



Dice
Environmental

Glencoe Villa

Phase I & II Geo-Environmental Report

26/04/2024

Ref: 101320

Version 1.0

Site Glencoe Villa,
 Ickleford,
 Hitchin,
 SG5 3TR

Client Mr and Mrs Del Basso

Date 26/04/2024

Project Reference 101320

Drafted by:



Abbie Davies BSc AMIEnvSc
Geo-Environmental Consultant

Date

24th April 2024

Prepared by:



Michael D'Elia BSc FGS
Geo-Environmental Consultant

Date

25th April 2024

Authorised by:



Jake Bayne MSc MIEnvSc CEnv
Director

Date

26th April 2024

Executive Summary	
Site Description	The site is situated in the village of Ickleford and is accessible via an access road off of Snailswell Lane, which is adjacent south of the site. The access road is surfaced with tarmac and compacted gravels, and leads through a locked gate, into the south-west of the site. In the south of the site, there is a shed, accessible via two locked doors. Access could not be gained into the shed at the time of the walkover. To the north of the shed, in the approximate centre of the site, there an area of slabbed land used as a parking facility and for storage of various items. Small structures, identified as portable bathroom facilities, are located to the rear of the shed. Additional storage items identified around the site include timber, piles of brick, unspecified liquid containers, damaged cars/vans, flammable liquid containers and various building materials. Building materials stacked on pallets also line the western border of the site. In the north-west of the site there is a large patch of hardstanding (including compacted gravel, cracked paving slabs and brick) which was specified by the owner to have been used as a turning area for large vehicles. Multiple vehicles in poor condition were also parked in this area. Scrap items were identified around this portion of the site, including burned material and ash, metal, tyres, glass and plastic. Multiple stockpiles were identified surrounding this patch of hardstanding, predominantly in the north of the site. The stockpiles contained burned materials, timber and wood chippings, metal, concrete and brick. The more established stockpiles were also covered in vegetation. The approximate locations of the identified stockpiles are included within in Appendix A. The remainder of the site comprised predominantly open land, covered in vegetation including shrubs, trees and long grasses, and appeared not to be being actively used. Vegetation was mostly focused in these areas, though some grasses and shrubs were present along the edges of the access road, bordering the shed and parking facilities, and growing on the stockpiles.
Proposed Development	The proposed development on site is to include the construction of a residential property with associated garden, driveway, and parking facility.
Geology	Geological maps of the area show the site is predominantly underlain by Glaciofluvial Deposits, comprising Sand and Gravel. However, the southern portion of the site is underlain by superficial strata of Head, comprising Clay, Silt Sand and Gravel.

	Geological maps of the area show the site to be situated upon bedrock of the West Melbury Chalk Formation, comprising Chalk. Made ground was identified across the site, to a minimum depth of 0.1mbgl (in WS02), and a maximum depth of 0.6mbgl (in WS03). Made ground, was predominantly identified as a gravelly clay. Superficial geology was identified to a maximum recorded depth of 5mbgl. Superficial geology predominantly comprised slightly sandy clay. However, occasional layers of sand and silt were identified across the site. Silty sand layers were identified in WS03 (1.2-2.4mbgl, 2.0-2.1mbgl and 4-4.3mbgl) and WS05 (4-4.1mbgl). Very clayey sandy silt was identified underlying the made ground in WS04 (0.2-0.9mbgl) and WS05 (0.5-1.1mbgl).
Hydrogeology	The underlying solid geology is classified as a Principal Aquifer comprising geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. The underlying superficial geology across the majority of the site is classified as a Secondary A Aquifer, comprising permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. The superficial strata in the south of the site is underlain by a Secondary Undifferentiated Aquifer, assigned where it is not possible to attribute either category A or B to a rock type.
Hydrology	There is a small river bordering the site in the south-east.
Radon	The Groundsure reports included within Appendix E show that the site is located within an area where the percentage of homes above the radon action level is below 1%. Therefore, no radon protection measures are required for this development.
Ground Gas	Potential infilled land associated with the proximal cuttings has been considered as a potential source of ground gas, however due to the age of the cuttings (1888), it is considered unlikely to present a significant source of ground gas for the proposed development site.
Geo-Technical	Cohesive strata was identified to be of predominantly intermediate plasticity. Therefore, within the influencing zone of trees, foundations within cohesive soils should be deepened in these areas in accordance with NHBC Guidance Chapter 4.2 – Building Near Trees. An arboricultural survey may be required to identify the influencing zones of trees, to assist with refining foundation design.

	Shallow, natural cohesive superficial strata up to 2mbgl in general across the site have been identified by SPT testing as soft to firm. Due to the presence of groundwater, a presumed bearing capacity of 50kN/m², relative to location, is considered to be achievable in the underlying natural soils up to 2mbgl. Whilst predominantly cohesive, some granular strata was identified across the site, as either a primary or secondary constituent of soil. Therefore, it is recommended that light mesh reinforcement is incorporated into foundations where they span between different strata to account for potential differential settlement. Whilst excavations remained stable during this site investigation, this was over a relatively short period of time. Instability of trenches should be assumed and battened as a precautionary measure. Based on the recorded water-soluble sulphate concentrations and pH value it is considered appropriate to adopt a precautionary Design Sulphate Class of DS-1, together with an Aggressive Chemical Environment of Concrete (ACEC) AC-1.
Risk to Controlled Waters	No significant levels of contaminants of concern have been identified with respect to controlled waters. Therefore, no specific remediation is considered to be required. Negligible Risk – No specific action required.
Human Health Risk Assessment & Remedial Measures	Elevated levels of Lead, Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(ah)anthracene were identified in the shallow soils of WS01 and WS05 with respect to the proposed end use. Therefore, in garden areas of soft landscaping, it will be necessary to include a 450mm clean capping layer of imported, verified topsoil. Topsoil should be pre-screened and confirmed as suitable for a residential with produce end use. Following installation, a verification study shall be required to confirm that the correct depth and chemical composition of the capping layer has been installed and submit the findings as a verification report to the local authority for approval. Stockpiles were also identified on site. 2No. stockpiles were sampled, with Stockpile A containing elevated levels of Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(ah)anthracene. A Stockpile Contamination Assessment should be undertaken, with each stockpile sampled and assessed, in order to provide a waste classification and safely remove them from site or determine their suitability for re-use.

Recommendations

- Elevated levels of Lead, Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(ah)anthracene were identified in the shallow soils of WS01 and WS05 with respect to the proposed end use. Therefore, in garden areas of soft landscaping, it will be necessary to include a 450mm clean capping layer of imported, verified topsoil. Topsoil should be pre-screened and confirmed as suitable for a residential with produce end use. Following installation, a verification study shall be required to confirm that the correct depth and chemical composition of the capping layer has been installed and submit the findings as a verification report to the local authority for approval.
- Stockpiles were also identified on site. 2No. stockpiles were sampled, with Stockpile A containing elevated levels of Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(ah)anthracene. A Stockpile Contamination Assessment should be undertaken, with each stockpile sampled and assessed, in order to provide a waste classification and safely remove them from site, or determine their suitability for re-use.
- Shallow, natural cohesive superficial strata up to 2mbgl in general across the site have been identified by SPT testing as soft to firm. Due to the presence of groundwater, a presumed bearing capacity of 50kN/m², relative to location, is considered to be achievable in the underlying natural soils up to 2mbgl.
- Cohesive strata was identified to be of predominantly intermediate plasticity. Therefore, within the influencing zone of trees, foundations within cohesive soils should be deepened in these areas in accordance with NHBC Guidance Chapter 4.2 – Building Near Trees. An arboricultural survey may be required to identify the influencing zones of trees, to assist with refining foundation design.
- Whilst predominantly cohesive, some granular strata was identified across the site, as either a primary or secondary constituent of soil. Therefore, it is recommended that light mesh reinforcement is incorporated into foundations where they span between different strata to account for potential differential settlement.
- Based on the recorded water-soluble sulphate concentrations and pH value it is considered appropriate to adopt a precautionary Design Sulphate Class of DS-1, together with an Aggressive Chemical Environment of Concrete (ACEC) AC-1.

Contents

Executive Summary.....	2
1. Introduction.....	8
1.1. Client Brief	8
1.2. Report Objectives.....	8
1.3. References.....	9
1.4. Limitations	10
2. Site Information	11
2.1. Site Location.....	11
2.2. Site Description.....	11
2.3. General Area Context	12
3. Geo-Environmental Setting	13
3.1. Geology.....	13
3.2. Hydrogeology.....	13
3.3. Hydrology.....	13
3.4. Radon.....	13
3.5. Historical Coal Mining	14
3.6. Landfills.....	14
3.7. Industrial Land Use.....	14
4. Site History	15
4.1. Historical Map Review	15
4.2. Summary of Historical Data.....	16
5. Conceptual Site Model.....	17
5.1. Potential Sources.....	17
5.2. Potential Pathways.....	17
5.3. Potential Receptors	17
6. Phase I Conceptual Site Model.....	18
7. Phase II Investigation.....	19
7.1. Overview of Works.....	19
8. Ground Conditions.....	20
8.1. Made Ground.....	20
8.2. Superficial Strata	20
8.3. Solid Strata.....	20
8.4. Groundwater	20

8.5. Field Observations.....	20
9. Geo-technical	21
9.1. Laboratory Testing	21
9.2. Foundation Design.....	21
9.3. Buried Concrete.....	21
10. Contamination Assessment	22
10.1. Inorganics & Organics.....	22
10.2. Stockpile Sampling	23
10.3. Asbestos	24
10.4. PCBs	24
10.5. Ground Gas	24
10.6. Controlled Waters	24
11. Phase II Conceptual Site Model.....	25
12. Risk Management & Remediation	27
12.1. Remediation to Protect End Users	27
12.2. Ground Gas Protection Measures	27
12.3. Remediation to Protect Controlled Waters.....	27
12.4. Remediation to Protect Construction Workers.....	27
13. Conclusions and Recommendations	28

Appendix A – Figures

Appendix B – Soil Logs

Appendix C – Laboratory Results

Appendix D - GACs

Appendix E – Environmental data summary (Groundsure Report)

Appendix F – Historical Maps

1. Introduction

1.1. Client Brief

Dice Environmental was instructed by Mr and Mrs Del Basso to undertake a Phase I & 2 Geo-Environmental Report for the site known as 'Glencoe Villa, Ickleford, Hitchin, SG5 3TR'.

The proposed development on site is to include the construction of a residential property with associated garden, driveway and parking facility.

The site location plan and layout are included within Appendix A.

1.2. Report Objectives

This Phase I & 2 Geo-Environmental Assessment includes:

- A record of a site inspection walkover, subsequent site description, and appraisal of any observed land contamination, or potential contaminative sources.
- A review of historical maps for the site and surrounding area, with respect to potential sources of contamination.
- A review of the general expected Environmental setting, including geology, hydrogeology and hydrology.
- The development of a preliminary conceptual site model based on the concept of 'contaminant linkage', which considers potential contamination sources, pathways and receptors.
- The provision and execution of a Phase II Contamination Assessment strategy, to investigate the potential sources of contamination identified.
- The development of a Phase II Conceptual Model.
- Conclusions and recommendations to facilitate responsible development of the site, in relation to the intended end use.

1.3. References

Assessment guidance and site-specific information has been sought from the following locations:

- EA/DEFRA (2020) LCRM: Land contamination Risk Management (Supersedes (2004), CLR11: Model Procedures for the Assessment of Land Contamination).
- BS 5930:2015+A1:2020: Code of practice for ground investigations.
- Nathanail, C.P., McCaffrey, C., Gillett, A.G., Ogden, R.C. and Nathanail, J.F. 2015. The LQM/CIEH S4UIs for Human Health Risk Assessment. Land Quality Press, Nottingham.
- DEFRA (2014). Category 4 Screening Levels (C4SL) – SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination.
- CIRIA. (2001). *Contaminated land risk assessment A guide to good practice*.
- DoE (1995), Industry profiles.
- Environment Agency. (2008). *R&D Publication 66. Guidance for the Safe Development of Housing on Land Affected by Contamination*.
- Environment Agency. (March 2017). *New Groundwater Vulnerability Mapping Methodology in England and Wales. Reference SC040016/R. Environment Agency*.
- BS 8485:2015+A1:2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.
- BRE (2004), BR465: Cover systems for land regeneration.
- CIRIA (2014), C733 Asbestos in soil and made ground: a guide to understanding and managing risks.
- Scivyer, C. (2015). *BRE 211. Radon: Guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment projects). Fifth Edition*.
- The Coal Authority. (2018). *Coal Authority Interactive Viewer*. Retrieved from <http://mapapps2.bgs.ac.uk/coalauthority/home.html>

1.4. Limitations

The recommendations and opinions expressed in this report are based on information obtained as part of the desk study or provided by others. Information provided from other sources is taken in good faith and Dice Environmental cannot guarantee its accuracy. By the very nature of a ground investigation, information gained through intrusive investigation is from specific point locations. Ground conditions have the potential to vary significant across any site, and the ultimate decision with regards to foundation design or other technical specifications lies with the developer and/or structural engineer. Reliance upon the contents of this report is subject to receipt of payment for any outstanding balance owed to Dice Consulting Engineers Ltd. or Dice Environmental Ltd. dated prior to, and in associated with this report.

This report does not include specific investigation for the presence of either Potential Asbestos Containing Material (PACM) (unless identified within soils) or Japanese Knotweed at the subject site however, if obvious evidence of either is observed during the site walkover, details will be provided in this report. Specialist contractors should be commissioned to make detailed assessments and recommendations if these materials are suspected.

The information contained in this report is intended for the use of Mr and Mrs Del Basso and Dice Environmental can take no responsibility for the use of this information by any third party or for uses other than that described in this report or detailed within the terms of our engagement.

2. Site Information

2.1. Site Location

The site is located approximately 3.25km north of Hitchin town centre. The national grid reference (NGR) for the approximate centre of the site is TL 182 325.

A site plan is presented within Appendix A.

2.2. Site Description

A site walkover was undertaken by Dice Environmental on the 2nd April 2024.

The site is situated in the village of Ickleford and is accessible via an access road off of Snailswell Lane, which is adjacent south of the site. The access road is surfaced with tarmac and compacted gravels, and leads through a locked gate, into the south-west of the site.

In the south of the site, there is a large shed, accessible via two locked doors. Access could not be gained into the shed at the time of the walkover. To the north of the shed, in the approximate centre of the site, there is an area of slabbed land used as a parking facility and for storage of various items. Small structures, identified as portable bathroom facilities, are located to the rear of the shed. Additional storage items identified around the site include timber, piles of brick, unspecified liquid containers, damaged cars/vans, flammable liquid containers and various building materials. Building materials stacked on pallets also line the western border of the site.

In the north-west of the site there is a large patch of hardstanding (including compacted gravel, cracked paving slabs and brick) which was specified by the owner to have been used as a turning area for large vehicles. Multiple vehicles in poor condition were also parked in this area. Scrap items were identified around this portion of the site, including burned material and ash, metal, tyres, glass and plastic.

Multiple stockpiles were identified surrounding this patch of hardstanding, predominantly in the north of the site. The stockpiles contained burned materials, timber and wood chippings, metal, concrete and brick. The more established stockpiles were also covered in vegetation. The approximate locations of the identified stockpiles are included within Appendix A.

The remainder of the site comprised predominantly open land, covered in vegetation including shrubs, trees and long grasses, and appeared not to be being actively used. Vegetation was mostly focused in these areas, though some grasses and shrubs were present along the edges of the access road, bordering the shed and parking facilities, and growing on the stockpiles.

2.3. General Area Context

North: To the north of the site there are predominantly open fields.

East: To the east of the site there is residential land use consisting of dwellings with associated gardens and parking facilities, with open fields beyond. A pathway and small river are present bordering the site in the south-east, and a railway is located approximately 526m east.

South: To the south of the site there are residential properties with associated gardens and parking facilities, with open fields beyond.

West: To the west of the site there are residential properties with associated gardens and parking facilities, with open fields beyond.

3. Geo-Environmental Setting

3.1. Geology

Geological maps of the area show the site is predominantly underlain by Glaciofluvial Deposits, comprising Sand and Gravel. However, the southern portion of the site is underlain by superficial strata of Head, comprising Clay, Silt Sand and Gravel.

Geological maps of the area show the site to be situated upon bedrock of the West Melbury Chalk Formation, comprising Chalk.

There is a landform (approximate margin of superficial-deposit filled channel or valley) located 287m south-west of the site, and an inferred fault 455m east of the site.

3.2. Hydrogeology

The underlying solid geology is classified as a Principal Aquifer comprising geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale.

The underlying superficial geology across the majority of the site is classified as a Secondary A Aquifer, comprising permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. The superficial strata in the south of the site is underlain by a Secondary Undifferentiated Aquifer, assigned where it is not possible to attribute either category A or B to a rock type.

The site is not located within a Source Protection Zone.

There are no groundwater abstraction licenses recorded within 500m of the site.

3.3. Hydrology

There is a small river bordering the site in the south-east.

There are no recorded licensed discharge consents within 250m of the site.

3.4. Radon

The Groundsure reports included within Appendix E show that the site is located within an area where the percentage of homes above the radon action level is below 1%.

3.5. Historical Coal Mining

The site is not located within a coal mining reporting area as defined by the Coal Authority.

3.6. Landfills

The Groundsure reports included within Appendix E show that:

- there are no active landfills recorded within 500m of the site.
- There are 2No. historic landfills recorded within 500m of the site, including an inert landfill 345m south-east (between 1955 and 1970) and a refuse tip 374m north-west (1979).

3.7. Industrial Land Use

The Groundsure reports included within Appendix E show that:

- There are no waste treatment facilities recorded within 250m of the site.
- There are no petrol stations recorded within 500m of the site.

Currently, the site is used as a storage facility. However, it is known that the site was previously used as a coal yard, though this is not recorded within the Groundsure Reports found in Appendix E.

Currently, the only proximal industrial land use to the site is an electricity substation 34m south and a CCTV shop 237m south-east.

Historically, few industrial land uses are recorded surrounding the site. These include cuttings from 84m west, recorded between 1880 and 1888. A refuse heap (374m north-west) and a pumping station (469m east) were both recorded around 1982. Historical electricity substations were also recorded 29m south and 357m south-east.

4. Site History

4.1. Historical Map Review

Map Date	Significant Changes on Site	Significant Changes in the Surrounding Area
1882	The site is situated in a field.	Allotments are recorded approximately 20m south. Midland railway is present approximately 50m west of the site.
1922	The site contains two small unspecified structures along the south-east and north-west of the site. Orchard trees are also identified on-site.	No significant change.
1977-79	The two small structures and orchard trees have been removed from site. There is an unspecified building in the south of the site.	An electricity substation is located 30m south of the site. The proximal railway is dismantled and now used as a pathway.
2024	The site is currently used as storage of old cars and building materials, with some parking facilities. The structure in the south of the site is identified as a wooden shed. Much of the site comprises a disused field.	No significant change.

Table 1: Summary of site targeted historical map data.

A copy of the historical maps used for this review are included within Appendix F.

4.2. Summary of Historical Data

A review of the historical mapping resources from between 1882 – 2024, provided by Groundsure, show the site was an empty plot of land until two small structures and orchard trees were identified on site, by 1922. By 1977, these had all been removed from the site, and an unspecified structure was constructed in the south of the site. The site walkover in 2024 identified this as a large shed, with some of the site being used for storage, and the remainder comprising an empty field. It should also be noted that the site is known to have historically being used as a coal yard, which is not specified in the historic mapping.

The surrounding land comprised mostly empty fields and allotments by 1882, with Midland railway located approximately 50m west of the site. By 1977, the railway had been dismantled and was being used as a pathway. By 1977, an electricity substation was also present 30m south of the site. This is how the surrounding remain in the present day.

5. Conceptual Site Model

5.1. Potential Sources

Significant potential sources of contamination which have been identified for the site include:

- Made ground across the site associated with the previous use as a coal yard and on-site structures, and proximal historic and existing industrial land use, including the historic railway (50m west) and existing electricity substation (30m south). The potential contaminants of concern associated with this potential source includes:
 - o Heavy Metals, Polyaromatic Hydrocarbon (PAHs), Petroleum Hydrocarbons (TPH), Polychlorinated Biphenyls (PCBs), asbestos containing materials (ACMs) and fibres.

Potential infilled land associated with the proximal cuttings has been considered as a potential source of ground gas, however due to the age of the cuttings (1888), it is considered unlikely to present a significant source of ground gas for the proposed development site. Should deep made ground be discovered on site during the phase 2 investigation, monitoring wells should be installed as a programme of ground gas (CH₄, CO₂) monitoring undertaken.

5.2. Potential Pathways

Pathways to human receptors:

- Direct dermal contact or ingestion of soils, or inhalation of dust/fibres and/or vapours (i.e. human interaction with surface and subsurface materials).
- The migration and accumulation of ground gases through permeable sub-surface materials and/ or preferential pathways.

Pathways to Environmental (controlled waters) receptors:

- Lateral and vertical migration of groundwater through permeable sub-surface materials and/ or preferential pathways.

5.3. Potential Receptors

The potential receptors for the site include:

- Site workers during the redevelopment of the site.
- Intended end users of the site (residents).
- The small river bordering the site in the south-east.
- The underlying Principal Aquifer within the underlying bedrock strata.
- The underlying Secondary A Aquifer and Secondary Undifferentiated Aquifer in the underlying superficial strata.

6. Phase I Conceptual Site Model

Human Receptors				
Source	Potential Contaminants of Concern	Pathway	Receptor	Risk
Made ground across the site associated with the previous use as a coal yard and on-site structures, and proximal historic and existing industrial land use, including the historic railway (50m west) and existing electricity substation (30m south). No significant potential source of ground gas has been identified for this development.	Heavy Metals, Polyaromatic Hydrocarbon (PAHs), Petroleum Hydrocarbons (TPH), Polychlorinated Biphenyls (PCBs), asbestos containing materials (ACMs) and fibres.	Direct dermal contact or ingestion of soils, or inhalation of dust/fibres and/or vapours (i.e., human interaction with surface and subsurface materials).	Site workers during the redevelopment of the site.	Moderate
			Intended end users of the site (residents).	
			The migration and accumulation of ground gases through permeable sub-surface materials and/ or preferential pathways.	Intended end users of the site (residents).
Environmental Receptors (Controlled Waters)				
Made ground across the site associated with the previous use as a coal yard and on-site structures, and proximal historic and existing industrial land use, including the historic railway (50m west) and existing electricity substation (30m south).	Heavy Metals, Polyaromatic Hydrocarbon (PAHs) and Petroleum Hydrocarbons (TPH).	Lateral and vertical migration of groundwater through permeable sub-surface materials and/ or preferential pathways.	The underlying Principal Aquifer within underlying bedrock strata. The underlying Secondary A Aquifer and Secondary Undifferentiated Aquifer in the underlying superficial strata.	Low to Moderate

7. Phase II Investigation

7.1. Overview of Works

The Phase II intrusive investigation was undertaken on the 2nd April 2024 under the supervision of a suitably qualified engineer and in general accordance with the Code of Practice for Site Investigations BS 5930:2015+A1:2020.

The Phase II investigation incorporated the following:

- The advancement of 5No. window sample boreholes to a maximum depth of 5mbgl.
- The advancement of 4No. hand dug pits to a maximum depth of 0.3mbgl into the stockpiles identified on-site.

In all exploratory locations, holes were advanced through any made ground onto underlying natural soils, soils were logged and any visual or olfactory evidence of contamination noted.

- The analysis of 10No. soil samples at a UKAS/MCERTS accredited laboratory for general and site specific chemical determinands. This included:
 - 10No. soil samples being analysed for a standard 'CLEA' screening suite of heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, V, Zn), PAHs (USEPA 16 & Total) and asbestos. 2No. of these were taken from within the stockpiles identified on-site.
 - 3No. soil samples being analysed for hydrocarbons (TPH CWG ali/aro split).
 - 1No soil samples tested for Polychlorinated Biphenyls (PCBs).
- The analysis of 4No. soils samples at a UKAS/MCERTS accredited laboratory for Geo-technical properties including plasticity and moisture content.

Boreholes, Hand Pit and sample locations are contained within Appendix A.
Soil logs are contained in Appendix B.

8. Ground Conditions

8.1. Made Ground

Made ground was identified across the site, to a minimum depth of 0.1mbgl (in WS02), and a maximum depth of 0.6mbgl (in WS03).

Made ground was predominantly identified as a gravelly clay. However, this was overlain by a black sandy gravel in WS01 and black very gravelly sand in WS05.

Gravels were predominantly identified as coal fragments wood chippings and brick fragments. However, shallow Made ground in WS01 also contained burned material, ash and glass.

8.2. Superficial Strata

Superficial geology was identified to a maximum recorded depth of 5mbgl.

Superficial geology predominantly comprised slightly sandy clay. However, occasional layers of sand and silt were identified across the site. Silty sand layers were identified in WS03 (1.2-2.4mbgl, 2.0-2.1mbgl and 4-4.3mbgl) and WS05 (4-4.1mbgl). Very clayey sandy silt was identified underlying the made ground in WS04 (0.2-0.9mbgl) and WS05 (0.5-1.1mbgl).

8.3. Solid Strata

Solid geology was not encountered during this site investigation.

8.4. Groundwater

Groundwater was identified at 2.0mbgl in WS01. Groundwater was also encountered at 1.8mbgl, and rose to 0.4mbgl during drilling of WS03.

8.5. Field Observations

4No. stockpiles (Stockpiles A to D) were identified around the site, predominantly in the north of the site. Stockpiles predominantly comprised gravelly sand with brick, coal, plastic and concrete fragments. Stockpile B also contained metal, ash, burned materials, wood chippings and shells.

Locations and photographs of the Stockpiles are located in Appendix A.
Soil logs for the Stockpiles are present in Appendix B.

9. Geo-technical

9.1. Laboratory Testing

The site was underlain by predominantly cohesive soils, so plasticity index testing was instructed, with results presented within Appendix C.

Generally, samples were identified to be of intermediate plasticity (WS01 at 1.2mbgl, WS02 at 0.1mbgl and WS03 at 1.0mbgl), with 1No. sample identified as low plasticity (WS05 at 1.5mbgl).

Water Soluble Sulphate and pH analysis revealed results of <10-247mg/ISO4 and 7.4 – 8.2 respectively.

9.2. Foundation Design

Cohesive strata was identified to be of predominantly intermediate plasticity. Therefore, within the influencing zone of trees, foundations within cohesive soils should be deepened in these areas in accordance with NHBC Guidance Chapter 4.2 – Building Near Trees. An arboricultural survey may be required to identify the influencing zones of trees, to assist with refining foundation design.

Shallow, natural cohesive superficial strata up to 2mbgl in general across the site have been identified by SPT testing as soft to firm. Due to the presence of groundwater, a presumed bearing capacity of 50kN/m², relative to location, is considered to be achievable in the underlying natural soils up to 2mbgl.

Whilst predominantly cohesive, some granular strata was identified across the site, as either a primary or secondary constituent of soil. Therefore, it is recommended that light mesh reinforcement is incorporated into foundations where they span between different strata to account for potential differential settlement.

Whilst excavations remained stable during this site investigation, this was over a relatively short period of time. Instability of trenches should be assumed and battened as a precautionary measure.

9.3. Buried Concrete

Based on the recorded water-soluble sulphate concentrations and pH value it is considered appropriate to adopt a precautionary Design Sulphate Class of DS-1, together with an Aggressive Chemical Environment of Concrete (ACEC) AC-1.

10. Contamination Assessment

The guidance detailed in section 1.3 has been followed to ensure that the risk posed to identified receptors, is reported according to accepted compliance criteria.

A Tier 1 stage, the long term (chronic) human health toxicity of the soil has been assessed by comparing the on-site concentrations of organic and inorganic compounds with reference values published in LQM/CIEH S4UL ("Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3829. All rights reserved") and DEFRA's C4SLs within Appendix D.

10.1. Inorganics & Organics

Determinand	Greatest recorded value across all samples (mg/kg)	Residential with Produce end use (mg/kg)	Pass/Fail	Samples with exceedances
Arsenic (total)	15.3	37	Pass	N/A
Cadmium (total)	<1.6	11	Pass	N/A
Chromium (total)	38.6	910	Pass	N/A
Chromium (VI)	<0.04	6	Pass	N/A
Copper (total)	95.2	2400	Pass	N/A
Lead (total)	229.1	200	Fail	WS01 @ 0.1
Mercury (total)	0.8	1.2	Pass	N/A
Nickel (total)	32.6	180	Pass	N/A
Selenium (total)	<3	250	Pass	N/A
Vanadium (total)	103.2	410	Pass	N/A
Zinc (total)	188.5	3700	Pass	N/A
PAHs				
Naphthalene	1.28	13	Pass	N/A
Acenaphthylene	0.25	920	Pass	N/A
Acenaphthene	2.03	1100	Pass	N/A
Fluorene	1.71	860	Pass	N/A
Phenanthrene	13.57	440	Pass	N/A
Anthracene	3.65	11000	Pass	N/A
Fluoranthene	18.65	890	Pass	N/A
Pyrene	16.08	2000	Pass	N/A
Benzo(a)anthracene	7.75	13	Pass	N/A
Chrysene	8.31	27	Pass	N/A
Benzo(b)fluoranthene	8.86	3.7	Fail	WS01 @ 0.6, WS05 @ 0.3
Benzo(k)fluoranthene	3.75	100	Pass	N/A
Benzo(a)pyrene	7.77	3	Fail	WS01 @ 0.6, WS05 @ 0.3
Indeno(123cd)pyrene	6.00	41	Pass	N/A

Dibenz(ah)anthracene	1.23	0.3	Fail	WS01 @ 0.6, WS05 @ 0.3
Benzo(ghi)perylene	4.98	350	Pass	N/A
TPH				
VPH Aromatic (>EC5-EC7)	<0.01	300	Pass	N/A
VPH Aromatic (>EC7-EC8)	<0.01	660	Pass	N/A
VPH Aromatic (>EC8-EC10)	<0.01	190	Pass	N/A
EPH Aromatic (>EC10-EC12)	6	380	Pass	N/A
EPH Aromatic (>EC12-EC16)	17	660	Pass	N/A
EPH Aromatic (>EC16-EC21)	29	930	Pass	N/A
EPH Aromatic (>EC21-EC35)	150	1700	Pass	N/A
EPH Aromatic (>EC35-EC44)	43	1700	Pass	N/A
VPH Aliphatic (>C5-C6)	<0.1	160	Pass	N/A
VPH Aliphatic (>C6-C8)	<0.1	530	Pass	N/A
VPH Aliphatic (>C8-C10)	0.19	150	Pass	N/A
EPH Aliphatic (>C10-C12)	4	760	Pass	N/A
EPH Aliphatic (>C12-C16)	3	4300	Pass	N/A
EPH Aliphatic (>C16-C35)	33	110000	Pass	N/A
EPH Aliphatic (>C35-C44)	4	110000	Pass	N/A

- Based on sandy loam soil as defined in SR3 (Environment Agency, 2009c) and 6% soil organic matter (SOM)
- Figures are rounded to two significant figures
- In applying the rules for non-soil background to the S4UIs, the background ADE is limited to being no larger than the contribution from the relevant soil ADE
- Based on comparison of inhalation exposure with inhalation ID
- Based on comparison of oral and dermal exposure with oral TDI

Based on published LQM/CIEH S4UIs & DEFRA's C4SLs, small exceedances in Lead were identified in WS01 at 0.1mbgl, and exceedances in PAHs (Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(ah)anthracene) were identified in WS01 at 0.6mbgl and WS05 at 0.3mbgl, with regards to a residential with produce end use. Therefore, proposed remedial measures are discussed in Section 12.1.

10.2. Stockpile Sampling

4No. stockpiles were identified on site. 2No samples, 1No. from Stockpile A and 1No. from Stockpile B, were analysed for a standard 'CLEA' screening suite of heavy metals, PAHs and asbestos.

Stockpile A was identified to contain elevated levels of Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(ah)anthracene with respect to the proposed residential with produce end use. Therefore, the stockpiles should be removed when remediating the site. Proposed measures are included within Section 12.1

The locations of the stockpiles are presented in Appendix A.

10.3. Asbestos

No asbestos was identified within any of the soil samples taken from across the site.

10.4. PCBs

2No. samples were analysed for presence of Polychlorinated Biphenyl (PCBs).

Negligible quantities of PCBs were detected in the samples.

10.5. Ground Gas

No significant potential source of ground gas has been identified.

10.6. Controlled Waters

No significant levels of contaminants of concern were identified, with respect to controlled waters.

Therefore, the risk posed to controlled waters is considered to be negligible.

11. Phase II Conceptual Site Model

Human Receptors			
Source	Pathway	Receptor	Solution
Elevated levels of Lead, Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(ah)anthracene were identified in the shallow soils of WS01 and WS05 with respect to the proposed residential with produce end use. Stockpile A was identified to contain exceedances in Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(ah)anthracene with respect to the proposed residential with produce end use.	Direct dermal contact or ingestion of soils, or inhalation of dust/fibres (i.e. human interaction with surface and subsurface materials).	Site workers during the redevelopment of the site.	Basic PPE and hygiene facilities should be provided for site workers.
		Intended end users of the site (residents).	Therefore, in garden areas of soft landscaping, it will be necessary to include a 450mm clean capping layer of imported, verified topsoil. Topsoil should be pre-screened and confirmed as suitable for a residential with produce end use. Following installation, a verification study shall be required to confirm that the correct depth and chemical composition of the capping layer has been installed, and submit the findings as a verification report to the local authority for approval. A Stockpile Contamination Assessment should be undertaken, with each stockpile sampled and assessed, in order to classify the on-site stockpiles waste classification and safely remove them from site, or determine their suitability for re-use.

No significant potential sources of ground gas have been identified for this site.	The migration and accumulation of ground gases through permeable sub-surface materials and/ or preferential pathways.	Intended end users of the site (residents).	No specific ground gas protection measures are considered required for this site.
Environmental Receptors (Controlled Waters)			
No significant levels of contaminants of concern have been identified with respect to controlled waters.	Lateral and vertical migration of groundwater through permeable sub-surface materials and/ or preferential pathways.	The underlying Principal Aquifer within underlying bedrock strata. The underlying Secondary A Aquifer and Secondary Undifferentiated Aquifer in the underlying superficial strata. The small river bordering the site in the south-east.	No specific remediation is considered to be necessary for this receptor.

12. Risk Management & Remediation

Previous sections have quantified the risk posed to identified receptors. The following section details measures and recommendations for dealing with risks associated with soil, gas, and groundwater contamination in respect to the proposed development.

12.1. Remediation to Protect End Users

Elevated levels of Lead, Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(ah)anthracene were identified in the shallow soils of WS01 and WS05 with respect to the proposed end use.

Therefore, in garden areas of soft landscaping, it will be necessary to include a 450mm clean capping layer of imported, verified topsoil. Topsoil should be pre-screened and confirmed as suitable for a residential with produce end use.

Following installation, a verification study shall be required to confirm that the correct depth and chemical composition of the capping layer has been installed, and submit the findings as a verification report to the local authority for approval.

Stockpiles were also identified on site. 2No. stockpiles were sampled, with Stockpile A containing elevated levels of Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(ah)anthracene. A Stockpile Contamination Assessment should be undertaken, with each stockpile sampled and assessed, in order to provide a waste classification and safely remove them from site or determine their suitability for re-use.

12.2. Ground Gas Protection Measures

No significant potential source of ground gas has been identified for this development, and the site is within an area where the percentage of homes above the radon action level is below 1%. Therefore, no specific ground gas protection measures are considered required for this development.

Therefore, no specific ground gas remedial measures are considered necessary at this time.

12.3. Remediation to Protect Controlled Waters

No significant levels of contaminants of concern have been identified with respect to controlled waters.

Therefore, no specific remediation is considered to be required.

12.4. Remediation to Protect Construction Workers

Basic PPE and hygiene facilities should be sufficient for site workers.

13. Conclusions and Recommendations

Review of current and historic land uses for the site and surrounding area indicate that the site the site was an empty plot of land until two small structures and orchard trees were identified on site, by 1922. By 1977, these had all been removed from the site, and an unspecified structure was constructed in the south of the site. The site walkover in 2024 identified this as a large shed, with some of the site being used for storage, and the remainder comprising an empty field. It should also be noted that the site is known to have historically being used as a coal yard, which is not specified in the historic mapping.

The surrounding land comprised mostly empty fields and allotments by 1882, with Midland railway located approximately 50m west of the site. By 1977, the railway had been dismantled and was being used as a pathway. By 1977, an electricity substation was also present 30m south of the site. This is how the surrounding remain in the present day.

A phase 2 intrusive investigation was carried out which successfully characterised made ground across the site, as well as its depth & extent. Representative soil samples were taken of these made ground materials and sent for analysis at a UKAS/MCERTS accredited laboratory for analysis of the identified contaminants of concern.

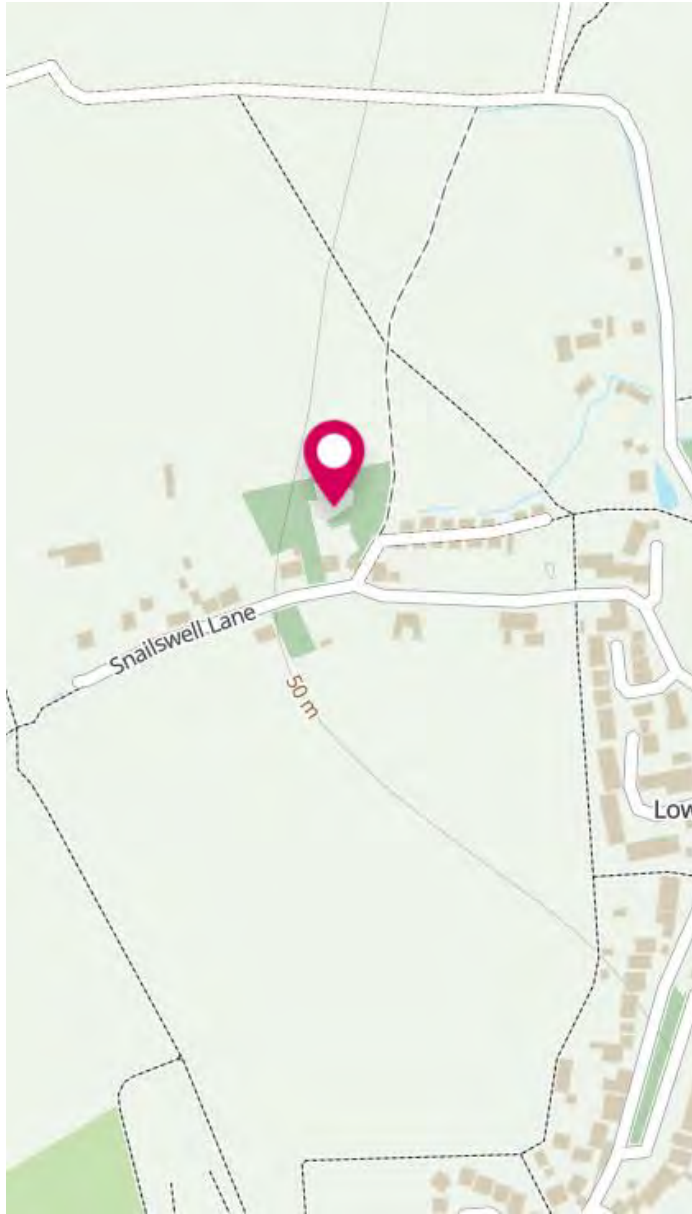
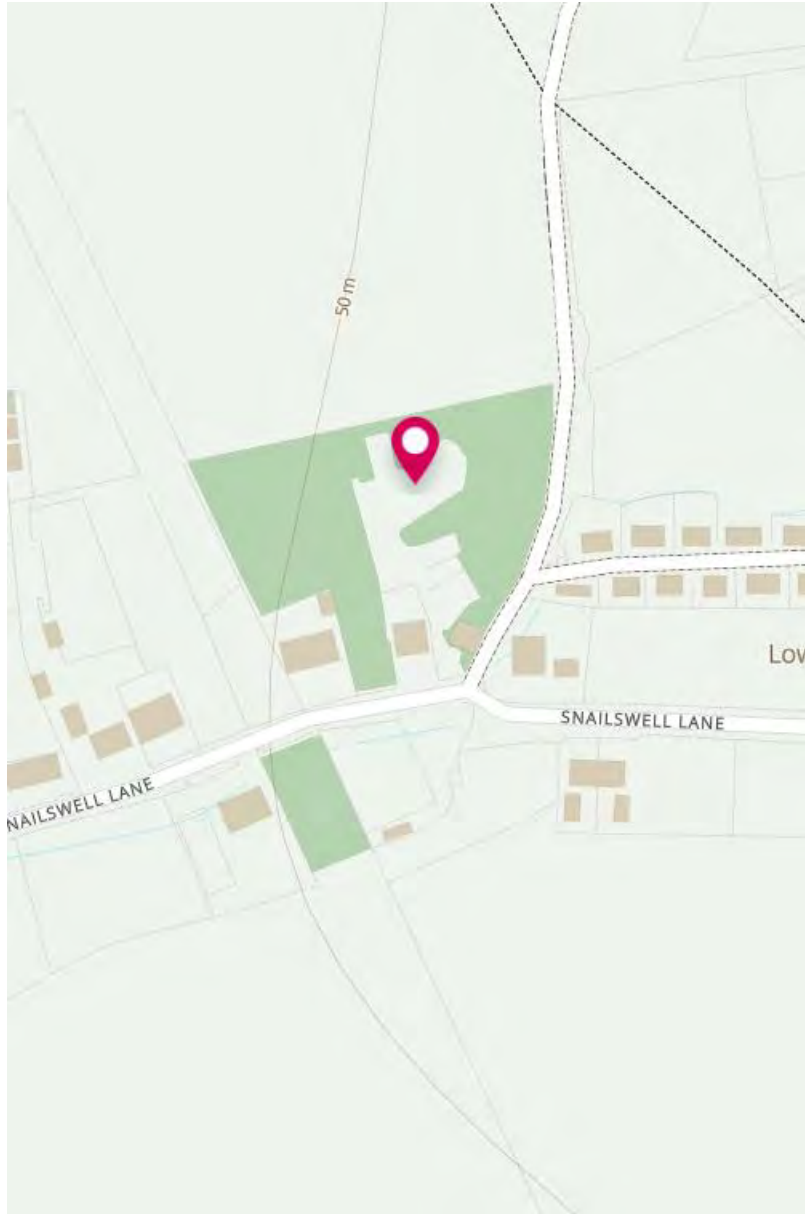
Recommendations:

- Elevated levels of Lead, Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(ah)anthracene were identified in the shallow soils of WS01 and WS05 with respect to the proposed end use. Therefore, in garden areas of soft landscaping, it will be necessary to include a 450mm clean capping layer of imported, verified topsoil. Topsoil should be pre-screened and confirmed as suitable for a residential with produce end use. Following installation, a verification study shall be required to confirm that the correct depth and chemical composition of the capping layer has been installed and submit the findings as a verification report to the local authority for approval.
- Stockpiles were also identified on site. 2No. stockpiles were sampled, with Stockpile A containing elevated levels of Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(ah)anthracene. A Stockpile Contamination Assessment should be undertaken, with each stockpile sampled and assessed, in order to provide a waste classification and safely remove them from site, or determine their suitability for re-use.
- Shallow, natural cohesive superficial strata up to 2mbgl in general across the site have been identified by SPT testing as soft to firm. Due to the presence of groundwater, a presumed bearing capacity of 50kN/m², relative to location, is considered to be achievable in the underlying natural soils up to 2mbgl.
- Cohesive strata was identified to be of predominantly intermediate plasticity. Therefore, within the influencing zone of trees, foundations within cohesive soils should be deepened in these areas in accordance with NHBC Guidance Chapter 4.2 – Building Near Trees. An arboricultural survey may be required to identify the influencing zones of trees, to assist with refining foundation design.

- Whilst predominantly cohesive, some granular strata was identified across the site, as either a primary or secondary constituent of soil. Therefore, it is recommended that light mesh reinforcement is incorporated into foundations where they span between different strata to account for potential differential settlement.
- Based on the recorded water-soluble sulphate concentrations and pH value it is considered appropriate to adopt a precautionary Design Sulphate Class of DS-1, together with an Aggressive Chemical Environment of Concrete (ACEC) AC-1.

This report should be submitted to your local planning authority for approval.

APPENDIX A



Title
Site Location

Reference	Date
101320	08/04/2024

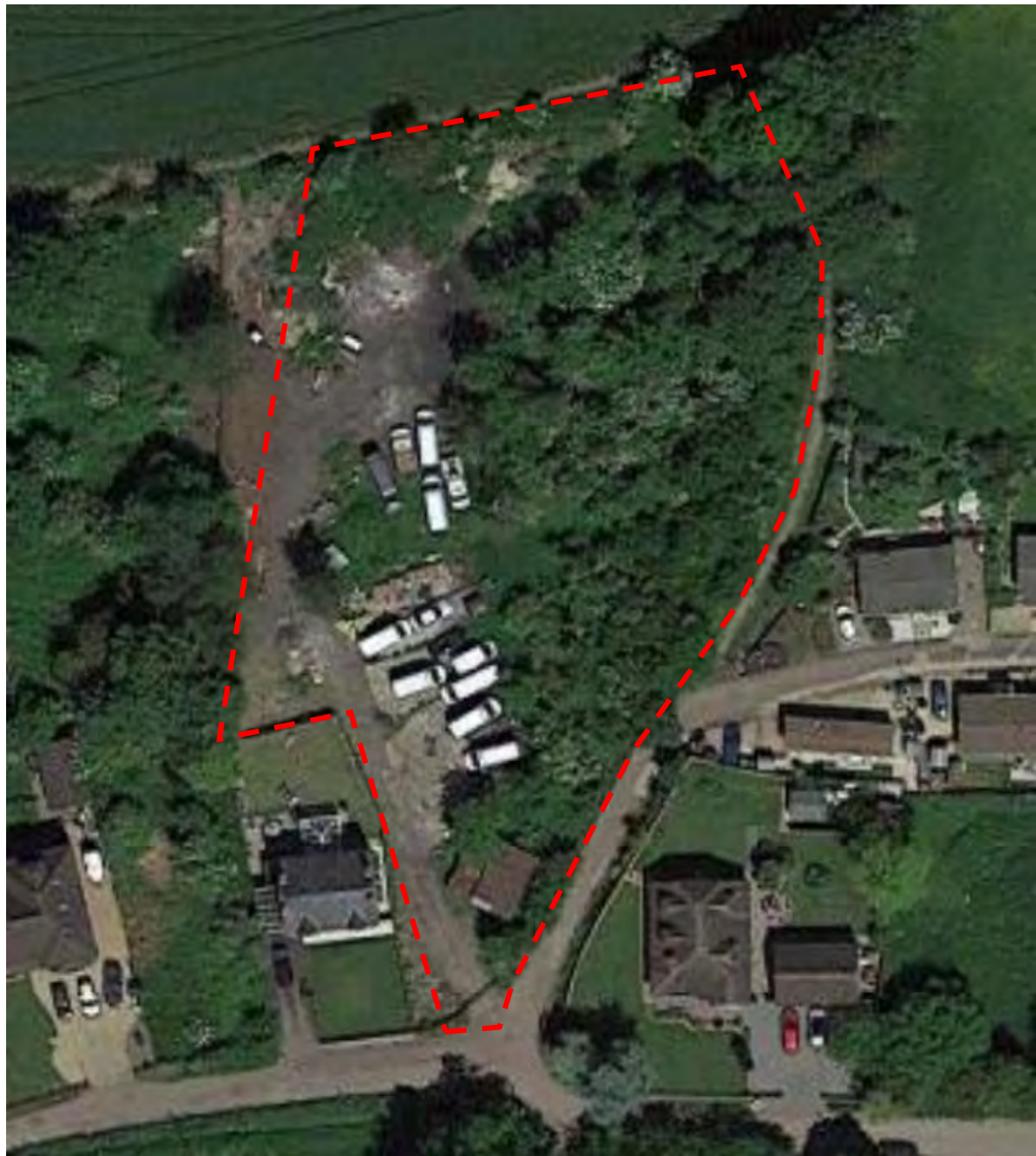
Site Address

Glencoe Villa,
Ickleford,
Hitchin
SG5 3TR

Legend

 Approximate Site Centre

Scale	Drawn	Figure Number
NTS	AMD	Fig.1



Title
Site Layout

Reference
101320

Date
08/04/2024

Site Address

Glencoe Villa,
Ickleford,
Hitchin
SG5 3TR

Legend

Scale
NTS

Drawn
AMD

Figure Number
Fig.2



Title

Development Proposal

Reference

101320

Date

08/04/2024

Site Address

Glencoe Villa,
Ickleford,
Hitchin
SG5 3TR

Legend

Scale

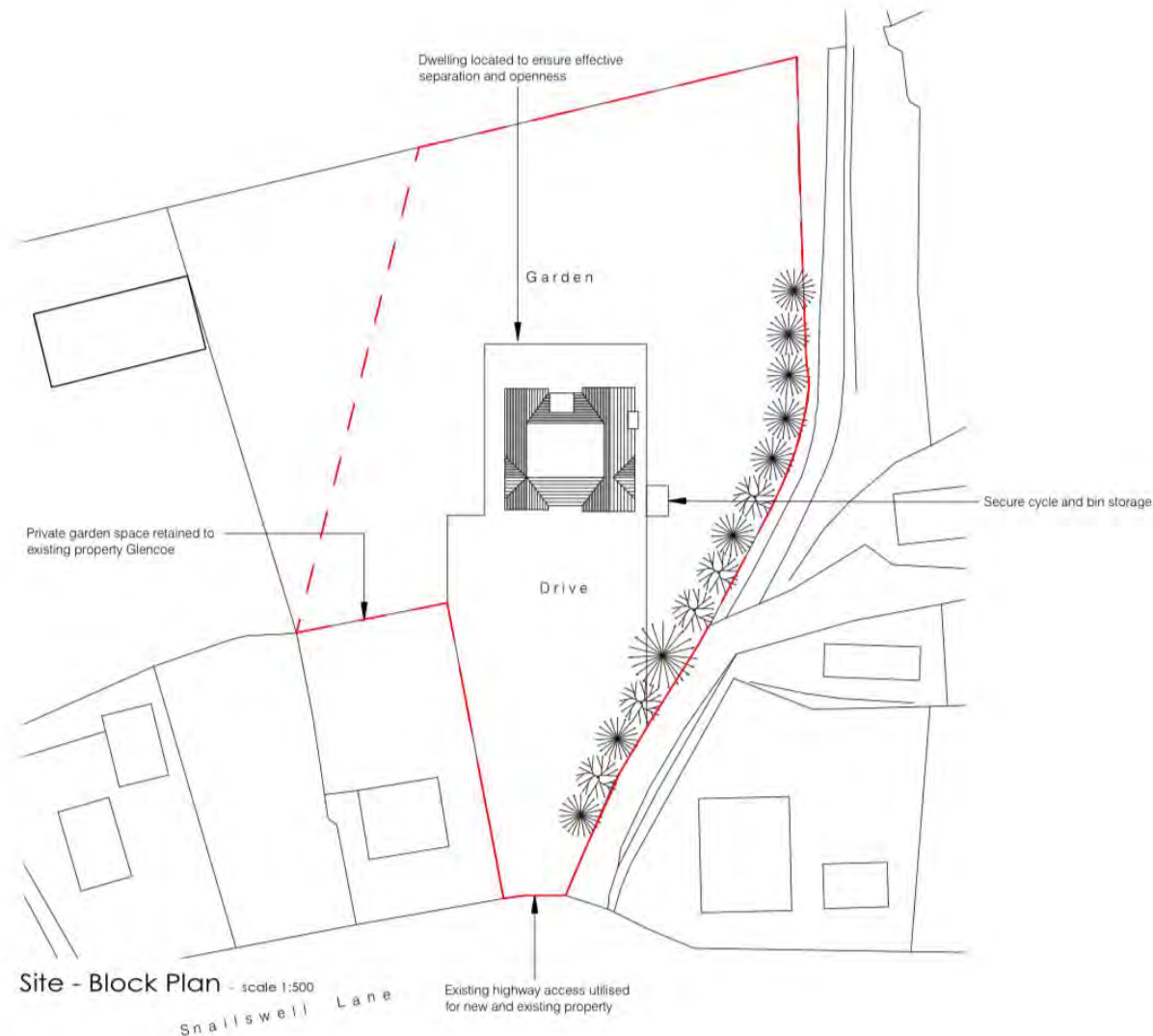
NTS

Drawn

AMD

Figure Number

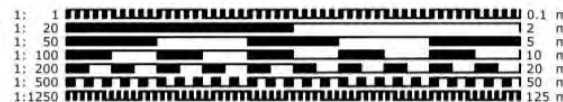
Fig.3



Site - Block Plan - scale 1:500

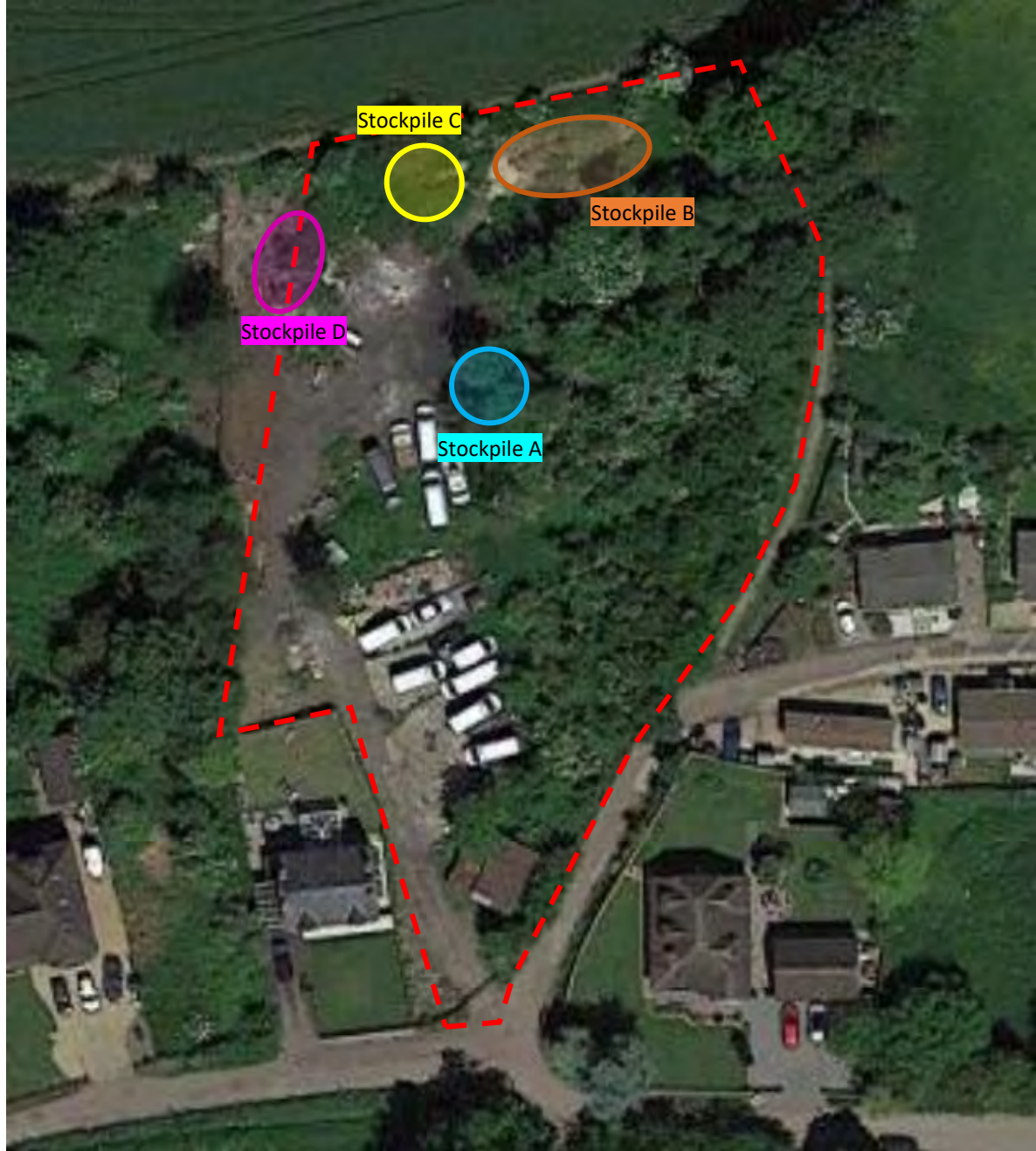
Notes

This drawing is PRELIMINARY only &
Subject to detailed design & all
relevant Statutory Approvals



Schedule of Areas

Site Area Approx 3520sqm



Title
Approximate Stockpile Locations

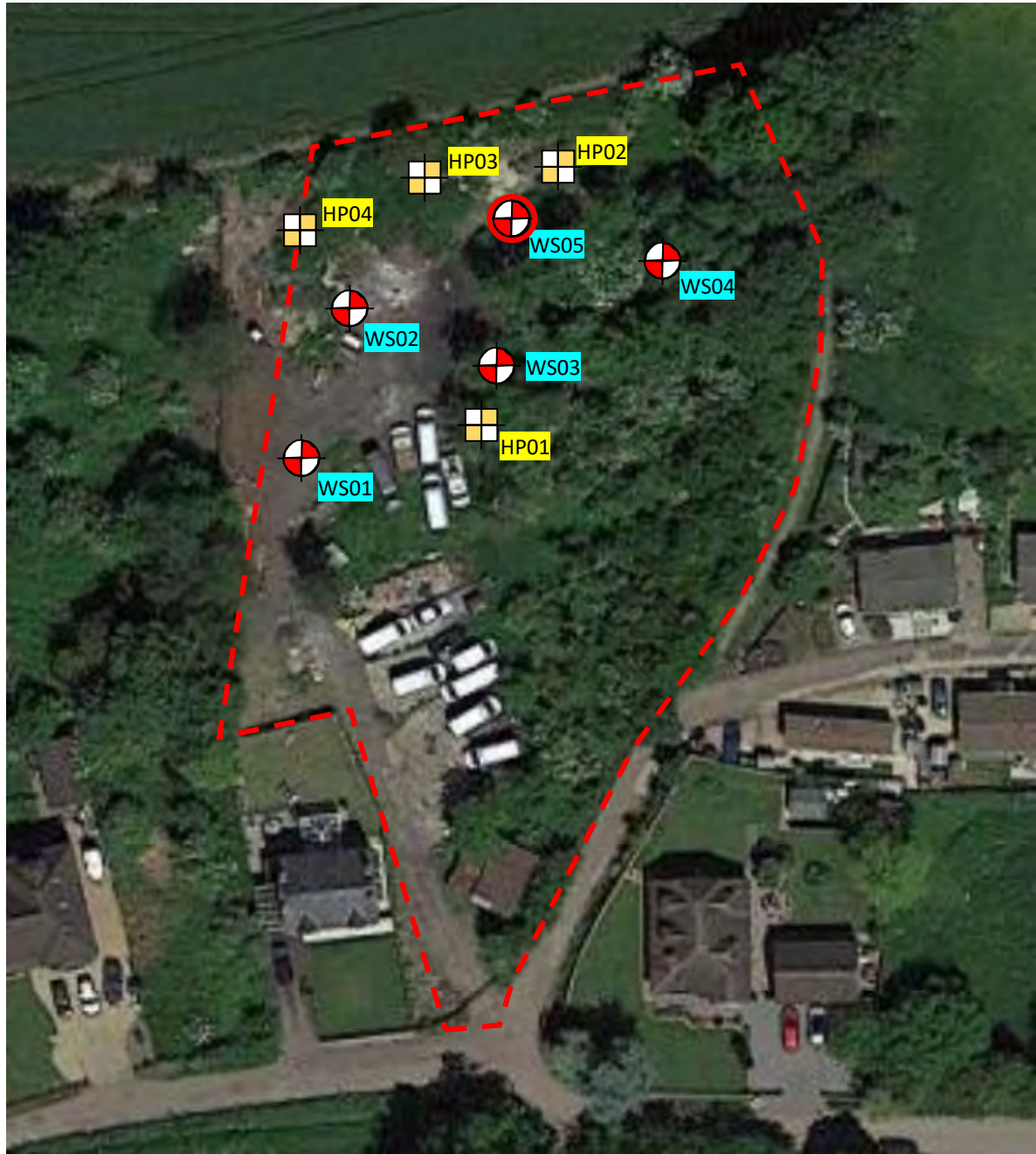
Reference	Date
101320	08/04/2024

Site Address

Glencoe Villa,
Ickleford,
Hitchin
SG5 3TR

Legend

Scale	Drawn	Figure Number
NTS	AMD	Fig.4



Title
SI Plan

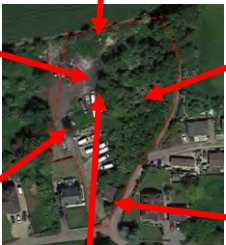
Reference	Date
101320	08/04/2024

Site Address

Glencoe Villa,
Ickleford,
Hitchin
SG5 3TR

Legend	
 Borehole Location	 Hand Dug Pit into Stockpile
 Indicates installed boreholes for ground water monitoring	

Scale	Drawn	Figure Number
NTS	AMD	Fig.5



Title
Site Photos

Reference
101320

Date
08/04/2024

Site Address

Glencoe Villa,
Ickleford,
Hitchin
SG5 3TR

Legend

Scale
NTS

Drawn
AMD

Figure Number
Fig.6



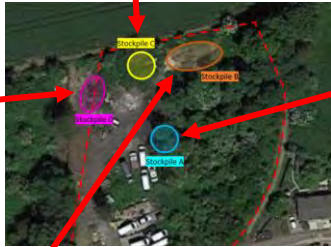
Title		
Site Photos		
Reference	Date	
101320	08/04/2024	
Site Address		
Glencoe Villa, Ickleford, Hitchin SG5 3TR		
Legend		
Scale	Drawn	Figure Number
NTS	AMD	Fig.7



Stockpile C



Stockpile D



Stockpile A



Stockpile B



Title
Photos – Stockpiles

Reference
101320

Date
08/04/2024

Site Address

Glencoe Villa,
Ickleford,
Hitchin
SG5 3TR

Legend

Scale
NTS

Drawn
AMD

Figure Number
Fig.8

APPENDIX B

		Window Sample Borehole										
Project Name: Glencoe Villa					Client: Peter George Town Planning				Date: 02/04/2024			
Location: Ickleford, Hitchin, SG5 3TR					Contractor:							
Project No. : 101320					Crew Name: Regional Drilling				Drilling Equipment: Window Sample Drilling Rig			
Borehole Number WS01		Hole Type WS		Level		Logged By AD		Scale 1:30		Page Number Sheet 1 of 1		
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description				
		Depth (m)	Type	Results								
		0.10	ES		0.20			[MADE GROUND] Black slightly sandy gravel. Gravel is coal fragments, burnt material, ash, glass and concrete fragments.				1
					0.50							
		0.60	ES					Gravel is fine to medium brick fragments and mixed lithologies. Greyish brown very gravelly CLAY. Gravel is fine to coarse mixed lithologies.				
												
		1.00	SPT	N=8 (1,1/1,2,2,3)	1.00			Pale grey mottled orangish brown slightly sandy CLAY. Sand is fine to coarse.				1
		1.20	D									
								Pale grey slightly sandy CLAY. Sand is fine to coarse.				2
		2.00	SPT	N=10 (1,1/2,2,3,3)	2.00							
								Pale blueish grey slightly sandy CLAY. Sand is fine to coarse.				3
		3.00	SPT	N=19 (3,4/4,4,5,6)								
						End of Borehole at 5.00m				4		
4.00	SPT	N=31 (5,6/7,7,8,9)										
					4.50			End of Borehole at 5.00m				5
												
		5.00	SPT	N=36 (5,6/8,8,10,10)	5.00			End of Borehole at 5.00m				6
												
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	
Remarks												
1. No significant visual or olfactory evidence of contamination was recorded. 2. Groundwater encountered at 2.0mbgl.												

Window Sample Borehole

Project Name: Glencoe Villa		Client: Peter George Town Planning		Date: 02/04/2024	
Location: Ickleford, Hitchin, SG5 3TR		Contractor:			
Project No. : 101320		Crew Name: Regional Drilling		Drilling Equipment: Window Sample Drilling Rig	
Borehole Number WS02	Hole Type WS	Level	Logged By AD	Scale 1:30	Page Number Sheet 1 of 1

Well	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.20	ES		0.10			[MADE GROUND] Dark brown slightly sandy slightly gravelly clay. Gravel is fine to coarse brick, glass and mixed lithologies.	
				0.30			Brown very silty slightly sandy CLAY.	
							Sand is fine to coarse.	
							Pale brown slightly sandy very silty CLAY.	
							Sand is fine to coarse.	
	0.80	ES					Pale grey mottled orangish brown slightly sandy CLAY.	
	1.00	SPT	N=11 (1,1/2,2,3,4)	1.00			Sand is fine to coarse.	1
	2.00	SPT	N=18 (2,3/4,4,5,5)	2.00			Pale grey slightly sandy CLAY.	
							Sand is fine to coarse.	
	3.00	SPT	N=27 (4,4/6,6,7,8)				Pale blueish grey slightly sandy CLAY.	
	4.00	SPT	N=27 (5,5/6,6,7,8)				Sand is fine to coarse.	
				4.50			Pale blueish grey slightly sandy CLAY.	
							Sand is fine to coarse.	
	5.00	SPT	0 (0 for 11mm/0 for 34mm)	5.00			End of Borehole at 5.00m	5
								6

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks 1. No significant visual or olfactory evidence of contamination was recorded. 2. Groundwater was not encountered.										
--	--	--	--	--	--	--	--	--	--	---

Window Sample Borehole

Project Name: Glencoe Villa		Client: Peter George Town Planning		Date: 02/04/2024	
Location: Ickleford, Hitchin, SG5 3TR		Contractor:			
Project No. : 101320		Crew Name: Regional Drilling		Drilling Equipment: Window Sample Drilling Rig	
Borehole Number WS03	Hole Type WS	Level	Logged By AD	Scale 1:30	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.10			[MADE GROUND] Blackish brown gravelly clay. Gravel is fine to coarse brick, coal fragments and mixed lithologies.	
		0.40	ES					[MADE GROUND] Brown mottled black silty gravelly clay. Gravel is fine to coarse brick, coal fragments and mixed lithologies.	
					0.60			Brown mottled grey sandy very gravelly CLAY. Gravel is fine to coarse flint and sandstone.	
					0.90			Pale grey mottled orangish brown slightly sandy CLAY. Sand is fine to coarse.	1
		1.00	D						
		1.00	SPT	N=14 (1,1/2,2,5,5)					
					1.20			Brown slightly silty SAND. Sand is fine to coarse.	
					1.40			Pale grey mottled orangish brown slightly sandy CLAY. Sand is fine to coarse.	
		2.00	SPT	N=10 (1,1/2,2,2,4)	2.00			Brown slightly silty SAND.	2
					2.10			Pale grey mottled orangish brown slightly sandy CLAY. Sand is fine to coarse.	
		3.00	SPT	N=17 (3,3/4,4,4,5)	3.00			Poor recovery due to groundwater. Assumed brown very sandy CLAY.	3
		4.00	SPT	N=22 (3,4/4,5,6,7)	3.90			Brown very sandy CLAY.	4
					4.00			Brown silty SAND.	
					4.30			Brown sandy CLAY.	
					4.50			Poor recovery due to groundwater. Assumed brown sandy CLAY.	
					4.80			Bluish grey sandy CLAY.	
		5.00	SPT	N=28 (3,4/6,7,7,8)	5.00			End of Borehole at 5.00m	5
									6

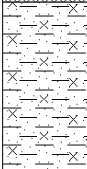
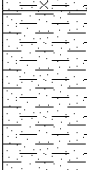
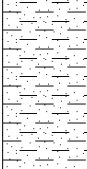
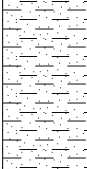
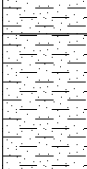
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks

- No significant visual or olfactory evidence of contamination was recorded.
- Groundwater encountered at 1.8mbgl, rose to 0.4mbgl during drilling.

Window Sample Borehole

Project Name: Glencoe Villa		Client: Peter George Town Planning		Date: 02/04/2024	
Location: Ickleford, Hitchin, SG5 3TR		Contractor:			
Project No. : 101320		Crew Name: Regional Drilling		Drilling Equipment: Window Sample Drilling Rig	
Borehole Number WS04	Hole Type WS	Level	Logged By AD	Scale 1:30	Page Number Sheet 1 of 1

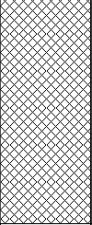
Well	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.30	ES		0.20			[MADE GROUND] Dark brown slightly gravelly sandy clay with rootlets. Gravel is fine to coarse coal fragments and mixed lithologies. Brown very clayey sandy SILT with rootlets.	
	1.00	SPT	N=9 (1,1/2,2,2,3)	0.90			Pale grey mottled orangish brown slightly sandy CLAY. Sand is fine to coarse.	1
	2.00	SPT	N=11 (2,2/2,2,3,4)					2
	3.00	SPT	N=18 (3,4/4,4,5,5)	3.00			Pale blueish grey slightly sandy CLAY. Sand is fine to coarse.	3
	4.00	SPT	N=20 (4,4/4,5,5,6)					4
	5.00	SPT	N=40 (6,10/10,10,10,10)	5.00			End of Borehole at 5.00m	5
								6

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

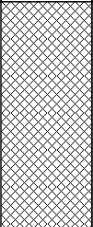
Remarks 1. No significant visual or olfactory evidence of contamination was recorded. 2. Groundwater was not encountered.										
--	--	--	--	--	--	--	--	--	--	---

		Window Sample Borehole										
Project Name: Glencoe Villa					Client: Peter George Town Planning				Date: 02/04/2024			
Location: Ickleford, Hitchin, SG5 3TR					Contractor:							
Project No. : 101320					Crew Name: Regional Drilling				Drilling Equipment: Window Sample Drilling Rig			
Borehole Number WS05		Hole Type WS		Level		Logged By AD		Scale 1:30		Page Number Sheet 1 of 1		
Well	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description					
	Depth (m)	Type	Results									
	0.30	ES		0.40			[MADE GROUND] Black very gravelly sand. Slight odour. Sand is fine to coarse. Gravel is fine to coarse brick, coal fragments and wood chippings.					
	0.60	ES		0.50			[MADE GROUND] Blackish brown slightly gravelly clay. Sand is fine to coarse. Gravel is fine to coarse brick, coal fragments and wood chippings. Brown very clayey sandy SILT with rootlets.					
	1.00	SPT	N=8 (1,1/2,2,2,2)	1.10								1
	1.50	D		1.80			Pale brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse mixed lithologies.					
	2.00	SPT	N=10 (3,2/3,2,2,3)				Pale grey mottled orangish brown slightly sandy CLAY. Sand is fine to coarse.					2
	3.00	SPT	N=17 (2,3/3,4,5,5)									3
	4.00	SPT	N=20 (4,5/4,6,5,5)	3.80			Pale blueish grey slightly sandy CLAY. Sand is fine to coarse.					4
				4.10			Brown clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse mixed lithologies. Pale blueish grey slightly sandy CLAY. Sand is fine to coarse.					
	5.00	SPT	N=36 (6,6/7,9,10,10)	5.00			End of Borehole at 5.00m					5
												6
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	
Remarks												
1. No significant visual evidence of contamination was recorded.												
2. Groundwater was not encountered.												
3. Monitoring well installed to 5mbgl (1m plain + 4m slotted pipe).												



		Trial Pit Log									
Project Name: Glencoe Villa				Client: Peter George Town Planning				Date: 02/04/2024			
Location: Ickleford, Hitchin, SG5 3TR				Contractor:							
Project No. : 101320				Crew Name:				Equipment: Hand Pitting Tools			
Location Number Stockpile B		Location Type HA		Level		Logged By AD		Scale 1:10		Page Number Sheet 1 of 1	
Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description					
Depth (m)	Type	Results									
0.10	ES		0.30			[MADE GROUND] Brown and black gravelly sand. Gravel is fine to coarse coal fragments, metal, burnt material, ash, wood chippings, shells and mixed lithologies.					
						End of Borehole at 0.30m					
									0.5		
									1.0		
									1.5		
									2.0		
Dimensions			Trench Support and Comment				Pumping Data				
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks			Date	Rate	Remarks		
Remarks											



			Trial Pit Log											
Project Name: Glencoe Villa					Client: Peter George Town Planning					Date: 02/04/2024				
Location: Ickleford, Hitchin, SG5 3TR					Contractor:									
Project No. : 101320					Crew Name:					Equipment: Hand Pitting Tools				
Location Number Stockpile D		Location Type HA			Level		Logged By AD			Scale 1:10		Page Number Sheet 1 of 1		
Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description								
Depth (m)	Type	Results												
			0.30			[MADE GROUND] Dark blackish brown gravelly sand. Gravel is fine to coarse ceramics, brick, concrete, plastic and mixed lithologies.								
End of Borehole at 0.30m														
											0.5			
											1.0			
											1.5			
											2.0			
Dimensions			Trench Support and Comment					Pumping Data						
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks			Date	Rate	Remarks					
Remarks														

APPENDIX C



ANALYTICAL TEST REPORT

Contract no: 131961

Contract name: Glencoe Villa, Ickleford

Client reference: 101320

Clients name: Dice Environmental

Clients address: 167 Kennington Road
Nottingham
NG8 1QE

Samples received: 04 April 2024

Analysis started: 04 April 2024

Analysis completed: 12 April 2024

Report issued: 12 April 2024

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
\$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
N/S	Sample not suitable for testing
NAD	No Asbestos Detected

Approved by:

Abbie Neasham-Bourn
Senior Reporting Administrator

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
131961-1	WS01 ES+O	0.10	Sand with Gravel	-	-	15
131961-2	WS01 ES	0.60	Sandy Clay with Gravel	-	-	15.5
131961-4	WS02 ES	0.20	Sandy Clay with Gravel	-	-	13.4
131961-6	WS03 ES+O	0.10	Sandy Loamy Clay with Gravel & Roots	-	-	13
131961-7	WS03 ES	0.40	Sandy Clay with Gravel	-	-	14.9
131961-9	WS04 ES	0.30	Sand with Gravel	-	-	13
131961-10	WS05 ES+O	0.30	Loamy Sand with Gravel & Roots	-	-	18.6
131961-11	WS05 ES	0.60	Sandy Clay with Gravel & Roots	-	-	13.6
131961-13	STP A	0.10	Sandy Loam with Gravel & Roots	-	-	14.6
131961-14	STP B	0.10	Sandy Loam with Gravel & Roots	-	-	16.9

Chemtech Environmental Limited

SOILS

Lab number Sample id Depth (m) Date sampled			131961-1 WS01 ES+O 0.10 02/04/2024	131961-2 WS01 ES 0.60 02/04/2024	131961-4 WS02 ES 0.20 02/04/2024	131961-6 WS03 ES+O 0.10 02/04/2024	131961-7 WS03 ES 0.40 02/04/2024	131961-9 WS04 ES 0.30 02/04/2024	131961-10 WS05 ES+O 0.30 02/04/2024	131961-11 WS05 ES 0.60 02/04/2024	131961-13 STP A 0.10 02/04/2024	131961-14 STP B 0.10 02/04/2024
Test	Method	Units										
Arsenic (total)	CE264 ^M	mg/kg As	12.3	13.2	13.6	15.3	14.2	9.9	12.3	11.3	12.9	18.3
Cadmium (total)	CE264 ^M	mg/kg Cd	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6
Chromium (total)	CE264 ^U	mg/kg Cr	21.9	38.3	37.7	38.6	37.6	25.9	30.8	30.4	14.0	158.7
Chromium (VI)	CE263	mg/kg CrVI	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.1	<0.04	<0.04
Copper (total)	CE264 ^M	mg/kg Cu	23.7	10.0	10.0	14.8	10.8	7.8	95.2	10.9	21.9	416.2
Lead (total)	CE264 ^U	mg/kg Pb	229.1	15.4	14.1	20.4	14.7	10.2	76.4	13.4	40.8	122.5
Mercury (total)	CE264 ^U	mg/kg Hg	0.8	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Nickel (total)	CE264 ^M	mg/kg Ni	14.0	32.6	23.7	26.4	27.2	17.1	22.3	18.9	11.0	17.4
Selenium (total)	CE264	mg/kg Se	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Vanadium (total)	CE264 ^U	mg/kg V	103.2	53.9	53.4	57.4	58.1	44.9	55.7	55.1	30.6	55.6
Zinc (total)	CE264 ^M	mg/kg Zn	101.3	43.0	58.9	72.5	56.9	45.2	188.5	54.5	132.6	352.4
pH	CE004 ^M	units	8.1	8.2	7.8	7.4	7.6	8.1	7.9	7.9	8.0	9.7
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	197	39	13	14	29	<10	247	25	14	1197
Sulphate (acid extractable)	CE062 ^M	mg/kg SO ₄	1411	513	288	317	261	238	1387	361	575	3602
Total Organic Carbon (TOC)	CE197	% w/w C	31.6	3.1	0.7	0.9	1.9	0.9	0.7	0.9	62.7	5.3
Estimate of OMC (calculated from TOC)	CE197	% w/w	54.5	5.4	1.2	1.6	3.2	1.6	1.3	1.5	108.1	9.1
PAH												
Naphthalene	CE087 ^M	mg/kg	<0.02	1.28	<0.02	0.03	<0.02	<0.02	0.20	<0.02	0.66	0.09
Acenaphthylene	CE087 ^M	mg/kg	<0.02	0.07	<0.02	<0.02	<0.02	<0.02	0.25	<0.02	0.17	<0.02
Acenaphthene	CE087 ^M	mg/kg	<0.02	2.03	<0.02	<0.02	<0.02	<0.02	0.25	<0.02	0.19	<0.02
Fluorene	CE087 ^U	mg/kg	<0.02	1.71	<0.02	<0.02	<0.02	<0.02	0.19	<0.02	0.18	<0.02
Phenanthrene	CE087 ^M	mg/kg	0.03	13.57	<0.02	0.11	<0.02	<0.02	2.97	<0.02	2.31	0.03
Anthracene	CE087 ^U	mg/kg	<0.02	3.65	<0.02	0.04	<0.02	<0.02	1.09	<0.02	0.82	<0.02
Fluoranthene	CE087 ^M	mg/kg	0.09	18.65	<0.02	0.18	<0.02	<0.02	8.36	0.03	6.66	0.03
Pyrene	CE087 ^M	mg/kg	0.09	16.08	<0.02	0.15	<0.02	<0.02	7.45	0.03	5.84	0.03
Benzo(a)anthracene	CE087 ^U	mg/kg	0.05	7.75	0.02	0.09	0.02	<0.02	4.25	0.03	3.25	<0.02
Chrysene	CE087 ^M	mg/kg	0.05	8.31	<0.03	0.10	<0.03	<0.03	4.31	<0.03	2.96	<0.03
Benzo(b)fluoranthene	CE087 ^M	mg/kg	0.09	8.86	<0.02	0.16	<0.02	<0.02	5.63	0.03	5.05	0.02
Benzo(k)fluoranthene	CE087 ^M	mg/kg	0.05	3.75	<0.03	0.06	<0.03	<0.03	2.21	<0.03	2.07	<0.03
Benzo(a)pyrene	CE087 ^U	mg/kg	0.07	7.77	<0.02	0.10	<0.02	<0.02	4.94	0.02	4.28	<0.02
Indeno(123cd)pyrene	CE087 ^M	mg/kg	0.09	6.00	<0.02	0.11	<0.02	<0.02	4.32	0.02	3.78	<0.02
Dibenz(ah)anthracene	CE087 ^M	mg/kg	<0.02	1.23	<0.02	0.03	<0.02	<0.02	0.92	<0.02	0.84	<0.02
Benzo(ghi)perylene	CE087 ^M	mg/kg	0.07	4.98	<0.02	0.09	<0.02	<0.02	3.67	<0.02	2.95	<0.02
PAH (total of USEPA 16)	CE087	mg/kg	0.69	106	<0.34	1.25	<0.34	<0.34	51.0	<0.34	42.0	<0.34
TPH												
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	-	-	<0.01	-	-	<0.01	-	-	-
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	-	-	<0.01	-	-	<0.01	-	-	-
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	-	-	<0.01	-	-	<0.01	-	-	-
EPH Aromatic (>EC10-EC12)	CE250	mg/kg	6	-	-	<0.6	-	-	3	-	-	-
EPH Aromatic (>EC12-EC16)	CE250	mg/kg	17	-	-	1	-	-	6	-	-	-
EPH Aromatic (>EC16-EC21)	CE250	mg/kg	29	-	-	<1.5	-	-	11	-	-	-
EPH Aromatic (>EC21-EC35)	CE250	mg/kg	150	-	-	<4.5	-	-	70	-	-	-
EPH Aromatic (>EC35-EC44)	CE250	mg/kg	43	-	-	<2	-	-	29	-	-	-
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	-	-	<0.1	-	-	<0.1	-	-	-
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	-	-	<0.1	-	-	<0.1	-	-	-
VPH Aliphatic (>C8-C10)	CE067	mg/kg	0.19	-	-	0.53	-	-	0.12	-	-	-
EPH Aliphatic (>C10-C12)	CE250	mg/kg	4	-	-	<1	-	-	3	-	-	-
EPH Aliphatic (>C12-C16)	CE250	mg/kg	3	-	-	<0.5	-	-	1	-	-	-
EPH Aliphatic (>C16-C35)	CE250	mg/kg	33	-	-	<3	-	-	21	-	-	-
EPH Aliphatic (>C35-C44)	CE250	mg/kg	4	-	-	<0.5	-	-	2	-	-	-
PCB												
PCB Congener 28	CE137	mg/kg	<0.015	-	-	<0.015	-	-	-	-	-	-
PCB Congener 52	CE137	mg/kg	<0.01	-	-	<0.01	-	-	-	-	-	-
PCB Congener 101	CE137	mg/kg	<0.015	-	-	<0.015	-	-	-	-	-	-
PCB Congener 118	CE137	mg/kg	<0.015	-	-	<0.015	-	-	-	-	-	-
PCB Congener 138	CE137	mg/kg	<0.015	-	-	<0.015	-	-	-	-	-	-
PCB Congener 153	CE137	mg/kg	<0.01	-	-	<0.01	-	-	-	-	-	-
PCB Congener 180	CE137	mg/kg	<0.008	-	-	<0.008	-	-	-	-	-	-
PCB (total of ICES 7)	CE137	mg/kg	<0.035	-	-	<0.035	-	-	-	-	-	-
Subcontracted Analysis												
Asbestos (qualitative)	\$	-	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE264	Arsenic (total)	Aqua Regia Extraction, ICPOES	Dry	M	1.8	mg/kg As
CE264	Cadmium (total)	Aqua Regia Extraction, ICPOES	Dry	M	1.6	mg/kg Cd
CE264	Chromium (total)	Aqua Regia Extraction, ICPOES	Dry	U	2	mg/kg Cr
CE263	Chromium (VI)	Discrete Analyser	Dry			mg/kg CrVI
CE264	Copper (total)	Aqua Regia Extraction, ICPOES	Dry	M	1.6	mg/kg Cu
CE264	Lead (total)	Aqua Regia Extraction, ICPOES	Dry	U	2.3	mg/kg Pb
CE264	Mercury (total)	Aqua Regia Extraction, ICPOES	Dry	U	0.7	mg/kg Hg
CE264	Nickel (total)	Aqua Regia Extraction, ICPOES	Dry	M	2.1	mg/kg Ni
CE264	Selenium (total)	Aqua Regia Extraction, ICPOES	Dry	U	3	mg/kg Se
CE264	Vanadium (total)	Aqua Regia Extraction, ICPOES	Dry	U	1.8	mg/kg V
CE264	Zinc (total)	Aqua Regia Extraction, ICPOES	Dry	M	4	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO ₄
CE062	Sulphate (acid extractable)	HCl extract, analysed by ICP-OES	Dry	M	100	mg/kg SO ₄
CE197	Total Organic Carbon (TOC)	Carbon Analyser	Dry		0.1	% w/w C
CE197	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry		0.1	% w/w
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.016	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.015	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	M	0.013	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.013	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	M	0.014	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	U	0.017	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.017	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.016	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.012	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.028	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.025	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.019	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.019	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.017	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.019	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.028	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	As received		0.01	mg/kg
CE250	EPH Aromatic (>EC10-EC12)	Solvent extraction, GCxGC-FID	As received		0.5	mg/kg
CE250	EPH Aromatic (>EC12-EC16)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
CE250	EPH Aromatic (>EC16-EC21)	Solvent extraction, GCxGC-FID	As received		2	mg/kg
CE250	EPH Aromatic (>EC21-EC35)	Solvent extraction, GCxGC-FID	As received		5	mg/kg
CE250	EPH Aromatic (>EC35-EC44)	Solvent extraction, GCxGC-FID	As received		1.5	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	As received		0.1	mg/kg

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE250	EPH Aliphatic (>C10-C12)	Solvent extraction, GCxGC-FID	As received		0.5	mg/kg
CE250	EPH Aliphatic (>C12-C16)	Solvent extraction, GCxGC-FID	As received		0.5	mg/kg
CE250	EPH Aliphatic (>C16-C35)	Solvent extraction, GCxGC-FID	As received		4.5	mg/kg
CE250	EPH Aliphatic (>C35-C44)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
CE137	PCB Congener 28	Solvent extraction, GC-MS	As received		0.015	mg/kg
CE137	PCB Congener 52	Solvent extraction, GC-MS	As received		0.01	mg/kg
CE137	PCB Congener 101	Solvent extraction, GC-MS	As received		0.015	mg/kg
CE137	PCB Congener 118	Solvent extraction, GC-MS	As received		0.015	mg/kg
CE137	PCB Congener 138	Solvent extraction, GC-MS	As received		0.015	mg/kg
CE137	PCB Congener 153	Solvent extraction, GC-MS	As received		0.01	mg/kg
CE137	PCB Congener 180	Solvent extraction, GC-MS	As received		0.01	mg/kg
CE137	PCB (total of ICES 7)	Solvent extraction, GC-MS	As received		0.035	mg/kg
\$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
131961-1	WS01 ES+O	0.10	N	
131961-2	WS01 ES	0.60	N	
131961-4	WS02 ES	0.20	N	
131961-6	WS03 ES+O	0.10	N	
131961-7	WS03 ES	0.40	N	
131961-9	WS04 ES	0.30	N	
131961-10	WS05 ES+O	0.30	N	
131961-11	WS05 ES	0.60	N	
131961-13	STP A	0.10	Y	PAH (IC)
131961-14	STP B	0.10	Y	PAH (IC)

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

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

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

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

Soil/Solid samples will be disposed of 4 weeks from initial receipt unless otherwise agreed.

Waters and leachate samples will be disposed of 2 weeks from report issue unless otherwise agreed.

DEFRA Licence for the introduction and movement within England of prohibited soil for chemical and physical analysis Licence No: 132693/469907-0

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

For soils and solids, analytical results are inclusive of stones, where applicable.

Moisture Content Calculated on a Wet Weight basis



LABORATORY REPORT



Contract Number: PSL24/2549

Report Date: 24 April 2024

Client's Reference:

Client Name: Chemtech Environmental on behalf of Dice Environmental Ltd
7 Philip Bent Rd
Ashby De La Zouch
LE65 2AN

For the attention of: Abbie Davis

Contract Title: Glencoe Villa, Ickeford

Date Received: 8/4/2024

Date Commenced: 8/4/2024

Date Completed: 24/4/2024

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. 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 other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Managing Director)

R Berriman
(Associate Director)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)


T Watkins
(Senior Technician)

5 – 7 Hexthorpe Road,
Hexthorpe,
Doncaster,
DN4 0AR
Tel: 01302 768098
Email: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

Glencoe Villa, Ickeford

Contract No:

PSL24/2549

Client Ref:

101320

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



Glencoe Villa, Ickeford

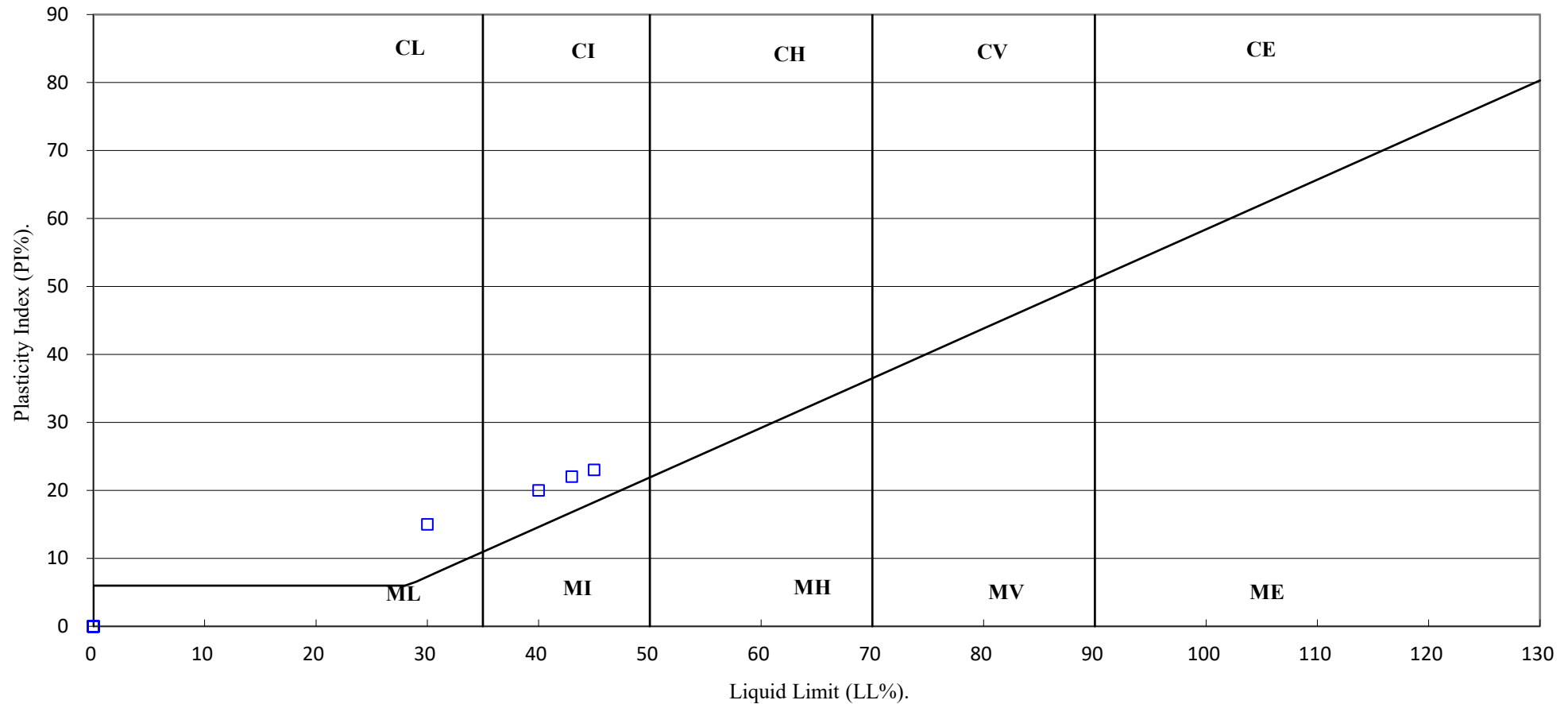
Contract No:

PSL24/2549

Client Ref:

101320

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



Glencoe Villa, Ickeford

Contract No:

PSL24/2549

Client Ref:

101320

APPENDIX D

Rational and full list of General Assessment Criteria used by Dice Environmental.

Copyright Land Quality Management Ltd reproduced with permission; Publication number S4UL3829. All rights reserved.

Determinand	Allotment	R _{WH} HP	R _{WO} HP	Commercial/ Industrial	POSresi	POSpark
Metals						
Arsenic (Inorganic) ^{a, b, c}	43	37	40	640	79	170
Beryllium ^{a, b, d, e}	35	1.7	1.7	12	2.2	63
Boron ^{a, b, d}	45	290	11000	240000	21000	46000
Cadmium (pH6-8) ^{a, b, d, f}	1.9	11	85	190	120	560
Chromium (trivalent) ^{a, b, d, g}	18000	910	910	8600	1500	33000
Chromium (hexavalent) ^{a, b, c}	1.8 ^h	6 ⁱ	6 ⁱ	33 ^j	7.7 ^j	220 ^j
Copper ^{a, b, c}	520	2400	7100	68000	12000	44000
Mercury (elemental) ^{a, b, c, j}	21	1.2	1.2	58 ^{vap} (25.8)	16	30 ^{vap} (25.8)
Mercury (inorganic) ^{a, b, c}	19	40	56	1100	120	240
Methylmercury ^{a, b, c}	6	11	15	320	40	68
Nickel ^{a, b, c}	230 ^k	180 ^e	180 ^e	980 ^e	230 ^e	3400 ^h
Selenium ^{a, b, c}	88	250	430	12000	1100	1800
Vanadium ^{a, b, c, i, j}	91	410	1200	9000	2000	5000
Zinc ^{a, b, c}	620	3700	40000	730000	81000	170000
BTEX Compounds (SOM 1%/ 2.5%/ 6%)						
Benzene ^{a, b, l, m}	0.017/0.034/ 0.075	0.087/0.17/ 0.37	0.38/0.7/1.4	27 / 47 / 90	72 / 72 / 73	90 / 100 / 110
Toluene ^{a, b, l, m}	22 / 51 / 120	130 / 290 / 660	800 ^{vap} (869) /1900/3900	56000 ^{vap} (869) / 110000 ^{vap} 1920/ 180000 ^{vap} (4360)	56000 / 56000 / 56000	87000 ^{vap} (869) / 95000 ^{vap} (1920) / 100000 ^{vap} (4360)
Ethylbenzene ^{a, b, l, m}	16 / 39 / 91	47 / 110 / 260	83 / 190 / 440	5700 ^{vap} (518) / 13000 ^{vap} (1220) / 27000 ^{vap} (2840)	24000 / 24000 / 25000	17000 ^{vap} (518) / 22000 ^{vap} (1220) / 27000 ^{vap} (2840)
O – Xylene ^{a, b, l, m, n}	28 / 67 / 160	60 / 140 / 330	88 / 210 / 480	6600 ^{sol} (478) / 15000 ^{sol} (1120) / 33000 ^{sol} (2620)	41000 / 42000 / 43000	17000 ^{sol} (478) / 24000 ^{sol} (1120) / 33000 ^{sol} (2620)
M – Xylene ^{a, b, l, m, n}	31 / 74 / 170	59 / 140 / 320	82 / 190 / 450	6200 ^{vap} (625) / 14000 ^{vap} (1470) / 31000 ^{vap} (3460)	41000 / 42000 / 43000	17000 ^{vap} (625) / 24000 ^{vap} (1470) / 32000 ^{vap} (3460)
P – Xylene ^{a, b, l, m, n}	29 / 69 / 160	56 / 130 / 310	79 / 180 / 430	5900 ^{sol} (576) / 14000 ^{sol} (1350) / 30000 ^{sol} (3170)	41000 / 42000 / 43000	17000 ^{sol} (576) / 23000 ^{sol} (1350) / 31000 ^{sol} (3170)
Polycyclic Aromatic Hydrocarbons (SOM 1%/ 2.5%/ 6%)^{a, b, l, p}						
Acenaphthene	34 / 85 / 200	210 / 510 / 1100	3000 ^{sol} (57.0) / 4700 ^{sol} (141) / 6000 ^{sol} (336)	84000 ^{sol} (57.0) / 97000 ^{sol} (141) / 100000	15000 / 15000 / 15000	29000 / 30000 / 30000
Acenaphthylene	28 / 69 / 160	170 / 420 / 920	2900 ^{sol} (86.1) / 4600 ^{sol} (212) / 6000 ^{sol} (506)	83000 ^{sol} (86.1) / 97000 ^{sol} (212) / 100000	15000 / 15000 / 15000	29000 / 30000 / 30000
Anthracene	380 / 950 / 2200	2400 / 5400 / 11000	31000 ^{sol} (1.17 /35000/ 37000	520000 / 540000 / 540000	74000 / 74000 / 74000	150000 / 150000 / 150000
Benz(a)anthracene	2.9 / 6.5 / 13	7.2 / 11 / 13	11 / 14 / 15	170 / 170 / 180	29 / 29 / 29	49 / 56 / 62
Benzo(a)pyrene (Bap)	0.97 / 2.0 / 3.5	2.2 / 2.7 / 3.0	3.2 / 3.2 / 3.2	35 / 35 / 36	5.7 / 5.7 / 5.7	11 / 12 / 13
Benzo(b)fluoranthene	0.99 / 2.1 / 3.9	2.6 / 3.3 / 3.7	3.9 / 4.0 / 4.0	44 / 44 / 45	7.1 / 7.2 / 7.2	13 / 15 / 16
Benzo(g,h,i)perylene	290 / 470 / 640	320 / 340 / 350	360/360 / 360	3900/4000/ 4000	640/640/640	1400/1500/ 1600
Benzo(k)fluoranthene	37 / 75 / 130	77 / 93 / 100	110 / 110 / 110	1200/ 1200/1200	190/190/190	370 / 410 / 440
Chrysene	4.1 / 9.4 / 19	15 / 22 / 27	30 / 31 / 32	350 / 350 / 350	57 / 57 / 57	93 / 110 / 120
Dibenzo(ah)anthracene	0.14 / 0.27 / 0.43	0.24 / 0.28 / 0.3	0.31/0.32/ 0.32	3.5 / 3.6 / 3.6	0.57/0.57/0.58	1.1 / 1.3 / 1.4
Fluoranthene	52 / 130 / 290	280 / 560 / 890	1500/1600/ 1600	23000/23000/ 23000	3100/3100/ 3100	6300 / 6300 / 6400
Fluorene	27 / 67 / 160	170 / 400 / 860	2800 ^{sol} (30.9) /3800 ^{sol} (76.5) /4500 ^{sol} (183)	63000 ^{sol} (30.9) / 68000 / 71000	9900 / 9900 / 9900	20000 / 20000 / 20000
Indeno(1,2,3-cd)pyrene	9.5 / 21 / 39	27 / 36 / 41	45 / 46 / 46	500 / 510 / 510	82 / 82 / 82	150 / 170 / 180
Naphthalene ^q	4.1 / 10 / 24	2.3 / 5.6 / 13	2.3 / 5.6 / 13	190 ^{sol} (76.4) / 460 ^{sol} (183) / 1100 ^{sol} (432)	4900/ 4900/ 4900	1200 ^{sol} (76.4) / 1900 ^{sol} (183) / 3000
Phenanthrene	15 / 38 / 90	95 / 220 / 440	1300 ^{sol} (36.0) / 1500/1500	22000 / 22000 / 23000	3100 / 3100 / 3100	6200 / 6200 / 6300
Pyrene	110 / 270 / 620	620 / 1200 / 2000	3700 / 3800 / 3800	54000 / 54000 / 54000	7400 / 7400 / 7400	15000 / 15000 / 15000
Coal Tar (Bap as surrogate marker)	0.32 / 0.67 / 1.2	0.79 / 0.98 / 1.1	1.2 / 1.2 / 1.2	15 / 15 / 15	2.2 / 2.2 / 2.2	4.4 / 4.7 / 4.8
Explosives^{a, b, l, p}						
2, 4, 6 Trinitrotoluene	0.24 / 0.58 / 1.40	1.6 / 3.7 / 8.0	65 / 66 / 66	1000/1000/1000	130/130 / 130	260 / 270 / 270
RDX (Royal Demolition Explosive C ₃ H ₆ N ₆ O ₆)	17 / 38 / 85	120 / 250 / 540	13000 / 13000 / 13000	210000 / 210000 / 210000	26000/26000/ 27000	49000 ^{sol} (18.7) / 51000 / 53000
HMX (High Melting Explosive C ₄ H ₈ N ₈ O ₈)	0.86 / 1.9 / 3.9	5.7 / 13 / 26	6700 / 6700 / 6700	110000 / 110000 / 110000	13000 / 13000 / 13000	23000 ^{vap} (0.35) /23000 ^{vap} (0.39) /24000 ^{vap} (0.48)

Determinand	Allotment	R _{HP}	R _{WP}	Commercial/ Industrial	POSresi	POSpark
Petroleum Hydrocarbons (SOM 1%/ 2.5%/ 6%)^{a, b, l, m}						
Aliphatic EC 5-6	730 / 1700 / 3900	42 / 78 / 160	42 / 78 / 160	3200 ^{sol} (304) / 5900 ^{sol} (558) / 12000 ^{sol} (1150)	570000 ^{sol} (304) / 590000 / 600000	95000 ^{sol} (304) / 130000 ^{sol} (558) / 180000 ^{sol} (1150)
Aliphatic EC >6-8	2300 / 5600 / 13000	100 / 230 / 530	100 / 230 / 530	7800 ^{sol} (144) / 17000 ^{sol} (322) / 40000 ^{sol} (736)	600000 / 610000 / 620000	150000 ^{sol} (144) / 220000 ^{sol} (322) / 320000 ^{sol} (736)
Aliphatic EC >8-10	320 / 770 / 1700	27 / 65 / 150	27 / 65 / 150	2000 ^{sol} (78) / 4800 ^{vap} (190) / 11000 ^{vap} (451)	13000 / 13000 / 13000	14000 ^{sol} (78) / 18000 ^{vap} (190) / 21000 ^{vap} (451)
Aliphatic EC >10-12	2200 / 4400 / 7300	130v ^{ap} (48) / 330 ^{vap} (118) / 760 ^{vap} (283)	130v ^{ap} (48) / 330 ^{vap} (118) / 770 ^{vap} (283)	9700 ^{sol} (48) / 23000 ^{vap} (118) / 47000 ^{vap} (283)	13000 / 13000 / 13000	21000 ^{sol} (48) / 23000 ^{vap} (118) / 24000 ^{vap} (283)
Aliphatic EC >12-16	11000 / 13000 / 13000	1100 ^{sol} (24) / 2400 ^{sol} (59) / 4300 ^{sol} (142)	1100 ^{sol} (24) / 2400 ^{sol} (59) / 4400 ^{sol} (142)	59000 ^{sol} (24) / 82000 ^{sol} (59) / 90000 ^{sol} (142)	13000 / 13000 / 13000	25000 ^{sol} (24) / 25000 ^{sol} (59) / 26000 ^{sol} (142)
Aliphatic EC >16-35 °	260000 / 270000 / 270000	65000 ^{sol} (8.48) / 92000 ^{sol} (21) / 110000	65000 ^{sol} (8.48) / 92000 ^{sol} (21) / 110000	1600000 / 1700000 / 1800000	250000 / 250000 / 250000	450000 / 480000 / 490000
Aliphatic EC >35-44 °	260000 / 270000 / 270000	65000 ^{sol} (8.48) / 92000 ^{sol} (21) / 110000	65000 ^{sol} (8.48) / 92000 ^{sol} (21) / 110000	1600000 / 1700000 / 1800000	250000 / 250000 / 250000	450000 / 480000 / 490000
Aromatic EC 5-7 (benzene)	13 / 27 / 57	70 / 140 / 300	370 / 690 / 1400	260000 ^{sol} (1220) / 46000 ^{sol} (2260) / 86000 ^{sol} (4710)	56000 / 56000 / 56000	76000 ^{sol} (1220) / 84000 ^{sol} (2260) / 92000 ^{sol} (4710)
Aromatic EC >7-8 (toluene)	22 / 51 / 120	130 / 290 / 660	860 / 1800 / 3900	56000 ^{vap} (869) / 110000 ^{sol} (1920) / 180000 ^{vap} (4360)	56000 / 56000 / 56000	87000 ^{vap} (869) / 95000 ^{sol} (1920) / 100000 ^{vap} (4360)
Aromatic EC >8-10	8.6 / 21 / 51	34 / 83 / 190	47 / 110 / 270	3500 ^{vap} (613) / 8100 ^{vap} (1500) / 17000 ^{vap} (3580)	5000 / 5000 / 5000	7200 ^{vap} (613) / 8500 ^{vap} (1500) / 9300 ^{vap} (3580)
Aromatic EC >10-12	13 / 31 / 74	74 / 180 / 380	250 / 590 / 1200	16000 ^{sol} (364) / 28000 ^{sol} (899) / 34000 ^{sol} (2150)	5000 / 5000 / 5000	9200 ^{sol} (364) / 97000 ^{sol} (899) / 10000
Aromatic EC >12-16	23 / 57 / 130	140 / 330 / 660	1800 / 2300 ^{sol} (419) / 2500	36000 ^{sol} (169) / 37000 / 38000	5100 / 5100 / 5000	10000 / 10000 / 10000
Aromatic EC >16-21 °	46 / 110 / 260	260 / 540 / 930	1900 / 1900 / 1900	28000 / 28000 / 28000	3800 / 3800 / 3800	7600 / 7700 / 7800
Aromatic EC >21-35 °	370 / 820 / 1600	1100 / 1500 / 1700	1900 / 1900 / 1900	28000 / 28000 / 28000	3800 / 3800 / 3800	7800 / 7800 / 7900
Aromatic EC >35-44 °	370 / 820 / 1600	1100 / 1500 / 1700	1900 / 1900 / 1900	28000 / 28000 / 28000	3800 / 3800 / 3800	7800 / 7800 / 7900
Aliphatic+Aromatic EC >44-70 °	1200 / 2100 / 3000	1600 / 1800 / 1900	1900 / 1900 / 1900	28000 / 28000 / 28000	3800 / 3800 / 3800	7800 / 7800 / 7900
Chloroalkanes & Chloroalkenes (SOM 1%/ 2.5%/ 6%)^{a, b, l, p}						
1,2-Dichloroethane	0.0046 / 0.0083 / 0.016	0.0071 / 0.011 / 0.019	0.092 / 0.013 / 0.023	0.67 / 0.97 / 1.7	29 / 29 / 29	21 / 24 / 28
1,1,1 Trichloroethane (TCA)	48 / 110 / 240	8.8 / 18 / 39	9.0 / 18 / 40	660 / 1300 / 3000	140000 / 140000 / 140000	57000 ^{vap} (1425) / 76000 ^{vap} (2915) / 100000 ^{vap} (6392)
1,1,1,2 Tetrachloroethane	0.79 / 1.9 / 4.4	1.2 / 2.8 / 6.4	1.5 / 3.5 / 8.2	110 / 250 / 560	1400 / 1400 / 1400	1500 / 1800 / 2100
1,1,2,2 Tetrachloroethane	0.41 / 0.89 / 2.0	1.6 / 3.4 / 7.5	3.9 / 8.0 / 17	270 / 550 / 1100	1400 / 1400 / 1400	1800 / 2100 / 2300
Tetrachloroethene (PCE)	0.65 / 1.5 / 3.6	0.18 / 0.39 / 0.90	0.18 / 0.4 / 0.92	19 / 42 / 95	1400 / 1400 / 1400	810 ^{sol} (424) / 1100 ^{sol} (951) / 1500
Tetrachloromethane (Carbon Tetrachloride)	0.45 / 1.0 / 2.4	0.026 / 0.056 / 0.13	0.026 / 0.056 / 0.13	2.9 / 6.3 / 14	890 / 920 / 950	190 / 270 / 400
Trichloroethene (TCE)	0.041 / 0.091 / 0.21	0.016 / 0.034 / 0.075	0.017 / 0.036 / 0.080	1.2 / 2.6 / 5.7	120 / 120 / 120	70 / 91 / 120
Trichloromethane (Chloroform)	0.42 / 0.83 / 1.7	0.91 / 1.7 / 3.4	1.2 / 2.1 / 4.2	99 / 170 / 350	2500 / 2500 / 2500	2600 / 2800 / 3100
Chloroethene (Vinyl Chloride)	0.00055 / 0.001 / 0.0018	0.00064 / 0.00087 / 0.0014	0.00077 / 0.001 / 0.0015	0.059 / 0.077 / 0.12	3.5 / 3.5 / 3.5	4.8 / 5.0 / 5.4
Phenol & Chlorophenols^{a, b, l, p}						
Phenol	23 / 42 / 83	120 / 200 / 380	440 / 690 / 1200	440 ^{dr} (26000) / 690 ^{dr} (30000) / 1300 ^{dr} (34000)	440 ^{dr} (10000) / 690 ^{dr} (10000) / 1300 ^{dr} (10000)	440 ^{dr} (7600) / 690 ^{dr} (8300) / 1300 ^{dr} (93000)
Chlorophenols (excluding PCP) ^f	0.13 ^s / 0.3 / 0.7	0.87 ^s / 2.0 / 4.5	94 / 150 / 210	3500 / 4000 / 4300	620 / 620 / 620	1100 / 1100 / 1100
Pentachlorophenol (PCP)	0.03 / 0.08 / 0.19	0.22 / 0.52 / 1.2	27 ^{vap} (16.4) / 29 / 31	400 / 400 / 400	60 / 60 / 60	110 / 120 / 120
Other^{a, b, l, p}						
Carbon Disulphide	4.8 / 10 / 23	0.14 / 0.29 / 0.62	0.14 / 0.29 / 0.62	11 / 22 / 47	11000 / 11000 / 12000	1300 / 1900 / 2700
Hexachlorobutadiene (HCBD)	0.25 / 0.61 / 1.4	0.29 / 0.7 / 1.6	0.32 / 0.78 / 1.8	31 / 66 / 120	25 / 25 / 25	48 / 50 / 51

Determinand	Allotment	R _{WH} HP	R _{WO} HP	Commercial/ Industrial	POSresi	POSpark
Pesticides (SOM 1%/ 2.5%/ 6%)^{a, b, l, p}						
Aldrin	3.2 / 6.1 / 9.6	5.7 / 6.6 / 7.1	7.3 / 7.4 / 7.5	170 / 170 / 170	18 / 18 / 18	30 / 31 / 31
Atrazine	0.5 / 1.2 / 2.7	3.3 / 7.6 / 17.4	610 / 620 / 620	9300 / 9400 / 9400	1200 / 1200 / 1200	2300 / 2400 / 2400
Dichlorvos	0.0049 / 0.010 / 0.022	0.032 / 0.066 / 0.14	6.4 / 6.5 / 6.6	140 / 140 / 140	16 / 16 / 16	26 / 26 / 27
Dieldrin	0.17 / 0.41 / 0.96	0.97 / 2 / 3.5	7.0 / 7.3 / 7.4	170 / 170 / 170	18 / 18 / 18	30 / 30 / 31
Alpha - Endosulfan	1.2 / 2.9 / 6.8	7.4 / 18 / 41	160 ^{vap} (0.003) / 280 ^{vap} (0.007) / 410 ^{vap} (0.016)	5600 ^{vap} (0.003) / 7400 ^{vap} (0.007) / 8400 ^{vap} (0.016)	1200 / 1200 / 1200	2400 / 2400 / 2500
Beta - Endosulfan	1.1 / 2.7 / 6.4	7.0 / 17 / 39	190 ^{vap} (0.00007) / 320 ^{vap} (0.0002) / 440 ^{vap} (0.0004)	6300 ^{vap} (0.00007) / 7800 ^{vap} (0.0002) / 8700	1200 / 1200 / 1200	2400 / 2400 / 2500
Alpha-Hexachlorocyclohexane	0.035 / 0.087 / 0.21	0.23 / 0.55 / 1.2	6.9 / 9.2 / 11	170 / 180 / 180	24 / 24 / 24	47 / 48 / 48
Beta - Hexachlorocyclohexane	0.013 / 0.032 / 0.077	0.085 / 0.2 / 0.46	3.7 / 3.8 / 3.8	65 / 65 / 65	8.1 / 8.1 / 8.1	15 / 15 / 16
Gamma - Hexachlorocyclohexane	0.0092 / 0.023 / 0.054	0.06 / 0.14 / 0.33	2.9 / 3.3 / 3.5	67 / 69 / 70	8.2 / 8.2 / 8.2	14 / 15 / 15
Chlorobenzenes^{a, b, l, p}						
Chlorobenzene	5.9 / 14 / 32	0.46 / 1.0 / 2.4	0.46 / 1.0 / 2.4	56 / 130 / 290	11000 / 13000 / 14000	1300 ^{sol} (675) / 2000 ^{sol} (1520) / 2900
1,2-dichlorobenzene (1,2-DCB)	94 / 230 / 540	23 / 55 / 130	24 / 57 / 130	2000 ^{sol} (571) / 4800 ^{sol} (1370) / 11000 ^{sol} (3240)	90000 / 95000 / 98000	24000 ^{sol} (571) / 36000 ^{sol} (1370) / 51000 ^{sol} (3240)
1,3-dichlorobenzene (1,3-DCB)	0.25 / 0.6 / 1.5	0.4 / 1.0 / 2.3	0.44 / 1.1 / 2.5	30 / 73 / 170	300 / 300 / 300	390 / 440 / 470
1,4-dichlorobenzene (1,4-DCB)	15 ⁱ / 37 ⁱ / 88 ⁱ	61 ^q / 150 ^q / 350 ^q	61 ^q / 150 ^q / 350 ^q	4400 ^{vap, q} (224) / 10000 ^{vap, q} (540) / 25000 ^{vap, q} (1280)	17000 ⁱ / 17000 ⁱ / 17000 ⁱ	36000 ^{vap, i} (224) / 36000 ^{vap, i} (540) / 36000 ^{vap, i} (1280)
1,2,3-Trichlorobenzene	4.7 / 12 / 28	1.5 / 3.6 / 8.6	1.5 / 3.7 / 8.8	102 / 250 / 590	1800 / 1800 / 1800	770 ^{vap} (134) / 1100 ^{vap} (330) / 1600 ^{vap} (789)
1,2,4- Trichlorobenzene	55 / 140 / 320	2.6 / 6.4 / 15	2.6 / 6.4 / 15	220 / 530 / 1300	15000 / 17000 / 19000	1700 ^{vap} (318) / 2600 ^{vap} (786) / 4000 ^{vap} (1880)
1,3,5- Trichlorobenzene	4.7 / 12 / 28	0.33 / 0.81 / 1.9	0.33 / 0.81 / 1.9	23 / 55 / 130	1700 / 1700 / 1800	380 ^{vap} (36.7) / 580 ^{vap} (90.8) / 860 ^{vap} (217)
1,2,3,4-Tetrachlorobenzene	4.4 / 11 / 26	15 / 36 / 78	24 / 56 / 120	1700 ^{vap} (122) / 3080 ^{vap} (304) / 4400 ^{vap} (728)	830 / 830 / 830	1500 ^{vap} (122) / 1600 / 1600
1,2,3,5- Tetrachlorobenzene	0.38 / 0.90 / 2.2	0.66 / 1.6 / 3.7	0.75 / 1.9 / 4.3	49 ^{vap} (39.4) / 120 ^{vap} (98.1) / 240 ^{vap} (235)	78 / 79 / 79	110 ^{vap} (39) / 120 / 130
1,2,4,5- Tetrachlorobenzene	0.06 / 0.16 / 0.37	0.33 / 0.77 / 1.6	0.73 / 1.7 / 3.5	42 ^{sol} (19.7) / 72 ^{sol} (49.1) / 96	13 / 13 / 13	25 / 26 / 26
Pentachlorobenzene (P ₅ CB)	1.2 / 3.1 / 7.0	5.8 / 12 / 22	19 / 30 / 38	640 ^{sol} (43.0) / 770 ^{sol} (107) / 830	100 / 100 / 100	190 / 190 / 190
Hexachlorobenzene (HCB)	0.47 / 1.1 / 2.5	1.8 ^{vap} (0.20) / 3.3 ^{vap} (0.5) / 4.9	4.1 ^{vap} (0.20) / 5.7 ^{vap} (0.5) / 6.7 ^{vap} (1.2)	110 ^{vap} (0.20) / 120 / 120	16 / 16 / 16	30 / 30 / 30

- R_{WH}HP Residential with homegrown produce
 R_{WO}HP Residential without homegrown produce
 POSresi public open spaces near residential housing
 POSpark public open space for recreational use but not dedicated sports pitches
 SOM Soil Organic Matter – **the S4UL for all organic compounds will vary according to SOM**
- a Based on a sandy loam soil as defined in SR3 (Environment Agency, 2009b) and 6% soil organic matter (SOM)
 b Figures rounded to two significant figures
 c Based only on a comparison of oral and dermal soil exposure with oral Index Dose
 d The background ADE is limited to being no larger than the contribution from the relevant soil ADE
 e Based on comparison of inhalation exposure with inhalation TDI only
 f Based on a lifetime exposure via the oral, dermal and inhalation pathways
 g Based on localised effects comparing inhalation exposure with inhalation ID only
 h Based on comparison of inhalation exposure with inhalation ID
 i Based on comparison of oral and dermal exposure with oral TDI
 j Based on comparison of oral, dermal and inhalation exposure with inhalation TDI
 k Based on comparison of all exposure pathways with oral TDI
 l S4ULs assume that free phase contamination is not present
 m S4ULs based on a sub-surface soil to indoor air correction factor of 10
 n The HCV applied is based on the intake of total Xylene and therefore exposure should not consider an isomer in isolation
 o Oral, dermal and inhalation exposure compared with oral HCV
 p S4ULs based on a sub-surface soil to indoor air correction factor of 1
 q Based on a comparison of inhalation exposure with the inhalation TDI for localised effects
 r Based on 2,4-dichlorophenol unless otherwise stated
 s Based on 2,3,4,6-tetrachlorophenol
 vap S4UL presented exceeded the vapour saturation limit, which is presented in brackets
 sol S4UL presented exceeds the solubility saturation limit, which is presented in brackets
 dir S4ULs based on a threshold protective of direct skin contact, guideline in brackets based on the health effects following long term exposure provided for illustration only

Copyright Land Quality Management Ltd reproduced with permission; Publication number S4UL3829. All rights reserved.

Category 4 Screening Levels (C4SL) – Table taken from SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document (Department for Environmental, Food and Rural Affairs December 2014).

	Residential (with home-grown produce)	Residential (without home-grown produce)	Allotments	Commercial	Public Open Space 1	Public Open Space 2
Arsenic	37	40	49	640	79	170
Benzene	0.87	3.3	0.18	98	140	230
Benzo(a)pyrene	5.0	5.3	5.7	77	10	21
Cadmium	22	150	3.9	410	220	880
Chromium VI	21	21	170	49	21	250
Lead	200	310	80	2300	630	1300

All in mg/kg

Public Open Space 1 – for grassed area adjacent to residential housing

Public Open Space 2 - Park Type Public Open Space Scenario