 %		
22	pyrene	204-927-3	129-00-0		1.15 mg/kg		1.15 mg/kg	0.000115 %		
23	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	0.66 mg/kg		0.66 mg/kg	0.000066 %		
24	chrysene	601-048-00-0	205-923-4	218-01-9	0.67 mg/kg		0.67 mg/kg	0.000067 %		
25	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	0.74 mg/kg		0.74 mg/kg	0.000074 %		
26	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	0.28 mg/kg		0.28 mg/kg	0.000028 %		
27	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	0.61 mg/kg		0.61 mg/kg	0.000061 %		
28	indeno[123-cd]pyrene	205-893-2	193-39-5		0.4 mg/kg		0.4 mg/kg	0.00004 %		
29	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	0.07 mg/kg		0.07 mg/kg	0.000007 %		
30	benzo[ghi]perylene	205-883-8	191-24-2		0.35 mg/kg		0.35 mg/kg	0.000035 %		
31	benzene	601-020-00-8	200-753-7	71-43-2	<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
32	toluene	601-021-00-3	203-625-9	108-88-3	<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
33	ethylbenzene	601-023-00-4	202-849-4	100-41-4	<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
34	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]	<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
35	TPH (C6 to C40) petroleum group		TPH		18.88 mg/kg		18.88 mg/kg	0.00189 %		
36	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4	<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
37	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3	<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
38	asbestos	650-013-00-6	-----	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5	<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
39	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4	<0.1 mg/kg	1.197	<0.12 mg/kg	<0.000012 %		<LOD
40	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9	<0.1 mg/kg	2.775	<0.278 mg/kg	<0.0000278 %		<LOD



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
41	manganese { manganese sulphate }				<0.1 mg/kg	2.749	<0.275 mg/kg	<0.0000275 %		<LOD
	025-003-00-4	232-089-9	7785-87-7							
42	molybdenum { molybdenum(VI) oxide }				<0.1 mg/kg	1.5	<0.15 mg/kg	<0.000015 %		<LOD
	042-001-00-9	215-204-7	1313-27-5							
43	1,1-dichloroethane and 1,2-dichloroethane (combined)				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		203-458-1, 200-863-5	107-06-2, 75-34-3							
44	tetrachloroethylene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-028-00-4	204-825-9	127-18-4							
45	carbon tetrachloride; tetrachloromethane				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-008-00-5	200-262-8	56-23-5							
46	trichloroethylene; trichloroethene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-027-00-9	201-167-4	79-01-6							
47	vinyl chloride; chloroethylene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-023-00-7	200-831-0	75-01-4							
48	DDT (ISO); clofenotane (INN); dicophane; 1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane; dichlorodiphenyltrichloroethane				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-045-00-7	200-024-3	50-29-3							
49	chlordan (ISO); 1,2,4,5,6,7,8-octachloro-3a,4,7,7a-tetrahydro-4,7-methanoindan				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-047-00-8	200-349-0	57-74-9							
50	hexachlorocyclohexanes, including lindane				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-043-00-6	210-168-9, 200-401-2, 206-270-8, 206-271-3	58-89-9, 319-84-6, 319-85-7, 608-73-1							
51	dieldrin (ISO)				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-049-00-9	200-484-5	60-57-1							
52	endrin (ISO); 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4:5,8-dimethanonaphthalene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-051-00-X	200-775-7	72-20-8							
53	heptachlor (ISO); 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-4,7-methanoindene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-046-00-2	200-962-3	76-44-8							
54	hexachlorobenzene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-065-00-6	204-273-9	118-74-1							
55	chlordecone (ISO); perchloropentacyclo[5.3.0.02,6.03,9.04,8]decan-5-one; decachloropentacyclo[5.2.1.02,6.03,9.05,8]decan-4-one				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	606-019-00-6	205-601-3	143-50-0							
56	aldrin (ISO)				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-048-00-3	206-215-8	309-00-2							
57	pentachlorobenzene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-074-00-5	210-172-0	608-93-5							
58	dodecachloropentacyclo[5.2.1.02,6.03,9.05,8]decane; mirex				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-077-00-1	219-196-6	2385-85-5							
59	camphechlor (ISO); toxaphene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-044-00-1	232-283-3	8001-35-2							
60	hexabromobiphenyl				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		252-994-2	36355-01-8							
61	2,3,7,8-TeCDD				<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
		217-122-7	1746-01-6							
62	1,2,3,7,8-PeCDD				<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
			40321-76-4							
63	1,2,3,4,7,8-HxCDD				<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
			39227-28-6							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
64	1,2,3,6,7,8-HxCDD		57653-85-7		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
65	1,2,3,7,8,9-HxCDD		19408-74-3		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
66	1,2,3,4,6,7,8-HpCDD		35822-46-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
67	OCDD		3268-87-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
68	2,3,7,8-TeCDF		51207-31-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
69	1,2,3,7,8-PeCDF		57117-41-6		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
70	2,3,4,7,8-PeCDF		57117-31-4		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
71	1,2,3,4,7,8-HxCDF		70648-26-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
72	1,2,3,6,7,8-HxCDF		57117-44-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
73	1,2,3,7,8,9-HxCDF		72918-21-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
74	2,3,4,6,7,8-HxCDF		60851-34-5		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
75	1,2,3,4,6,7,8-HpCDF		67562-39-4		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
76	1,2,3,4,7,8,9-HpCDF		55673-89-7		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
77	OCDF		39001-02-0		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
78	petrol (gasoline) petroleum group				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
79	diesel petroleum group		68334-30-5, 68476-34-6, 94114-59-7, 1159170-26-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
80	heavy/residual fuel oils petroleum group				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
81	crude oils petroleum group				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
82	kerosine petroleum group including kerosine (petroleum); kerosine (petroleum) hydrosulphurised; kerosine (petroleum) sweetened	232-366-4; 265-184-9; 294-799-5	8008-20-6; 64742-81-0; 91770-15-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
Total:								0.044 %		

Key

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

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because Concentrations too low to be considered flammable risk



Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00189%)



Classification of sample: WS03

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

Sample details

Sample name: **WS03** LoW Code: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth: **0.45 m** Chapter: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Entry:

Hazard properties

None identified

Determinands

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

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				4.8	mg/kg	1.32	6.338	mg/kg	0.000634 %		
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium oxide }				<0.5	mg/kg	1.142	<0.571	mg/kg	<0.0000571 %		<LOD
	048-002-00-0	215-146-2	1306-19-0									
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				14.3	mg/kg	1.462	20.9	mg/kg	0.00209 %		
		215-160-9	1308-38-9									
4	copper { dicopper oxide; copper (I) oxide }				13.6	mg/kg	1.126	15.312	mg/kg	0.00153 %		
	029-002-00-X	215-270-7	1317-39-1									
5	lead { lead chromate }			1	24.2	mg/kg	1.56	37.748	mg/kg	0.00242 %		
	082-004-00-2	231-846-0	7758-97-6									
6	mercury { mercury dichloride }				<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
7	nickel { nickel chromate }				11.7	mg/kg	2.976	34.822	mg/kg	0.00348 %		
	028-035-00-7	238-766-5	14721-18-7									
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8											
9	zinc { zinc chromate }				34.1	mg/kg	2.774	94.598	mg/kg	0.00946 %		
	024-007-00-3	236-878-9	13530-65-9									
10	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
	006-007-00-5											
11	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.8	mg/kg	1.923	<1.538	mg/kg	<0.000154 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
12	boron { diboron trioxide; boric oxide }				0.5	mg/kg	3.22	1.61	mg/kg	0.000161 %		
	005-008-00-8	215-125-8	1303-86-2									
13	pH				8	pH		8	pH	8pH		
			PH									
14	phenol				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	604-001-00-2	203-632-7	108-95-2									
15	naphthalene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
	601-052-00-2	202-049-5	91-20-3									



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
16	acenaphthylene	205-917-1	208-96-8		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
17	acenaphthene	201-469-6	83-32-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
18	fluorene	201-695-5	86-73-7		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
19	phenanthrene	201-581-5	85-01-8		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
20	anthracene	204-371-1	120-12-7		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
21	fluoranthene	205-912-4	206-44-0		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
22	pyrene	204-927-3	129-00-0		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
23	benzo[a]anthracene	601-033-00-9	200-280-6		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
24	chrysene	601-048-00-0	205-923-4		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
25	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
26	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
27	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
28	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
29	dibenz[a,h]anthracene	601-041-00-2	200-181-8		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
30	benzo[ghi]perylene	205-883-8	191-24-2		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
31	benzene	601-020-00-8	200-753-7		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
32	toluene	601-021-00-3	203-625-9		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
33	ethylbenzene	601-023-00-4	202-849-4		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
34	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
35	TPH (C6 to C40) petroleum group		TPH		20.06 mg/kg		20.06 mg/kg	0.00201 %		
36	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
37	polychlorobiphenyls; PCB	602-039-00-4	215-648-1		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
38	asbestos	650-013-00-6	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
39	antimony { antimony trioxide }	051-005-00-X	215-175-0		<0.1 mg/kg	1.197	<0.12 mg/kg	<0.000012 %		<LOD
40	beryllium { beryllium oxide }	004-003-00-8	215-133-1		<0.1 mg/kg	2.775	<0.278 mg/kg	<0.0000278 %		<LOD



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
41	manganese { manganese sulphate }				<0.1 mg/kg	2.749	<0.275 mg/kg	<0.0000275 %		<LOD
	025-003-00-4	232-089-9	7785-87-7							
42	molybdenum { molybdenum(VI) oxide }				<0.1 mg/kg	1.5	<0.15 mg/kg	<0.000015 %		<LOD
	042-001-00-9	215-204-7	1313-27-5							
43	1,1-dichloroethane and 1,2-dichloroethane (combined)				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		203-458-1, 200-863-5	107-06-2, 75-34-3							
44	tetrachloroethylene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-028-00-4	204-825-9	127-18-4							
45	carbon tetrachloride; tetrachloromethane				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-008-00-5	200-262-8	56-23-5							
46	trichloroethylene; trichloroethene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-027-00-9	201-167-4	79-01-6							
47	vinyl chloride; chloroethylene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-023-00-7	200-831-0	75-01-4							
48	DDT (ISO); clofenotane (INN); dicophane; 1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane; dichlorodiphenyltrichloroethane				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-045-00-7	200-024-3	50-29-3							
49	chlordan (ISO); 1,2,4,5,6,7,8,8-octachloro-3a,4,7,7a-tetrahydro-4,7-methanoindan				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-047-00-8	200-349-0	57-74-9							
50	hexachlorocyclohexanes, including lindane				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-043-00-6	210-168-9, 200-401-2, 206-270-8, 206-271-3	58-89-9, 319-84-6, 319-85-7, 608-73-1							
51	dieldrin (ISO)				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-049-00-9	200-484-5	60-57-1							
52	endrin (ISO); 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4,5,8-dimethanonaphthalene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-051-00-X	200-775-7	72-20-8							
53	heptachlor (ISO); 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-4,7-methanoindene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-046-00-2	200-962-3	76-44-8							
54	hexachlorobenzene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-065-00-6	204-273-9	118-74-1							
55	chlordecone (ISO); perchloropentacyclo[5,3,0,02,6,03,9,04,8]decan-5-one; decachloropentacyclo[5,2,1,02,6,03,9,05,8]decan-4-one				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	606-019-00-6	205-601-3	143-50-0							
56	aldrin (ISO)				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-048-00-3	206-215-8	309-00-2							
57	pentachlorobenzene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-074-00-5	210-172-0	608-93-5							
58	dodecachloropentacyclo[5.2.1.02,6.03,9.05,8]decane; mirex				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-077-00-1	219-196-6	2385-85-5							
59	camphechlor (ISO); toxaphene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-044-00-1	232-283-3	8001-35-2							
60	hexabromobiphenyl				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		252-994-2	36355-01-8							
61	2,3,7,8-TeCDD				<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
		217-122-7	1746-01-6							
62	1,2,3,7,8-PeCDD				<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
			40321-76-4							
63	1,2,3,4,7,8-HxCDD				<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
			39227-28-6							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
64	1,2,3,6,7,8-HxCDD		57653-85-7		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
65	1,2,3,7,8,9-HxCDD		19408-74-3		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
66	1,2,3,4,6,7,8-HpCDD		35822-46-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
67	OCDD		3268-87-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
68	2,3,7,8-TeCDF		51207-31-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
69	1,2,3,7,8-PeCDF		57117-41-6		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
70	2,3,4,7,8-PeCDF		57117-31-4		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
71	1,2,3,4,7,8-HxCDF		70648-26-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
72	1,2,3,6,7,8-HxCDF		57117-44-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
73	1,2,3,7,8,9-HxCDF		72918-21-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
74	2,3,4,6,7,8-HxCDF		60851-34-5		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
75	1,2,3,4,6,7,8-HpCDF		67562-39-4		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
76	1,2,3,4,7,8,9-HpCDF		55673-89-7		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
77	OCDF		39001-02-0		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
78	petrol (gasoline) petroleum group				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
79	diesel petroleum group		68334-30-5; 68476-34-6; 94114-59-7; 1159170-26-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
80	heavy/residual fuel oils petroleum group				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
81	crude oils petroleum group				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
82	kerosine petroleum group including kerosine (petroleum); kerosine (petroleum) hydrosulphurised; kerosine (petroleum) sweetened	232-366-4; 265-184-9; 294-799-5	8008-20-6; 64742-81-0; 91770-15-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
Total:								0.0227 %		

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

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because Concentrations too low to be considered flammable risk



Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00201%)



Classification of sample: WS04

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

Sample details

Sample name: **WS04** LoW Code: Chapter: **17: Construction and Demolition Wastes (including excavated soil from contaminated sites)**
Sample Depth: **0.50 m** Entry: **17 05 04 (Soil and stones other than those mentioned in 17 05 03)**

Hazard properties

None identified

Determinands

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

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	arsenic { arsenic trioxide }				5.2 mg/kg	1.32	6.866 mg/kg	0.000687 %			
	033-003-00-0	215-481-4	1327-53-3								
2	cadmium { cadmium oxide }				<0.5 mg/kg	1.142	<0.571 mg/kg	<0.0000571 %			<LOD
	048-002-00-0	215-146-2	1306-19-0								
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				29.6 mg/kg	1.462	43.262 mg/kg	0.00433 %			
		215-160-9	1308-38-9								
4	copper { dicopper oxide; copper (I) oxide }				13.9 mg/kg	1.126	15.65 mg/kg	0.00156 %			
	029-002-00-X	215-270-7	1317-39-1								
5	lead { lead chromate }			1	18.5 mg/kg	1.56	28.857 mg/kg	0.00185 %			
	082-004-00-2	231-846-0	7758-97-6								
6	mercury { mercury dichloride }				<0.5 mg/kg	1.353	<0.677 mg/kg	<0.0000677 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
7	nickel { nickel chromate }				27.5 mg/kg	2.976	81.847 mg/kg	0.00818 %			
	028-035-00-7	238-766-5	14721-18-7								
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %			<LOD
	034-002-00-8										
9	zinc { zinc chromate }				240 mg/kg	2.774	665.795 mg/kg	0.0666 %			
	024-007-00-3	236-878-9	13530-65-9								
10	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %			<LOD
	006-007-00-5										
11	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.8 mg/kg	1.923	<1.538 mg/kg	<0.000154 %			<LOD
	024-001-00-0	215-607-8	1333-82-0								
12	boron { triboron trioxide; boric oxide }				1.8 mg/kg	3.22	5.796 mg/kg	0.00058 %			
	005-008-00-8	215-125-8	1303-86-2								
13	pH				6.3 pH		6.3 pH	6.3 pH			
			PH								
14	phenol				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
	604-001-00-2	203-632-7	108-95-2								
15	naphthalene				<0.02 mg/kg		<0.02 mg/kg	<0.000002 %			<LOD
	601-052-00-2	202-049-5	91-20-3								



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
16	acenaphthylene	205-917-1	208-96-8		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
17	acenaphthene	201-469-6	83-32-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
18	fluorene	201-695-5	86-73-7		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
19	phenanthrene	201-581-5	85-01-8		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
20	anthracene	204-371-1	120-12-7		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
21	fluoranthene	205-912-4	206-44-0		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
22	pyrene	204-927-3	129-00-0		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
23	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
24	chrysene	601-048-00-0	205-923-4	218-01-9	<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
25	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
26	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
27	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
28	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
29	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
30	benzo[ghi]perylene	205-883-8	191-24-2		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
31	benzene	601-020-00-8	200-753-7	71-43-2	<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
32	toluene	601-021-00-3	203-625-9	108-88-3	<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
33	ethylbenzene	601-023-00-4	202-849-4	100-41-4	<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
34	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]	<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
35	TPH (C6 to C40) petroleum group		TPH		2.46 mg/kg		2.46 mg/kg	0.000246 %		
36	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4	<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
37	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3	<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
38	asbestos	650-013-00-6	-----	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5	<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
39	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4	<0.1 mg/kg	1.197	<0.12 mg/kg	<0.000012 %		<LOD
40	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9	<0.1 mg/kg	2.775	<0.278 mg/kg	<0.0000278 %		<LOD



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
41	manganese { manganese sulphate }				<0.1 mg/kg	2.749	<0.275 mg/kg	<0.0000275 %		<LOD
	025-003-00-4	232-089-9	7785-87-7							
42	molybdenum { molybdenum(VI) oxide }				<0.1 mg/kg	1.5	<0.15 mg/kg	<0.000015 %		<LOD
	042-001-00-9	215-204-7	1313-27-5							
43	1,1-dichloroethane and 1,2-dichloroethane (combined)				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		203-458-1, 200-863-5	107-06-2, 75-34-3							
44	tetrachloroethylene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-028-00-4	204-825-9	127-18-4							
45	carbon tetrachloride; tetrachloromethane				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-008-00-5	200-262-8	56-23-5							
46	trichloroethylene; trichloroethene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	602-027-00-9	201-167-4	79-01-6							
47	vinyl chloride; chloroethylene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-023-00-7	200-831-0	75-01-4							
48	DDT (ISO); clofenotane (INN); dicophane; 1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane; dichlorodiphenyltrichloroethane				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-045-00-7	200-024-3	50-29-3							
49	chlordan (ISO); 1,2,4,5,6,7,8-octachloro-3a,4,7,7a-tetrahydro-4,7-methanoindan				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-047-00-8	200-349-0	57-74-9							
50	hexachlorocyclohexanes, including lindane				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-043-00-6	210-168-9, 200-401-2, 206-270-8, 206-271-3	58-89-9, 319-84-6, 319-85-7, 608-73-1							
51	dieldrin (ISO)				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-049-00-9	200-484-5	60-57-1							
52	endrin (ISO); 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4:5,8-dimethanonaphthalene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-051-00-X	200-775-7	72-20-8							
53	heptachlor (ISO); 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-4,7-methanoindene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-046-00-2	200-962-3	76-44-8							
54	hexachlorobenzene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-065-00-6	204-273-9	118-74-1							
55	chlordecone (ISO); perchloropentacyclo[5.3.0.02,6.03,9.04,8]decan-5-one; decachloropentacyclo[5.2.1.02,6.03,9.05,8]decan-4-one				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	606-019-00-6	205-601-3	143-50-0							
56	aldrin (ISO)				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-048-00-3	206-215-8	309-00-2							
57	pentachlorobenzene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-074-00-5	210-172-0	608-93-5							
58	dodecachloropentacyclo[5.2.1.02,6.03,9.05,8]decane; mirex				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-077-00-1	219-196-6	2385-85-5							
59	camphechlor (ISO); toxaphene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	602-044-00-1	232-283-3	8001-35-2							
60	hexabromobiphenyl				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		252-994-2	36355-01-8							
61	2,3,7,8-TeCDD				<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
		217-122-7	1746-01-6							
62	1,2,3,7,8-PeCDD				<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
			40321-76-4							
63	1,2,3,4,7,8-HxCDD				<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
			39227-28-6							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
64	1,2,3,6,7,8-HxCDD		57653-85-7		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
65	1,2,3,7,8,9-HxCDD		19408-74-3		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
66	1,2,3,4,6,7,8-HpCDD		35822-46-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
67	OCDD		3268-87-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
68	2,3,7,8-TeCDF		51207-31-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
69	1,2,3,7,8-PeCDF		57117-41-6		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
70	2,3,4,7,8-PeCDF		57117-31-4		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
71	1,2,3,4,7,8-HxCDF		70648-26-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
72	1,2,3,6,7,8-HxCDF		57117-44-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
73	1,2,3,7,8,9-HxCDF		72918-21-9		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
74	2,3,4,6,7,8-HxCDF		60851-34-5		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
75	1,2,3,4,6,7,8-HpCDF		67562-39-4		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
76	1,2,3,4,7,8,9-HpCDF		55673-89-7		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
77	OCDF		39001-02-0		<0.1 ng/kg		<1.0e-07 mg/kg	<1.0e-11 %		<LOD
78	petrol (gasoline) petroleum group				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
79	diesel petroleum group		68334-30-5, 68476-34-6, 94114-59-7, 1159170-26-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
80	heavy/residual fuel oils petroleum group				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
81	crude oils petroleum group				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
82	kerosine petroleum group including kerosine (petroleum); kerosine (petroleum) hydrosulphurised; kerosine (petroleum) sweetened	232-366-4; 265-184-9; 294-799-5	8008-20-6; 64742-81-0; 91770-15-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
Total:								0.085 %		

Key

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

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because Concentrations too low to be considered flammable risk



Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00024%)



Appendix A: Classifier defined and non GB MCL determinands

■ **chromium(III) oxide (worst case)** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database

Data source: <https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806>

Data source date: 17 Jul 2015

Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex**

GB MCL index number: 006-007-00-5

Description/Comments: Conversion factor based on a worst case compound: sodium cyanide

Additional Hazard Statement(s): EUH032 >= 0.2 %

Reason for additional Hazards Statement(s):

20 Nov 2021 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

■ **pH** (CAS Number: PH)

Description/Comments: Appendix C4

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: None.

■ **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

■ **acenaphthene** (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Aquatic Chronic 2; H411

■ **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

■ **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21 Aug 2015

Hazard Statements: Acute Tox. 4; H302 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21 Aug 2015

Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410



• **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2; H351

• **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

• **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

GB MCL index number: 601-023-00-4
Description/Comments:
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

• **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3; H226 , Asp. Tox. 1; H304 , STOT RE 2; H373 , Muta. 1B; H340 , Carc. 1B; H350 , Repr. 2; H361d , Aquatic Chronic 2; H411

• **polychlorobiphenyls; PCB** (EC Number: 215-648-1, CAS Number: 1336-36-3)

GB MCL index number: 602-039-00-4
Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans;

POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.
Additional Hazard Statement(s): Carc. 1A; H350
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 1A; H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

• **1,1-dichloroethane and 1,2-dichloroethane (combined)** (EC Number: 203-458-1, 200-863-5, CAS Number: 107-06-2, 75-34-3)

Description/Comments: Combines the hazard statements and risk phrases for 1,1-dichloroethane and 1,2-dichloroethane
Data source: N/a
Data source date: 14 Oct 2016
Hazard Statements: Flam. Liq. 2; H225 , Acute Tox. 4; H302 , Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 1B; H350 , Aquatic Chronic 3; H412

• **hexabromobiphenyl** (EC Number: 252-994-2, CAS Number: 36355-01-8)

Description/Comments:
Data source: POP specific threshold from ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004).
Data source date: 01 Jul 2013
Hazard Statements: POP >= 0.005 %

• **2,3,7,8-TeCDD** (EC Number: 217-122-7, CAS Number: 1746-01-6)

Description/Comments: 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=1)

• **1,2,3,7,8-PeCDD** (CAS Number: 40321-76-4)

Description/Comments: 1,2,3,7,8-pentachlorodibenzo-p-dioxin
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=1)

• **1,2,3,4,7,8-HxCDD** (CAS Number: 39227-28-6)

Description/Comments: 1,2,3,4,7,8-hexachlorodibenzo-p-dioxin
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=0.1)



▪ **1,2,3,6,7,8-HxCDD** (CAS Number: 57653-85-7)

Description/Comments: 1,2,3,6,7,8-hexachlorodibenzo-p-dioxin
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=0.1)

▪ **1,2,3,7,8,9-HxCDD** (CAS Number: 19408-74-3)

Description/Comments: 1,2,3,7,8,9-hexachlorodibenzo-p-dioxin
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=0.1)

▪ **1,2,3,4,6,7,8-HpCDD** (CAS Number: 35822-46-9)

Description/Comments: 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=0.01)

▪ **OCDD** (CAS Number: 3268-87-9)

Description/Comments: octachlorodibenzo-p-dioxin
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=0.0003)

▪ **2,3,7,8-TeCDF** (CAS Number: 51207-31-9)

Description/Comments: 2,3,7,8-tetrachlorodibenzofuran
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=0.1)

▪ **1,2,3,7,8-PeCDF** (CAS Number: 57117-41-6)

Description/Comments: 1,2,3,7,8-pentachlorodibenzofuran
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=0.03)

▪ **2,3,4,7,8-PeCDF** (CAS Number: 57117-31-4)

Description/Comments: 2,3,4,7,8-pentachlorodibenzofuran
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=0.3)

▪ **1,2,3,4,7,8-HxCDF** (CAS Number: 70648-26-9)

Description/Comments: 1,2,3,4,7,8-hexachlorodibenzofuran
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=0.1)

▪ **1,2,3,6,7,8-HxCDF** (CAS Number: 57117-44-9)

Description/Comments: 1,2,3,6,7,8-hexachlorodibenzofuran
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=0.1)

▪ **1,2,3,7,8,9-HxCDF** (CAS Number: 72918-21-9)

Description/Comments: 1,2,3,7,8,9-hexachlorodibenzofuran
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=0.1)

▪ **2,3,4,6,7,8-HxCDF** (CAS Number: 60851-34-5)

Description/Comments: 2,3,4,6,7,8-hexachlorodibenzofuran
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=0.1)



■ **1,2,3,4,6,7,8-HpCDF** (CAS Number: 67562-39-4)

Description/Comments: 1,2,3,4,6,7,8-heptachlorodibenzofuran
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=0.01)

■ **1,2,3,4,7,8,9-HpCDF** (CAS Number: 55673-89-7)

Description/Comments: 1,2,3,4,7,8,9-heptachlorodibenzofuran
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=0.01)

■ **OCDF** (CAS Number: 39001-02-0)

Description/Comments: octachlorodibenzo[b,d]furan
Data source: ATP1 (Regulation (EU) 756/2010) to POPs Regulation (Regulation (EC) 850/2004)
Data source date: 24 Aug 2010
Hazard Statements: PCDD/PCDF (TEF=0.0003)

■ **petrol (gasoline) petroleum group**

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 1; H224 , Skin Irrit. 2; H315 , Muta. 1B; H340 , Carc. 1B; H350 , Repr. 2; H361d , STOT SE 3; H336 , Asp. Tox. 1; H304 , Aquatic Chronic 2; H411

■ **diesel petroleum group** (CAS Number: 68334-30-5, 68476-34-6, 94114-59-7, 1159170-26-9)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3; H226 , Skin Irrit. 2; H315 , Acute Tox. 4; H332 , Carc. 2; H351 , Asp. Tox. 1; H304 , STOT RE 2; H373 , Aquatic Chronic 2; H411

■ **heavy/residual fuel oils petroleum group**

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Muta. 1B; H340 , Carc. 1B; H350 , Acute Tox. 4; H332 , Repr. 2; H361d , STOT RE 2; H373 , Aquatic Chronic 2; H411

■ **crude oils petroleum group**

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 2; H225 , Carc. 1B; H350 , Eye Irrit. 2; H319 , Asp. Tox. 1; H304 , STOT RE 2; H373 , STOT SE 3; H336 , Aquatic Chronic 2; H411

■ **kerosine petroleum group including kerosine (petroleum); kerosine (petroleum) hydrosulphurised; kerosine (petroleum) sweetened** (EC Number: 232-366-4; 265-184-9; 294-799-5, CAS Number: 8008-20-6; 64742-81-0; 91770-15-9)

Description/Comments: Review of ECHA Registered Substances database; Concawe report: hazard classification and labelling of petroleum substances in the European Economic Area - 2012; REACH compliant SDS from Total, Petrobras; Petrochem; Shell; ESS
Data source: <http://echa.europa.eu/information-on-chemicals/registered-substances>;
Hazard classification and labelling of petroleum substances in the European Economic Area - 2012 (CONCAWE); SDS: company websites
Data source date: 21 Jan 2014
Hazard Statements: Flam. Liq. 3; H226 , Skin Irrit. 2; H315 , Asp. Tox. 1; H304 , Aquatic Chronic 2; H411

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds (edit as required)

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. (edit as required) Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history (edit as required)

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass (edit as required)



copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. (edit as required) Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected. (edit as required)

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

selenium {selenium compounds with the exception of cadmium sulposelenide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case. Pigment cadmium sulposelenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil. (edit as required)

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case as complex cyanides and those specified elsewhere in the annex are not likely to be present in this soil: [Note conversion factor based on a worst case compound: sodium cyanide] (edit as required)

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments (edit as required)

boron {diboron trioxide; boric oxide}

Reasonable case CLP species based on hazard statements/ molecular weight, physical form and low solubility. Industrial sources include: fluxing agent for glass/enamels; additive for fibre optics, borosilicate glass (edit as required)

antimony {antimony trioxide}

Worst case CLP species based on hazard statements/molecular weight and low solubility. Industrial sources include: flame retardants in electrical apparatus, textiles and coatings (edit as required)

beryllium {beryllium oxide}

Reasonable case CLP species based on hazard statements/molecular weight. Industrial sources include: most common (non alloy) form, used in ceramics (edit as required)

manganese {manganese sulphate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

molybdenum {molybdenum(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021

HazWasteOnline Classification Engine Version: 2023.111.5569.10274 (22 Apr 2023)

HazWasteOnline Database: 2023.111.5569.10274 (22 Apr 2023)



This classification utilises the following guidance and legislation:

WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021

CLP Regulation - Regulation 1272/2008/EC of 16 December 2008

1st ATP - Regulation 790/2009/EC of 10 August 2009

2nd ATP - Regulation 286/2011/EC of 10 March 2011

3rd ATP - Regulation 618/2012/EU of 10 July 2012

4th ATP - Regulation 487/2013/EU of 8 May 2013

Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013

5th ATP - Regulation 944/2013/EU of 2 October 2013

6th ATP - Regulation 605/2014/EU of 5 June 2014

WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014

Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014

7th ATP - Regulation 2015/1221/EU of 24 July 2015

8th ATP - Regulation (EU) 2016/918 of 19 May 2016

9th ATP - Regulation (EU) 2016/1179 of 19 July 2016

10th ATP - Regulation (EU) 2017/776 of 4 May 2017

HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017

13th ATP - Regulation (EU) 2018/1480 of 4 October 2018

14th ATP - Regulation (EU) 2020/217 of 4 October 2019

15th ATP - Regulation (EU) 2020/1182 of 19 May 2020

The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit)

Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020

The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK:

2020 No. 1540 of 16th December 2020

GB MCL List - version 1.1 of 09 June 2021

APPENDIX I: CURRENT GUIDANCE & LEGISLATIONS

CURRENT CONTAMINATED LAND LEGISLATION / GUIDANCE & ENVIRONMENTAL RISK ASSESSMENT METHODOLOGY

LEGISLATION OVERVIEW

This report includes hazard identification and risk assessment in line with the risk-based methods referred to in relevant UK legislation and guidance. Government environmental policy is based upon a "suitable for use approach". When considering the current use of land, Part IIA of the Environment Protection Act 1990 (EPA 1990) provides the regulatory regime, which was introduced by Section 57 of the Environment Act 1995, which came into force in England on 1 April 2000. The main objective of introducing the Part IIA regime is to provide an improved system for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment given the current use and circumstances of the land.

Part IIA provides a statutory definition of contaminated land under Section 78A(2) as:

"any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on, or under the land, that:

- (a) Significant harm is being caused or there is a significant possibility of such harm being caused;
- or
- (b) Pollution of controlled waters is being, or is likely to be, caused."

Part IIA provides a statutory definition of the pollution of controlled waters under Section 78A(9) as:

"the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter".

In order to assist in establishing if there is a "significant possibility of significant harm" there must be a "significant pollutant linkage" for potential harm to exist. That means there must be a source(s) of contamination, sensitive receptors present and a connection or pathway between the two. This combination of source-pathway-receptor is termed a "pollutant linkage or SPR linkage."

Part IIA of The Environmental Protection Act 1990 is supported by a substantial quantity of guidance and other Regulations, especially DEFRA Circular 01/2006 Contaminated Land (this replaces DETR Circular 02/2000). Part IIA defines the duties of Local Authorities in dealing with it. With the exception of situations of very high pollution risk, Part IIA places contaminated land responsibility on the planning and redevelopment process. In situations where there is very high pollution risk direct action from the Local Authority is usually necessary. Planning Policy Statement 23 (PPS23) provides guidance on the planning process and requires that sites which have been developed shall not be capable of being determined "contaminated land" under Part IIA.

The criteria for assessing levels of pollutants and hence determining whether a site represents a hazard are based on a range of techniques, models and guidance. Within this context it is relevant to note that Government objectives are:

- (a) to identify and remove unacceptable risks to human health and the environment;
- (b) to seek to bring damaged land back into beneficial use;
- (c) to seek to ensure that the cost burdens faced by individuals, companies and society as a whole are proportionate, manageable and economically sustainable.

These three objectives underlie the "suitable for use" approach to remediation of contaminated land. The "suitable for use" approach focuses on the risks caused by land contamination. The approach recognises that the risks presented by any given level of contamination will vary greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Risks therefore should be assessed on a site-by-site basis.

The "suitable for use" approach then consists of three elements:

- (a) ensuring that land is suitable for its current use - in other words, identifying any land where contamination is causing unacceptable risks to human health and the environment, assessed on the basis of the current use and circumstances of the land, and returning such land to a condition where such risks no longer arise; the contaminated land regime provides the regulatory mechanisms to achieve this;
- (b) ensuring that land is made suitable for any new use, as planning permission is given for that new use - in other words, assessing the potential risks from contamination, on the basis of the proposed future use and circumstances, before official permission is given for the development and, where necessary to avoid unacceptable risks to human health and the environment, remediating the land before the new use commences; this is the role of the town and country planning and building control regimes; and
- (c) limiting requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to the current use or future use of the land for which planning permission is being sought - in other words, recognising that the risks from contaminated land can be satisfactorily assessed only in the context of specific uses of the land (whether current or proposed), and that any attempt to guess what might be needed at some time in the future for other uses is likely to result either in premature work (thereby running the risk of distorting social, economic and environmental priorities) or in unnecessary work (thereby wasting resources).

The mere presence of pollutants does not therefore necessarily warrant action, and consideration must be given to the scale of risk involved for the current and proposed end use of the site.

RISK ASSESSMENT METHODOLOGY

Current practice recommends that the determination of potential liabilities that could arise from land contamination be carried out using the process of risk assessment, whereby "risk" is defined as:

- "(a) The probability, or frequency, or occurrence of a defined hazard; and
- (b) The magnitude (including the seriousness) of the consequences."

The UK's approach to the assessment of environmental risk is set out in by the Department of the Environment (2000) publication "A Guide to Risk Assessment and Risk Management for Environmental Protection." This established an iterative, systematic staged process which comprises:

- (a) Hazard identification
- (b) Hazard assessment
- (c) Risk estimation
- (d) Risk evaluation
- (e) Risk Assessment

At each stage during the investigation process the above steps are repeated as more detailed information becomes available for the site.

Land contamination risk management' (LCRM) (2020)), a document published by the Department for Environment, Food and Rural Affairs (DEFRA) and the Environment Agency (EA) outlines a tiered approach to the assessment of risks posed by contaminated land, as summarised hereunder:

Tier 1: Preliminary Risk Assessment

A Preliminary Risk Assessment is usually undertaken as part of a desk study, outlines potential risks posed by potential contamination to all receptors by defining plausible "pollution linkages" and developing a preliminary conceptual model (PCM). The purpose of this model is to define all possible complete pollution linkages, where the requisite source – pathway – target elements are present, and these elements being defined as:

- a contaminant (source) is a hazardous substance or agent, present at levels that have the potential to cause harm or damage a receptor
- a pathway is the means by or through which a contaminant comes into contact with, or otherwise affects, the receptor
- a receptor (target) is an entity (human being, aquatic environment, flora and fauna etc) that is vulnerable to the adverse effects of the contaminant

This relationship is termed a "pollution linkage". It should be recognised that for a health or environmental risk to exist, all three elements of the relationship or linkage must be present, i.e.

- if there is no contaminant, or contaminant present at levels below those considered to be harmful or damaging to a receptor, then there can be no adverse effect on a receptor
- if there is no receptor present that can be adversely affected by a contaminant, no harm or damage can arise
- even where both a contaminant and a receptor are present, no harm or damage will occur if there is no pathway by or through which a linkage between the two can be established

The absence of one or more of each component (source, pathway, receptor) would prevent a pollutant linkage being established and there would be no significant environmental risk.

The PCM is subject to continual refinement as additional data becomes available. As part of a Phase I Investigation (Desk Study and site walk over) a PCM is formed. Based on the PCM, potential pollutant linkages can be assessed. If the PCM and hazard assessment indicate that a pollution linkage is not of significance then no further assessment or action is required due to this linkage. For each significant and possible linkage a risk assessment is carried out. The linkages which potentially pose significant risks may require a variety of responses ranging from immediate remedial action or risk management or, more commonly, further investigation and risk assessment. This next stage is usually termed a Phase II Main Site Investigation and should provide additional data to allow refinement of the PCM and assess the level of risk from each pollutant linkage. Risk assessment will usually include Tier 2 Generic Quantitative Risk Assessment and / or, if necessary, a Tier 3 Detailed Quantitative Risk Assessment.

Tier 2: Generic Quantitative Risk Assessment (GQRA)

GQRA requires an intrusive investigation in order to characterise the site assisting in the re-assessment of the source-pathway receptor linkage. The conceptual model should be refined accordingly.

Upon completion of an intrusive investigation it must be decided whether Generic Assessment Criteria (GAC) are suitable for assessing the risk posed by observed contamination at the site. If GAC are deemed unacceptable for risk assessment purposes or cannot be developed, a Tier 3 Detailed Quantitative Risk Assessment (DQRA) is required.

If GQRA reveals that unacceptable risks are not present then no further action is required. If GQRA identifies a possibility of risk, a decision must be made whether further work is required or necessary for the purposes of risk assessment. If further risk assessment is deemed not suitable not required an Options Appraisal should be undertaken. If further risk assessment is required, the scope nature of further risk assessment must be decided – it is possible that a Tier 3 DQRA will be undertaken in this scenario.

Where the Environment Agency have published an SGV for a contaminant, this will be used in the GQRA. For contaminants where an SGV has not been published and an S4UL has been published by LQM/CI EH S4UL's, then this S4UL will be used.

Where an SGV or an S4UL is not available, and a DEFRA C4SL is available, then this C4SL will be used. In house derived GAC's will only be used for contaminants where there is no SGV or LQM S4UL or DEFRA C4SL.

Tier 3: Detailed Quantitative Risk Assessment (DQRA)

DQRA is used when pollutant linkages require further assessment. DQRA is often undertaken for pollutant linkages where GAC are unavailable or inappropriate for or more conservative than the actual circumstances of the site. Site specific data is used to create Site Specific Assessment Criteria (SSAC) and enable a more accurate assessment of the risks. Further investigation may or may not be required to formulate SSAC depending on the site specific conditions and information already obtained.

If DQRA reveals that unacceptable risks are not present then no further action is required. If DQRA identifies a possibility of risk, a decision must be made whether further work is required or necessary for the purposes of risk assessment. If further risk assessment is deemed not suitable not required an Options Appraisal should be undertaken. If further risk assessment is required, the scope and nature of further risk assessment must be decided at this point.

NOTE: A Tier 1 Preliminary Risk Assessment is undertaken as part of a Desk Study Report and a Preliminary Conceptual Model is developed for all pollutant linkages. However, the methodologies for assessing the risks to human health, risks to controlled waters and risk posed by ground gas using quantitative techniques vary considerably, therefore GQRA and DQRA for human health, controlled waters and ground gas must be undertaken separately. The risk assessment methodologies where quantitative assessment is used for risks to human health, risks to controlled waters and risks posed by ground gas, if relevant, are described hereunder.

BACKGROUND INFORMATION, CURRENT GUIDANCE AND RISK ASSESSMENT METHODOLOGY FOR RISKS POSED TO HUMAN HEALTH

Background

In March 2002, the Department for Environment, Food and Rural Affairs (DEFRA) and the EA published the Contaminated Land Exposure Assessment (CLEA) Model and a series of related reports. These were designed to provide a scientifically based framework for the assessment of chronic risks to human health from contaminated land. These reports (CLR7-10) together with associated "SGV" documents have since been withdrawn (August 2008) and the following documents have been published as revised guidance to the CLEA assessment:

- Environment Agency : 2008: Updated Technical Background to the CLEA model Science Report SC050021/SR3
- Environment Agency : 2008: Human Health Toxicological Assessment of Contaminants in Soil SC050021/SR2

Additional guidance on statistical assessment replacing CLR 7 is provided in:

- CL:AIRE :2008 Guidance on Comparing Data With a Critical Concentration

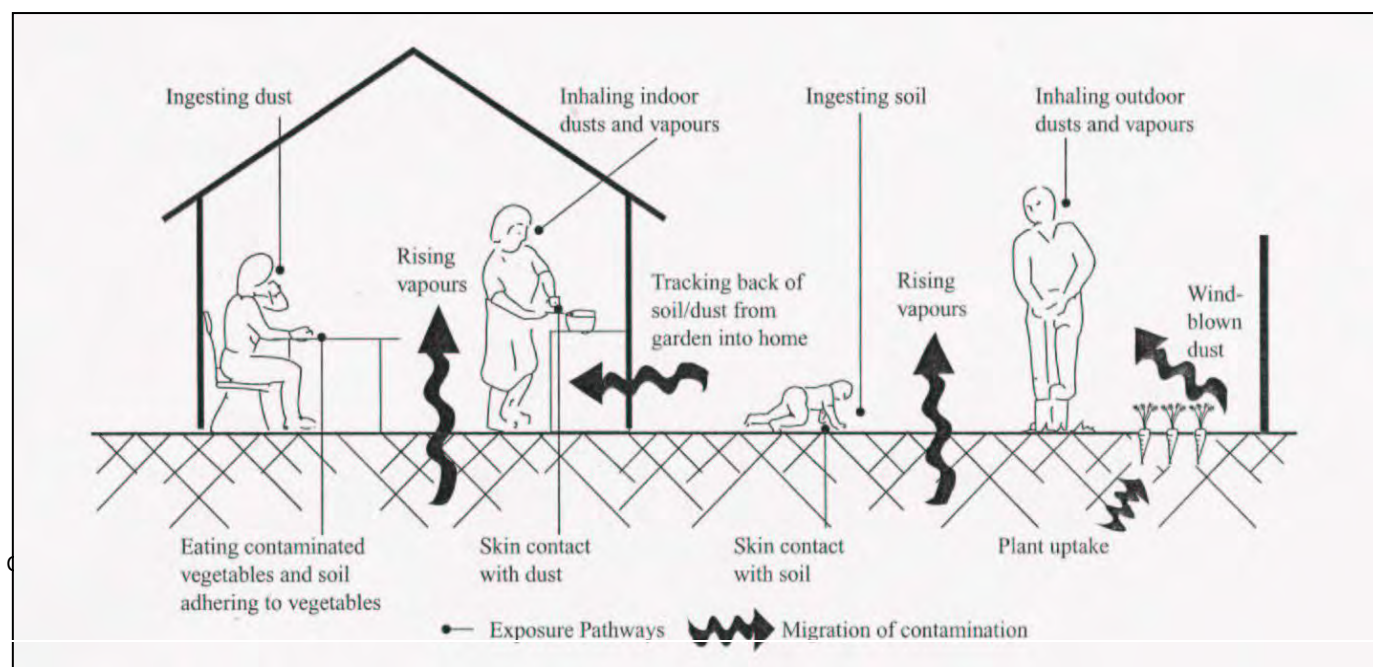
Other guidance/software used in spatial / statistical assessment is provided in:

- USEPA 2006: Data Quality Assessment: Statistical Methods for Practitioners
- Spatial Analysis and Decision Assistance (SADA) – The University of Tennessee

A different approach to the statistical appraisal of data is required depending on whether the assessment of risk is to assess whether land is Contaminated Land in accordance with regulations, or whether the assessment is to determine whether the site is suitable for new development in according with Planning guidance. This is discussed further in CL:AIRE :2008 "Guidance on Comparing Data With a Critical Concentration".

A program for the derivation of GAC's based on the above guidance is provided by the Environment Agency and is entitled "CLEA Software Version 1.06".

The CLEA model has been developed to calculate an estimated tolerable daily soil intake (TDSI) for site users given a set 'default' exposure pathways. Ten human exposure pathways are covered in the CLEA model as presented below:



(

Ingestion

- ingestion of outdoor soil
- ingestion of indoor dust
- ingestion of home grown produce
- ingestion of soil attached to home grown produce

Dermal Contact

- dermal contact with outdoor soil
- dermal contact with indoor dust

Inhalation

- inhalation of outdoor dust
- inhalation of indoor dust
- inhalation of outdoor soil vapour
- inhalation of indoor soil vapour

It should be noted that there are other potential exposure pathways on some sites not included in the CLEA model e.g. certain organic compounds can pass through plastic water pipes into drinking water supply.

Where contaminated water is present at a depth less than 2mbgl and there is a potential risk of inhalation of vapours (only when volatile compounds are present) the risk from inhalation of vapours from soil water will be assessed using a UK compliant version of BP Risc v4.02.

The presence and/or significance of each of the above exposure pathways are dependent on the type of land use being considered and the nature of the contaminant under scrutiny. Accordingly, the CLEA model considers for principle 'default' land use types and makes a series of 'default' assumptions with regard to human exposure frequency, duration and critical human target groups for each land use considered:

- residential
- allotments
- commercial / industrial land use

The above land use categories defined in the CLEA are detailed below:

Residential: This generic scenario assumes a typical residential property consisting of a two-storey house built on a ground-bearing slab with a private garden consisting of lawn, flowerbeds, and a small fruit and vegetable patch. The occupants are assumed to be parents with young children, who make regular use of the garden area.

Allotments: This generic scenario assumes a plot of open space (about 250 m²), commonly made available by the local authority to tenants to grow fruit and vegetables for their own consumption. There are usually several plots to a site and the overall site area may cover more than a hectare. The tenants are assumed to be parents or grandparents and that young children make occasional accompanied visits to the plot.

Commercial/Industrial: There are many different kinds of workplace and work-related activities. This generic scenario assumes a typical commercial or light industrial property consisting of a threestorey building at which employees spend most time indoors and are involved in officebased or relatively light physical work.

Human Health Risk Assessment Methodolgy

Assessment of risk for the protection of human health is undertaken using the methodology as outlined previously, and summarised hereunder:

- Tier 1 Preliminary Risk Assessment
- Tier 2 Generic Quantitative Risk Assessment
- Tier 3 Detailed Quantitative Risk Assessment

The Tier 1 Preliminary Risk Assessment is undertaken as part of the desk study report and includes the development of a Preliminary Conceptual Model. Tier 2 and Tier 3 Quantitative Risk Assessments are undertaken in order to develop and refine the Preliminary Conceptual Model aiding a more detailed assessment of the risk posed by contaminants revealed by site investigation and soil / soil water chemical analyses.

The methods used by *CC GEOTECHNICAL LTD* to derive assessment criteria, to statistically analyse chemical data and to compare chemical data to the derived assessment criteria are discussed herunder.

Derivation of Generic Assessment Criteria (GAC) and Site Specific Assessment Criteria (SSAC)

GAC's are derived on the basis of the proposed land use and the associated applicable exposure pathways. It should be noted that there are difficulties in establishing soil concentrations of contaminants beyond which risks from exposure to these contaminants would be 'unacceptable' and the GAC value does not necessarily equate to the level for "significant possibility of significant harm" as defined in Part IIA of The Environmental Protection Act (1990) to determine whether land is "contaminated." This ultimately requires detailed 'toxicological' information of the health effects of individual contaminants and also a scientific judgement on what constitutes an 'unacceptable' risk. The primary purpose of the CLEA derived GAC's are as 'minimal risk thresholds' for the assessment of human health risks in relation to land use.

Minimal risk thresholds calculated using generic input parameters for each of the above land uses are termed Generic Assessment Criteria (GAC) and are used for Generic Quantitative Risk Assessment (GQRA). However, further assessment may be required taking into consideration site specific factors such as the way the land is used, the soil type, the building

characteristics and the exact nature of the receptor, to determine whether there is a significant possibility of risk to human health to site users. Such an assessment is known as a Detailed Quantitative Risk Assessment (DQRA) and the resultant threshold concentrations are known as Site Specific Assessment Criteria (SSAC). Such assessments should be conducted with the agreement of the local authority (or the Environment Agency) since it is the authority that determines whether land is Contaminated Land or whether Planning Permission for a new development may be granted.

For the purposes of this report, assessment criteria have been derived in accordance with current guidance based on the conceptual model for the proposed land use using the CLEA v1.06 software. These criteria are not intended to indicate whether the site may be contaminated land nor do they replace any published soil guideline values. However, the values are intended to provide guidance for the local authority on whether the site may be considered uncontaminated. If, based on the site's proposed future use, the site would be considered by the local authority to be uncontaminated and therefore, on the basis of soil concentrations, fit for purpose, then no further risk assessment based on soil concentrations and the risk to human health would be necessary. However, should these criteria be exceeded or the conceptual site model vary from the model used in the risk assessment to derive these values then the risk assessment should be updated accordingly.

For contaminants routinely analysed where inhalation is a significant pathway (naphthalene, phenanthrene, Aromatic EC5-EC7, Aromatic EC7-EC8, Aromatic EC8-EC10, Aromatic EC10-EC12, Aromatic EC12-EC16, Aliphatic EC5-EC6, Aliphatic EC8-EC10, Aliphatic EC10-EC12, Aliphatic EC12-EC16), plots of the GAC as a function of Soil Organic Matter (SOM) are used to determine if they pose a potential risk to human health, which are presented hereunder. Where there is an exceedance further assessment may be undertaken.

Statistical Assessment of Soil Contamination Data & Comparison of Contamination Data to Threshold Values

In any site investigation only a small fraction of the soil on the site is analysed. Therefore the mean derived from the contamination data for a contaminant may not be the same as the true mean for the contaminant distribution on the site. To improve the reliability of any assessment a statistical analysis is undertaken in line with the CL:AIRE document "Guidance on Comparing Soil Contamination Data with a Critical Concentration".

Statistical assessment of soil data is undertaken using programs based on the guidance in the CL:AIRE document or the USEPA software ProUCL v4.0.

Where the number of results in a dataset is less than four, a statistical assessment is not undertaken, and the assessment is performed by comparison of the maximum value(s) with a Health Criteria Value (HCV), such as Generic Assessment Criteria value(s).

For the Planning situation, the regulator needs to check whether the concentration of contaminants is low compared to the HCV. This decision is based on whether there is at least a 95% confidence level that the true mean of the dataset is lower than the HCV.

For the Part IIA scenario the regulator needs to determine whether the concentration of contaminants is greater than the HCV. This decision is based on whether there is at least a 95% confidence level that the true mean of the dataset is higher than the HCV. However, the regulator may proceed with determination if there is just a 51% probability, "on the balance of probabilities".

The Outlier Test used in the statistical assessment may not be able to identify separate populations if numerous populations are present. In order to ensure that this is not the case a spatial assessment of the data will be undertaken using SADA.

If the screening levels are exceeded then more sophisticated quantitative risk assessment or remedial action may be undertaken. The benefits of undertaking a quantitative risk assessment must be weighed against the likelihood that it will bring about cost savings in the proposed remediation.

BACKGROUND INFORMATION, CURRENT GUIDANCE AND RISK ASSESSMENT METHODOLOGY FOR RISKS POSED TO CONTROLLED WATER

Definition of Controlled Waters

The term 'controlled waters' is defined in Section 104 of the Water Resources Act 1991 as:

"Territorial Waters...which extend seawards for three miles..., coastal waters..., inland freshwaters, waters in any relevant lake or pond or of so much of any relevant river or watercourse as is above the freshwater limit, and ground waters, that is to say, any waters contained in underground strata."

Note that the definition of groundwater under the Water Resources Act 1991 includes all water within underground strata (including soil / pore water in the unsaturated zone). The definition of groundwater under the Groundwater Directive however is limited to water in the saturated zone. For the purposes of Part IIA of the Environmental Protection Act 1990, the Environment Agency recommends that the groundwater within the saturated zone only is considered as the receptor (rather than soil / pore water).

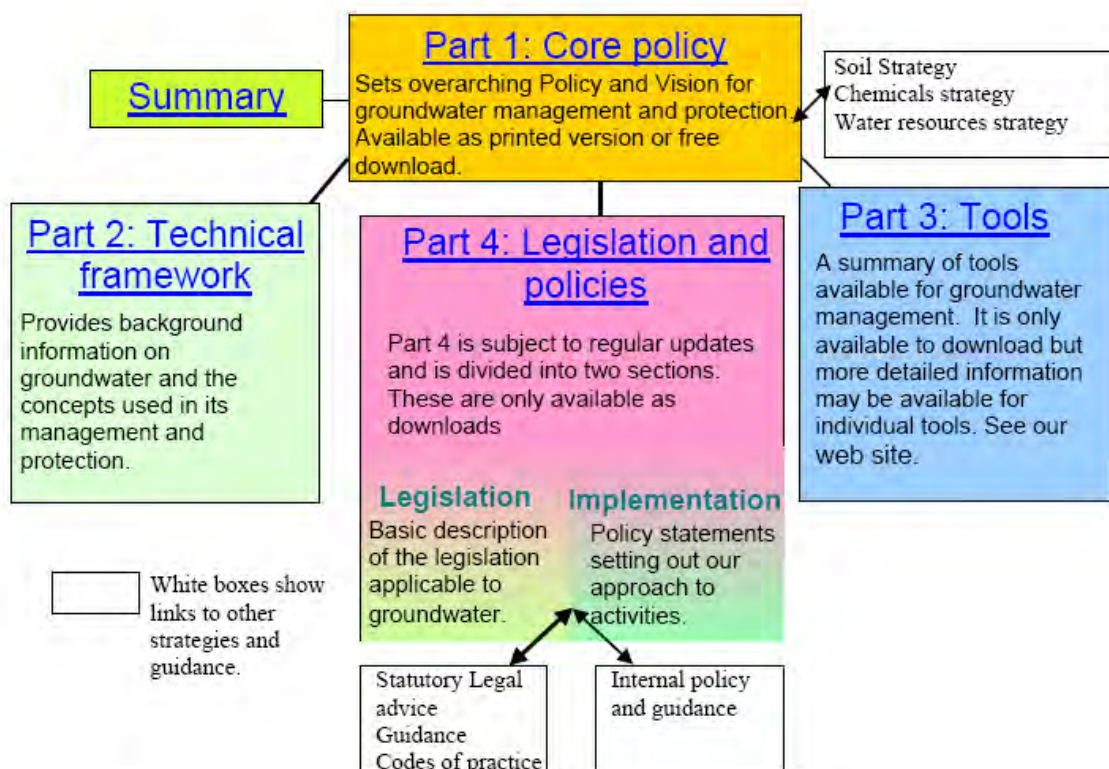
Environment Agency Guidance

Legislation and guidance surrounding the protection of controlled waters in the UK is abundant and can be complex. The Environment Agency's overall position on groundwater is *"To protect and manage groundwater resources for present and future generation in ways that are appropriate for the risks that we identify"* (Groundwater Protection : Policy and Practice GP3, 2006). In brief, the core objectives of the existing legislation serve to enforce this position.

In 1992, the National Rivers Authority published their Policy and Practice for the Protection of Groundwater (PPPG), this document was influential as it provided a focus for key developments such as Source Protection Zones (SPZs) and

Groundwater Vulnerability Maps. The Policy was then revised in 1998, since which there have been substantial changes in legislation, driven by Europe. Key European Directives relating to groundwater include the Groundwater Directive (80/68/EEC) and the Water Framework Directive (2000/60/EC). Aspects of these directives are controlled by primary UK legislation such as the Water Resources Act 1991. Further to legislative changes, gaps identified in the 1998 PPPG required addressing. These changes are reflected in the forthcoming Environment Agency Policy document entitled *Groundwater Protection : Policy and Practice (GP3)*, a draft version of which was available for public consultation (Parts 1 to 3) ending July 2006 with Part 4 issued in March 2008. Part 4 includes a section on key groundwater legislation and the Environment Agency's interpretation of it.

The following gives a breakdown of the structure of the document (taken from the Environment Agency GP3 draft consultation document, 2006)



Controlled Water Risk Assessment Methodology

The risk posed to controlled water is assessed by *CC GEOTECHNICAL* in accordance with current guidance as outlined hereunder.

In order for a developer of a potentially contaminated site to fulfil their obligations under the legislation, a site assessment would be required to be undertaken in order to identify any potential risks to controlled waters and to derive suitable clean-up criteria if necessary to ensure the protection of controlled waters. The general approach for Groundwater Protection is detailed further in Part 3 of GP3.

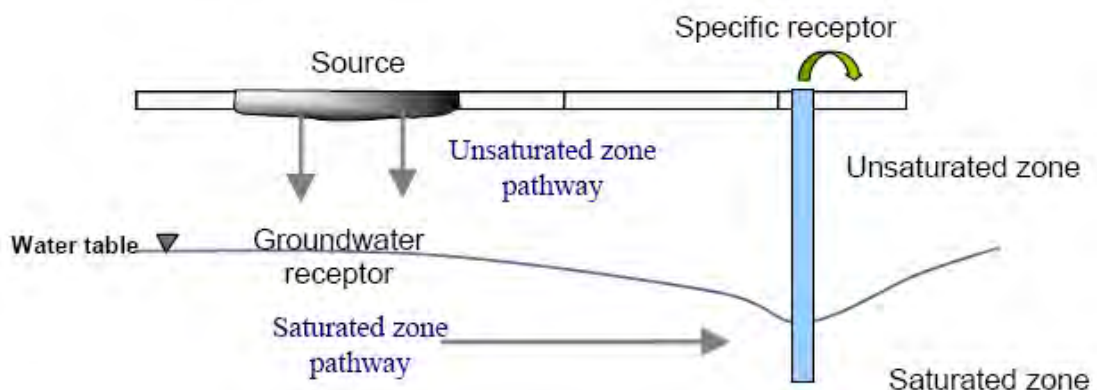
When assessing groundwater impact the Environment Agency advocate the application of their framework methodology "Remedial Targets Methodology – Hydrogeological Risk Assessment for Land Contamination" Environment Agency (2006). The methodology has four levels of assessment as described below:

- Level 1 considers whether contaminant concentrations in "pore water" in contaminated soil are sufficient to impact on the receptor, ignoring dilution, dispersion and attenuation along the pathway. The "pore water" concentration is determined from:
 - i) measured "pore water" concentrations or perched water quality
 - ii) soil leaching tests
 - iii) theoretical calculations based on soil/water partitioning equations
- Level 2 considers dilution by the receiving groundwater or surface water body and whether this is sufficient to reduce contaminant concentrations to acceptable levels. The remedial target is defined as the target concentration multiplied by a dilution factor (DF).
- Levels 3 and 4 consider whether natural attenuation (including dispersion, retardation and degradation) of the contaminant as it moves through the unsaturated and saturated zones to the receptor are sufficient to reduce contaminant concentrations to acceptable levels. The remedial target is defined as target concentration multiplied by a dilution factor (DF) and attenuation factor (AF). In Level 3 simple analytical models are used to calculate the significance of attenuation. The Environment Agency has released a "Remedial targets worksheet v3.1" to carry out basic calculations using a conservative approach up to Level 3 using basic principles assuming a simple migration of contaminants from the

source zone into the aquifer receptor. Level 4 assessment uses more sophisticated numerical models, and allows for the introduction of additional geological horizons and is used mainly to determine whether soil contaminants will reach their target within a specified timeframe. Use of such software should only be used once agreement has been obtained from the Environment Agency.

Three main stages apply to any risk assessment of controlled waters, these are:

1. Risk Screening (Tier 1 Preliminary Risk Assessment): The understanding of the Conceptual Site Model (CSM) is the key to assessing any site. Using a robust CSM, potential pathways or receptors may be screened out from any further assessment at an early stage. For example if the pathway through the unsaturated zone is blocked by the presence of a significant thickness of low permeability clay. A greater understanding of the CSM is achieved with each tier of risk assessment. An example of a basic CSM is given below (taken from the Environment Agency GP3 draft consultation document, 2006):



2. Generic Hydrogeological Risk Assessment (EA Remedial Targets Methodology Level 1): When undertaking the Generic Hydrogeological Risk Assessment (EA Remedial Targets Methodology Tier 1), comparison of chemical analytical results is made with screening criteria. Published values of screening criteria with which chemical test results can be compared are published in the following guidance:

- Water Supply (Water Quality) Regulations 2000
- The Private Water Supplies Regulations 1991
- Environmental Quality Standards for surface waters based on The EC Dangerous Substances Directive (76/464/EEC and Daughter Directives)
- The Surface Waters (Abstraction for Drinking Water Classification) Regulations 1996
- World Health Organisation Drinking Water Standards 2004

Should the Level 1 assessment indicate threshold levels to be exceeded, then there are three alternative ways in which to proceed:

- To devise suitable remedial solutions
- To carry out more investigation, sampling and analysis
- To conduct a site specific Detailed Quantitative Risk Assessment (DQRA) to determine if the materials are suitable for their proposed use, or devise site specific clean-up level

3. Detailed Quantitative Risk Assessment (EA Remedial Targets Methodology Levels 2 to 4): The decision to carry out a DQRA will be dependant on the extent and implications of the initial qualitative and generic assessment. The scope of any such assessment will be accurately defined by the outcomes of the previous levels of assessment. The conceptual model will be sufficiently refined by this stage that only certain contaminants of concern, certain pathways and certain receptors will require further assessment, the remainder having been screened out.

Additional site specific data is normally required for this stage of assessment, as explained above, more processes that are capable of affecting contaminant concentrations are considered (such as dilution and attenuation).

Remediation criteria, if derived, will therefore be specific to each site and will be based on a detailed assessment of the potential impact at the identified receptor or *compliance point*. A greater level of confidence can be placed on the predicted impact on the compliance point following a DQRA.

BACKGROUND INFORMATION, CURRENT GUIDANCE AND RISK ASSESSMENT METHODOLOGY FOR RISKS POSED BY GROUND GAS

Background

Origin of Ground and Landfill Gases

When carrying out a ground gas risk assessment, the origin or source of the gases is important as potential risks will vary depending on the source. This Appendix relates to the risk of the two main ground gases of concern; methane and carbon dioxide, and does not apply to other ground gases (e.g. radon or vapours from hydrocarbon spills). Methane and carbon dioxide are major constituents of landfill gas but can also occur from a variety of anthropogenic and natural sources, as summarised in Table 5 below:

Gas	Source	Comments
Landfill Gas	Anaerobic decomposition of degradable waste within landfill sites. Typically 60% methane and 40% carbon dioxide during methanogenic phase.	Composition varies over time, particularly in early stages. Contains a range of minor constituents (particularly carbon monoxide and hydrogen sulphide).
Landfill Associated Gases	- Anaerobic degradation of leachate external to the site; - Degassing of dissolved gases in groundwater; - Evolution of gases following interaction between leachate and groundwater	Can result in secondary (external) production of methane or carbon dioxide.
Made Ground	Anaerobic degradation of organic components	Very variable depending on source
Sewer Gas, Cess Pits	Anaerobic degradation of organic components of sewage producing methane and carbon dioxide.	Often characterised by hydrogen sulphide odour.
Mains Gas	Leakage from underground pipework or storage tanks. Mainly methane but often contains higher alkanes.	An odouriser is added to permit detection of leaks. Typically 90% CH ₄ , but 1 to 27% C ₂ -C ₄ alkanes, May also contain other trace gases e.g. CO, helium and CO ₂ (from degradation of CH ₄ in the ground).
Other Anthropogenic Sources	- Degradation of leaked or spilled hydrocarbons or other industrial chemicals; - Anaerobic degradation of organic contaminants in groundwaters (e.g. silage liquor); - Reactions between monitoring well construction components and environment; - Burial grounds/cemeteries.	Hydrocarbon spillages often have an 'oily' odour. Fuel spillages common – Petrol or Diesel and can contain a wide range of VOC's. Can degrade to produce methane / carbon dioxide.
Alluvium / Marsh / Peat Gas	Anaerobic microbial degradation of organic material (usually waterlogged vegetation / peat). Often associated with the presence of alluvial deposits or dredgings.	
Geogenic Gas	Natural seepages of carbon dioxide and hydrocarbon gases derived from geologic sources such as coal seams and deep oil / gas source formations. Can be present in solution in groundwaters.	Methane most common but can contain carbon dioxide and higher alkanes.
Mine Gases	Various types. Most common is "fire damp" with high methane, produced by the desorption of gas trapped in coal. "Black damp" (Stythe gas) with high carbon dioxide and denser than air. "White damp" is high in carbon monoxide.	Methane most common. Can contain higher alkanes, carbon dioxide and carbon monoxide. Often low in oxygen.
Natural Shallow Ground Gas	Various types - high carbon dioxide formed by subsurface aerobic activity leading to depleted oxygen and elevated carbon dioxide; - chemical degradation of rocks (e.g. carbonates) producing carbon dioxide; - carbon dioxide production in root zone of soils by plants.	Gases can be emitted from ground under falling barometric pressure conditions.

Table 5. Potential Sources of Ground Gases

This Appendix does not provide guidance for the assessment of risk when other gases are present due to 'Other Sources' from the above table (particularly organic compounds such as BTEX and VOC's or for the risk from radon or hydrogen sulphide).

To determine the origin of the gas a range of factors must be considered together, including;

1. Proximity of likely sources
2. Ground conditions (geology, hydrogeology, anthropogenic pathways etc)
3. Properties of gases present including:
 - Chemical composition
 - Physical properties
 - Ratios of components e.g. methane : carbon dioxide
4. Timeframe of activities such as infilling periods, capping works, installation of gas control systems etc

Identification of the originating source may be problematic given that there may be more than one source present and trace gas analysis may be required. Identification of the sources of the gases encountered during monitoring is usually carried out through a process of eliminating the most unlikely potential sources (given the site setting) and selecting those which are most likely.

Hazards Associated with Presence of Methane

Methane gas is combustible and potentially explosive. When the concentration of methane in air is between the limits of 5.0%v/v and 15.0%v/v an explosive mixture is formed. The Lower Explosive Limit (LEL) of methane is 5.0%v/v, which is equivalent to 100% LEL. The 15.0%v/v limit is known as the Upper Explosive Limit (UEL), but concentrations above this level cannot be assumed to represent safe concentrations. Further, the LEL and UEL will vary (up and down) depending upon the proportion of other gases (including oxygen). However, the fact that methane is a colourless, odourless gas means that there

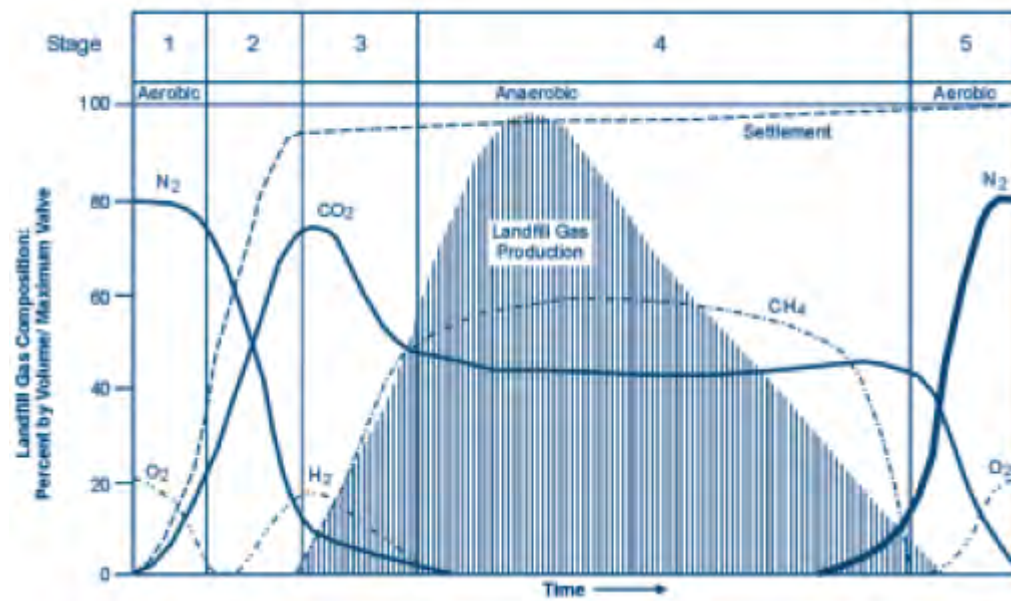
is no simple indicator of the presence of the gas until such a time as explosive limits are reached and an incident occurs. Methane is lighter than air and has a low toxicity. However, at high concentrations it can result in asphyxiation due to oxygen displacement.

Hazards Associated with Presence of Carbon Dioxide

Carbon dioxide is a colourless, odourless gas, which, although non-flammable, is both toxic and an asphyxiant. As carbon dioxide is denser than air, it will collect in low points and depressions. The UK Health & Safety Executive (HSE) has published information relating to concentrations of carbon dioxide that humans may be exposed to, which uses concentrations contained in the Control of Substances Hazardous to Health Regulations 2002 (as amended). These are the Long Term Occupational Exposure Limit (LTOEL, 8 hour period) and the Short Term Occupational Exposure Limit (STOEL, 15 minute period), which are 0.5% and 1.5% carbon dioxide, respectively.

Parameters Influencing the Rate of Ground Gas Production

The figure below is taken from EA guidance document LFTGN 03 illustrates typical ground gas generation curves from biodegradable materials:



The production of methane and carbon dioxide at a landfill site may be expected to be considerable and ongoing. Concentrations of methane will eventually decrease, followed by concentrations of carbon dioxide, but the duration and rate of gas production can vary markedly between sites. Five distinct phases of gas production occur during the process which are, in order of event as marked above, as follows:

1. An aerobic phase involving oxygen depletion and temperature increase through aerobic respiration;
2. The establishment of anaerobic conditions and the evolution of carbon dioxide and hydrogen through acidogenic activity;
3. Commencement of methanogenic activity; the establishment of populations of methanogenic bacteria;
4. A phase of stable methanogenic activity, which may go on for many tens of years;
5. A phase of decreasing methanogenic activity, representing depletion of the organic material and a return to aerobic conditions.

The time scale for the return to the normal ground gas concentrations will be highly variable, depending upon the types and quantities of materials present. In addition, the optimum parameters influencing the rate of decomposition and ground gas production within the ground at a site are as follows:

- High water content with adequate rainfall and water infiltration to provide moisture content between approximately 20 to 26%;
- Conditions that either are or are very close to anaerobic;
- High proportion of biodegradable materials;
- A pH between 6.5 and 8.5, ideally verging slightly on the acidic between pH 6 to 7;
- Temperature between 25°C and 55°C;
- The ratio of the biochemical and chemical oxygen demands (BOD:COD);
- High permeability;
- Small particle size, as finer subsurface materials possess a greater surface area to provide a growing 'face' for the micro-organisms but high fines levels reduces permeability and reduces decomposition rate.

For this reason, it is vital that sources of methane and carbon dioxide are identified prior to the commencement of any work on a construction site, and that the ground gas regime is characterised at the worst temporal conditions a site may experience. From this, a risk assessment is carried out to identify the risk at the site from ground gases so that suitable protection measures can be designed and incorporated into a development to prevent a dangerous build-up of gas occurring.

Factors Influencing the Migration and Behaviour of Ground Gases

There are many factors that influence the migration of ground gases which can effect the risk from a gassing source:

- driving force – pressure differential along a pathway, diffusion and dissolved in solution;
- meteorological conditions – short term and seasonal conditions including atmospheric pressure changes (e.g. rapidly falling pressure causes gas to expand increasing emission rates), rainfall, frozen ground and thawing, temperature;
- geological and groundwater conditions – these can have the over riding influence on the direction/pathways and quantity of migrating gas;
- anthropogenic influences – man-made pathways include mine shafts, service runs/drains, foundation piles, underground voids/pits/basements, foundation/building design/construction

Current Guidance

Previous versions of Building Regulations Approved Document C provided statutory guidance stating that consideration should be given to appropriate action and / or specific solutions in situations where methane concentration exceeded 1%v/v or carbon dioxide concentrations exceeded 5%v/v. The latest Building Regulations Approved Document C (DoE 2004) no longer endorses this approach and recommends the use of a risk based approach to interpreting a gas monitoring survey. This is in line with current EA guidance for landfill gas (LFTGN 03, 2004) which recommends the use of a structured risk based approach similar to that outlined in CLR 11. On this basis, recent guidance has been produced in 2006 and 2007 with the aim of providing up to date advice in relation to residential and commercial development. The guidance does not address issues associated with gas derived from landfills, for this refer to *"Guidance on the Management of Landfill Gas"* (Environment Agency 2004) for an overview.

Recent guidance relevant to gas assessments for residential and commercial development includes;

- Wilson *et al.* (CIRIA C665, December 2007) ***"Assessing Risks Posed by Hazardous Ground Gases for Buildings."***
This document provides up to date advice on all aspects of ground gas risk assessment such as investigation, monitoring programmes, data collection and interpretation. The guidance presents separate methodologies for the characterisation of:
 - All development types except low rise housing with gardens (Situation A)
 - Low rise housing with gardens (Situation B)
- Boyle and Witherington (NHBC / RSK Group, Report 10627-R01(04) January 2007) ***"Guidance on the Evaluation of Development Proposals on Sites where Methane and Carbon Dioxide are Present."***
This document presents the "Traffic Lights System" detailed below and is relevant only for low rise properties (e.g. bungalows and town houses) that have a ventilated sub-floor void (i.e. Situation B as described in CIRIA C665).
- British Standard (BS 8485 2015 +A1 2019) ***"Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings"***
This document provides an overview of gas characterisation and assessment. The Standard is intended to be used by designers of gas protection measures and regulators involved in the assessment of design solutions.

Further guidance, Wilson and Card (CIEH) ***"Ground Gas Handbook for Designers and Regulators"*** providing practical guidance on ground gas assessments and the design and evaluation of protection measures, is expected to be published in March 2009.

Each of these documents continues to highlight the importance of, and give further guidance towards, carrying out a tiered risk-based decision-making process in accord with government policy on dealing with contamination from historic or natural sources and highlight the importance of the Conceptual Model in site characterisation.

Ground Gas Risk Assessment Methodology

Assessment of risk posed by ground gas is undertaken using the methodology as outlined previously, and summarised hereunder:

- Tier 1 Preliminary Risk Assessment
- Tier 2 Generic Quantitative Risk Assessment
- Tier 3 Detailed Quantitative Risk Assessment

The methodology used in each of the above assessments with concern to ground gas is discussed hereunder.

Tier 1 Preliminary Risk Assessment

All potential sources of methane and carbon dioxide are identified in the Preliminary Conceptual Model and the generation potential determined. The background information discussed earlier is referred to in order to determine the potential for a source to generate ground gas.

CIRIA C665 provides idealised monitoring frequency / period dependant upon generation potential of gas source and sensitivity of the proposed land use as below:

Idealised Frequency and Period of Monitoring (after Table 5.5a and 5.5b, CIRIA C665)

		Generation Potential of Source				
		Very Low	Low	Moderate	High	Very High
Sensitivity of Development	Low (Commercial)	4/1	6/2	6/3	12/6	12/12
	Moderate (Flats)	6/2	6/3	9/6	12/12	24/24
	High (Residential with Gardens)	6/3	9/6	12/6	24/12	24/24

Notes

1. First number is the number of readings and the second is the minimum period in months (e.g. 6/2 – six sets of readings over two months).
2. At least two sets of readings must be at low (preferably under 1,000 mb) and falling pressure.

The monitoring programme is decided using the above table prior to the intrusive site investigation. However, if the intrusive investigation reveals that a the potential source is better or worse than anticipated the monitoring programme should be modified accordingly. For example, if the made ground contains no evidence of organic material and comprises entirely granular brick fill, the potential for that made ground to generate ground gas is reduced considerably.

Tier 2 Generic Quantitative Risk Assessment

Generic Quantitative Risk Assessment is undertaken upon completion of the required gas monitoring period.

All three current guidance documents propose that both ground gas concentrations and flow rates are used to calculate the limiting gas well gas volume flow rates for methane and carbon dioxide, based on the ground gas conditions monitored for during the worse-case temporal conditions. This limiting gas well volume flow rate is termed the Gas Screening Value (GSV, note that this was termed borehole gas volume flow), and is calculated as follows:

$$GSV (l/hr) = \frac{[gas\ well\ gas\ concentration\ (\%v/v)] \times [gas\ well\ flow\ rate\ (l/hr)]}{100}$$

GSV's are compared to typical max concentrations and limiting gas screening values derived for either Situation A - All development except low rise housing with gardens, or Situation B low rise housing with gardens (NHBC Traffic Light System). Table 8.5 from CIRIA C665 is used for comparison of gas screening values for "Situation A Developments" and is presented hereunder:

Characteristic Situation (CIRIA R149)	Comparable Partners in Technology gas Regime (see Box 8.2)	Risk Classification	Gas Screening Value (CH ₄ or CO ₂) (l/hr) ¹	Additional Factors	Typical Source of Generation
1	A	Very low risk	<0.07	Typically methane ≤ 1% and/or carbon dioxide ≤ 5%. Otherwise consider increase to Situation 2	Natural soils with low organic content "Typical" made ground
2	B	Low risk	<0.7	Borehole air flow rate not to exceed 70l/hr. Otherwise consider increase to characteristic Situation 3	Natural soil, high peat/organic content. "Typical" made ground
3	C	Moderate risk	<3.5		Old landfill, inert waste, mineworking flooded
4	D	Moderate to high risk	<15	Quantitative risk assessment required to evaluate scope of protective measures.	Mineworking susceptible to flooding, completed landfill (WMP 26B criteria)
5	E	High risk	<70		Mineworking unflooded inactive with shallow workings near surface
6	F	Very high risk	>70		Recent landfill site

Table 8.5 from CIRIA C665 Modified Wilson and Card Classification

Table 8.7 is used for comparison of gas screening values for "Situation B Developments" and is presented herunder:

Traffic Light	Methane ¹		Carbon Dioxide ²	
	Typical max concentration ³ (% by volume)	Gas screening value ^{2,4} (litres/hour)	Typical max concentration ³ (% by volume)	Gas screening value ^{2,4} (litres/hour)
Green				
Amber 1	1	0.13	5	0.78
Amber 2	5	0.63	10	1.60
Red	20	1.60	30	3.10

Notes:

1. The worst-case ground gas regime identified on the site, either methane or carbon dioxide, at the worst-case temporal conditions that the site may be expected to encounter will be the decoder as to what Traffic Light is allocated;
2. Borehole Gas Volume Flow Rate, in litres per hour as defined in Wilson and Card (1999), is the borehole flow rate multiplied by the concentration in the air stream of the particular gas being considered;
3. The Typical Maximum Concentration can be exceeded in certain circumstances should the Conceptual Site Model indicate it is safe to do so;
4. The Gas Screening Value thresholds should not generally be exceeded without the completion of a detailed ground gas risk assessment taking into account site-specific conditions.

Table 8.7 from CIRIA C665 - NHBC Traffic light system for 150 mm void

Dependant on the outcome of the assessment of risk posed by ground gas it is determined whether gas protection measures are required for the proposed development, and or whether a detailed quantitative risk assessment is required for the site.

Selection & Design of Protective Measures

Table 8.6 and Box 8.4 of CIRIA C665 contain information on the detailed design of protection measures and were initially intended for the purposes of determining then level of protection measures a development requires. These tables and related text include some useful information on the design of gas protection measures, however BS8485:2007, which supersedes the guidance included within CIRIA C665, is used for selection of gas protection measures.

BS8485:2015 +A1 2019 uses a scoring system dependant on the Characteristic Situation / NHBC Traffic Light and proposed end use of the site. The scoring system is summarised in BS8485:2015 + A1 2019 Table 2 as presented hereunder:

Characteristic gas situation, CS	NHBC traffic light	Required gas protection			
		Non-managed property e.g. private housing	Public building (a)	Commercial buildings	Industrial buildings (b)
1	Green	0	0	0	0
2	Amber 1	3	3	2	1 (c)
3	Amber 2	4	3	2	2
4	Red	6 (d)	5(d)	4	3
5			6(e)	5	4
6				7	6

NOTE Traffic light indications are taken from NHBC Report no.:10627-RO1 (04) and are mainly applicable to low-rise residential housing¹. These are for comparative purposes but the boundaries between the traffic light indications and CS values do not coincide.

a) Public buildings include, for example, managed apartments, schools and hospitals.
b) Industrial buildings are generally open and well ventilated. However, areas such as office pods might require a separate assessment and may be classified as commercial buildings and require a different scope of gas protection to the main building.
c) Maximum methane concentration 20% otherwise consider and increase to CS3.
d) Residential building on higher traffic light/CS sites is not recommended unless the type of construction or site circumstances allow additional levels of protection to be incorporated, e.g. high-performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system, e.g. in institutional and/or fully serviced contractual situations.
e) Consideration of issues such as ease of evacuation and how false alarms will be handled are needed when completing the design specification of any gas protection scheme

¹ The NHBC guidance and CIRIA C665 guidance refers to low rise housing (which is up to three storeys without lifts) that is constructed with a 150mm ventilated sub-floor void.

BS8485:2015 A1 +2019 Table 2 Required gas protection by characteristic gas situation and type of building

Once a score is assigned, a combination of protection systems / elements is chosen from BS8485:2015 +A1 2019 Table 3 shown below:

PROTECTION ELEMENT / SYSTEM		SCORE	COMMENTS
a) Venting / dilution (See Annex A BS8485)			
Passive sub floor ventilation (venting layer can be a clear void or formed using gravel, geocomposites, polystyrene void formers, etc.) ^A	Very good performance	2.5	<i>Ventilation performance in accordance with Annex A (BS8485)</i> <i>If passive ventilation is poor this is generally unacceptable and some form of active system will be required.</i> <i>There have to be robust management systems in place to ensure the continued maintenance of any ventilation system.</i> <i>Active ventilation can always be designed to meet good performance.</i> <i>Mechanically assisted systems come in two forms: extraction and positive pressurization.</i>
	Good performance	1	
Subfloor ventilation with active abstraction/pressurization (venting layer can be a clear void or formed using gravel, geocomposites, polystyrene void formers, etc.) ^A		2.5	
Ventilated car park (basement or undercroft)		4	
b) Barriers			
Floor slabs			<i>It is good practice to install ventilation in all foundation systems to effect pressure relief as a minimum.</i> <i>Breaches in floor slabs such as joints have to be effectively sealed against gas ingress in order to maintain these performances.</i>
Block and beam floor slab		0	
Reinforced concrete ground bearing slab		0.5	
Reinforced concrete ground bearing foundation raft with limited service penetrations that are cast into slab		1.5	
Reinforced concrete cast in situ suspended floor slab with minimal service penetrations and water bars around all slab penetrations and at joints		1.5	
Fully tanked basement		2	
c) Membranes			
Taped and sealed membrane to reasonable levels of workmanship/in line with current good practice with validation ^{B,C}		0.5	<i>The performance of membranes is heavily dependent on the quality of design of the installation, resistance to damage after installation, and the integrity of joints.</i>
Proprietary gas resistant membrane to reasonable levels of workmanship /in line with good practice under independent inspection (CQA) ^{B,C}		1	
Proprietary gas resistant membrane installed to reasonable levels of workmanship/in line with current good practice under CQA with integrity testing and independent validation		2	
d) Monitoring and detection (not applicable to non-managed property, or in isolation)			
Intermittent monitoring using hand held equipment		0.5	<i>Where fitted, permanent monitoring systems ought to be installed in the underfloor venting/dilution system in the first instance but can also be provided within the occupied space as a fail safe.</i>
Permanent monitoring and alarm system ^A	Installed in the underfloor venting/dilution system	2	
	Installed in the building	1	
e) Pathway Intervention			
Pathway intervention		-	<i>This can consist of site protection measures for off-site or on-site sources (see Annex A, BS8485)</i>
NOTE In practice the choice of materials might well rely on factors such as construction method and the risk of damage after installation. It is important to ensure that the chosen combination gives an appropriate level of protection			
A) It is possible to test ventilation systems by installing monitoring probes for post installation validation.			
B) If a 1 200g DPM material is to function as a gas barrier it should be installed according to BRE 212 /BRE 414 being taped and sealed to all penetrations			
C) Polymeric Materials> 1200 g (proportional to thickness) but their physical properties mean that they are more robust and resistant to damage.			

BS8485:2015 + A1 2019 Table 3 Solution Scores

Where the gas situation is 4 or more (and for NHBC Red situations) the site requires a comprehensive risk assessment to confirm the scope of protection measures. These are higher risk sites and reliance on Table 2 and 3 alone is not sufficient.

For a site which is impacted by migratory gases from an off site source, the development may be protected by imposing pathway intervention methods, which if successfully validated, could also remove the need for further analysis. It is essential that the gas regime in these circumstances has been fully characterised and that the only source impacting the site is located off site and that the pathway is clearly defined and its interception equally proven before construction commences. Pathway intervention methods may include vertical membrane installations, venting trenches, rows of stone columns, activated trenches and various proprietary systems. These systems are particularly relevant to domestic housing where there is limited scope for foundation type solutions.

CURRENT GUIDANCE ON REMEDIATION

When risk assessment of the site has been completed and it indicates that remedial works are required, the main guidance in managing this process is set out in the DEFRA/EA publication LCRM (2020)) "*Model Procedures for the Management of Land Contamination.*" The stages of managing remediation are as follows:

- (a) Options Appraisal and develop Remediation Strategy;
- (b) Develop Implementation Plan and Verification Plan;
- (c) Remediation, Verification and Monitoring.

The Remediation Strategy sets out the remediation targets, identifies technically feasible remedial solutions and presents an evaluation of the options so that these can be assessed enabling that the most suitable solution is adopted. An outline of the proposed remedial method should be presented. Agreement should be sought of the appropriate statutory bodies for the Remediation Strategy before proceeding to the next stage.

The Implementation Plan is a detailed method statement setting out how the remediation is to be carried out including stating how the site will be managed, welfare procedures, health and safety considerations together with practical measures such as details of temporary works, programme of works, waste management licences and regulatory consents required. Agreement should again be sought of the appropriate statutory bodies for this Plan.

The Verification Plan sets out the requirements for gathering data to demonstrate that the remediation has met the required remediation objectives and criteria. The Verification Plan presents the requirements for a wide range of issues including the level of supervision, sampling and testing regimes for treated materials, waste and imported materials, required monitoring works during and post remediation, how compliance with all licenses and consents will be checked etc. Agreement should again be sought of the appropriate statutory bodies for the Verification Plan. On completion of the remediation a Verification Report should be produced to provide a complete record of all remediation activities on site and the data collected as required in the Verification Plan. The Verification Report should demonstrate that the remediation has met the remedial targets to show that the site is suitable for the proposed use.

APPENDIX J: NOTES ON LIMITATIONS

Standard Terms and Conditions of Engagement

Notes on Limitations For Geoenvironmental and Geotechnical Consultancy Services

General

CC GEOTECHNICAL LTD has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from CC GEOTECHNICAL LTD and a charge may be levied against such approval.

CC GEOTECHNICAL LTD accepts no responsibility or liability for:

the consequences of this document being used for any purpose or project other than for which it was commissioned and/or

the consequences of use of this document by any party with whom an agreement has not been executed.

Phase I Environmental Audits / Desk Studies

The work undertaken to provide the basis of a Phase 1 Desk Study report comprises a study of available documented information from a variety of sources (including the client), together with (where appropriate) a walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in a Desk Study report have been dictated by finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in the report, CC GEOTECHNICAL LTD reserves the right to review such information and to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Environmental Audits

The investigation of the site has been carried out with the intention of providing sufficient information concerning the type and degree of contamination, and ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated to potential human targets, building materials, the environment (including adjacent land), and surface and groundwater.

The amount of exploratory work and chemical testing undertaken may have been restricted by the timescale available, and the locations of the exploratory holes may have been restricted to areas unoccupied by the building(s) on the site, and further restricted by the existence of buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues may need to be resolved.

For those reasons, if costs have been included in relation to site remediation these must be considered as tentative only and must, in any event, be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of site conditions. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised "hotspots" of contamination where concentrations may be significantly higher than those actually encountered.

Geoenvironmental Ground Investigations

The investigation of the site has been carried out to provide sufficient information within the agreed scope of the investigation, under the general headings of type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions, to provide a reasonable assessment of the environmental risks together with engineering and development implications.

If costs have been included in relation to the site remediation, these must be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of the site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be ground conditions present on the site which have not been disclosed by this investigation, and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal, weather, or other effects.

The risk assessment and opinions provided, inter alia, take into consideration currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.