

The decision to use the CLAIRE DoWCoP is the responsibility of the holder of the materials. The project manager should collate all relevant documents; permissions, site reports, MMP etc and consult with an independent QP to confirm that the site meets the requirements and tests for use of the DOWCOP prior to any excavations. If the site meets the tests that materials are suitable for re-use, certain to be re-used, are not excessive in volume and pose no risk to the environment or harm to human health then the QP can make a formal Declaration via CLAIRE.

For clarification however, it is important to note that DoWCoP declarations cannot be made retrospectively. In addition to this if you wish to re-use material under the 'site of origin scenario' and this material has **previously been imported to that site as waste without authorisation** for example a historical illegal deposit then it does not originate at that site. It is not site derived material and **you cannot** use DoWCoP site of origin scenario for this activity, you will require an appropriate waste authorisation such as an environmental permit.

Our Area Enforcement Team routinely monitor sites that are being developed under the DoWCoP as well as Illegal Waste Sites and will undertake enforcement proceedings where appropriate.

Kind regards,

EPR Sussex Waste Team

We are committed to becoming [net zero for carbon emissions](#) by 2030

From: Karen Boothby <Karen.Boothby@soiltechnics.net>

Sent: 24 April 2023 13:57

To: Enquiries, Unit <enquiries@environment-agency.gov.uk>

Subject: ref: 230504/KT01 - Materials Management Plan - Site off Barrington Road, Worthing, BN12 4XL

Hello,

Please would you be able to forward this on to the relevant waste officer/department that covers the Worthing area.

We have been asked to complete a Materials Management Plan (MMP) for a development site at the former HMRC Offices, Barrington Road, Durrington, Worthing, BN12 4XL.

The site is being redeveloped for residential housing and as part of this it is proposed to raise levels at the site. There will be limited cut material and foundations will be piled therefore a deficit of soils is anticipated. In addition to the reuse of Made Ground and natural site won soils, it is proposed to import natural soils to the site from other development sites using the Direct Transfer pathway. At this stage, the proposed donor sites have not been determined.

As part of the procedure outlined in the code of practice, the MMP requires us to provide the contact details of the relevant contact at the EA and documentation to confirm there are no objections. A full ground investigation and remediation strategy have been prepared for the site and further details can be provided on request.

I look forward to hearing back from someone,

Kind regards

Karen Boothby B.Sc. (Hons). (Open)., M.Sc. Earth Sci. (Open) MEnvSc. | **Associate Director**
m 07775 620 892 | t 01604 781 877 | w www.soiltechnics.net

Office hours: Please note that my office hours are currently 9.00-14.30

Northampton Cedar Barn, White Lodge, Walgrave, Northamptonshire NN6 9PY t 01604 781 877

Manchester Unit 9, Clarence Avenue, Westpoint Enterprise Park, Trafford Park, Manchester M17 1QS t 0161 947 0270

The information in this e-mail is confidential and may be legally privileged or prohibited from disclosure and unauthorised use. It is intended solely for the addressee, or the employee or agent responsible for delivering such materials to the addressee, and access to this e-mail by anyone else is unauthorised. If you are not the intended recipient, any form of reproduction, dissemination, copying, disclosure, modification, distribution and/or publication or any action taken or omitted to be taken in reliance upon this message or its attachments is prohibited and may be unlawful. At present the integrity of e-mail across the Internet cannot be guaranteed and messages sent via this medium are potentially at risk. We will therefore not accept liability for any claims arising as a result of the use of this medium.

Soiltechnics disclaims any responsibility to our Client and others in respect of any matters outside the scope of our commission. Our advices will be prepared with reasonable skill, care and diligence in accordance with the terms of our contract, taking account of the manpower, resources, investigations and testing devoted to it by agreement with our Client. Our advices shall be confidential to our Client and the company accepts no responsibility of whatsoever nature to third parties to whom our advices or any part thereof is made known. Any such party relies upon our advices at their own risk.



Please consider the environment before printing this email.

Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else. We have checked this email and its attachments for viruses. But you should still check any attachment before opening it. We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes.

Definition of Waste: Development Industry Code of Practice (V2)

Purpose of this note

CL:AIRE (Contaminated Land: Applications in Real Environments) published the Definition of Waste: Development Industry Code of Practice (the Code of Practice) in 2008. At the same time we published this position statement setting out how we would take account of the code when we take our waste regulatory decisions in England and Wales. This updated version is being published at the same time as version 2 of the Code of Practice.

Issue

Excavated material generated by the development of land may be waste and subject to waste regulatory controls which ensure that waste does not harm human health or the environment.

Whether or not a substance or material is waste is ultimately a question for the courts. It depends on whether the holder of a substance or material is discarding it or intends to or is required to discard it. This must be considered in the light of all the specific circumstances of each case.

The Code of Practice sets out good practice for the development industry to use when:

- assessing if materials are classified as waste or not
- determining when treated waste can cease to be waste for a particular use.

It also describes an auditable system to demonstrate that the code has been adhered to on a site by site basis. It applies to both uncontaminated and contaminated¹ material from man made and natural sources excavated:

- for use on the site from which it has been excavated, either without treatment or after on-site treatment², in the development of that land
- for use in the development of land other than the site from which the material has been excavated, following treatment at an authorised treatment Hub within a defined Cluster³ agreed with us, and used in the development of land at a site within the Cluster.

¹ The need to distinguish between “contaminated” and “uncontaminated” soils is no longer considered necessary. We accept that these are self defining terms on a site specific basis having regard to the risk assessment (e.g. some soil may not be considered contaminated for a given land use, but would be for a more sensitive land use, on the same site)

² The fact that the material has to be treated indicates that it is a waste i.e. it is not suitable for use until it is treated.

³ In a Cluster project specified sites share a temporary treatment facility known as a hub. The question of whether or not any material is waste has to be made on a case by case basis and therefore each Cluster project will need to be considered individually and agreed with us. Treated soils are returned to the cluster sites.

The updated Code of Practice also applies to the re-use of “clean naturally occurring soil and mineral materials” in the development of land other than the site from which the materials have been excavated.

This position does not apply to the following activities which will remain subject to waste regulatory control:

- contaminated materials that go off site for direct use at another site as we consider such materials to be waste
- wastes that go to and from Fixed Soil Treatment Facilities unless it operates and material originates and is used within a defined Cluster
- the control of landspreading⁴ activities
- the management of extractive wastes within the scope of Mining Waste Directive.

Our position

We want to encourage the appropriate remediation of brownfield land and the use of Cluster projects, and reduce the amount of material that is sent for disposal. We believe that a Better Regulation approach enables us to target our resources at sites and activities that pose the highest risk to the environment including poor performers and illegal operators.

We will therefore take account of the Code of Practice in deciding whether to regulate excavated materials to be used in development projects as waste. If materials are dealt with in accordance with the Code of Practice we consider that those materials are unlikely to be waste at the point when they are to be used for the purpose of land development. This may be because the materials were never discarded in the first place, or because they have been submitted to a recovery operation and have been completely recovered so that they have ceased to be waste.

When the declaration is provided to us by the Qualified Person demonstrating that the materials are to be dealt with in accordance with the Code of Practice we will take the view that the materials on the site where they are to be used will not be waste. To ensure that human health and the environment continue to be protected we will be undertaking a random audit of a number of the decisions made by the Qualified Persons working with the Code of Practice.

The success of this approach requires a high level of professional integrity by those involved. If we subsequently find the Code of Practice is being used improperly so that human health or the environment is being put at risk we will withdraw this position. If that happens we will revert to requiring our input into case by case decision making.

Further advice

Appendix 1 brings all of the aspects of waste management and land contamination together to provide some context and clarity for customers.

⁴ The spreading of waste soil, dredgings or other materials on existing agricultural land for agricultural or ecological benefit is regarded as a distinct land treatment operation subject to separate legislative control i.e. permit or exemption

CL:AIRE (Contaminated Land: Applications in Real Environments). CLAIRE is an independent not-for-profit organisation established in 1999 to stimulate the regeneration of contaminated land in the UK by raising awareness of, and confidence in, practical and sustainable remediation technologies. Further advice on the application of the Code of Practice can be found on: <http://www.claire.co.uk/>

Position Statement: PS 006
Version 2
Issued March 2011

customer service line

08708 506 506

www.environment-agency.gov.uk

incident hotline

0800 80 70 60

floodline

0845 988 1188

Appendix 1 - Development of Land and Waste Regulation – The big picture

Key issues

We want the land development industry to use sustainable waste management practices paying a high regard to protecting the environment and health and that this is seen as an issue to strive for continual improvement.

Our role

We are the authority responsible for enforcing waste management legislation in England and Wales. It is the responsibility of the holder of material that has been excavated to decide whether or not they are handling waste and conform to the requirements of waste legislation. Where there is a disagreement as to whether or not excavated material is waste it is ultimately a matter for the courts to decide.

Sustainable Waste Management in Land Development

Material may need to be managed because:-

1. The Local Planning Authority might suspect that the site being developed has been subject to previous contaminative uses and may require investigation and remediation (see [Planning Policy Statement 23](#))
2. Voluntary remediation may be proposed at a site as part of the management of liabilities or as a result of a pollution incident
3. Remediation is required under Part IIA EPA1990 or WRA1991.

Management of material at the site should be undertaken in accordance with the sustainable waste management principles of (in order of preference) waste reduction, re-use, recovery and finally, disposal. Construction projects in **England** worth more than £300,000 must have a [site waste management plan](#) (SWMP) which outlines ways that waste can be reduced and site-gained materials can be reused or recycled as part of the project. This does not apply to Wales, though SWMPs are being promoted as an example of best practice in the construction industry.

Reduce waste generated

Reduce the generation of waste materials, perhaps by reviewing the layout of the development, ensuring that land use is related to the contamination identified or encountered and appropriate levels of site investigation to characterise and delineate contamination on site have been undertaken.

Re-use excavated material

In certain circumstances, excavated material re-used in the development of land may not be waste, and hence not subject to waste regulatory control, provided that the aims and objectives of the Waste Framework Directive are not undermined and that its use will not harm human health or the environment.

We consider this may be the case for excavated material used on the site where it was produced or at other sites when;

- it is used in appropriate amounts
- it is suitable for that use directly without treatment
- its use will not cause harm to human health or the environment.

The [Model Procedures for the Management of Land Contamination](#) provides the framework for deciding whether use of material is suitable for its intended use without harm to human health or the environment on the site being redeveloped.

The [Verification Report](#), produced on completion of the development, will show that the material has been properly and suitably used and causes no harm to human health or the environment. If this can not be shown, we may conclude that the material is being discarded as waste and will take appropriate action.

The voluntary Code of Practice (CoP) ([Definition of Waste: Development Industry Code of Practice](#)) produced by industry provides a framework for determining whether or not excavated material used in land development is waste. It prescribes the circumstances under which re-use can be considered and the circumstances under which waste can be considered to have been recovered. It also describes an auditable system to demonstrate that the Code of Practice has been adhered to on a site by site basis.

This (Definition of Waste) position statement explains how we will take account of the Code of Practice when considering the need for an environmental permit to control the redeposit of excavated materials. When considering development activities we will apply modern risk based regulatory practices, focusing our effort on bad practice and on those activities that present the greatest threat to environment or health. We will be open, responsive, seek feedback and review our positions to ensure we react to technological advancement and change in the sector.

Recover material

Where the materials cannot be used directly without treatment then recovery options should be considered. We encourage the use of on-site treatment technologies and have issued a series of [remediation position statements](#) covering each of the main technologies, explaining how we apply the regulations.

In certain circumstances, segregation and sorting at the source may be sufficient treatment to produce a suitable material. Treatment of excavated material will normally require a [Mobile Treatment Permit](#) (MTL). The MTL will control the operations and emissions from the recovery activity. Operating under a MTL does not infer that the remediation processes used will be suitable for meeting any remediation objectives specified. These issues should be considered by the developer/consultant and by the relevant regulatory body and set out in the site Remediation Strategy which sets out the remediation options to reduce or control the risks from pollution linkages associated with the site as a whole. Further guidance on this topic can be found in the [Model Procedures for the Management of Contaminated Land](#).

Material may cease to be waste after treatment if the requirements of the CoP are followed. This only applies to material excavated and treated on the site where it is to be used and to CLUSTER projects. The redeposit of material that remains a waste requires a permit, or an exemption or may be done under an enforcement position (see our [remediation position statements](#) for further detail).

Aggregates from recovered inert waste produced in accordance with the [WRAP - Quality Protocol for the production of aggregates from inert waste](#), are not likely to be waste. A recent [WRAP report](#) on developing a Quality protocol for contaminated soils concluded that it would be difficult to produce a generic standard to ensure that all potential receptors and any receiving site are adequately protected and that we should support the development of an alternative Code of Practice. The CL:AIRE CoP is the outcome of this work.

Dispose of material

This is the final option where excavated material has to be disposed of at an appropriately permitted facility. Before any decision can be made on the disposal option one has to adequately describe and classify the waste material. In particular one has to establish whether the waste material is a Hazardous Waste (see "[Framework for the Classification of Contaminated Soils as Hazardous Waste](#)"). In the case of inert or hazardous waste destined for landfill, only those materials within the numerical limits of the prescribed [Waste Acceptance Criteria](#) can be accepted.

Most waste materials must be treated before being landfilled. In certain circumstances, segregation at source may be considered as adequate pre-treatment and excavated material may not have to be treated any further prior to landfill. We have produced a factsheet ([factsheet on contaminated soils](#)) which explains more about these requirements.

Any movement of waste material from site to site will be subjected to control under [Duty of Care](#) and the developer may need to register as a hazardous waste producer if the material is hazardous waste.

References

- The Environmental Protection Act 1990
- The Environment Act 1995
- Environmental Permitting (England and Wales) Regulations 2010
- Definition of Waste Position Statement
- The Contaminated Land (England) Regulations 2006 (as amended), The Contaminated Land (Wales) Regulations 2006, DETR Circular 01/2006 & The National Assembly for Wales Guidance on the Remediation of Contaminated Land. Environment Agency Policies and Process Documentation on Part 2A
- Town & Country Planning Act 1990 & Planning & Policy Statement 23
- Water Resources Act (1991), The Anti-Pollution (Works Notices) Regulations 1999 (as amended)
- Environment Agency Groundwater Protection Policy and Practice
- Environment Agency Enforcement & Prosecution Policy
- Environment Agency: Guidance on the Enforcement and Prosecution Policy
- DTI Site Waste Management Plans – Guidance for Construction Contractors and Clients
- CL:AIRE Definition of Waste: Development Industry Code of Practice
- Environment Agency: Contaminated Land Report 11 – Model Procedures for the Management of Land Contamination
- WRAP The Quality Protocol – The production of aggregates from inert waste
- Environment Agency: Hazardous Waste. Interpretation of the definition and classification of Hazardous Waste - Technical Guidance WM2

Appendix D Report Extracts

**Northern Arc, Burgess Hill,
Land Parcel 1.5**

For

John Sisk and Son

Project Number:

13258

October 2020

Campbell Reith Hill LLP
Raven House
29 Linkfield Lane
Redhill
Surrey RH1 1SS

T: +44 (0)1737 784500
E: surrey@campbellreith.com
W: www.campbellreith.com

Document History and Status

Revision	Date	Purpose/Status	Author	Check	Review
F1	September 2020	Final	T. Tavendale / D. Maclean	J. Chastney	J. Chastney
F2	October 2020	Final / Minor update	T. Tavendale	J. Chastney	J. Chastney

This document has been prepared in accordance with the scope of Campbell Reith Hill LLP's (CampbellReith) appointment with its client and is subject to the terms of the appointment. It is addressed to and for the sole use and reliance of CampbellReith's client. CampbellReith accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of Campbell Reith Hill LLP. Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole. The contents of this document are not to be construed as providing legal, business or tax advice or opinion.

© Campbell Reith Hill LLP 2020

Document Details

Last saved	09/10/2020
Report Version	F2
File Name	13258-CRH-XX-XX-RP-GE-0021
Author	T. Tavendale / D. Maclean
Project Partner	S. Boots
Project Number	13258
Project Name	Northern Arc, Burgess Hill, Land Parcel P1.5

Contents

1.0	EXECUTIVE SUMMARY	1
2.0	INTRODUCTION	3
2.2.	Previous Investigations	3
3.0	SITE DESCRIPTION	5
3.1.	Site Location	5
3.2.	Site Topography	5
3.3.	Site Layout	5
3.4.	Invasive Plant Species	5
3.5.	Surrounding Land Use	5
3.6.	Redevelopment Proposal	6
4.0	DESK STUDY RESEARCH AND ENVIRONMENTAL SETTING	7
4.1.	Geology	7
4.2.	Natural Ground Stability Hazards	8
4.3.	Man-Made Ground Stability Hazards	8
4.4.	Hydrogeology and Hydrology	8
4.5.	Radon	9
4.6.	Sensitive Land Uses	9
5.0	SITE HISTORY AND INDUSTRIAL SETTING	10
5.1.	Site History	10
5.2.	Tunnels and Infrastructure	10
5.3.	Current Industrial Setting	10
6.0	PRELIMINARY CONCEPTUAL SITE MODEL & QUALITATIVE RISK ASSESSMENT	11
6.1.	Introduction	11
6.2.	Classification of Risk	11
6.3.	Potential Sources of Contamination	11
6.4.	Receptors and Exposure Pathways	12
7.0	SITE INVESTIGATION	14
7.1.	Scope of Works	14
7.2.	Restrictions on Exploratory Hole Positions	14
7.3.	Installations and Monitoring	14
7.4.	Geotechnical Testing	14
7.5.	Contamination Observations and Testing	15
8.0	GENERIC QUANTITATIVE RISK ASSESSMENT	16
8.1.	Assessment Framework	16
8.2.	Soil	17
8.3.	Asbestos	18
8.4.	Pesticides and Herbicides	19
8.5.	Ground Water	19
8.6.	Surface Water	21
8.7.	Ground Gas	22
9.0	GEOTECHNICAL EVALUATION	24
9.1.	Ground Conditions	24
9.2.	Topsoil / Made Ground	24
9.3.	Weald Clay (Weathered)	25
9.4.	Weald Clay Formation (Bedrock)	27
9.5.	Groundwater Conditions	28
9.6.	Buried Concrete	29
9.7.	Additional Comments	30

10.0	UPDATED GEOTECHNICAL HAZARDS	31
10.1.	Geotechnical Hazards	31
11.0	REVISED CONCEPTUAL MODEL	34
12.0	GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS	37
12.1.	Introduction	37
12.2.	Earthworks	37
12.3.	Shallow Foundations	39
12.4.	Piled Foundations	40
12.5.	Floor Slabs	40
12.6.	Drainage	40
12.7.	Road Pavements	41
12.8.	Ground Improvement	42
12.9.	Buried Concrete	42
12.10.	Desiccation	43
12.11.	Animal Setts / Burrows	43
12.12.	General Construction Advice	43
12.13.	Recommendations for Further Work	43
13.0	ENVIRONMENTAL CONCLUSIONS AND RECOMMENDATIONS	45
13.1.	Summary of Risk	45
13.2.	Exploratory Hole Location Limitations	45
13.3.	Summary of Recommendations	45
13.4.	Waste Management	46
	TECHNICAL REFERENCES	48
	ENVIRONMENTAL RISK ASSESSMENT SUPPORTING INFORMATION	49
	LIMITATIONS	55

APPENDIX A: FIGURES

APPENDIX B: FACTUAL GROUND INVESTIGATION REPORT

APPENDIX C: SITE IMAGES

1.0 EXECUTIVE SUMMARY

SITE LOCATION	The site is located in a rural setting on the northern outskirts of the town of Burgess Hill, West Sussex (NGR: 531151E, 121054N).
SITE TOPOGRAPHY	The site lies at approximately 35m AOD in the north, sloping south / east to approximately 23-25m AOD towards the River Adur East. A slight depression is located in the south of the site, bearing roughly northwest-southeast from approximately 28m AOD to 23m AOD towards the River Adur East.
DEVELOPMENT PROPOSAL	The site is proposed to be developed with residential dwellings. The configuration and layout of the proposed development was not known at the time of writing this report however the dwellings have been assumed to include private gardens.
ENVIRONMENTAL SETTING	The ground conditions encountered during the investigation comprised a sequence of Topsoil / local Made Ground into weathered Weald Clay deposits comprised of CLAY, locally potentially SILT, often transitioning into interlaminated, locally interbedded, CLAY and MUDSTONE, and / or into MUDSTONE bedrock of the Weald Clay Formation. Site Sensitivities, Hydrogeology: Very Low, Hydrology: Medium, End User: Medium/High.
CURRENT USE AND HISTORY	The site was shown as fields, as in present day, with trees mapped on field boundaries and a suspected path on earliest mapping (1874). The trees and path were no longer mapped by 1897. A small rectangular structure was mapped on site in 1911 and was no longer mapped by 1976. A line of pylons was developed on site by 2001.
GEOTECHNICAL HAZARDS	The following geotechnical hazards have been identified in relation to the site: • Shrinking and swelling of clay soils including desiccation • Occasional areas of hard excavation / shallow bedrock and rock bands • The presence of relict shear surfaces • Shallow groundwater • Presence of some natural soils susceptible to frost heave • Low permeability materials • Animal burrows • Services and overhead cables
CONTAMINATION ISSUES & RECOMMENDATIONS	Contamination levels on site have been found to be low. No specific remediation is considered to be required based on the assessment and investigation presented in this report (noting limitations). Unforeseen contamination encountered during the groundworks should be segregated assessed in accordance with Contaminated Land Risk Management guidance and associated identified risks mitigated. Should significant earthworks be proposed a Materials Management Plan or appropriate waste exception may be required.
GEOTECHNICAL RECOMMENDATIONS	<u>Earthworks</u> Fill material should be suitably assessed, tested and laid to a suitable specification e.g. SHW Series 600 and any soft / loose / putrescible / significantly desiccated soils, large cobbles etc. should be removed from formation levels prior to the placement of fill unless treated. Removed material should be replaced with suitable fill and compacted to a suitable specification. Thought should be given to appropriate excavation equipment, taking into account the presence of rock bands and any proposed cut works anticipated to be in bedrock. Slope stability analyses should be undertaken on proposed significant slopes / embankments / cuttings and should take into account the potential presence of pre-existing relict shear surfaces. <u>Foundations</u>

	The type, size and depth of foundation utilised on site will depend on the structural loads imparted by the proposed developments and ground conditions encountered locally. Shallow foundations may be considered on site embedded into firm or better CLAY of the weathered Weald Clay or intact bedrock of the Weald Clay Formation and preliminary allowable bearing pressures of 100kPa for firm CLAY and 250kPa for intact weak MUDSTONE bedrock are considered suitable for costing purposes / preliminary design. Should the use of shallow foundations be precluded e.g. due to structural loads, deepening requirements e.g. due to filling works, then piled foundation solutions may be required. Foundations should be designed in accordance with NHBC Chapter 4.2, taking into account the presence of clay material with a volume change potential. The potential presence of shallow groundwater, desiccated soils and, materials with pre-existing shear surfaces should be considered in foundation design. <u>Floor Slabs</u> Suspended floor slabs will be required due to the presence of materials of the Weald Clay with a low to high volume change potential. <u>Groundwater Control / Drainage</u> Although natural soils are of a low permeability, designs should consider the presence of a high water table on site. Drainage should be designed to account for the effects of heave. The use of soakaway drainage is considered unsuitable on site. <u>Road Pavements</u> A preliminary long term design CBR of 2.5% and a preliminary long term design subgrade surface modulus of 31.6MPa is considered suitable for CLAY soils of the weathered Weald Clay across the site. Where road pavement is constructed on fill it is recommended that such fill is placed and compacted in accordance with a suitable specification and testing undertaken to confirm that suitable CBR values have been achieved. Formations should be suitably inspected e.g. for soft spots prior to construction and such unsuitable materials should be suitably remediated. All pavement surfaces should be constructed in flexible materials such as bituminous compounds or block paving which are more easily able to accommodate ground movement and can be more easily repaired. <u>Buried Concrete</u> A concrete classification of DS-1, AC-2z is considered to be appropriate for the site.
GEOTECHNICAL ACTIONS	Once development proposals, including final levels and structural loads, are confirmed further ground investigations may be required to inform detailed designs and a Geotechnical Design Report (GDR) prepared or the findings within this report confirmed by a competent geotechnical engineer.
<i>NOTE: This Executive Summary is part of CampbellReith report 13254-CRH-XX-XX-RP-GE-0021 and should not be used as a stand-alone document.</i>	

**Northern Arc, Burgess Hill,
Land Parcel P1.6**

**Geotechnical and Geo-environmental
Land Quality Statement**

For

John Sisk and Son

Project Number:

13258

October 2020

Campbell Reith Hill LLP
Raven House
29 Linkfield Lane
Redhill
Surrey RH1 1SS

T: +44 (0)1737 784500
E: surrey@campbellreith.com
W: www.campbellreith.com

Northern Arc, Burgess Hill, Land Parcel P1.6

Land Quality Statement

Document History and Status

Revision	Date	Purpose/Status	Author	Check	Review
F1	October 2020	Final	T. Tavendale / D. Maclean	J. Chastney	J. Chastney

This document has been prepared in accordance with the scope of Campbell Reith Hill LLP's (CampbellReith) appointment with its client and is subject to the terms of the appointment. It is addressed to and for the sole use and reliance of CampbellReith's client. CampbellReith accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of Campbell Reith Hill LLP. Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole. The contents of this document are not to be construed as providing legal, business or tax advice or opinion.

© Campbell Reith Hill LLP 2020

Document Details

Last saved	06/10/2020 16:14
Report Version	F1
File Name	13258-CRH-XX-XX-RP-GE-0022
Author	T. Tavendale / D. Maclean
Project Partner	S.Boots
Project Number	13258
Project Name	Northern Arc, Burgess Hill, Land Parcel P1.6

Contents

1.0	EXECUTIVE SUMMARY	1
2.0	INTRODUCTION	3
2.1.	Appointment and Scope.....	3
2.2.	Previous Investigations.....	3
3.0	SITE DESCRIPTION.....	5
3.1.	Site Location.....	5
3.2.	Site Topography.....	5
3.3.	Site Layout	5
3.4.	Invasive Plant Species	5
3.5.	Surrounding Land Use	5
3.6.	Redevelopment Proposal	6
4.0	DESK STUDY RESEARCH AND ENVIRONMENTAL SETTING	7
4.1.	Geology.....	7
4.2.	Natural Ground Stability Hazards.....	8
4.3.	Man-Made Ground Stability Hazards	8
4.4.	Hydrogeology and Hydrology	8
4.5.	Radon	9
4.6.	Sensitive Land Uses.....	9
5.0	SITE HISTORY AND INDUSTRIAL SETTING	10
5.1.	Site History.....	10
5.2.	Tunnels and Infrastructure	10
5.3.	Current Industrial Setting	10
6.0	PRELIMINARY CONCEPTUAL SITE MODEL & QUALITATIVE RISK ASSESSMENT	11
6.1.	Introduction.....	11
6.2.	Classification of Risk	11
6.3.	Potential Sources of Contamination	11
6.4.	Receptors and Exposure Pathways	12
7.0	GROUND INVESTIGATION.....	14
7.1.	Scope of Works.....	14
7.2.	Installations and Monitoring	14
7.3.	Geotechnical Testing	14
7.4.	Contamination Observations and Testing	14
8.0	GENERIC QUANTITATIVE RISK ASSESSMENT.....	16
8.1.	Assessment Framework	16
8.2.	Soil	17
8.3.	Asbestos.....	18
8.4.	Pesticides and Herbicides.....	18
8.5.	Water.....	18
8.6.	Ground Gas	20
9.0	GEOTECHNICAL EVALUATION	22
9.1.	Ground Conditions.....	22
9.2.	Topsoil and Made Ground	22
9.3.	Weald Clay (Weathered).....	23
9.4.	Weald Clay Formation (Bedrock)	25
9.5.	Groundwater Conditions	25
9.6.	Buried Concrete	26
9.7.	Additional Comments.....	26
10.0	UPDATED GEOTECHNICAL HAZARDS	28

10.1. Geotechnical Hazards	28
11.0 REVISED CONCEPTUAL MODEL	30
12.0 GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS.....	32
12.1. Introduction.....	32
12.2. Earthworks	32
12.3. Shallow Foundations	33
12.4. Piled Foundations.....	34
12.5. Floor Slabs.....	35
12.6. Drainage.....	35
12.7. Road Pavements	36
12.8. Ground Improvement	36
12.9. Buried Concrete	37
12.10.Desiccation	37
12.11.Animal Setts / Burrows	38
12.12.General Construction Advice	38
12.13.Recommendations for Further Work	38
13.0 ENVIRONMENTAL CONCLUSIONS AND RECOMMENDATIONS	39
13.1. Summary of Risk.....	39
13.2. Summary of Recommendations.....	39
13.3. Waste Management	40
TECHNICAL REFERENCES	42
ENVIRONMENTAL RISK ASSESSMENT SUPPORTING INFORMATION.....	43
LIMITATIONS.....	49

APPENDIX A: FIGURES

APPENDIX B: FACTUAL GROUND INVESTIGATION REPORT

APPENDIX C: SITE IMAGES

1.0 EXECUTIVE SUMMARY

SITE LOCATION	The site is located in a rural setting on the northern outskirts of the town of Burgess Hill, West Sussex (NGR: 530982E, 121049N).
SITE TOPOGRAPHY	The site lies at approximately 31m AOD in the north, sloping gradually eastwards to approximately 26-28m AOD towards the River Adur East and southwards to approximately 28m AOD. Lidar data shows the presence of a ditch along the southern field boundary and two suspected historical gullies / ditches inside / from the eastern site boundary running downhill towards the River Adur East.
DEVELOPMENT PROPOSAL	The site is proposed to be developed with residential dwellings. The configuration and layout of the proposed development was not known at the time of writing this report however they have been assumed to at least in part include private gardens.
ENVIRONMENTAL SETTING	The ground conditions encountered during the investigation comprised a sequence of Topsoil / local Made Ground into weathered Weald Clay deposits comprised of CLAY often transitioning into variably interlaminated CLAY and MUDSTONE, and / or locally into MUDSTONE bedrock of the Weald Clay Formation. Site Sensitivities, Hydrogeology: Very Low, Hydrology: Medium-High, End User: Medium/ High.
CURRENT USE AND HISTORY	The site is currently undeveloped grass farmland. The site was shown as fields, as is today, on earliest mapping (1874), with trees. By 1937 a small pond is mapped to encroach on the western site boundary. A line of pylons is mapped across the site from 1954-55. A standalone mature tree was observed in the north of the site and the pond was considered to be offsite during a site walkover (2020).
GEOTECHNICAL HAZARDS	The following geotechnical hazards have been identified in relation to the site: • Shrinking and swelling of clay soils including desiccation • Occasional areas of hard excavation / shallow bedrock and rock bands • Shallow groundwater • Presence of natural soils susceptible to frost heave • Low Permeability materials • Services and overhead cables
CONTAMINATION ISSUES & RECOMMENDATIONS	Contamination levels on site have been found to be low. No specific remediation is considered to be required based on the assessment and investigation presented in this report (noting limitations). Unforeseen contamination encountered during the groundworks should be segregated assessed in accordance with Contaminated Land Risk Management guidance and associated identified risks mitigated. Should significant earthworks be proposed a Materials Management Plan or appropriate waste exception may be required.
GEOTECHNICAL RECOMMENDATIONS	<u>Earthworks</u> Fill material should be suitably assessed, tested and laid to a suitable specification e.g. SHW Series 600 and any soft / loose / putrescible / significantly desiccated soils, large cobbles etc. should be removed from formation levels prior to the placement of fill unless treated. Removed material should be replaced with suitable fill and compacted to a suitable specification. Thought should be given to appropriate excavation equipment, taking into account the presence of rock bands and any proposed cut works anticipated to be in bedrock. Slope stability analyses should be undertaken on proposed slopes / embankments / cuttings and should take into account the potential presence of pre-existing relict shear surfaces. <u>Foundations</u>

	The type, size and depth of foundation utilised on site will depend on the structural loads imparted by the proposed developments and ground conditions encountered locally. Shallow foundations may be considered on site embedded into firm or better CLAY of the weathered Weald Clay or intact bedrock of the Weald Clay Formation and preliminary allowable bearing pressures of 140kPa for firm CLAY and 250kPa for intact weak MUDSTONE bedrock are considered suitable for costing purposes / preliminary design. Should the use of shallow foundations be precluded e.g. due to structural loads, deepening requirements e.g. due to filling works, then piled foundation solutions may be required. Foundations should be designed in accordance with NHBC Chapter 4.2, taking into account the presence of material with a volume change potential. The potential presence of shallow groundwater, desiccated soils and materials with pre-existing shear surfaces should be considered in foundation design. <u>Floor Slabs</u> Suspended floor slabs will be required on site for residentially properties due to the presence of materials of the Weald Clay with a low to medium volume change potential unless treatment or material import is undertaken. <u>Groundwater Control / Drainage</u> Although natural soils are of a low permeability, designs should consider the presence of a high water table on site. Drainage should be designed to account for the effects of heave. The use of soakaway drainage is considered unsuitable on site. <u>Road Pavements</u> A preliminary long term design CBR of 3% and a preliminary long term design subgrade surface modulus of 35.5MPa is considered suitable for CLAY soils of the weathered Weald Clay across the site. Where road pavement is constructed on fill it is recommended that such fill is placed and compacted in accordance with a suitable specification and testing undertaken to confirm that suitable CBR values have been achieved. Formations should be suitably inspected e.g. for soft spots prior to construction and such unsuitable materials should be suitably remediated. All pavement surfaces should be constructed in flexible materials such as bituminous compounds or block paving which are more easily able to accommodate ground movement and can be more easily repaired. <u>Buried Concrete</u> A concrete classification of DS-1, AC-2z is considered to be appropriate for the weathered soils of the Weald Clay on site.
GEOTECHNICAL ACTIONS	Once development proposals, including final levels and structural loads, are confirmed further ground investigations may be required to inform detailed designs and a Geotechnical Design Report (GDR) prepared or the findings within this report confirmed by a competent geotechnical engineer.
INVESTIGATION LIMITATIONS	The south eastern on site field was not investigated due to ecological constraints. Consequently, the ground conditions in this area are effectively unknown and require investigation.
<i>NOTE: This Executive Summary is part of CampbellReith report 13254-CRH-XX-XX-RP-GE-0022 and should not be used as a stand-alone document.</i>	

13.0 ENVIRONMENTAL CONCLUSIONS AND RECOMMENDATIONS

13.1. Summary of Risk

- 13.1.1. The ground investigation commissioned by CampbellReith incorporated contamination testing of soil and monitoring of groundwater and ground gas across the site. In addition, available Desk Study information has been consulted.
- 13.1.2. The site is considered to lie in area of **Low** environmental sensitivity with respect to Hydrogeology and a **Medium/High** environmental sensitivity with respect to Hydrology. The proposed residential development is considered to be of **Medium/High** end user sensitivity. The site is considered to present a **Low** risk in relation to contamination issues due to the minimal sources and evidence of contamination identified during the investigation.

13.2. Summary of Recommendations

- 13.2.1. Desk study and subsequent site investigation and chemical analysis did not identify risks requiring remediation. However limitations of the investigation coverage should be acknowledged.
- 13.2.2. Recommendations are limited to:
- Watching brief for unforeseen contamination
 - Topsoil Reuse & Validation Reporting
 - Waste recommendations

Watching Brief and Unforeseen Contamination

- 13.2.3. A watching brief should be maintained throughout the groundworks in order to identify any previously undetected areas of contamination; such as asbestos containing materials and/or stained/odorous soils. These should be assessed by an Environmental Consultant if identified.
- 13.2.4. Should unforeseen contamination be encountered during the ground works, the area should be segregated upon discovery and an investigation strategy devised to characterise potential associated risks. Generally, this assessment should follow Contaminated Land Risk Management procedures (formerly CLR 11).
- 13.2.5. If encountered contamination should be assessed for the risks associated with groundworkers. Principle points of reference are HSE Publication HS(G) 66 and CIRIA Report 132 are considered. The Contractor must also control matters such as any contracted CDM responsibilities.
- 13.2.6. In relation to presence of asbestos in soils, the Contractor should formulate their working arrangements in view of the requirements of the Control of Asbestos Regulations (2012) and the associated ACoP (L143). Additional interpretation on the application of these regulations is presented in publications prepared by CL:AIRE and the Joint Industry Working Group (CAR-SOIL™ Control of Asbestos Regulations 2012, Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials, 2016; and the associated JIWG decision support tool, 2017). Additional guidance is provided in CIRIA C765, Asbestos in Soil and Made Ground Good Practice Site Guide, 2017.
- 13.2.7. If encountered, TPH and PAH concentrations require assessment due to the potential for the protection of public water supply pipework, such as the use of organic resistant pipework. The infrastructure designer should assess requirements for pipework with respect to soil

contamination and consult statutory utility companies and relevant guidance as necessary. Guidance on this topic is presented in UKWIR Report 'Publication UKWIR Report Ref 10/WM/03/21: Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites - Final Project Report, as amended by the Contaminated Land Assessment Guidance (Water UK, January 2014).

Topsoil Reuse & Validation Reporting

- 13.2.8. Topsoil present on the site should be managed in accordance with good practice during the construction phase as outlined in the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, DEFRA 2009.
- 13.2.9. It may be prudent to chemically validate topsoil against the generic assessment criteria used in Section 8.
- 13.2.10. Following on from the recommendations made herein, in order to control the environmental works on site and facilitate the collection of records required for the Verification Report, a Remediation / Groundworks Specification will be required. The Specification should detail necessary requirement for inspections / record keeping / actions for unforeseen contamination / detail the requirements for the control of imported material and waste management.
- 13.2.11. Additional discussions may be required with the NHBC and / or Building Control, such matters are not detailed herein. Once approved it will be the Contractor's obligation to fulfil the agreed requirements of the Specification.

13.3. Waste Management

- 13.3.1. A hazardous properties assessment of waste soils has not been undertaken as part of this report. The soil results can, however, be used by the Contractor as a basis for waste soil classification and disposal purposes; however, additional testing may be required, particularly if non-representative soils are uncovered such as those that are stained, odorous or containing asbestos.
- 13.3.2. All waste related activities must be undertaken in accordance with the Waste Management and Landfill Regulations. Any proposed reuse of materials must be in accordance with the Waste (England and Wales) Regulations 2011 (as amended). With respect to waste soils disposal, as a minimum, the following information should be collected and retained by the Contractor for subsequent validation:
 - source and origin of the waste;
 - information on the process producing the waste;
 - European Waste Catalogue code and characteristics of material;
 - for hazardous waste, definition of the relevant properties according to the Hazardous Waste Directive (Annex III 91/689/EC);
 - confirmation that waste is not prohibited waste;
 - appearance of the waste;
 - landfill class; and,
 - Duty of Care records including full and completed chain of custody documentation.

- 13.3.3. The final waste classification is the responsibility of the Contractor and should be determined in conjunction with the receiving landfill and in liaison with the Environment Agency (and their technical guidance). It is noted that, depending on the landfill selected, additional soils testing information and independent verification of the materials of the materials being received by the landfill may be required.
- 13.3.4. As the correct classification of waste is likely to have a significant impact on the redevelopment budget, the waste classification should be reviewed independently by a consultant at an early stage in the project management stage. In addition, contractors should be asked to confirm that their tenders consider the full requirements of the Landfill Directive and associated waste legislation. This is to ensure waste is correctly classified and costed at the inception of the project.
- 13.3.5. The Landfill Directive states that all hazardous and non-hazardous waste requires treatment prior to disposal to landfill. Treatment must provide a 'three – point step'. As such, provision for treating (including physical separation) should be made for all arisings that are likely to be classified as hazardous or non-hazardous so that each of the above three requirements are met.
- 13.3.6. A separate assessment should be made for the rate of Landfill Tax (where applicable) in accordance with HMRC Excise Notice LFT1.

Appendix E Remediation Strategy

soiltechnics

environmental • geotechnical • building fabric

Remediation Strategy

Residential Redevelopment

Barrington Road, Worthing

March 2023



Industrial Development

Document Title: Remediation Strategy

Document no.: STV5959-R01-Rev_A

Date: March 2023

Client: Bellway Homes Limited

Issuing office: Soiltechnics Ltd
Cedar Barn, White Lodge, Walgrave, Northampton. NN6 9PY
Tel: 01604 781 877 E-mail: mail@soiltechnics.net

Document history and status

Revision	Date	Description	Author	Checker	Reviewer
A	February 2023	First Issue	CR	KB	MOH
B	March 2023	Second Issue	CR	KB	MOH

Table of Contents

1	Introduction	2
1.1	Scheme Outline	2
1.2	Site Setting	2
1.3	Brief	2
1.4	Aims and Objectives	3
1.5	Limitations	3
1.6	Options Appraisal	3
2	Site Conditions and Identified Contamination	4
2.1	Sources of information	4
2.2	Ground Conditions Encountered	4
2.3	Groundwater	5
2.4	Contamination Encountered	5
2.5	Underground Tanks and Sub-stations	5
2.6	Adjacent Gas Holder	5
2.7	Ground Gas Conditions Encountered	5
2.8	Sufficiency of Information	5
3	Site Considerations	7
3.1	Unexploded Ordnance	7
3.2	Adjacent Residents	7
3.3	Dust Control Measures	7
3.4	Wastewater Disposal	7
3.5	Soil Resources	7
4	Outline Remediation Strategy	8
4.1	General	8
4.2	Relevant Pollutant Linkages	8
4.3	Outline Remediation strategy	8
5	Discovery Strategy	9
5.1	General	9
6	Asbestos Controls for Construction Workers	10
6.1	General	10
8	Soils and Material Compliance	12
8.1	Material Sourcing	12
8.2	Contractor Pre-delivery Compliance Checks	12
8.3	Contractor Requirements Upon Delivery	12
8.4	Material Suitability Criteria	13
8.5	Unsuitable Materials	13
8.6	Inspection Verification Strategy	13
8.7	Chemical Verification Strategy	13
8.8	Exceptions	14
9	Soft Landscaping Clean Cover	15
9.1	Scope	15
9.2	Clean Cover Design	15
9.3	Additional Design & Suitability Considerations	15

9.4 Contractor Requirements	16
9.5 Verification Strategy	16
10 Verification Report	17
10.1 General Requirements	17
10.2 Client / Contractor Requirements	17
10.3 Report Requirements	17
11 Supplementary Further Works	18
11.1 General	18
11.2 Current Data-Gaps	18
11.3 Scope of Works	18
11.4 Vapour Assessment	20
12 Recommendations	21
12.1 Further Ground Investigation and Watching Brief	21

Appendix A Drawings

Appendix B Contamination Discovery Strategy and Underground Storage Tank Procedure

Drawing Register

Title	Produced by	Date	Reference
Exploratory Hole Location Plan (current layout)	Soiltechnics	February 2021	STS5226-D02
Exploratory Hole Location Plan (proposed layout)	Soiltechnics	January 2021	STV5959-D03-A
Indicative Further Testing Plan	Soiltechnics	January 2023	STV5959-D02-A

List of Tables

Table 2-A: Summary of previous reports	4
Table 2-B: Ground conditions encountered during Soiltechnics investigation	4
Table 4-A: Established relevant pollutant linkages from previous reports.	8
Table 8-A: Verification Sampling Plan	14
Table 10-A: Recommended Further Works (Post demolition, prior to enabling works)	21
Table 10-B: Recommended Further Works (Construction Phase)	21

1 Introduction

1.1 Scheme Outline

- 1.1.1 We understand the scheme will comprise the demolition of existing commercial buildings (former HM Revenues and Customs) and construction of a residential development comprising a mixture of houses, apartments and a care home. Plans of the existing and proposed site layout are provided within Appendix A. Approximately, this comprises of 139 residential plots, 4 blocks of flats, and a care home.
- 1.1.2 It is understood that the development is controlled under the Worthing Borough Council planning regime, under the planning application number AWDM/0605/22.
- 1.1.3 The report is based on the project proposals and information outlined above; should the scheme change then it will be necessary to review the report.

1.2 Site Setting

- 1.2.1 The site is situated in a predominantly residential area of Goring-by Sea, west Worthing, with access granted off Barrington Road. Essentially, the site comprises a vacant office complex. An area of undeveloped scrubland is present to the southwest, which was previously part of the site boundary but which is to now be developed under a separate planning application.
- 1.2.2 Historically the site was a brickworks until it was redeveloped for Inland Revenue Offices by c1953. A chimney and tanks were recorded in the centre of the site from 1967-68. The western most buildings were demolished by 2002 to make way for the existing car park.
- 1.2.3 The site is bound by a railway line to the north, and Barrington Road to the south, beyond which lies residential housing. A commercial building and car park border the site to the east and residential housing and undeveloped land border the site to the west.

1.3 Brief

- 1.3.1 This report has been prepared following instructions received from our client, Bellway Homes Limited. This report details a Remediation Strategy to support the proposed residential development at the former HM Revenues and Customs, Barrington Road, Worthing, West Sussex.
- 1.3.2 Compliance with condition 26 of the planning application requires the submission of a Remediation Strategy to deal with the risks associated with contamination of the site in respect of the development. The condition states that the strategy should include:
- A site investigation scheme for further investigations following demolition,
 - An options appraisal and remediation strategy based on the findings of risk assessments carried out.
 - A verification plan.
- 1.3.3 The Remediation Strategy will be carried out following the principles of BS10175: 2011+A2:2017 'Investigation of potentially contaminated sites – Code of Practice' and the Environment Agency's Land Contamination Risk Management guidance.

1.4 Aims and Objectives

1.4.1 The principal aim of this report is to satisfy the brief outlined above and thereby provide information to facilitate the safe development of the project. The objectives of this report are outlined below:

- i. Confirm if sufficient information is available to inform the remediation.
- ii. Set out a site investigation scheme where further investigation works are required.
- iii. State the relevant pollutant linkages which require remediation.
- iv. Identify a feasible remediation option to break the pollutant linkages.
- v. Set remediation objectives and criteria.
- vi. Outline how the remediation will be implemented.
- vii. Identify any monitoring and maintenance requirements.
- viii. Establish a verification plan.
- ix. Recommend any further works.

1.5 Limitations

1.5.1 Soiltechnics disclaims any responsibility to our Client and others in respect of any matters outside the scope of this report. This report has been prepared with reasonable skill, care and diligence in accordance with the terms of our contract, taking account of the resources devoted to it by agreement with our Client. This report is confidential to our Client and Soiltechnics accepts no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

1.6 Options Appraisal

1.6.1 In the context of the proposed development and the nature of the relevant pollutant linkages identified, an Options Appraisal is not considered necessary at this stage.

2 Site Conditions and Identified Contamination

2.1 Sources of information

2.1.1 Reference has been made to the following sources of information.

Author	Document Title	Date & Document Reference	Report Context
Ashdown Ground Investigation Limited	Combined Geotechnical and Ground Contamination Risk Assessment	December 2018 R18-13236	Preliminary geoenvironmental risk assessment, an assessment of ground conditions and a geotechnical appraisal
Soiltechnics	Ground Investigation Report	April 2021 STS5226-G01-Rev_A	The objective of this investigation was to undertake supplementary works to address outstanding geotechnical and contamination concerns at the site.

Table 2-A: Summary of previous reports

2.1.2 The recommendations made within this preliminary Remediation Strategy are based on ground investigations completed to date, detailed in the above reports. It is acknowledged that additional works are required as detailed within the Soiltechnics Ground Investigation Report (ref: STS5226-G01-Rev A, dated April 2021).

2.1.3 A reassessment to assess if any additional remediation measures is required upon completion of further works.

2.2 Ground Conditions Encountered

2.2.1 The ground conditions encountered are summarised in the table below.

Strata	Summary	Depth to Base (m)	Groundwater
Topsoil	Slightly gravelly very sandy CLAY (gravels of brick, pottery, and clinker within some parts of the site)	0.10-0.40	None observed
Made Ground	Orangish brown slightly gravelly clay (gravels of flint, brick, concrete, charcoal, clinker, chalk, glass and ash)	0.40-1.80	None observed
River Terrace Deposits	Firm to very stiff slightly gravelly clay and, medium dense to dense sands and gravels within the southern and western parts of the site	5.00-7.00	From 5.22
		1.90-2.60	
White Chalk Subgroup	Off-white clayey gravels with cobbles (eastern and western parts of the site)	4.40 - 4.80m	As above (saturated)

Table 2-B: Ground conditions encountered during Soiltechnics investigation

2.3 Groundwater

- 2.3.1 Groundwater was encountered within deep boreholes during the Soiltechnics ground investigation at depths of between 5.22m and 8.50m bgl.

2.4 Contamination Encountered

- 2.4.1 Both the Ashdown and Soiltechnics reports noted sporadic elevated levels of PAHs and metals within the Made Ground deposits following soil testing. In addition, asbestos fibres were identified in Made Ground local to the existing facilities maintenance compounds although given the variability of the Made Ground, its presence elsewhere could not be discounted.
- 2.4.2 The risk assessment concluded that while sporadic, due to the sensitivity of the development proposals, contaminant levels could pose an unacceptable level of risk to proposed end users, and therefore requires remediation.

2.5 Underground Tanks and Sub-stations

- 2.5.1 The site reconnaissance identified an interceptor tank in the south-western corner of the site. Samples from one borehole excavated adjacent to the interceptor did not contain any elevated concentrations of TPH or BTEX. However, the presence below the tank cannot be discounted.
- 2.5.2 Similarly, a sub-station was noted in the south-east of the site. Although no PCBs were detected in samples taken from a borehole adjacent to the sub-station, localised contamination in this area, particularly below the sub-station, cannot be fully discounted.
- 2.5.3 Above ground tanks were observed within the facilities maintenance area; however, limited access was available at the time of investigation. There is a risk that further tanks, and potentially underground tanks, may also be present.

2.6 Adjacent Gas Holder

- 2.6.1 Land to the immediate west of the site is currently disused but historical maps indicate a gas holder was present until around 2010. Excavations undertaken along the western boundary did not identify any associated contamination within the soils although these boreholes were relatively shallow and did not extend into groundwater. Limited groundwater testing more distant to the gas holder did not identify any contamination but further investigations in this area to refine the risk from vapours is recommended.

2.7 Ground Gas Conditions Encountered

- 2.7.1 No ground gas or radon protection measures are required.

2.8 Sufficiency of Information

- 2.8.1 Due to the access limitations at the time of the previous investigation, there are a series of data-gaps which require further investigation. These works should be completed post-demolition and prior to the enabling and construction works phases.

- 2.8.2 It is recommended to conduct the ground investigation works in a single phase, which incorporates the following:
- Additional boreholes within the area of the facilities maintenance area (including beneath tanks) to determine whether any localised contamination is present. Investigations should be deep enough to allow for groundwater samples to be collected for testing.
 - Further deep borehole along the western site boundary to allow for groundwater sampling to be undertaken to confirm or otherwise the absence of contamination associated with the adjacent (off site) former gas holder. Shallow boreholes should also be undertaken to allow shallow vapour monitoring along the site boundary.
 - A watching brief should also be kept during removal of the interceptor tanks, the maintenance facility and sub-stations with some additional testing undertaken to confirm or otherwise the absence of associated contamination.
- 2.8.3 As with any site investigation works, the requirement for additional phases of investigation cannot be ruled out. For instance, gross contamination may be identified during planned works which requires delineating and characterising fully within a return visit to site.
- 2.8.4 Any subsequent contamination identified must be addressed in a supplementary Remediation Strategy

3 Site Considerations

3.1 Unexploded Ordnance

- 3.1.1 Worthing was subject to a moderate level of bombing during WWII and at least one highly explosive bomb strike was recorded on land to the west of the site. A UXO specialist attended site during intrusive investigations.
- 3.1.2 It is understood that a Detailed UXO Risk Assessment Report has subsequently been obtained for the site to determine the risk for the construction phase. The report indicates a low risk within the development site.
- 3.1.3 All stakeholders must be made aware of the UXO risk levels and the potential impact on the project, and UXO Safety Induction Training should be provided for all site workers.

3.2 Adjacent Residents

- 3.2.1 Residential and commercial properties are present adjacent to the east, south and west of the site. Whilst they are not currently considered to be put at an unacceptable risk by the development of the site, dust suppression measures should be maintained throughout all demolition and construction phases.
- 3.2.2 No significant odours are anticipated to be generated as a result of the works.

3.3 Dust Control Measures

- 3.3.1 Standard dust control measures should be always maintained across the site, including the dampening down of roadways, materials stockpiles, and any screening or crushing areas.
- 3.3.2 Stockpiles should be bladed down to reduce infiltration and minimise dust infiltration.
- 3.3.3 Routine dust monitoring is not considered necessary, except for any crushing activities; however, the Principal Contractor may wish to conduct such monitoring for reassurance and due diligence purposes.

3.4 Wastewater Disposal

- 3.4.1 Wastewater generated from site operations will require off-site disposal via tankers, or to sewer. Any disposal to sewer must be made under prior consent with the water authority by the operator.
- 3.4.2 The sewage operator must be consulted prior to mobilisation to obtain a discharge consent, along with establishing any compliance and monitoring targets.

3.5 Soil Resources

- 3.5.1 Due to extensive hardstanding present across the current site and the requirement to raise development levels, there is considered to be limited soils present which would be suitable as a growing medium in proposed soft landscaping. Therefore, suitable growing mediums will require importing to support the landscaping scheme.
- 3.5.2 A Materials Management Plan is anticipated to be undertaken to facilitate the transfer of suitable soils from off-site developments.

4 Outline Remediation Strategy

4.1 General

- 4.1.1 This Remediation Strategy only considers the process of remedial action in terms of addressing contamination recognised to date.
- 4.1.2 If, following the recommended further ground investigation or during development, contamination not previously identified is found to be present, then further assessment and a supplementary strategy will be required.
- 4.1.3 Sampling and laboratory analysis associated with the recommended remediation will be undertaken following nationally recognised guidelines and standards that are appropriate at the point of investigation.
- 4.1.4 Laboratory analysis must be commissioned with testing houses that are suitably experienced and are MCERTS accredited with a quality assurance system.

4.2 Relevant Pollutant Linkages

- 4.2.1 The relevant pollutant linkages identified within the previous Ground Investigation Report are as follows:

Source	Pathway	Receptor
Asbestos fibres within the Made Ground	Disturbance and inhalation of dusts	Construction workers during demolition /development End users
Elevated metals and PAHs within the Made Ground.	Dermal contact, inhalation and ingestion of soils and dusts.	Construction workers during demolition /development End users

Table 4-A: Established relevant pollutant linkages from previous reports.

4.3 Outline Remediation strategy

- 4.3.1 The remediation strategy has been determined in view of the previous ground investigation report findings and the proposed development scheme. It can be summarised as follows:
- Prepare a discovery strategy in the event of encountering unexpected or previously unencountered contamination.
 - Installation of barrier pipe for underground drinking water infrastructure where they are in contact with the Made Ground.
 - Importing of soils for use as fill and in the proposed soft landscaped areas.
 - Install a cover system in proposed soft landscaped areas to prevent end user exposure to identified contamination.
 - Provide a scope of works for further investigation

5 Discovery Strategy

5.1 General

- 5.1.1 With the development of any site, there is a residual risk of contamination being found that is unexpected or has not been previously encountered.
- 5.1.2 As a precaution, the Principal Contractor should adopt the contamination Discovery Strategy, contained within Appendix B, for dealing with unexpected contamination.
- 5.1.3 Accompanying the Discovery Strategy is a procedure to follow in the event of encountering any underground storage tanks.

6 Asbestos Controls for Construction Workers

6.1 General

- 6.1.1 Further works are required to refine the risks posed by asbestos in soils to construction workers.
- 6.1.2 The risks posed to human health during the construction phase and any associated mitigation measures required must be detailed within follow-up report (see Section 11), prior to commencement. The report must be submitted to the Local Authority for approval.

7 Drinking Water Infrastructure

7.1 General

- 7.1.1 Protective barrier pipe is recommended for all new below-ground water supply pipes (Protectaline or similar) where in contact with Made Ground.
- 7.1.2 Where existing water pipes are to remain in use, these should be upgraded to ensure the same level of protection is in place across the site.
- 7.1.3 The local water authority (Southern Water) should be consulted to inform them of the risk assessment, and to obtain their approval.

7.2 Verification Strategy

- 7.2.1 This is to be validated by the Contractor through the provision of delivery tickets showing protective barrier pipe has been delivered to site and by providing photographs showing the subsequent installation.
- 7.2.2 Southern Water should also be consulted to determine any further verification requirements.

8 Soils and Material Compliance

8.1 Material Sourcing

- 8.1.1 A clean cover system is required within the development and limited suitable soils are present on site. Therefore, soils will require importing to support the proposed landscaping scheme.
- 8.1.2 It is understood that as part of the development site levels are to be raised by approximately 1m. Therefore, fill materials are expected to be imported to site facilitate construction.
- 8.1.3 Site-won natural and Made Ground materials are also likely to be utilised as general fill. However, they are considered unsuitable for use as a growing medium within soft landscaping areas and require capping.

8.2 Contractor Pre-delivery Compliance Checks

- 8.2.1 The Contractor should confirm the origin of all imported materials and request available chemical testing results from suppliers prior to delivery, to provide confidence of suitability.

8.3 Contractor Requirements Upon Delivery

- 8.3.1 The source and volume of all imported fill and soil materials used in the development must be clearly documented, with records provided for inclusion in the Verification Report.
- 8.3.2 The contractor should take and provide a series of site photographs to evidence the laying of clean soils on site.
- 8.3.3 For all imported materials, the Principal Contractor should maintain records sufficient to evidence the following:
- The supplier
 - Material source (address)
 - Material origin (e.g. virgin material, recycled, manufactured)
 - Material type (e.g. topsoil, subsoil, recycled aggregate, 6F2, etc.)
 - The overall volume of each material type imported.
 - Delivery dates.
 - The overall volume of each material type imported, as part of each batch.
 - Inspection records of the materials to confirm the physical, visual, and olfactory suitability of the material, at the following frequencies:
 - **Clean cover soils:** An inspection of every other delivery of landscaping soil (1 in 2).
 - **Fill materials:** An inspection of each “batch” of fill materials.
- 8.3.4 A ‘batch’, in the context used above can comprise of multiple deliveries from the same source, delivered over consecutive days for a period of no more than one working week.

8.4 Material Suitability Criteria

- 8.4.1 All imported soils and fill material should be inspected and tested to confirm they are chemically and physically suitable for use, in terms of the risks to human health.
- 8.4.2 The physical composition of materials must be free of harmful and injurious artefacts (such as sharps), over-sized materials (such as cobbles and boulders) and show no visual or olfactory evidence of contamination.
- 8.4.3 Materials should also be chemically suitable, with concentrations of contaminants falling within widely recognised and published soil guideline values (such as the C4SLs and S4ULs), with the following model being applied.
 - Residential with plant uptake, at 2.5% SOM.
- 8.4.4 No bulk ACM materials should be present. Asbestos fibres, if present, should be quantified and be found at concentrations of less than 0.001%.

8.5 Unsuitable Materials

- 8.5.1 If an inspection of a materials proves or suspects it to be unsuitable, the load should be quarantined on site, pending collection or off-site disposal. The Consultant should be notified, and a record made for inclusion into the Verification Report.
- 8.5.2 Alternatively, the Consultant should undertake an investigation and risk assessment to delineate the areas of impacted soils and/or to identify a possible alternative use for the materials.

8.6 Inspection Verification Strategy

- 8.6.1 Site visits by a geoenvironmental consultant are required during the placement of fill materials to inspect and photograph the works being undertaken.
- 8.6.2 The visual inspection strategy for the clean cover system is outlined in the following report section.

8.7 Chemical Verification Strategy

- 8.7.1 All verification sampling must be undertaken by the Consultant. In addition, an inspection of the soils at the time of sampling must confirm the physical, visual, and olfactory suitability of the material. The following table summarises the sampling and chemical verification requirements.
- 8.7.2 Where the material is sourced from a brownfield, remediated, or unknown source, the testing frequency should increase to 1 sample per 50m³ and include TPH CWG analysis.
- 8.7.3 A 'batch', can comprise of multiple deliveries from the same source, delivered over consecutive days for a period of no more than one working week.

Material Type	Sampling Frequency	Sampling Timing	Testing Schedule
Topsoil and Subsoils	1 per 100m ³ , Minimum of 3 per batch Minimum of 3 per type	After placement. Reassurance sampling prior to placement is recommended.	Metals Suite, Cyanide (free and complex) Asbestos screen, PAHs (USEPA 16) Banded TPH
Fill Soil Materials	1 per 250m ³ , Minimum of 3 per batch Minimum of 3 per type	Before, during or after placement	
Recycled Aggregate	1 per 500m ³ , Minimum of 2 per batch		
Virgin Quarried Materials	2 per source	Before, during or after placement	Metals Suite, Asbestos screen

Table 8-A: Verification Sampling Plan

- 8.7.4 A metals suite must include arsenic, beryllium, boron, cadmium, chromium (total and VI), copper, lead, mercury, nickel, selenium, and zinc.

8.8 Exceptions

- 8.8.1 Where the Made Ground is removed entirely from the areas of soft landscaping, this removes the source of contamination and therefore negates the need for a clean cover system in that area. However, all imported soil materials for use within soft landscaping areas will still require the same level of physical, visual, and chemical verification to demonstrate suitability.
- 8.8.2 Where bulk removal of the Made Ground occurs, a site visit must be completed by a geo-environmental consultant to inspect the reduced-dig excavation and exposed natural soils.

9 Soft Landscaping Clean Cover

9.1 Scope

- 9.1.1 Where present, the provision of hardstanding areas will negate the requirement for a clean cover system, and no action is considered necessary.
- 9.1.2 In proposed landscaped areas, a cover system of 'clean' suitable soils should be placed to sever the pathway between contaminants in the Made Ground and end-users, thus breaking the pollutant linkage and reducing the risk to acceptable levels.
- 9.1.3 All soils used within the clean cover system should be inspected and tested to confirm they are chemically and physically suitable for use, in terms of the risk to human health.
- 9.1.4 Limited soils, as a suitable growing medium, are present on site. Therefore, soils will require importing to support the proposed landscaping scheme.

9.2 Clean Cover Design

- 9.2.1 For this development, soft landscaping areas comprise private garden areas, and managed areas of public open space (POS) within the park, care home and apartment blocks, and parcels of road-side public open space. Hand-excavations and planting is anticipated in garden areas; whereas following development the maintenance of public open space areas will largely be limited to superficial works on grassed areas and hedgerows. Excavations in such areas would be minimal and of very short duration.
- 9.2.2 The following overall depth requirements can therefore be applied:
 - Private garden areas: 600mm minimum cover
 - Planted areas of public open space: 600mm minimum cover
 - Grassed lawn areas of public open space: 300mm minimum cover
- 9.2.3 The cover system should comprise of topsoil between 150mm and 300mm thick, with the remainder of the cover comprising of loosened subsoil.
- 9.2.4 It should be noted that in large areas of the site, substantial fill materials will be placed below the cover system to raise site levels. Where such materials are a suitable growing medium and have been proven to be chemically and physically suitable, they can be considered as part of the 'subsoil' component and count towards the minimum depth requirement.

9.3 Additional Design & Suitability Considerations

- 9.3.1 BS 3882:2015 states that at least 450mm of suitable soil is required to provide a sufficient rooting depth for grass. This increases to a minimum depth of 600mm for shrubs, and 900mm for the planting of trees.
- 9.3.2 The suitability of soils as a growing medium (irrespective of the risk to human health) could be evidenced through sampling and analysis in accordance with BS:3882 (2015).

- 9.3.3 Whilst desirable, these recommendations do not form part of the remedial strategy and have been included for reference. Site specific advice should be sought from the landscape designer regarding the suitability of soils as growing mediums and any requirements for deepening the cover system to accommodate the planting scheme.

9.4 Contractor Requirements

- 9.4.1 In addition to the requirements outlined in the Soils and Material Compliance report section, the contractor must provide photographic evidence demonstrating the laying of the clean cover system.

9.5 Verification Strategy

- 9.5.1 The verification of the chemical and physical suitability of soils is outlined within Soils and Material Compliance report section.
- 9.5.2 Upon completion of the cover system, a site visit will be required by the Consultant to undertake a series of hand pits to visually inspect, document, photograph, and sample the soils to verify adherence to this Remediation Strategy.
- 9.5.3 Based upon the development proposals, the following number of inspection pits are required. Each pit must penetrate the full depth of the cover system.
- Private gardens (~139 plots): 1 pit every 5 plots. Total of 28 pits.
 - Park and general POS: 3 pits in total.
 - Care home POS: 2 pits in total
 - Flat blocks (6 No. blocks): 3 pits in total
 - Total pits within scheme: 36
- 9.5.4 The hand pits should demonstrate an adequate thickness of cover, confirm physical suitability, and obtain samples so the chemical suitability can be confirmed through laboratory analysis.
- 9.5.5 Verification must be completed by a competent geoenvironmental consultant, with a record of each visit made for inclusion in the Verification Report.

10 Verification Report

10.1 General Requirements

- 10.1.1 The verification requirements discussed above should be compiled into a Verification Report, which is to be produced on completion of the remedial works.
- 10.1.2 As part of the Verification Report, any imported materials should be clearly documented, including source certificates, delivery notes, and site plans. The results and frequency of verification testing undertaken should also be documented, along with confirmation of the materials suitability for use.
- 10.1.3 Records of the on-site inspections must be included within the Verification Report, and include a hole location plan, logs of the excavation and photographic record as a minimum.

10.2 Client / Contractor Requirements

- 10.2.1 Supporting information will be required from the client and their contractors. This includes the following:
- Appropriate site plans confirming location of remediated areas.
 - Photographic evidence of the clean cover system installation.
 - Photographic evidence of the drinking water 'barrier pipe' installation.
 - Signed delivery tickets, or an alternative reference system to track imported loads, including a statement on the type and volume of materials imported.
 - All waste transfer documentation, including a statement on the type and volume of materials taken off-site.
 - Details on any unexpected ground conditions encountered and contingency arrangements that had to be implemented.

10.3 Report Requirements

- 10.3.1 The Validation Report will include the following, where appropriate:
- A summary of remedial requirements.
 - A summary of any supplementary risk assessments.
 - A concise summary of material types, sources and volumes imported.
 - Lines of evidence to demonstrate compliant and effective material management, including confirmation of source, volumes and suitability of all site-won and imported materials, delivery notes, waste transfer and consignment notes and chemical testing records.
 - Details demonstrating the chemical and physical suitability of the capping materials.
 - Details of any unexpected or unencountered materials encountered, along with further investigative and remedial action undertaken.
 - Statements confirming if the remedial objectives have been met, and if the site is suitable for its proposed use.

11 Supplementary Further Works

11.1 General

- 11.1.1 A supplementary phase of investigation works is recommended to improve our understanding of ground conditions at the site and to refine our understanding of the potential risks posed by asbestos, hydrocarbons, vapours, and other potential contaminants.
- 11.1.2 So access for the investigation is not restricted, it is recommended to undertake the ground investigation post demolition, and prior to construction.

11.2 Current Data-Gaps

- 11.2.1 The facilities maintenance area was inaccessible during previous ground investigation works. Intrusive ground investigation works will be required in this area to characterise the Made Ground and underlying soils, both in terms of the human health risk and controlled waters risk. It is noted that previous works immediately around this area did identify elevated concentrations of lead and asbestos fibres within the Made Ground, and it is considered possible they are associated with this area. Various tanks and a chimney are also present in this area and are considered potential sources of contamination.
- 11.2.2 The site reconnaissance identified an interceptor tank in the south-western corner of the site and a sub-station in the south-east. Contamination below these features and associated with any pipework cannot be discounted.
- 11.2.3 Land to the immediate west of the site is currently disused but historical maps indicate a gas holder was present until around 2010. Although no soil contamination has been identified, none of the boreholes undertaken in close proximity to the western site boundary reached groundwater and therefore the risk from vapours requires further assessment.

11.3 Scope of Works

- 11.3.1 To address the data-gaps outlined above, it is recommended to undertake exploratory boreholes along the western boundary and within the facilities maintenance area to depths of between 2-10m bgl. A watching brief is also required during removal of the interceptor tank and the sub-station (if this is to be removed), along with undertaking verification sampling and testing. This should comprise a full-time presence during removal of any tank or interceptor, to help verify the works and aid in identifying areas of contamination. Further details on the verification of tank removal is presented in Appendix B.
- 11.3.2 An indicative proposed exploratory hole plan is provided in Appendix A.
- 11.3.3 The borehole locations, sampling regime and installation designs are provided in the table overleaf. The investigation strategy is indicative only and may be subject to change based upon visual observations of the ground conditions and any contamination encountered during the works.
- 11.3.4 The target depth of all holes varies; however, it is acknowledged that the presence of River Terrace Deposits may limit progression.

Location	Specific Objective	Target depth/installation response zone	In-situ Testing Regime	Sampling Regime
BH301	Vapours from contamination arising from former off-site gas holder	10m 1m – 6m installation	PID screening on soil samples	0.5m intervals throughout the Made Ground, commencing at ~ 0.25m depth.
WLS301-303		2m No installations	PID screening on soil samples	At 1m intervals within the natural soils
WLS304		3m – 4m No installations	PID screening on soil samples	0.5m intervals throughout the Made Ground, commencing at ~ 0.25m depth.
WLS3.5-WS306	Targeting unexplored areas (facilities maintenance area)	1m – 3m No installations	PID screening on soil samples	
BH302		10m 1m – 6m installation	PID screening on soil samples	Sampling of natural soils only undertaken where visual/olfactory evidence of hydrocarbon contamination is notes.
SP01-SP04	Samples for verification testing following removal of interceptor/sub-station if required.	Various	None	

Table 3: Proposed Investigation Scope and Rationale

- 11.3.5 Groundwater analysis will be undertaken on samples taken from the two deep boreholes and will comprise:
- 2 No. general contamination suites (metals, PAHs, TPH CWG, SVOCs, VOCs)
- 11.3.6 Soil testing will be undertaken within the shallow boreholes in the facilities maintenance area.
- 11.3.7 Soil analysis should include the following:
- 5 No. asbestos screens
[within the facilities maintenance area]
 - Quantification of asbestos
[In any and every sample identified as asbestos containing]
 - 3 No. general contamination suites (metals, PAHs, TPH CWG, SVOCs, VOCs)
[Within the facilities maintenance area]
- 11.3.8 The results of the fieldworks will be presented in a standalone report, which must include appropriate contaminated land risk assessments to address the data-gaps highlighted within this report. Further phases of investigation may be required if significant uncertainty remains.
- 11.3.9 Following satisfactory completion of the risk assessment report, this Remediation Strategy must be updated to incorporate the findings and any recommendations made. Both reports must be submitted to the Local Authority for approval.

11.4 Vapour Assessment

11.4.1 The following triggers have been set to aid in the assessment of the risk from vapour intrusion.

- Detection of volatiles in excess of 100ppm on a PID soil screen on soils.
- ‘Strong’ hydrocarbon odours in any materials
- Oil saturated or heavily stained soils in veins or zones in any materials, primarily comprising of hydrocarbons with a carbon banding <EC16.

11.4.2 Should vapour trigger levels be exceeded, one of the following actions must be undertaken, as appropriate:

- i. Vapour protection measures incorporated into proposed houses within the contaminated area as a precaution; or,
- ii. Submission of a robust risk assessment to the Local Authority which updates the CSM and incorporates all other site data to de-risk the vapour intrusion contaminant linkage;
- iii. Where significant uncertainty still remains, the submission of an additional proposed scheme of works to the Local Authority for the undertaking of a further supplementary phase of investigation. For instance, to delineate and characterise a hydrocarbon plume encountered, or to obtain site specific parameters to inform a Detailed Quantitative Risk Assessment and vapour intrusion model.

12 Recommendations

12.1 Further Ground Investigation and Watching Brief

12.1.1 The following table summarises the additional works which should be undertaken post demolition, and prior to the enabling works and construction of the site.

Aspect	Delivered By	Description
Supplementary Investigation Works	Soiltechnics	A supplementary phase of ground investigation works to be undertaken following demolition of the site, as detailed in Section 11. A supplementary Remediation Strategy is anticipated to be required as part of these works.
Consultation on Protective Barrier Pipe	Principal Contractor / Developer	Liaison with Southern Water to confirm the use of barrier pipe and determine any additional verification requirements.
UXO Detailed Risk Assessment	Specialist	The Preliminary Risk Assessment identified that bombing occurred in the vicinity of the site and the site is at Medium Risk. A Detailed UXO Risk Assessment should be undertaken in accordance with CIRIA C785.
UXO Pile Testing	Specialist	Mag Cone testing of all pile locations prior to commencement. Unless a Detailed Risk Assessment is produced down-grading the preliminary UXO risk.
Piling Risk Assessment	Soiltechnics	At the request of the Environment Agency: Piling and the use of penetrative construction methods shall not be carried out unless a full piling risk assessment and method statement, including consideration of contaminants, groundwater and aquifers and methods to minimise risk of contamination, has been submitted to and approved in writing by the Local Authority.
Material Management Plan	Soiltechnics	To facilitate the sustainable use of soils in the development, an MMP is recommended to control the import of soil fill materials from other development sites and for the reuse of Made Ground on site. Verification Works

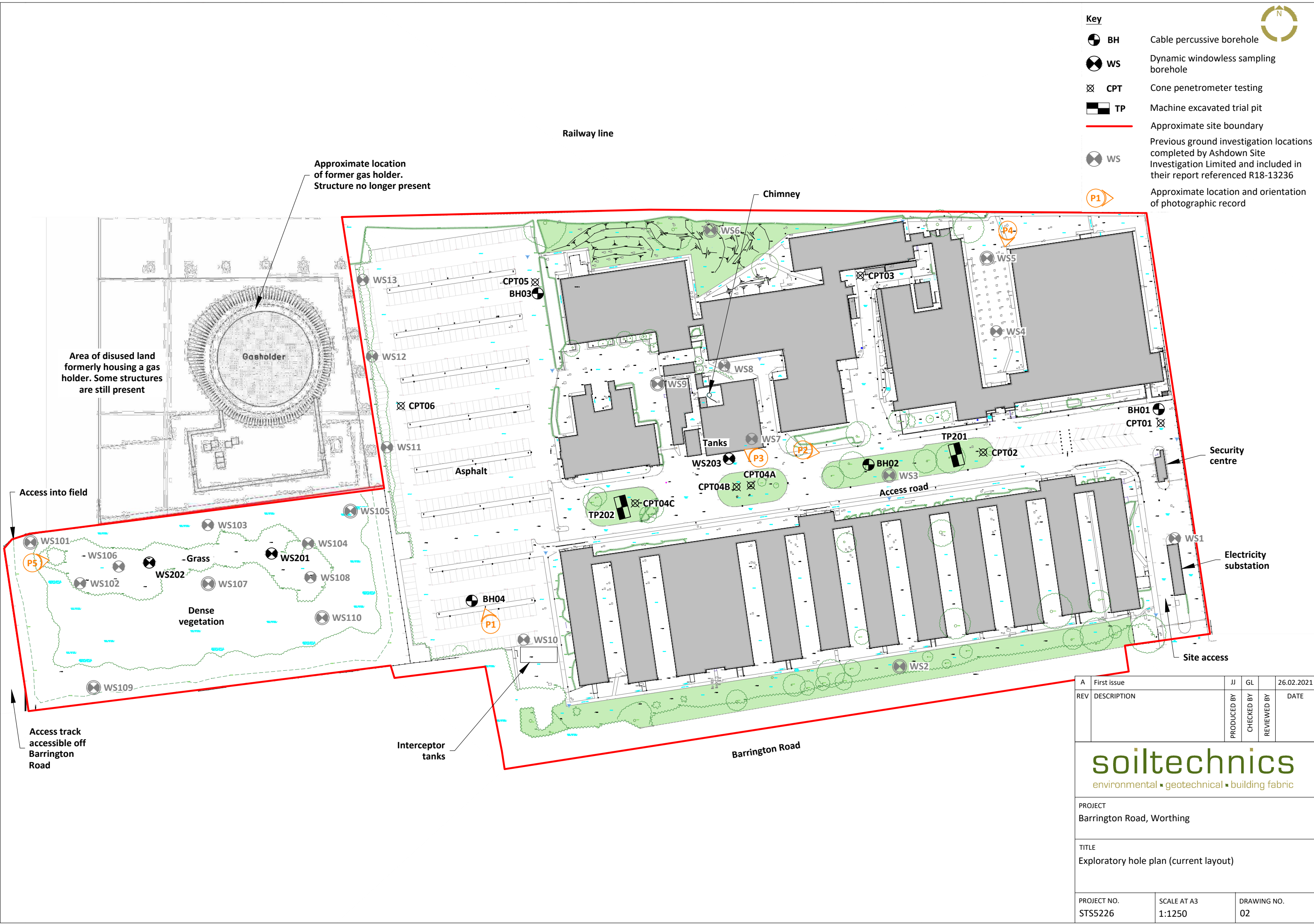
Table 12-A: Recommended Further Works (Post demolition, prior to enabling works)

12.1.2 The following table summarises the additional works which should be undertaken during the main enabling and construction works phase, and prior to occupation of the site.

Aspect	Delivered By	Description
UXO Risk	Specialist	Provision of UXO Safety Induction Training for all site workers. EOD supervision during all bulk excavations and drilling works. Unless a Detailed UXO Risk Assessment states otherwise.
Installation of barrier pipe	Principal Contractor	Provide delivery certificates and photographic evidence demonstrating installation of drinking water barrier pipes, along with any other verification works as stated by Southern Water.
Verification of imported soils and fill materials and material management	Soiltechnics	Chemical and physical verification of all imported soft landscaping soils and fill materials. Verification of material management in accordance with the MMP.
Verification of the clean cover system	Soiltechnics	Chemical and physical verification of the installed clean cover system.
Verification Report	Soiltechnics	Undertaking a report to draw all necessary lines of evidence together, to demonstrate the effective remediation of the site.

Table 12-B: Recommended Further Works (Construction Phase)

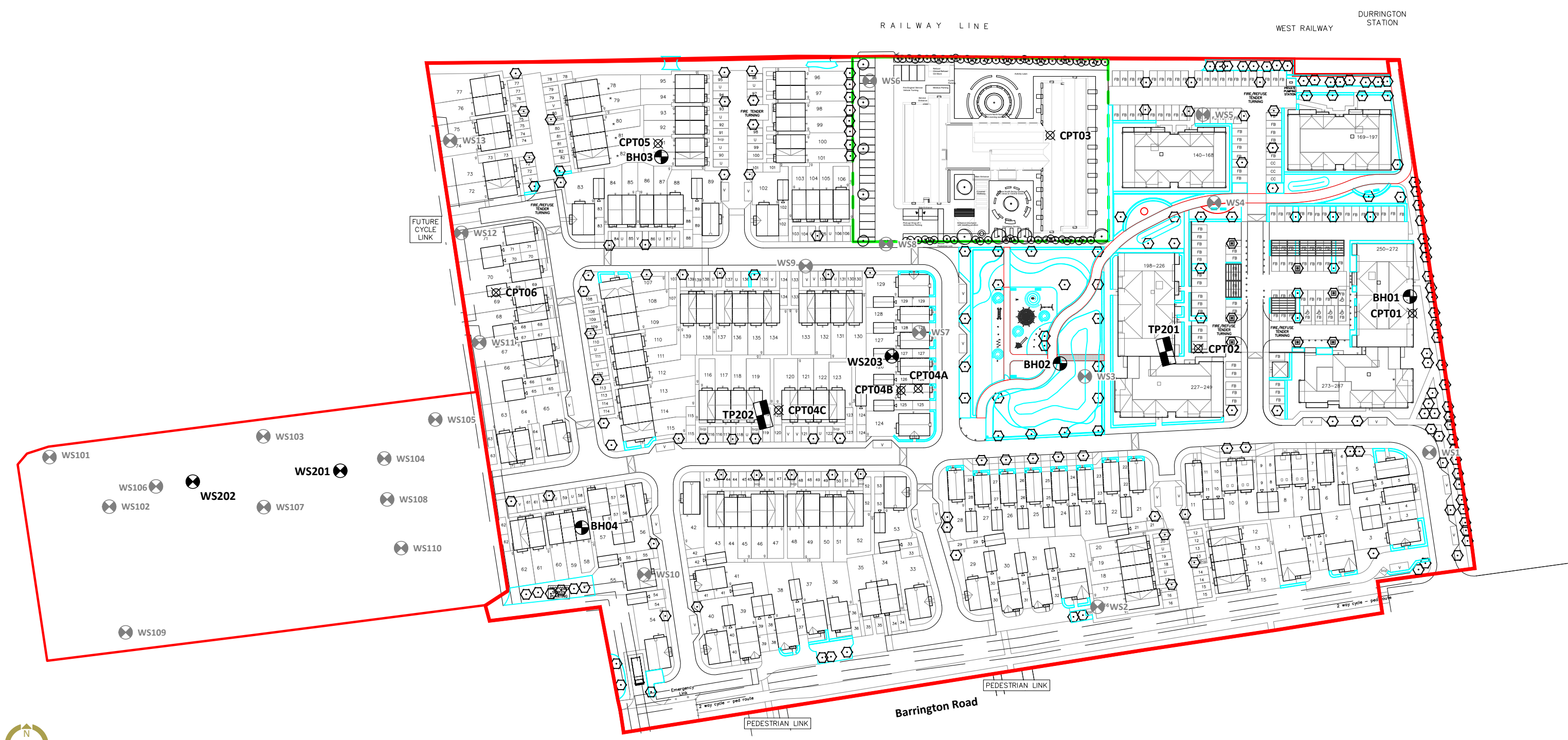
Appendix A Drawings



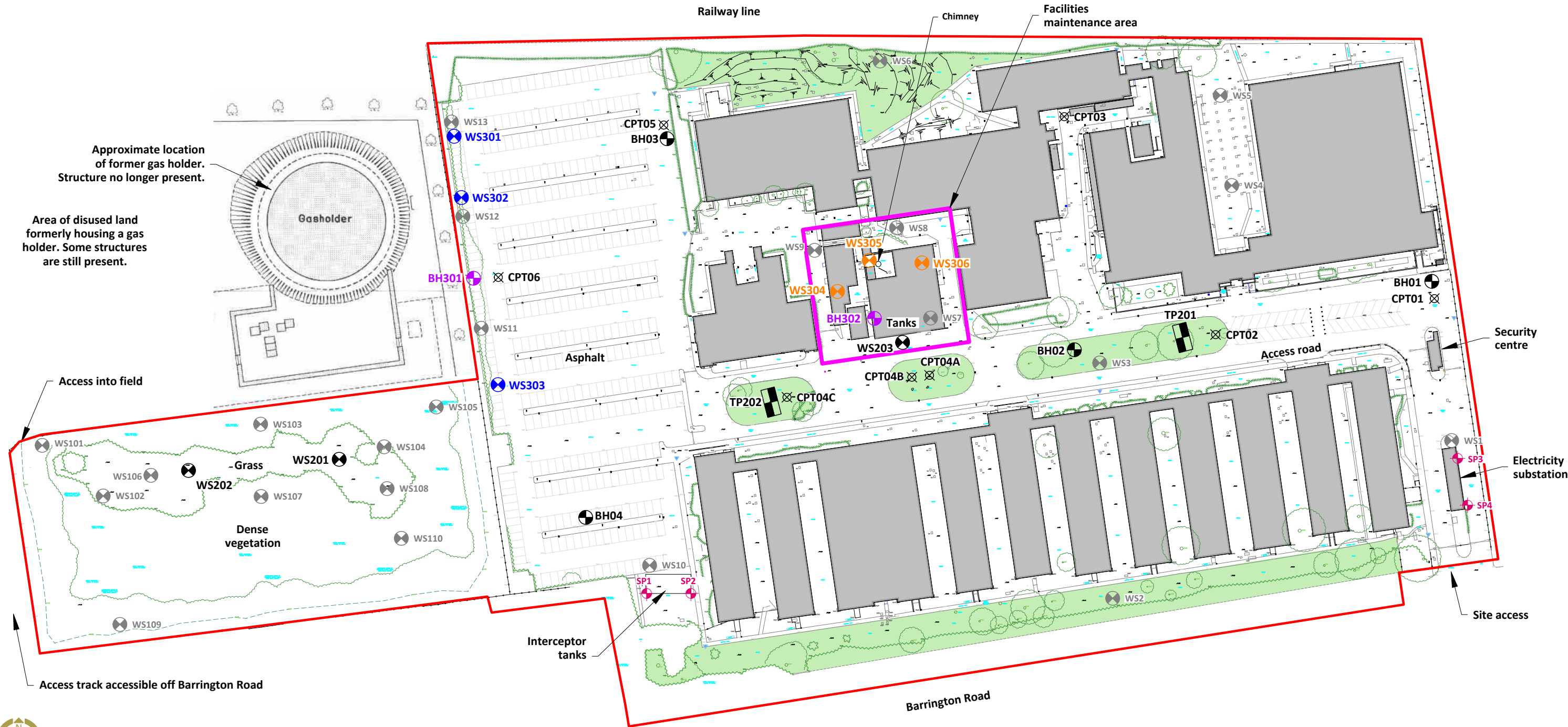


Key

-  **BH** Cable percussive borehole
-  **WS** Dynamic windowless sampling borehole
-  **CPT** Cone penetrometer testing
-  **TP** Machine excavated trial pit
-  **WS** Previous ground investigation locations completed by Ashdown Site Investigation Limited and included in their report referenced R18-13236
-  Approximate site boundary



A	First issue	AM	13.02.2023
REV	DESCRIPTION	PREP	DATE
soiltechnics environmental • geotechnical • building fabric			
PROJECT Barrington Road, Worthing			
TITLE Exploratory hole plan (proposed layout)			
DRAWING NO. STV5959-D03-A		SCALE AT A3 1:1250	



Key



Cable percussive borehole



Dynamic windowless sampling borehole



Cone penetrometer testing



Machine excavated trial pit



Previous ground investigation locations completed by Ashdown Site Investigation Limited and included in their report referenced R18-13236



Approximate site boundary



Proposed deep borehole to assess groundwater



Proposed shallow borehole for vapour monitoring



Proposed shallow borehole to determine presence of shallow soil contamination



Proposed sampling position

A	First issue	AM	13.02.2023
REV	DESCRIPTION	PREP	DATE
soiltechnics environmental • geotechnical • building fabric			
PROJECT Barrington Road, Worthing			
TITLE Further testing plan (current layout)			
DRAWING NO. STV5959-D02-A		SCALE AT A3 1:1250	

Appendix B Contamination Discovery Strategy and Underground Storage Tank Procedure

Contamination Discovery Strategy: Procedure

1 General

- 1.1 With the development of any site, there is a residual risk of contamination being found that is unexpected or has not previously been identified.
- 1.2 As a precaution, the Principal Contractor should adopt this Contamination Discovery Strategy for dealing with unexpected contamination.
- 1.3 The Principal Contractor should also ensure it is distributed and communicated appropriately to all relevant ground workers.

2 Step 1: Halting Works

- 2.1 Should any previously unidentified contamination be encountered, works should be made safe then temporarily halted in the affected area and Soiltechnics (The Consultant) informed within 24hrs.
- 2.2 If, due to site constraints, the contaminated materials need to be excavated prior to being assessed, the Contactor should segregate the material as best as is reasonably practicable, based upon visual and olfactory observations. The contaminated materials should then be stockpiled on an impermeable surface and covered with impermeable sheeting.

3 Step 2: Initial Assessment

- 3.1 The Consultant must liaise with the contractor and undertake an initial assessment within 48 hours of notification to determine if the event represents “*potentially significant unexpected contamination*”.
- 3.2 Where the initial assessment does not consider the contamination to be potentially significant and unexpected, works can recommence.

4 Step 3: Contamination Assessment and Remedial Strategy

- 4.1 Where *potentially significant unexpected contamination* is confirmed, the Consultant must produce a standalone report which includes a description and risk assessment of the contamination.
- 4.2 A phase of intrusive investigation works may be required to inform the risk assessment.
- 4.3 Where remediation is required, the report must also include a remedial and verification strategy.
- 4.4 The report must also make it clear whether remediation, and the subsequent submission and approval of an event-specific Verification Report to the Local Authority is required prior to recommencement.
- 4.5 Within 24 hours of completion, the report must be provided to the Local Authority for their approval, and a copy held for appending to the project Verification Report.

5 Step 4: Recommencement and Implementation

- 5.1 Works can only recommence upon specific instruction from the Consultant and once the event-specific Remediation Strategy has been submitted to, and approved in writing by, the Local Authority.
- 5.2 All remedial works must be implemented and verified in full. The event-specific Verification Report (if required) must be submitted to the Local Authority for approval.

Contamination Discovery Strategy: Contractor Site Guide

Discovery Event

- Previously unidentified contamination is encountered.
- This includes encountering underground storage tanks (UST).

Halt Works in Area

- Make the area safe.
- Halt works in the affected area.
- Stockpile any contaminated arisings on an impermeable surface and cover with impermeable sheeting.
- Works to recommence only upon instruction from the Consultant (Soiltechnics Ltd).

Inform the Consultant

- Contact Soiltechnics (the Consultant) within 24 hours.
- Tel: 01604 781 877
- E-mail: enquiries@soiltechnics.net

Assessment

- An initial assessment must be carried out by Soiltechnics to determine the appropriate course of action.
- A detailed assessment and a sampling exercise may be required.
- If remediation is necessary, the Local Authority will need to approve a Remediation Strategy prior to commencement.

Remediation

- All remedial works must be implemented and verified in full, in accordance with the Remediation Strategy.
- Once remedial works are complete, the event-specific Verification Report must be submitted to the Local Authority.

Encountering & Decommissioning of Underground Storage Tanks

1 General

- 1.1 The following expands on the general procedures outlined within the Contamination Discovery Strategy to provide a detailed process that must be followed in the event of encountering an underground storage tank (UST).
- 1.2 Any UST encountered and associated pipework shall be decommissioned and removed from site following the current guidance within the APEA document “Design, Construction, Modification, Maintenance And Decommissioning Of Petrol Filling Stations”, April 2015.
- 1.3 The purpose of this report is to provide a Remediation Strategy for the site contractors and Consultant to work to in the event of encountering underground storage tanks.

2 Step 1: Halting Works

- 2.1 Should any USTs be encountered, works should be made safe then temporarily halted. A tank decommissioning specialist and Soiltechnics (The Consultant) should be informed within 24hrs. Efforts should be made, under the guidance of the specialist, to inspect and confirm the contents of the tank and identify any special precautions which may be required.

3 Step 2: Bottoming

- 3.1 Before the removal of a UST, all residual fuel/oil should be removed from the tank, so far as is reasonably practicable. This is referred to as 'bottoming' and should be carried out by a specialist contractor.
- 3.2 Where present, pipework carrying fuel should be drained back to the tank before bottoming takes place.

4 Step 3: Inerting

- 4.1 Due to the potential for explosive atmospheres to be present, any tanks containing flammable substances, such as petrol or solvents, should be ‘inerted’ prior to excavation. Where tanks contain substances with a low flashpoint, inerting is not required.
- 4.2 Inerting operations can include filling with gases or cleaning and de-gassing followed by carrying out oxygen testing, or the filling of the tank with water or foam.
- 4.3 The operation should be carried out by a specialist and a certificate provided ensuring the tank is safe to remove.

5 Step 4: Pipework Removal

- 5.1 All pipework connected to the tank should, as far as is reasonably practicable, be removed.
- 5.2 The removal of pipework should not be carried out until it has been drained and isolated from fuel sources.
- 5.3 Residual fuels may be present in pipework and a precautionary measure of flushing with water should precede the removal and dismantling work.
- 5.4 Care should be taken to ensure that no fuel or contaminated water is allowed to enter any drainage system, watercourse or the ground. Water used to flush out the pipework should be collected for safe disposal. It may be possible, with appropriate approval, to discharge this water through the on-site oil/water separator.

6 Step 5: Tank Lifting and Excavation Works

- 6.1 Prior to lifting a tank from an excavation, a risk assessment should be prepared by the specialist contractor responsible for the works.
- 6.2 During the excavation and removal of a UST it should be assumed that contaminated soils are likely to be encountered in the area immediately surrounding the underground tank and pipework. Excavations should continue until all grossly contaminated soils have been removed. The sides and the base of the excavation must then be sampled by a Geoenvironmental consultant to verify the satisfactory removal of contaminated soils.

7 Step 6: Dismantling and Disposal

- 7.1 Uplifted redundant tanks may be broken up on-site prior to disposal, providing such works can be undertaken without endangering workers of the environment.
- 7.2 To minimise the risk of fire or explosion only cold cutting techniques should be used.

8 Watching Brief and 3rd Party Verification

- 8.1 A Geoenvironmental Consultant should be present during all UST tank removals to undertake verification sampling of the excavation prior backfilling and to aid in the identification and segregation of grossly contaminated soils for off-site removal.
- 8.2 The overall frequency of verification sampling will be dependent upon the scale of the excavations and extent of contamination.
- 8.3 As a minimum, sampling must comprise one sample from each pit side and two samples from the base (6 No.). Additional side-wall and base samples will be required for every 10 linear metres of excavation.
- 8.4 For fuel oils, the testing scope will comprise of a speciated TPH CWG, PAH and BTEX suite per sample. Tanks storing solvent shall be subject to a TPHCWG, SVOC & VOC testing suite.
- 8.5 Any remaining soils or imported backfill materials must meet published UK-specific generic assessment criteria produced under the 'commercial/industrial' scenario. Such as C4SLs, S4ULs, SGVs, and ATRISKsoil SSVs.
- 8.6 All tank removal and remedial works undertaken must be documented and submitted to the Local Authority within a Verification Report

9 Contractor Records

- 9.1 The contractor should maintain all records associated with the decommissioning and removal of fuel/oil tanks, and provide them to the geo-environmental consultant for inclusion into the Verification Report. As a minimum, the records should include:
 - i) A plan showing the location of the tank(s) encountered and removed.
 - ii) The approximate volume, contents and state of each tank upon inspection.
 - iii) Who undertook the specialist decommissioning works.
 - iv) Records confirming the bottoming out and inerting of tanks has taken place, along with the provision of any disposal records for the oil and contaminated water.
 - v) Off-site disposal records for the tank carcass and grossly contaminated soils .

Appendix F Example Tracking System

Belwags much import.

264 Loads to 17/06
327 Loads to 27/06

Totals in June

Newick 138
Hoxfield 38
Uxfield 47
Billingshurst 327
Total

550 Loads
Totals in July

Uxfield 181
Hallsam 267
Total

448 Loads

HGM 138

Newick - 138 Loads
Brown (Ux) - 38 Loads (20/6)
Brown (Ux) - 31 Loads (30/6)
Mark Luck - 8 Loads (30/6)
MV - 2 Loads (30/6)
Midcut - 1 Load (30/6)
JMS - 2 Loads (30/6)
AMV - 3 Loads (30/6)
Brown (Ux) - 33 Loads (15/7)
Brown (Ux) - 26 Loads (4/7)
Brown (Ux) - 15 Loads (15/7)
Brown (Hall) - 41 Loads (18/2)
Brown (Hall) - 28 Loads (19/7)
Brown (Hall) - 28 Loads (20/7)
Brown (Hall) - 26 Loads (21/7)
Brown (Hall) - 27 Loads (24/7)
Brown (Hall) - 33 Loads (25/7)
Brown (Hall) - 25 Loads (26/7)
Brown (Ux) - 20 Loads (26/7)
Brown (Ux) - 32 Loads (27/7)
Brown (Ux) - 32 Loads (28/7)
Brown (Hall) - 21 Loads (28/7)
Brown (Hall) - 27 Loads (31/7)
Euro Green (Hall) - 4 Loads (31/7)
MV (Hall) - 6 Loads (31/7)
Brown (Ux) - 23 Loads (31/7)
Belwags (Belw) - 1 Load (31/7)
Brown (Ux) - 27 Loads (4/8)
Brown (Hall) - 27 Loads (4/8)
Euro Green (Hall) - 6 Loads (4/8)
Brown (Ux) - 31 Loads (2/8)
Brown (Hall) - 25 Loads (2/8)
Euro Green (Hall) - 4 Loads (2/8)
Brown (Ux) - 39 Loads (3/8)
Brown (Hall) - 27 Loads (3/8)
Euro Green (Hall) - 2 Loads (3/8)
Brown (Hall) - 23 Loads (4/8)
Brown (Hall) - 28 Loads (7/8)

