



Report
Title:

Contamination Assessment & Updated Remediation Strategy

Project
Name:

Millfields Farm, Rusper



Report
Reference:

BRD4518-OR3-B

Date:

January 2026

BRD Environmental Ltd

Hawthorne Villa, 1 Old Parr Road,
Banbury, Oxfordshire, OX16 5HT
01295 272244 info@brduk.com
www.brduk.com

REPORT CONTROL SHEET

REPORT TITLE	CONTAMINATION ASSESSMENT AND UPDATED REMEDIATION STRATEGY
PROJECT	MILLFIELDS FARM, RUSPER
CLIENT	STONEBOND PROPERTIES

REPORT REFERENCE	ISSUE DETAIL	DATE	PREPARED BY	CHECKED BY
BRD4518-OR3-A	First Issue	16/01/2026	M Morgan	I Hibberd
BRD4518-OR3-B	Second Issue incorporating Client comments	27/01/2026	I Hibberd	J Brockwell

BRD Environmental Limited

Geotechnical and Environmental Services

- Ground Investigation
- Japanese Knotweed Removal
- Soil, Water and Gas Testing
- Contamination Assessment
- Geotechnical Advice
- Remediation Solutions

Hawthorne Villa, 1 Old Parr Road, Banbury, Oxfordshire. OX16 5HT

T: 01295 272244

www.brduk.com

info@brduk.com

The information and advice contained within this report is provided by BRD Environmental Limited (BRD) for the sole use and reliance by its Client in performance of BRD's duties under its contract with the Client. Any advice, opinions or recommendations within this report should be read and relied upon only in the context of the report as a whole. The advice within the report is based upon the information made available to BRD within the financial and timeframe constraints imposed. BRD relied on the accuracy of the information contained in the third party documents consulted and is in no circumstances responsible for the accuracy of such information or data supplied. The report is prepared with reasonable skill and care based generally on UK standards, codes and common practice current at the time of writing. When considering this report due regard should be given to the terms and conditions of BRD's contract with the Client under which the report was prepared. The copyright of this report is held by BRD. Should the Client wish to release this report to a Third Party for that party's reliance, BRD agree to such release provided that BRD assumes no duties, liabilities or obligations to the Third Party, that the Third Party does not acquire any rights whatsoever against BRD, and BRD accepts no responsibility for any loss incurred by the Client through the Client's release of the report to the Third Party. Following final issue of this report, BRD has no further obligation to advise the Client on any matters such as changes in legislation or codes of practice that may affect the advice contained within the report.



REPORT LAYOUT

This report is divided into the following four sections: Summary Report, Technical Report, Supporting Information and Appendices.

SUMMARY REPORT

This expanded executive summary provides the main findings of the work undertaken in brief non-technical language. This section provides an overview of the key outcomes for the benefit of non-specialists and concludes with the main recommendations for any further work required. This section should only be relied upon in the context of the whole report and the detailed within the Technical Report should be referred to with respect to any design decisions.

TECHNICAL REPORT

The main report section is intended to provide the technical detail of the works completed and meet the information required by current guidance and practice. The Technical Report is written in a language that, in part, assumes knowledge of the subject matter so that it can be written in as concise a form as possible. Its primary audience is clients, peers, regulators and other professionals in related disciplines.

1. INTRODUCTION TO TECHNICAL REPORT	1
1.1. CONTRACT DETAILS	1
1.2. SCOPE OF WORKS	2
1.3. REPORT LIMITATIONS	2
2. SITE CHARACTERISTICS	3
2.1. SITE SETTING	3
2.2. SITE DESCRIPTION	3
2.3. GIANT HOGWEED	5
2.4. PREVIOUS GROUND INVESTIGATIONS	5
2.5. INITIAL CONCEPTUAL MODEL	6
3. ADDITIONAL GROUND INVESTIGATION	7
3.1. INVESTIGATION DESIGN	7
3.2. BRD FIELDWORK	8
3.3. LABORATORY TESTING	8
4. GROUND CONDITIONS	9
4.1. OVERVIEW	9
4.2. MADE GROUND	9
4.3. BEDROCK	9
4.4. CONTAMINATION OBSERVATIONS	10



4.5.	OBSERVED GROUNDWATER BEHAVIOUR	10
5.	RISK ESTIMATION - SOILS	11
5.1.	HUMAN HEALTH	11
5.2.	WATER ENVIRONMENT	14
5.3.	BUILDING MATERIALS	15
6.	RISK EVALUATION	16
6.1.	REVISED CONCEPTUAL MODEL	16
6.2.	UPDATED CONTAMINATION RISK ASSESSMENT	16
6.3.	RISK MANAGEMENT	18
7.	SOIL RE-USE AND WASTE SOIL DISPOSAL	19
7.1.	OVERVIEW	19
7.2.	TOPSOIL	19
7.3.	SUB-SOIL	19
8.	REMEDATION STRATEGY	21
8.1.	INTRODUCTION	21
8.2.	IDENTIFIED CONTAMINATION RISKS	21
8.3.	PROPOSED DEVELOPMENT	22
8.4.	OBJECTIVES	22
8.5.	REMEDIALTION OPTIONS APPRAISAL	23
8.6.	GENERAL	25
8.7.	PROPOSED REMEDIATION WORKS	26
8.8.	PREVIOUSLY UNIDENTIFIED CONTAMINATION	28
9.	VERIFICATION PLAN	30
9.1.	INTRODUCTION	30
9.2.	REMOVAL OF CONTAMINATED SOILS	30
9.3.	PLACEMENT OF TOPSOIL	30
9.4.	TESTING OF IMPORTED TOPSOIL, SUB-SOIL AND VERIFICATION	31
9.5.	WATER SUPPLY PIPES	32
9.6.	VERIFICATION REPORT	32
10.	HEALTH AND SAFETY FILE INFORMATION	33
10.1.	INTRODUCTION	33
10.2.	HAZARDS	33
10.3.	EXISTING STRUCTURES	33

10.4.	HAZARDOUS MATERIALS	34
10.5.	UTILITY SERVICES	34
REFERENCES		
SUPPORTING INFORMATION		
This section of the report provides background details of a generic nature together with specific technical approaches adopted by BRD and details of the guidance documents that are commonly referenced in the report. The section also includes explanations of technical terms to assist non-specialist readers in understanding the Technical Report. It should be noted that not all the information within this section is necessarily applicable to this specific report.		
APPENDICES		
The final section of the report presents the factual data collected and employed as part of the preparation of the report.		
APPENDIX 1	SITE PLANS & PHOTOGRAPHS	
	Site Location Plan	Ref.BRD4518-OP7-A
	Proposed Development Layout	'Proposed Site Layout - Land at Millfields Farm, Rusper, West Sussex' ECE Architecture, 7288-PL04, Rev H, 09.02.24
	Exploratory Point Plan	Ref. BRD4518-OD1-B
	Remediation Plan	Ref. BRD4518-OP4-C
	Revised Conceptual Site Model	Ref. BRD4518-OP5-B
APPENDIX 2	EXPLORATORY HOLE RECORDS	
	Logs of confirmatory trial pits.	Ref. VS03 to VS12
	Photographic records of trial pits.	Ref. BRD4518-OP10-A
APPENDIX 3	LABORATORY TEST RESULTS	
	DETS report 25-09147 & 25-28540	23 x A4 pages

SUMMARY REPORT- GENERAL INFORMATION

SUBJECT	COMMENTS
CURRENT SITE CONDITION	The site comprises a former farmyard, previously used for the training of horses, alongside fields or parts thereof. Several single storey derelict buildings were until recently present in the southwestern area of the site, which were used as stables and for storage, along with a larger commercial-style metal clad building to the south. These have recently been demolished as part of the initial enabling works.
PROPOSED DEVELOPMENT	It is proposed that the site will be developed for residential houses with associated roads and landscaping. To the south and east is proposed for public open space and drainage ponds. The site extends to the southeast with a thin strip of land proposed to be for the construction of a shallow swale connecting to a ditch.
HISTORICAL SUMMARY	Some minor development first occurred on site by the map edition from 1911, when some small unknown buildings were constructed adjacent to the central western site boundary. The remainder of the site was shown to be largely undeveloped farmland with several footpaths until the early 1970s when the central buildings, referred to as Millfields Farm, were constructed. Further buildings in the northern part of the farmyard and the larger commercial style building in the south were constructed by 2010. The remainder of the site appears to have been fields throughout the mapped history.
PUBLISHED GEOLOGY	The site is shown to be devoid of any superficial deposits. The entire site is underlain by the bedrock geology of the Weald Clay Formation - Mudstone.
ACTUAL GROUND CONDITIONS	The ground conditions encountered during the investigation works were generally in keeping with those encountered by the previous investigations with mostly shallow Made Ground identified in the farmyard area, along with Topsoil in the field areas. Deeper Made Ground soils were identified where soils have been imported to artificially raise levels in the south of the farmyard area. The underlying natural soils consisted of silty clays with occasional lenses of mudstone.
HYDROGEOLOGY	The site is situated upon unproductive strata associated with the Weald Clay Formation. The site is not located within a groundwater Source Protection Zone.
HYDROLOGY	The nearest main water course to the site is the River Mole which is located approximately 700m to the south. A number of ditches are present within the ancient woodland along the eastern boundary of the site. These run in a north-south direction before continuing south and ultimately connecting to the River Mole. The site is not in an area indicated to be at risk of flooding.

SUMMARY REPORT - CONTAMINATION ISSUES

SUBJECT	COMMENTS
SOIL RISKS TO HUMAN HEALTH	No risks to future residents have been identified in the northern field or in the majority of the existing agricultural fields within the proposed site boundary. Within the farmyard and immediate surrounding area, some contaminated Made Ground soils have been identified that present risks to future residents where they are exposed to these soils in future garden, landscaping and public open space areas. A localised contamination hotspot has also been identified in the eastern field.
ASBESTOS	Low concentrations of asbestos fibres and rare asbestos fragments have been identified in the surface Made Ground soils in the northern and central farmyard areas which will need to be managed by appropriately trained operatives during redevelopment of the site.
LANDFILL GAS	Ground gas protection measures are not required at this development.
RADON GAS	Radon gas protection measures are not required.
RISKS TO THE WATER ENVIRONMENT	No unacceptable contamination risks to water resources have been identified by this investigation.
RISKS TO BUILDING MATERIALS AND SERVICES	It is considered likely that 'barrier' pipes incorporating an aluminium foil layer or plastic wrapped metal pipes will be required for new water supplies laid within the farmyard area. As no contamination has been identified in the field areas of the site, it is considered that 'barrier' pipes will not be required elsewhere.
REMEDIATION STRATEGY	To protect future residents from the identified soil contamination, removal of the areas of contaminated soil is required. This is due to the fact that most of the contaminated material is only shallow and near surface and therefore off-site disposal to a suitably licensed facility will be the most effective measure.

SUMMARY REPORT - KEY RECOMMENDATIONS

CONTAMINATION RECOMMENDATIONS
A formal remediation strategy is presented within this report and should be agreed with the relevant regulatory authorities.

1. INTRODUCTION TO TECHNICAL REPORT

1.1. CONTRACT DETAILS

CLIENT	Stonebond Properties (Guildford) Limited trading as Stonebond Properties.
SITE	Land situated at Millfields Farm in the village of Rusper, West Sussex.
CLIENT'S ADVISORS	BRD Environmental Limited (BRD) has been commissioned directly by the Client.
REPORT CONTEXT	It is understood that the Client intends to undertake residential redevelopment of the site.
REPORT TYPE	Additional contamination assessment following demolition and an updated remediation strategy.
REPORT OBJECTIVES	The site has been the subject of the following previous ground investigations, contamination assessment and remediation strategy by BRD referenced as follows: • Additional Site Investigation and Remediation Strategy - Millfields Farm, Rusper', BRD Environmental Ltd report ref. BRD4518-OR1-A, July 2025. The report made recommendations for additional investigation beneath the building floor slabs at the site following demolition. This was originally proposed to form part of the remediation verification works, but following consultation with the local authority, the additional investigation work was to be documented separately and the remediation strategy updated if required, prior to commencing construction works. Therefore, the aim of this report is to present the findings of the additional post-demolition ground investigation and to update the remediation strategy accordingly. This is in accordance with Condition 4(a) of the planning permission (Horsham District Council Planning ref. DC/24/0699) which is a pre-commencement condition (following any required demolition works) dictating that the post demolition survey is required prior to finalising and agreeing the remediation strategy. The report will then aim to address the requirements conditions 4(b) and 4(c) covering a remediation strategy and verification plan.

1.2. SCOPE OF WORKS

The agreed scope of works was:

- Mobilisation to site and production of health and safety documentation.
- Attendance by a Geo-Environmental Consultant to inspect exposed soils during / following the demolition and to excavate (using the demolition contractor's plant) approximately 11No. shallow trial pits within the building footprints.
- Update existing investigation & strategy report with the findings of the post-demolition investigation and re-issue report for submission to the LPA.

1.3. REPORT LIMITATIONS

Any site boundary lines depicted on plans included within this report are approximate only and do not imply legal ownership of land. Any observations of tree species, asbestos containing materials within structures or invasive weeds, does not constitute a formal survey of such features. The identification of such features is therefore tentative only. In the case of Japanese Knotweed and other non-aqueous invasive weeds, such as Giant Hogweed, BRD can undertake separate surveys for this plant undertaken by a Property Care Association qualified surveyor. For the Giant Hogweed previously identified at the site, the Client has appointed a separate contractor to deal with this aspect. Therefore, this report does not contain any further advice or recommendations in relation to the presence of the Giant Hogweed.

The report does not consider whether sensitive ecology or archaeology is present as these require consideration by professionals specialising in these matters. For excavations planned within six metres of a third part structure then separate professional advice should be sought in respect of the requirements of the Party Wall Act.

It should be recognised that the collection of desk study information may not be exhaustive and that other information pertinent to the site may be available.

The recommendations, interpretations and conclusions of this report are based solely on the ground conditions found at the exploratory holes. Due to the variability in the nature of ground, conditions between exploratory holes can only be interpreted and not defined. The description of the site and the ground conditions is accurate only for the dates of the field works. In particular, groundwater levels can vary due to seasonal and other effects.

The assessment and interpretation of contamination risks is based on the scope of works agreed with the Client together with the budgetary and programme constraints imposed. Further investigation, analysis and assessment of contamination may be required by regulators or other third parties with an interest in the site. An ecological risk assessment of contaminated soils is beyond the scope of this report. This report is concerned with assessing those contamination risks which apply to the future use of the site through the proposed development as part of the planning regime. The assessment does not consider the risk to current site users or continued future use of the site in its current state. If development of the site should occur that differs from that proposed, then the findings of the contamination assessment would need to be re-evaluated.

This report is restricted to a contamination assessment only and does not include any form of geotechnical advice. It should be noted that a geotechnical assessment has been completed in the previous report for this site and this should be referred to.

2. SITE CHARACTERISTICS

2.1. SITE SETTING

SITE ADDRESS AND POST CODE	Millfields Farm, Rusper, Horsham, West Sussex, RH12 4PR.
NATIONAL GRID REFERENCE	520747E, 137043N

2.2. SITE DESCRIPTION

SUBJECT	COMMENTS
CURRENT SITE DESCRIPTION	The site comprises an irregularly shaped piece of land to the southeast of Rusper village. Access to the site is currently via a track located centrally on the western site boundary from Horsham Road. A further gated entrance is located on the northeastern site boundary from East Street. The site comprises a former farmyard, previously used for the training of horses, alongside fields or parts thereof. Several single storey derelict buildings were present in the southwestern area of the site, which were used as stables and for storage, along with a larger commercial-style metal clad building. These have recently been demolished as part of the initial enabling works. Two outdoor horse training manège areas are also present in this area of the site. A previous report suggests that one of the site buildings was previously used for light vehicle maintenance. Vehicle parts with various oil and chemical substances were understood to have been stored at the eastern end of the stables. The majority of the farmyard area has a loose gravel surface with concrete floor slabs present beneath the site buildings. The manège area to the southwest is covered by a mixture of loose gravelly sands and the smaller circular area located centrally is covered by shredded rubber tyre mix. The field areas are laid to grass. The topography of the general area slopes down to the southeast, but site levels have been artificially raised in the area of the site buildings. This is most evident to the east of the larger commercial style building where the ground has been artificially raised above the surrounding ground levels to form a level platform. The site contains multiple mature trees and hedgerows on the boundaries. Notable trees include mature oaks and a row of large leylandii trees located on the northeastern site boundary. In the southern corner of the farmyard, the non-native invasive plant species, Giant Hogweed, has been identified.

SUBJECT	COMMENTS
SURROUNDING LAND USE	The site is situated in a mixed agricultural and residential area. Residential properties are located to the west and northeast of the site. To the north, south and west of the site are agricultural fields laid to grass. To the north, the fields are located beyond East Street. To the east of the site of the site are further agricultural fields and several small woodland areas. The proposed development plan identifies the woodland along the eastern boundary to be an ancient woodland.
PROPOSED DEVELOPMENT	It is proposed that the site will be developed with 43No. residential dwellings with associated roads and landscaping. To the south and east is proposed for public open space and drainage ponds. The site extends to the southeast with a thin strip of land proposed to be for the construction of a shallow swale connecting to a ditch.
HISTORICAL SUMMARY	Some minor development first occurred on site by the map edition from 1911, when some small unknown buildings were constructed adjacent to the central western site boundary. The remainder of the site was shown to be largely undeveloped farmland with several footpaths until the early 1970s when the central buildings, referred to as Millfields Farm, were constructed. Further buildings in the northern part of the farmyard and the larger commercial style building in the south were constructed by 2010. The remainder of the site appears to have been fields throughout the mapped history.
PUBLISHED GEOLOGY	The site is shown to be devoid of any superficial deposits. The entire site is underlain by the bedrock geology of the Weald Clay Formation - Mudstone.
RADON	Radon protection measures are not required.
HYDROGEOLOGY	The site is situated upon unproductive strata associated with the Weald Clay Formation. The site is not located within a groundwater Source Protection Zone.
HYDROLOGY	The nearest main water course to the site is the River Mole, which is located approximately 700m to the south. A number of ditches are present within the ancient woodland along the eastern boundary of the site. These run in a north-south direction before continuing south and ultimately connecting to the river Mole. The site is not in an area indicated to be at risk of flooding.

2.3. GIANT HOGWEED

As discussed above, Giant Hogweed has also been identified in the south of the site, which is harmful to both humans and animals. It is understood that management of the Giant Hogweed is being undertaken by a separate contractor appointed by the Client and as such is not covered within this remediation strategy.

2.4. PREVIOUS GROUND INVESTIGATIONS

2.4.1. T&P Regeneration (2015) and IDOM (2024)

The following previous investigations have been completed at the site:

- 'Desk Study and Ground Investigation Report - Millfields Farm, Horsham Road, Rusper' T&P Regeneration Ltd, 2015Feb_MILL1356_DS&GI Report, Issue 1_V1, February 2015.
- Geo-Environmental Assessment - Millfields Farm, Rusper' IDOM, GEA-22623-23-405, Rev C, Dated 24/04/2024.

These previous reports were reviewed in detail in the previous site investigation report completed by BRD. The main areas of concern were identified as follows:

- Significant contaminant concentrations recorded in trial pit MTP104. Such high concentrations would not typically be expected in topsoil with occasional clinker fragments.
- No quantification testing has been completed on the amosite asbestos encountered in T&P trial pit TP1 (northern farmyard area) albeit that no further asbestos has been recorded elsewhere on site during both phases of investigation, suggesting any asbestos is a localised issue regardless.
- Only limited investigation of the manège areas was completed. T&P Regeneration have recorded a high copper concentration and whilst not a risk to human health may present issues for waste disposal. In BRD's experience, the surfacing to manège areas often contains high concentrations of metals and the presence of elevated copper does suggest this is maybe an issue on this site.
- There is a high proportion of building cover and so some further contamination may be present beneath the footprints.
- A large quantity of contaminated and unsuitable waste soils appeared to have been imported to site. These soils are located alongside the southeastern edge of the farmyard area.
- Made Ground soils to a depth of 0.7m bgl were identified in borehole MBH101 in the location of the eastern fields. The presence of these soils in the field area is unexpected.
- There appeared to be some doubt as to the accuracy of the IDOM exploratory point plan as several of their exploratory points do not seemingly correlate with the ground conditions reported on their logs. Borehole MBH101 being of particular concern. As such the location of some of the identified contamination was uncertain at this stage.

2.4.2. BRD Environmental (2025)

BRD then undertook the following investigation / report to address the above identified limitations:

- Additional Site Investigation and Remediation Strategy - Millfields Farm, Rusper', BRD Environmental Ltd report ref. BRD4518-OR1-A, July 2025.



The additional investigation comprised the excavation of 13No. trial pits, 5No. windowless sample boreholes and 1No. surface sample. These were undertaken to address the limitations identified above, but with the boreholes primarily undertaken for geotechnical purposes.

The ground conditions encountered during the investigation works were generally in keeping with those encountered by the previous investigations with mostly shallow Made Ground identified in the farmyard area alongside Made Ground Topsoil and Topsoil in the field areas. Deeper Made Ground soils were identified where the soils have been imported to artificially raise levels in the southeastern part of the farmyard. Underlying the Made Ground soils, the clay soils of the Weald Clay Formation were encountered across the site.

Following the additional contamination testing it was determined that some areas of the site contained near surface Made Ground soils contaminated with heavy metals, PAHs, TPH and asbestos, albeit that some of these contamination sources are localised and/or limited to shallow Made Ground soils. This presented a moderate risk to human health in the farmyard area and a negligible risk in the northern field area with the exception of a localised hotspot at location ref. MTP104.

A risk to water a supply pipes was also identified in the farmyard area.

2.5. INITIAL CONCEPTUAL MODEL

The preliminary risks, based on the potential contaminant linkages, are detailed in the table below.

SOURCES AND CONTAMINANTS	PATHWAYS (REFERENCE FROM MODEL)	RECEPTORS	POTENTIAL RISK
Contaminated near surface Made Ground soils and in Topsoil at MTP104 Metals PAH TPH Asbestos	Ingestion Inhalation Consumption of home grown produce (1)	Residents	Moderate risk - Farmyard area & MTP104 Negligible risk - Northern fields (excluding MTP104)
	Direct contact (2)	Water supply pipes and building foundations	Low risk - Farmyard area Negligible risk - Northern fields

To address the identified uncertainties, some further investigation was planned following demolition of the site buildings. This investigation would include machine excavated trial pits along with chemical testing of the excavated soils beneath the building footprint in order to confirm that the underlying soils are all in keeping with the findings of the previous investigations.

During this further investigation, the asbestos fibre contamination identified in trial pit TP112 would also be delineated through some additional pits excavated in and around this location. The proposed additional investigation following the previous investigation forms the basis of this report.

3. ADDITIONAL GROUND INVESTIGATION

3.1. INVESTIGATION DESIGN

METHODOLOGY	Trial pits were chosen as the best investigation technique for below the building floor slabs as they expose more soil to allow an accurate record of the ground conditions identified. However, in some instances where natural soils were exposed beneath the slab, only a shallow hand dug pit was required.	
DATES OF SITE WORKS	The field works were undertaken on 22 nd October and 2 nd December 2025 as the demolition progressed.	
CONSTRAINTS TO EXPLORATORY HOLE LAYOUT	Following the above ground demolition of the buildings there were no constraints to the additional investigation layout.	
LAYOUT RATIONALE	SOURCE / FEATURE	EXPLORATORY HOLE
CONTAMINATION SOURCES / FEATURES TARGETED	Northern buildings.	VS01-VS03.
	Beneath southerly buildings.	VS04-VS06, VS09-VS11.
	Area of former hardstanding between southern buildings.	VS07 and VS08.
	Cleared manège area.	VS12.
	Asbestos fibres - TP112	VS06 - VS09.
CONTAMINATION SAMPLING PLAN	Based on the proposed end use, the sampling and analysis plan is more positively biased towards near surface Made Ground samples as these represent the soils most likely to be available to future site users and are those identified by the previous investigation works as being contaminated. Where applicable, the sampling has been focussed on soils displaying evidence of contamination as well as soils below or adjacent to such contamination to confirm the degree of migration, if any.	
ANALYSIS PLAN	Based on the contaminants identified during the previous investigation works the samples for analysed for a suite of contaminants including heavy metals, asbestos and polycyclic aromatic hydrocarbons (PAH).	

3.2. BRD FIELDWORK

SURFACE SAMPLING	
REFERENCES	VS01 to VS02.
DEPTH RANGE	0.05m bgl
DETAILS	Natural soils were encountered beneath the northerly building floor slabs and therefore only a shallow surface sample was warranted in these locations.

TRIAL PITS	
REFERENCES	VS03 to VS12.
DEPTH RANGE	From 0.65m to 1.40m bgl.
EXCAVATOR	Tracked 14 Tonne 360° excavator.
BACKFILL	All the trial pits were backfilled with arisings upon completion and compacted with rams of the excavator bucket.

3.3. LABORATORY TESTING

SOIL CHEMICAL TESTING	
The soil samples for contamination and/or chemical geotechnical testing were forwarded to the laboratory of DETS Ltd and the testing suite is detailed below. The UKAS or MCERTS accreditation of the individual test methods is shown on the laboratory test report included in the Appendices. It should be noted that the additional testing includes some verification sampling from a localised hotspot (MTP104) which was also verified at the time of the additional trial pits beneath the buildings. Whilst included in the testing, this verification element will be reported separately in the future verification report following the full implementation of the remediation strategy.	
SOIL TESTS	NUMBER OF SAMPLES TESTED
Arsenic, Cadmium, Chromium, Chromium VI, Copper, Lead, Mercury, Nickel, Selenium, Zinc.	11
Speciated Polycyclic Aromatic Hydrocarbons (PAH).	11
Asbestos Quantification.	15

4. GROUND CONDITIONS

4.1. OVERVIEW

The ground conditions encountered during the additional investigation works were generally in keeping with the previous phases of investigation. This typically consisted of varying Made Ground layers beneath the former buildings, over the natural Weald Clay Formation.

Details of the various stratigraphic units are given in the following sections.

4.2. MADE GROUND

Made Ground was noted to be absent from beneath the northern most building (VS01 to VS02) following the removal of the concrete floor slab to this building. The natural clay subsoils were exposed directly beneath.

Moving south, VS03 (next building to the south) and VS04 and VS05 (western end of third building to the south) all encountered similar Made Ground strata with broken out concrete to 0.13m (VS04 and VS05 only) then a cover of reworked chalk material to depths of between 0.20m to 0.25 described as *'Off-white, slightly sandy, silty gravel of fine to coarse, angular chalk'*. Beneath this, a distinct strata of *'dark red brown, gravelly sand. Gravel of fine to medium, angular to subrounded brick, clinker and rare flint'* was encountered and extending to depths in the range 0.35m to 0.40m and overlying the natural soils. This is also consistent with an upper layer of material previously identified in the area between the farm buildings (TP112).

Elsewhere, moving south, beneath the eastern end of the third building and the area between the third and fourth buildings (VS6 to VS8), Made Ground to between 0.60m and 0.80m was encountered. This Made Ground generally consisted of two strata with an upper layer comprising *'Red brown to brown, slightly clayey in parts, sandy gravel of fine to coarse, angular granite, flint, brick and concrete'*. Underlying this was a *'Dark brown, very sandy, gravelly clay with decaying plant remains. Gravel of fine to coarse, angular brick, flint and concrete with occasional plastic fragments and rare asbestos cement fragments'*. This is consistent with the previously encountered deeper Made Ground material between the farmyard buildings.

Beneath the fourth and final building to the south, VS9-VS11 encountered a more 'inert' Made Ground which extended to depths between 0.10m (VS10) to 1.10m (VS11). Where the Made Ground extended deeper at the eastern end (VS9 and VS11) it consisted of two layers, with an upper layer comprising gravelly, cobbly sand with the gravel and cobbles primarily comprising brick. A deeper layer of reworked clays soils was then encountered beneath. The Made Ground at the western end virtually petered out at VS10.

Finally, VS12 excavated in the location of the former manège, encountered the natural Weald Clay from the outset albeit the surface 200mm had been churned up by recent plant movements.

4.3. BEDROCK

4.3.1. Weald Clay Formation

All of the additional trial pits / sample points were terminated upon proving the Weald Clay Formation. This was typically described as *'stiff light grey mottled orange brown silty CLAY'* and proven to a depth of up to 1.40m bgl during this investigation.

4.4. CONTAMINATION OBSERVATIONS

The thin band of dark red brown, gravelly sand Made Ground beneath the thin chalk layer (VS03 to VS05) was noted to contain clinker fragments and therefore may be at risk of containing elevated PAHs as has previously been recorded at the site.

The surface Made Ground in VS08 (located between the southerly buildings) recorded rare asbestos cement fragments to a depth of 0.30m.

The surface Made Ground in VS03 identified ceramic and rare glass fragments within. The deeper imported Made Ground included some large wood fragments.

4.5. OBSERVED GROUNDWATER BEHAVIOUR

Groundwater was not encountered whilst forwarding any of the BRD exploratory holes.

5. RISK ESTIMATION - SOILS

5.1. HUMAN HEALTH

The samples from the additional trial pits have been assessed against the Generic Assessment Criteria (GAC) for residential land use as this is appropriate for the proposed form of development.

The previous testing is not included in this table but is referred to in the subsequent discussion.

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
Arsenic	mg/kg	11	34	37	0
Cadmium	mg/kg	11	0.7	22	0
Chromium (total)	mg/kg	11	37	910	0
Chromium (hexavalent)	mg/kg	11	<2	21	0
Copper	mg/kg	11	3,400	2,400	1
Lead	mg/kg	11	590	200	1
Mercury	mg/kg	11	1.1	11	0
Nickel	mg/kg	11	87	180	0
Selenium	mg/kg	11	1.3	250	0
Zinc	mg/kg	11	1,000	3,700	0
pH	Units	11	5.7-10.3	<5-10>	2
Naphthalene	mg/kg	11	<0.1	2.3	0
Acenaphthylene	mg/kg	11	<0.1	170	0
Acenaphthene	mg/kg	11	<0.1	210	0
Fluorene	mg/kg	11	<0.1	170	0
Phenanthrene	mg/kg	11	0.14	95	0
Anthracene	mg/kg	11	0.39	2,400	0
Fluoranthene	mg/kg	11	0.29	280	0
Pyrene	mg/kg	11	0.24	620	0
Benzo(a)anthracene	mg/kg	11	0.40	7.2	0
Chrysene	mg/kg	11	0.88	15	0
Benzo(b)fluoranthene	mg/kg	11	0.36	2.6	0
Benzo(k)fluoranthene	mg/kg	11	0.17	77	0
Benzo(a)pyrene	mg/kg	11	0.17	2.2	0
Indeno(1,2,3-cd)pyrene	mg/kg	11	0.29	27	0
Dibenzo(a,h)anthracene	mg/kg	11	0.26	0.24	1
Benzo(ghi)perylene	mg/kg	11	0.17	320	0
Asbestos Quantification	%	15	0.002	0.001	3

DISCUSSION OF RESULTS

LEAD	Elevated lead was recorded in VS05 at 0.30m which consisted of the reddish, brown brick and clinker material beneath some of the buildings in VS03, VS04 and VS05. In VS05 the lead was recorded at a concentration on 590mg/kg compared to the GAC of 200mg/kg. In the similar material in VS04, the lead was very low at a concentration 2.1mg/kg. In VS03 the overlying chalk material was tested but not the ashy material. <u>Previously Investigated Manège Areas</u> During the previous BRD investigation, a single elevated lead concentration of 636mg/kg, which is above the GAC of 200mg/kg, was recorded in the surface manège material in TP104 at 0.05m bgl. <u>Previously Investigated Imported Soils</u> The previous IDOM investigation identified an elevated lead concentration of 248mg/kg in the imported soils area, but BRD trial pits TP101, TP102 and TP103 did not identify any elevated lead in these soils. <u>Previously Investigated Northern Farmyard</u> In the northern section of the farmyard, the IDOM investigation identified an elevated lead concentration of 280mg/kg in the surface Made Ground soils. However, trial pit TP1 (T&P Regeneration) and previous BRD trial pits TP106 and TP107 did not identify any elevated lead within these soils.
COPPER	The same reddish, brown brick and clinker material that recorded elevated lead also recorded elevated copper at a concentration of 3,400mg/kg compared to the GAC of 2,400mg/kg. <u>Previously Investigated Manège Areas</u> During the previous BRD investigation, a single elevated copper concentration of 3,360mg/kg was recorded in the surface manège material in TP104 at 0.05m bgl.
ARSENIC	<u>Previously Investigated Imported Soils</u> During the IDOM investigation, a single elevated arsenic concentration of 91.5mg/kg, which is above the GAC of 37mg/kg, was recorded in the imported soils. However, BRD trial pits TP101, TP102 and TP103 did not identify any elevated arsenic in these soils.
PAH	The deeper Made Ground in VS11, beneath the southerly farm building, recorded a marginally elevated concentration of dibenzo(a)anthracene at a concentration of 0.26mg/kg compared to the GAC of 0.24mg/kg. Given the lack of any other PAH compounds exceeding their respective GAC in all of the samples in the area, coupled with the fact it is only a marginal exceedance of what is already a very low screening levels, it is not considered that this presents any significant cause for concern for this specific soil. <u>Previously Investigated Northern Farmyard</u> The previous BRD investigation has recorded several elevated PAH compounds within the near surface soils in trial pits TP106 and TP107. The BaP concentrations at these locations were 11.8mg/kg and 7.29mg/kg, respectively.

	Analysis of the underlying natural soils in TP106 recorded no elevated concentrations of PAHs. The previous investigations by others recorded some PAHs above the water supply pipe GAC in MWS104 and TP1, but the concentrations were not elevated above the GAC for human health. The previous BRD concentrations are considered to be typical of the presence of tarmac and clinker in these soils. As the underlying natural soils were proven to be uncontaminated, it confirms a lack of leachable contamination. <u>Previously Investigated Imported Soils</u> The previous BRD investigation recorded several elevated PAH compounds in the near surface imported soils in TP102 with a BaP concentration of 14.2mg/kg, which is elevated above the GAC of 2.2mg/kg. The recorded concentrations are again considered to be due to the presence of tarmac in these soils. In BRD trial pits TP101 and TP103 where similar soils were tested, no elevated concentrations of PAHs were recorded above their respective GAC and none of the previous IDOM trial pits recorded any elevated concentrations either. <u>Previously Investigated Field - MTP104</u> Significantly elevated concentrations of PAHs were recorded in the reworked topsoil in MPT104 during the previous IDOM investigation. However, no elevated concentrations of PAHs were recorded in the two previous BRD trial pits (TP108 or TP109) located either side of this location. Some trace PAH concentrations were recorded in TP108 with the BaP concentration being elevated above the GAC for the water pipe specification. No contamination was identified in the underlying natural soils present from 0.4m bgl. The source of the contamination identified by IDOM is unknown but given that the BRD trials pit were located at either end of the IDOM pit, the extent of the contamination has been confirmed to be highly localised.
TPH	During the previous BRD investigation, none of the TPH compounds are elevated above the human health GAC. <u>Previously Investigated Field - MTP104</u> It should be noted that no elevated TPH concentrations were recorded in trial pits TP108 or TP109, where elevated concentrations of TPH had been previously recorded by IDOM.

ASBESTOS	<u>Previously Investigated Northern Farmyard</u> T&P Regeneration trial pit TP1 identified amosite asbestos fibres in the near surface Made Ground in this area, however, there was no associated quantification testing to determine how widespread these fibres were. Within the surrounding BRD trial pits TP106 and TP107, no elevated asbestos was identified. <u>Central Farmyard</u> The previous BRD trial pit TP112 recorded Amosite and Chrysotile asbestos fibre bundles at a concentration of 0.004% in the Made Ground soils at 0.40m bgl. During this additional investigation, three other samples from the nearby area have recorded similarly low concentrations of asbestos fibres as follows: • VS05 at 0.30m - Bundles of Amosite fibres at 0.002%. • VS07 at 0.10m - Bundles of chrysotile fibres at 0.001%. • VS08 at 0.10m - Bundles of chrysotile fibres at 0.002%. Visually identified rare fragments of suspected asbestos cement also noted during the trial pitting. It should be noted that VS07 and VS08 were located in the external area either side of the previous TP112. Trial pit VS05 is located in a nearby trial pit in the building just to the north. BRD employed the JIWG 'Decision support tool for the qualitative risk ranking of work activities and receptors involved in or exposed to asbestos in soil and Construction & Demolition materials' (Version 2, February 2017) for the sample from trial pit TP112. This confirmed the risk ranking as being a medium risk.
PHYSICALLY UNSUITABLE SOILS	Whilst not a contamination issue, the near surface Made Ground soils in the northern farmyard area, the imported soils areas and the central manège area are considered to be physically unsuitable to remain regardless of the contaminant concentrations recorded.

5.2. WATER ENVIRONMENT

It is not appropriate to consider human health assessment criteria for human health in relation to the risk to the water environment, but currently there are no generic soil assessment criteria in respect of the water environment. In the absence of any groundwater sampling data, the soil results are assessed on the basis of professional judgement.

The contaminant concentrations recorded in the soils at the site are not considered to be at such levels that they would present any significant risk to the underlying water environment. The PAH contamination has been shown to be an intrinsic part of the soil, i.e, a tarmac or clinker fragment, rather than any leachable contamination, therefore, this does not present any cause for concern to the water environment even if an aquifer were present.

However, it is noted that the underlying clay soils and the classification of Unproductive Strata means that there is no identified risk to the underlying water environment and the pollutant linkage is considered to be invalid.

A single water sample was analysed from borehole MWS101 during the IDOM investigation. This did not identify any elevated concentrations of contaminants. The groundwater from MWS101 was presumably from a localised pocket of perched water, either within claystone nodules or from surface water ingress and therefore not representative of groundwater in any case.

5.3. BUILDING MATERIALS

The results summarised in the table below are from the current and previous BRD investigation only with the results from all phases of investigation discussed in the subsequent sections of the report.

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
pH	units	34	5.3 to 10.3	<5.5	1
Sulphate (w/s)	mg/l	34	1,630	500	4
Sum of Aliphatic TPH >C10-C21 + Aromatic TPH >C10-C21 above detection limits	mg/kg	7	285	10	2
Sum of Aliphatic TPH >C21-C34 + Aromatic TPH >C10-C35 above detection limits	mg/kg	7	658	500	1
Sum of BTEX + MTBE above detection limits	mg/kg	7	0.013	0.1	0
Naphthalene	mg/kg	24	0.18	0.5	0
Benzo(a)pyrene	mg/kg	24	14.2	0.5	6

RESULTS EXCEEDING BUILDING MATERIALS ASSESSMENT CRITERIA	
BENZO(A)PYRENE	The concentrations of the Polycyclic Aromatic Hydrocarbon (PAH) benzo(a)pyrene recorded are above the limits for the use of conventional polyethylene (PE) water supply pipes. The majority of these elevated concentrations are limited to the near surface Made Ground soils, to depths of around 0.3m bgl, with the underlying natural soils confirmed to be uncontaminated. In trial pit TP102 the deeper imported soils at 0.8m bgl recorded an elevated concentration of 1.55mg/kg which is elevated above the GAC. Whilst the deep Made Ground is sporadic and limited in extent, it is considered that the use of protective 'barrier' water supply pipes will likely be required within the farmyard area. Due to the presence of natural soils within the field areas, conventional plastic pipes should be suitable for the remaining areas.
TPH	The Made Ground sample from TP106 at 0.1m recorded TPH concentrations exceeding the water pipe criteria. As with the PAH, this is thought to relate to the presence of tarmac fragments within the surface soils and this also corresponds with the heavier carbon bands detected within the TPH analysis.
WATER SOLUBLE SULPHATE	Concentrations of water soluble sulphate and pH are such that they could detrimentally impact sub-surface concrete. The impact on concrete mix design is a geotechnical issue that is considered separately in the previous report and so no further comment is made on these results within this contamination assessment.
pH	

6. RISK EVALUATION

6.1. REVISED CONCEPTUAL MODEL

The revised conceptual site model plan is presented in Appendix 1.

INVALID CONTAMINANT LINKAGES	Following the completion of various phases of investigation works, the potential contamination linkages to the water environment or from the generation of landfill gasses and hydrocarbon vapours are considered to be invalid.
VALID CONTAMINANT LINKAGES	The investigations completed have identified some of the near surface soils to be contaminated with heavy metals, PAHs, TPH and asbestos, albeit that some of these contamination sources are localised and/or limited to shallow Made Ground soils.
LIMITATIONS AND UNCERTAINTIES	Following the post-demolition investigation, it is considered that the limitations and uncertainties have been reduced as far as practicable and that the remediation strategy can be produced based on the site investigation data obtained.

6.2. UPDATED CONTAMINATION RISK ASSESSMENT

The contamination linkages identified in the revised conceptual site model will now be evaluated as to their severity:

SOURCES AND CONTAMINANTS	PATHWAYS (REFERENCE FROM MODEL)	RECEPTORS	POTENTIAL RISK
Various contaminated Made Ground soils at the site: Metals PAH TPH Asbestos	Ingestion Inhalation Consumption of home grown produce (1)	Residents	Moderate risk
	Direct contact (2)	Water supply pipes and building foundations	Low risk - Farmyard area Negligible risk - Northern fields

The contamination risks that are presented to the various receptor groups are discussed further in the following sections:

SOIL RISKS TO HUMAN HEALTH

The investigations have identified elevated concentrations of heavy metals, PAHs and TPH in the northern farmyard area, in the location of the imported soils in the south of the site, beneath part of the central farmyard area, the central manège and in a localised area of the existing field in trial pit MTP104. These soils are considered to present a moderate risk to future residents should they remain in future garden and landscaping areas following redevelopment of the site.

Most of these soils (all except MTP104) have also been identified as being physically unsuitable to remain in future garden and landscaping areas regardless of the levels of contamination identified.

Elsewhere, the remaining open field sections of the site and the southern site is found to be free of any significant soil contamination.

Asbestos fibres have been identified in the Made Ground soils in trial pits TP112, TP1, VS5, VS7 and VS8 and are considered to present a moderate risk to human health where future residents are exposed to these soils. Whilst it is relatively easy to release asbestos fibres when working with building materials and/or debris consisting of asbestos insulation, asbestos coatings and Asbestos Insulation Board, in most circumstances similar materials in the ground are unlikely to give rise to equivalent airborne fibre releases and, consequently, the potential risk to human health from exposure to and inhalation of asbestos fibres will be significantly lower.

GROUND GAS RISKS

No risks from ground gases have been identified at the site.

RISK TO WATER ENVIRONMENT

No risks to the water environment have been identified at the site.

RISK TO BUILDING MATERIALS AND SERVICES

Farmyard Area

Within the farmyard area, elevated PAH and TPH have been identified in the Made Ground soils. The presence of hydrocarbons can denature and permeate plastic services, which is a particular concern for water supply pipes. This could lead to both the taste and quality of drinking water supplies being compromised. This associated risk can be easily managed through the use of hydrocarbon resistant pipes within this area, for example plastic 'barrier' pipes incorporating an aluminium foil layer or metal pipes.

Northern Fields Area

Within the wider northern fields area, no such contamination has been identified and therefore there are no associated risks to water supply pipes and as such conventional polythene pipes should suffice.

6.3. RISK MANAGEMENT

Based on all the investigations completed to date, the soils in the northern field and the majority of the proposed areas of public open space are uncontaminated and suitable for the proposed redevelopment of the site.

Within the northern and central farmyard areas, contaminated soils have been identified which present potential risks to both future residents and to the use of conventional polythene water supply pipes. Remedial works will be required to address these issues as part of the redevelopment of the site. A localised area to the east of the development has also identified some elevated hydrocarbons in the topsoil, however, this will be removed as part of the remediation.

It should be noted that the water pipe specification should always be confirmed with the local water supply company as they may insist on such protective pipes regardless of the level of contamination or remediation.

As previously stated, it is understood that management of the Giant Hogweed in the south of the site is being undertaken by a separate contractor appointed by the Client and as such is not covered within this remediation strategy.

7. SOIL RE-USE AND WASTE SOIL DISPOSAL

7.1. OVERVIEW

It is considered that uncontaminated soil and other naturally occurring material excavated in the course of construction activities is not waste, on the proviso that the material will be used only on site for the purposes of construction in its natural state. Accordingly, the planned re-use of such soils on site to form the development landform that has been determined through the planning process is excluded from waste regulation by the Waste Framework Directive (2008).

Made Ground and other materials such as recycled aggregate are also not waste unless they are discarded, intended to be discarded or required to be discarded.

Any soils that are surplus to requirements and/or are unsuitable for re-use and need to be disposed of from site are recognised as 'waste' according to the Environment Agency and the European Waste Framework Directive.

Giant Hogweed is present on site which is a controlled waste. If removed from site, the plant and impacted soils will need to be disposed at a landfill able to accept such waste.

It is a legal requirement to correctly assess and classify waste. There are specific technical requirements for waste sampling such that it is proportionate to the volume of the waste type in question and its nature. The preliminary waste assessment provided below is based only upon the available data and may not be sufficient to adequately classify the waste.

7.2. TOPSOIL

Topsoil should be viewed as a resource rather than a waste. As the majority of the topsoil across the field areas is suitable for residential garden use in terms contamination, it should be stripped and any surplus reused on other developments. It should be noted that topsoil, even if uncontaminated, is unlikely to constitute 'inert waste' due to its high organic matter content.

The suitability of the topsoil for re-use is considered in this report only in respect of contamination issues.

7.3. SUB-SOIL

7.3.1. Natural Soils

It is considered that the natural sub-soils disposed of from the site would be classified as 'non-hazardous waste' and would be characterised for disposal to landfill as 'inert waste'. However, the chemical results should be forwarded to the proposed landfill site and the waste classification confirmed prior to disposing of any surplus soils. Waste Acceptance Criteria (WAC) testing of the soils will also be required where the soil is to be disposed of at a landfill permitted to accept inert waste. The waste code from the European Waste Catalogue (EWC) 2002 for the soils would be 17 05 04 'Soil and Stones, not containing dangerous substances'.

7.3.2. Contaminated Made Ground from farmyard area and imported Made Ground

It is considered that the identified contaminated soils disposed of from the site would be generally classified as 'non-hazardous waste' and as such the waste will require pre-treatment prior to off-site disposal e.g. by selective excavation. The chemical results should be forwarded to the proposed landfill site and the waste classification confirmed prior to disposing of any surplus soils. The waste code from the European Waste Catalogue (EWC) 2002 for the soils would be 17 05 04 'Soil and Stones, not containing dangerous substances'. It should be noted that the WAC testing of the imported soils completed by IDOM confirms that these soils fail the inert waste WAC limits.

The exception is a localised area at VS05 where the concentrations of copper in the Made Ground render it as hazardous waste. This area should be segregated and the waste soil disposed of separately as 17 05 03 'Soil and Stones, containing dangerous substances'

7.3.3. MTP104 hotspot

It is considered that the topsoil in the location of MTP104 of from the site would be classified as 'hazardous waste'. Such waste will require pre-treatment prior to off-site treatment or disposal e.g. by selective excavation and further testing. Waste Acceptance Criteria (WAC) testing of the soils for disposal will also be required if the soil is to be disposed of to landfill. The waste code from the European Waste Catalogue (EWC) 2002 for the soils would be 17 05 03 'Soil and Stones, containing dangerous substances'. Given the limited extent of these materials, it may be prudent to excavate the soils and re-test them to confirm their waste classification prior to off-site disposal.

7.3.4. Asbestos impacted soils

The investigations to date have generally only identified loose asbestos fibres in the soils at very low concentrations (maximum 0.004%). This would characterise the soils as 'non-hazardous waste'. However, the presence of rare visually identified asbestos cement fragments in VS8 would render the soils as hazardous waste in this location. In this instance, hand picking of all visual asbestos fragments by suitably trained personnel would be required in order render the soils as non-hazardous waste, albeit any fragments would need to be disposed separately as hazardous waste.

7.3.5. Manège

The surface materials in the central manège would be classified as hazardous waste for disposal to landfill. However, the recycling of shredded or granulated tyres is a permitted activity where the materials are used within a horse manège. The European Waste Catalogue (EWC) 2002 for this material would be 19 12 04 'shredded or granulated end-of-life tyres'. An U8 exemption allows the use of waste materials (that do not need treating) for a specific purpose to reduce the use of virgin or non-waste materials. Considering this, rather than disposal to landfill there is the potential that this material could be reused at a similar off-site horse training facility. This would offer a practicable and sustainable reuse of this material as long as the requirements of the U8 exemption are met.

7.3.6. Giant Hogweed

Whilst the management of the Giant Hogweed is being dealt with by others, however, the plants and soils potentially containing viable seeds are a controlled waste and if removed from site need to be disposed at a landfill able to accept such waste.

8. REMEDIATION STRATEGY

8.1. INTRODUCTION

The overall aim of a remediation strategy is to design the remediation works necessary to mitigate the potentially unacceptable contamination risks identified through the various desk study and investigation reports. The remediation process begins with development of the remediation objectives and the options appraisal process, although the appraisal process must be proportionate to the degree and extent of remediation required. A verification plan will need to be documented that can be implemented as the remediation works are completed.

The processes of remediation design, implementation and verification comprise:

- Definition of remediation objectives.
- Appraisal of the options for remediation and selection of a preferred strategy.
- Planning and implementation of the preferred strategy.
- Long term monitoring and maintenance.
- Preparation of a verification report.

The previous assessment has identified the unacceptable contamination risks. The remediation strategy must present a clear methodology for managing the risks associated with each pollutant linkage that has been identified.

8.2. IDENTIFIED CONTAMINATION RISKS

From the previous contamination assessment, the following pollutant linkages have been identified:

- The surface Made Ground soils in the northern farmyard area contains elevated concentrations of PAHs, TPH and lead and is not suitable to remain in future garden and landscaping areas within the proposed development.
- The surface Made Ground in the central farmyard area contains elevated concentrations of metals and asbestos fibres with rare asbestos fragments identified in one location.
- The imported soils present in the southern part of the farmyard are contaminated with PAHs, lead and arsenic and are not suitable to remain in future garden and landscaping areas within the proposed development. These soils are also considered to be physically unsuitable to remain in future garden and landscaping areas.
- The surface material in the central manège is contaminated with lead and copper and is not suitable to remain in future garden and landscaping areas within the proposed development.
- The Made Ground Topsoil in trial pit MTP104 is contaminated with PAH and TPH and is not suitable to remain in the area of proposed open space.
- The elevated PAH and TPH concentrations within the Made Ground across the farmyard area present a risk to the use of conventional polythene water supply pipes.

8.3. PROPOSED DEVELOPMENT

With reference to the proposed development layout included in Appendix 1, the identified contamination will affect the following areas:

- Northern farmyard - Plots 16 and 17 and the adjacent area of landscaping.
- Central farmyard area - Plots 21-34
- Imported Soils - Plot 27 and an area proposed for public open space and road construction.
- Central manège - Plot 20 and an area proposed for public open space and road construction.
- Trial pit MTP104 - Public open space.

A Remediation Plan showing the location of the identified contamination on the development layout is included in Appendix 1.

8.4. OBJECTIVES

On some sites, a range of objectives may be established in response to the different nature of the risks associated with different pollutant linkages. These fall into the following three categories:

- Contamination remediation objectives must be based on the conceptual model for the site and must define the desired end condition. They can be qualitative or quantitative but must always relate to the risk assessment. Contamination related objectives are the most important of the three types of objectives and wherever possible, should drive the selection of a remediation option.
- Engineering related objectives consider the need for improvement, maintenance or modification of the engineering properties of the physical ground conditions on a site. Improvements in stability of the site or changes in ground levels may be required in order to construct the proposed development.
- Management related objectives often relate to the aspects of the remediation process itself, but also to the site after remediation has been completed. For example, the costs of a particular remediation option may exceed the budget making the project not financially viable. Programme constraints may conflict with the use of particular remediation technology. On sites where there are existing buildings or structures to be retained, remediation activities will have to be designed and carried out to avoid unnecessary disruption.

Accordingly, all three categories of objectives need to be considered in developing the strategy.

The remediation objectives for this project are as follows:

- To ensure that future residents are not exposed to contaminated soils within future garden landscaped areas and areas of public open space.
- To ensure the water supply pipes will not be adversely affected by any contamination.
- To complete the remediation works in a timely, sustainable and cost-effective manner.
- To conform with current guidance regarding contamination and remediation and to gain regulatory and warranty provider approval.

8.5. REMEDIATION OPTIONS APPRAISAL

8.5.1. Introduction

Having identified the remediation objectives, an appraisal of potentially suitable remediation options must be carried out. Conceptually, remediation action will involve breaking the pollutant linkage or linkages by use of one or more of the following methods:

- Source control: technical action to either, remove or in some way modify the source(s) of the contamination for example excavation or bioremediation.
- Pathway control: technical action to reduce the ability of the contaminant source to pose a threat to receptors by inhibiting or controlling the pathway for example cover systems or gas membranes.
- Receptor control: non-technical actions or controls that alter the likelihood of receptors coming into contact with the contaminants, for example altering the site layout.

A wide range of different techniques can be used individually or in combination in order to break a pollutant linkage. The options appraisal will consider a technique's effectiveness in dealing with the contaminants of concern but will also give consideration of the wider circumstances of the site.

8.5.2. Mitigation options for risk to Human Health

In respect of the identified contamination on site, the following remedial options have been considered:

- Excavation of the contaminated Made Ground soils in their entirety to expose the underlying natural soils.
- Placing a 0.6m thick, clean soil capping layer on top of the existing Made Ground soils in proposed garden and landscaping areas. This option would result in site levels being raised. Finished floor levels will also need to be raised by a similar amount.
- Removal of the Made Ground soils to 0.6m in proposed private gardens to allow for the replacement with an appropriate thickness of a clean soil capping layer. This will maintain the same levels as present.
- Removal of the Made Ground soils to 0.3m in proposed landscaping and public open space areas to allow for the replacement with an appropriate thickness of a clean soil capping layer. This will maintain the same levels as present.

It should be noted that the contaminated soils can remain beneath future buildings and hardstanding such as roads without presenting any risk to the future residents.

An assessment of each area requiring remediation will now be completed to determine the most appropriate remediation solution.

8.5.2.1. *Northern Farmyard Area - Plots 16 and 17 and the adjacent area of landscaping*

The overall depth of Made Ground soils across the northern farmyard area is limited to 0.3m bgl. The placement of a 0.6m clean capping layer in this area of the site would result in a significant increase in proposed levels to accommodate this and is unlikely to be a practicable remediation solution. Given the shallow thickness of the Made Ground, the removal of the Made Ground soils in its entirety to expose the underlying natural soils would offer the most viable remediation solution.

It is proposed that 300mm of suitable topsoil would need to be placed and verified in the future garden areas to further ensure that suitable materials are present in these areas.

8.5.2.2. Central farmyard area - Plots 21-34

As with the northern farmyard area, the contamination is in a thin upper layer extending to a maximum depth of 0.6m but typically around 0.4m bgl. Therefore, full thickness 600mm capping is unnecessary and removal of the thin upper layer of contaminated soil is considered to be the most viable option.

8.5.2.3. Imported Soils - Public Open Space and Road Construction.

The proposed estate road passes directly through this area which forms a thin strip of land with unsuitable Made Ground extending to a depth of up to 1.3m bgl. Therefore, a large quantity of this material will need to be removed regardless. Given that the material is unsuitable for use on site, it is considered that complete removal of these previously imported soils is the most appropriate option.

It is proposed that 300mm of suitable topsoil would need to be placed and verified in the future garden areas to further ensure that suitable materials are present in these areas.

8.5.2.4. Central Manège - Plot 20 and majority of the area proposed for public open space and road construction.

The identified contaminated Made Ground located in the central manège area is a distinctive layer of plastic and shredded rubber tyre that extends to a depth of 0.1m bgl only. Given its potential to be re-used in a similar manège, it is considered that this should be scraped up and removed from site in its entirety.

8.5.2.5. Trial Pit MTP104

The identified contamination has been confirmed to be limited to the Made Ground Topsoil and to a depth of 0.3m bgl.

Whilst the use of capping solutions to raise levels by 0.3m may offer viable remediation solution in this area of the site, given the proposed capping would end up being a raised mound it would not be practicable solution.

Therefore, given the shallow depth and small volume of soils requiring remediation, it is considered that the most appropriate solution would be the removal of these soils in their entirety. As discussed in the waste disposal section of this report, it would be prudent to stockpile these soils and re-test them to confirm their waste classification prior to disposal.

8.5.3. Mitigation options for risk to Building Materials and Services

It is considered that based on the PAH & TPH concentrations recorded in the farmyard, the local water supply company will likely require the installation of 'barrier' water supply pipes in this area and therefore there is no requirement to consider any other remediation options in this regard.

Due to the presence of natural soils and the absence of any contamination within the northern fields area, conventional plastic pipes could remain a suitable option within this area proposed for redevelopment.

8.6. GENERAL

8.6.1. Liaison with Regulatory Authorities

Prior to commencing with any remediation works, this investigation and strategy shall be agreed with the planning department of the Local Authority, warranty providers and the organisation undertaking the Building Control function in order to confirm that the investigation completed to date is satisfactory and that the remediation strategy is acceptable.

During the remedial works, the appointed consultant will continue to liaise directly with the regulatory authorities. They will be consulted over any deviation from the remediation strategy and their representatives will be welcome to visit the site on any occasion throughout the site works.

8.6.2. Professional Supervision

Where complete removal is recommended, it is considered that full time attendance during the works would be required by a suitably qualified Geo-environmental Consultant.

For the placement of suitable soils in garden areas, it is considered that only part time supervision of the works by a suitably qualified and experienced environmental consultant will be required. The consultant will need to attend site on sufficient occasions to ensure that a sufficient thickness of uncontaminated soils have been placed in the gardens and that barrier water pipes have been installed.

8.6.3. Safety

The remediation and subsequent construction of the new development will fall within the remit of the Construction (Design and Management) Regulations 2015. Adherence to these regulations provides a framework for the management of health and safety during the redevelopment of the site.

8.6.4. Photographic Surveys

Photographs shall be taken throughout the remediation works and copies included within the verification report.

8.7. PROPOSED REMEDIATION WORKS

The table below summarises the proposed remediation works at each area requiring remedial measures. The details of these works are provided on the Remediation Plan included in Appendix 1.

REMEDIATION AREA	CONTAMINATION DEPTH	PROPOSED REMEDIATION WORKS
Northern farmyard	Approximately 0.3m bgl and underlain by natural soils.	Removal of the contaminated soils in their entirety to expose the underlying natural soils. Off-site disposal.
Central Farmyard	Between 0.22m and 0.60m bgl following slab removal. (Typically to 0.4m bgl)	Removal of the contaminated soils in their entirety to expose the underlying natural soils. Off-site disposal.
Imported soils in the southeastern farmyard area of the site	Contamination extends to depths up to 1.3m bgl forming a steep bank.	Excavation and complete removal. A large proportion of this will be required for the cut and fill and road construction regardless. Off-site disposal.
Central manège	Contaminated material extends to a depth of 0.1m bgl.	Removal of the contaminated surface materials in their entirety. Off-site disposal or re-use on other sites.
MTP104 - Surface topsoil	Contaminated soils extend to 0.3m bgl.	Removal of the contaminated soils in their entirety to expose the underlying natural soils. Off-site disposal.

8.7.1. Asbestos in Soils

During any excavation works within the Made Ground soils across the site, there is the potential that asbestos containing materials, in particular asbestos cement fragments, could be encountered.

This is a common occurrence on brownfield sites and competent contractors should have procedures for addressing the associated risks. All below ground operatives would be expected to have asbestos awareness training, so that they can identify any suspected asbestos and inform site management so it can be appropriately dealt with. The appointed groundworks contractor should employ at least one worker on site who is qualified in 'Non-Licensed Work' with asbestos.

8.7.1.1. *Soils containing Asbestos Fibres*

During the T&P investigation, Amosite asbestos fibres were identified in the Made Ground soils in TP1, but no quantification testing was completed. Subsequent BRD trial pits in this area did not identify any additional asbestos fibres.

In BRD trial pit TP112, VS5, VS7 and VS8, Amosite and Chrysotile asbestos fibres were identified in the Made Ground soils at concentrations of up to 0.004%.

For any works involving this soil, BRD has employed the JIWG 'Decision support tool for the qualitative risk ranking of work activities involved in or exposed to asbestos in soil and Construction & Demolition materials' (Version 2, February 2017). This confirmed that the works would be classified as 'Non-Licensed Work' with asbestos.

During the remediation of the contaminated soils in the northern farmyard area and in the location of TP112 etc, the soil stripping works should be completed with the following control measures:

- Operatives trained in 'Non-Licensed Work' with asbestos.
- EN140 with P3 filter half mask.
- Manual/localised dust suppression.
- Localised and basic personal decontamination facilities.

8.7.1.2. Potential for Asbestos Fragments within Made Ground

If suspected asbestos fragments are encountered, works in the area should cease. If the fragments are non-licensed (e.g. cement asbestos) then a qualified worker should remove the asbestos fragments by hand picking with appropriate controls in place. Bagged collected fragments should be stored securely and eventually disposed of from site as hazardous waste. The controlled hand picking of fragments is consistent with current industry practice and, if done correctly, complies with obligations under The Control of Asbestos Regulations 2012.

Providing that the asbestos contamination within the Made Ground is found to be occasional non-licensed fragments within the soil matrix, then the procedures described above will suffice and no other treatment options need to be considered. Should any larger pockets of asbestos fragments, in particular materials with a greater risk of fibre release, be encountered then its removal may require more specialist licensed contractors and expert advice should be sought.

In addition to this, measures to protect the health and safety of site workers should always be implemented including use of appropriate personal protective equipment, education and good hygiene procedures.

8.7.2. General Procedures and Constraints for Soil Excavation

8.7.2.1. Excavation of Contaminated Soils

All contaminated soils will be excavated to stockpile ready for loading on to tipper trucks for off-site disposal. Contaminated soils will be stockpiled on plastic sheeting to avoid cross contamination of underlying soils.

Soils of differing nature will be segregated by selective excavation. Where contaminated soils appear to differ from that anticipated from the investigation data and may be uncontaminated, these soils will be stockpiled separately and samples taken for analysis.

Contaminated soil will be removed as far as is reasonably practicable. Constraints to the excavation of contamination at the site include:

- Excavation that potentially affects the stability of structures to be retained will not be undertaken i.e. excavation adjacent to the site boundaries in particular where significant changes in levels with neighbouring properties may occur.
- All excavations are to be undertaken by mechanical equipment and thus may be limited by the constraints of the plant, e.g. access of such equipment.
- Utility services to be retained and protected may limit the extent of mechanical excavation.
- The presence of boundary trees may limit the excavation by the need to protect the root systems.

8.7.2.2. *Excavation of Clean Soils*

As part of the main phase of construction works, there may be excavations undertaken for other reasons that will generate clean natural soils. Soils that have been identified as clean from investigation data can be re-used potentially as part of the clean soil remedial capping solution or as general fill within the development.

8.7.3. Placement of topsoil in garden areas

Given the presence of Made Ground extending to depth in some areas and to provide further comfort that the upper garden soils are suitable, it is proposed that at least 300mm of suitable clean soil is placed within all private garden areas, regardless of the level of soil remediation completed. This would typically consist of 150mm of topsoil overlying at least 150mm of subsoil.

If soils are required to be imported to site, they will need to be proven to be suitable for a residential setting. Representative samples of all soil types must therefore be submitted for a general contamination suite, as set out in the following Verification Plan (Section 11).

All garden areas, or groups of gardens will need verifying to confirm this requirement is met.

8.7.4. Water Supply Pipes

Based on the findings of the contamination testing, barrier water supply pipes will be required within the farmyard area. Conventional polythene pipes should suffice elsewhere on the development. All water pipes will be fitted by specialist contractors.

Prior to the installation of new water supply pipes, the pipe specification should be confirmed with the local water supply company as they may insist on such protective pipes across the development regardless of the level of contamination or remediation.

8.8. **PREVIOUSLY UNIDENTIFIED CONTAMINATION**

Although various phases of investigations have been undertaken on the site, there remains the potential for further unidentified contaminated soil being exposed during the future construction works.

In the first instance, if any anomalous material or unexpected / unidentified contamination is encountered during course of construction, then the following “discovery strategy” process is set out below:

- The potential for uncovering potential contamination / anomalous materials should be communicated as part of the general construction site induction undertaken to all site workers / operatives.
- Any “discovery” is to be reported to the Site Manager immediately and works at that location are to halt. The Site Manager / Client’s representative is then to consult with BRD in the first instance. Depending on the type, nature and extent of the discovery, it may be necessary to continue to halt works in that location. This shall be reviewed on a case specific basis and in conjunction with consultation with the Client.
- A BRD Consultant shall attend the site to record the location, extent and nature of the discovery and, where necessary, will undertake appropriate sampling and/or supervision of any immediate remedial works.
- If warranted, BRD shall discuss the “discovery” with the Local Authority and if considered necessary, arrange to meet their representative on site. It should be noted that some minor / straightforward contamination finds will just be dealt with without any regulatory involvement, e.g. removal of a pocket of some asbestos fragments or ashy material, etc.

- Where more significant remediation is required, approval will be sought from the Local Authority.
- All the remediation / verification works to address the discovery will be documented within the main remediation verification report to be produced at the completion of the works.

This discovery strategy will be retained on site by the Site Manager and it is their responsibility to follow it and act on any potentially anomalous material or unexpected / unidentified contamination encountered during the course of the development.

9. VERIFICATION PLAN

9.1. INTRODUCTION

The verification plan for the remediation works will be completed in a phased approach as and when the remedial works are completed. The details of the proposed verification works are described in the following sections.

9.2. REMOVAL OF CONTAMINATED SOILS

Where contaminated soils are to be removed in their entirety, the removal should be verified by an experienced Geo-Environmental Consultant to ensure that the works have been completed in accordance with this remediation strategy.

In the location of the northern farmyard, verification will be completed on a visual basis only as the Made Ground is distinctive and the remedial excavation should result in the natural clay soils being exposed at the base and faces of the excavation. The same applies for the imported material at the southeastern edge of the former farmyard area where the natural clay soils will be exposed below.

In the location of the central manège, this material is again distinctive and its removal can be verified on a visual basis only.

In the location of MTP104, verification of the removal of the contaminated topsoil will require confirmatory testing of the base and faces of the resultant excavation. The soils should be analysed for both TPH and PAH and the results assessed against the generic assessment criteria detailed in section 7.1 of this report to confirm removal of the contamination.

In the location of the central farmyard area, high concentrations of metals have been recorded locally within the Made Ground as well as asbestos fibres in the near surface Made Ground. As there is further Made Ground (reworked natural soils) beneath the surface Made Ground, then it is proposed that verification sampling is completed for the underlying soils to confirm all of the underlying soils and heavy metal contamination impacted soils are successfully removed from this area. Samples across the area should be completed on a 10-15m grid with up to around 15No. samples analysed for asbestos, metals and PAHs.

Copies of waste transfer tickets and disposal records for the contaminated soils will be provided for inclusion within the verification report.

9.3. PLACEMENT OF TOPSOIL

The placement of the clean soils within private garden areas to the required thickness and makeup will be verified by a Geo-Environmental Consultant through the excavation of hand dug inspection pits undertaken through the placed soils. The inspections will be completed as individual gardens or groups of adjoining gardens are completed.

9.4. TESTING OF IMPORTED TOPSOIL, SUB-SOIL AND VERIFICATION

It is unlikely that any soils will be required to be imported to site as sufficient soils will be generated from uncontaminated areas on site.

However, if needed then any imported topsoil or subsoil imported to site will require testing for the following suite to confirm that they are suitable for use in a residential garden setting. The same suite will be used to verify the remedial works (where required).

CONTAMINANT	UNITS	ASSESSMENT CRITERIA
Arsenic	mg/kg	37
Cadmium	mg/kg	11
Chromium (hexavalent)	mg/kg	6
Chromium (total)	mg/kg	910
Copper	mg/kg	2,400
Lead	mg/kg	200
Mercury	mg/kg	11
Nickel	mg/kg	180
Selenium	mg/kg	250
Zinc	mg/kg	3,700
pH	Units	<5-10>
Naphthalene	mg/kg	2.3
Acenaphthylene	mg/kg	170
Acenaphthene	mg/kg	210
Fluorene	mg/kg	170
Phenanthrene	mg/kg	95
Anthracene	mg/kg	2,400
Fluoranthene	mg/kg	280
Pyrene	mg/kg	620
Benzo(a)anthracene	mg/kg	7.2
Chrysene	mg/kg	15
Benzo(b)fluoranthene	mg/kg	2.6
Benzo(k)fluoranthene	mg/kg	77
Benzo(a)pyrene	mg/kg	2.2
Indeno(1,2,3-cd)pyrene	mg/kg	27
Dibenzo(a,h)anthracene	mg/kg	0.24
Benzo(ghi)perylene	mg/kg	320

The testing rate should be at a minimum of one test per 100m³ of topsoil/subsoil and at least three results should be provided for each soil source. Test results should ideally be provided by the soil supplier to provide confidence that the source is uncontaminated. In any case samples will be taken in-situ of the placed soil on site by the attending geo-environmental consultant. Sample density may need to be increased depending upon the consistency of the material and nature of the source. Alternatively, if a well-defined greenfield source is adopted then the sample density may be decreased.

It is not proposed to undertake TPH testing on imported soils as the source will likely be greenfield or a reputable topsoil supplier and as such petroleum hydrocarbons would not be expected.

If topsoil is imported from another development site, then this should be in accordance with a U1 waste exemption registered with the Environment Agency or a Material Movement Plan developed in accordance with “The Definition of Waste: Development Industry Code of Practice” Version 2, Contaminated Land: Applications in Real Environments (CL:AIRE), March 2011.

It should also be noted that any imported granular materials, such as crushed concrete or aggregate, do not require any verification sampling from a human health perspective.

9.5. WATER SUPPLY PIPES

Verification of the installation of barrier water supply pipes within the farmyard area will be via the local water supply company. However, visual confirmation and supporting photographic evidence of this will also be made during inspection visits undertaken by the BRD Geo-Environmental Consultant.

9.6. VERIFICATION REPORT

Upon completion of the remediation works, BRD shall prepare a remediation verification report, including commentary on the following:

- Evidence of the removal of the contaminated soils.
- Evidence of suitable topsoil thickness within all of the private garden areas.
- Details on the contaminated Made Ground material removal from site and copies of waste tickets for soils removed from site.
- Details on any deviation from the remediation strategy.
- Confirmation of the suitability of any imported soils.
- Confirmation of protective water pipe installation within the farmyard area.
- Photographic records.

The verification report will conclude with a statement confirming the site is fit for its intended use in respect of contamination.

10. HEALTH AND SAFETY FILE INFORMATION

10.1. INTRODUCTION

The aim of the following sections is to present pertinent Health and Safety information that has arisen from the current investigation/survey works discussed in this report. The aim is to identify health and safety controls that may be necessary during any subsequent maintenance, refurbishment, demolition or construction works. The information is not exhaustive and stems only from the aspects identified within the scope of the works undertaken by BRD.

Where BRD has been appointed as a Principal Contractor, then this information shall form the Health and Safety Files as required by the Construction Design and Management (CDM) Regulations 2015.

Reports are always forwarded to the Client and they shall be responsible for ensuring this safety information is disseminated to those who need it.

The works undertaken by BRD are detailed in the previous sections of this report.

10.2. HAZARDS

10.2.1. Contamination

Contaminated soils are present at the site within the surface Made Ground. Construction workers will be at risk where they are exposed to these soils and groundwater, for example during demolition, utility services work and foundation construction. During the redevelopment of the site, the presence of contaminated soils should be considered within health and safety plans. Measures to protect the health and safety of site workers should be implemented including use of appropriate personal protective equipment, education and good hygiene procedures.

If during the redevelopment any anomalous material is encountered that is different to the conditions revealed by this investigation, then expert environmental advice should be sought. Section 10.9 of this report sets out a discovery strategy.

10.2.2. Asbestos

10.2.2.1. *Soils*

Asbestos fibres have been identified in the Made Ground soils on site as well as rare asbestos cement fragments in one location in the central farmyard area.

Details on the proposed management of the asbestos in soils is detailed in Section 10.8.1 of this report and should be referred to for further details.

10.2.3. Giant Hogweed

Giant Hogweed has been previously identified on site and it is understood that management of this invasive weed is being undertaken by a separate contractor appointed by the Client. Contact with Giant Hogweed sap can lead to skin blisters and photosensitivity and therefore any management works should be completed to prevent regrowth and eliminate risks to construction workers and future residents.

10.3. EXISTING STRUCTURES

BRD recommend that advice on existing structures is gained from a qualified and experienced Building Surveyor or Structural Engineer.

10.4. HAZARDOUS MATERIALS

BRD did not construct anything with hazardous materials.

Any soils to be imported to the site, in particular topsoil, should be tested to confirm their suitability in the development.

10.5. UTILITY SERVICES

The utility services plans held by the Client should be referred to.



REPORT SPECIFIC REFERENCES

- British Geological Survey sheet 302 “Horsham” Solid and Drift edition (1:50,000) published 1972.
- ‘Desk Study and Ground Investigation Report - Millfields Farm, Horsham Road, Rusper’ T&P Regeneration Ltd, 2015Feb_MILL1356_DS&GI Report, Issue 1_V1, February 2025.
- Geo-Environmental Assessment - Millfields Farm, Rusper’ IDOM, GEA-22623-23-405, Rev C, Dated 24/04/2024.
- Additional Site Investigation and Remediation Strategy - Millfields Farm, Rusper’, BRD Environmental Ltd report ref. BRD4518-OR1-A, July 2025.



SUPPORTING INFORMATION

GROUND INVESTIGATION

Exploratory holes are logged by an experienced Geo-Environmental Consultant in general accordance with 'Code of practice for site investigations' BS5930:2015+A1:2020 (BSi, 2020). Soil samples for chemical and geotechnical analysis are taken from the exploratory holes at intervals dictated by the nature of the soils and the objectives of the investigation.

Where stated on the logs of inspection pits, trial pits or boreholes (where insitu testing has not been undertaken), the relative density of coarse (sand and gravel) soils is tentative only. Such assessments of density are on the basis of visual inspection only taking into consideration such factors as drilling rates, stability of pit side walls, appearance and behaviour under excavation.

Where Chalk strata is encountered it is logged and graded in general accordance with CIRIA guidance 'C574 - Engineering in Chalk' (CIRIA, 2002). It should be recognised that where percussive drilling methods are employed, the structure of the Chalk is destroyed and therefore the grading stated on such logs is either tentative or absent where it is not possible to assess the grade.

Hand Dug Inspection Pits

Hand tools are used to forward shallow inspection pits as a cost effective method of describing and sampling near surface soils. The technique is also used where exposure of existing footings is required. The depth reached by such techniques is a function of the nature of the ground and generally does not exceed 1.5m

Trial Pits

Mechanically excavated trial pits allow detailed inspection of near surface ground due to the large volume of soil exposed. A wheeled backhoe loader is the usual machine for digging trial pits that are typically 3 to 4.5m deep, 0.5m wide and 3m long. It is worth noting that due to the disturbance of the ground, this technique will leave visible pits scars, localised surface disturbance and may leave a mound of soils that can settle over time.

Windowless Sampling Boreholes

This type of borehole is formed by a small tracked dynamic percussion drilling rig with samples retrieved in thin plastic liners within the narrow diameter steel sampling tubes. Borehole depths of up to 5m are typical, but in exceptional circumstances up to 15m depth can be achieved. This is the smallest type of rig that is capable of undertaking Standard Penetration Tests (SPTs).

Hand Held Window Sampling

Hand held window sampling is a useful method of drilling narrow diameter boreholes particularly where access is difficult. Hand held mechanical percussive hammers are used to drive the sampling tube into the ground. The soil samples are collected within the hollow metal sampling tubes and inspected via the open window along one side. Window sampling boreholes can be forwarded to depths of 3m to 6m depending upon ground conditions.

Cable Percussive Boreholes

This form of drilling involves repetitive dropping of a tube into the soil under its own weight from a tripod support. The sample is obtained from the clay cutter head in fine soils or a bailer for wet granular soils. As the borehole progresses SPTs can be undertaken and relatively

undisturbed samples can be obtained. Typically these boreholes are 15 to 25m deep, but depths of double that can be achieved in soils, but only thin weak rock layers can be penetrated.

Rotary Boreholes

Where competent rock is required to be drilled then rotary drilling techniques are required. The drilling rigs can vary in size from small tracked units to larger units mounted on four wheel drive trucks. Rotary open hole drilling techniques break the rock into small fragments and so recovery of any samples is limited. In contrast, rotary coring generally retrieves excellent samples. Some rigs also allow dynamically driven windowless sampling to be undertaken through soil layers. There are no practical limits to the depths that this drilling method can achieve.

Dynamic Probing

Dynamic probing comprises a sectional rod with a sacrificial cone at the base of slightly larger diameter than the rod. The rod is driven into the ground by a constant mass falling through a set distance. The number of blows required to forward the rod per 100mm is then recorded and presented in a graph of N_{10} values. The standard applicable to dynamic probing is 'BS EN ISO 22476-2:2005 Incorporating corrigendum no. 1, Geotechnical investigation and testing – Field testing – Part 2: Dynamic probing' (BSi, 2007).

Static Cone Penetration Tests

Cone Penetration Tests (CPT) consist of pushing a conical 60° cone into the ground at a constant rate and recording the force required to do this. Sensors in the cone record other information and this data can be correlated to a number of different geotechnical parameters.

Dynamic Penetrometer

The Transport Research Laboratory Dynamic Cone Penetrometer (TRL DCP) uses an 8 kg hammer dropping through a height of 575mm to drive a 60° cone of 20mm maximum diameter into the ground. The depth driven either per blow or per several blows is recorded. The strength of each of the soil layer encountered is then calculated by converting the penetration rate into an approximate California Bearing Ratio (CBR) value employing the correlation proposed by TRL.

Light Weight Deflectometer

The falling Light Weight Deflectometer (LWD) test is a dynamic plate load test. It is a surface testing instrument and does not involve any penetration of the underlying soils. The plate used is 300mm diameter and so the results achieved are effectively an average of the ~450mm to 600mm soils beneath the plate. The LWD result can be correlated to a California Bearing Ratio (CBR) value and BRD's experience is that these results compare well with other insitu CBR test methods.

Gas Monitoring

Gas monitoring is undertaken with a portable gas monitor for Oxygen, Methane, Carbon Dioxide, Hydrogen Sulphide and Carbon Monoxide together with recording of atmospheric pressure and any flow rate.

Vapour Monitoring

Headspace tests and monitoring for Volatile Organic Compounds (VOC) or Semi Volatile Organic Compounds (SVOC) is undertaken using a Photo Ionisation Detector (PID). The MiniRAE models used have a 10.6 eV lamp calibrated for isobutylene. The PID is useful tool to indicate the presence of a wide range of volatile compounds, but only provides semi-quantitative data as different compounds provide a different response and thus the reading is not a true reflection of the actual concentration present.

Low PID readings can be recorded in natural uncontaminated organic soils or even as a result of atmospheric pollution. It is generally accepted by consultants and regulators that recorded values in excess 50 parts per million (ppm) represents the presence of organic compound pollutants and in excess of 100 ppm such contamination may be significant.

The headspace test procedure involves the collection of a sample of suspected contaminated soils and placing within a sample bag. A tight seal to the bag is formed with a similar volume of air trapped to that of the soil and the sample is left for fifteen minutes to allow volatilisation of any contaminants. The bag is then pierced by, and sealed around, the sample probe of the PID and a reading taken.

Borehole well monitoring is undertaken by connecting the PID directly to the gas tap on the monitoring well installation.

Groundwater Level Monitoring

Groundwater levels are recorded with an electronic dip meter that has a detector end that is lowered into the borehole well. An audible signal is made when water is reached and the depth recorded from the graduated tape used to lower the detector. Where there is potential for a separate Light Non Aqueous Phase Liquid (LNAPL) to be present floating on the groundwater an oil/water interface meter is used in preference to a conventional dip meter so that any such floating product can be detected.

Geotechnical Sampling

BRD schedule a range of geotechnical testing as appropriate to the identified ground conditions, available budget and the proposed development. Different types of soil samples are obtained as appropriate to the ground conditions and planned testing.

SAMPLE TYPE	LOG SYMBOL	DESCRIPTION
Disturbed	D	Small disturbed soil samples of about 1 to 2 kg are collected in plastic bags.
Bulk	B	Large disturbed bulk samples up to about 20 to 30 kg are collected in plastic bags
Undisturbed	U	'Undisturbed' samples generally collected in plastic or metal tubes within cable percussive boreholes of 100mm diameter for samples of fine soils of firm to stiff consistency. Can also be representative of samples taken by cutting plastic sample liners from windowless sampling drilling methods. It is recognised that such samples do not generally meet Eurocode sample quality requirements for the tests commonly employed. However, given the wealth of experience with these sampling methods this continues to be a common approach in United Kingdom practice particularly for less sensitive developments where more expensive sampling techniques are not economically justifiable.
Undisturbed	UT	A thin walled steel sampler developed by Archway Engineering called a UT100 in an attempt to gain better quality samples of soft to firm fine soils when using cable percussive drilling methods.

Contamination Sampling

BRD schedule contamination testing as appropriate to the ground conditions, available budget, potential contaminants and the proposed development. Samples are collected in single use laboratory supplied containers.

Soil samples are retrieved in plastic containers and/or amber glass jars with a lined plastic cap. Contamination samples are indicated by a 'J' on exploratory hole logs.

Water samples are collected in plastic bottles and/or amber glass jars with a lined plastic cap then placed in cool boxes together with freezer packs. Water samples are indicated by a 'W' on exploratory hole records, but generally such samples are not tested as testing from dedicated monitoring wells is preferred for sample quality reasons.

Samples retrieved from the exploratory holes are dispatched to the laboratory by overnight courier. Where samples cannot be transported directly from site they are temporarily stored in the BRD dedicated sample storage facility which includes refrigeration where necessary. The individual accreditation of the test methods is detailed in the laboratory test report.

GEOTECHNICAL ASSESSMENT

Under Eurocode 7 (EC7) the following risk ranking is applied to geotechnical projects:

GEOTECHNICAL CATEGORY	DESCRIPTION
1	<i>Small and relatively simple structures for which it is possible to ensure that the fundamental requirements will be satisfied on the basis of experience and qualitative geotechnical investigations with negligible risk. For example, straightforward ground conditions, local experience, no excavation below the water table unless this will be straight forward.</i>
2	<i>Conventional types of structures and foundations. No difficult soil or loading conditions. Quantitative geotechnical data and laboratory testing. Routine procedures for field and laboratory testing. Conventional structures and no exceptional geotechnical risk. For example, spread, raft and piled foundations, retaining walls, bridge piers and abutments, embankments, ground anchors, tunnels and excavations.</i>
3	<i>Those structures not in Categories 1 and 2 such as very large or unusual structures, structures involving abnormal risks, or unusual or exceptionally difficult ground or loading conditions. Structures in highly seismic areas. Structures in areas of probable site instability or persistent ground movements that require separate investigation or special measures.</i>

GEOTECHNICAL PARAMETERS

Soakage Tests

Soakage tests comprise the filling of a test pit with water and recording the time taken for the water to drain away. The tests are undertaken in general accordance with 'Digest DG 365: Soakaway design' (BRE, 2016). The test pits are usually gravel filled for safety with a slotted vertical pipe through which water observations are made. Water is generally supplied by a tanker to allow fast filling of the pits with water. Compliant tests are filled and allowed to drain near empty three times.

Standard Penetration Tests

The standard penetration test (SPT) determines the resistance of soils at the base of a borehole to the dynamic penetration of a split barrel sampler and the recovering of disturbed samples for identification purposes. In gravelly soils and some soft rocks a solid cone is used in preference to the sampler.

The basis of the test consists in driving a sampler by dropping a hammer of 63.5 kg mass on from a height of 760 mm. The number of blows (N value) necessary to achieve a penetration of the sampler of 300 mm is recorded. The test is described in 'Geotechnical investigation and testing – Field testing – Part 3: Standard penetration test - BS EN ISO 22476-3:2005 Incorporating corrigendum no. 1' (BSi, 2007).

The uncorrected N values of the SPT tests are recorded upon the borehole logs together with a record of blows for each 75mm test portion including the seating blows. Where the full test depth cannot be achieved due to refusal on hard stratum, the number of blows and the distance achieved is recorded and the N value given as >50. The abbreviation SPT(c) is used on the logs indicates that the test was performed with a solid cone rather than a split spoon sampler.

It is necessary to apply a correction to the N values to account for the effects of energy delivery using the equation: $N_{60} = \frac{E_r}{60} N$ where E_r is the energy ratio of the specific test equipment.

In the case of tests in sand, for the effects of overburden and rod length the equation is modified to $N_{60} = \frac{E_r}{60} \times \lambda \times C_N \times N$ where λ is the correction factor for energy losses due to the rod length and C_N is the correction factor for vertical stress due to overburden of the soil.

Sulphate

In order to compare the laboratory soil test results with 'Concrete in aggressive ground. BRE Special Digest 1: 2005' (BRE, 2005) laboratory results are converted to SO_4 mg/l. Laboratory results expressed as SO_3 g/l and are multiplied by a factor of 1200 to express the results as SO_4 mg/l.

Index Property Tests

In accordance with National House Building Council (NHBC) 'Standards Chapter 4.2 - Building near trees', the laboratory plasticity indexes are assessed against their volume change potential. The Modified Plasticity Index is defined as the Plasticity Index of the soil multiplied by the percentage of particles with a nominal diameter of less than 425µm. Whilst the NHBC Standards were developed for residential buildings, the advice is equally applicable to a large number of other types of low rise structures.

Hand Shear Vane

The undrained shear strength of the fine (i.e. clay) soils at the site can be established using hand shear vane apparatus. Usually three readings are taken at every depth tested and the uncorrected results recorded on the exploratory point log. Shear vane readings from depths below 1m depth in trial pits are from tests performed on excavated soil. In accordance with Eurocode 7 – Geotechnical design – Part 2: Ground investigation and testing EN 1997-2:2007 the results should be corrected. BRD employ only simple correction methods as the more complex correction methodologies imply undue accuracy to a test that has distinct disadvantages and limitations.

Pocket Penetrometers

The Pocket Penetrometer is a lightweight instrument for use by field personnel to check visual classification of soils. It is a simple test and there is inherent uncertainty related to the small volume of soil being tested and so the results should be used with appropriate caution. Pocket penetrometers are calibrated in terms of unconfined compressive strength and once converted to undrained shear strength (divide by two) the results are further reduced by a factor of 1.5 - 2.0 as the device tends to overestimate strengths.

<i>Instrument Reading (uncompressive strength in kg/cm²)</i>	<i>Indicative Undrained Shear Strength (kN/m²)</i>	<i>Indicative Consistency</i>	<i>Indicative strength</i>
1.0	25 - 33	Soft	Low
1.5	38 - 50	Soft to firm	Low to medium
2.0	50 - 67	Firm	Medium
2.5	63 - 83	Firm to stiff	Medium to high
3.5	88 - 116	Stiff	High
4.5	113 - 150	Stiff to very stiff	High to very high

CONTAMINATION ASSESSMENT METHODOLOGY

UK Policy

The UK Government's policy in relation to land affected by historic contamination is based on a 'suitable for use' approach. The approach recognises that the risks presented by any given level of contamination will vary greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Contamination risks therefore need to be assessed on a site-by-site basis. The 'suitable for use' approach limits requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to either the current use or future use of the land.

The three main drivers for contamination assessment and remediation are:

- *Voluntary action.*
- *Development as part of the planning regime.*
- *Regulatory action to mitigate unacceptable risks e.g. Part 2A of the Environmental Protection Act 1990.*

Contaminant Linkages

For a contamination risk to exist there must be a 'contaminant linkage' from the source (contaminant or pollutant) via a pathway (the route from contaminant to receptor) to a receptor (the entity that could be harmed). The absence of a source, pathway or receptor breaks the contaminant linkage and therefore no contamination risk exists.

Contamination is typically present at a site (in the ground and/or in the underlying groundwater) as a result of a historic or current industrial use, usually as a result of leaks, spills or disposal of residues, wastes and excess raw materials from the industrial processes. Contamination may also be present due to:

- *The deliberate application of chemicals e.g. the spraying of herbicide/pesticide.*
- *Migration of pollutants from adjacent land.*
- *Naturally occurring processes e.g. elevated concentrations of particular heavy metals associated with specific geological strata.*
- *Atmospheric deposition.*

Conceptual Site Model

The conceptual site model can be defined as a textual or graphical representation of the identified contaminant linkages for a given site. The model forms the basis for designing the investigation as the aim will be to target all of the potential contaminant linkages to determine, through the subsequent phases of risk assessment, whether or not they pose an actual risk.

It is important that the conceptual site model is updated with new information as the various investigation, risk assessment and remediation works are completed.

Technical Guidance

The technical and legal framework for contamination assessment is complex. The process adopted through this report for assessing contamination risks is in general accordance with the following guidance, as listed below:

- 'Investigation of Potentially Contaminated Sites - Code of Practice - BS 10175:2011+A2:2017', (BSi, 2017).
- Land Contamination Risk Management (LCRM) website, (Environment Agency, 2023).
- 'Guidance for the safe development of housing on land affected by contamination - R&D66: 2008', (NHBC/Environment Agency, 2008).

Land Contamination Risk Management: Stage 1 Risk Assessment

In line with the technical guidance, the contamination risk assessment follows a series of steps for each tier of risk assessment:

- *Identify the hazard* - A preliminary stage of risk assessment concerned with identifying and characterising the contamination source that may be associated with a particular site.
- *Assess the hazard* - Use a source-pathway-receptor (S-P-R) linkage approach to find out if there is the potential for unacceptable risk.
- *Estimate the risk* - predict what degree of harm or pollution might result and how likely it is to occur by using the tiered approach to risk assessment.
- *Evaluate the risk* - Decide whether a risk is unacceptable, taking into account the nature and scale of the risk estimates, any uncertainties associated with the assessment and the broad costs and benefits of taking action to mitigate risks.

The separate staged tiers of risk assessment are as follows:

TIER	DESCRIPTION
TIER 1: PRELIMINARY RISK ASSESSMENT	Generally limited to desk based research and a site walkover survey (site reconnaissance) to develop an initial conceptual site model and identify what risks, if any, are likely to be presented by the site. Occasionally it may include assessment of a limited exploratory ground investigation or previous investigation data.
TIER 2: GENERIC QUANTITATIVE RISK ASSESSMENT	This phase is concerned with establishing whether contamination is present, usually through intrusive ground investigation, and then evaluating the magnitude of the associated risks with test results compared to generic assessment criteria.
TIER 3: DETAILED QUANTITATIVE RISK ASSESSMENT	To further evaluate risks the development of site-specific assessment criteria are values for concentrations of contaminants derived using risk estimation models

Risk Classification

The objective of risk assessment is to identify the nature and magnitude of the potential risks and should be based on a consideration of both:

- The likelihood/probability of an event [taking into account both the presence of the hazard and receptor and the integrity of the pathway].
- The severity of the potential consequence [taking into account both the potential severity of the hazard and the sensitivity of the receptor].

There is a need for a logical, transparent and repeatable system in defining the categories of severity of consequence and likelihood as well as for the risk itself and therefore the following risk rating matrix is employed:

		SEVERITY OF CONSEQUENCE			
		SEVERE	MEDIUM	MILD	MINOR
PROBABILITY	HIGH LIKELIHOOD	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	LIKELY	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	LOW LIKELIHOOD	Moderate Risk	Moderate/Low Risk	Low Risk	Negligible Risk
	UNLIKELY	Moderate/Low Risk	Low Risk	Negligible Risk	Negligible Risk

These risk classifications are defined as follows:

- **Very High Risk** - There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without appropriate remediation action.
- **High Risk** - Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remediation action.
- **Moderate Risk** - It is possible that without appropriate remediation action harm could arise to a designated receptor. It is relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely that such harm would be relatively mild.
- **Low Risk** - It is possible that harm could arise to a designated receptor from an identified hazard. It is likely that, at worst if any harm was realised any effects would be mild.
- **Negligible Risk** - The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.

This risk assessment matrix and classification system is based on guidance produced by Department for Environment, Food and Rural Affairs (Defra) and the Environment Agency in connection with contaminated land assessment.

TIER 2 RISK ESTIMATION - SOILS

Introduction to Soil Human Health Generic Assessment Criteria (GAC)

The Environment Agency (EA) and Department of Environment Food and Rural Affairs (DEFRA) had previously issued revised guidance following the consultation about the DEFRA publication 'Assessing risks from land contamination - a proportionate approach. Soil Guideline Values: the Way Forward'. This resulted in a revised version of the Contaminated Land Exposure Model (CLEA) model (version 1.06) and a few of the previously published Soil Guideline Values (SGVs) were revised.

The main legislative driver for dealing with historical land affected by contamination is Part 2A of the Environmental Protection Act 1990. Revised Statutory Guidance to support Part 2A was published in April 2012. This Guidance introduced a new four-category system for classifying land under Part 2A for cases of a Significant Possibility of Significant Harm to human health, 1 where Category 1 includes land where the level of risk is clearly unacceptable and Category 4 includes land where the level of risk posed is acceptably low. The impact assessment for the new Statutory Guidance stated "The new statutory guidance will bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land". The C4SLs are still derived using the CLEA model, but adopt a slightly different approach to toxicological assessment and exposure modelling.

In March 2014, the outcome of 'SP1010 - Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination - Final Project Report' (CL:AIRE) was published. Due to slightly ambiguous wording within this report, Lord de Mauley, Parliamentary Under Secretary, DEFRA wrote to all local authorities on 3 September 2014 to confirm that the published C4SLs were final and that they can be used in risk assessment undertaken under the planning regime.

Whilst there are proposals for the industry to develop C4SLs for other contaminants, these have only produced limited results to date. BRD do not believe that C4SLs could be developed by a single organisation with sufficient confidence. BRD has therefore employed other, more conservative guidance based on the CLEA model (detailed below) within this assessment for compounds where C4SLs are not available. However, it should be noted that the results of this investigation may need to be reinterpreted as new C4SLs become available.

Due to the limited number of published C4SL values at this time, the Chartered Institute of Environmental health (CIEH) and Land Quality Management Ltd (LQM) have produced Generic Assessment Criteria (GAC) known as Suitable for Use Levels (S4ULs), for use in contaminated land human health risk assessment. These S4ULs (2014) have been derived for a large number of substances using the current CLEA model and are therefore consistent with current guidance. They also incorporate the revised exposure parameters as adopted by the C4SL programme, but have not adopted the revised toxicological approach adopted by the C4SLs and so remain a more conservative assessment criteria. The substances for which SGVs were previously published have also been revised as new S4ULs in light of the new exposure parameters proposed by the C4SL programme, and therefore effectively replace the existing SGVs.

In addition, in December 2009, other GAC for less common substances were produced by the Environmental Industries Commission (EIC), The Association of Geotechnical and Geoenvironmental Specialists (AGS) and Contaminated Land: Applications in Real Environments (CL:AIRE) using the CLEA model. These are referred to as the EIC/AGS/CLAIRE GAC.

In summary, C4SLs have been used where these are available. For those substances where C4SLs have yet to be issued, then the S4ULs have been adopted or in some cases, the EIC/AGS/CLAIRE GAC. All of the previously produced SGVs have now either been withdrawn, or superseded by the respective C4SLs or S4ULs.

The only exception to this approach is the PAH compound benzo(a)pyrene (BaP) where a C4SL guideline value has been produced, whereas BRD has adopted the S4UL value. The C4SL for BaP relates to its use as a surrogate marker compound representing all of the genotoxic PAH compounds as a mixture, rather than this individual compound. BRD has therefore adopted the compound specific S4UL value as the initial screening value, for consistency with the other PAH compounds before then employing the C4SL is necessary.

It should be noted that unless otherwise stated, all the assessment criteria adopted within this report have been derived based on a sandy loam soil at pH 7 and the values quoted are for a conservative soil organic matter content of 1% where applicable (i.e. organic contaminants).

Human Health - Soil Generic Assessment Criteria

The results of the soils analysis have been compared to generic assessment criteria for the default exposure scenarios comprising either residential land with plant uptake, residential land without plant uptake, or commercial/industrial land use. The criteria values selected are listed in the table below and full details on the source are referred to above. Where deemed appropriate, the results have also been assessed with reference to the required statistical tests presented within CL:AIRE Professional Guidance: 'Comparing Soil Contamination Data with a Critical Concentration'.

ANALYSIS	GENERIC ASSESSMENT CRITERIA (mg/kg unless stated)			SOURCE
	RESIDENTIAL WITH PLANT UPTAKE	RESIDENTIAL WITHOUT PLANT UPTAKE	COMMERCIAL / INDUSTRIAL	
Arsenic	37	40	640	C4SL
Cadmium	22	150	410	
Chromium (total) ⁵	910	910	8,600	S4UL
Chromium VI	21	21	49	C4SL
Lead	200	310	2,330	
Mercury*	11	15	320	S4UL
Selenium	250	430	12,000	
Nickel	180	180	980	
Copper	2400	7,100	68,000	
Zinc	3,700	40,000	730,000	
pH	<5 - 10> units			Professional judgement
Naphthalene	2.3	2.3	190	S4UL
Acenaphthylene	170	2,900	83,000	
Acenaphthene	210	3,000	84,000	
Fluorene	170	2,800	63,000	
Phenanthrene	95	1,300	22,000	
Anthracene	2,400	31,000	520,000	
Fluoranthene	280	1,500	23,000	
Pyrene	620	3,700	54,000	
Benzo(a)anthracene	7.2	11	170	
Chrysene	15	30	350	
Benzo(b)fluoranthene	2.6	3.9	44	
Benzo(k)fluoranthene	77	110	1,200	
Benzo(a)pyrene	2.2	3.2	35	
Indeno(1,2,3-cd)pyrene	27	45	500	
Dibenzo(a,h)anthracene	0.24	0.31	3.5	S4UL
Benzo(ghi)perylene	320	360	3,900	
TPH Aliphatic C5-C6	42	42	3,200	
TPH Aliphatic C6-C8	100	100	7,800	
TPH Aliphatic C8-C10	27	27	2,000	
TPH Aliphatic C10-C12	130	130	9,700	
TPH Aliphatic C12-C16	1,100	1,100	59,000	
TPH Aliphatic C16-C35	65,000	65,000	1,600,000	

ANALYSIS	GENERIC ASSESSMENT CRITERIA (mg/kg unless stated)			SOURCE
	RESIDENTIAL WITH PLANT UPTAKE	RESIDENTIAL WITHOUT PLANT UPTAKE	COMMERCIAL / INDUSTRIAL	
TPH Aliphatic C35-C44	65,000	65,000	1,600,000	
TPH Aromatic C5-C7	70	370	26,000	
TPH Aromatic C7-C8	130	860	56,000	
TPH Aromatic C8-C10	34	47	3,500	
TPH Aromatic C10-C12	74	250	16,000	
TPH Aromatic C12-C16	140	1,800	36,000	
TPH Aromatic C16-C21	260	1,900	28,000	
TPH Aromatic C21-C35	1,100	1,900	28,000	
TPH Aromatic C35-C44	1,100	1,900	28,000	
Benzene	0.87	3.3	98	C4SL
Toluene	130	880	56,000	S4UL
Ethylbenzene	47	83	5,700	
Xylene [^]	56	79	5,900	
MTBE	49	73	7,900	EIC/AGS/CL:AIRE GAC

Notes:

* The S4UL for methyl mercury has been adopted as the worst case mercury compound as generally there is no desk study evidence to suggest the potential for elemental mercury on the majority of sites.

[^] The lowest S4UL of either p-xylene, o-xylene or m-xylene has been adopted for each land use as a conservative measure.

⁵ S4UL for Chromium III adopted, as in the absence of Chromium VI it is likely that all of the chromium will be in this form as these are the two most common and stable forms of chromium in the soil environment.

Where no GAC is available, any concentrations exceeding the laboratory limit of detection are identified and discussed in more detail.

Water Environment - Soil Generic Assessment Criteria

There are no UK published Generic Assessment Criteria for soil test results in respect of the risk to the water environment and therefore risk estimation is on the basis of the professional judgement and experience of BRD to employ values that are a reasonable concentration above which concern for water resources is valid.

The Total PAH GAC employed is the sum of the 16No. priority PAH compounds regularly tested for in contaminated land analysis (i.e. US EPA 16PAHs). BRD employ a soil screening based upon the total PAH limit for 'inert waste' of 100mg/kg. The rationale is based on PAHs are recognised to be generally of low solubility and the risk to the water environment is correspondingly low.

In respect of Total Petroleum Hydrocarbons, BRD employ a value of 500 mg/kg as a screening value in comparison to the sum of the component aliphatic and aromatic TPH carbon bands. The employed soil screening value is based upon:

- In common with some other consultants, the professional judgement and experience of BRD suggests that this value is a reasonable concentration above which concern for water resources is valid. The rationale is based on the fact that lower concentrations of fuel based contaminants are more likely to naturally degrade than migrate any great distance.
- BRD is aware of regional Environment Agency groundwater and contaminated land teams historically employing 500 mg/kg as a screening value for considering whether or not TPH could represent a risk to water resources.
- The value mirrors the mineral oil Waste Acceptance Criteria limits for what is considered 'inert waste'.

Should elevated contaminants that pose a potential risk to the water environment be identified then site specific assessment criteria should be developed.

Building Materials and Services - Soil Generic Assessment Criteria

Some hydrocarbon compounds are known to both attack and permeate through certain plastic pipe materials, with the primary concern being the degradation and tainting of water supplies. The UK Water Industry Research (UKWIR) has therefore produced a document 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites' (ref. 10/WM/03/21) that specifies threshold criteria for the adoption of 'standard' polythene (PE) or PVC pipes, protective barrier pipe and ductile iron/steel/copper pipes.

The UKWIR threshold assessment criteria from Table 3.1 of this document for standard PE pipes have been employed. It should be noted that the approach taken by UKWIR is very conservative, and both the document and research are flawed. However, it is these values that are being using to specify water pipe materials and therefore it is appropriate to consider them.

The UKWIR guidance is particularly flawed in respect of the chemical analysis it expects as it seeks a limit of detection that is generally below limits that are reasonable or commonly employed in contaminated land assessment. The UKWIR seeks that where a substance is below the limit of detection it should be taken as being present at half this concentration. For the larger suite of chemicals where the limit is against a sum of compounds, this approach would mean that a sample of virgin sub-soil from a greenfield site with absolutely no contamination would actually fail the criteria for using standard PE pipes. To avoid this situation, BRD have adopted the approach of summing only those compounds detected above their respective limits of detection.

In terms of building materials, the primary concern is in respect of concrete as certain commonly occurring natural ground conditions can adversely impact on buried concrete as discussed in 'Special digest 1:2005 Concrete in aggressive ground', BRE, 2005.

ANALYSIS	GENERIC ASSESSMENT CRITERIA	SOURCE
pH	<5.5	BRE Special Digest 1:2005
Sulphate (w/s)	500 mg/l	BRE Special Digest 1:2005
Sum of any VOC above detection limits	0.5 mg/kg	Relevant compounds adapted from UKWIR Table 3.1
Sum of SVOC + Aliphatic TPH >C5-C10 + Aromatic TPH >C5-C10 above detection limits	2 mg/kg	
Sum of Aliphatic TPH >C10-C21 + Aromatic TPH >C10-C21 above detection limits	10 mg/kg	
Sum of Aliphatic TPH >C21-C34 + Aromatic TPH >C10-C35 above detection limits	500 mg/kg	
Sum of BTEX + MTBE above detection limits	0.1 mg/kg	
Phenols	2 mg/kg	
Cresols and chlorinated phenols	2 mg/kg	
Naphthalene	0.5 mg/kg	
Benzo(a)pyrene	0.5 mg/kg	

TIER 2 RISK ESTIMATION - SURFACE WATER AND GROUNDWATER

The initial assessment of the contamination risk to groundwater is by comparing dissolved groundwater concentrations with screening values (GAC) that are protective of surface water resources. Surface waters are supplied with a baseflow from groundwater and so shallow groundwater often enters the surface water. It is therefore appropriate to compare groundwater to these GAC.

The reference source for the target concentrations is generally the Environment Agency's maximum allowable concentration Environmental Quality Standard (EQS) (as accessed February 2025: <https://www.gov.uk/guidance/surface-water-pollution-risk-assessment-for-your-environmental-permit#screening-tests-freshwaters>), the Water Supply (Water Quality) Regulations 2016 (WSR) and the DW1/DW2 criteria from the Surface Water (Abstraction for drinking water)(classification) Regulations 1996. The target concentrations are outlined in the table below.

The 'Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies'. CL:AIRE, 2017 has also been used as reference source for the values.

ANALYSIS	GENERIC ASSESSMENT CRITERIA (GAC)	SOURCE
Arsenic	50 µg/l	DW1 (& EQS annual average)
Cadmium	50 µg/l	DW1
Chromium (total)	32 µg/l	EQS
Chromium (VI)	3.4 µg/l	EQS
Copper	50 µg/l	DW1
Nickel	34 µg/l	EQS
Lead	14 µg/l	EQS
Mercury	1 µg/l	WSR
Selenium	10 µg/l	WSR
Zinc	10.9 mg/l	EQS annual average bioavailable
Cyanide	50 µg/l	WSR
pH	6 to 9 units	-
Benzene	50 µg/l	EQS
Toluene	380 µg/l	EQS
Ethylbenzene	300 µg/l	WHO guideline
Xylene	30 µg/l	EQS (annual average)
Methyl tert-butyl ether (MTBE)	15 µg/l	Taste and odour threshold.
Naphthalene	130 µg/l	EQS
Benzo(a)pyrene	0.27 µg/l	EQS
Total PAH	-	Benzo(a)pyrene can be considered as a marker for the other PAHs
TPH Aliphatic C5-C6	15,000 µg/l	World Health Organization (WHO) guide values for TPHCWG fractions in drinking water
TPH Aliphatic C6-C8	15,000 µg/l	
TPH Aliphatic C8-C10	300 µg/l	
TPH Aliphatic C10-C12	300 µg/l	
TPH Aliphatic C12-C16	300 µg/l	
TPH Aromatic C5-C7	10 µg/l	
TPH Aromatic C7-C8	700 µg/l	
TPH Aromatic C8-C10	300 µg/l	
TPH Aromatic C10-C12	90 µg/l	
TPH Aromatic C12-C16	90 µg/l	
TPH Aromatic C16-C21	90 µg/l	
TPH Aromatic C21-C35	90 µg/l	

TIER 2 RISK ESTIMATION - GROUND GAS

Introduction

A variety of potentially hazardous gases occur naturally in the ground environment. Microbial decay of organic matter under anaerobic conditions and geological processes can lead to the generation of Methane and Carbon Dioxide, but can also include traces gases such as Hydrogen sulphide and Carbon monoxide.

Methane is a colourless and odourless gas that has the hazardous properties of being flammable and, at certain air/Methane mixtures, explosive. Methane has a low toxicity, but can be a simple asphyxiant due to the displacement of oxygen.

Carbon Dioxide is a colourless, odourless and non-combustible gas that has the hazardous property of being a highly toxic chemical. At concentrations of 3% by volume, shortness of breath and headaches will occur becoming acute by 6%. At levels of above 10% by volume headache, visual distortion, tremors and rapid loss of consciousness occur. Concentrations of Carbon Dioxide above 22% by volume are likely to be fatal. The effects of Carbon Dioxide poisoning are made more severe if there is accompanying reduction in oxygen concentrations.

Hydrogen sulphide is a colourless and flammable gas that has an odour of rotten eggs. It is important that the sense of smell is over powered at higher concentrations. The gas is toxic and can be an asphyxiant.

Carbon monoxide is a colourless, odourless and explosive gas in air mixtures that has the hazardous property of being a highly toxic chemical.

Radon is a naturally occurring colourless and odourless gas that is radioactive. It is formed by the radioactive decay of radium which in turn is derived from the radioactive decay of uranium, both of which are minerals that can be found in many soil types. Whilst it is recognised that the air inside every building contains radon, some buildings built in certain defined areas of the country might have unacceptably high concentrations and require special precautions to be taken. The maps contained within BRE211:2015 'Radon: guidance on protective measures for new buildings' identify areas where no radon protection measures are necessary or where higher concentrations are present that either basic or full radon protection measures are required to be fitted to all new buildings, extensions or refurbishments.

Basis of Gas Assessment

In order to classify the level of risk and need, if any, for gas protection measures at a site with the potential for a gas problem, consideration of each of the following is necessary:

- The source of the gas.*
- The generation potential of the gas.*
- The location of the source and the geological setting.*
- Boreholes flow rate and estimated surface emission rate.*
- The nature of the proposed development.*
- Confidence in the knowledge of the gas regime.*

The gas assessment is made with reference to 'C665 - Assessing risks posed by hazardous ground gases to buildings', (CIRIA, 2007) and 'BS8485:2015+A1:2019 - Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings' (BSI, 2019).

Gas Screening Value

The methods within CIRIA C665 and BS8485 both use the gas concentrations together with the borehole flow rates to define a characteristic situation for a site based on the limiting borehole gas volume flow for Methane and Carbon Dioxide. This limiting borehole gas volume flow is called the Gas Screening Value (GSV) and is expressed below:

$$\text{Gas Screening Value (l / hr)} = \text{borehole flow rate (l/hr)} \times \text{gas concentration (fraction)}$$

The calculation of GSV is completed for both Methane and Carbon Dioxide and then the 'worse case' maximum values are used in the assessment. The assessment is to determine the gas regime at the site is dependent upon the nature of the development.

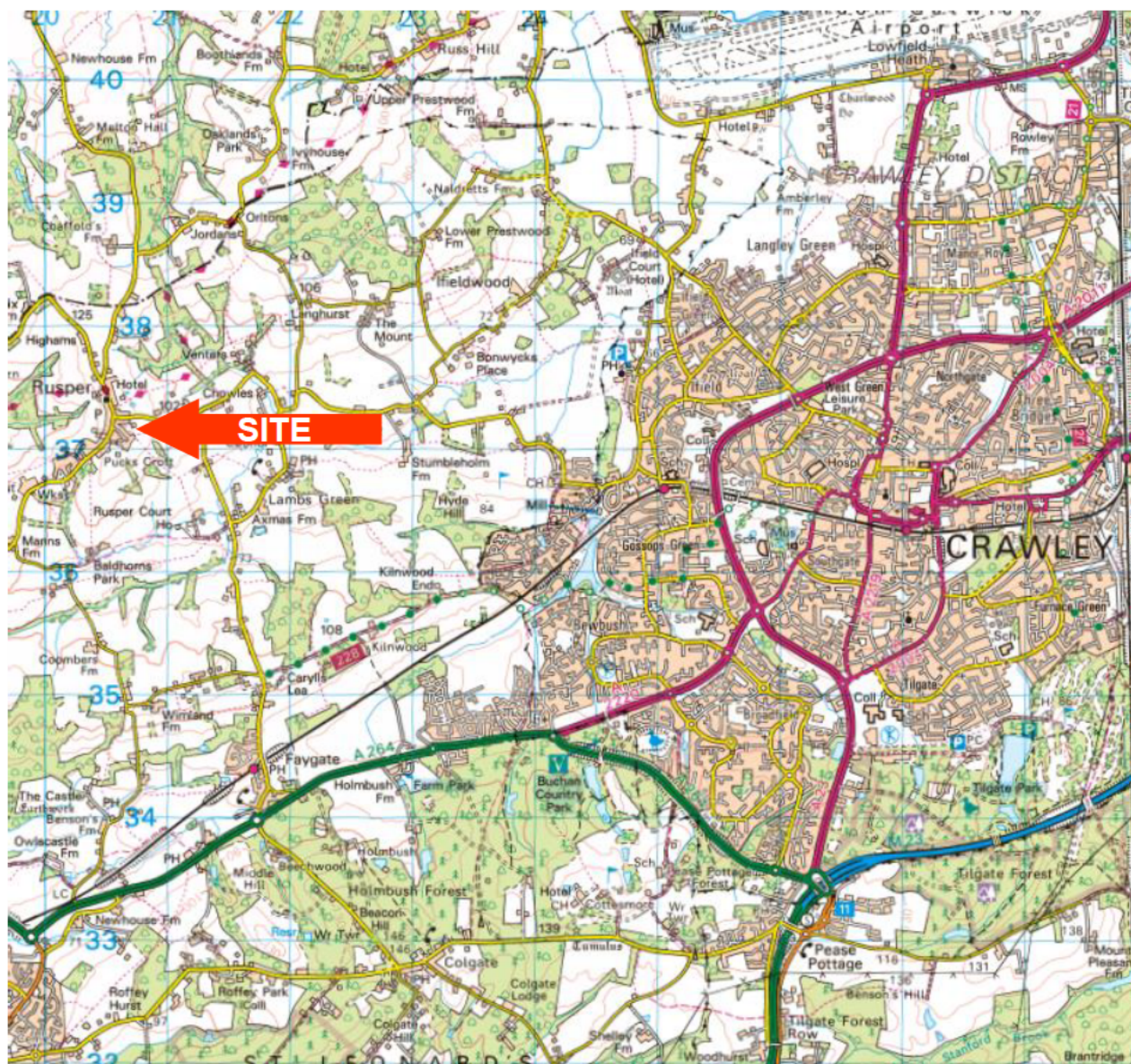
Characteristic Gas Situation

The characteristic situation for many sites is determined from evaluation of the Gas Screening Value derived against the criteria in the following table.

Characteristic situation	Hazard potential	Gas Screening Value (CH ₄ or CO ₂ l/hr)	Additional factors
CS1	Very low risk	<0.07	Typically Methane ≤1% and/or Carbon Dioxide ≤5%. Otherwise consider an increase to characteristic situation 2.
CS2	Low risk	0.07 to <0.7	Borehole air flow rate not to exceed 70 l/hr. Otherwise consider an increase to characteristic situation 3.
CS3	Moderate risk	0.7 to <3.5	-
CS4	Moderate to high risk	3.5 to <15	Quantitative risk assessment required to evaluate the scope of protection measures.
CS5	High risk	15 to <70	-
CS6	Very high risk	>70	-

APPENDIX 1

Site Location Plan



Not to scale.

Project Title: Millfields Farm, Rusper
Client: Stonebond Properties
BRD Reference: BRD4518-OP7-A
Date Issued: July 2025

Reproduced by permission of Ordnance Survey® on behalf of
The Controller of Her Majesty's Stationery Office. © Crown
copyright. All rights reserved. Licence number 100040257.



Accommodation Schedule

Open Market Provision [21 dwellings - 48.8%]
7no. 2-Bedroom Houses
3no. 3-Bedroom Houses
5no. 4-Bedroom Houses

Affordable Provision [22 dwellings - 51.2%]
Affordable Rent [10 dwellings - 68.2%]
3no. 1-Bedroom Houses
1no. 2-Bedroom Houses
3no. 3-Bedroom Houses
1no. 4-Bedroom Houses

Shared Ownership [5 dwellings - 31.8%]
2no. 2-Bedroom Houses
2no. 3-Bedroom Houses
1no. 4-Bedroom Houses

Affordable Dwellings - Tenure to be Agreed
(7 Dwellings - 16.3%)
1no. 1-Bedroom Houses
2no. 2-Bedroom Houses
1no. 4-Bedroom Houses

Total: 43 Dwellings

Car Parking
1.5 car spaces per 1 bed dwelling
2 car spaces per 2, 3 & 4 bedroom dwellings
3 car spaces per 4 bed dwelling
13 visitor car spaces including 2no. disabled car parking spaces

Key

- Affordable Rent
- Shared Ownership
- Affordable Housing - Tenure to be Agreed
- Existing Building Footprints
- Existing Horse Training Ring
- Existing Trees and Hedges Retained

H	05.07.24	Trees added to parking court	EW	SLG
G	30.07.24	Revised layout	EW	SLG
F	24.08.24	Tenure allocation updated	SLG	AK
E	26.04.24	Amended client's name	FH	SLG
D	23.04.24	Layout amendments	KA	SLG
C	25.03.24	Layout amendments	KA	SLG
B	12.03.24	Layout amendments	KA	SLG
A	11.03.24	Coloured Layout	KA	SLG
Rev	Date	Revision Details	Dr	Ch

London 7/6 Great Suffolk Street
T 0207 928 2773 E london@ecearchitecture.com
Sussex 64, 68 Brighton Road, Worthing
T 01903 240777 E sussex@ecearchitecture.com
Bristol Weston Park, Beacon Tower
T 0117 214 1101 E bristol@ecearchitecture.com
www.ecearchitecture.com

Client's Name
Stonebond Properties (Guildford)
Limited

Job Title
Land at Millfields Farm,
Rusper, West Sussex

Drawing Title
Proposed Site Layout

Scale
1:500 @ A0 / 1:1000 @ A2

Drawn
SLG

Checked
AK

Date
09.02.24

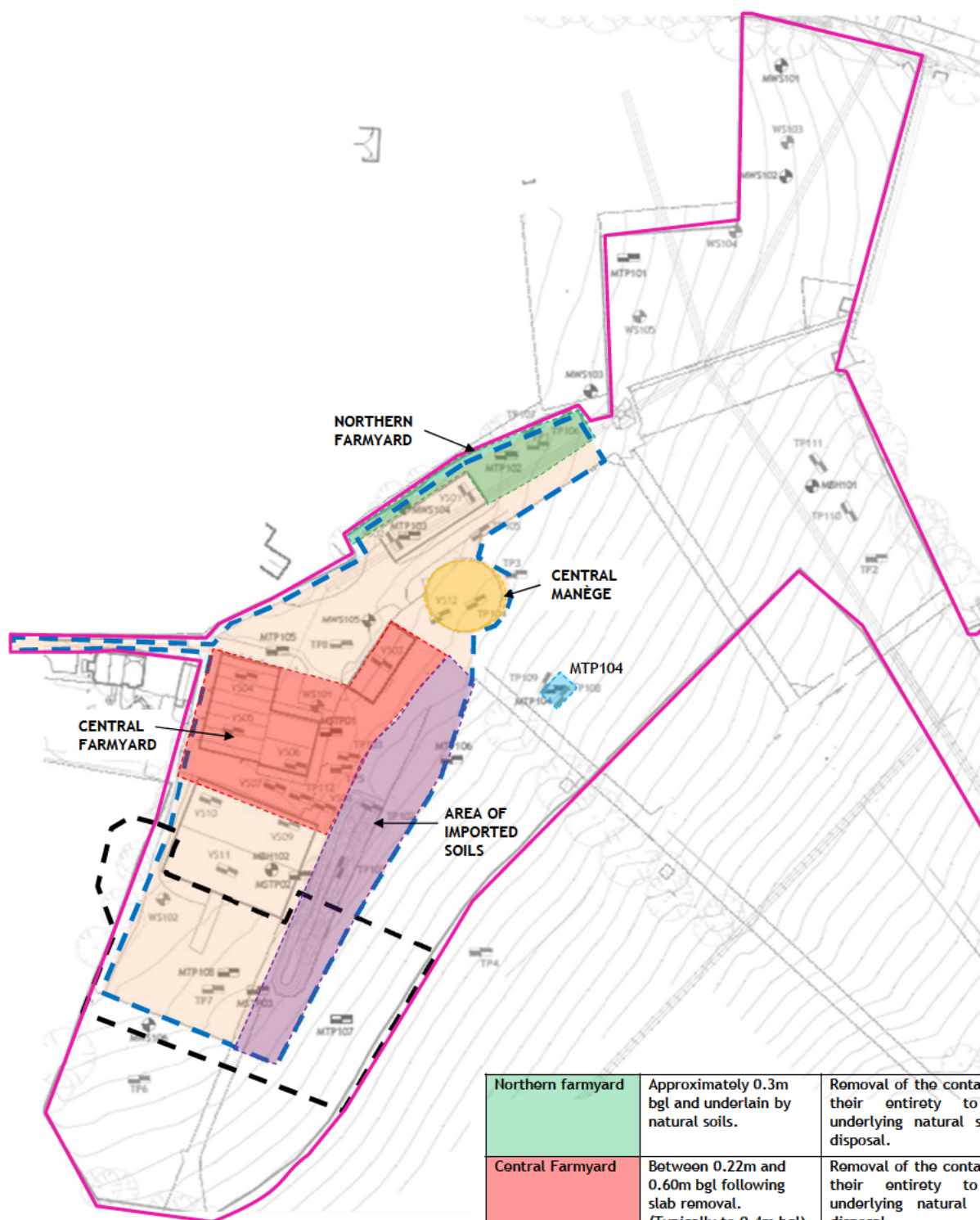
Job No
7288

Drawing No
PL-04

Rev
H

Status
APPROVAL

Remediation Plan



Key:

Site Boundary

Approximate extent of Giant Hogweed contaminated soils.
Giant Hogweed Management Plan to be completed by others.

Hydrocarbon resistant 'barrier' water supply pipes to be installed in the farmyard area.
No requirement for 'barrier pipes' elsewhere on site.

All private gardens to have at 300mm clean soil placement typically consisting of 150mm topsoil and 150mm subsoil. Placement to be independently verified.

Reproduced from 'Proposed Site Layout' Drawing ref. 7288-PL-04
Rev H, Dated 09.02.24

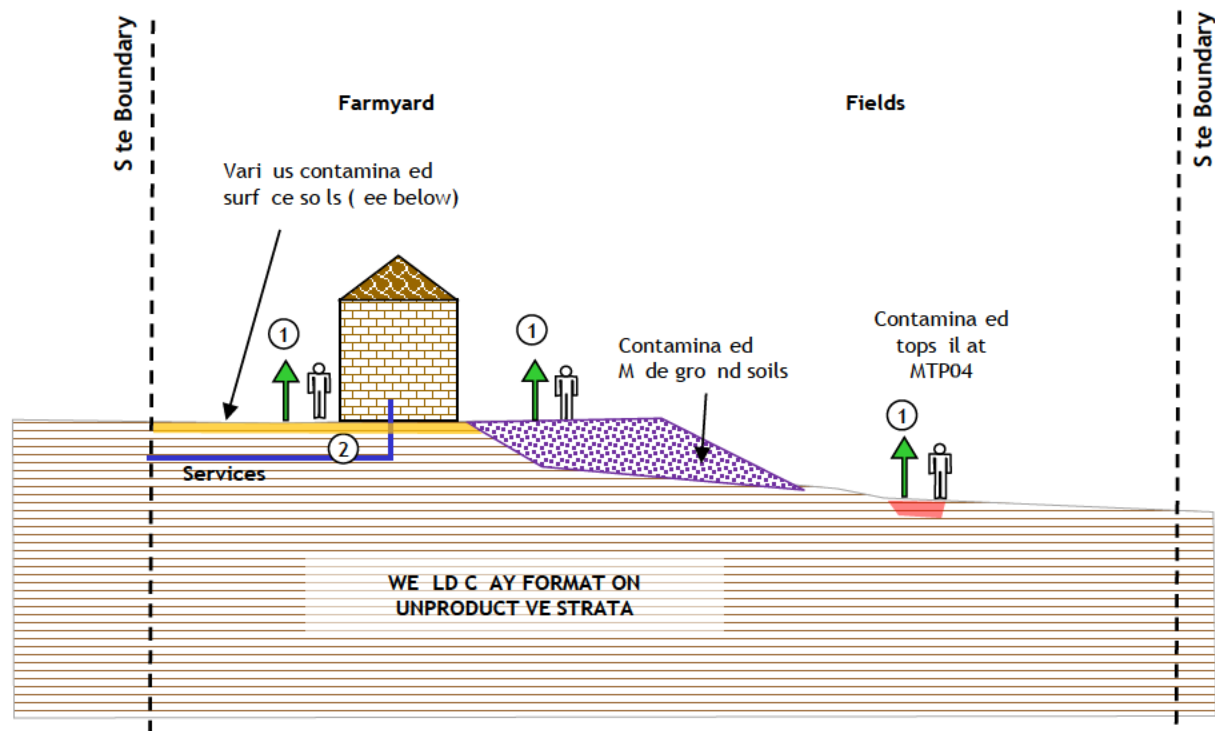
Not to scale.
All positions illustrative only.

Northern farmyard	Approximately 0.3m bgl and underlain by natural soils.	Removal of the contaminated soils in their entirety to expose the underlying natural soils. Off site disposal.
Central Farmyard	Between 0.22m and 0.60m bgl following slab removal. (Typically to 0.4m bgl)	Removal of the contaminated soils in their entirety to expose the underlying natural soils. Off site disposal.
Imported soils in the southeastern farmyard area of the site	Contamination extends to depths up to 1.3m bgl forming steep bank.	Excavation and complete removal. A large proportion of this will be required for the cut and fill and road construction regardless. Off site disposal.
Central manège	Contaminated material extends to a depth of 0.1m bgl.	Removal of the contaminated surface materials in their entirety. Off site disposal.
MTP104 - Surface topsoil	Contaminated soils extend to 0.3m bgl.	Removal of the contaminated soils in their entirety to expose the underlying natural soils. Off site disposal.

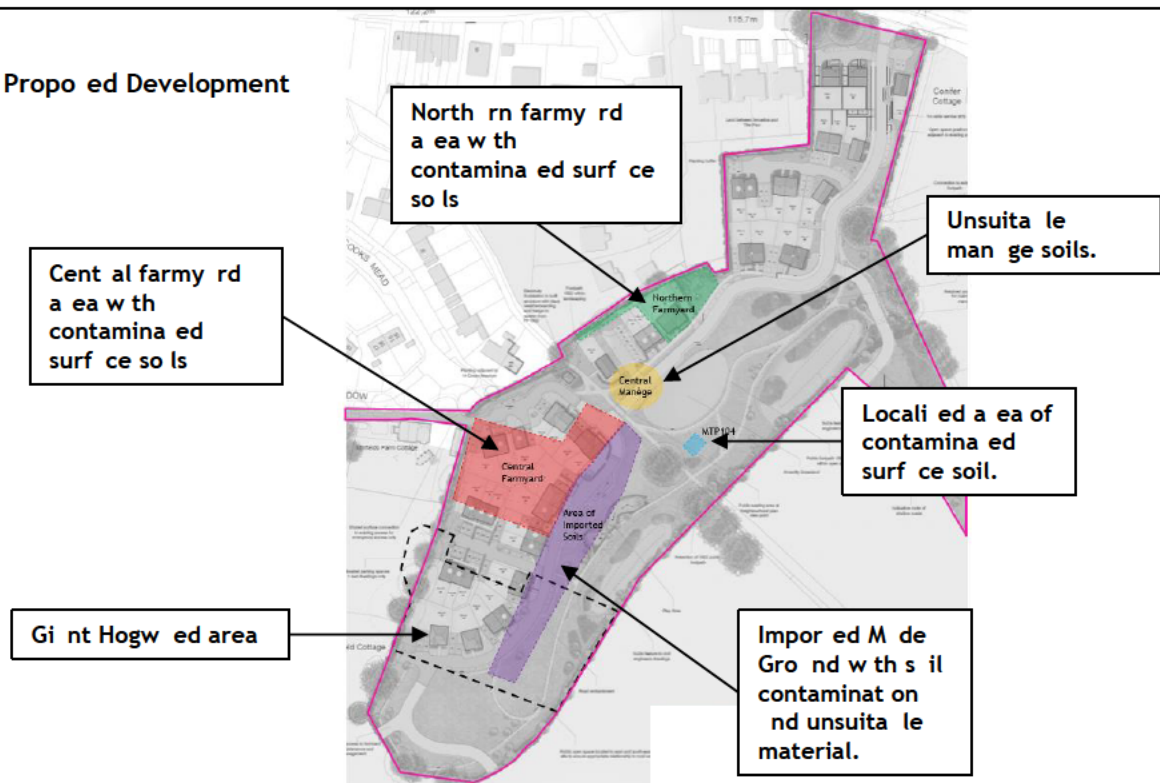
Project Title: Millfields Farm, Rusper
Client: Stonebond Properties
BRD Reference: BRD4518-OP4-C
Date Issued: January 2026

Revised Conceptual Model Plan

Proposed Development



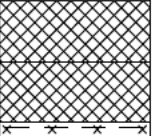
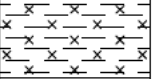
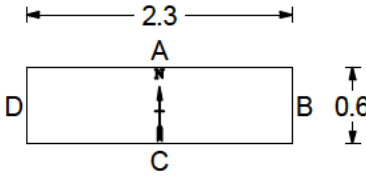
Proposed Development



Project Title: Millfields Farm, Rusper
Client: Stonebond Properties
BRD Reference: BRD4518-OP -B
Date Issued: January 2026

APPENDIX 2

TRIAL PIT RECORD

Client: Stonebond Properties Project Title: Millfields Farm, Rusper Project No: BRD4518 Logged By: R Davies Date Completed: 02/12/2025 Method Used: 360° Mechanical Excavator				Trial Pit No. VS03		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	J1		MADE GROUND: Off-white, slightly sandy, silty gravel of fine to coarse, angular chalk.	0.20	MG	
0.30	J2		MADE GROUND: Red brown becoming brown, slightly clayey, sandy gravel of fine to coarse, angular brick, concrete, chalk and ceramic with rare glass fragments. Stiff, orange brown mottled grey, silty CLAY.	0.40		
				0.70	WEALD	
				1		
				2		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 0.70m bgl.			
All dimensions in metres Log Scale 1:25					 Telephone: 01295 272244 Email: info@brduk.com	

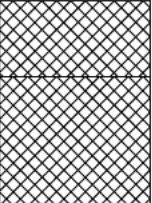
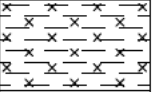
TRIAL PIT RECORD

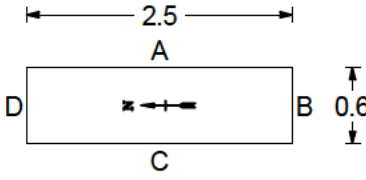
Client: Stonebond Properties Project Title: Millfields Farm, Rusper Project No: BRD4518 Logged By: R Davies Date Completed: 02/12/2025 Method Used: 360° Mechanical Excavator			Trial Pit No. VS04	
			Sheet 1 of 1	
Samples & Tests			Description of Strata	
Depth	Type & No	Value		
0.20	J1		Broken out CONCRETE.	
0.30	J2		MADE GROUND: Off-white, slightly sandy, silty gravel of fine to coarse, angular chalk. MADE GROUND: Dark red brown, gravelly sand. Gravel of fine to medium, angular to subrounded brick, clinker and rare flint. Stiff, orange brown mottled grey, silty CLAY.	
			Depth / (Level) 0.13 0 0.25 0 0.35 0 0.75 0 1 2 3 4	
			Geology MG WEALD	
			Legend 	
Pit Stability: Generally stable throughout Groundwater: Not encountered			Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 0.75m bgl.	
All dimensions in metres Log Scale 1:25			 Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

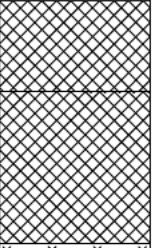
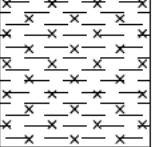
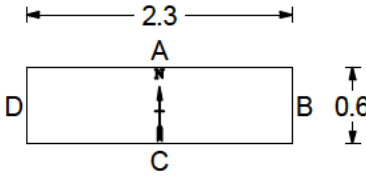
Client: Stonebond Properties Project Title: Millfields Farm, Rusper Project No: BRD4518 Logged By: R Davies Date Completed: 02/12/2025 Method Used: 360° Mechanical Excavator				Trial Pit No. VS05		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.20	J1		Broken out CONCRETE.	0.13	MG	
0.30	J2		MADE GROUND: Off-white, slightly sandy, silty gravel of fine to coarse, angular chalk.	0.25		
			MADE GROUND: Dark red brown, gravelly sand. Gravel of fine to medium, angular to subrounded brick, clinker and rare flint. Stiff, orange brown mottled grey, silty CLAY.	0.35		
				0.65	WEALD	
				1		
				2		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 0.75m bgl.		All dimensions in metres Log Scale 1:25 Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

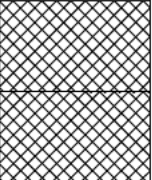
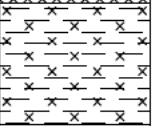
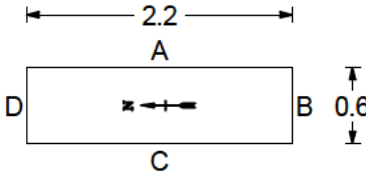
Client: Stonebond Properties Project Title: Millfields Farm, Rusper Project No: BRD4518 Logged By: R Davies Date Completed: 02/12/2025 Method Used: 360° Mechanical Excavator				Trial Pit No. VS06		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.40	J1		MADE GROUND: Grey, sandy gravel of fine to coarse, angular granite.	0.25	MADE GROUND	
			MADE GROUND: Firm, dark grey, silty clay with occasional brick gravel and decaying wood fragments.	0		
1.00	D1		Stiff, fissured, grey mottled orange brown, silty CLAY with rare mudstone gravel lithorelicts.	0.70	WEALD	
				1.00		
				2		
				3		
				4		

Pit Stability: Generally stable throughout Groundwater: Seepage at 0.25m		Surface Elevation Level:
Plan of Trial Pit: 	General Remarks: Trial pit terminated at 1.00m bgl.	
All dimensions in metres Log Scale 1:25		 Telephone: 01295 272244 Email: info@brduk.com

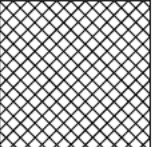
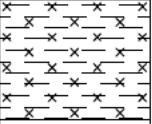
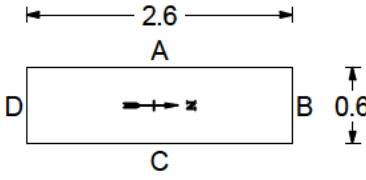
TRIAL PIT RECORD

Client: Stonebond Properties Project Title: Millfields Farm, Rusper Project No: BRD4518 Logged By: R Davies Date Completed: 02/12/2025 Method Used: 360° Mechanical Excavator				Trial Pit No. VS07		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	J1		MADE GROUND: Red brown to brown, slightly clayey in parts, sandy gravel of fine to coarse, angular granite, flint, brick and concrete.	0.30 0	MADE GROUND	
0.40	J2		MADE GROUND: Firm, grey brown, silty clay with rare brick, ceramic and flint gravel.			
			Stiff, fissured, grey mottled orange brown, silty CLAY with rare mudstone gravel lithorelicts.	0.80 0	WEALD CLAY	
				1		
				1.30 0		
				2		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered				Surface Elevation Level:		
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 1.30m bgl.		All dimensions in metres Log Scale 1:25	
					 Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

Client: Stonebond Properties Project Title: Millfields Farm, Rusper Project No: BRD4518 Logged By: R Davies Date Completed: 02/12/2025 Method Used: 360° Mechanical Excavator				Trial Pit No. VS08		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	J1		MADE GROUND: Dark brown, very sandy, gravelly clay with decaying plant remains. Gravel of fine to coarse, angular brick, flint and concrete with occasional plastic fragments and rare asbestos cement fragments.	0.30 0	MADE GROUND	
0.40	J2		MADE GROUND: Firm, grey brown with rare orange brown, silty clay with occasional brick and flint gravel.	0.60 0		
			Stiff, fissured, grey mottled orange brown, silty CLAY with rare mudstone gravel lithorelicts.	1.00 0	WEALD	
				2		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 1.00m bgl.			
All dimensions in metres Log Scale 1:25					 Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

Client: Stonebond Properties Project Title: Millfields Farm, Rusper Project No: BRD4518 Logged By: R Davies Date Completed: 02/12/2025 Method Used: 360° Mechanical Excavator				Trial Pit No. VS09		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	J1		MADE GROUND: Light yellow brown to beige with some red, slightly gravelly, cobbley sand. Gravel and cobbles of fine to coarse, angular brick.		MADE GROUND	
0.60	J2		MADE GROUND: Firm, grey brown, silty clay with rare brick and flint gravel.	0.50 0		
			Stiff, light grey mottled orange brown, silty CLAY.	1 1.00 0	WEALD	
				1.40 0		
				2		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 1.40m bgl.			
All dimensions in metres Log Scale 1:25					 Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

Client: Stonebond Properties Project Title: Millfields Farm, Rusper Project No: BRD4518 Logged By: R Davies Date Completed: 02/12/2025 Method Used: 360° Mechanical Excavator				Trial Pit No. VS10	
				Sheet 1 of 1	

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.05	J1		MADE GROUND: Wet, brown to red brown, sandy, gravelly clay with occasional cobbles. Gravel of fine to coarse, angular brick, tarmac and granite. Stiff, light grey mottled orange brown, silty CLAY. 0.50 m: Very thin bed of mudstone.	0.10 0	M	
				0.90 0	WEALD CLAY	
				1		
				2		
				3		
				4		

Pit Stability: Generally stable throughout Groundwater: Not encountered		Surface Elevation Level:
--	--	--------------------------

Plan of Trial Pit: 	General Remarks: Trial pit terminated at 0.90m bgl.	All dimensions in metres Log Scale 1:25 Telephone: 01295 272244 Email: info@brduk.com
-----------------------------------	---	--

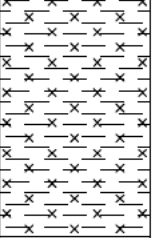
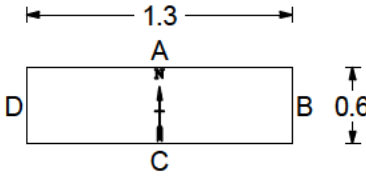
TRIAL PIT RECORD

Client: Stonebond Properties Project Title: Millfields Farm, Rusper Project No: BRD4518 Logged By: R Davies Date Completed: 02/12/2025 Method Used: 360° Mechanical Excavator				Trial Pit No. VS11	
				Sheet 1 of 1	

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.20	J1		MADE GROUND: Orange brown to red brown, slightly gravelly, cobbly sand. Gravel of fine to coarse, angular brick and tarmac and cobbles of brick.	0.60 0 1 1.10 1.40 0 2 3 4	MADE GROUND	
0.70	J2		MADE GROUND: Firm, grey brown, silty clay with rare brick and flint gravel.			
			Stiff, light grey mottled orange brown, silty CLAY.			
					WEALD	

Pit Stability: Generally stable throughout Groundwater: Not encountered		Surface Elevation Level:
Plan of Trial Pit: 	General Remarks: Trial pit terminated at 1.40m bgl.	
		All dimensions in metres Log Scale 1:25 Telephone: 01295 272244 Email: info@brduk.com

TRIAL PIT RECORD

Client: Stonebond Properties Project Title: Millfields Farm, Rusper Project No: BRD4518 Logged By: R Davies Date Completed: 02/12/2025 Method Used: 360° Mechanical Excavator				Trial Pit No. VS12		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.30	J1		MADE GROUND: Wet, soft, orange brown, silty clay.	0.20	MG	
			Stiff, fissured, orange brown mottled light grey, silty CLAY with rare rootlets.	0		
				1	WEALD CLAY	
				1.00		
				2		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 1.00m bgl.			
All dimensions in metres Log Scale 1:25					 Telephone: 01295 272244 Email: info@brduk.com	

Verification Trial Pit Photographs

VS01



VS02



Project Title: Millfields Farm, Rusper
Client: Stonebond Properties
BRD Reference: BRD4518-OP10-A
Date Issued: December 2025



01295 272244
info@brduk.com

Verification Trial Pit Photographs

VS03



Project Title: Millfields Farm, Rusper
Client: Stonebond Properties
BRD Reference: BRD4518-OP10-A
Date Issued: December 2025



01295 272244
info@brduk.com

Verification Trial Pit Photographs

VS04



Project Title: Millfields Farm, Rusper
Client: Stonebond Properties
BRD Reference: BRD4518-OP10-A
Date Issued: December 2025



01295 272244
info@brduk.com

Verification Trial Pit Photographs

VS05



Project Title: Millfields Farm, Rusper
Client: Stonebond Properties
BRD Reference: BRD4518-OP10-A
Date Issued: December 2025



01295 272244
info@brduk.com

Verification Trial Pit Photographs

VS06



Project Title: Millfields Farm, Rusper
Client: Stonebond Properties
BRD Reference: BRD4518-OP10-A
Date Issued: December 2025



01295 272244
info@brduk.com

Verification Trial Pit Photographs

VS07



Project Title: Millfields Farm, Rusper
Client: Stonebond Properties
BRD Reference: BRD4518-OP10-A
Date Issued: December 2025



01295 272244
info@brduk.com

Verification Trial Pit Photographs

VS08



Project Title: Millfields Farm, Rusper
Client: Stonebond Properties
BRD Reference: BRD4518-OP10-A
Date Issued: December 2025



01295 272244
info@brduk.com

Verification Trial Pit Photographs

VS09



Project Title: Millfields Farm, Rusper
Client: Stonebond Properties
BRD Reference: BRD4518-OP10-A
Date Issued: December 2025



01295 272244
info@brduk.com

Verification Trial Pit Photographs

VS10



Project Title: Millfields Farm, Rusper
Client: Stonebond Properties
BRD Reference: BRD4518-OP10-A
Date Issued: December 2025



01295 272244
info@brduk.com

Verification Trial Pit Photographs

VS11



Project Title: Millfields Farm, Rusper
Client: Stonebond Properties
BRD Reference: BRD4518-OP10-A
Date Issued: December 2025



01295 272244
info@brduk.com

Verification Trial Pit Photographs

VS12



Project Title: Millfields Farm, Rusper
Client: Stonebond Properties
BRD Reference: BRD4518-OP10-A
Date Issued: December 2025



01295 272244
info@brduk.com

APPENDIX 3

[REDACTED]
BRD Environmental Ltd
Hawthorne Villa
1 Old Parr Road
Banbury
Oxfordshire
OX16 5HT

Normec DETS Limited
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 25-09147

Site Reference: Millfields Farm, Ruser

Project / Job Ref: BRD4518

Order No: None Supplied

Sample Receipt Date: 27/10/2025

Sample Scheduled Date: 27/10/2025

Report Issue Number: 1

Reporting Date: 04/11/2025

Authorised by:

[REDACTED]
Steve Knight
Customer Support Manager

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

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

Soil Analysis Certificate						
DETS Report No: 25-09147	~Date Sampled	22/10/25	22/10/25	22/10/25	22/10/25	22/10/25
BRD Environmental Ltd	~Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: Millfields Farm, Rusper	~TP / BH No	VS01	VS02	MTP04 F1	MTP04 F2	MTP04 B1
~Project / Job Ref: BRD4518	~Additional Refs	None Supplied	None Supplied	F1	F2	B2
~Order No: None Supplied	~Depth (m)	0.05	0.05	0.05	0.05	0.30
Reporting Date: 04/11/2025	DETS Sample No	794430	794431	794432	794433	794434

Determinand	Unit	RL	Accreditation	(n)				
Asbestos Quantification ⁽⁵⁾	%	< 0.001	ISO17025	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
pH	pH Units	N/a	MCERTS	7.1	7.0			
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	13	44			
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.01	0.04			
Organic Matter (SOM)	%	< 0.1	MCERTS	1.2	1.6			
Arsenic (As)	mg/kg	< 2	MCERTS	10	10			
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2			
Chromium (Cr)	mg/kg	< 2	MCERTS	25	23			
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2			
Copper (Cu)	mg/kg	< 4	MCERTS	20	16			
Lead (Pb)	mg/kg	< 3	MCERTS	10	20			
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1			
Nickel (Ni)	mg/kg	< 3	MCERTS	10	10			
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2			
Zinc (Zn)	mg/kg	< 3	MCERTS	33	41			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Analysis carried out on the dried sample is corrected for the stone content

Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 25-09147	~Date Sampled	22/10/25	22/10/25	22/10/25	22/10/25	22/10/25
BRD Environmental Ltd	~Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: Millfields Farm, Rusper	~TP / BH No	VS01	VS02	MTP04 F1	MTP04 F2	MTP04 B1
~Project / Job Ref: BRD4518	~Additional Refs	None Supplied	None Supplied	F1	F2	B2
~Order No: None Supplied	~Depth (m)	0.05	0.05	0.05	0.05	0.30
Reporting Date: 04/11/2025	DETS Sample No	794430	794431	794432	794433	794434

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

Soil Analysis Certificate - TPH LQM Banded

DETS Report No: 25-09147	~Date Sampled	22/10/25	22/10/25	22/10/25		
BRD Environmental Ltd	~Time Sampled	None Supplied	None Supplied	None Supplied		
~Site Reference: Millfields Farm, Rusper	~TP / BH No	MTP04 F1	MTP04 F2	MTP04 B1		
~Project / Job Ref: BRD4518	~Additional Refs	F1	F2	B2		
~Order No: None Supplied	~Depth (m)	0.05	0.05	0.30		
Reporting Date: 04/11/2025	DETS Sample No	794432	794433	794434		

Determinand	Unit	RL	Accreditation	(n)					
Aliphatic >C5 - C6 : HS 1D MS AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01		
Aliphatic >C6 - C8 : HS 1D MS AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05		
Aliphatic >C8 - C10 : EH CU 1D AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2		
Aliphatic >C10 - C12 : EH CU 1D AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2		
Aliphatic >C12 - C16 : EH CU 1D AL	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3		
Aliphatic >C16 - C35 : EH CU 1D AL	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10		
Aliphatic >C35 - C44 : EH CU 1D AL	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10		
Aliphatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 30	NONE	< 30	< 30	< 30	< 30		
Aromatic >C5 - C7 : HS 1D MS AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01		
Aromatic >C7 - C8 : HS 1D MS AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05		
Aromatic >C8 - C10 : EH CU 1D AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2		
Aromatic >C10 - C12 : EH CU 1D AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2		
Aromatic >C12 - C16 : EH CU 1D AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2		
Aromatic >C16 - C21 : EH CU 1D AR	mg/kg	< 3	MCERTS	3	< 3	< 3	< 3		
Aromatic >C21 - C35 : EH CU 1D AR	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10		
Aromatic >C35 - C44 : EH CU 1D AR	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10		
Aromatic (>C5 - C44) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 30	NONE	< 30	< 30	< 30	< 30		
Total >C5 - C44 : HS_1D_MS+EH_CU_1D_Tot al	mg/kg	< 60	NONE	< 60	< 60	< 60	< 60		

Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 25-09147	~Date Sampled	22/10/25	22/10/25	22/10/25		
BRD Environmental Ltd	~Time Sampled	None Supplied	None Supplied	None Supplied		
~Site Reference: Millfields Farm, Rusper	~TP / BH No	MTP04 F1	MTP04 F2	MTP04 B1		
~Project / Job Ref: BRD4518	~Additional Refs	F1	F2	B2		
~Order No: None Supplied	~Depth (m)	0.05	0.05	0.30		
Reporting Date: 04/11/2025	DETS Sample No	794432	794433	794434		

Determinand	Unit	RL	Accreditation	(n)			
Benzene : HS 1D MS	µg/kg	< 2	MCERTS	< 2	< 2	< 2	
Toluene : HS 1D MS	µg/kg	< 5	MCERTS	< 5	< 5	< 5	
Ethylbenzene : HS_1D_MS	µg/kg	< 2	MCERTS	< 2	< 2	< 2	
p & m-xylene : HS_1D_MS	µg/kg	< 2	MCERTS	< 2	< 2	< 2	
o-xylene : HS 1D MS	µg/kg	< 2	MCERTS	< 2	< 2	< 2	
MTBE : HS 1D MS	µg/kg	< 5	MCERTS	< 5	< 5	< 5	

Soil Analysis Certificate - Sample Descriptions

DETS Report No: 25-09147	
BRD Environmental Ltd	
~Site Reference: Millfields Farm, Rusper	
~Project / Job Ref: BRD4518	
~Order No: None Supplied	
Reporting Date: 04/11/2025	

DETS Sample No	~TP / BH No	~Additional Refs	~Depth (m)	Moisture Content (%)	Sample Matrix Description
794430	VS01	None Supplied	0.05	17.6	Brown clay
794431	VS02	None Supplied	0.05	19.1	Brown clay
794432	MTP04 F1	F1	0.05	20.1	Brown clay with vegetation
794433	MTP04 F2	F2	0.05	22.7	Brown sandy clay with vegetation
794434	MTP04 B1	B2	0.30	19.5	Light brown clay

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

Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 25-09147
BRD Environmental Ltd
~Site Reference: Millfields Farm, Rusper
~Project / Job Ref: BRD4518
~Order No: None Supplied
Reporting Date: 04/11/2025

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

List of HWOL Acronyms and Operators	
DETS Report No: 25-09147	
BRD Environmental Ltd	
~Site Reference: Millfields Farm, Rusper	
~Project / Job Ref: BRD4518	
~Order No: None Supplied	
Reporting Date: 04/11/2025	

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

Benzene - HS_1D_MS
Ethylbenzene - HS_1D_MS
MTBE - HS_1D_MS
TPH CWG - Aromatic >C16 - C21 - EH_CU_1D_AR
TPH LQM - Aliphatic >C10 - C12 - EH_CU_1D_AL
TPH LQM - Aliphatic >C12 - C16 - EH_CU_1D_AL
TPH LQM - Aliphatic >C16 - C35 - EH_CU_1D_AL
TPH LQM - Aliphatic >C35 - C44 - EH_CU_1D_AL
TPH LQM - Aliphatic >C5 - C44 - HS_1D_MS+EH_CU_1D_AL
TPH LQM - Aliphatic >C5 - C6 - HS_1D_MS_AL
TPH LQM - Aliphatic >C6 - C8 - HS_1D_MS_AL
TPH LQM - Aliphatic >C8 - C10 - EH_CU_1D_AL
TPH LQM - Aromatic >C10 - C12 - EH_CU_1D_AR
TPH LQM - Aromatic >C12 - C16 - EH_CU_1D_AR
TPH LQM - Aromatic >C21 - C35 - EH_CU_1D_AR
TPH LQM - Aromatic >C35 - C44 - EH_CU_1D_AR
TPH LQM - Aromatic >C5 - C44 - HS_1D_MS+EH_CU_1D_AR
TPH LQM - Aromatic >C5 - C7 - HS_1D_MS_AR
TPH LQM - Aromatic >C7 - C8 - HS_1D_MS_AR
TPH LQM - Aromatic >C8 - C10 - EH_CU_1D_AR
TPH LQM - Total >C5 - C44 - HS_1D_MS+EH_CU_1D_Total
Toluene - HS_1D_MS
m & p-xylene - HS_1D_MS
o-Xylene - HS_1D_MS

Normec DETS Limited
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Certificate Key

Symbol	Description
F	Filtered sample
UF	Unfiltered sample
D	Dried sample
AR	As received sample
RL	Reporting limit
~	Sample details provided by customer and can affect the validity of results
M/S	Missing Sample
*	The Dutch 10 PAH compounds consist of Naphthalene, Anthracene, Phenanthrene, Fluoranthene, Benz(a)anthracene, Chrysene, Benzo(k)fluoranthene, Benzo(a)pyrene, Benzo(g,h,i)perylene, and Indeno(1,2,3-cd)pyrene
**	Total EPA-16 PAHs consist of the following polycyclic aromatic hydrocarbons: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, and Benzo(ghi)perylene.
***	Total WAC-17 PAHs consist of the following polycyclic aromatic hydrocarbons: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, Benzo(ghi)perylene and Coronene.
^	No sampling date provided; unable to confirm if samples are within acceptable holding times
\$	Samples exceeded their recommended holding times
C	Deviation due to exceeded time between Sampling and Receipt
n	Please note that we are MCERTS soil accredited (UK soils only) for sand, loam, and clay, and UKAS accredited for groundwater, tap water, surface water, and generated leachates. Other matrices are outside our scope of accreditation.
S	Subcontracted analysis
M	MCERTS accredited test
U	UKAS accredited test

Certificate of Analysis

Certificate Number 25-28540

Issued: 23-Dec-25

Client BRD Environmental Ltd
Hawthorne Villa
1 Old Parr Road
Banbury
Oxfordshire
OX16 5HT

Our Reference 25-28540

Client Reference ~ brd4518

Order No ~ (not supplied)

Contract Title ~ Millfields Farm Rusper

Description 13 Soil samples.

Date Received 05-Dec-25

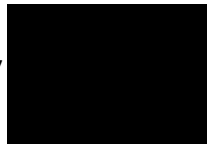
Date Started 05-Dec-25

Date Completed 23-Dec-25

Test Procedures Identified by prefix DETSn (details on request).

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

Approved By



Reyhan Irfan
Operations Manager



Summary of Chemical Analysis

Matrix Descriptions

Our Ref 25-28540

Client Ref ~ brd4518

Contract Title ~ Millfields Farm Rusper

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
VS03	J1	0.1	2611075	23/12/2025	White gravelly, sandy CLAY
VS04	J2	0.3	2611076	23/12/2025	White gravelly, sandy CLAY
VS05	J2	0.3	2611077	23/12/2025	Dark brown gravelly, sandy CLAY (Possible made ground - slag)
VS06	J1	0.4	2611078	23/12/2025	Brown gravelly, sandy CLAY
VS09	J1	0.1	2611083	23/12/2025	Brown SAND
VS09	J2	0.6	2611084	23/12/2025	Brown gravelly, sandy CLAY
VS10	J1	0.05	2611085	23/12/2025	Brown gravelly, sandy CLAY including odd rootlets
VS11	J2	0.7	2611086	23/12/2025	Brown gravelly, sandy CLAY
VS12	J1	0.3	2611087	23/12/2025	Brown gravelly, sandy CLAY

Summary of Chemical Analysis

Soil Samples

Our Ref 25-28540

Client Ref ~ brd4518

Contract Title ~ Millfields Farm Rusper

Lab No	2611075	2611076	2611077	2611078	2611079	2611080	2611081
Sample ID ~	VS03	VS04	VS05	VS06	VS07	VS07	VS08
Depth ~	0.10	0.30	0.30	0.40	0.10	0.40	0.10
Other ID ~	J1	J2	J2	J1	J1	J2	J1
Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date ~	02/12/2025	02/12/2025	02/12/2025	02/12/2025	02/12/2025	02/12/2025	02/12/2025
Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units							
Asbestos Quantification (Gravimetric)	DETSC 1102	0.001	%	< 0.001	< 0.001	0.002	< 0.001	0.001	< 0.001	0.002
Preparation										
Moisture Content	DETSC 1004	0.1	%	15	17	26	24			
Metals										
Arsenic	DETSC 2301#	0.2	mg/kg	0.6	0.8	34	10			
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	0.1	0.7	0.2			
Chromium	DETSC 2301#	0.15	mg/kg	1.5	2.0	21	20			
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0			
Copper	DETSC 2301#	0.2	mg/kg	5.9	4.9	3400	28			
Lead	DETSC 2301#	0.3	mg/kg	2.8	2.1	590	45			
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	1.1	0.08			
Nickel	DETSC 2301#	1	mg/kg	1.6	3.0	87	11			
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	0.9	< 0.5			
Zinc	DETSC 2301#	1	mg/kg	16	18	1000	120			
Inorganics										
pH	DETSC 2008#		pH	8.9	10.3	8.3	9.1			
Total Organic Carbon	DETSC 2084#	0.5	%	6.2	2.9	16	2.4			
Organic matter	DETSC 2002#	0.1	%	< 0.1	0.2	2.5	2.9			
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	70	59	220	70			
PAHs										
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10			
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10			
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10			
Fluorene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10			
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.10	0.10	< 0.10	0.11			
Anthracene	DETSC 3301	0.1	mg/kg	< 0.10	0.30	0.33	0.39			
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	0.20	0.29	0.23			
Pyrene	DETSC 3301	0.1	mg/kg	< 0.10	0.14	0.24	< 0.10			
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10			
Chrysene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.12	< 0.10			
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.35	< 0.10			
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.17	< 0.10			
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.17	< 0.10			
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.29	< 0.10			
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.21	< 0.10			
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.17	< 0.10			
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	1.9	< 1.6			

Summary of Chemical Analysis

Soil Samples

Our Ref 25-28540

Client Ref ~ brd4518

Contract Title ~ Millfields Farm Rusper

Lab No	2611082	2611083	2611084	2611085	2611086	2611087
Sample ID ~	VS08	VS09	VS09	VS10	VS11	VS12
Depth ~	0.40	0.10	0.60	0.05	0.70	0.30
Other ID ~	J2	J1	J2	J1	J2	J1
Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date ~	02/12/2025	02/12/2025	02/12/2025	02/12/2025	02/12/2025	02/12/2025
Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Asbestos Quantification (Gravimetric)	DETSC 1102	0.001	%	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Preparation									
Moisture Content	DETSC 1004	0.1	%		8.6	21	16	21	23
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg		19	12	11	12	13
Cadmium	DETSC 2301#	0.1	mg/kg		< 0.1	0.2	0.1	0.2	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg		19	23	14	26	37
Chromium, Hexavalent	DETSC 2204*	1	mg/kg		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg		270	19	62	22	36
Lead	DETSC 2301#	0.3	mg/kg		48	31	18	47	18
Mercury	DETSC 2325#	0.05	mg/kg		0.05	< 0.05	< 0.05	0.07	< 0.05
Nickel	DETSC 2301#	1	mg/kg		3.5	15	9.9	15	14
Selenium	DETSC 2301#	0.5	mg/kg		< 0.5	1.3	< 0.5	0.6	< 0.5
Zinc	DETSC 2301#	1	mg/kg		46	69	48	89	50
Inorganics									
pH	DETSC 2008#		pH		8.5	7.7	10.3	7.4	5.7
Total Organic Carbon	DETSC 2084#	0.5	%		2.3	1.7	2.8	1.9	< 0.5
Organic matter	DETSC 2002#	0.1	%		0.3	2.2	1.2	2.7	0.9
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l		45	34	140	24	110
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	DETSC 3301	0.1	mg/kg		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	DETSC 3301	0.1	mg/kg		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	DETSC 3301	0.1	mg/kg		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	DETSC 3301	0.1	mg/kg		< 0.10	< 0.10	< 0.10	0.14	< 0.10
Anthracene	DETSC 3301	0.1	mg/kg		0.28	< 0.10	0.28	0.29	< 0.10
Fluoranthene	DETSC 3301	0.1	mg/kg		< 0.10	< 0.10	0.14	0.14	< 0.10
Pyrene	DETSC 3301	0.1	mg/kg		< 0.10	< 0.10	0.15	< 0.10	< 0.10
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg		< 0.10	< 0.10	< 0.10	0.40	< 0.10
Chrysene	DETSC 3301	0.1	mg/kg		0.88	< 0.10	< 0.10	0.11	< 0.10
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg		< 0.10	< 0.10	< 0.10	0.36	< 0.10
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg		< 0.10	< 0.10	< 0.10	0.16	< 0.10
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg		< 0.10	< 0.10	< 0.10	0.17	< 0.10
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg		< 0.10	< 0.10	< 0.10	0.21	< 0.10
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg		< 0.10	< 0.10	< 0.10	0.26	< 0.10
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg		< 0.10	< 0.10	< 0.10	0.12	< 0.10
PAH 16 Total	DETSC 3301	1.6	mg/kg		< 1.6	< 1.6	< 1.6	1.9	< 1.6

Summary of Asbestos Analysis

Soil Samples

Our Ref 25-28540

Client Ref ~ brd4518

Contract Title ~ Millfields Farm Rusper

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2611075	VS03 J1 0.10	SOIL	NAD	none	Darryl Fletcher
2611076	VS04 J2 0.30	SOIL	NAD	none	Darryl Fletcher
2611077	VS05 J2 0.30	SOIL	Amosite	Bundles of Amosite fibres	Darryl Fletcher
2611078	VS06 J1 0.40	SOIL	NAD	none	Darryl Fletcher
2611079	VS07 J1 0.10	SOIL	Chrysotile	Bundles of Chrysotile fibres	Darryl Fletcher
2611080	VS07 J2 0.40	SOIL	NAD	none	Darryl Fletcher
2611081	VS08 J1 0.10	SOIL	Chrysotile	Bundles of Chrysotile fibres	Darryl Fletcher
2611082	VS08 J2 0.40	SOIL	NAD	none	Darryl Fletcher
2611083	VS09 J1 0.10	SOIL	NAD	none	Darryl Fletcher
2611084	VS09 J2 0.60	SOIL	NAD	none	Darryl Fletcher
2611085	VS10 J1 0.05	SOIL	NAD	none	Darryl Fletcher
2611086	VS11 J2 0.70	SOIL	NAD	none	Darryl Fletcher
2611087	VS12 J1 0.30	SOIL	NAD	none	Darryl Fletcher

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Summary of Asbestos Quantification Analysis Soil Samples

Our Ref 25-28540

Client Ref ~ brd4518

Contract Title ~ Millfields Farm Rusper

Lab No	2611075	2611076	2611077
Sample ID ~	VS03	VS04	VS05
Depth ~	0.10	0.30	0.30
Other ID ~	J1	J2	J2
Sample Type ~			
Sampling Date ~	02/12/2025	02/12/2025	02/12/2025
Sampling Time ~			

Test	Method	LOQ	Units			
Total Mass% Asbestos (a+b+c)	DETSC 1102	< 0.001	Mass %	< 0.001	< 0.001	0.002
Gravimetric Quantification (a)	DETSC 1102	< 0.001	Mass %	na	na	na
Detailed Gravimetric Quantification (b)	DETSC 1102	< 0.001	Mass %	na	na	0.002
Quantification by PCOM (c)	DETSC 1102	< 0.001	Mass %	na	na	na
Potentially Respirable Fibres (d)	DETSC 1102	< 0.001	Fibres/g	na	na	na
Breakdown of Gravimetric Analysis (a)						
Mass of Sample			g	28.20	4.55	711.64
ACMs present*			type			
Mass of ACM in sample			g			
% ACM by mass			%			
% asbestos in ACM			%			
% asbestos in sample			%			
Breakdown of Detailed Gravimetric Analysis (b)						
% Amphibole bundles in sample			Mass %	na	na	0.002
% Chrysotile bundles in sample			Mass %	na	na	na
Breakdown of PCOM Analysis (c)						
% Amphibole fibres in sample			Mass %	na	na	na
% Chrysotile fibres in sample			Mass %	na	na	na
Breakdown of Potentially Respirable Fibre Analysis (d)						
Amphibole fibres			Fibres/g	na	na	na
Chrysotile fibres			Fibres/g	na	na	na

* Denotes test or material description outside of UKAS accreditation.
 % asbestos in Asbestos Containing Materials (ACMs) is determined by
 by reference to HSG 264.
 Recommended sample size for quantification is approximately 1kg
 # denotes deviating sample
 The results are based on dry weight.

Summary of Asbestos Quantification Analysis Soil Samples

Our Ref 25-28540

Client Ref ~ brd4518

Contract Title ~ Millfields Farm Rusper

Lab No	2611078	2611079	2611080
Sample ID ~	VS06	VS07	VS07
Depth ~	0.40	0.10	0.40
Other ID ~	J1	J1	J2
Sample Type ~			
Sampling Date ~	02/12/2025	02/12/2025	02/12/2025
Sampling Time ~			

Test	Method	LOQ	Units			
Total Mass% Asbestos (a+b+c)	DETSC 1102	< 0.001	Mass %	< 0.001	0.001	< 0.001
Gravimetric Quantification (a)	DETSC 1102	< 0.001	Mass %	na	na	na
Detailed Gravimetric Quantification (b)	DETSC 1102	< 0.001	Mass %	na	0.001	na
Quantification by PCOM (c)	DETSC 1102	< 0.001	Mass %	na	na	na
Potentially Respirable Fibres (d)	DETSC 1102	< 0.001	Fibres/g	na	na	na
Breakdown of Gravimetric Analysis (a)						
Mass of Sample			g	24.65	1036.63	15.10
ACMs present*			type			
Mass of ACM in sample			g			
% ACM by mass			%			
% asbestos in ACM			%			
% asbestos in sample			%			
Breakdown of Detailed Gravimetric Analysis (b)						
% Amphibole bundles in sample			Mass %	na	na	na
% Chrysotile bundles in sample			Mass %	na	0.001	na
Breakdown of PCOM Analysis (c)						
% Amphibole fibres in sample			Mass %	na	na	na
% Chrysotile fibres in sample			Mass %	na	na	na
Breakdown of Potentially Respirable Fibre Analysis (d)						
Amphibole fibres			Fibres/g	na	na	na
Chrysotile fibres			Fibres/g	na	na	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by
by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
denotes deviating sample
The results are based on dry weight.

Summary of Asbestos Quantification Analysis Soil Samples

Our Ref 25-28540

Client Ref ~ brd4518

Contract Title ~ Millfields Farm Rusper

Lab No	2611081	2611082	2611083
Sample ID ~	VS08	VS08	VS09
Depth ~	0.10	0.40	0.10
Other ID ~	J1	J2	J1
Sample Type ~			
Sampling Date ~	02/12/2025	02/12/2025	02/12/2025
Sampling Time ~			

Test	Method	LOQ	Units			
Total Mass% Asbestos (a+b+c)	DETSC 1102	< 0.001	Mass %	0.002	< 0.001	< 0.001
Gravimetric Quantification (a)	DETSC 1102	< 0.001	Mass %	na	na	na
Detailed Gravimetric Quantification (b)	DETSC 1102	< 0.001	Mass %	0.002	na	na
Quantification by PCOM (c)	DETSC 1102	< 0.001	Mass %	na	na	na
Potentially Respirable Fibres (d)	DETSC 1102	< 0.001	Fibres/g	na	na	na
Breakdown of Gravimetric Analysis (a)						
Mass of Sample			g	884.38	23.56	32.91
ACMs present*			type			
Mass of ACM in sample			g			
% ACM by mass			%			
% asbestos in ACM			%			
% asbestos in sample			%			
Breakdown of Detailed Gravimetric Analysis (b)						
% Amphibole bundles in sample			Mass %	na	na	na
% Chrysotile bundles in sample			Mass %	0.002	na	na
Breakdown of PCOM Analysis (c)						
% Amphibole fibres in sample			Mass %	na	na	na
% Chrysotile fibres in sample			Mass %	na	na	na
Breakdown of Potentially Respirable Fibre Analysis (d)						
Amphibole fibres			Fibres/g	na	na	na
Chrysotile fibres			Fibres/g	na	na	na

* Denotes test or material description outside of UKAS accreditation.
 % asbestos in Asbestos Containing Materials (ACMs) is determined by
 by reference to HSG 264.
 Recommended sample size for quantification is approximately 1kg
 # denotes deviating sample
 The results are based on dry weight.

Summary of Asbestos Quantification Analysis Soil Samples

Our Ref 25-28540

Client Ref ~ brd4518

Contract Title ~ Millfields Farm Rusper

Lab No	2611084	2611085	2611086
Sample ID ~	VS09	VS10	VS11
Depth ~	0.60	0.05	0.70
Other ID ~	J2	J1	J2
Sample Type ~			
Sampling Date ~	02/12/2025	02/12/2025	02/12/2025
Sampling Time ~			

Test	Method	LOQ	Units			
Total Mass% Asbestos (a+b+c)	DETSC 1102	< 0.001	Mass %	< 0.001	< 0.001	< 0.001
Gravimetric Quantification (a)	DETSC 1102	< 0.001	Mass %	na	na	na
Detailed Gravimetric Quantification (b)	DETSC 1102	< 0.001	Mass %	na	na	na
Quantification by PCOM (c)	DETSC 1102	< 0.001	Mass %	na	na	na
Potentially Respirable Fibres (d)	DETSC 1102	< 0.001	Fibres/g	na	na	na
Breakdown of Gravimetric Analysis (a)						
Mass of Sample			g	16.57	15.75	26.39
ACMs present*			type			
Mass of ACM in sample			g			
% ACM by mass			%			
% asbestos in ACM			%			
% asbestos in sample			%			
Breakdown of Detailed Gravimetric Analysis (b)						
% Amphibole bundles in sample			Mass %	na	na	na
% Chrysotile bundles in sample			Mass %	na	na	na
Breakdown of PCOM Analysis (c)						
% Amphibole fibres in sample			Mass %	na	na	na
% Chrysotile fibres in sample			Mass %	na	na	na
Breakdown of Potentially Respirable Fibre Analysis (d)						
Amphibole fibres			Fibres/g	na	na	na
Chrysotile fibres			Fibres/g	na	na	na

* Denotes test or material description outside of UKAS accreditation.
 % asbestos in Asbestos Containing Materials (ACMs) is determined by
 by reference to HSG 264.
 Recommended sample size for quantification is approximately 1kg
 # denotes deviating sample
 The results are based on dry weight.

Summary of Asbestos Quantification Analysis

Soil Samples

Our Ref 25-28540

Client Ref ~ brd4518

Contract Title ~ Millfields Farm Rusper

Lab No	2611087
Sample ID ~	VS12
Depth ~	0.30
Other ID ~	J1
Sample Type ~	
Sampling Date ~	02/12/2025
Sampling Time ~	

Test	Method	LOQ	Units	
Total Mass% Asbestos (a+b+c)	DETSC 1102	< 0.001	Mass %	< 0.001
Gravimetric Quantification (a)	DETSC 1102	< 0.001	Mass %	na
Detailed Gravimetric Quantification (b)	DETSC 1102	< 0.001	Mass %	na
Quantification by PCOM (c)	DETSC 1102	< 0.001	Mass %	na
Potentially Respirable Fibres (d)	DETSC 1102	< 0.001	Fibres/g	na
Breakdown of Gravimetric Analysis (a)				
Mass of Sample			g	18.07
ACMs present*			type	
Mass of ACM in sample			g	
% ACM by mass			%	
% asbestos in ACM			%	
% asbestos in sample			%	
Breakdown of Detailed Gravimetric Analysis (b)				
% Amphibole bundles in sample			Mass %	na
% Chrysotile bundles in sample			Mass %	na
Breakdown of PCOM Analysis (c)				
% Amphibole fibres in sample			Mass %	na
% Chrysotile fibres in sample			Mass %	na
Breakdown of Potentially Respirable Fibre Analysis (d)				
Amphibole fibres			Fibres/g	na
Chrysotile fibres			Fibres/g	na

* Denotes test or material description outside of UKAS accreditation.
 % asbestos in Asbestos Containing Materials (ACMs) is determined by
 by reference to HSG 264.
 Recommended sample size for quantification is approximately 1kg
 # denotes deviating sample
 The results are based on dry weight.

Information in Support of the Analytical Results

Our Ref 25-28540
 Client Ref ~ brd4518
 Contract ~ Millfields Farm Rusper

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2611075	VS03 0.10 SOIL	02/12/25	GJ 250ml, PT 1L		
2611076	VS04 0.30 SOIL	02/12/25	GJ 250ml, PT 1L		
2611077	VS05 0.30 SOIL	02/12/25	GJ 250ml, PT 1L		
2611078	VS06 0.40 SOIL	02/12/25	GJ 250ml, PT 1L		
2611079	VS07 0.10 SOIL	02/12/25	GJ 250ml, PT 1L		
2611080	VS07 0.40 SOIL	02/12/25	GJ 250ml, PT 1L		
2611081	VS08 0.10 SOIL	02/12/25	GJ 250ml, PT 1L		
2611082	VS08 0.40 SOIL	02/12/25	GJ 250ml, PT 1L		
2611083	VS09 0.10 SOIL	02/12/25	GJ 250ml, PT 1L		
2611084	VS09 0.60 SOIL	02/12/25	GJ 250ml, PT 1L		
2611085	VS10 0.05 SOIL	02/12/25	GJ 250ml, PT 1L		
2611086	VS11 0.70 SOIL	02/12/25	GJ 250ml, PT 1L		
2611087	VS12 0.30 SOIL	02/12/25	GJ 250ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 2311	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	As Received	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3321	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3521	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3521	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3521	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
--------	-----------	-------	--------------------	--------------------	----------------	------	--------

Key:

~ Sample details are provided by the client and can affect the validity of the results

* -not accredited.

-MCERTS (accreditation only applies if report carries the MCERTS logo).

\$ -subcontracted.

n/s -not supplied.

I/S -insufficient sample.

U/S -unsuitable sample.

t/f -to follow.

nd -not detected.

End of Report