



REMEDIATION STRATEGY

**THE OLD COAL YARD
NORTH END ROAD
YAPTON
WEST SUSSEX**

PROJECT REFERENCE: C17111

REPORT REFERENCE: R16632

Report Beneficiary: Padwick Builders Ltd.

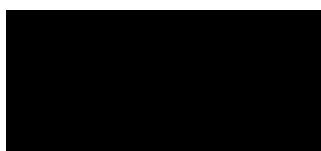
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1. INTRODUCTION

It is proposed to develop The Old Coal Yard located at North End Road, Yapton, West Sussex. The development proposals are understood to comprise the erection of four dwellings with associated landscaping, access and parking. A copy of the proposed development layout is presented in Appendix A.

The development has been approved conditionally (on appeal)¹ with a planning condition – Condition 6 imposed with respect to contaminated land.

Ashdown Site Investigation Ltd. has previously prepared a Combined Geotechnical and Ground Contamination Risk Assessment² with respect to Condition 6 parts (1), (2) and the first part of (3).

The ground contamination risk assessment identified complete pollutant linkages and concluded that remedial measures were necessary as part of the development.

Ashdown Site Investigation Ltd. was requested to produce a remediation strategy and verification report for the site to assist with the discharge of Condition 6 parts (3) and (4).

The scope of the works covered by this report, and the terms and conditions under which they were undertaken, were set out within the offer letter Q14989, dated 14th February 2025. The instruction to proceed was received from the client.

2. SITE LOCATION

The site comprises a broadly rectangular shaped plot of land located to the west of North End Road, Yapton, West Sussex, and is centred on the approximate Ordnance Survey national grid reference 498080, 104337. A site location plan is presented as Figure 1.

3. RISK ASSESSMENT

3.1 Preliminary Risk Assessment

The preliminary risk assessment identified potential sources of contamination associated with the current and former use of the site as a depot, made ground from potential cut and fill works having occurred on the site, and from the potential for made ground beneath shelters and areas of compacted hardcore on the site.

3.2 Quantitative Risk Assessment

The ground investigation comprised the drilling of a series of boreholes and the hand excavation of trial pits across the site. A variable depth of made ground and reworked soils, recorded locally to extend to a significant depth, were encountered across the site. These soils generally comprised gravelly sandy clay deposits, with the gravel fraction comprising variable quantities of flint, brick, concrete, ash and clinker-like material, plastic and chalk. Underlying the made ground and reworked soils, where penetrated, the ground investigation encountered River Terrace Deposits overlying the White Chalk Subgroup deposits.

Samples of the made ground and reworked soils were tested for the range of contaminants identified by the preliminary conceptual model, with the results compared to generic soil screening values (SSV) for a

¹ Arun District Council, Application Ref: Y/14/23/PL

² Project Ref: P15845, Report Ref: R15502, Issue 2, dated 28th March 2025

residential land use. Nine of the ten samples tested recorded either concentrations of lead or PAH compounds in excess of their respective SSV.

The made ground was considered to pose an unacceptable risk to end users of the site and remedial measures were considered to be necessary.

In addition, the concentrations of petroleum hydrocarbons recorded exceeded the threshold value for the use of PE water supply pipework, and the use of upgraded water supply pipework (i.e. barrier pipework) was considered to be necessary, though recommendation with the local water supply company was also recommended.

A copy of the quantitative conceptual model is presented as Appendix B.

4. REMEDIATION STRATEGY

Current best practice guidance recommends that any remedial action proposed for the site should be justified. The pollutant linkages identified by the quantitative risk assessment are considered to provide sufficient justification for remedial works.

The remediation works have been developed to meet the technical objectives for the development, the major drivers behind which are:

- To achieve successful remediation within a particular timescale and budget;
- Familiarity with the methodology by the developer/ground worker;
- Confidence that the remediation can be carried out by good technical practices; and
- Likely success of the style of remediation.

It is noted that the risk assessment report has not yet been approved by the local authority. The remediation strategy proposed herein is provisional based upon their approval of the risk assessment. Additional measures may be required following comment from the local authority.

4.1 Options Appraisal

The driver for remediation at the site is the presence of made ground and reworked soils containing concentrations of lead and PAH compounds that are considered to pose an unacceptable level of risk to human health in the context of the development. There are no in situ or ex situ remediation techniques available to reduce the concentrations of lead and PAH compounds within the soils to below that of the published screening values.

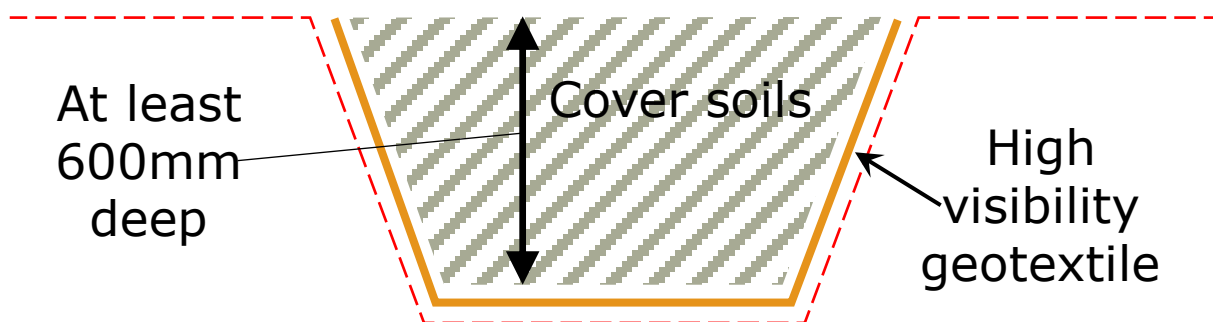
The recommended works must be achievable by the groundworker, using techniques that they are familiar with. It is therefore considered that the remediation proposals could either comprise the complete removal of the contaminant source (the made ground AND the reworked soils), or the provision of a cover system to sever the contaminant pathways in areas where the end users may reasonably be expected to be exposed to the soils or soil derived dust.

Given the variable depth of made ground and reworked soils recorded to be present, their complete removal would be hugely disruptive to the existing site and would result in the disposal of a very large volume of soils. Such an approach is considered to be unsustainable and therefore provision of a cover system is considered to represent the better approach to reducing the risk to end users of the site to an acceptable level.

4.2 Protection of Human Health

Within proposed areas of soft landscaping, the made ground soils and reworked soils should be excavated to a sufficient depth to allow the placement of a cover system of at least 600mm of verified "clean" cover soils underlain by a high visibility geotextile marker.

A schematic cross section of the cover system construction is shown below.



The depth of the cover system specified represents “two spade depths” to allow for planting of trees, shrubs etc. without residents coming into contact with the contaminated soils remaining at depth.

Should any tree planting be proposed within areas of general soft landscaping, then the depth of the cover system should be locally deepened to that required for the tree pit.

Elsewhere on the site the presence of building cover, driveways, patios and permanent access ways comprising hard cover will also act to sever the contaminant pathways and thereby reduce the risk to end users to an acceptable level.

The extent of the areas where the above remedial works are required are shown on Figure 2.

4.3 Protection of Controlled Waters

The risk assessment did not identify any unacceptable risks to controlled waters beneath the site and therefore no specific remedial works are considered necessary in this regard.

4.4 Protection of Services

Unless confirmed otherwise in writing by the water supply company, it should be assumed that barrier pipe is required for all new water supply connections.

All other service providers' requirements must be fully adhered to in order to reduce the risk to end users and services to an acceptable level.

Details of any measures required by service providers and confirmation of their implementation should be included within the verification report.

4.4.1 Protection of Construction Workers

All construction workers must undertake their own risk assessment, based upon the works to be carried out and the proposed method by which this will be achieved, in accordance with current health and safety legislation. Their assessment should take into account all available information about the site, including that present within this report.

Appropriate working procedures and PPE should be adopted to ensure the health and safety of the site operatives. Instruction should be given in the recognition of potentially hazardous materials. All site personnel should be appropriately briefed on the discovery strategy, presented below, and what actions they must take in the event that further evidence of contamination is identified or suspected.

4.5 Discovery Strategy

If, during the course of the site clearance and development works, any materials not previously identified by the investigation that are suspected of being 'contaminants' are encountered, then the following procedure should apply:

- All works in that area should cease and the site manager should be informed.
- Advice should be sought from suitably qualified and experienced personnel as to whether any further site inspection, sampling, testing and/or assessment is deemed necessary.
- If required, the conclusions of any assessment and any proposed remedial works (if required) should be agreed by the local authority.
- If necessary, full details of any remedial works should be included in the verification report for the site.

Suspected 'contamination' may take the following form, though it is noted that this list is not exhaustive and site operatives should ask if they are at all unsure of any findings:

- Soil or water looks oily and/or has an oily odour
- Soil or water has a solvent type of odour
- Significant quantities of man-made materials within fill such as paint cans, car parts, glass fragments
- Suspected asbestos containing materials (insulating boards, cement, loose fibres etc.)
- Significant volumes of clinker like or ashy material
- Sand bags, and/or subsurface concrete structures
- Animal carcasses or evidence of animal burial pits

5. VERIFICATION PLAN

A checklist summarising the requirements of the verification report is presented within Appendix C. Depending on the development programme, it may be necessary for interim verification reports to be produced for parts of the site prior to the completion of all development works.

5.1 Stripped Formations and Placement of Geotextile Marker

For all areas where remediation works are required (reference Figure 2) the formation level will be inspected prior to placement of any cover soils to confirm that the excavations are sufficiently deep to enable placement of the required thickness of cover soils, and to document the placement of the high visibility geotextile marker.

A photographic record of all stripped formations will be maintained for inclusion in the verification report.

If for any reason the above inspections are not undertaken for areas where remediation works are required, retrospective verification will be carried out by way of the excavation of trial pits to expose the geotextile in representative locations. In such circumstances these works may be undertaken in conjunction with the works detailed in Section 5.2.

5.2 Cover System Depth

The final depth of cover material placed in all required areas should be confirmed by use of tape measurements made within excavations to the base of the cover soils. In the event that tree pits requiring deeper sections of cover system are included in the final development then these locations should be specifically checked to ensure the depth provided meets the requirements for the trees.

Photographic evidence of the depth of cover soils present will be included in the verification report.

5.3 Imported Materials

Any imported material from a potentially contaminated (e.g. industrial) site should be rejected. It is recommended that chemical testing results are obtained and supplied for comment prior to accepting the soils on site. Obtaining such results does not negate the need to carry out sampling and testing of the soils, once brought onto the site.

Once imported materials have been brought to site they should be stockpiled and protected from cross contamination with any other materials already on site. They will then be inspected, sampled and tested by Ashdown Site Investigation Ltd.

5.3.1 Soils for use in soft covered areas.

The table below summarises the soil screening values³ against which any imported soils will be assessed.

Table 1. Calculated soil screening values for imported soils

Contaminant	Screening Value (mg/kg)	Contaminant	Screening Value (mg/kg)
Arsenic	37	Fluorene	170
Cadmium	11	Phenanthrene	95
Chromium	910	Anthracene	2400
Copper	2400	Fluoranthene	280
Lead	200	Pyrene	620
Mercury	40	Benz(a)anthracene	7.2
Nickel	180	Chrysene	15
Selenium	250	Benzo(b)fluoranthene	2.6
Zinc	3700	Benzo(k)fluoranthene	77
Hexavalent Chromium	6	Benzo(a)pyrene	2.2
Water Soluble Boron	290	Indeno(123-cd)pyrene	27
Naphthalene	2.3	Dibenz(ah)anthracene	0.24
Acenaphthylene	170	Benzo(ghi)perylene	320
Acenaphthene	210	Asbestos	None detected

It is noted that the SSV are only protective of long-term risk to human health and do not necessarily represent suitable concentrations for planting or landscaping. If necessary, a horticulturalist should be consulted in this regard.

All soils must be free from any visual or olfactory evidence of suspected petroleum hydrocarbon contamination and should contain no significant quantity of putrescible material (incl. wood or paper). Along with testing for the contaminants listed above, testing should also be undertaken to confirm the absence of any significant concentrations of petroleum hydrocarbons.

All soils used as surface dressing or as part of the cover system must be free from propagules of aggressive weeds, fragments of glass, bricks, concrete, wire or other potentially hazardous foreign matter and bulk vegetative growth, in order to ensure negligible risk of subsequent weed problems (introduced in the soil) or traumatic injury.

In the event that any individual sample of imported material records concentrations of contaminants above the screening values listed above, the following method of assessment will be undertaken:

³ Comprising 'Suitable For Use Levels' (S4ULs), 'The LQM/CIEH Suitable 4 Use Levels, 2015' and for lead, the Category 4 Screening Level (C4SL), SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. Final Project Report, published by DEFRA, 2014.

- Statistical analysis of the results, along with an assessment of whether any statistical 'outliers' should be removed from the dataset and treated as 'hotspots'. If the data indicates that the majority of the soil mass as a whole may be considered to contain contaminant concentrations below the screening values then it may be deemed suitable to remain.
- Depending on the findings of the analysis additional testing (which may include retests of the original sample) may be undertaken along with further analysis of the results to determine if this is representative of a widespread issue, or may be attributed to a smaller part of the site, or batch of imported soils.
- Liaison with the regulators may be undertaken to agree whether or not the materials are to be considered suitable to remain.

Where testing and analysis identify a significant failure and the procedures above do not provide sufficient evidence that the imported materials are suitable to remain, then the imported soils will be removed and replaced with other suitable soils.

5.4 Services

The contractor should provide photographic evidence to confirm installation of barrier pipe or, if applicable, written confirmation from the local water supply company that other pipework is acceptable.

Confirmation of any service providers' requirements and evidence to demonstrate adherence to them should be included in the verification report.

6. POST REMEDIATION RISK ASSESSMENT

The remedial works set out in this report are considered to remove or sever the identified pollutant linkages. A post remediation conceptual model is presented in the following table.

Table 2. Post Remediation Conceptual Model for End Users – Potential Pollutant Linkages and Assessment of Risk

Contaminant Source	Remedial Measures	Potential Pathway(s)	Assessment of Risk to Human Health
Made ground and reworked soils containing elevated concentrations of lead and PAH compounds and concentrations of petroleum hydrocarbons above the threshold value for the use of PE water supply pipework	Soft Landscaping Areas: Provision of 600mm of verified "clean" cover soils over a high visibility geotextile marker	Pathways severed by remedial measures	No significant pollutant linkages identified.
	Tree Planting: Depth of cover system increased to required depth of the tree pit		
	Water Supply Pipework: Provision of barrier pipe OR Other pipework acceptable to the local water supply company	Pathways severed by remedial measures and construction works.	
	Building cover, driveways, patios and permanent access ways comprising hard cover	Pathways severed by construction works	

7. REGULATORY APPROVAL

This report should be submitted to the local authority in support of an application to discharge planning Condition 6 parts (3) and (4).

The conclusions drawn in this report should be considered as provisional until such time as the report has been accepted and the relevant conditions have been discharged.

It is noted that Condition 6 cannot be discharged in full until a verification report has been prepared, providing evidence of the successful completion of the remediation works.

Regulatory feedback on this report, and the previously issued risk assessment, should be included within the verification report.

FIGURES

- Figure 1 Site Location Plan
- Figure 2 Remedial Works Plan



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Site

The Old Coal Yard
North End Road
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West Sussex

Project Ref

C17111

Figure No

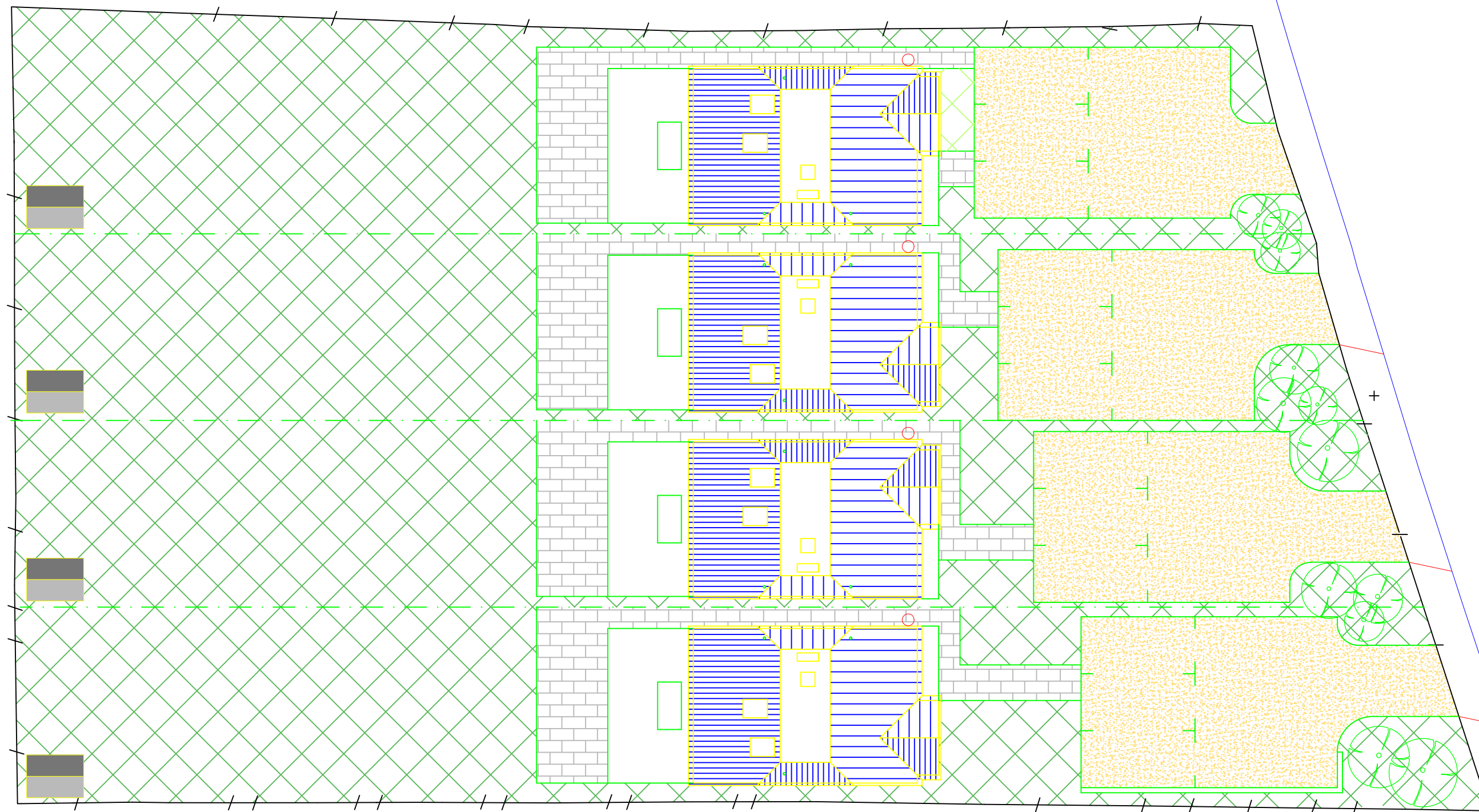
1

Drawing Title

Site Location Plan

Scale

Not To Scale



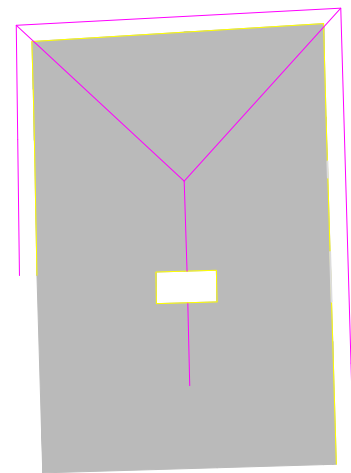


Soft Landscaping Areas: Provision of 600mm of verified "clean" cover soils overlying a high visibility geotextile maker



Tree Planting: Cover soils and high visibility geotextile marker to the full depth of the tree pit

Water Supply Pipework: Provision of barrier pipe or other pipework acceptable to the local water supply company



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SITE INVESTIGATION

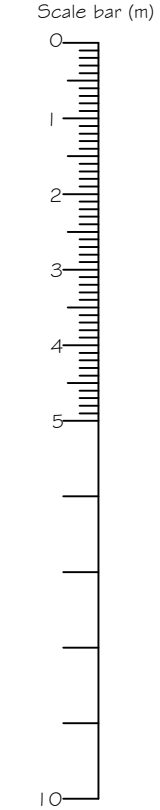
Head Office
Unit 3 The Old Grain Store Ditchling Common Business Park Ditchling East Sussex BN6 8SG contact@ashdownsi.co.uk
Site
The Old Coal Yard North End Road Yapton West Sussex
Project Ref.
C17111
Figure No.
2
Drawing Title
Site Plan indicating Extent of Remediation Required
Scale
Not To Scale

APPENDIX A

Proposed Development Plan



NOTE:
WRITTEN DIMENSIONS TO BE TAKEN IN PREFERENCE TO SCALE AND ARE TO BE CHECKED ON SITE PRIOR TO COMMENCING WORK.
THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER DOCUMENTS RELATING TO THIS PROJECT.
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A SITE SECTION LINES & OTHER INFO ADDED 03.03.23
REV DESCRIPTION DATE

PROJECT
THE OLD COAL YARD
NORTH END ROAD
YAPTON
WEST SUSSEX

DRAWING TITLE
PROPOSED SITE LAYOUT & STREET ELEVATION

SCALE 1:100 @A1
DRAWN BY FLB
DATE FEB 23

DWG NO 1209/PO1
REV. A

APPENDIX B

Quantitative Conceptual Model

The Old Coal Yard, North End Road, Yapton, West Sussex				Quantitative Conceptual Model		P15845	
Source	Receptor	Contaminants	Pathway	Complete Linkage Present?	Probability	Consequence	Risk
Made ground and reworked soils containing elevated concentrations of lead and PAH compounds and concentrations of petroleum hydrocarbons above the threshold value for the use of PE water supply pipework	End Users	Lead and PAH Compounds	Dermal contact with soil and dust (indoor & outdoor)	Yes	P3: Moderate	C3: Moderate	Moderate
			Ingestion of soil and indoor dust	Yes	P3: Moderate	C3: Moderate	Moderate
			Consumption of home-grown produce and attached soil	Yes	P3: Moderate	C3: Moderate	Moderate
			Inhalation of soil dust (indoor and outdoor)	Yes	P3: Moderate	C3: Moderate	Moderate
			Inhalation of soil vapours	Identified contaminants do not pose a risk via this pathway			N/A
			Inhalation of soil gases/ Risk of explosion	Identified contaminants do not pose a risk via this pathway			N/A
	End Users (via Water Supply Pipework)	Petroleum Hydrocarbons	Contamination of incoming services	Yes	P3: Moderate	C3: Moderate	Moderate
	Groundwater		Migration to groundwater	No contaminants present at concentrations posing risk to groundwater			N/A

APPENDIX C

Checklist for Verification Report(s)

Item	Tick (✓)
Regulatory Feedback on Risk Assessment and Remediation Strategy	
Documentation (Including Photographs) of Stripped Formation	
Documentation (Including Photographs) of Placed High Visibility Geotextile Marker	
Documentation (Including Photographs) Confirming Depth of Cover Soils	
Supplier Certification for Imported Soils (Where Supplied)	
Laboratory Test Data for Imported Materials sampled on site	
Confirmation that the local water supply company are satisfied with new water supply connection material	
Confirmation of Any Other Service Providers' Requirement Having Been Adhered to (If Imposed)	