Land Science

45A UNDERDOWN ROAD, SOUTHWICK, BN42 4HN

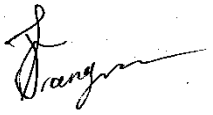
PHASE II GEOTECHNICAL GROUND INVESTIGATION

MR STEVE WOOD

15TH SEPTEMBER 2021

LS5838

Site:	**45A UNDERDOWN ROAD, SOUTHWICK, BN42 4HN**
Title:	**GEOTECHNICAL GROUND INVESTIGATION**
Project:	**CONSTRUCTION OF A BUNGALOW WITH HABITABLE LOFT SPACE**
Client:	**MR STEVE WOOD**
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Prepared by:		**JAKE TRANGMAR B.Sc. (Hons.)** **Project Environmental Scientist**
Checked by:		**ADAM CORMACK HNC, FGS** **Project Manager**
Authorised by:		**ELLIOT TOMS CEnv M.Sc., B.Sc. (Hons.), FGS, MIEnvSci** **Managing Director**

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1.0 INTRODUCTION

1.1 General

Land Science was instructed to undertake a Geotechnical Ground Investigation in relation to the construction of a new build detached dwelling at 45A Underdown Road, Southwick, BN42 4HN. The location is shown on Figure 1, which is centred at grid reference TQ2402 1058.

1.2 Client

The Client for this appointment was Mr Steve Wood. This report may only be used by this named client and their directly appointed project team for the purposes set out in the report conditions. It was understood that the Client already owned the property, and that this investigation was not a pre-purchase appraisal.

1.3 Area Under Investigation

The area under investigation comprised of the garden of 45A Underdown Road, Southwick, BN42 4HN which contained a parcel of lawn, with a summerhouse in the south western and south eastern corner. The layout is indicated on Figure 2, and a walkover survey is presented in section 3.0. The area was approximately 0.10 hectares.

1.4 Form of Development

The proposed development was understood to comprise the construction of a 4no. bed bungalow with habitable loft space. The dwelling was to be surrounded by hard landscaping with a small area of soft landscaping to the east. The proposed development was covered under planning application number AWDM/0608/20. This planning application also included alterations to the existing dwelling (which was to be retained) although this was not relevant to this investigation. Figure 3 illustrates the layout of the proposed redevelopment. The findings of this report may be not valid if the proposed development is altered.

1.5 Previous Investigations

Land Science was not aware of any previous desk studies undertaken on this site and for this scheme; however, evidence of a previous intrusive investigation was identified with a monitoring well already located on site, but no reports were supplied to Land Science.

1.6 Scope of Work

The work carried out is described in detail in following sections but in summary included:

- A review of historical land uses, a review of a ground stability and mining report, and assessment of Radon gas.
- An intrusive investigation comprising dynamic sampler boreholes
- Preliminary geotechnical testing of selected soils in the field and laboratory

- Preliminary chemical testing of selected soil in laboratory

The fieldwork was conducted on 23rd August 2021, under the supervision of Land Science.

1.7 Geotechnical Objectives

An interpretive Ground Investigation Report (GIR) was required in order to provide an assessment of ground conditions with respect to proposed foundations and concrete specification.

2.0 STANDARDS AND REFERENCES

2.1 Standards

Where practicable, the investigation was undertaken in accordance with the following primary standards and guidance:

- BS 5930:2015 Code of Practice for Site Investigations
- BS 1377:2018 Soils for Civil Engineering Purposes
- BS 8004:2015 Code of Practice for Foundations
- BS EN 1997-2:2007. Eurocode 7: Geotechnical Design – Part 2: Ground Investigation and testing.

Other technical sources have been cited in respect of specific aspects of the investigation, as referenced throughout the text.

2.2 References

A number of technical references have been referred to in the preparation of this document, including:

- Smith, I. (2014) Smith's Elements of Sil Mechanics. Chichester. Wiley Blackwell. 9th Edition.
- Radon: Guidance on protective measures for new buildings, BRE Report BR 211, 2015 2ND edition
- Revised EU Waste Framework Directive 2008 2008/98/EC [transposed into English law under The Waste (England and Wales) Regulations 2011]
- European Community (EC) Directive 1999/31/EC [transposed into English law under the Landfill (England and Wales) Regulations 2002]
- Defining Waste Recovery - Permanent Deposit of Waste on Land, EPR13 v1.0, EA 2010
- The definition of waste: Development Industry Code of Practice, v2, CL:AIRE 2011
- Guidance on the classification and assessment of waste Technical Guidance WM3 ("WM3") EA publication (1st edition 2015)

3.0 DESK STUDY

3.1 General

A desk study was carried out to inform the preliminary conceptual understanding of the site and its setting, and to identify potential aspects of concern, in the context of the stated report objectives.

3.2 Walkover Survey

A walkover survey was carried out, as recorded in Appendix A. In summary, the area under investigation comprised land to the south of a single storey house with habitable loft space with a single storey side extension which contained associated garden space and 2no. summerhouses (southwest and southeast of site).

The following key features were identified:

- A number of all mature trees were noted in the vicinity of the proposed dwelling. These included conifer to heights estimated at around 10-12m. Furthermore, a mixed native hedgerow was noted around the southern site boundaries, which was also close to the proposed building footprint.

3.3 Historical Land Use Data

Various historical records were reviewed in order to assess potential historical land uses and activities that may impact on ground conditions at the site.

Free historic maps were reviewed online and the following key features were noted:

- The earliest map dated 1875 showed the site comprised undeveloped land which was segregated with numerically labelled plots. The site lies within plot *338* with an unlabelled road to the east, considered to be Underdown Road.
- *Underdown Road* adjacent to the east of the site, which was first mapped in 1898.
- The 1912 map showed the site to be an area of undeveloped land with a small outbuilding to the rear of a residential dwelling.
- By 1966, a row of three outbuildings (believed to be garages) were noted to the rear no No.47.
- No further significant changes were noted, however due to larger scale, fine details could not be observed.
- Off site, the site lies within a residential area with *Allotment Gardens* situated adjacent to the northeast of the site, and *Norfolk Lodge* adjacent to the south, and dwellings to the east. An access path was noted leading from *Underdown Road.*

Recent aerial photography covering the site was examined using Google Earth Pro. Imagery dated between 1985-2021 identified the site to commensurate with present day.

3.4 Ground Conditions

A preliminary ground model was derived for the site by based on a combination of various sources including published maps, borehole records, previous investigations, and the site history. In summary, the following potential ground model was identified:

Strata	Approximate Depth (mbgl)	Summary Description
Head Deposits	6.00mbgl	Head is poorly sorted and poorly stratified, angular rock debris and/or clayey hillwash and soil creep, mantling a hillslope and deposited by solifluction and gelifluction processes.
Tarrant Chalk Member	To depth	Soft white chalk with relatively widely spaced but large flint seams.

No groundwater was anticipated.

The desk study included searches of geological hazards. The following report found no hazards were identified as moderate, or above.

A search of various databases for coal mining, mining, brine compensation, and natural cavities was carried-out. No relevant features were identified.

3.5 Environmental Setting

The site lies in the following groundwater setting:

- Superficial aquifer: The Head Deposit strata was classified as a Secondary Undifferentiated - Assigned in cases where it has not been possible to attribute either category A or B to a rock type. May be permeable or limited permeability.
- Bedrock aquifer: The Tarrant Chalk Member strata was classified as a Principal Aquifer - Strata that have high inter-granular and/or fracture permeability, usually providing a high level of water storage. They may support water supply and/or river base flow on a strategic scale.
- Source protection zone: A no groundwater Source Protection Zones were identified on site or in the vicinity.
- Flooding from Rivers and Sea: Zone 1 Low Probability - Land having a less than 1 in 1,000 annual probability of river or sea flooding
- Surface water flooding on site: Medium risk - each year this area has a chance of flooding of between 1% and 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

3.6 Radon Gas

The requirement for Radon Protection Measures (RPM) has been assessed in accordance with BRE 211:2015. Public Health England and the BGS estimate the potential for radon and the requirement for Radon Protection Measures on site as follows:

- Radon probability: Low probability - Between 1% and 3% of homes are estimated by PHE to exceed the threshold for Radon gas in residential dwellings.
- Radon Protection Measures (RPM): No Radon protection is required for new dwellings or extensions constructed at this location.

4.0 INTRUSIVE INVESTIGATION

4.1 Investigation Strategy

Based on the geotechnical objectives, the intrusive investigation was based on the following strategy:

- Dynamic sampler boreholes were used to minimise disruption to the site
- The positions were located to give broad coverage across the footprint of the proposed dwelling

Position	Targets			Testing
	Provisional Depth / strata	Existing Location	Proposed Location	
DS1	5.00mbgl or refusal	Rear garden	Footprint of proposed dwelling	SHDP
DS2				
DS3				

4.2 Dynamic (Windowless) Sampling (DS)

Dynamic Sampling entails 1m long hollow tubes with liners driven into the ground and retracted in order to obtain samples. The process is repeated sequentially to the target depth, unless impenetrable strata or borehole instability prevent further progress. The liners are split, logged, tested, and subsampled as required.

4.3 Super Heavy Dynamic Probing (SHDP)

Dynamic Probing involves driving a cone point into the ground using a percussive hammer and recording the number of blows required for each increment of penetration. The mass and falling height of the hammer, the energy efficiency, the dimensions of the cone, the rod specifications and rod friction are important considerations. A range of configurations are prescribed in Eurocode 7 and EN ISO 22476-2; the type deployed was *DPSH-A*.

5.0 GROUND CONDITIONS

5.1 General

The expected ground conditions were anticipated to comprise Head Deposits to depth; Topsoil and Made Ground was encountered at surface.

A summary of the encountered conditions is presented below.

Base Depth (mbgl)			Strata
DS1	DS2	DS3	
0.40	0.70	0.60	Topsoil
1.00	-	-	Made Ground
1.60	-	-	Head Deposits (Granular)
2.60	2.10	2.40	Head Deposits (Cohesive)
+5.00	+4.00	+5.00	Head Deposits (Granular)

The identification of materials encountered as specific geological strata is tentative and should be used as a guide, and interpolation between or below investigation points should be treated with caution.

5.2 Topsoil

A thin cover of topsoil was encountered at surface to depths between 0.40-0.70mbgl and was generally described as a dark brown, slightly sandy, slightly gravelly, slightly clayey SILT with flints, and brick and pottery fragments. These materials are identified separately from Made Ground, even though they may have been disturbed through human activity and contain recent entrained materials such as fragments of brick and concrete.

5.3 Made Ground

Made Ground was encountered within DS01 only to a depth of 1.00mbgl; the stratum generally comprised light orangey brown, slightly sandy, gravelly, clayey SILT with flint, brick, and pottery fragments. This was encountered at DS01, close to a concrete pathway.

5.4 Head Deposits

Head Deposit was encountered to the full extent of the investigation (5.00mbgl) and generally comprised a light brown to orange-brown sandy gravelly CLAY, gravels are fine to coarse sub-angular flint, locally chalk, sands fine to medium. Beneath this the Head Deposits comprised a light brown gravelly fine to medium SAND, gravels comprised rare fine to coarse sub-angular to sub-rounded flint. A granular layer was encountered above the cohesive within DS1, which comprised a sandy clayey GRAVEL.

5.5 Roots and Rootlets

Roots and rootlets were identified in all positions, as presented below.

Position	Roots and rootlets
DS01	0.00 - 0.40mbgl; Occasional roots and rootlets
DS02	0.00 - 0.90mbgl; Occasional roots and rootlets
DS03	0.00 - 0.90mbgl; Occasional roots and rootlets

5.6 Field Evidence of Contamination

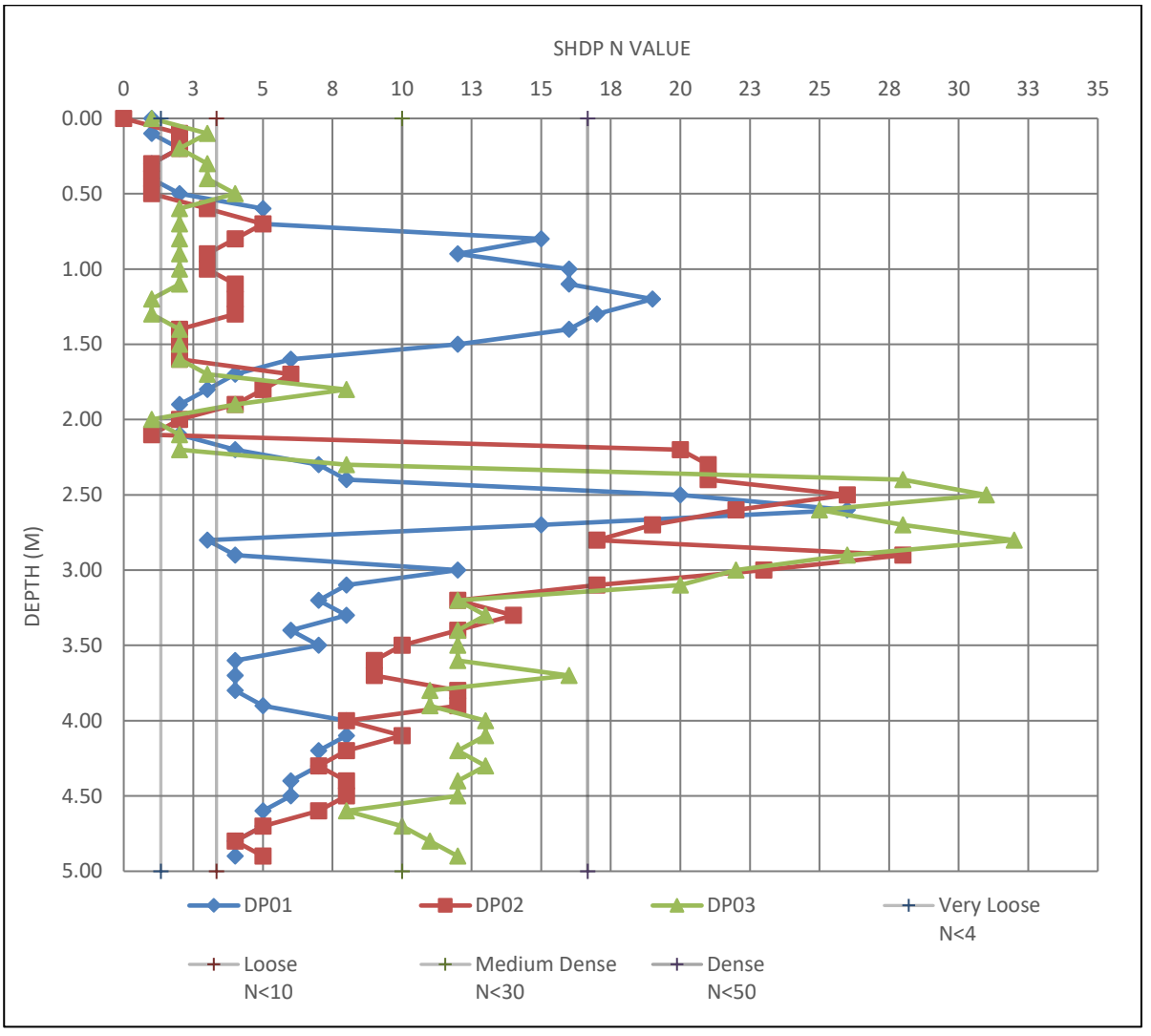
Potential Asbestos Containing Materials (PACM's) were identified at the location of DS02, testing was carried out as described in section 6.1.

Made Ground was identified to 1.00mbgl, and such materials may be imported from an unknown source or mixed with hazardous materials, and as such may contain a wide range of potential contaminants. All such materials should be treated as suspect unless proven otherwise. Preliminary testing has been carried out, as described in section 7.1.

6.0 FIELD TESTING

6.1 Super Heavy Dynamic Probing (SHDP)

Dynamic Probing involves driving a cone point using a percussive hammer and recording the number of blows required for each increment of penetration. The particular testing method employed was DPSH-A as prescribed under BS EN 1997-:2004 and EN ISO 22476-2. The results are summarised below:



No hand penetrometer or shear vane testing could be carried out within the cohesive Head Deposits due to the amount of granular material producing inaccurate results.

7.0 LABORATORY TESTING

7.1 Geochemical Laboratory Analysis

Samples were selected for geochemical (contamination) analysis, based on the following:

- Due to suspected ACM's near DS02, a shallow sample (0.50mbgl) was tested for a routine screening suite (LS1), screened for asbestos, and also tested for Waste Acceptance Criteria (WAC) test (LS2), to provide information on waste disposal.

The scope and extent of testing was considered appropriate.

Sample	Strata	Suite		
		LS1	Asbestos	LS2
DS02 (0.50mbgl)	Made Ground	✓	✓	✓

The relevant screening suites are defined below. Where duplicate analysis exists between suites, each test is performed only once:

Suite	Definition
LS1	Screening suite: pH, fraction of organic carbon, Metals and Non Metals, water soluble Sulphate, Sulphide, total Cyanide, total Phenols, speciated PAH's.
Asbestos	Asbestos screen: Laboratory screening for fibres and Asbestos Containing Materials; identification where identified. Using polarising light and dispersion staining as described in HSG 248, HSE Contract Research Report No 83/1996and in Davies et al, 1996.
LS2	Waste Acceptance Criteria: Total Organic Carbon, Loss on Ignition, BTEX, speciated PCB's, Mineral Oil (EC10 – EC40), pH, Acid Neutralisation Capacity, speciated PAH's, 10:1 leachable Metals and Non Metals.

The results are discussed in the relevant sections.

7.2 Geotechnical Laboratory Testing

Samples were selected for geotechnical testing, based on the following rationale:

- For general classification purposes, representative cohesive natural samples of soil were analysed for 1pt Atterberg Limit tests (otherwise known as plasticity indexes (PI)).
- Moisture content (MC) tests were carried out in association with the Atterberg.
- Also, for general classification purposes, representative samples of granular soils were selected for Particle Size Distribution by wet sieving (PSD).
- To determine the required concrete specification to resist chemical attack, samples were tested for pH and soil soluble sulphate. (pH/SO4)

A summary of the testing scheduled is given below:

Sample	Strata	Test			
		PI	MC	PSD	pH/SO4
DS01 (1.50mbgl)	Head Deposits	-	-	✓	-
DS01 (2.20mbgl)		✓	✓	-	-
DS02 (1.30mbgl)		✓	✓	-	-
DS02 (1.80mbgl)		-	-	-	✓
DS03 (1.50mbgl)		✓	✓	-	-
DS03 (2.50mbgl)		-	-	✓	-

The results are discussed in the relevant sections.

8.0 GEOTECHNICAL ASSESSMENT

8.1 General

The proposed development was understood to comprise a 4no. bed bungalow construction with habitable loft space and garden, to the south of the existing dwelling.

Shrinkable soils were identified, which may be susceptible to heave and shrinkage caused by changes in moisture content seasonally and through the action of tree roots. Large trees were noted off-site to the west, and hedgerows were noted to occupy the southern and south-eastern boundaries. The design of foundations will need to take this into account.

Based on the ground and groundwater conditions encountered, it is considered that traditional strip foundations would be appropriate for the proposed development.

8.2 Volume Change Potential

Soil shrinkability has been assessed following the NHBC Standards Chapter 4.2. The advice of this publication or similar guidance should be taken when designing and constructing foundations in the zone of influence of trees and hedgerows that currently exist, are to be planted, or have recently been felled.

Strata	% passing 425µm sieve	Modified Plasticity Index	Shrinkability classification
Head Deposits - Cohesive	-	10-20%	Low volume change potential
Head Deposits – Granular	<10%	<10%	Not susceptible to significant volume change

Specifications for heave precautions on low volume change potential soils are summarised below. In addition to the depths marked *, localised deepening of foundations will be required in the influence of trees; it will be necessary to evaluate tree species and height in relation to the proposed building footprints.

Volume Change Potential		Low
Minimum depth for traditional foundations outside zone of influence of trees (m) *		0.75m
No tree planting zone required for minimum depth foundations above (m)		0.2 x mature tree height
Minimum depth for traditional foundations but allowing for restricted new planting (m) *		1.00m
Minimum void dimension	Against side of traditional foundations and ground beams etc.	0mm
	Beneath ground beam and suspended in-situ concrete ground floors etc.	50mm
	Beneath suspended precast concrete or timber floors etc.	200mm
Minimum allowance for potential ground movement for new drains		50mm

All foundations should extend below any major root zones or desiccated soil encountered, and trenches should be carefully inspected accordingly.

8.3 Traditional Shallow Foundations

The following recommendations are made where traditional foundations are to be used.

The primary design parameter for shallow foundations is maximum net allowable bearing pressure, which takes into account a tolerable degree of settlement, and is dependent not only on soil conditions but also the foundation dimensions, ground levels, sloping ground, and the symmetry of loading, amongst others.

All traditional shallow foundations should be taken through any Made Ground, soft or loose zones, disturbed soils, major root zones, or desiccated materials and taken wholly into or onto the firm to stiff gravelly clay of the Head Deposits circa 1.60mbgl.

Foundations spanning between granular and cohesive formations should be avoided, and it is anticipated the footings would be taken below the superficial granular head encountered in DS01. Alternatively, consideration maybe given to reducing the allowable bearing pressure and incorporating reinforcement, to mitigate differential load-settlement characteristics.

A long narrow strip foundation, as described above, symmetrically loaded and up to a width of 1.00m, may be designed based on a maximum allowable net bearing pressure of 80kN/m^2.

This assessment includes an appropriate factor of safety against shear failure, and settlements should remain within appropriate limits. This figure should be sufficient for the type of construction proposed.

In general terms, settlement will be broadly proportional to loading. Under no circumstances should a safe bearing pressure be exceeded (at which point there is a risk of shear failure). Foundations should be subject to sensibly uniform loading, to minimise differential settlement.

The cohesive Head Deposits will soften rapidly when exposed to free water. The final 50mm of any foundation trench should not be excavated until immediately before concreting, unless blinded or otherwise protected immediately after excavation.

8.4 Ground Floor Slabs

Given the presence of soils susceptible to volume change potential (i.e. shrinkable), it is recommended that all ground floor slabs should be fully suspended, with a suitable minimum void space.

8.5 Excavations

The risks arising from excavation works should be properly assessed and appropriate safety precautions should be adopted. Reference may be made to various guidance including BS8000-1:1989, BS6031:2009 and CIRIA C97.

The likelihood of excavation instability through different strata has been assessed as summarised below. It should be noted that all open unsupported excavations have the potential to collapse.

Strata	Stability
Topsoil/Made Ground	Generally unstable. May be battered back to a safe angle. Deeper excavations may require trench support.
Head Deposits - Cohesive	Generally stable in the short to medium term.
Head Deposits - Granular	Marginally stable in the short term. Spalling and collapse should be expected, particularly in long or deep excavations which are left open for prolonged periods.

Excavations which are to remain open for prolonged periods will require trench support. It is considered that normal-rated plant and machinery will be sufficient for undertaking excavations. Care should be taken so as not to undermine existing structures, services, or adjacent property.

Adjacent excavations should generally be tackled in order of depth with the deepest first. Vehicles and spoil heaps etc. should not surcharge excavations, and edge protection and fencing should be used as appropriate. Frozen materials should generally not be used as backfill.

8.6 Pavements

The design of pavements will depend on the performance requirements and specification, as well as the ground conditions and finished levels etc. The suitability of shallow soils encountered as a formation level for pavements is summarised as follows:

Strata	Depth range	Suitability
Topsoil	0.40-0.70mbgl	Not suitable for trafficable pavements. All topsoil should be removed and replaced.
Made Ground	1.00mbgl	Only suitable for pavements with low performance requirements. A CBR value for these materials will not reflect the possible settlements that may occur. The materials will be frost susceptible so a minimum pavement thickness of 450mm will be required, and the formation will need to be adequately proof-rolled and treated
Head Deposit - Cohesive	2.10 to 2.60mbgl	These materials are generally a suitable formation level. Based on the Atterberg Limit test results, the formation materials should be considered as being non-frost susceptible for pavement design purposes.

With reference to Transport Road Research Laboratory Report LR1132 "The Structural Design of Bituminous Roads", a CBR index of 5% is considered appropriate for cohesive Head Deposits assuming average construction conditions and a deep groundwater table.

The formation level should be carefully inspected, and any soft or loose zones should be removed and replaced with engineering fill, well-compacted in layers to a suitable specification. Consideration

might be given to installing geotextiles. Cohesive formations will degrade rapidly if exposed to standing water for even short periods. All engineering fill should be granular and non-frost susceptible (i.e. <10% fine material passing 425µm sieve).

8.7 Building Materials

Based on BS8500-1:2015+A1:2016, the results of the Sulphate and pH analyses fell into Class DS-1 and an ACEC class AC-1 is deemed appropriate. The advice of this publication should be taken for the design and specification of all sub surface concrete.

9.0 PRELIMINARY CONTAMINATION ASSESSMENT

Suspected PACM was identified within the vicinity of DS02. As a matter of routine, the chemical testing carried out for waste classification purposes have also been compared to the standards for residential land uses (with plant uptake) based on a soil organic matter (SOM) of 2.50%. Whilst other standards exist, such as the LQM Generic Assessment Criterion and the Environment Agency's Soil Guideline Values, these are considered to have been superseded by the above publications. A summary is presented below:

- Elevated PAH's (Benzo(b)fluoranthene, Benzo(a)pyrene and Di-benzo(a,h)anthracene)
- Elevated heavy metals (Lead)

9.1 PAH's

With respect to Polycyclic Aromatic Hydrocarbons (PAH's) and for this assessment Land Science have adopted the surrogate marker approach described in Appendix E or the C4SL suite of documents i.e./ using benzo(a)pyrene as a representative compound for all genotoxic PAH's that may be present in soils at this site. This approach was used as benzo(a)pyrene was detected in the samples, and the other PAH's identified above the individual screening values were all classed as genotoxic. The table below summarises the revised screening assessment:

Determinand	GAC	Concentration		Results above GAC value
		Mean	Max	
Benzo(a)Pyrene (as surrogate marker)	5.0	3.98	6.2	Benzo(a)pyrene (5.0mg/kg) Benzo(b)fluoranthene (6.2mg/kg)

9.2 Lead

The total Lead was noted to be 390mg/kg. It is noted that the screening value for Lead set at 200mg/kg under the C4SL assumes all Lead ingestion will enter the body. However, Lead tends to have a low solubility in stomach acid, and it is seldom the case that all ingested Lead would be *bio-available*. Physiological Based Extraction Testing (PBET analysis) is a laboratory method to assess the bio-available fraction of Lead, which can be used to provide a more reliable assessment with respect to Lead. Given the likely outcome of PBET testing, it is recommended that such analysis be undertaken to confirm whether remediation is required on this site.

9.3 Conclusion

The exceedances are a trigger to require a formal contamination risk assessment which will involve additional sampling, testing and quantitative risk assessment within the proposed soft landscaped garden.

10.0 RELIMINARY WASTE ASSESSMENT

10.1 General

Waste may be defined as any substance or object in Annex 1 of the Waste Framework Directive which the holder discards, intends to discard, or is required to discard. Subject to certain provisions, soils may either be handled as either:

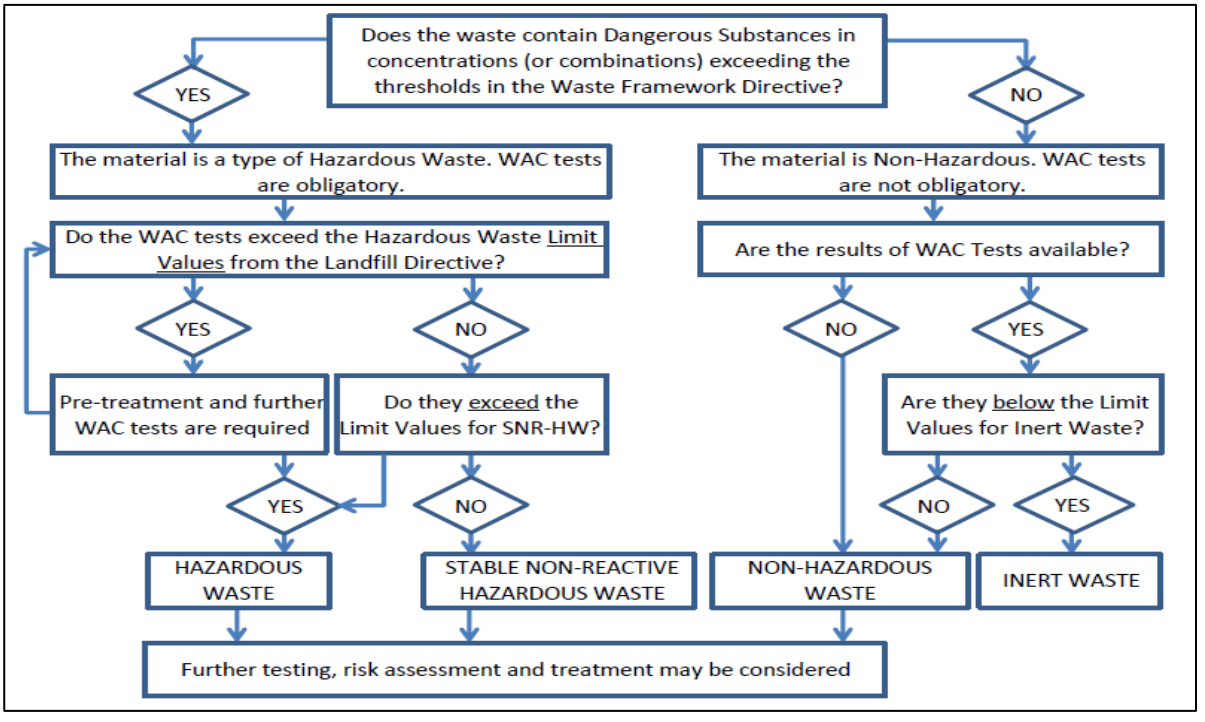
- Non-Waste, and re-used (on or off-site), or
- Waste, and disposed of (to a waste management facility).

Given the confines of the site, it was anticipated that all materials would be disposed of from site as waste.

The waste producer has a legal duty of care to ensure that waste materials are handled properly and sent to the appropriate licenced facility. Further inspection, testing, segregation etc will be required on site, and the advice of a suitably qualified consultant sought wherever necessary. Substantial tax penalties and fines are being levied by the regulators. The advice contained in this section is preliminary only.

10.2 Waste Disposal

Where materials are not re-used they must be handled as Waste, and must be sent to a licenced waste management facility. The classification of waste is prescribed under the Waste Framework Directive and the Landfill Directive, as summarised below. Different waste management facilities may also have specific acceptance criteria, and their advice should be sought.



The results of the soil analysis have been classified as follows:

Soil	Hazardous		Non Hazardous		Details
	Hazardous	Stable Non-Reactive	Non-Hazardous	Inert	
Topsoil (DS02 0.50mbgl)				✓	The soil analysis was not identified as hazardous and the WAC test met the requirements for Inert.

With reference to the current List of Wastes (formerly European Waste Catalogue), waste soils and stone derived from construction and demolition sites may be disposed of under either of the following codes as appropriate:

Waste	Code	Description
Hazardous	17 05 03*	soil and stones containing dangerous substances
Non-Hazardous	17 05 04	soil and stones other than those mentioned in 17 05 03

(Note, the asterix is a Mirror Entry, as defined in the List of Wastes, conferring the relationship with the non-hazardous code 17-05-04).

11.0 SUMMARY AND CONCLUSIONS

This summary is a brief precis of the main findings and conclusions of the investigation. For detailed information, the reader is referred to the main report.

11.1 General

The intrusive investigation included 3no Dynamic (Windowless) Sampling boreholes with Super Heavy Dynamic Probing at each location. The existing development comprised a single storey dwelling with habitable loft space with a single storey side extension and associated garden. The proposed development comprised the Construction of a 4no. bed bungalow with habitable loft space and garden to the south of the existing dwelling.

11.2 Soils Encountered

Strata	Depth (mbgl)	Summary
Topsoil	0.70	Generally described as a dark brown, slightly sandy, slightly gravelly, slightly clayey SILT with flints, and brick and pottery fragments.
Made Ground	1.00	Generally comprised light orangey brown, slightly sandy, gravelly, clayey SILT with flint, brick, and pottery fragments.
Head Deposits	+5.00	Generally comprised light brown orangey GRAVEL over CLAY over SAND. Apart from a thin band of granular at DS01, cohesive Head deposits were encountered over granular Head Deposits throughout.

11.3 Groundwater

No groundwater encountered within 5.00mbgl depth.

11.4 Foundations

Traditional foundations are likely to be suitable to the ground and groundwater conditions, and suggested design parameters are given. The formation should be treated as being low volume change potential.

11.5 Excavations

Generally likely to remain stable. Excavations below the water table may become highly unstable. Risk assessments should be prepared and appropriate safety measures provided.

11.6 Pavements

CBR value of 5% recommended for the Cohesive Head Deposits which is not classified as being frost susceptible.

11.7 Building Materials

DS-1 and AC-1 in accordance with BS8500. Water supply pipe work will not require protection from aggressive soil contaminants.

11.8 Radon Protection

No issues with respect to Radon gas have been identified.

11.9 Waste Disposal

The chemical results confirmed that the Topsoil should be handled as Inert Waste for disposal purposes. It is likely that natural soils could be handled as Inert Waste.

11.10 Further Action

Further investigation will be required to assess the risk of contamination to end users in the proposed garden due to elevated PAH's and Lead. No other immediate requirements for further ground investigation have been identified.

REPORT CONDITIONS

The Client

This report may also be used only by the client named in section 1 and their appointed project team for the purpose of design, obtaining planning, building regulations approval, and in connection with finance. This report must not be used by any other persons or for other purposes without express written agreement of Land Science.

General

Land Science takes all reasonable professional care in preparation of this report, using current standards and industry practice. However, the evaluation of ground conditions depends on an interpretation and extrapolation of the conditions revealed by a limited data set. The level of risk is related to the extent of investigation and no site is ever free of risk. The client should understand their risks and liabilities. We accept no liability whatsoever in respect of:

- The scope, extent or design of an investigation.
- Any conditions not directly revealed by the investigation.
- Published standards or methodologies used or adopted in this report.
- The opinion of any other party including any regulator, authority or stakeholder.
- Any dispute, claim or consequential loss arising from any findings of this report.
- Third party information and data.

This report relates solely to ground-related matters as set out in the objectives and makes no representation on other matters such as ecology, arboriculture, invasive plant species, the condition of buildings and structures, hazardous building materials such as insulation or asbestos, the locations of boundaries, unexploded ordnance, and or planning constraints etc. Further reports should be commissioned in this respect as appropriate.

Regulators and Approvals

This (and any other) report should be submitted to relevant authorities for their own assessments and to provide their approval or comments accordingly. This should be in good time before commencing on site in case additional work is to be carried out.

Standards, technical guidance and regulatory positions change over time and which may therefore affect the findings and recommendations made in this report; this should be verified by the client prior to any critical project milestones. Where this information is used in design, the designer should verify that the information is appropriate and has been used correctly.

Variations with time

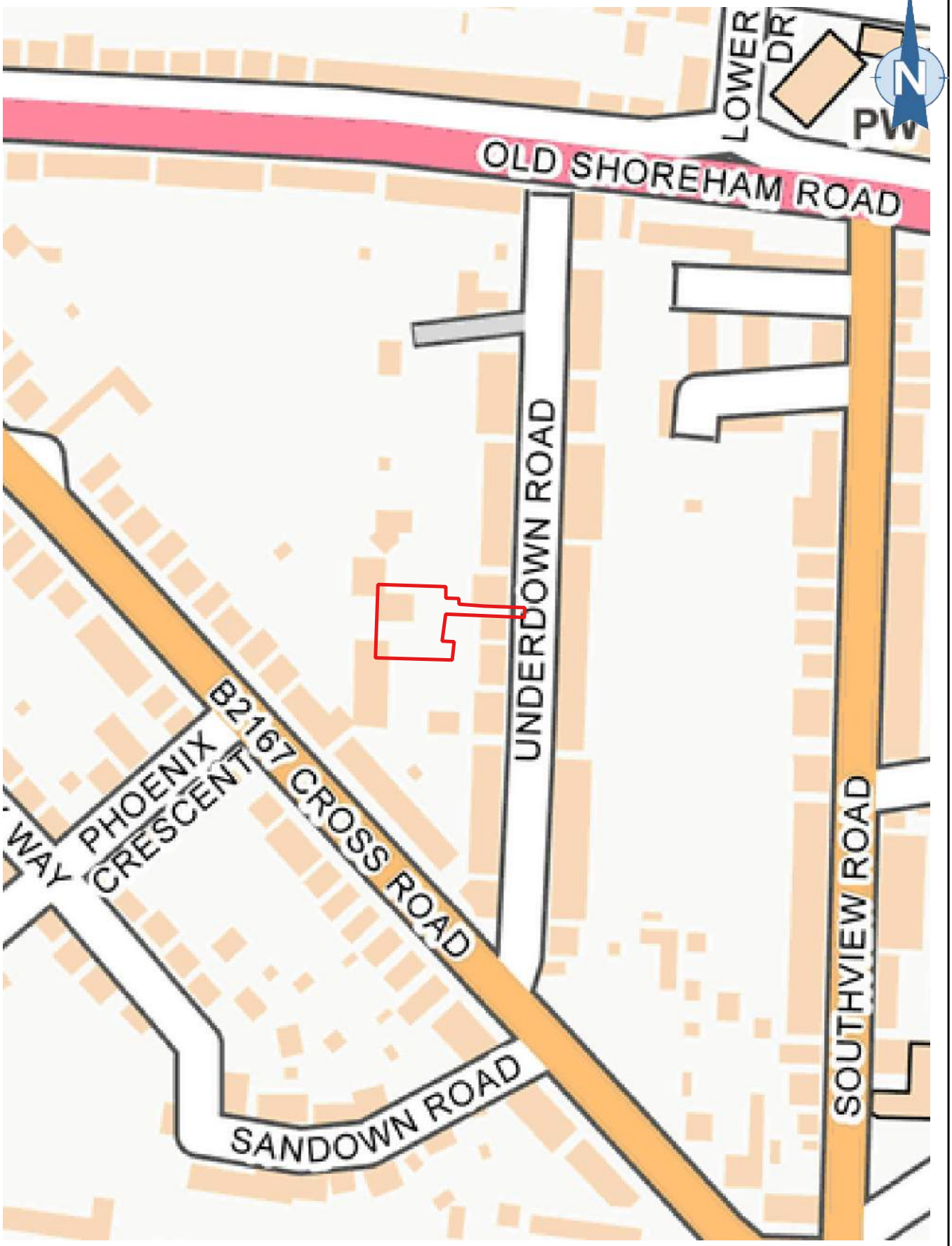
The report relates to conditions revealed at the time of the investigation and any monitoring visits. Some parameters may vary over time or seasonally; groundwater levels, ground gas compositions, or concentrations of contaminants are particularly variable in this respect. Further monitoring or verification should be considered as appropriate.

GLOSSARY OF TERMS

ACM	Asbestos Containing Material
BGS	British Geological Survey
BRE	Building Research Establishment
BS	British Standard
C4SL	Category 4 Screening Level
CBR	California Bearing Ratio
CDM	Construction Design and Management regulations
CIRIA	Construction Industry Research and Information Association
CL:AIRE	Contaminated Land: Applications in Real Environments
CLEA	Contaminated Land Exposure Assessment model
CSM	Conceptual Site Model
EA	Environment Agency
EQS	Environmental Quality Standards
FOC	Fraction of Organic Carbon
GAC	Generic Assessment Criterion
GQRA	Generic Quantitative Risk Assessment
mbgl	Meters Below Ground Level
NHBC	National House Building Council
mOD	Metres above Ordnance Datum
PAH's	Polycyclic Aromatic Hydrocarbons
PHE	Public Health England
PID	Photo-Ionisation Detector
PQRA	Preliminary Quantitative Risk Assessment
PSD	Particle Size Distribution Test
RMS	Remediation Method Statement
S4UL	Suitable for Use Level
SOM	Soil Organic Matter
SPZ	Source Protection Zone
SPT	Standard Penetration Test
SSSI	Sites of Special Scientific Interest
ST-WEL	Short Term Workplace Exposure Limit
SVOC's	Semi-Volatile Organic Compounds
TPH	Total Petroleum Hydrocarbons
TRRL / TRL	Transport Road Research Laboratory
TWA-WEL	Time Weighted Average Workplace Exposure Limit
UK HBF	United Kingdom House Building Federation
VOC's	Volatile Organic Compounds
WAC	Waste Acceptance Criteria

FIGURES

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Land Science	Title: Site Location		Reference: LS5838
	Project: 45A UNDERDOWN ROAD, SOUTHWICK BN42 4HN		Figure: 1
	Client: Mr Steve Woods		Date: 20/08/2021
	Prepared by: OD	Checked by: AC	Version: 1	Sheet: 1 of 1

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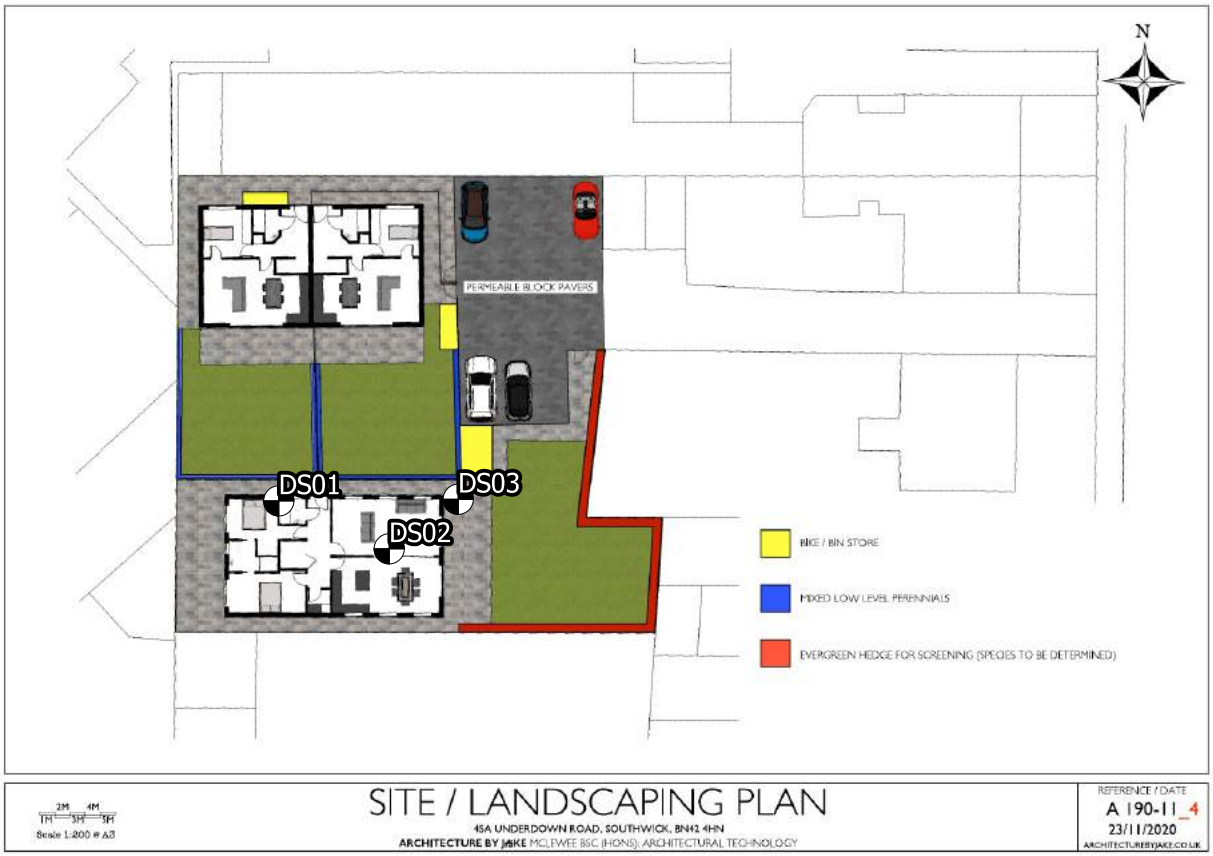
These maps courtesy of Google and The GeoInformation Group (XXXX)



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Land Science	Title: Exploratory Hole Location Plan		Reference: LS5838
	Project: 45A UNDERDOWN ROAD, SOUTHWICK BN42 4HN		Figure: 2
	Client: Mr Steve Woods		Date: 20/08/2021
	Prepared by: OD	Checked by: AC	Version: 1	Sheet: 1 of 1

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Land Science	Title: Proposed Development Layout		Reference: LS5838
	Project: 45A Underdown Road, Southwick, BN42 4HN		Figure: 3
	Client: Mr Steve Wood		Date: 20/08/2021
	Prepared by: OD	Checked by: AC	Version: 1	Sheet: 1 of 1

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APPENDIX A

SITE WALKOVER RECORD

The walkover is restricted only to aspects related to the Land Science report and the stated objectives therein. The walkover does not replace other surveys such as asbestos, arboriculture, ecology, utilities etc which the client should consider. The client should review the walkover and provide any further relevant information where available.

SITE DETAILS			
Project	*45a Underdown Road, Southwick BN42 4HN*		
Reference	*LS5838*	**Date of walkover**	24/08/2021
Engineer	*Oli Deverill*		
CURRENT USE			
Existing land uses	*Residential – Single storey house with habitable loft space and a single storey side extension with associated gardens. 2no. sheds were noted on site (south west and south east of site)*		
Status	*Active*		
Suspected asbestos	*Suspected asbestos was encountered at BH02. BH02 relocated.*		
Below ground structures	*No immediate evidence.*		
Hardstanding's	*Concrete paving part occupying the eastern extent of the building, and fully occupying the southern extent of the building. An extended section of concrete leading to a shed was noted in the southwest corner of the site, separated by a small retaining wall.*		
Soft landscaping	*Unkept garden area with a lawn surrounded by hedgerows was noted.*		
General condition	*Active, dilapidated*		
Boundaries	*Timber fencing, brick wall, main building and shed making up the boundary of the site.*		
Adjacent land uses	*The site was surrounded by residential properties.*		
TOPOGRAPHY			
General lie of the land	*Located on a relatively level area.*		
General lie of the site	*Sensibly flat and level.*		
Abrupt changes in slope	*The garden area and concrete path area was separated by a small retaining wall*		
Excavations and Depressions	*No excavations or depressions were noted on site.*		
Raised ground	*No raised ground was noted on site.*		

GROUND STABILITY	
Signs of landslip	*No signs of land slip were noted on site.*
Cracking in buildings and walls etc	*None recorded*
Subsidence on ground surface	*No subsidence was noted on site.*
GROUND CONDITIONS	
Possible filled-in ground	*No filled-in ground was identified on site.*
Possible built-up ground	*No raised ground was noted on site.*
Exposed soils	*None recorded*
Desiccation	*Cracks in paving were noted on site.*
Disturbance	*No evidence of disturbance identified on site.*
WATER CONDITIONS	
Wet boggy ground	*No evidence of wet boggy areas noted on site.*
Wells and ditches	*A monitoring well was noted on site.*
Ponds or ponding	*No ponds or ponding was noted on site.*
Streams / Rivers	*No streams or rivers were noted in the vicinity.*
ECOLOGY	
Burrows	*No signs of burrows were noted.*
VEGETATION	
Reeds or water loving plants	*No reeds or water loving plants were observed on site.*
Sparse growth or die back	*No bare patches were identified on site.*
Invasive species	*None recorded.*
TREES	
Relevant trees height/species	*None recorded on site.*
Off-site	*Large conifers were identified in the adjacent property (west).*
Hedgerows	*The boundary of the site (south and south western) was occupied by medium sized hedgerows. Some hedgerows were identified adjacent to the north eastern extent of the current dwelling.*
Recent felling and older stumps	*None recorded.*
CONTAMINATION	
Tipped materials	*No tipped materials were noted on site.*

Areas of possible fill	*None recorded*
Discolouration/sheens of waterbodies	*None recorded*
Surface staining	*None recorded*
Chemicals storage	*2no. sheds were identified on site that could be used to store chemicals.*
Drums and tanks	*None recorded*
Petrol interceptor	*None recorded*
Soakaways	*None recorded*
LOCAL INFORMATION	
Place/road names	
3rd party information	*Information from owners / occupiers / neighbours*

APPENDIX B









Land Science	**TITLE:**	Site Photographs	**REF:**	LS5838	**PREPARED:** JT
	PROJECT:	45A Underdown Road	**FIGURE:**	N/A	**CHECKED:** AC
	CLIENT:	Mr Steve Wood	**DATE:**	15/09/2021	**VERSION** v1

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APPENDIX C

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Site	Number
45a Underdown Road, Southwick, BN424HN	DS01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler			Mr Steve Woods	LS5838
	Location	**Dates** 23/08/2021	**Engineer** Land Science	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	E				(0.40) 0.40	Grass over darkish brown, slightly sandy, slightly gravelly, slightly clayey SILT with occasional roots and rootlets present. Sand is fine to medium. Gravels are fine to coarse, sub angular to sub rounded flints, brick and pottery fragments. (TOPSOIL)		
0.50	E				(0.60) 1.00	Light orangey brown, slightly sandy, gravelly, clayey SILT. Sand is fine to medium. Gravels are fine to coarse, sub angular to sub rounded, flints, brick and pottery fragments. (MADE GROUND) ... Bands of flint between 0.80mbgl and 1.00mbgl.		
0.90	D				(0.60) 1.60	Light brown/ orangey very sandy, clayey GRAVEL. Sand is fine to medium. Gravels are abundant, fine to coarse, sub angular to sub rounded flint. (HEAD DEPOSITS)		
1.50	D				(1.00) 2.60	Light creamy, off-whiteish brown mottled with slightly orangey brown, slightly sandy, slightly silty, very gravelly, CLAY. Sand is fine. Gravels are fine to medium, flints and fine chalk. (HEAD DEPOSITS) ... Becomes more clayey between 1.40mbgl to 1.60mbgl.		
1.80	D							
2.20	D							
2.80	D				(2.40) 5.00	Dark orangy, brown slightly gravelly, SAND. Sand is fine. (HEAD DEPOSITS) ... Becomes less gravelly and slightly lighter off white mottled orangy brown between 2.40mbgl to 2.60mbgl. ... Band of flint between 2.60mbgl to 2.70mbgl with dark brown fine clayey sand. ... Large flint at 3.0mbgl. ... Sand becomes whitish yellow between 2.70mbgl to 3.10mbgl. ... Slightly orangey mottling between 3.50mbgl to 4.50mbgl.		
3.20	D							
3.80	D							
4.20	D							
4.80	D							
						Complete at 5.00m		

Remarks

Scale (approx)	Logged By
1:40	OD

Figure No. ls5838.DS01

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Land Science	Brighton | London | Bristol 0845 604 6494 www.landscience.co.uk	**Site** 45a Underdown Road, Southwick, BN424HN	**Number** **DS02**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Drive-in Windowless Sampler			Mr Steve Woods	LS5838
	Location	**Dates** 23/08/2021	**Engineer** Land Science	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	E				(0.70)	Grass over darkish brown, slightly sandy, slightly gravelly, slightly clayey SILT with occasional roots and rootlets present. Sand is fine to medium. Gravels are fine to medium, sub angular to sub rounded, flints, brick and pottery. (TOPSOIL)		
0.50	E				0.70			
0.90	D				(0.20) 0.90	Light brown orangey, very gravelly, very clayey SILT occasional roots and rootlets present. Sand is fine to medium. Gravels are fine to medium, sub angular to sub rounded flints. (HEAD DEPOSITS) .. Becomes light brown between 0.50mbgl to 0.70mbgl.		
1.30	D				(0.60)			
1.80	D				1.50	Orangey dark brown, slightly silty, slightly gravelly, sandy, CLAY. Sand is fine to medium. Gravels are fine to coarse, angular to sub angular flints and occasional chalk fragments. (HEAD DEPOSITS) ... Clay is very dark brown blackish and disturbed at 1.10mbgl.		
2.10	D				(0.60)			
					2.10	Light brown, sandy, very gravelly CLAY. Sand is fine to coarse. Gravels are fine to coarse, angular to sub angular flints. (HEAD DEPOSITS)		
2.75	D				(1.10)	Light brown silty, very gravelly SAND. Sand is fine to medium. Gravels are fine to coarse, sub angular to sub rounded flints. (HEAD DEPOSITS)		
3.10	D				3.20	Light brown slightly gravelly SAND. Sands are fine to medium. Gravels are rare, fine to coarse, sub angular to sub rounded flints. (HEAD DEPOSITS) ... Clay lens at 3.30mbgl.		
3.50	D				(0.80)			
3.80	D				4.00	Terminated at 4.00m		

Remarks

Scale (approx)	**Logged By**
1:40	OD

Figure No.
ls5838.DS02

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Land Science	Brighton | London | Bristol 0845 604 6494 www.landscience.co.uk	Site 45a Underdown Road, Southwick, BN424HN	Number DS03

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler			Mr Steve Woods	LS5838
	Location	**Dates** 23/08/2021	**Engineer** Land Science	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	E				(0.60)	Grass over darkish brown, slightly sandy, gravelly, clayey SILT with occasional roots and rootlets present. Sands are fine to medium. Gravels are fine to medium, sub angular to sub rounded flints and brick. (TOPSOIL)		
0.50	E				0.60	... Becomes light brown between 0.50mbgl to 0.60mbgl.		
0.80	D				(0.30) 0.90	Light brown orangey, slightly sandy, very clayey, very gravelly SILT with occasional roots and rootlets present. Sands are fine. Gravels are fine to medium, sub angular to sub rounded flints. (HEAD DEPOSITS)		
1.50	D				(1.50)	Firm-stiff light brown sandy, silty, gravelly CLAY. Sands are fine to coarse. Gravels are fine to coarse, angular to sub angular flints and fine chalk fragments throughout. (HEAD DEPOSITS)		
2.00	D					...Chalk becomes more abundant between 2.00mbgl to 2.40mbgl.		
2.50	D				2.40 (0.40)	Orangey brown slightly sandy GRAVEL. Sands are fine to medium. Gravels are fine to coarse, rounded to angular flints. (HEAD DEPOSTIS)		
3.00	D				2.80	Orangey brown slightly gravelly SAND. Sands are fine to medium. Gravels are fine to coarse, sub angular to sub rounded flints. (HEAD DEPOSITS)		
3.50	D				(1.40)	.... Clay lens at 3.80mbgl.		
4.00	D							
4.50	D				4.20 (0.80)	Orangey brown SAND. Sands are fine to medium. (HEAD DEPOSITS)		
					5.00	Complete at 5.00m		

Remarks

Scale (approx)	Logged By
1:40	OD

Figure No.
ls5838.DS03

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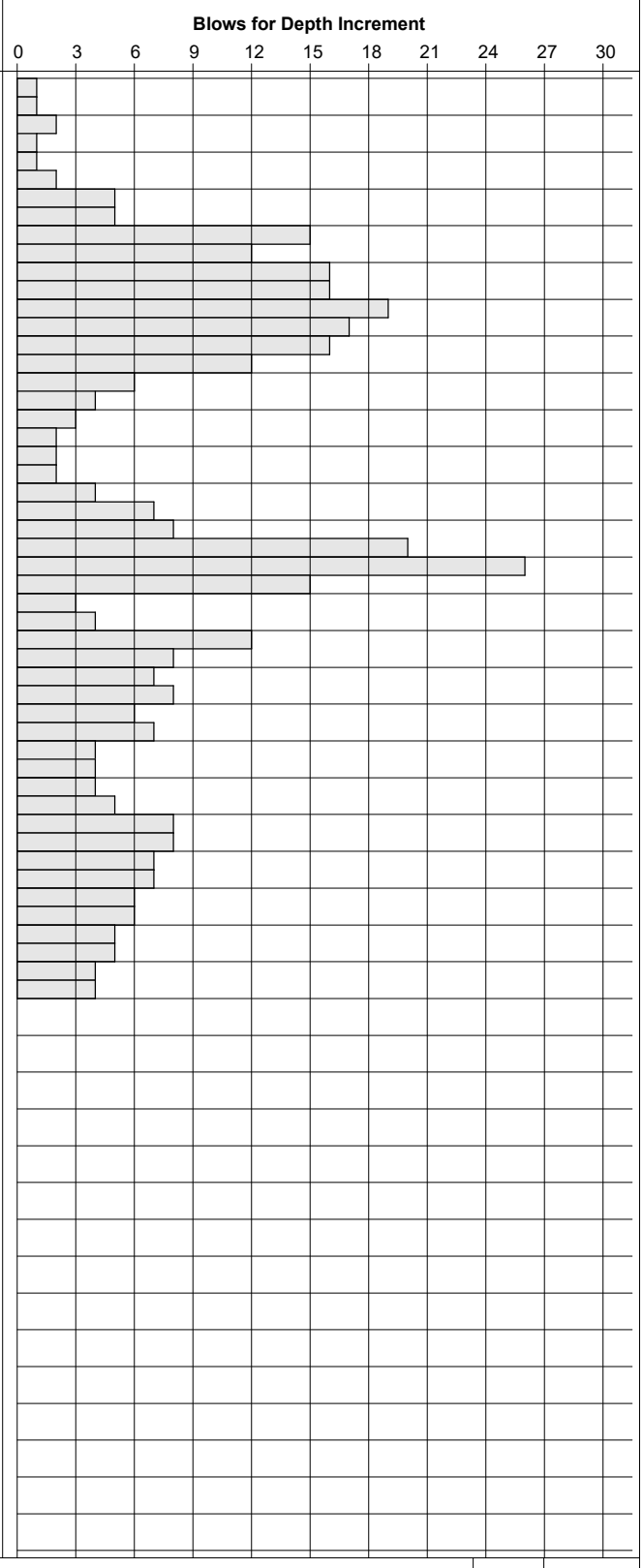
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Site	Probe Number
45a Underdown Road, Southwick, BN424HN	DP01

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probing			Mr Steve Woods	LS5838
	Location	**Dates**	**Engineer**	**Sheet**
		23/08/2021	Land Science	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	1		
0.10-0.20	1		
0.20-0.30	2		
0.30-0.40	1		
0.40-0.50	1		
0.50-0.60	2		
0.60-0.70	5		
0.70-0.80	5		
0.80-0.90	15		
0.90-1.00	12		
1.00-1.10	16		
1.10-1.20	16		
1.20-1.30	19		
1.30-1.40	17		
1.40-1.50	16		
1.50-1.60	12		
1.60-1.70	6		
1.70-1.80	4		
1.80-1.90	3		
1.90-2.00	2		
2.00-2.10	2		
2.10-2.20	2		
2.20-2.30	4		
2.30-2.40	7		
2.40-2.50	8		
2.50-2.60	20		
2.60-2.70	26		
2.70-2.80	15		
2.80-2.90	3		
2.90-3.00	4		
3.00-3.10	12		
3.10-3.20	8		
3.20-3.30	7		
3.30-3.40	8		
3.40-3.50	6		
3.50-3.60	7		
3.60-3.70	4		
3.70-3.80	4		
3.80-3.90	4		
3.90-4.00	5		
4.00-4.10	8		
4.10-4.20	8		
4.20-4.30	7		
4.30-4.40	7		
4.40-4.50	6		
4.50-4.60	6		
4.60-4.70	5		
4.70-4.80	5		
4.80-4.90	4		
4.90-5.00	4		



Remarks

Scale (approx)	Logged By
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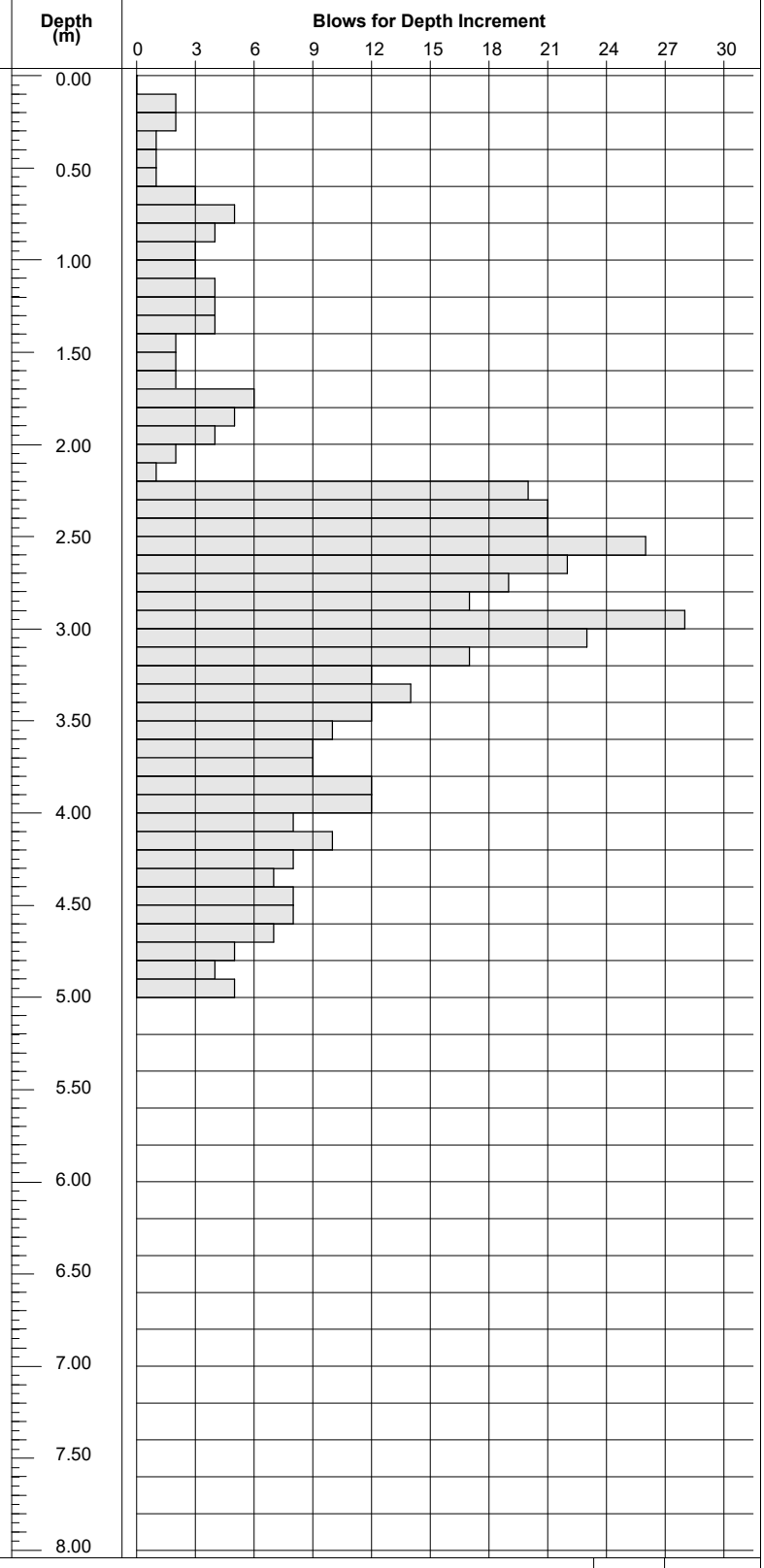
Figure No.
ls5838.DP01

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Land Science	Brighton | London | Bristol 0845 604 6494 www.landscience.co.uk	Site 45a Underdown Road, Southwick, BN424HN	Probe Number DP02

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probing			Mr Steve Woods	LS5838
	Location	**Dates**	**Engineer**	**Sheet**
		23/08/2021	Land Science	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	0		
0.10-0.20	2		
0.20-0.30	2		
0.30-0.40	1		
0.40-0.50	1		
0.50-0.60	1		
0.60-0.70	3		
0.70-0.80	5		
0.80-0.90	4		
0.90-1.00	3		
1.00-1.10	3		
1.10-1.20	4		
1.20-1.30	4		
1.30-1.40	4		
1.40-1.50	2		
1.50-1.60	2		
1.60-1.70	2		
1.70-1.80	6		
1.80-1.90	5		
1.90-2.00	4		
2.00-2.10	2		
2.10-2.20	1		
2.20-2.30	20		
2.30-2.40	21		
2.40-2.50	21		
2.50-2.60	26		
2.60-2.70	22		
2.70-2.80	19		
2.80-2.90	17		
2.90-3.00	28		
3.00-3.10	23		
3.10-3.20	17		
3.20-3.30	12		
3.30-3.40	14		
3.40-3.50	12		
3.50-3.60	10		
3.60-3.70	9		
3.70-3.80	9		
3.80-3.90	12		
3.90-4.00	12		
4.00-4.10	8		
4.10-4.20	10		
4.20-4.30	8		
4.30-4.40	7		
4.40-4.50	8		
4.50-4.60	8		
4.60-4.70	7		
4.70-4.80	5		
4.80-4.90	4		
4.90-5.00	5		



Remarks

Scale (approx)	Logged By
1:40	OD

Figure No.
ls5838.DP02

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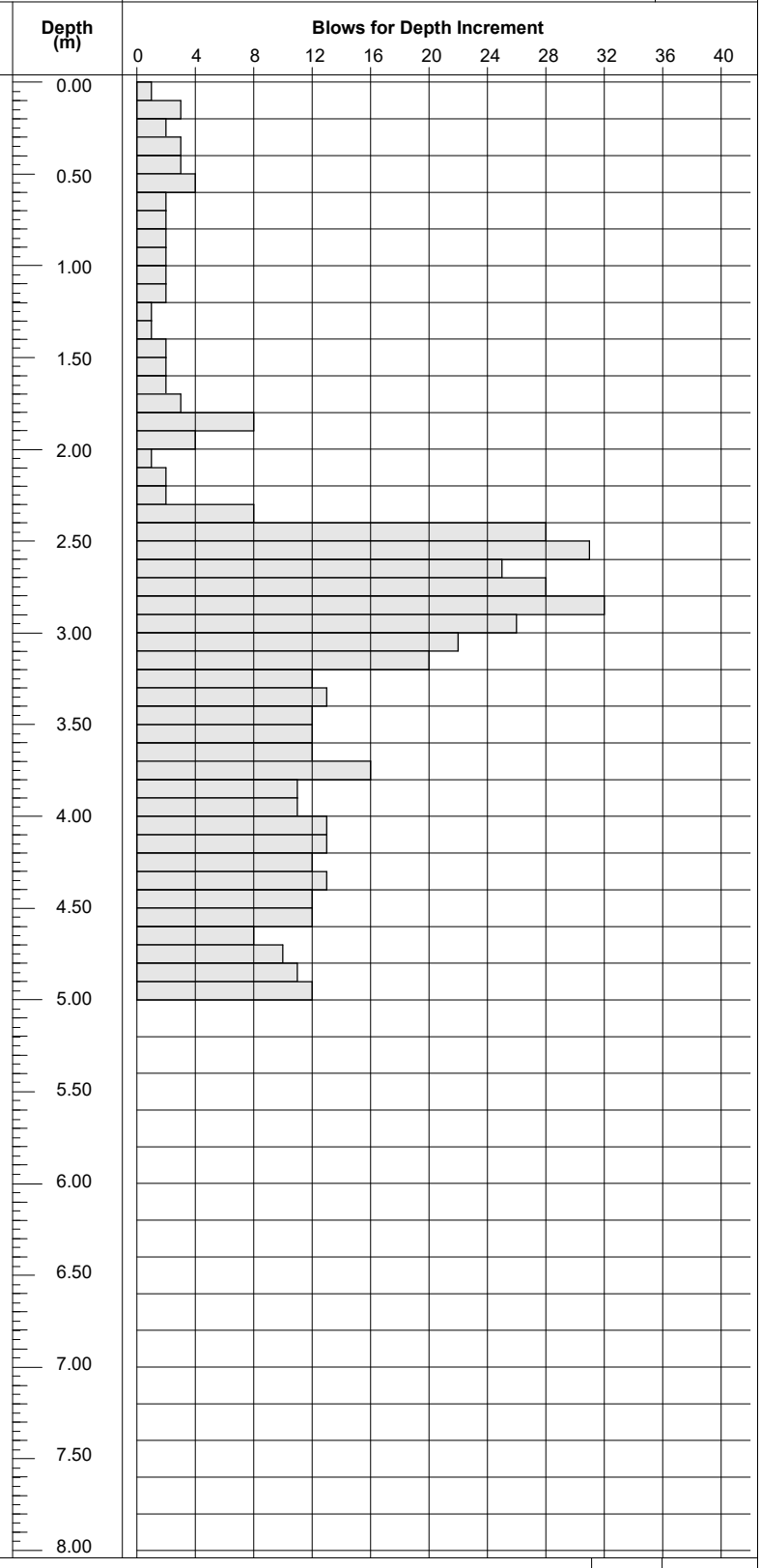
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Site	Probe Number
45a Underdown Road, Southwick, BN424HN	DP03

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probing			Mr Steve Woods	LS5838
	Location	**Dates**	**Engineer**	**Sheet**
		23/08/2021	Land Science	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	1		
0.10-0.20	3		
0.20-0.30	2		
0.30-0.40	3		
0.40-0.50	3		
0.50-0.60	4		
0.60-0.70	2		
0.70-0.80	2		
0.80-0.90	2		
0.90-1.00	2		
1.00-1.10	2		
1.10-1.20	2		
1.20-1.30	1		
1.30-1.40	1		
1.40-1.50	2		
1.50-1.60	2		
1.60-1.70	2		
1.70-1.80	3		
1.80-1.90	8		
1.90-2.00	4		
2.00-2.10	1		
2.10-2.20	2		
2.20-2.30	2		
2.30-2.40	8		
2.40-2.50	28		
2.50-2.60	31		
2.60-2.70	25		
2.70-2.80	28		
2.80-2.90	32		
2.90-3.00	26		
3.00-3.10	22		
3.10-3.20	20		
3.20-3.30	12		
3.30-3.40	13		
3.40-3.50	12		
3.50-3.60	12		
3.60-3.70	12		
3.70-3.80	16		
3.80-3.90	11		
3.90-4.00	11		
4.00-4.10	13		
4.10-4.20	13		
4.20-4.30	12		
4.30-4.40	13		
4.40-4.50	12		
4.50-4.60	12		
4.60-4.70	8		
4.70-4.80	10		
4.80-4.90	11		
4.90-5.00	12		



Remarks

Scale (approx)	Logged By
1:40	OD

Figure No.
ls5838.DP03

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APPENDIX D

Land Science

SUMMARY OF MOISTURE CONTENT AND ATTERBERG LIMIT DETERMINATIONS

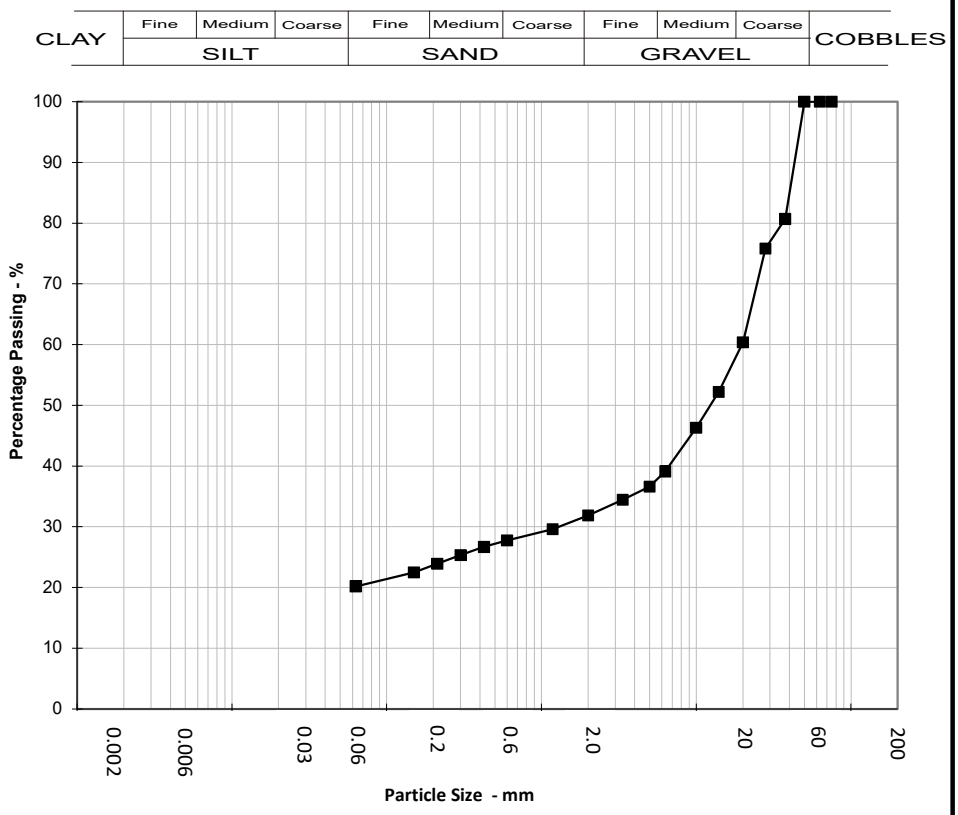
Site Name:	45a Underdown Road	**Samples Received:**	26/08/2021
Reference:	LS5838	**Reported:**	03/09/2021

Position	Depth m	Sample Description	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index %	Passing 425µm %	Modified PI %
DS01	2.20	Light brown slightly gravelly very silty CLAY	18.1	31.8	17.8	14.0	90.2	12.6
DS02	1.30	Brown slightly gravelly very silty CLAY	16.8	38.8	19.4	19.3	89.5	17.3
DS03	1.50	Light brown gravelly silty CLAY	18.6	39.6	16.1	23.5	75.5	17.8

SUMMARY OF PARTICLE SIZE DISTRIBUTION ANALYSIS			
Site Name:	45a Underdown Road	**Samples Received:**	26/08/2021
Reference:	LS5838	**Reported:**	03/09/2021

Sample Data		**Sample Description**
Position	DS01	Brown very clayey GRAVEL(FLINT)
Sample Ref	-	
Depth	1.50	

Sieve Analysis	
mm	**%**
125	
90	
75	100.0
63	100.0
50	100.0
37.5	80.7
28	75.8
20	60.4
14	52.2
10	46.3
6.3	39.1
5.0	36.6
3.35	34.5
2.0	31.9
1.18	29.6
0.60	27.7
0.425	26.7
0.30	25.3
0.212	23.9
0.150	22.5
0.063	20.2
0.020	
0.006	
0.002	



Sample Proportions		**Grading Analysis**	
Cobbles	0.0	D100	50
Gravel	68.1	D60	19
Sand	11.7	D10	-
Silt & Clay	20.2	Uniformity Coeff.	#VALUE!
-		-	

BS 1377 : Part 2 : 1990 : Clause 9

Test Results relate only to the sample numbers shown above.

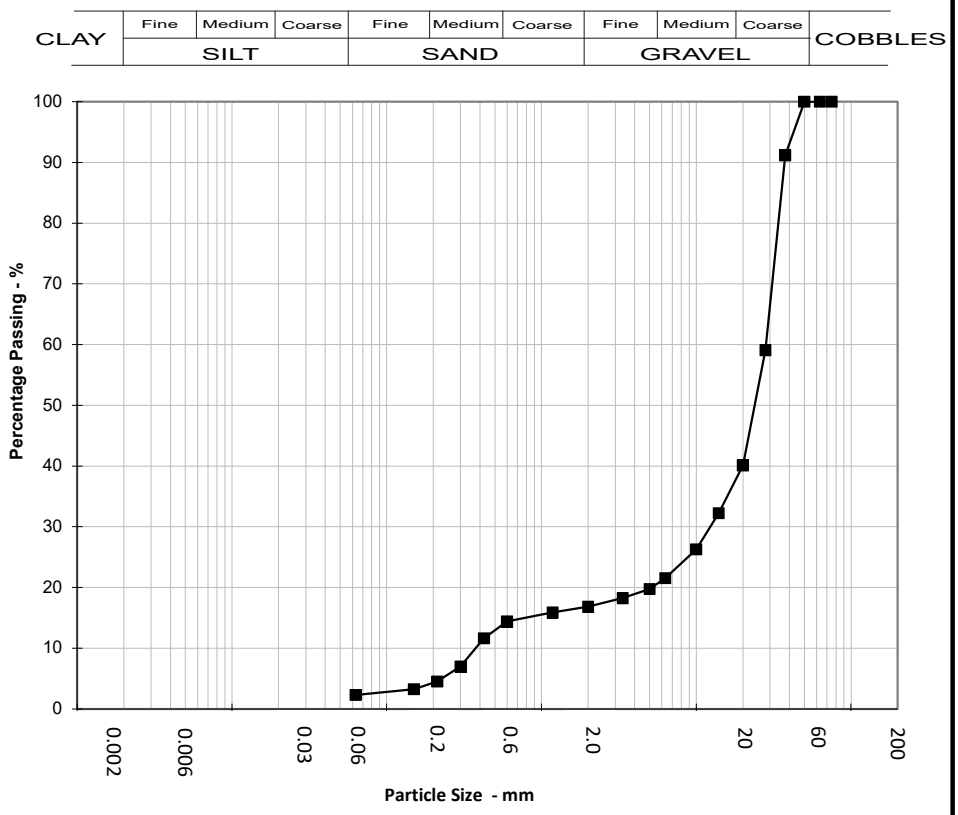
Prepared:
T Curtis
Checked:
E Toms

THE OLD POLICE STATION, JOBS LANE, SAYERS COMMON, WEST SUSSEX, BN6 9HE
t: 0845 604 6494 **e:** brighton@landscience.co.uk

SUMMARY OF PARTICLE SIZE DISTRIBUTION ANALYSIS			
Site Name:	45a Underdown Road	**Samples Received:**	26/08/2021
Reference:	LS5838	**Reported:**	03/09/2021

Sample Data		Sample Description
Position	DS03	Brown sandy GRAVEL
Sample Ref	-	
Depth	2.50	

Sieve Analysis	
mm	**%**
125	
90	
75	100.0
63	100.0
50	100.0
37.5	91.2
28	59.1
20	40.1
14	32.3
10	26.3
6.3	21.5
5.0	19.8
3.35	18.3
2.0	16.8
1.18	15.9
0.60	14.4
0.425	11.6
0.30	7.0
0.212	4.5
0.150	3.2
0.063	2.3
0.020	
0.006	
0.002	



Sample Proportions		Grading Analysis	
Cobbles	0.0	D100	50
Gravel	83.2	D60	28
Sand	14.5	D10	0.38
Silt & Clay	2.3	Uniformity Coeff.	73.7
-		-	

BS 1377 : Part 2 : 1990 : Clause 9

Test Results relate only to the sample numbers shown above.

Prepared:
T Curtis
Checked:
E Toms

THE OLD POLICE STATION, JOBS LANE, SAYERS COMMON, WEST SUSSEX, BN6 9HE
t: 0845 604 6494 **e:** brighton@landscience.co.uk

APPENDIX E

Adam Cormack
Land Science
Unit 10
19 Albert Drive
Burgess Hill
West Sussex
RH15 9TN

e: adam.cormack@landscience.co.uk

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 21-95758

Project / Site name:	45a Underdown Road, Southwick, BN424HN	**Samples received on:**	27/08/2021
Your job number:	LS5838	**Samples instructed on/ Analysis started on:**	27/08/2021
Your order number:		**Analysis completed by:**	08/09/2021
Report Issue Number:	1	**Report issued on:**	08/09/2021
Samples Analysed:	1 leachate sample - 2 soil samples		

Signed: Karolina Marek

Karolina Marek
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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

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

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-95758
Project / Site name: 45a Underdown Road, Southwick, BN424HN

Lab Sample Number				1989691	1989692
Sample Reference				DS02	DS02
Sample Number				None Supplied	None Supplied
Depth (m)				0.50	1.80
Date Sampled				23/08/2021	23/08/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	11	13
Total mass of sample received	kg	0.001	NONE	0.40	2.0
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-

General Inorganics

pH - Manual	pH Units	N/A	MCERTS	7.6	-
pH - Automated	pH Units	N/A	MCERTS	8.0	8.3
Total Cyanide	mg/kg	1	MCERTS	< 1.0	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.032	0.066
Sulphide	mg/kg	1	MCERTS	< 1.0	-
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.018	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.8	-
Loss on Ignition @ 450oC	%	0.2	MCERTS	4.7	-
Acid Neutralisation Capacity	+/- mol/kg	-999	NONE	1.1	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	0.28	-
Acenaphthene	mg/kg	0.05	MCERTS	0.26	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-
Phenanthrene	mg/kg	0.05	MCERTS	4.6	-
Anthracene	mg/kg	0.05	MCERTS	0.76	-
Fluoranthene	mg/kg	0.05	MCERTS	10	-
Pyrene	mg/kg	0.05	MCERTS	8.8	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	4.9	-
Chrysene	mg/kg	0.05	MCERTS	3.8	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	6.2	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.7	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.0	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.9	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.76	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	3.2	-
Coronene	mg/kg	0.05	NONE	< 0.05	-

Total PAH

Total WAC-17 PAHs	mg/kg	0.85	NONE	53.3	-

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 21-95758
Project / Site name: 45a Underdown Road, Southwick, BN424HN

Lab Sample Number				1989691	1989692
Sample Reference				DS02	DS02
Sample Number				None Supplied	None Supplied
Depth (m)				0.50	1.80
Date Sampled				23/08/2021	23/08/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Heavy Metals / Metalloids					
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12	-
Barium (aqua regia extractable)	mg/kg	1	MCERTS	270	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.94	-
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.7	-
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	39	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	62	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	390	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	24	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	32	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	380	-
Monoaromatics & Oxygenates					
Benzene	µg/kg	1	MCERTS	< 1.0	-
Toluene	µg/kg	1	MCERTS	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-
Total BTEX	µg/kg	10	MCERTS	< 10	-
Petroleum Hydrocarbons					
Mineral Oil (C10 - C40)	mg/kg	10	NONE	58	-
PCBs by GC-MS					
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	-
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	-
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	-
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	-
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	-
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	-
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	-
Total PCBs by GC-MS					
Total PCBs	mg/kg	0.007	MCERTS	< 0.007	-

U/S = Unsuitable Sample I/S = Insufficient Sample

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 21-95758
Project / Site name: 45a Underdown Road, Southwick, BN424HN

Lab Sample Number				1989693
Sample Reference				DS02
Sample Number				None Supplied
Depth (m)				0.50
Date Sampled				23/08/2021
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
10:1 WAC Leachate				
Arsenic	mg/l	0.001	ISO 17025	< 0.0010
Barium	mg/l	0.00005	ISO 17025	0.0285
Cadmium	mg/l	0.0001	ISO 17025	< 0.0001
Chromium	mg/l	0.0004	ISO 17025	0.0034
Copper	mg/l	0.0007	ISO 17025	0.0099
Mercury	mg/l	0.0005	ISO 17025	< 0.0005
Molybdenum	mg/l	0.0004	ISO 17025	< 0.0004
Nickel	mg/l	0.0003	ISO 17025	0.0061
Lead	mg/l	0.001	ISO 17025	0.0031
Antimony	mg/l	0.0017	ISO 17025	< 0.0017
Selenium	mg/l	0.004	ISO 17025	< 0.0040
Zinc	mg/l	0.0004	ISO 17025	0.038
Chloride	mg/l	0.15	ISO 17025	1.5
Fluoride	mg/l	0.05	ISO 17025	0.27
Sulphate	mg/l	0.1	ISO 17025	5.0
Total dissolved solids	mg/l	4	ISO 17025	50
Total monohydric phenols	mg/l	0.01	ISO 17025	< 0.010
Dissolved organic carbon	mg/l	0.1	NONE	10.6
10:1 WAC Leachate				
Arsenic	mg/kg	0.01	NONE	< 0.0100
Barium	mg/kg	0.0005	NONE	0.251
Cadmium	mg/kg	0.0008	NONE	< 0.0008
Chromium	mg/kg	0.004	NONE	0.030
Copper	mg/kg	0.007	NONE	0.087
Mercury	mg/kg	0.005	NONE	< 0.0050
Molybdenum	mg/kg	0.004	NONE	< 0.0040
Nickel	mg/kg	0.003	NONE	0.054
Lead	mg/kg	0.01	NONE	0.027
Antimony	mg/kg	0.017	NONE	< 0.017
Selenium	mg/kg	0.04	NONE	< 0.040
Zinc	mg/kg	0.004	NONE	0.34
Chloride	mg/kg	1.5	NONE	13
Fluoride	mg/kg	0.5	NONE	2.4
Sulphate	mg/kg	1	NONE	44
Total dissolved solids	mg/kg	40	ISO 17025	440
Total monohydric phenols	mg/kg	0.1	NONE	< 0.10
Dissolved organic carbon	mg/kg	1	NONE	93.2

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number : 21-95758
Project / Site name: 45a Underdown Road, Southwick, BN424HN

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1989691	DS02	None Supplied	0.5	Brown loam and clay with gravel and vegetation.
1989692	DS02	None Supplied	1.8	Brown clay and sand with gravel.

Analytical Report Number : 21-95758
Project / Site name: 45a Underdown Road, Southwick, BN424HN

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance""	L046-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
pH at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE

Analytical Report Number : 21-95758
Project / Site name: 45a Underdown Road, Southwick, BN424HN

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Total BTEX in soil (Poland)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073-PL	W	MCERTS
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method	L009	D	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by EC probe using a factor of 0.6.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Sample Deviation Report

Analytical Report Number : 21-95758
Project / Site name: 45a Underdown Road, Southwick, BN424HN

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
DS02	None Supplied	S	1989691	c	Fraction Organic Carbon FOC Automated	L009	c
DS02	None Supplied	S	1989691	c	Sulphide in soil	L010-PL	c
DS02	None Supplied	S	1989691	c	Total cyanide in soil	L080-PL	c

HazWasteOnline™

Waste Classification Report

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

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

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

FNW9T-8ON9T-FR262

Job name

LS5838

Description/Comments

Project

45a Underdown Road, Southwick, BN42 4HN

Site

Classified by

Name:
Tom Kistruck
Date:
09 Sep 2021 08:53 GMT
Telephone:
01444 882 084

Company:
Land Science
Unit 10
19 Albert Drive
Burgess Hill
RH15 9TN

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

HazWasteOnline™ Certification: -

Course	Date
Hazardous Waste Classification	-

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	DS02	0.50	Non Hazardous		2

Related documents

#	Name	Description
1	Land Science Template WM3 v1.1	waste stream template used to create this Job

Report

Created by: Tom Kistruck

Created date: 09 Sep 2021 08:53 GMT

Appendices	Page
Appendix A: Classifier defined and non CLP determinands	5
Appendix B: Rationale for selection of metal species	6
Appendix C: Version	7

Classification of sample: DS02

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

Sample details

Sample name:
DS02
Sample Depth:
0.50 m
Moisture content:
11%
(no correction)

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

Hazard properties

None identified

Determinands

Moisture content: 11% No Moisture Correction applied (MC)

#		Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number / EC Number / CAS Number							
1		pH PH		8 pH		8 pH	8pH		
2		phenol 604-001-00-2 / 203-632-7 / 108-95-2		<1 mg/kg		<1 mg/kg	<0.0001 %		<**LOD**
3		naphthalene 601-052-00-2 / 202-049-5 / 91-20-3		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<**LOD**
4		acenaphthylene 205-917-1 / 208-96-8		0.28 mg/kg		0.28 mg/kg	0.000028 %		
5		acenaphthene 201-469-6 / 83-32-9		0.26 mg/kg		0.26 mg/kg	0.000026 %		
6		fluorene 201-695-5 / 86-73-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<**LOD**
7		phenanthrene 201-581-5 / 85-01-8		4.6 mg/kg		4.6 mg/kg	0.00046 %		
8		anthracene 204-371-1 / 120-12-7		0.76 mg/kg		0.76 mg/kg	0.000076 %		
9		fluoranthene 205-912-4 / 206-44-0		10 mg/kg		10 mg/kg	0.001 %		
10		pyrene 204-927-3 / 129-00-0		8.8 mg/kg		8.8 mg/kg	0.00088 %		
11		benzo[a]anthracene 601-033-00-9 / 200-280-6 / 56-55-3		4.9 mg/kg		4.9 mg/kg	0.00049 %		
12		chrysene 601-048-00-0 / 205-923-4 / 218-01-9		3.8 mg/kg		3.8 mg/kg	0.00038 %		
13		benzo[b]fluoranthene 601-034-00-4 / 205-911-9 / 205-99-2		6.2 mg/kg		6.2 mg/kg	0.00062 %		
14		benzo[k]fluoranthene 601-036-00-5 / 205-916-6 / 207-08-9		1.7 mg/kg		1.7 mg/kg	0.00017 %		
15		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3 / 200-028-5 / 50-32-8		5 mg/kg		5 mg/kg	0.0005 %		
16		indeno[123-cd]pyrene 205-893-2 / 193-39-5		2.9 mg/kg		2.9 mg/kg	0.00029 %		
17		dibenz[a,h]anthracene 601-041-00-2 / 200-181-8 / 53-70-3		0.76 mg/kg		0.76 mg/kg	0.000076 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
18		benzo[ghi]perylene				3.2	mg/kg		3.2	mg/kg	0.00032 %		
			205-883-8	191-24-2									
19		coronene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			205-881-7	191-07-1									
20		arsenic { arsenic trioxide }				12	mg/kg	1.32	15.844	mg/kg	0.00158 %		
		033-003-00-0	215-481-4	1327-53-3									
21		barium { barium sulfate }				270	mg/kg	1.7	458.87	mg/kg	0.0459 %		
			231-784-4	7727-43-7									
22		beryllium { beryllium oxide }				0.94	mg/kg	2.775	2.609	mg/kg	0.000261 %		
		004-003-00-8	215-133-1	1304-56-9									
23		boron { diboron trioxide; boric oxide }				1.2	mg/kg	3.22	3.864	mg/kg	0.000386 %		
		005-008-00-8	215-125-8	1303-86-2									
24		cadmium { cadmium oxide }				1.7	mg/kg	1.142	1.942	mg/kg	0.000194 %		
		048-002-00-0	215-146-2	1306-19-0									
25		chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									
26		copper { dicopper oxide; copper (I) oxide }				62	mg/kg	1.126	69.805	mg/kg	0.00698 %		
		029-002-00-X	215-270-7	1317-39-1									
27		lead { lead chromate }			1	390	mg/kg	1.56	608.328	mg/kg	0.039 %		
		082-004-00-2	231-846-0	7758-97-6									
28		mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
29		nickel { nickel chromate }				24	mg/kg	2.976	71.43	mg/kg	0.00714 %		
		028-035-00-7	238-766-5	14721-18-7									
30		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
		034-002-00-8											
31		vanadium { divanadium pentaoxide; vanadium pentoxide }				32	mg/kg	1.785	57.126	mg/kg	0.00571 %		
		023-001-00-8	215-239-8	1314-62-1									
32		zinc { zinc sulphate }				380	mg/kg	2.469	938.333	mg/kg	0.0938 %		
		030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
33		benzene				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
34		toluene				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
35		ethylbenzene				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
36		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
37		TPH (C6 to C40) petroleum group				58	mg/kg		58	mg/kg	0.0058 %		
				TPH									
38		polychlorobiphenyls; PCB				0.007	mg/kg		0.007	mg/kg	0.0000007 %		
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.213 %		

Key

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

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because he sample was initially classified as potentially hazardous due to a TPH concentration of 58mg/kg. However, a hazardous limit of 1,000mg/kg can applied as described in Waste Classification: Guidance on the classification and assessment of waste (1st edition 2015) therefore meaning the sample would be classified as non-hazardous. The receiving waste operator should confirm whether they are able to accept material on this basis as Inert

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0058%)

Appendix A: Classifier defined and non CLP determinands

pH (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4 H302 , Acute Tox. 1 H330 , Acute Tox. 1 H310 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Aquatic Chronic 2 H411

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Carc. 2 H351 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Skin Irrit. 2 H315

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

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

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2 H315 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

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

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

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

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

- **coronene** (EC Number: 205-881-7, CAS Number: 191-07-1)

Description/Comments: Data from C&L Inventory Database; no entries in Registered Substances or Pesticides Properties databases; SDS: Sigma Aldrich, 1907/2006 compliant, dated 2012 - no entries; IARC – Group 3, not carcinogenic.
Data source: http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=17010&HarmOnly=no?fc=true&lang=en
Data source date: 16 Jun 2014
Hazard Statements: STOT SE 2 H371

- **barium sulfate** (EC Number: 231-784-4, CAS Number: 7727-43-7)

Description/Comments: No hazard statements
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/89983 Sigma Aldrich SDS dated 15/4/19
Data source date: 02 Apr 2020
Hazard Statements: None.

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

CLP index number: 601-023-00-4
Description/Comments:
Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)
Additional Hazard Statement(s): Carc. 2 H351
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2B (77) 2000

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

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

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

CLP index number: 602-039-00-4
Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans; POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): Carc. 1A H350
Reason for additional Hazards Statement(s):
29 Sep 2015 - Carc. 1A H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

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

barium {barium sulfate}

No Hexavalent Chromium noted.

beryllium {beryllium oxide}

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

boron {diboron trioxide; boric oxide}

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

cadmium {cadmium oxide}

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

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

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

copper {dicopper oxide; copper (I) oxide}

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

lead {lead chromate}

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

mercury {mercury dichloride}

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

nickel {nickel chromate}

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

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

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

vanadium {divanadium pentaoxide; vanadium pentoxide}

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

zinc {zinc sulphate}

No Hexavalent chromium noted

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1, May 2018
HazWasteOnline Classification Engine Version: 2021.246.4869.9247 (05 Sep 2021)
HazWasteOnline Database: 2021.246.4869.9247 (05 Sep 2021)

This classification utilises the following guidance and legislation:
WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2019 - UK: 2019 No. 720 of 27th March 2019
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
POPs Regulation 2019 - Regulation (EU) 2019/1021 of 20 June 2019

WASTE ACCEPTANCE CRITERIA (WAC) ASSESSMENT

Site: LS5838 45a Underdown Road, Southwick, BN42 4HN

Date: 09/09/2021

Assesment Criteria											
	Inert Waste Landfill	**SNRHW Landfill**	**Hazardous Waste Landfill**	**Sample**	Position	**DS02**	-	-	-	-	-
					Depth	**0.50**	-	-	-	-	-
					Sample ref	**None Supplied**	-	-	-	-	-
					Preliminary Hazardous Assessment*	Non-Hazardous	Non-Hazardous				
	--	6.0	--	**Solid Analysis**	pH (units)	8.0	-	-	-	-	-
	3	5	6		Total Organic Carbon (TOC) (%)	1.8	-	-	-	-	-
	--	--	10		Loss on Ignition @ 450oC (%)	4.7	-	-	-	-	-
	--	to be evaluated			Acid Neutralisation Capacity (mol/kg)	1.1	-	-	-	-	-
	6000	--	--		BTEX (µg/kg)	< 10	-	-	-	-	-
	1	--	--		Total PCB's (mg/kg)	< 0.007	-	-	-	-	-
	500	--	--		Mineral Oil (mg/kg)	58	-	-	-	-	-
	100	--	--		Total PAH (mg/kg)	53.3	-	-	-	-	-
	0.50	2	25	**10:1 WAC Leachate Analysis (mg/kg equivalent)**	Arsenic	< 0.0100	-	-	-	-	-
	20	100	300		Barium	0.251	-	-	-	-	-
	0.0400	1	5		Cadmium	< 0.0008	-	-	-	-	-
	0.5	10	70		Chromium	0.030	-	-	-	-	-
	2	50	100		Copper	0.087	-	-	-	-	-
	0.01	0.2	2		Mercury	< 0.0050	-	-	-	-	-
	0.500	10	30		Molybdenum	< 0.0040	-	-	-	-	-
	0.400	10	40		Nickel	0.054	-	-	-	-	-
	0.5	10	50		Lead	0.027	-	-	-	-	-
	0.060	0.7	5		Antimony	< 0.017	-	-	-	-	-
	0.10	0.5	7		Selenium	< 0.040	-	-	-	-	-
	4	50	200		Zinc	0.34	-	-	-	-	-
	800	15000	25000		Chloride	13	-	-	-	-	-
	10	150	500		Fluoride	2.4	-	-	-	-	-
	1000	20000	50000		Sulphate	44	-	-	-	-	-
	4000	60000	100000		Total dissolved solids	440	-	-	-	-	-
	1	--	--		Total monohydric phenols	< 0.10	-	-	-	-	-
	500	800	1000		Dissolved organic carbon	93.2	-	-	-	-	-
					Classification	Inert					

Soils are classified as Hazardous or Non-Hazardous based on the total soils analysis. The WAC test is then used to potentially sub-classify as Inert or Stable Non-Reactive Hazardous Waste (SNRHW). Where a material is Hazardous, a WAC test is mandatory, and where it ***exceeds*** *the Hazardous waste limit, the material must be pre-treated to reduce the hazardous constituents to be below the WAC limit.*

Unit 10, 19 Albert Drive, Burgess Hill, **West S**
2nd Floor, 25-28 Field Street, **Lo**
W: www.landscience.co.uk

APPENDIX F

Envirocheck® Report:

Mining and Ground Stability Datasheet

Order Details:

Order Number:
284351493_1_1

Customer Reference:
LS5838

National Grid Reference:
524040, 105880

Slice:
A

Site Area (Ha):
0.11

Search Buffer (m):
1000

Site Details:

45a, Underdown Road
Southwick
BRIGHTON
BN42 4HN

Client Details:

Mr E Toms
Land Science Ltd
Unit 10
19 Albert Drive
Burgess Hill
West Sussex
RH15 9TN

Contents

Report Section and Details	Page Number
Summary	-
The Summary section provides an overview of the data contained within the report, detailing the number of data set features or the existence of a data set in relation to the buffer selected. For ease of reference, the report is broken down into 4 sections of data; Mining and Natural Cavities Data, Historical Land Use Information (1:2,500), Historical Land Use Information (1:10,000) and Ground Stability Data (1:50,000).	
Mining and Natural Cavities Data	1
The Mining and Natural Cavities Data section features data sets related to the existence of mining areas and their potential hazards; and details of naturally formed cavities. Data sets within this section are not plotted, with the exception of BGS Recorded Mineral Sites and Potential Mining Areas which feature on the Historical Land Use Information (1:10,000) map.	
Historical Land Use Information (1:2,500)	-
The Historical Land Use Information (1:2,500) section contains data captured from analysis carried out by Landmark of 1:1,250 and 1:2,500 scale historical Ordnance Survey mapping, identifying areas where, historically, the land uses were potentially contaminative. For the purpose of this Envirocheck module, only historical data relating to mining and ground stability has been included and plotted on the corresponding Historical Land Use Information (1:2,500) map. This section also includes the Subterranean Features data set, which details various man-made and man-used underground spaces obtained from the Subterranea Britannica society.	
Historical Land Use Information (1:10,000)	3
The Historical Land Use (1:10,000) section covers data captured from the systematic analysis carried out by Landmark of 1:10, 560 and 1:10,000 scale historical Ordnance Survey mapping dating back to the mid-19th century, identifying potentially contaminative past industrial land uses. For the purpose of this Envirocheck module, only data relating to mining and ground stability has been included and plotted on the accompanying Historical Land Use Information (1:10,000) map.	
Ground Stability Data (1:50,000)	4
The Ground Stability (1:50,000) section includes the BGS Geosure data suite, reporting features to 250m and plotted onto 3 separate maps. Also reported is brine subsidence, brine mining and salt mining data sets, of which Brine Pumping and Salt Mining Related Features are plotted, and subsidence insurance claims and insurance investigations data, which is not plotted.	
Historical Map List	5
The Historical Map List section details the historical mapping that has been analysed for your site, in relation to the Historical Land Use Information sections.	
Data Currency	6
Data Suppliers	7
Useful Contacts	8

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The brine subsidence data relating to the Driotwich area as provided in this report is derived from JPB studies and physical monitoring undertaken annually over more than 35 years. For more detailed interpretation contact enquiries@jpb.co.uk. JPB retain the copyright and intellectual rights to this data and accept no liability for any loss or damage, including in direct or consequential loss, arising from the use of this data.

The Mining Instability data was obtained on licence from Ove Arup & Partners Limited (for further information, contact mining.review@arup.com). No reproduction or further use of such Data is to be made without the prior written consent of Ove Arup & Partners Limited. The supplied Mining Instability data is derived from publicly available records and other third party sources and neither Ove Arup & Partners nor Landmark warrant the accuracy or completeness of such information or data.

Report Version v53.0

Land Science

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m
Mining and Natural Cavities Data					
BGS Recorded Mineral Sites	pg 1		1	1	9
Coal Mining Affected Areas			n/a	n/a	n/a
Man Made Mining Cavities					
Mining Instability			n/a	n/a	n/a
Natural Cavities					
Non Coal Mining Areas of Great Britain	pg 2	Yes		n/a	n/a
Potential Mining Areas					
Historical Land Use Information (1:2,500)					
Extractive Industries or Potential Excavations from 1855-1909 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1893-1915 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1906-1937 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1924-1949 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1950-1980 (100m)				n/a	n/a
Subterranean Features (100m)				n/a	n/a
Historical Land Use Information (1:10,000)					
Air Shafts					
Disturbed Ground					
General Quarrying					
Heap, unknown constituents					
Mineral Railway					
Mining & quarrying general					
Mining of coal & lignite					
Quarrying of sand & clay, operation of sand & gravel pits	pg 3			1	5
Former Marshes					
Potentially Infilled Land (Non-Water)	pg 3			1	5
Potentially Infilled Land (Water)					
Ground Stability Data (1:50,000)					
CBSCB Compensation District			n/a	n/a	n/a
Brine Pumping Related Features					
Brine Subsidence Solution Area					
Potential for Collapsible Ground Stability Hazards	pg 4	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 4	Yes		n/a	n/a
Potential for Ground Dissolution Stability Hazards	pg 4	Yes	Yes	n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 4	Yes		n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 4	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 4	Yes		n/a	n/a
Salt Mining Related Features					

Summary

Report Version v53.0

Mining and Natural Cavities Data

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	**BGS Recorded Mineral Sites** Site Name: Southwick Gravel Pit Location: Southwick, West Sussex Source: British Geological Survey, National Geoscience Information Service Reference: 157934 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Head Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A13SW (SW)	223	1	523889 105682
2	**BGS Recorded Mineral Sites** Site Name: Southwickhill Barn Chalk Pit Location: Kingston By Sea, Shoreham-By-Sea, West Sussex Source: British Geological Survey, National Geoscience Information Service Reference: 157928 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: Newhaven Chalk Formation Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A18SW (N)	454	1	523864 106327
3	**BGS Recorded Mineral Sites** Site Name: Kingston By Sea Gravel Pit Location: Kingston By Sea, Shoreham-By-Sea, West Sussex Source: British Geological Survey, National Geoscience Information Service Reference: 157931 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Head Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A12SW (W)	656	1	523355 105847
4	**BGS Recorded Mineral Sites** Site Name: Kingston By Sea Gravel Pit Location: Kingston By Sea, Shoreham-By-Sea, West Sussex Source: British Geological Survey, National Geoscience Information Service Reference: 157932 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Head Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A12NW (W)	745	1	523318 106169
5	**BGS Recorded Mineral Sites** Site Name: Kingston By Sea Gravel Pit Location: Kingston By Sea, Shoreham-By-Sea, West Sussex Source: British Geological Survey, National Geoscience Information Service Reference: 157936 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Head Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A12SW (W)	786	1	523281 105576
6	**BGS Recorded Mineral Sites** Site Name: Kingston By Sea Gravel Pit Location: Kingston By Sea, Shoreham-By-Sea, West Sussex Source: British Geological Survey, National Geoscience Information Service Reference: 157935 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Head Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A12SW (W)	811	1	523208 105753

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
7	**BGS Recorded Mineral Sites** Site Name: Merton House Chalk Pit Location: Portslade By Sea, Brighton, West Sussex Source: British Geological Survey, National Geoscience Information Service Reference: 157946 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: Tarrant Chalk Member Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A14NE (E)	811	1	524832 106169
8	**BGS Recorded Mineral Sites** Site Name: Turberville Wharf Location: Southwick, Portslade-By-Sea, West Sussex Source: British Geological Survey, National Geoscience Information Service Reference: 66610 Type: Wharf **Status: Active** Operator: Dudman Aggregates Ltd. Operator Location: Not Supplied Periodic Type: Not Available Geology: Quarry (Hard Rock) Commodity: Crushed Rock Positional Accuracy: Located by supplier to within 10m	A8SW (S)	925	1	523900 104950
8	**BGS Recorded Mineral Sites** Site Name: Turberville Wharf Location: Southwick, Portslade-By-Sea, West Sussex Source: British Geological Survey, National Geoscience Information Service Reference: 66610 Type: Wharf **Status: Active** Operator: Dudman Aggregates Ltd. Operator Location: Not Supplied Periodic Type: Quaternary Geology: Marine Deposits Commodity: Marine Sand And Gravel Positional Accuracy: Located by supplier to within 10m	A8SW (S)	925	1	523900 104950
9	**BGS Recorded Mineral Sites** Site Name: Penney'S Wharf Location: Southwick, Portslade, West Sussex Source: British Geological Survey, National Geoscience Information Service Reference: 10892 Type: Wharf **Status: Active** Operator: Dudman Aggregates Ltd. Operator Location: Not Supplied Periodic Type: Not Available Geology: Quarry (Hard Rock) Commodity: Crushed Rock Positional Accuracy: Located by supplier to within 10m	A8SW (S)	929	1	524000 104940
9	**BGS Recorded Mineral Sites** Site Name: Penney'S Wharf Location: Southwick, Portslade, West Sussex Source: British Geological Survey, National Geoscience Information Service Reference: 10892 Type: Wharf **Status: Active** Operator: Dudman Aggregates Ltd. Operator Location: Not Supplied Periodic Type: Quaternary Geology: Marine Deposits Commodity: Marine Sand And Gravel Positional Accuracy: Located by supplier to within 10m	A8SW (S)	929	1	524000 104940
	Coal Mining Affected Areas In an area which may not be affected by coal mining				
	Non Coal Mining Areas of Great Britain Risk: Rare Source: British Geological Survey, National Geoscience Information Service	A13NW (E)	0	1	524037 105884

Historical Land Use Information (1:10,000)

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
10	**Quarrying of sand & clay, operation of sand & gravel pits** Use: Not Supplied Date of Mapping: 1879 - 1963	A18SW (N)	381	-	523958 106274
11	**Quarrying of sand & clay, operation of sand & gravel pits** Use: Not Supplied Date of Mapping: 1912	A12SE (W)	615	-	523396 105844
12	**Quarrying of sand & clay, operation of sand & gravel pits** Use: Not Supplied Date of Mapping: 1912 - 1947	A12NE (W)	673	-	523373 106110
13	**Quarrying of sand & clay, operation of sand & gravel pits** Use: Not Supplied Date of Mapping: 1912 - 1947	A12SE (W)	673	-	523385 105621
14	**Quarrying of sand & clay, operation of sand & gravel pits** Use: Not Supplied Date of Mapping: 1947	A12SW (SW)	733	-	523338 105579
15	**Quarrying of sand & clay, operation of sand & gravel pits** Use: Not Supplied Date of Mapping: 1879 - 1912	A14NE (NE)	758	-	524763 106198
16	**Potentially Infilled Land (Non-Water)** Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1984	A18SW (N)	381	-	523958 106274
17	**Potentially Infilled Land (Non-Water)** Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1984	A12SE (W)	615	-	523396 105844
18	**Potentially Infilled Land (Non-Water)** Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1984	A12SE (W)	669	-	523387 105629
19	**Potentially Infilled Land (Non-Water)** Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1984	A12NE (W)	684	-	523367 106127
20	**Potentially Infilled Land (Non-Water)** Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1984	A12SW (SW)	733	-	523338 105579
21	**Potentially Infilled Land (Non-Water)** Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1984	A14NE (NE)	758	-	524763 106198

Ground Stability Data (1:50,000)

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	CBSCB Compensation District The site does not fall within the brine compensation area.				
	Brine Subsidence Solution Area The site does not fall within the brine subsidence solution area.				
22	**Potential for Collapsible Ground Stability Hazards** Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (E)	0	1	524037 105884
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (E)	0	1	524037 105884
23	**Potential for Ground Dissolution Stability Hazards** Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (E)	0	1	524037 105884
24	**Potential for Ground Dissolution Stability Hazards** Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13NW (NW)	192	1	523918 106066
25	**Potential for Landslide Ground Stability Hazards** Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (E)	0	1	524037 105884
26	**Potential for Running Sand Ground Stability Hazards** Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (E)	0	1	524037 105884
27	**Potential for Shrinking or Swelling Clay Ground Stability Hazards** Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (E)	0	1	524037 105884

Historical Map List

The following mapping has been analysed for Historical Land Use Information (1:2,500):

1:2,500	Mapsheet	Published Date
Ordnance Survey Plan	TQ2305	1952
Ordnance Survey Plan	TQ2306	1952

The following mapping has been analysed for Historical Land Use Information (1:10,000):

1:10,560	Mapsheet	Published Date
Sussex	065_00	1879
Sussex	065_NE	1899
Sussex	065_NW	1899
Sussex	065_SE	1899
Sussex	065_SW	1899
Sussex	065_NE	1912
Sussex	065_NW	1912
Sussex	065_SE	1912
Sussex	065_SW	1912
Sussex	065_NE	1938
Sussex	065_SE	1940
Sussex	065_NW	1947
Sussex	065_SW	1948
Ordnance Survey Plan	TQ20NE	1963
Ordnance Survey Plan	TQ20NW	1963
Ordnance Survey Plan	TQ20SE	1963
Ordnance Survey Plan	TQ20SW	1963
1:10,000	**Mapsheet**	**Published Date**
Ordnance Survey Plan	TQ20NW	1984
Ordnance Survey Plan	TQ20SW	1984
Ordnance Survey Plan	TQ20NE	1993
Ordnance Survey Plan	TQ20SE	1993

Mining and Cavities Data	Version	Update Cycle
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	May 2021	Bi-Annually
Coal Mining Affected Areas The Coal Authority - Property Searches	March 2014	Annual Rolling Update
Man Made Mining Cavities Stantec UK Ltd	May 2021	Bi-Annually
Mining Instability Ove Arup & Partners	June 1998	Not Applicable
Natural Cavities Stantec UK Ltd	May 2021	Bi-Annually
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Historical Land Use Information (1:2,500)	**Version**	**Update Cycle**
Subterranean Features Landmark Information Group Limited	February 2020	Bi-Annually
Ground Stability Data (1:50,000)	**Version**	**Update Cycle**
CBSCB Compensation District Cheshire Brine Subsidence Compensation Board (CBSCB)	August 2011	As notified
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	April 2020	Annually
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Brine Subsidence Solution Area Johnson Poole & Bloomer	December 2020	Annual Rolling Update

Data Suppliers

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
British Geological Survey	
The Coal Authority	
Ove Arup	
Stantec UK Ltd	
Wardell Armstrong	
Johnson Poole & Bloomer	

Useful Contacts

Contact	Name and Address	Contact Details
1	**British Geological Survey - Enquiry Service** British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
-	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Public Health England

Report of address search for radon risk

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Radon Risk Report for addresses in England and Wales

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Address searched: 45A Underdown Road, Southwick, Brighton, BN42 4HN
Date of report: 2 September 2021

Guidance for existing properties

Is this property in a radon Affected Area? - Yes

A radon Affected Area is defined as where the radon level in at least one property in every hundred is estimated to exceed the Action Level.

The estimated probability of the property being above the Action Level for radon is: 1-3%

The result may not be valid for buildings larger than 25 metres.
If this site if for redevelopment, you should undertake a GeoReport provided by the British Geological Survey.

This report informs you of the estimated probability that this particular property is above the Action Level for radon. This does not necessarily mean there is a radon problem in the property; the only way to find out whether it is above or below the Action Level is to carry out a radon measurement in an existing property.

Radon Affected Areas are designated by the Public Health England. PHE advises that radon gas should be measured in all properties within Radon Affected Areas.

If you are buying a currently occupied property in a Radon Affected Area, you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were above the Radon Action Level and if so, whether remedial measures were installed, radon levels were re-tested, and the results of re-testing confirmed the effectiveness of the measures.

Further information is available from PHE or https://www.ukradon.org

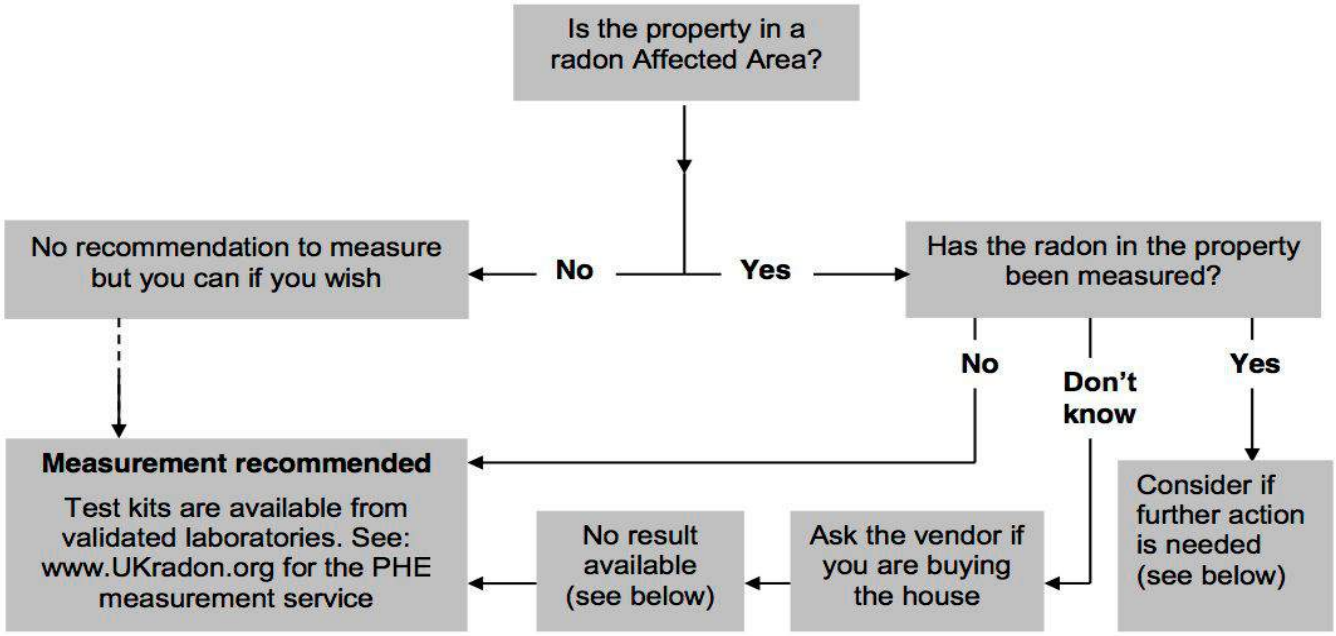
Guidance for new buildings and extensions to existing properties

What is the requirement under Building Regulations for radon protection in new buildings and extensions at the property location? - None

If you are buying a new property in a Radon Affected Area, you should ask the builder whether radon protective measures were incorporated in the construction of the property.

See the Radon and Building Regulations for more details.

PHE guidance for occupiers and prospective purchases



Existing radon test results: There is no public record of individual radon measurements. Results of previous tests can only be obtained from the seller. Radon levels can be significantly affected by changes to the building or its use, particularly by alterations to the heating and ventilation which can also be affected by changes in occupier. If in doubt, test again for reassurance.

Radon Bond: This is simply a retained fund, the terms of which are negotiated between the purchaser and the vendor. It allows the conveyance of the property to proceed without undue delay. The purchaser is protected against the possible cost of radon reduction work and the seller does not lose sale proceeds if the result is low. Make sure the agreement allows enough time to complete the test, get the result and arrange the work if needed.

High Results: Exposure to high levels of radon increases the risk of developing lung cancer. If a test in a home gives a result at or above the Action Level of 200 Becquerels per cubic metre of air (Bq/m3), formal advice will be given to lower the level. Radon reduction will also be recommended if the occupants include smokers or ex-smokers when the radon level is at or above the Target Level of 100 Bq/m3; these groups have a higher risk. Information on health risks and radon reduction work is available from PHE. Guidance about radon reduction work is also available from some Local Authorities, the Building Research Establishment and specialist contractors.

PHE designated radon website: https://www.ukradon.org
Building Research Establishment: http://www.bre.co.uk/page.jsp?id=3137

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