



Supplementary Contamination Investigation Report

at
**Moatfield Farm Barns, Kings Lane, Cowfold, Horsham,
West Sussex RH13 8BD**

for
Toby Chapman

**Reference: 21191/SCIR Rev1.0
December 2023**

Control Document

Project

Moatfield Farm Barns, Kings Lane, Cowfold, Horsham, West Sussex RH13 8BD

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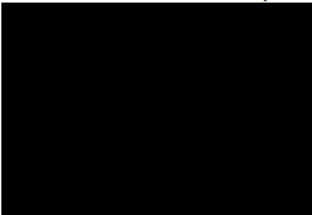
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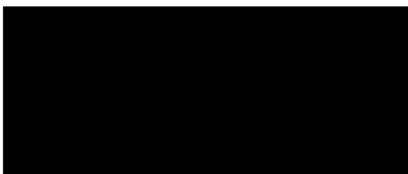
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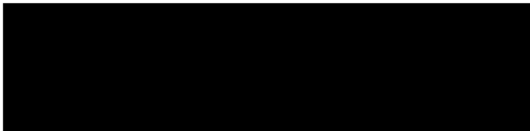
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This is not a valid document for use in the design of the project unless it is titled Final in the document status box.

Current regulations and good practice were used in the preparation of this report. The recommendations given in this report must be reviewed by an appropriately qualified person at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

Commission

This document comprises the Supplementary Contamination Investigation Report (SCIR) and incorporates the results, discussion, and conclusions to this intrusive works. General site data is recorded below:

Commission Record	
Client	Toby Chapman
Site Name	Moatfield Farm Barns, Kings Lane, Cowfold, Horsham, West Sussex RH13 8BD
Grid Reference	TQ2243920675
Soils Limited Quotation Ref	Q27897, dated 29 th June 2023
Clients Purchase Order	Q27897, dated 29 th June 2023

The record of revision to this document is presented below:

Record Of Revisions		
Revision	Date	Reason
1.0	December 2023	Original

Note(s):

Documents associated with this development that must be referred to are given below.

Record Of Associated Documents			
Reference	Type	Date	Creator
20022/PIR	Preliminary Investigation Report	February 2022	Soils Limited
20823/CIR	Contamination Investigation Report	May 2023	Soils Limited

Limitations and Disclaimers

The report was prepared solely for the brief described in Section 1.1 of this report.

The contents, recommendations and advice given in the report are subject to the Terms and Conditions given in Soils Limited's Quotation

Soils Limited disclaims any responsibility to the Client and others in respect of any matters outside the scope of the above.

This report has been prepared by Soils Limited, with all reasonable skill, care and diligence within the terms of the Contract with the Client, incorporation of our General Conditions of Contract of Business and taking into account the resources devoted to us by agreement with the Client.

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The ground is a product of continuing natural and artificial processes. As a result, the ground will exhibit a variety of characteristics that vary from place to place across a site, and also with time. Whilst a ground investigation will mitigate to a greater or lesser degree against the resulting risk from variation, the risks cannot be eliminated.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the Client in accordance with their brief. As such these do not necessarily address all aspects of ground behaviour at the site.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

If the term "competent person" is used in this report or any Soils Limited document, it means an engineering geologist or civil engineer with a minimum of three years post graduate experience in the understanding and application of the appropriate codes of practice.

Unless the site investigation works have been designed and specified in accordance with EC7, this report is a Geotechnical Investigation Report and is not necessarily a Ground Investigation Report as defined by EC7 (Eurocode 7 Part 1, §3.4, Part 2, §6.1) or a Geotechnical Design Report (Eurocode 7 Part 1, §2.8) as defined by Eurocode 7 and as such may not characterise the ground conditions and additional works may be required to comply with the requirements of EC7.

Within the report reference to ground level relates to the site level at the time of the investigation, unless otherwise stated.

Exploratory hole is a generic term used to describe a method of direct investigation. The term trial pit, borehole or window sample borehole implies the specific technique used to produce an exploratory hole.

The chemical analyses were undertaken by Derwentside Environmental Testing Services (DETS) in accordance with their UKAS and MCERTS accredited test methods or their documented in-house testing procedures. This investigation did not comprise an environmental audit of the site or its environs.

Ownership of land brings with it onerous legal liabilities in respect of harm to the environment. "Contaminated Land" is defined in Section 57 of the Environment Act 1995 (as updated 2021) as:

"Land which is in such a condition by reason of substances in, on or under the land that significant harm is being caused or that there is a significant possibility of such harm being caused or that pollution of controlled waters is being, or is likely to be caused".

It must be noted that a detailed survey of the possible presence or absence of invasive species, such as Japanese Knotweed, is outside of the scope of investigation.

Deleterious materials may be present in any Made Ground that pose a potential risk to site workers, end users and adjacent vulnerable receptors. These could include a range of contaminants, including asbestos, especially if the material includes large fractions of demolition derived materials.

The investigation, analysis or recommendations in respect of contamination are made solely in respect of the prevention of harm to vulnerable receptors, using where possible best practice at the date of preparation of the report. The investigation and report do not address, define or make recommendations in respect of environmental liabilities. A separate environmental audit and liaison with statutory authorities is required to address these issues.

All environmental works are undertaken in the context of, and in compliance with, BS10175+A2 2017 and LCRM (EA 2021) and all other pertinent planning, standards, documentation and guidance appropriate to the site at the time of production which may include, but are not necessarily limited to, documents provided by BS/CEN/ISO, NHBC, AGS, CIEH, SCIRIA, SoBRA and CLAIRE.

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Section 1 Introduction

1.1 Objective of Investigation

The Client commissioned Soils Limited to undertake an intrusive ground investigation and to prepare a Supplementary Contamination Investigation Report to assess the ground conditions and potential for contamination to satisfy planning conditions relating to contaminated land at the site (Planning Ref: DC/21/0699).

The additional works were requested by Horsham District Council (HDC) following submission of the Contamination Investigation Report (Ref: 20823/CIR, dated May 2023), prepared by Soils Limited. The further works were to target areas of soft landscaping to the south of the southernmost barn on site, inside the southern boundary, which were previously overgrown.

Soil samples were taken for chemical laboratory testing to enable recommendations for the safe redevelopment of the site and the protection of site workers, end-users and the public from any contamination identified.

1.2 Site Description

The site comprised an existing farm including two barns used for storage and livestock, a silo for feed storage and surrounding farmland. The site was generally covered by grass, concrete and brick with occasional mature trees and shrubs present.

A domestic oil AST was located towards the southwest corner of the site. It was of metal construction, cuboid in shape and set above a concrete slab with fill point(s) located on its top. Based on its dimensions it was estimated to be of 2250 litre capacity and appeared to be relatively new and in good condition with a separate vent pipe adjacent to the neighbouring barn, which was located within a metre or so of the northern edge of the AST. There were no obvious signs of straining on the concrete slab or surrounding ground and no odours were noted during the site works. The underground feed pipes to the adjacent property (Park Farm farmhouse) are anticipated to run to the west / northwest away from the tank.

The site was relatively flat lying with a slight incline to the southwest ($<3^\circ$). The wider area dipped down to the west and northwest, towards the local stream, again on a gentle incline ($<3^\circ$), according to OS mapping.

The surrounding area generally comprised farmland with a farmhouse and stables to the west. Further detached dwellings were noted to the south / southwest and woodland further to the east.

The site location plan is given in Figure 1. An aerial photograph of the site and its close environs has been included in Figure 2.

1.3 Proposed Development

The proposal comprised the conversion of the existing barns into a single storey, 5-bedroom dwelling with a separate detached guest annexe, both including private soft landscaped gardens.

In compiling this report reliance was placed on drawings CMF/HD21/027 100_03 & 04, dated February 2021, prepared by Acorus. The recommendations provided within this report are made exclusively in relation to the scheme outlined above and must not be applied to any other scheme without further consultation with Soils Limited. Soils Limited must be notified about any change or deviation from the scheme outlined.

Development plans provided by the Client are presented in Appendix D.

1.4 Anticipated Geology

The 1:50,000 BGS Geology map showed the site to be situated on bedrock of the Weald Clay Formation, with no overlying superficial deposits noted.

1.4.1 Weald Clay

The Weald Clay Formation consists of shales and mudstones with occasional thin beds of siltstones, sandstone, shelly limestone and clay ironstone. When fresh the beds are normally dark grey weathering to mottled yellow and brown near the surface or at outcrop. Bands of red clay occur within the bed, usually in association with the sandstone. In this case the Geological report and maps indicate a predominance of Limestones in this area.

Section 2 Site Works

2.1 Project Works

The intrusive investigation, as outlined within the Soils Limited quotation (Q27897, dated 29th June 2023), was to comprise the following items:

- Service clearance at exploratory hole locations using a CAT and Genny
- 3No. hand excavated trial pits
- PID screening of soil samples
- Contamination laboratory testing

2.2 Ground Conditions

The actual project works were undertaken on 13th November 2023 at locations selected by Soils Limited using an indicative plan provided by the Client, with subsequent laboratory testing and reporting.

Table 2.1 Final Depth of Exploratory Holes

Exploratory Hole	Depth (m bgl)
HDTP01	1.22
HDTP02	1.25
HDTP03	1.20
Note(s): The depths given in this table are taken from the ground level on-site at the time of investigation.	

The approximate exploratory hole locations are shown on Figure 3.

The soil conditions encountered were recorded and soil sampling commensurate with the purposes of the investigation was carried out. The depths given on the exploratory hole logs and quoted in this report were measured from ground level.

The soils encountered from immediately below ground surface have been described in the following manner. Where the soil incorporated an organic content such as either decomposing leaf litter or roots or has been identified as part of the in-situ weathering profile, it has been described as Topsoil both on the logs and within this report. Where man has clearly either placed the soil, or the composition altered, with say greater than an estimated 5% of a non-natural constituent, it has been referred to as Made Ground both on the log and within this report.

For more complete information about the soils encountered within the general area of the site reference must be made to the detailed records given within Appendix B, but for the purposes of discussion, the succession of conditions encountered in the exploratory holes in descending order can be summarised as:

Made Ground (MG)
Weathered Weald Clay Formation (wWC)

The ground conditions encountered in the exploratory holes are summarised in Table 2.2.

Table 2.2 Ground Conditions

Strata	Depth Encountered (m bgl)		Typical Thickness (m)	Typical Description
	Top	Bottom		
MG	G.L.	0.25–0.30	0.25	Soft dark grey slightly silty CLAY with occasional rootlets. Rare fine brick fragments. Locally with fine to coarse angular to sub-angular flint gravel.
wWC	0.25–0.30	1.20 ¹ –1.25 ¹	Not proven ²	Soft becoming firm medium orangish grey mottled brown slightly sandy CLAY. Rare rootlets.

Note(s): ¹ Final depth of exploratory hole. ² Base of strata not encountered. The depths given in this table are taken from the ground level on-site at the time of investigation.

2.3 Ground Conditions Encountered in Exploratory Holes

The ground conditions encountered in exploratory holes have been described below in descending order. The engineering logs are presented in Appendix B.1.

2.3.1 Made Ground

Soils described as Made Ground were encountered in each of the three trial pits from ground level to depths ranging between 0.25m and 0.30m bgl.

The Made Ground typically comprised soft dark grey slightly silty CLAY with occasional rootlets. Rare fine brick fragments. Locally with fine to coarse angular to sub-angular flint gravel.

2.3.2 Weathered Weald Clay Formation

Soils of the Weathered Weald Clay Formation were encountered directly underlying the Made Ground to the base of each of the trial pits to a maximum depth of 1.25m bgl.

The Weathered Weald Clay Formation typically comprised soft becoming firm medium orangish grey mottled brown slightly sandy CLAY. Rare rootlets.

2.4 Groundwater

Perched groundwater was encountered in HDTP01 at 0.30m bgl. There was no rise in level and the other trial pits remained dry. The previous investigation did not record any groundwater.

Changes in groundwater level occur for reasons including seasonal effects and variations in drainage. The investigation was conducted in November (2023), when groundwater levels should be rising from their annual minimum, which typically occurs around September, to their annual maximum (highest), which occurs around March.

The site is located directly upon an Unproductive Strata so significant shallow groundwater would not be anticipated on site.

Groundwater equilibrium conditions may only be conclusively established if a series of observations are made via groundwater monitoring wells.

Section 3 Determination of Chemical Analysis

3.1 Site Characterisation and Revised Conceptual Site Model

The Preliminary Investigation Report undertaken by Soils Limited (report ref: 20022/PIR dated February 2022) identified a low to negligible risk of ground contamination from previous usage of the site and offsite sources.

HDC requested sampling around a domestic oil AST that located in the southwest corner of the site, associated with the adjacent residential property as well as sampling and testing in areas of soft landscaping within the development area itself. No exceedances were recorded on site during this investigation (report ref: 20823/CIR, dated May 2023), although one was noted off site adjacent to the AST (WS01).

HDC requested further sampling to the south of the southernmost barn to provide reassurance that this area was fit for use as domestic gardens.

This investigation identified Made Ground to a maximum depth of 0.30m bgl.

There were no significant visual or olfactory indicators of contamination noted, and PID screening noted maximum readings of 0.6ppm which is negligible.

The Made Ground was underlain by bedrock of the Weathered Weald Clay Formation, with no other superficial deposits recorded. Perched groundwater was encountered during the investigation in one location but not the other trial pits or during the previous investigation. It is unlikely to be present in significant quantities given the Unproductive Strata recorded.

The conceptual site model was updated to take account of the above findings and presented in Appendix C.1.

3.2 Soil Sampling

Exploratory hole locations were established to provide an overview of ground conditions within the specified area in relation to the proposed construction, together with enabling the collection of samples to enable chemical characterisation of the underlying strata.

Representative samples for potential environmental testing were obtained from the exploratory holes at depths of between 0.20m and 0.50m to allow appropriate representation of the materials encountered, as set out in Table 3.1.

Table 3.1 Sample Selection

Location	Depth (m bgl)	Matrix	Rational	Location within Proposed Layout
HDTP01	0.20	Silty sandy CLAY (MG)	Coverage of development area, potentially soft landscaping / domestic gardens	Presumed soft landscaping (possible domestic gardens), but no landscaping plan provided at time of writing
	0.50	Slightly sandy CLAY (wWC)		
HDTP02	0.20	Slightly silty CLAY (MG)		
	0.50	Slightly sandy CLAY (wWC)		
HDTP03	0.20	Slightly silty CLAY (MG)		
	0.50	Slightly sandy CLAY (wWC)		

3.3 Determination of Chemical Analysis

The driver for determination of the analysis suite was the information obtained from the Preliminary Investigation Report, previous investigation, and this intrusive investigation.

The chemical analyses were carried out on three samples of Made Ground and three samples of the Weathered Weald Clay Formation. The nature of the analyses is detailed in Table 3.2.

Table 3.2 Chemical Analyses Suites - Soil

No. of Tests	Determinants	Soil Tested	
		MG	wWC
6No.	Metal suites: Arsenic, Boron (Water Soluble), Cadmium, Chromium (total & hexavalent), Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc	✓	✓
6No.	Organic Matter	✓	✓
6No.	pH	✓	✓
6No.	Polycyclic aromatic hydrocarbons (PAH) – (EPA 16)	✓	✓
6No.	Phenols – total monohydric	✓	✓
6No.	Extractable petroleum hydrocarbons (EPH) – Texas banding	✓	✓
6No.	Asbestos screening	✓	✓

The soil testing was carried out in compliance with the MCERTS performance standard, and the results are shown in Appendix C.2, test report 23-14162.

Section 4 Qualitative Risk Assessment

4.1 Assessment Criteria

The assessment criteria used to determine risks to human health are derived and explained within Appendix C.3.

4.2 Representative Contamination Criteria - Soil

The proposal comprised the conversion of the existing barns into a single storey, 5-bedroom dwelling with a separate detached guest annexe, both including private soft landscaped gardens.

In compiling this report reliance was placed on drawings CMF/HD21/027 100_03 & 04, dated February 2021, prepared by Acorus. The recommendations provided within this report are made exclusively in relation to the scheme outlined above and must not be applied to any other scheme without further consultation with Soils Limited. Soils Limited must be notified about any change or deviation from the scheme outlined.

Based on the proposed development, the results of the chemical analysis have been compared against generic assessment criteria (GAC) for a '**Residential with home grown produce**' end use, as presented in SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination December 2014 (C4SL), derived for the protection of human health. Where this document has not published screening values for determinants, GACs derived for the same end use have been adopted from the following published guidance; DEFRA Soil Guideline Values (SGV) and LQM/CIEH/Suitable 4 Use Level (S4UL).

To assess the potential toxicity of organic determinants (Petroleum Hydrocarbons and Polyaromatic Hydrocarbons) to the human health, soils samples were analysed for Soil Organic Matter (SOM). The selected samples analysed recorded, SOM values of between 0.7% and 16.8%. For each soil sample tested, the resultant SOM allowed for the correct comparison to be made with the appropriate guideline value for each organic determinants analysed.

4.3 Risk Assessment – Made Ground

Table 4.1 outlines the sample that have exceeded their relevant assessment criteria. The full laboratory report is presented in Appendix C.2.

Table 4.1 Summary of GAC Exceedances – Made Ground

Location	Depth (m bgl)	Contaminant	Concentration	Guidance Level
None recorded				
Note(s): Units mg/kg				

The risk assessment has not established a pollutant linkage in relation to human health within the Made Ground and no further works are deemed necessary in respect of this material.

4.4 Risk Assessment – Weathered Weald Clay Formation

Table 4.2 outlines the samples that have exceeded their relevant assessment criteria. The full laboratory report is presented in Appendix C.2.

Table 4.2 Summary of GAC Exceedances – Weathered Weald Clay Formation

Location	Depth (m bgl)	Contaminant	Concentration	Guidance Level
None recorded				
Note(s): Units mg/kg				

The risk assessment has not established a pollutant linkage in relation to human health within the Weathered Weald Clay Formation and no further works are deemed necessary in respect of this material.

4.5 Asbestos

The test certificate for each sample submitted for contamination analysis during this investigation includes the results of an Asbestos Screen.

In each case 'Not detected' was reported.

This finding does not obviate the risk of asbestos being present on the site and the Client must seek advice from qualified and competent asbestos specialist during and prior to undertaking works to ensure compliance with appropriate legislation and guidance.

4.6 Risk to Groundwater

The site is located on an Unproductive Strata, is not within a groundwater source protection zone and there are no groundwater abstractions within 1km of the site.

If present, any groundwater flow was anticipated to be towards the northwest in line with the predominant topography.

The nearest surface water feature was a pond, 13m southwest and the nearest inland river was 114m south of the site.

An initial assessment of the risk to controlled waters has been conducted based on the soils analyses and the site sensitivity, which is considered to be low.

Taking into consideration the ground conditions encountered and the lack of contaminant concentrations observed, there is not any significant risk to controlled waters and no further assessment is necessary at this time.

4.7 Risk from Ground Gas Ingression

There were no potential sources of ground gas within influencing distance of the site identified within the CSM compiled as part of the Preliminary Investigation Report (ref: 20022/PIR, dated February 2022).

This and the previous investigation found limited Made Ground (max. 0.50m bgl), which would not be considered a source of ground gas.

PID screening of samples taken adjacent to the AST during the previous investigation recorded a maximum 11ppm at 0.20m bgl, reducing with depth, which was not significant in context and does not warrant further monitoring or assessment in respect of ground gas. PID screening of samples taken during this investigation recorded a maximum 0.6ppm which is negligible.

In summary, there is negligible risk of ground gas at the site and no further works are necessary.

4.7.1 Radon

The site **was not situated** within an area where protection or risk assessment against the ingress of radon was required. Radon protection measures **will not be required** within the proposed new development.

4.8 Generic Risk Assessment

Risk assessments are undertaken for soil, groundwater and ground gas. The CSM has been updated to take account of the assessments below and presented in Appendix C.1. The full laboratory chemical report is presented in Appendix C.2.

4.8.1 Soils

None of the samples tested showed concentrations more than the relevant C4SL / S4UL for a 'Residential with home grown produce' land-use scenario, as detailed in Table 4.1.

The Tier 1 Quantitative risk assessment therefore established that there was **no risk to the human health receptors** of construction workers or future end-users.

4.8.2 Groundwater

Taking into consideration the ground conditions encountered and the limited contaminant concentrations observed, there is not considered to be any significant risk to controlled waters and no further assessment is necessary at this time.

4.8.3 Ground Gas

Given the absence of established sources, there is negligible risk of ground gas at the site and no further works are necessary at this time.

4.9 Recommendations

Analysis did not record any samples with substance levels over their representative guideline values.

As such, no remedial works are necessary in relation to the proposed development, subject to agreement and approval of the regulatory authority, which should be sought at the earliest opportunity.

4.10 Protection of Services

Contamination of the ground may pose a risk to human health by permeating potable water supply pipes. To fulfil their statutory obligations, UK water supply companies require robust evidence from developers to demonstrate either that the ground in which new plastic supply pipes will be laid is free from contaminants specified in UKWIR Report 10/WM/03/21 Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites (UKWIR, 2010), or that the proposed remedial strategy will mitigate any existing risk.

4.11 Duty of Care

Groundworkers must maintain a good standard of personal hygiene including the wearing of overalls, boots, gloves and eye protectors and the use of dust masks during periods of dry weather.

4.12 Excavated Material

Excavated material as waste must be defined or classified prior to any disposal, transport, recycling or re-use at or by an appropriately licensed or exempt carrier and/or off-site disposal facility. The requirements inherent in both Duty of Care and Health and Safety must also be complied with. In order to determine what is to happen, what is suitable, appropriate and most effective in the disposal of wastes, especially those subject to CDM waste management plan requirements, several factors must be considered, and competent advice must always be sought.

4.13 HazWasteOnline

Further consideration of results using HazWasteOnline™ can be undertaken on request to give an indication of potentially hazardous properties in the materials analysed.

4.14 Re-use of Excavated Material On-site

The re-use of on-site soils may be undertaken either under the Environmental Permitting Regulations 2007 (EPR), in which case soils other than uncontaminated soils are classed as waste, or under the CL:AIRE Voluntary Code of Practice (CoP) which was published in September 2008 and is accepted as an alternative regime to the EPR.

4.15 Imported Material

Any soil, which is to be imported onto the site, must undergo chemical analysis to permit classification prior to its importation and placement in order to ascertain its status with specific regard to contamination, i.e. to prove that it is suitable for the purpose for which it

is intended.

4.16 Discovery Strategy

There may be areas of contamination not identified during the course of the investigation. Such occurrences may also be discovered during the demolition and construction phases for the redevelopment of the site.

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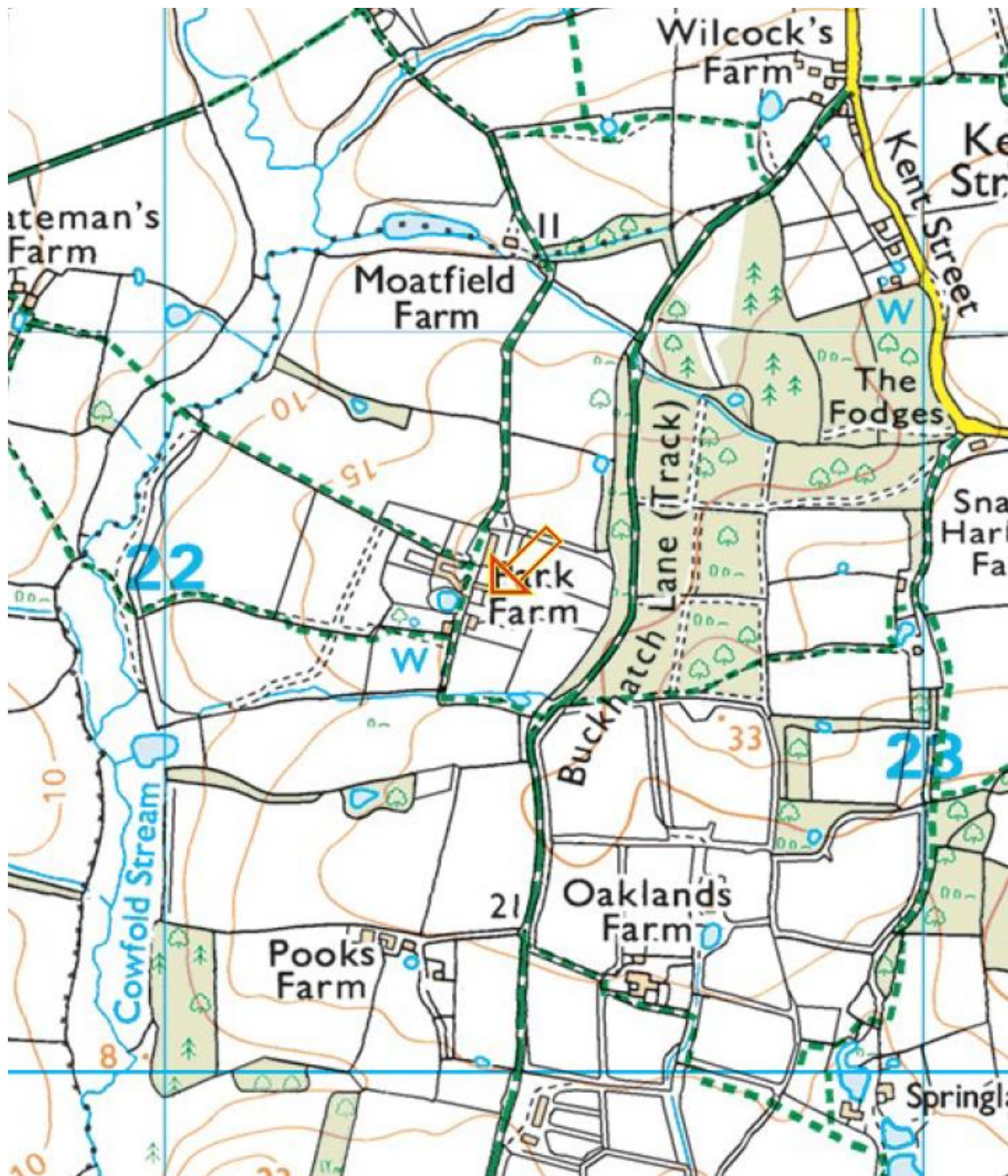


Figure 1 – Site Location Map



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Project
Moatfield Farm Barns, Kings Lane, Cowfold,
Horsham, West Sussex RH13 8BD

Client
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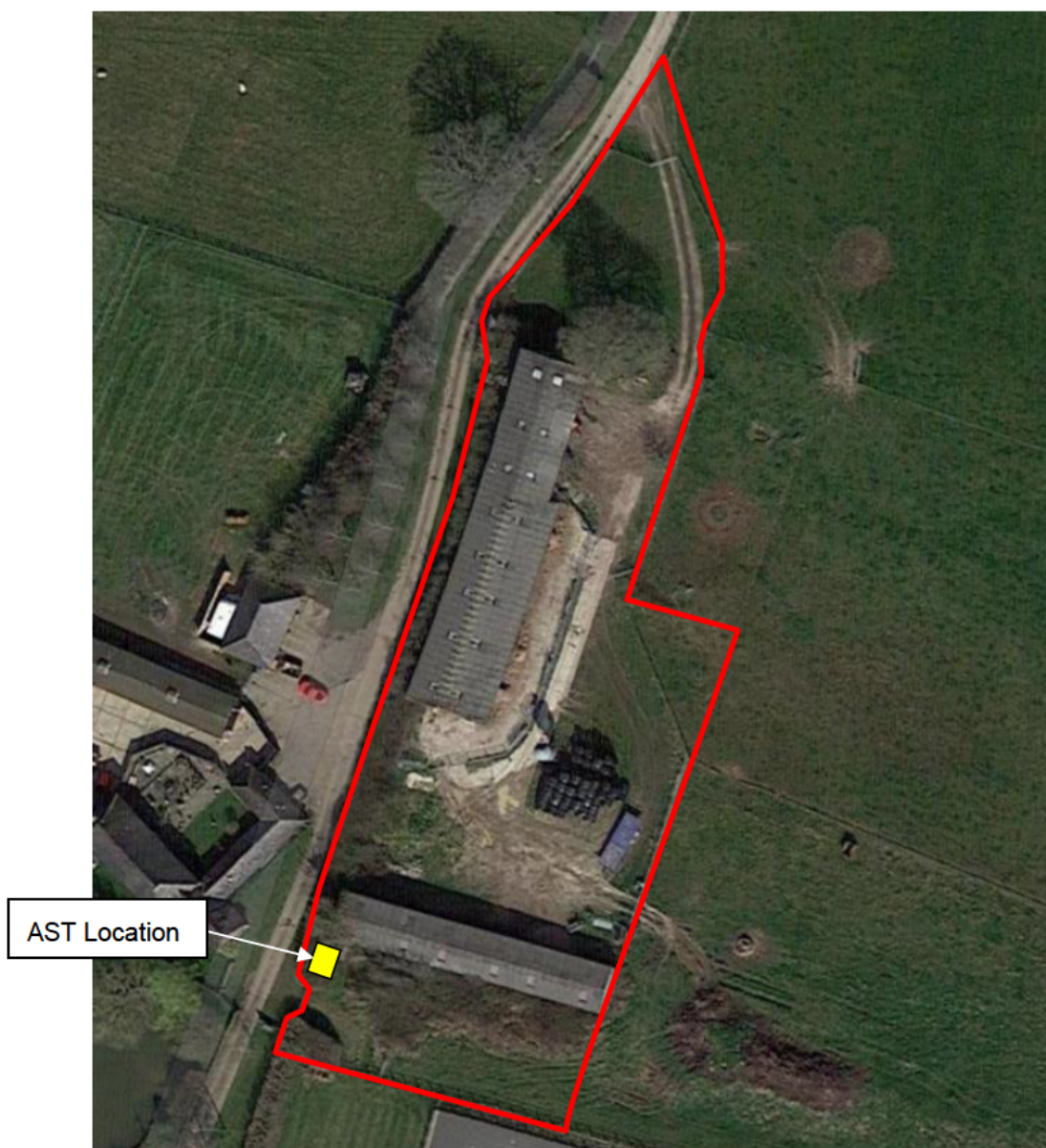


Figure 2 – Aerial Photograph

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Moatfield Farm Barns, Kings Lane,
Cowfold, Horsham, West Sussex
RH13 8BD

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Figure 3 – Exploratory Hole Plan

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Moatfield Farm Barns, Kings Lane,
Cowfold, Horsham, West Sussex
RH13 8BD

Client

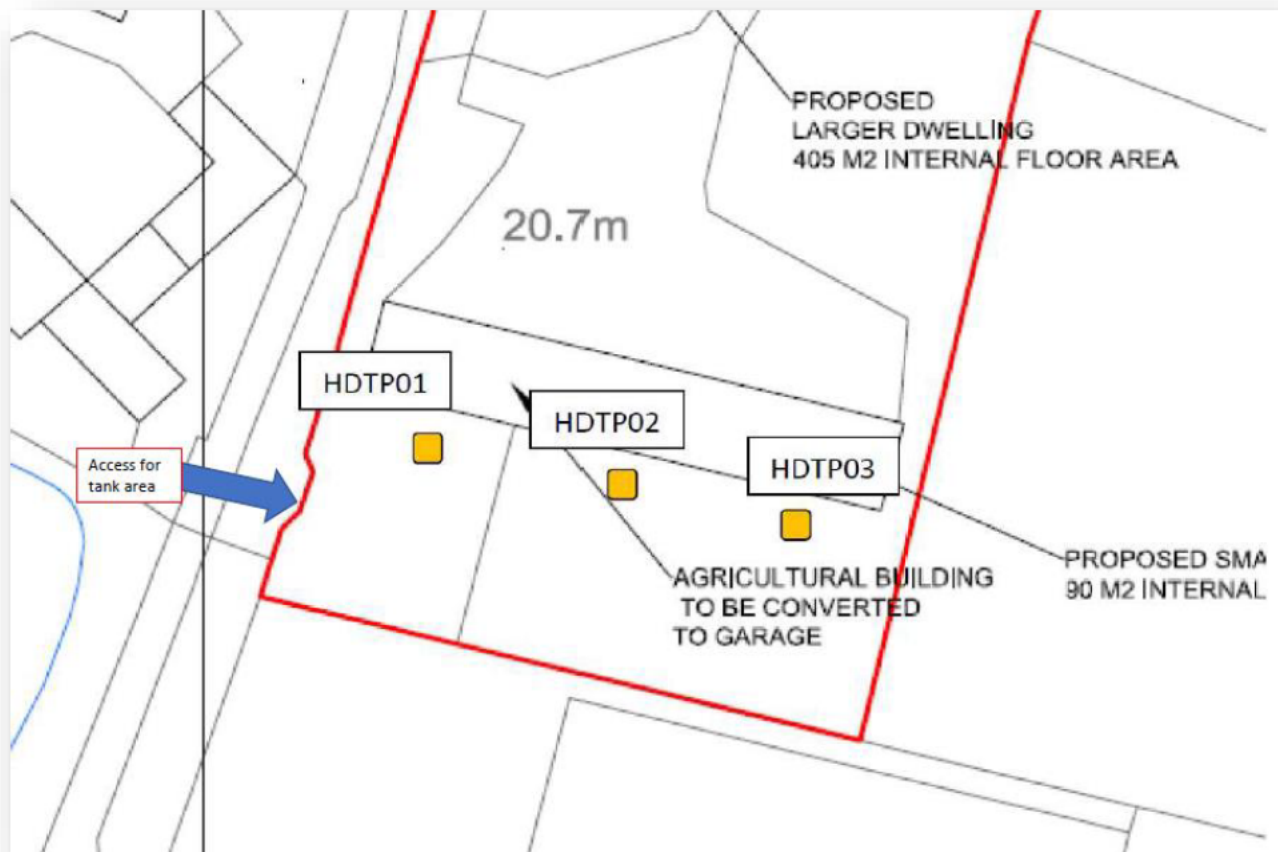
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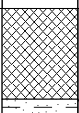
Appendix A Standards and Resources

The site works, soil descriptions and testing were undertaken in accordance with the following standards were applicable:

- BS EN ISO 14688-1:2018
- BS EN ISO 14688-2:2018
- BS 10175:2011+A2:2017 - Investigation of potentially contaminated sites
- BS 8485:2015+A1:2019
- LCRM 2021 Environment Agency
- SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination December 2014
- Soil Guideline Value (SGV) (Environment Agency, 2009)
- Suitable 4 Use Level (S4UL) (Nathanail et al, 2015)
- Google Earth
- British Geological Survey Website & iGeology App

Appendix B Field Work

Appendix B.1 Engineers Logs

		Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk			Trial Pit Log		Trial Pit No. HDTP01 Sheet 1 of 1	
Project Name: Moatfield				Project No.: 21191		Method: Hand Excavated		Hole Type TP
Location: Moatfield Farm, Kings Lane, Cowfold, RH13 8BD						Plant: Hand Tools		
Client: Toby Chapman				Trial Pit Length: m		Trial Pit Width: m		Scale 1:25
Dates: 13/11/2023		Level:		Co-ords:		Logged By GJB		
Water Strike	Samples & In Situ Testing			Depth (m)	Level (mAOD)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	D+J PID	0.3ppm	0.30			Soft medium orangish grey mottled brown slightly silty sandy CLAY. Occasional rootlets. Rare fine roots. Occasional fine to coarse brick fragments. Frequent intermittent pockets of dark orange brown coarse sand. Rare fine angular to sub-angular flint gravel. MADE GROUND.	
	0.50	D+J PID	0.5ppm				Firm medium orangish grey mottled brown slightly sandy CLAY. Occasional rootlets. Occasional desiccated rootlets. Rare fine brick fragments. Occasional intermittent pockets of medium orange brown fine to coarse sand. Rare off white cause calcarious nodules. WEALD CLAY FORMATION	
	0.90	D+J PID	0.3ppm					
	1.22	D+J PID	0.3ppm				End of Pit at 1.220m	
								1
								2
								3
								4
								5
General Remarks:								Sample Type D: Disturbed B: Bulk J: Jar W: Water
Groundwater Remarks: Groundwater strike at 0.30m bgl								

		Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk			Trial Pit Log		Trial Pit No. HDTP02 Sheet 1 of 1	
Project Name: Moatfield				Project No.: 21191		Method: Hand Excavated		Hole Type TP
Location: Moatfield Farm, Kings Lane, Cowfold, RH13 8BD						Plant: Hand Tools		
Client: Toby Chapman				Trial Pit Length: m		Trial Pit Width: m		Scale 1:25
Dates: 13/11/2023				Level:		Co-ords:		Logged By GJB
Water Strike	Samples & In Situ Testing			Depth (m)	Level (mAOD)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	D+J PID	0.3ppm	0.25			Strimmed nettles over soft dark grey slightly silty CLAY. Occasional rootlets. Rare fine brick fragments. Occasional fine to coarse angular to sub-angular flint gravel. MADE GROUND.	
	0.50	D+J PID	0.5ppm				Soft becoming firm medium orangish grey mottled brown slightly sandy CLAY. Rare rootlets. Rare desiccated rootlets. Rare occasional fine to coarse brick fragments. Occasional intermittent pockets of medium greyish orange brown fine to coarse sand. Becoming sandy from 1.0m to 1.2m BL/GL. WEALD CLAY FORMATION	
	0.90	D+J PID	0.5ppm					
	1.25	D+J PID	0.5ppm	1.25				
							End of Pit at 1.250m	
General Remarks:								Sample Type D: Disturbed B: Bulk J: Jar W: Water
Groundwater Remarks: Groundwater not encountered								

		Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk			Trial Pit Log		Trial Pit No. HDTP03 Sheet 1 of 1	
Project Name: Moatfield				Project No.: 21191		Method: Hand Excavated		Hole Type TP
Location: Moatfield Farm, Kings Lane, Cowfold, RH13 8BD						Plant: Hand Tools		
Client: Toby Chapman				Trial Pit Length: m		Trial Pit Width: m		Scale 1:25
Dates: 13/11/2023		Level:		Co-ords:		Logged By GJB		
Water Strike	Samples & In Situ Testing			Depth (m)	Level (mAOD)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	D+J PID	0.5ppm	0.25			Strimmed nettles over soft dark grey slightly silty CLAY. Occasional rootlets. Rare fine brick fragments. Occasional fine to coarse angular to sub-angular flint gravel. MADE GROUND.	
	0.50	D+J PID	0.3ppm				Soft becoming firm medium orangish grey mottled brown slightly sandy CLAY. Rare rootlets. Rare desiccated rootlets. Rare occasional fine to coarse brick fragments. Occasional intermittent pockets of medium greyish orange brown fine to coarse sand. WEALD CLAY FORMATION	
	0.90	D+J PID	0.6ppm					
	1.20	D+J PID	0.5ppm	1.20				
							End of Pit at 1.200m	
General Remarks:								Sample Type D: Disturbed B: Bulk J: Jar W: Water
Groundwater Remarks: Groundwater not encountered								

Appendix C Chemical Laboratory Analyses

Appendix C.1 Conceptual Site Model

Table C.1.1 CSM Revised Pre-Chemical Analyses

Source	Potential Contaminant	Exposure Pathway	Receptor	Initial Assessment from Preliminary Investigation Report Information			Comments	Further works
				Severity	Probability	Risk		
Made Ground on site / Domestic Heating Oil AST On-site historic and current site usage.	Metals, Semi-metals and non-metals, PAHs, TPH, pH	Inhalation of dust	Site Workers/Site Maintenance	Mild	Low	Low	Site located on bedrock of the Weald Clay Formation, which was classified as Unproductive Strata that have negligible significance for water supply or river base flow.	Additional chemical testing and PID screening of samples taken adjacent to southernmost barn prior to undertaking a generic quantitative risk assessment.
			End Users	Mild	Low	Low		
			Off-site Users	Minor	Unlikely	Very low		
	Metals, Semi-metals and non-metals, PAHs, TPH, pH	Ingestion and absorption via direct contact	Site Workers/Site Maintenance	Mild	Low	Low	Limited Made Ground recorded (max 0.50m bgl).	
			End Users	Minor	Unlikely	Very low		
			Off-site Users	Minor	Unlikely	Very low		
	Metals, Semi-metals and non-metals, PAHs, TPH, pH	Migration via surface runoff	Surface Water	Mild	Low	Low	No visual or olfactory indicators of contamination noted.	
			Surface Water	Mild	Low	Low		
		Migration in solution via groundwater	Shallow Aquifer	-	-	-		
			Deep Aquifer	-	-	-		
		Direct contact with construction material	Buried Structures	Minor	Unlikely	Very low		
			Buried Services	Minor	Unlikely	Very low		
	PAHs, TPH	Migration of gases via permeable soils	Site Workers/Site Maintenance	Medium	Unlikely	Low		
			End Users	Medium	Unlikely	Low		
			Off-site Users	Minor	Unlikely	Very low		
			Building and Confined Spaces	Minor	Unlikely	Very low		

Table C.1.2 CSM Revised Post-Chemical Analyses

Source	Potential Contaminant	Exposure Pathway	Receptor	Initial Assessment from Preliminary Investigation Report Information			Comments	Further works
				Severity	Probability	Risk		
None on site		Inhalation of dust	Site Workers/Site Maintenance				Site located on bedrock of the Weald Clay Formation, which was classified as Unproductive Strata that have negligible significance for water supply or river base flow.	None required.
			End Users					
			Off-site Users					
		Ingestion and absorption via direct contact	Site Workers/Site Maintenance				Limited Made Ground recorded (max 0.50m bgl).	
			End Users					
		Migration via surface runoff	Surface Water				No visual or olfactory indicators of contamination noted.	
		Migration in solution via groundwater	Surface Water					
			Shallow Aquifer				No exceedances of relevant assessment criteria on site.	
			Deep Aquifer					
		Direct contact with construction material	Buried Structures					
			Buried Services					
		Migration of gases via permeable soils	Site Workers/Site Maintenance					
			End Users					
			Off-site Users					
			Building and Confined Spaces					
End Users								

Appendix C.2 Chemical Laboratory Results



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Derwentside Environmental Testing Services Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 23-14162

Site Reference: Moatfield Farm

Project / Job Ref: 21191

Order No: 21191/SB

Sample Receipt Date: 16/11/2023

Sample Scheduled Date: 16/11/2023

Report Issue Number: 1

Reporting Date: 24/11/2023

Authorised by:

Steve Knight
Customer Support Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.



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Soil Analysis Certificate						
DETS Report No: 23-14162	Date Sampled	13/11/23	13/11/23	13/11/23	13/11/23	13/11/23
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Moatfield Farm	TP / BH No	HDTP01	HDTP01	HDTP02	HDTP02	HDTP03
Project / Job Ref: 21191	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 21191/SB	Depth (m)	0.20	0.50	0.20	0.50	0.20
Reporting Date: 24/11/2023	DETS Sample No	685960	685961	685962	685963	685964

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.6	7.8	8.0	8.1	8.0
Organic Matter (SOM)	%	< 0.1	MCERTS	3.7	1.2	1.4	1.6	1.6
Arsenic (As)	mg/kg	< 2	MCERTS	25	37	16	22	17
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.6	0.2	0.3	0.2	0.3
Chromium (Cr)	mg/kg	< 2	MCERTS	28	37	34	32	35
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	24	32	46	38	35
Lead (Pb)	mg/kg	< 3	MCERTS	47	22	24	28	21
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	17	16	38	31	40
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Vanadium (V)	mg/kg	< 1	MCERTS	44	48	38	39	37
Zinc (Zn)	mg/kg	< 3	MCERTS	90	58	78	79	79
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)



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Soil Analysis Certificate						
DETS Report No: 23-14162	Date Sampled	13/11/23				
Soils Ltd	Time Sampled	None Supplied				
Site Reference: Moatfield Farm	TP / BH No	HDP03				
Project / Job Ref: 21191	Additional Refs	None Supplied				
Order No: 21191/SB	Depth (m)	0.50				
Reporting Date: 24/11/2023	DETS Sample No	685965				

Determinand	Unit	RL	Accreditation				
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected			
pH	pH Units	N/a	MCERTS	7.8			
Organic Matter (SOM)	%	< 0.1	MCERTS	3.2			
Arsenic (As)	mg/kg	< 2	MCERTS	22			
W/S Boron	mg/kg	< 1	NONE	< 1			
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.4			
Chromium (Cr)	mg/kg	< 2	MCERTS	30			
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2			
Copper (Cu)	mg/kg	< 4	MCERTS	23			
Lead (Pb)	mg/kg	< 3	MCERTS	40			
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1			
Nickel (Ni)	mg/kg	< 3	MCERTS	18			
Selenium (Se)	mg/kg	< 2	MCERTS	< 2			
Vanadium (V)	mg/kg	< 1	MCERTS	43			
Zinc (Zn)	mg/kg	< 3	MCERTS	66			
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
 Subcontracted analysis (S)



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-14162	Date Sampled	13/11/23	13/11/23	13/11/23	13/11/23	13/11/23
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Moatfield Farm	TP / BH No	HDP01	HDP01	HDP02	HDP02	HDP03
Project / Job Ref: 21191	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 21191/SB	Depth (m)	0.20	0.50	0.20	0.50	0.20
Reporting Date: 24/11/2023	DETS Sample No	685960	685961	685962	685963	685964

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.18	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.24	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.20	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-14162	Date Sampled	13/11/23				
Soils Ltd	Time Sampled	None Supplied				
Site Reference: Moatfield Farm	TP / BH No	HDP03				
Project / Job Ref: 21191	Additional Refs	None Supplied				
Order No: 21191/SB	Depth (m)	0.50				
Reporting Date: 24/11/2023	DETS Sample No	685965				

Determinand	Unit	RL	Accreditation				
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1			
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1			
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1			
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6			



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Soil Analysis Certificate - EPH Texas Banded						
DETS Report No: 23-14162	Date Sampled	13/11/23	13/11/23	13/11/23	13/11/23	13/11/23
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Moatfield Farm	TP / BH No	HDTPO1	HDTPO1	HDTPO2	HDTPO2	HDTPO3
Project / Job Ref: 21191	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 21191/SB	Depth (m)	0.20	0.50	0.20	0.50	0.20
Reporting Date: 24/11/2023	DETS Sample No	685960	685961	685962	685963	685964

Determinand	Unit	RL	Accreditation					
EPH Texas (C6 - C8) : HS 1D MS Total	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
EPH Texas (>C8 - C10) : EH 1D Total	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C10 - C12) : EH 1D Total	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C12 - C16) : EH 1D Total	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C16 - C21) : EH 1D Total	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C21 - C40) : EH 1D Total	mg/kg	< 6	MCERTS	< 6	< 6	< 6	< 6	< 6
EPH Texas (C6 - C40) : HS 1D MS+EH 1D Total	mg/kg	< 6	NONE	< 6	< 6	< 6	< 6	< 6



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Soil Analysis Certificate - EPH Texas Banded						
DETS Report No: 23-14162	Date Sampled	13/11/23				
Soils Ltd	Time Sampled	None Supplied				
Site Reference: Moatfield Farm	TP / BH No	HDTP03				
Project / Job Ref: 21191	Additional Refs	None Supplied				
Order No: 21191/SB	Depth (m)	0.50				
Reporting Date: 24/11/2023	DETS Sample No	685965				

Determinand	Unit	RL	Accreditation				
EPH Texas (C6 - C8) : HS 1D MS Total	mg/kg	< 0.05	NONE	< 0.05			
EPH Texas (>C8 - C10) : EH 1D Total	mg/kg	< 1	MCERTS	< 1			
EPH Texas (>C10 - C12) : EH 1D Total	mg/kg	< 1	MCERTS	< 1			
EPH Texas (>C12 - C16) : EH 1D Total	mg/kg	< 1	MCERTS	< 1			
EPH Texas (>C16 - C21) : EH 1D Total	mg/kg	< 1	MCERTS	< 1			
EPH Texas (>C21 - C40) : EH 1D Total	mg/kg	< 6	MCERTS	< 6			
EPH Texas (C6 - C40) : HS 1D MS+EH 1D Total	mg/kg	< 6	NONE	< 6			



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Soil Analysis Certificate - Sample Descriptions

DETS Report No: 23-14162	
Soils Ltd	
Site Reference: Moatfield Farm	
Project / Job Ref: 21191	
Order No: 21191/SB	
Reporting Date: 24/11/2023	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
685960	HDTP01	None Supplied	0.20	24	Brown sandy clay with vegetation
685961	HDTP01	None Supplied	0.50	20.5	Brown clay
685962	HDTP02	None Supplied	0.20	18.1	Brown sandy clay
685963	HDTP02	None Supplied	0.50	20.4	Brown clay
685964	HDTP03	None Supplied	0.20	21.4	Brown clay
685965	HDTP03	None Supplied	0.50	20.2	Brown sandy clay with stones

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

Unsuitable Sample ^{1/5}



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-14162

Soils Ltd

Site Reference: Moatfield Farm

Project / Job Ref: 21191

Order No: 21191/SB

Reporting Date: 24/11/2023

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



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Lenham Heath
Maidstone
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List of HWOL Acronyms and Operators	
DETS Report No: 23-14162	
Soils Ltd	
Site Reference: Moatfield Farm	
Project / Job Ref: 21191	
Order No: 21191/SB	
Reporting Date: 24/11/2023	

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym	
EPH Texas (C10 - C12) - EH_1D_Total	
EPH Texas (C12 - C16) - EH_1D_Total	
EPH Texas (C16 - C21) - EH_1D_Total	
EPH Texas (C21 - C40) - EH_1D_Total	
EPH Texas (C6 - C40) - HS_1D_MS+EH_1D_Total	
EPH Texas (C6 - C8) - HS_1D_MS_Total	
EPH Texas (C8 - C10) - EH_1D_Total	

Appendix C.3 General Assessment Criteria

HUMAN HEALTH RISK ASSESSMENT

Introduction

The statutory definition of contaminated land was initially defined in the Environmental Protection Act 1990, ref. 1.1, which was introduced by the Environment Act 1995, ref. 1.2, and retained in the Environment Act 2021, ref 1.3, as;

‘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.’

The UK guidance on the assessment of contaminated land has developed as a direct result of the introduction of these Acts. The technical guidance supporting the original legislation was summarised in a number of key documents collectively known as the Contaminated Land Reports (CLRs). These have since been replaced or superseded by Land Contamination Risk Management (LCRM) 2021, ref 1.4 produced and administrated by the Environment Agency online through the .GOV.uk website <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm> .

However, the basic definitions, methodology and guidance remain essentially the same utilizing the UK Contaminated Land Exposure Assessment Models (CLEA) as within the original CLR and planning guidance it replaces or supersedes.

In establishing whether a site fulfils the statutory definition of ‘contaminated land’ it remains necessary to identify, whether a pollutant linkage exists in respect of the land in question and whether the pollutant linkage:

- is resulting in significant harm being caused to the identified receptor in the pollutant linkage,
- presents a significant possibility of significant harm being caused to that receptor,
- is resulting in the pollution of the controlled waters which constitute the receptor, or
- is likely to result in such pollution.

A ‘pollutant linkage’ may therefore be defined as the confirmation of a link between a contaminant ‘source’ and a vulnerable at risk ‘receptor’ by means of a ‘pathway’ and that the risk is potentially significant. If there is no complete linkage, risk defaults to low to negligible and can never be potentially significant.

Assessment Methodology

A four-stage assessment process is followed for identifying potential pollutant linkages on a site. These stages are summarised in the table below:

No.	Process	Description
1	Hazard Identification	Establishing contaminant sources, pathways and receptors (the conceptual model).
2	Hazard Assessment	Analysing the potential for unacceptable risks (what linkages could be present, what could be the effects).
3	Risk Estimation	Trying to establish the magnitude and probability of the possible consequences (what degree of harm might result and to what receptors, and how likely is it).
4	Risk Evaluation	Deciding whether the risk is unacceptable in the context of existing and future proposals.

Stages 1 and 2 develop an initial '*conceptual model*' based upon information collated from desk-based available and existing site information and a walkover of the site as recommended in BS10175 and LCRM. The formation of any conceptual model is an iterative process and as such it should be updated and refined throughout each phase of the project to reflect any additional information obtained and unknowns being resolved and identify the potential contaminants of concern at the site, i.e. those with the potential to cause significant harm to identified receptors.

The extent of the desk studies and enquiries to be conducted should be in general accordance with BS10175 and other UK guidance to produce an initial conceptual model highlighting the known potential risks, remaining unknowns and contaminants of concern. The information from these enquiries is presented in a desk study or preliminary report with recommendations, if necessary, for further work based upon the conceptual model findings and any identified or unresolved unknowns.

If potential pollutant linkages or potentially significant unknowns are identified within the initial conceptual model, further site investigation and report will be recommended and usually required under planning. Such investigation should be based on and driven by the findings of the initial conceptual model and planned in general accordance with BS10175, LCRM and other current UK guidance where relevant. The number of exploratory holes and samples collected for analysis should be consistent with the size, extent and nature of the site, the identified contaminants of concern and the level of initial risk identified in the initial conceptual model. This will enable a contamination risk assessment to be conducted in accordance with current UK requirements, at which point the conceptual model can be updated and any relevant pollutant linkages can be further quantified and any remaining unknowns resolved. As previously this is an iterative process that may highlight or require additional investigation to resolve to the satisfaction of the regulator.

A two-stage investigation process may therefore be more appropriate where time constraints are less of an issue with the first intrusive investigation being conducted as an initial or screening assessment to confirm or validate the presence of potential sources on site identified in the initial conceptual model and to investigate if additional unknown sources not previously identified are present. This helps to define the scope, extent and requirements of a second more refined and targeted investigation to delineate wherever possible the extent of the identified contamination, contaminants of concern and/or remaining unknowns.

All site works should be undertaken in general accordance with the British Standards BS 10175, ref. 5, for environmental only investigations and BS 5930:2015, ref. 1.6, in the case of combined Geoenvironmental and/or Geotechnical investigations.

The results of analysis are compared initially against generic guidance values which are dependent on the proposed end-use of the development and which must ultimately be based on traceable, scientifically valid and justified exposure and chemical data using the UKCLEA methodology.

The end-use and therefore potential exposure pathways may be defined as one of the following under current UK guidance;

- Residential with homegrown produce i.e. typical low rise and low-density housing with gardens where vegetables and fruits may be grown for home consumption.
- Residential without homegrown produce i.e. low-density housing where no gardens are present where vegetables and fruits could be grown for home consumption.
- Allotments – i.e. areas where vegetables and fruits are grown for home consumption but are not specifically associated with a residential property.
- Public open space residential – i.e. grassed areas adjacent and/or directly related to high density housing and other common or communal open areas on which underlying soils could be exposed but on which vegetables and fruits are not grown for consumption.
- Public open space – i.e. areas such as parks, playing fields and other recreational areas to which public access is possible but otherwise to which there is no direct residential linkage.
- Commercial – i.e. industrial premises where there is limited exposure to soil and residents are not present on site.

Standard Land-use Scenarios

The standard land-use scenarios used to develop exposure models are further detailed in the following sections:

Residential with homegrown produce

Generic scenario assumes a house built on a ground bearing slab with a private garden having a lawn, flowerbeds and a small fruit and vegetable patch.

-
- Critical receptor is assumed to be a young female child (zero to six years old)
 - Exposure pathways include direct soil and indoor dust ingestion, consumption of home-grown produce and any adhering soil, skin contact with soils and indoor dust and inhalation of indoor and outdoor dust and vapours.
-

A sub-set of the Residential land-use is **Residential without Homegrown produce**. The generic scenario assumes low density housing with communal landscaped gardens where the consumption of homegrown vegetables will not occur and the pathways of direct ingestion and produce inputs are suitably moderated.

Allotments

Areas of open space commonly made available to local users but remote from residential properties, but on which tenants may grow fruit and vegetables for their own consumption. Typically, there are a number of plots to a site which may have a total area of up to 1 hectare. The tenants are assumed to be adults and that young children make only occasional accompanied visits.

Although some allotment holders may choose to keep animals on allotments, potential exposure to animal products is not currently considered within the CLEA model.

-
- Critical receptor is a young female child (zero to six years old)
 - Exposure pathways include direct soil ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and inhalation of outdoor dust and vapours but at reduced exposure levels reflecting non-residential status.
-

Commercial

This generic scenario assumes a typical commercial or light industrial property at which employees spend most time indoors and are involved in office-based or relatively light physical work.

-
- Critical receptor is a working female adult (aged 16 to 65 years old).
 - Exposure duration is over working lifetime
 - Exposure pathways include direct soil and indoor dust ingestion, skin contact with soils and dusts and inhalation of dust and vapours but exposure reduced to reflect non-residential nature and general lack of open spaces.
-

Public Open Space within Residential Area

This generic scenario refers to any grassed area up to 0.05 ha that is associated with residential properties but is not for their exclusive use and on which no fruit or vegetables are grown for home consumption.

-
- Grassed area of up to 0.05 ha and a considerable proportion of this (up to 50%) may be bare soil which can be interacted with directly
 - Predominantly used by children for play and/or access
 - Sufficiently close proximity to home for tracking back of soil to occur, thus indoor exposure pathways apply
-

-
- older children chosen as the critical receptor on basis that they will use site most frequently (age class 4-9 years)
-
- ingestion rate assumed to be 75 mg.day⁻¹
-

Public Open Space Park

This generic scenario refers to any public park or grassed space that is more than 0.5ha in area:

-
- Public park (>0.5 ha), predominantly grassed and may also contain children's play equipment and border areas of soil containing flowers or shrubs (75% assumed cover)
-
- Female child age classes 1-6
-
- Soil ingestion rate of 50 mg.day⁻¹
-
- Occupancy period outdoors = 2 hours.day⁻¹
-
- Exposure frequency of 170 days.year⁻¹ for age classes 2-18 and 85 days.year⁻¹ for age class 1
-
- Outdoor exposure pathways only (no tracking back of soils).
-

Human Health Generic Quantitative Risk Assessment (GQRA) involves the comparison of contaminant concentrations measured in soil at the site with Generic Assessment Criteria (GAC) generated using the CLEA model based on the exposure and land use scenario assumptions noted above.

GAC's are deliberately conservative values adopted to ensure that they are applicable to the majority of possible contaminated sites and below which there is considered a low to negligible risk to identified human health receptors, i.e. there can be no harm. These values may be published Contaminated Land Exposure Assessment Model (CLEA) derived GAC's derived by a competent third party or the Environment Agency / DEFRA. It is imperative to the risk assessor to understand the uncertainties and limitations associated with these GAC's to ensure that they are used appropriately.

Where the adoption of a GAC is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses or the contaminant is susceptible to wide variation depending on factors such as form and bioavailability, then a Detailed Quantitative Risk Assessment (DQRA) may be undertaken to develop site specific or remediation values for relevant soil contaminants based on site and contaminant specific conditions.

In 2014, the publication of Category 4 Screening Levels (C4SL), refs 1.8 and 1.9, as part of the Defra-funded research project SP1010, included modifications to certain exposure assumptions documented within EA Science Report SC050221/SR3 (herein after referred to as SR3) ref 1.7 used in the generation of SGVs. C4SL were published for six substances (cadmium, arsenic, benzene, benzo(a)pyrene, chromium VI and lead) for a sandy loam soil type with 6% soil organic matter, based on a low level of toxicological concern. Where a C4SL has been published, Soils Limited has adopted them as GAC for these six substances.

For all other substances the soils will be compared to Suitable For Use Levels (S4ULs) published by LQM, ref. 1.10, which were developed for around 85 substances and are

intended to enable a screening assessment of the risks posed by soil quality on development sites. The updated LQM/CIEH GAC publication was developed to accommodate recent developments in the understanding of chemical, toxicological and routine exposure to soil-based contaminants.

Where no S4UL or C4SL is available, assessment criteria may be generated using the Contaminated Land Exposure Assessment (CLEA) Software Version 1.07, ref. 1.11, Toxicological and physico-chemical/fate and transport data used to generate the criteria has been derived from a hierarchy of data sources as follows:

1. Environment Agency or Department of Environment Food and Rural Affairs (DEFRA) documents;
2. Other documents produced by UK Government or state organisations;
3. European institution documents;
4. International organisation documents;
5. Foreign government institutions.

In the case of the majority of contaminants considered, the toxicological data has been drawn originally from the relevant CLR 9 TOX report, or updated toxicological data published by the Environment Agency (2009), where available. Where no TOX report is available reference has been made to appropriately determined health criteria values, derived from the above-noted hierarchy, as this is considered to represent appropriate peer reviewed data sources. Similarly, fate and transport data should also be determined by reference to appropriate sources and the CLEA model assumptions.

Chemical laboratory test results are processed as follows. A statistical analysis of the results is conducted, as detailed in CIEH and CL:AIRE 'Guidance on Comparing Soil Contamination Data with a Critical Concentration', ref. 1.12. Individual concentrations are then compared to the selected guideline values to identify and isolate concentrations of contaminants that are in excess of the selected screening low or no risk criteria.

Where the risk estimation identifies significant concentrations of one or more contaminants, further risk evaluation needs to be undertaken often as a site specific DQRA in line with current guidance to determine and confirm if the identified exceedances are significant in the context of the proposed development or activity.

References

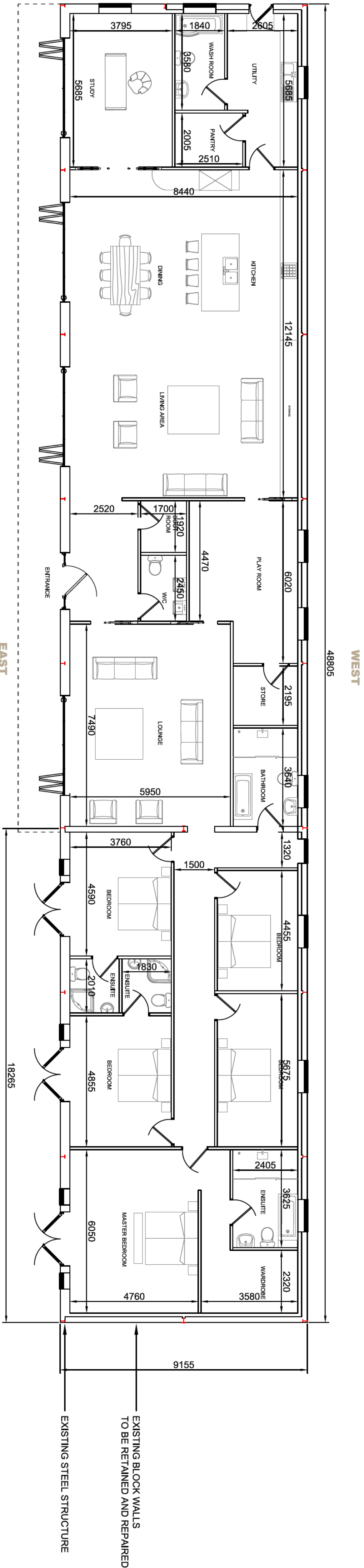
- 1.1 The Environmental Protection Act, Part IIA, Section 78, DoE 1990.
- 1.2 Environment Act 1995, Section 57, DoE 1995.
- 1.3 Environment Act 2021 OEP 2021.
- 1.4 Land Contamination Risk Management Gov.UK (EA) 2021
- 1.5 BS 10175: 2011+A2:2017 '*Investigation of potentially contaminated sites. Code of practice*', British Standards Institute, 2017
- 1.6 BS 5930: 2015+A1:2020 '*Code of practice for ground investigations*', British Standards Institute, 2015
- 1.7 Science Report SC050021/SR3 '*Updated technical background to the CLEA model*', Environment Agency, 2008
- 1.8 DEFRA SP1010: Development of Category 4 Screening Levels for the Assessment of Land Affected by Contamination, published March 2014.
- 1.9 Contaminated Land: Applications in Real Environment (CL:AIRE) (2014). '*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*', Revision 2, DEFRA research project SP1010.
- 1.10 The LQM/S4ULs for Human Health Risk Assessment, Nathanail P, McCaffery C, Gillett A, Ogden R, and Nathanail J, Land Quality Press, Nottingham, published 2015.
- 1.11 CLEA '*Software Version 1.071*' (downloaded from the CL:AIRE website , <https://www.claire.co.uk/home/news/44-risk-assessment/178-soil-guideline-values>)
- 1.12 CIEH '*Guidance on Comparing Soil Contamination Data with a Critical Concentration*', Chartered Institute of Environmental Health (CIEH) and Contaminated Land: Applications in Real Environments (CL:AIRE), May 2008.

Land Use			Residential With or Without Plant Uptake									Public Open Space (POS)											Name	Authority	Date
			With			Without			Allotments			Commercial			Residential						Park				
			SOM	1.0	2.5	6	1	2.5							6	1	2.5	6	1	2.5	6	1			
Type	Contaminants	Species	Year																						
Metals	Antimony		2010					550						7500								EIC/AGS/ CL:AIRE	EIC/AGS/ CL:AIRE	2010	
	Arsenic		2014			37		40			49		640		79		168				C4SL	DEFRA	2014		
			2015			37		40			40		640		79		170				S4UL	LQM/CIEH	2015		
	Barium		2010					1300					22000								EIC/AGS/ CL:AIRE	EIC/AGS/ CL:AIRE	2010		
	Beryllium		2015			1.7		1.7			35		12		2.2		63				S4UL	LQM/CIEH	2015		
	Boron		2015			290		11000			45		240000		21000		46000				S4UL	LQM/CIEH	2015		
	Cadmium		2015			11		85			1.9		190		120		532				S4UL	LQM/CIEH	2015		
	Chromium	III	2014			26		149			4.9		410		220		880				C4SL	DEFRA	2014		
			2015			910		910		18000		8600		1500		33000				S4UL	LQM/CIEH	2015			
			2014			21		21		170		49		23		250				C4SL	DEFRA	2014			
		VI	2015			6		6			1.8		33		7.7		220				S4UL	LQM/CIEH	2015		
	Copper		2015			2400		7100			520		68000		12000		44000				S4UL	LQM/CIEH	2015		
	Lead					210		310			84		6000		760		1400				C4SL	DEFRA	2014		
	Mercury	Elemental	2012			1.0		1.0			26		26									SGV	DEFRA	2012	
			2015			1.2		1.2		21		58		16		30				S4UL	LQM/CIEH	2015			
		Inorganic	2012			170		170			80		36000								SGV	DEFRA	2012		
			2015			40		56		19		1100		120		240				S4UL	LQM/CIEH	2015			
		Methyl	2012			11		11			8		410								SGV	DEFRA	2012		
			2015			11		15			6		320		40		68				S4UL	LQM/CIEH	2015		
	Molybdenum		2010					670					17000								EIC/AGS/ CL:AIRE	EIC/AGS/ CL:AIRE	2010		
	Nickel		2012			130		130			230		1800								SGV	DEFRA	2012		
			2015			130		180			53		980		230		800				S4UL	LQM/CIEH	2015		
	Selenium		2012			350		350			120		13000								SGV	DEFRA	2012		
			2015			250		430			88		12000		1100		1800				S4UL	LQM/CIEH	2015		
	Vanadium		2015			410		1200			91		9000		2000		5000				S4UL	LQM/CIEH	2015		
	Zinc		2015			3700		40000			620		730000		81000		170000				S4UL	LQM/CIEH	2015		
BTEX & MTBE	Benzene		2012			0.33		0.33			0.07		95								SGV	DEFRA	2012		
			2014			0.87		3.3			0.18		98		140		230				C4SL	DEFRA	2014		
			2015	0.087	0.17	0.37	0.38	0.7	1.4	0.017	0.034	0.075	27	47	90	72	72	73	90	100	110	S4UL	LQM/CIEH	2015	
	Toluene		2012			610		610			120		4400								SGV	DEFRA	2012		
			2015	130	290	660	880	1900	3900	22	51	120	65000	110000	180000	56000	56000	56000	87000	95000	100000	S4UL	LQM/CIEH	2015	
	Ethylbenzene		2012			350		350			90		2800								SGV	DEFRA	2012		
			2015	47	110	260	83	190	440	16	39	91	4700	13000	27000	24000	24000	25000	17000	22000	27000	S4UL	LQM/CIEH	2015	
	Xylenes	o-xylene	2012			250		250			160		2600								SGV	DEFRA	2012		
			2015	60	140	330	88	210	480	28	67	160	6600	15000	33000	41000	42000	43000	17000	24000	33000	S4UL	LQM/CIEH	2015	
		m-xylene	2012			240		240			180		3500								SGV	DEFRA	2012		
			2015	59	140	320	82	190	450	31	74	170	6200	14000	31000	41000	42000	43000	17000	24000	32000	S4UL	LQM/CIEH	2015	
		p-xylene	2012			230		230			160		3200								SGV	DEFRA	2012		
			2015	56	130	310	79	180	310	29	69	160	5900	14000	30000	41000	42000	43000	17000	23000	31000	S4UL	LQM/CIEH	2015	
Petroleum Hydrocarbons Fractions	Aliphatic >C5 - C6		2015	42	78	160	42	78	160	730	1700	3900	3200	5900	12000	570000	590000	600000	95000	130000	180000	S4UL	LQM/CIEH	2015	
	Aliphatic >C6 - C8		2015	100	230	530	100	230	530	2300	5600	13000	7800	17000	40000	600000	610000	620000	150000	220000	320000	S4UL	LQM/CIEH	2015	
	Aliphatic >C8 - C10		2015	27	65	150	27	65	150	320	770	1700	2000	4800	11000	13000	13000	13000	14000	18000	21000	S4UL	LQM/CIEH	2015	
	Aliphatic >C10 - C12		2015	130	330	760	130	330	770	2200	4400	7300	9700	23000	47000	13000	13000	13000	21000	23000	24000	S4UL	LQM/CIEH	2015	
	Aliphatic >C12 - C16		2015	1100	2400	4300	1100	2400	4400	11000	13000	13000	59000	82000	90000	13000	13000	13000	25000	25000	26000	S4UL	LQM/CIEH	2015	
	Aliphatic >C16 - C35		2015	65000	92000	110000	65000	92000	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015	
	Aliphatic >C35 - C44		2015	65000	92000	140000	65000	92000	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015	
	Aromatic >C5 - C7		2015	70	140	300	370	690	1400	13	27	57	26000	46000	86000	56000	56000	56000	76000	84000	92000	S4UL	LQM/CIEH	2015	
	Aromatic >C7 - C8		2015	130	290	660	860	1800	3900	22	51	120	56000	110000	180000	56000	56000	56000	87000	95000	100000	S4UL	LQM/CIEH	2015	
	Aromatic >C8 - C10		2015	34	83	190	47	110	270	8.6	21	51	3500	8100	17000	5000	5000	5000	7200	8500	9300	S4UL	LQM/CIEH	2015	

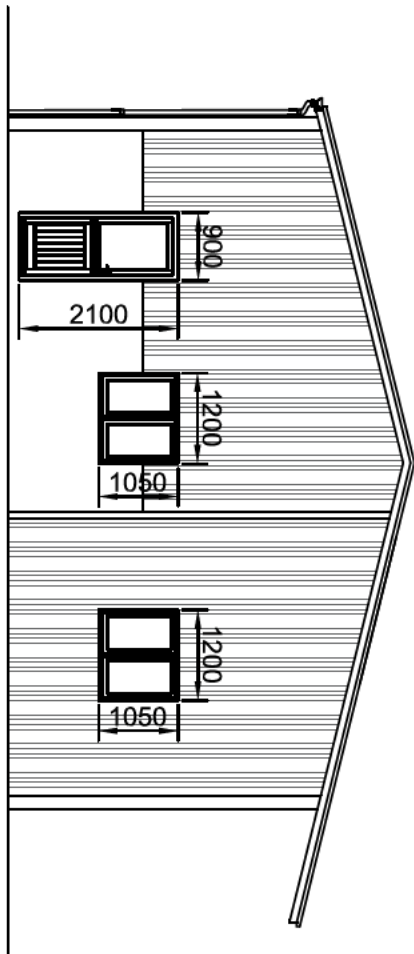
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			With			Without			Residential								Park											
			SOM	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6							
Type	Contaminants	Species	Year																									
	Aromatic >C10 - C12		2015	74	180	380	250	590	1200	13	31	74	16000	28000	34000	5000	5000	5000	9200	9700	10000	S4UL	LQM/CIEH	2015				
	Aromatic >C12 - C16		2015	140	330	660	1800	2300	2500	23	57	130	36000	37000	38000	5100	5100	5000	10000	10000	10000	S4UL	LQM/CIEH	2015				
	Aromatic >C16 - C21		2015	260	540	930	1900	1900	1900	46	110	260	28000	28000	28000	3800	3800	3800	7600	7700	7800	S4UL	LQM/CIEH	2015				
	Aromatic >C21 - C35		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015				
	Aromatic >C34 - C44		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015				
	Aliphatic + Aromatic >C44 - C70			1600	1800	1900	1900	1900	1900	1200	2100	3000	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015				
Polycyclic Aromatic Hydrocarbons (PAH' s) (mg/kg)	Acenaphthene		2015	210	510	1100	3000	4700	6000	34	85	200	84000	97000	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015				
	Acenaphthylene		2015	170	420	920	2900	4600	6000	28	69	160	83000	97000	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015				
	Anthracene		2015	2400	5400	11000	31000	35000	37000	380	950	2200	520000	540000	540000	740000	740000	740000	150000	150000	150000	S4UL	LQM/CIEH	2015				
	Benzo(a)anthracene		2015	7.2	11	13	11	14	15	2.9	6.5	13	170	170	180	29	29	29	49	56	62	S4UL	LQM/CIEH	2015				
	Benzo(a)pyrene		2014			5			5.3			5.7			76			10		21	C4SL	DEFRA	2014					
			2015	2.2	2.7	3	3.2	3.2	3.2	0.97	2	3.5	35	35	36	5.7	5.7	5.7	11	12	13	S4UL	LQM/CIEH	2015				
	Benzo(b)fluoranthene		2015	2.6	3.3	3.7	3.9	4.0	4.0	0.99	2.1	3.9	44	44	45	7.1	7.2	7.2	13	15	16	S4UL	LQM/CIEH	2015				
	Benzo(ghi)perylene		2015	320	340	350	360	360	360	290	470	640	3900	4000	4000	640	640	640	1400	1500	1600	S4UL	LQM/CIEH	2015				
	Benzo(k)fluoranthene		2015	77	93	100	110	110	110	37	75	130	1200	1200	1200	190	190	190	370	410	440	S4UL	LQM/CIEH	2015				
	Chrysene		2015	15	22	27	30	31	32	4.1	9.4	19	350	350	350	57	57	57	93	110	120	S4UL	LQM/CIEH	2015				
	Dibenz(a,h)anthracene		2015	0.24	0.28	0.3	0.31	0.32	0.32	0.14	0.27	0.43	3.5	3.6	3.6	0.57	0.57	0.58	1.1	1.3	1.4	S4UL	LQM/CIEH	2015				
	Fluoranthene		2015	280	560	890	1500	1600	1600	52	130	290	23000	23000	23000	3100	3100	3100	6300	6300	6400	S4UL	LQM/CIEH	2015				
	Fluorene		2015	170	400	860	2800	3800	4500	27	67	160	63000	68000	71000	9900	9900	9900	20000	20000	20000	S4UL	LQM/CIEH	2015				
	Indeno(1,2,3-cd)pyrene		2015	27	36	41	45	46	46	9.5	21	39	500	510	510	82	82	82	150	170	180	S4UL	LQM/CIEH	2015				
	Naphthalene		2015	2.3	5.6	13	2.3	5.6	13	4.1	10	24	190	460	1100	4900	4900	4900	1200	1900	3000	S4UL	LQM/CIEH	2015				
	Phenanthrene		2015	95	220	440	1300	1500	1500	15	38	90	22000	22000	23000	3100	3100	3100	6200	6200	6300	S4UL	LQM/CIEH	2015				
	Pyrene		2015	620	1200	2000	3700	3800	3800	110	270	620	54000	54000	54000	7400	7400	7400	15000	15000	15000	S4UL	LQM/CIEH	2015				
	Coal Tar(Bap as surrogate matter)		2015	0.79	0.98	1.1	1.2	1.2	1.2	0.32	0.67	1.2	15	15	15	2.2	2.2	2.2	4.4	4.7	4.8	S4UL	LQM/CIEH	2015				
Chloroalkanes & alkenes	1,2 Dichloroethane		2015	0.0071	0.011	0.019	0.0092	0.013	0.023	0.0046	0.0083	0.016	0.67	0.97	1.7	29	29	29	21	24	28	S4UL	LQM/CIEH	2015				
	1,1,1 Trichloroethane		2015	8.8	18	39	9	18	40	48	110	240	660	1300	3000	140000	140000	140000	57000	76000	100000	S4UL	LQM/CIEH	2015				
	1,1,2,2 Tetrachloroethane		2015	1.6	3.4	7.5	3.9	8	17	0.41	0.89	2	270	550	1100	1400	1400	1400	1800	2100	2300	S4UL	LQM/CIEH	2015				
	1,1,1,2 Tetrachloroethane		2015	1.2	2.8	6.4	1.5	3.5	8.2	0.79	1.9	4.4	110	250	560	1400	1400	1400	1500	1800	2100	S4UL	LQM/CIEH	2015				
	Tetrachloroethene		2015	0.18	0.39	0.9	0.18	0.4	0.92	0.65	1.5	3.6	19	42	95	1400	1400	1400	810	1100	1500	S4UL	LQM/CIEH	2015				
			2021	0.31	0.7	1.6	0.32	0.71	1.6	2	4.8	11	24	55	130	3200	3300	3400	1400	1900	2500	C4SL	CLAIRE	2021				
	Tetrachloromethane (Carbon Tetrachloride)		2015	0.026	0.056	0.13	0.026	0.056	0.13	0.45	1	2.4	2.9	6.3	14	890	920	950	190	270	400	S4UL	LQM/CIEH	2015				
	Trichloroethene (TCE)		2015	0.016	0.034	0.075	0.017	0.036	0.08	0.041	0.091	0.21	1.2	2.6	5.7	120	120	120	70	91	120	S4UL	LQM/CIEH	2015				
			2021	0.0093	0.02	0.043	0.0097	0.02	0.045	0.032	0.072	0.16	0.73	1.5	3.4	76	78	79	41	54	69	C4SL	CLAIRE	2021				
	Trichloromethane		2015	0.91	1.7	3.4	1.2	2.1	4.2	0.42	0.83	1.7	99	170	350	2500	2500	2500	2600	2800	3100	S4UL	LQM/CIEH	2015				
Explosives	Vinyl Chloride (Chloroethene)		2015	0.00064	0.00087	0.0014	0.00077	0.001	0.0015	0.00055	0.001	0.0018	0.059	0.077	0.12	3.5	3.5	3.5	4.8	5	5.4	S4UL	LQM/CIEH	2015				
			2021	0.0064	0.01	0.017	0.015	0.019	0.029	0.0017	0.0031	0.0058	1.1	1.4	2.2	7.8	7.8	7.8	18	19	19	C4SL	CLAIRE	2021				
	2,4,6 Trinitrotoluene		2015	1.6	3.7	8.1	65	66	66	0.24	0.58	1.4	1000	1000	1000	130	130	130	260	270	270	S4UL	LQM/CIEH	2015				
	RDX (Hexogen/Cyclonite/1,3,5-trinitro-1,3,5-triazacyclohexane)		2015	120	250	540	13000	13000	13000	17	38	85	210000	210000	210000	26000	26000	27000	49000	51000	53000	S4UL	LQM/CIEH	2015				
	HMX (Octogen/1,3,5,7-tetrenitro-1,3,5,7-tetrazacyclo-octane)		2015	5.7	13	26</																						

Land Use			Residential With or Without Plant Uptake									Public Open Space (POS)									Name	Authority	Date	
			With			Without			Allotments			Commercial			Residential			Park						
			SOM	1.0	2.5	6	1	2.5							6	1	2.5	6	1	2.5				6
Type	Contaminants	Species	Year																					
	I,3-Dichlorobenzene		2015	0.4	1	2.3	0.44	1.1	2.5	0.25	0.6	1.5	30	73	170	300	300	300	390	440	470	S4UL	LQM/CIEH	2015
	I,4-Dichlorobenzene		2015	61	150	350	61	150	350	15	37	88	4400	10000	25000	17000	17000	1700	36000	36000	36000	S4UL	LQM/CIEH	2015
	1,2,3,-Trichlorobenzene		2015	1.5	3.6	8.6	1.5	3.7	8.8	4.7	12	28	102	250	590	1800	1800	1800	770	1100	1600	S4UL	LQM/CIEH	2015
	1,2,4,-Trichlorobenzene		2015	2.6	6.4	15	2.6	6.4	15	55	140	320	220	530	1300	15000	17000	19000	1700	2600	4000	S4UL	LQM/CIEH	2015
	1,3,5,-Trichlorobenzene		2015	0.33	0.81	1.9	0.33	0.81	1.9	4.7	12	28	23	55	130	1700	1700	1800	380	580	860	S4UL	LQM/CIEH	2015
	1,2,3,4,-Tetrachlorobenzene		2015	15	36	78	24	56	120	4.4	11	26	1700	3080	4400	830	830	830	1500	1600	1600	S4UL	LQM/CIEH	2015
	1,2,3,5,- Tetrachlobenzene		2015	0.66	1.6	3.7	0.75	1.9	4.3	0.38	0.9	2.2	49	120	240	78	79	79	110	120	130	S4UL	LQM/CIEH	2015
	1,2,4, 5,- Tetrachlobenzene		2015	0.33	0.77	1.6	0.73	1.7	3.5	0.06	0.16	0.37	42	72	96	13	13	13	25	26	26	S4UL	LQM/CIEH	2015
	Pentachlrobenzene		2015	5.8	12	22	19	30	38	1.2	3.1	7	640	770	830	100	100	100	190	190	190	S4UL	LQM/CIEH	2015
	Hexachlorobenzene		2015	1.8	3.3	4.9	4.1	5.7	6.7	0.47	1.1	2.5	110	120	120	16	16	16	30	30	30	S4UL	LQM/CIEH	2015
Phenols & Chlorophenols																								
	Phenols		2012			420			420			280			3200							SGV	DEFRA	2012
			2015	120	200	380	440	690	1200	23	42	83	440	690	1300	440	690	1300	440	690	1300	S4UL	LQM/CIEH	2015
	Chlorophenols (4 Congeners)		2015	0.87	2	4.5	94	150	210	0.13	0.3	0.7	3500	4000	4300	620	620	620	1100	1100	1100	S4UL	LQM/CIEH	2015
	Pentachlorophenols		2015	0.22	0.52	1.2	27	29	31	0.03	0.08	0.19	400	400	400	60	60	60	110	120	120	S4UL	LQM/CIEH	2015
Others																								
	Carbon Disulphide		2015	0.14	0.29	0.62	0.14	0.29	0.62	4.8	10	23	11	22	47	11000	11000	12000	1300	1900	2700	S4UL	LQM/CIEH	2015
	Hexachloro-1,3-Butadiene		2015	0.29	0.7	1.6	0.32	0.78	1.8	0.25	0.61	1.4	31	66	120	25	25	25	48	50	51	S4UL	LQM/CIEH	2015
	Sum of PCDDs, PCDFs and dioxin-like PCB's.		2012			8			8			8			240							SGV	DEFRA	2012
NOTE																								
	Priority	Guideline (mg kg ⁻¹)																						
	1	Site Specific Assessment Criteria (SSAC) (Soils Limited)																						
	2	2014: Category 4 Screening Level (C4SL) (Contaminated Land: Application in Real Environment (CL:ARE), 2014 and 2021)																						
	3	2012: Soil Guideline Value (SGV) (Environment Agency, 2009)																						
	4	2015: Suitable 4 Use Level (S4UL) (Nathanail <i>et al</i> , 2015)																						
For Generic Risk Assessment, the values in Bold should have priority unless site specific, Client or regulatory requirements dictate otherwise – which must be justified																								
Table reviewed January 2022																								

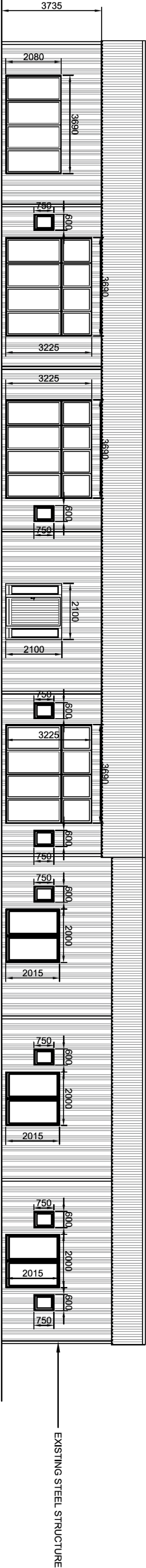
Appendix D Information Provided by the Client



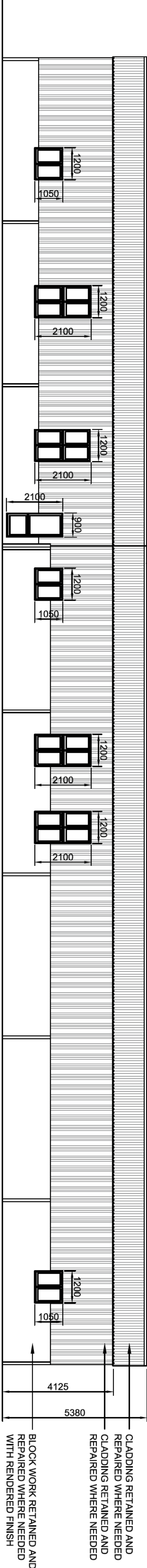
NORTH



EAST



WEST

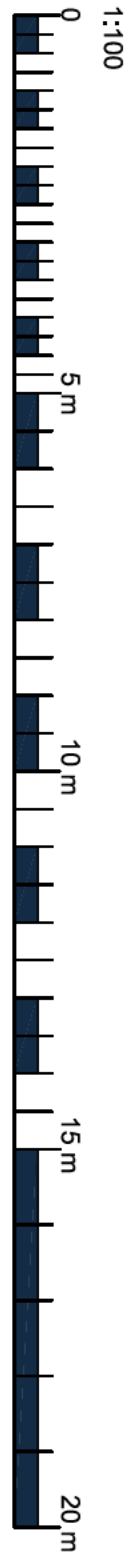


FLOOR PLAN & ELEVATIONS

Scale 1:100



- NOTES:
1. Use written dimensions only. All dimensions to be checked on site and any discrepancies reported to ACORUS immediately. If in doubt ask.
 2. Where relevant, significant hazards have been identified on the drawing. Hazards which should be obvious to a competent contractor or unforeseeable have not been identified.
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CONVERSION TO DWELLING
INTERNAL FLOOR AREA - 405 M2

PROJECT			
CHAPMAN			
MOATFIELD FARM BARN			
RH13 8BD			
TITLE			
PROPOSED DRAWINGS BUILDING 1			
PLAN & ELEVATIONS			
SCALE	DATE	DRAWN BY	CHECKED BY
AS SHOWN @A1	02/21	EB	HD
JOB NO.	DRAWING NO.	REVISION	
CMF/HD21/027	100_03		

PRELIMINARY

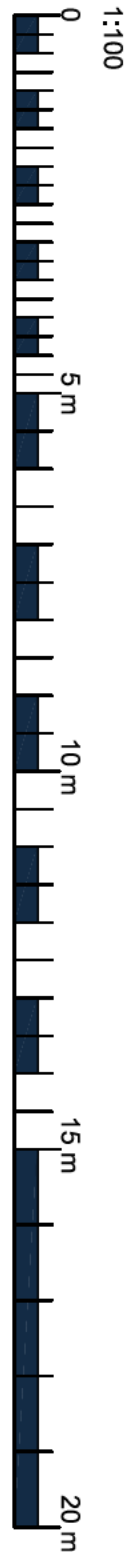
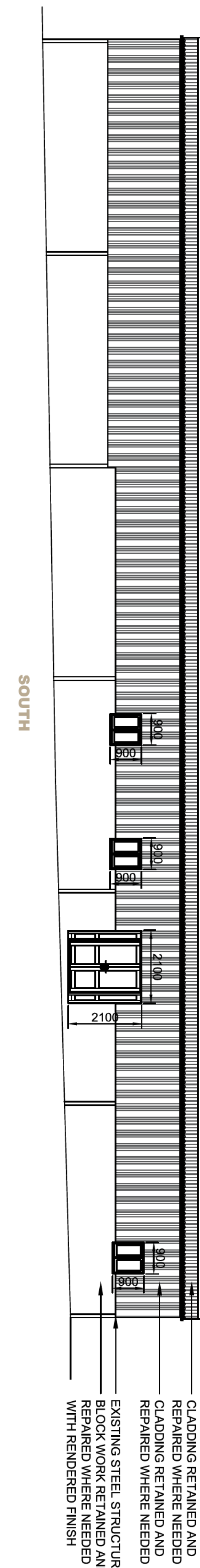
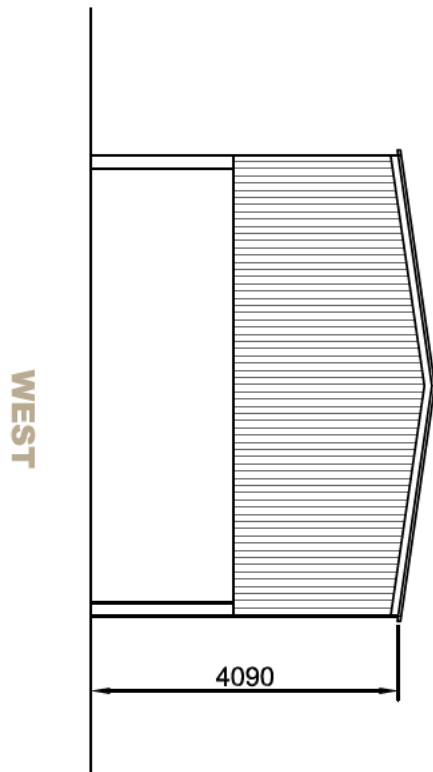
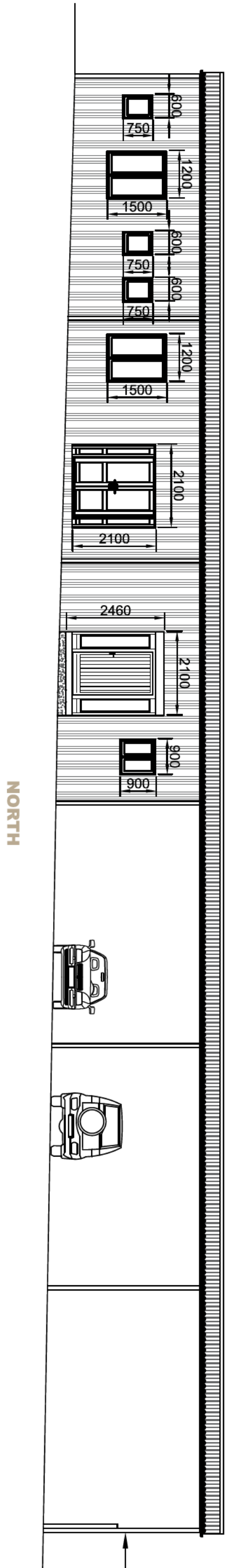
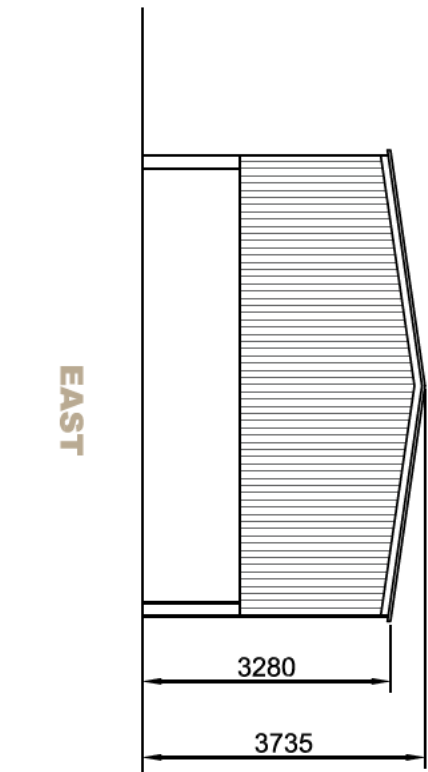
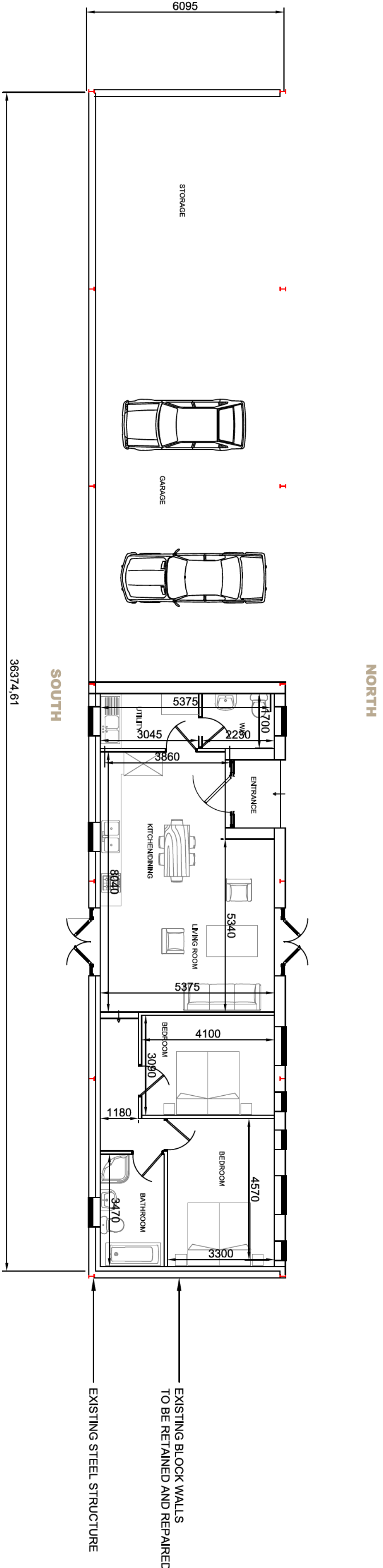


FLOOR PLAN & ELEVATIONS

Scale 1:100

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PRELIMINARY

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