



REMEDIATION & ENABLING WORKS STRATEGY

Land at Whitburn Lodge,
Mill Lane,
Whitburn,
Sunderland

Prepared for:

LOVELL

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EXECUTIVE SUMMARY

Site Address	Land at Whitburn Lodge, Mill Lane, Whitburn.
National Grid Reference	E440717, N563522.
Site Area	1.04 Hectares.
Background	ERGO has been instructed by Lovell to develop a Remediation Strategy and Enabling Works Performance Specification for the proposed residential development at the site located to the east of Mill Lane at Whitburn Lodge in Whitburn. The ERGO Remediation & Enabling Works Strategy has been produced in due consideration of the Phase I and II Geo-Environmental Assessments previously undertaken by ERGO. The site comprises a derelict Public House, Whitburn Lodge and electricity substation, with associated parking to the north and landscaping to the south. The eastern site area comprises fields in use for grazing, with allotments adjacent in the south-eastern site area. ERGO understands that Lovell intend to develop the subject site for a low rise residential end use. The proposed development is understood to comprise detached, semi-detached and terraced properties with associated estate roads, private gardens and associated utility infrastructure.
Contaminated Land Assessment	
Human Health Risk Assessment	The Tier 1 Human Health Risk Assessment identified elevated concentrations of non-volatile, insoluble heavy metals and hydrocarbon compounds onsite that would present unacceptable degrees of theoretical risk to the identified receptors associated with direct exposure pathways. All landscaped areas where Made Ground is to remain at formation level will require the placement of a 600mm chemically suitable cover system (comprising 450mm subsoil and 150 topsoil) to remove the exposure pathway and ensure no unacceptable risk to the human health receptors. Where the Made Ground is <600mm thick below final garden levels, the cover system should only extend to the natural stratum to ensure adequate mitigation of all perceived risk. Elevated concentrations of Naphthalene were identified within 1no. sample within the previously identified area of contamination onsite. It is recommended that this material is delineated, excavated and either removed from site or placed within an area of low sensitivity. By removing the source, following validation sampling to confirm absence of Naphthalene within remaining soils, it is considered the risk from Naphthalene will be negligible. Asbestos in the form of loose Chrysotile and Amosite fibres has been identified in shallow Made Ground deposits. Furthermore, visual evidence of ACM tiles was encountered during the ground investigation in the vicinity of the existing buildings. A process of delineation is recommended to be undertaken to confirm the extent of the identified asbestos material. It is recommended that Made Ground deposits proposed for reuse within the scheme in areas where asbestos has been identified previously are subject to a process of handpicking by a trained CAT B operative to ensure the removal of all residual visible ACM as far as reasonably practicable. All Asbestos Containing Material (ACM) identified during the site enabling works must be dealt with in strict accordance with the Control of Asbestos Regulations (CAR) 2012, UK Waste Management Legislation and the Environmental Protection Act 1994. ERGO should be contacted should further unforeseen contamination be encountered during subsequent works.

EXECUTIVE SUMMARY

	Further post demolition investigations are required to confirm the findings of the initial assessment as and when full and unrestricted access is available to the entire site.
Controlled Waters Risk Assessment	Based on the site investigation information, a low risk to controlled waters has been identified. Should significant gross contamination be encountered during subsequent works, it may be necessary to revise the above assessment.
Ground Gas	Based on the completed gas monitoring period, the site has been classified as CS1/Green when comparing results obtained to guidance outlined within CIRIA C665, and therefore gas protection measures are not required within proposed buildings. The findings of this assessment should be confirmed with the relevant regulatory authorities.
Coal Mining & Historical Workings	The site is not considered to be at risk from shallow mining or quarrying related issues.
Invasive Plants	Invasive species have not been identified on site during works carried out by ERGO.
Geotechnical Considerations (Subject to completion of post demolition investigation)	The Remediation and Enabling Works will be delivered in a manner that will seek to ensure: • The stratum should be prepared in a manner that will facilitate re-engineering potentially using a Vibro Stone Column (VSC) solution; • If VSC is proposed for plots located within the influence of trees, the stratum should be prepared to mitigate the potential risk associated within volumetric instability in cohesive soils; and, • Engineer all up-filled materials beneath highways to sub-grade in accordance with the requirements of this specification to ensure a CBR >5% in the sub-grade.
Summary of Site Remediation & Enabling Works	The site Remediation / Enabling Works Strategy provides a comprehensive specification for the regeneration of the land to negate identified pollutant linkages and construct a development platform that will be geotechnically suitable for the proposed end use. The salient features of the Remediation & Enabling Works Strategy are summarised below: • Post Demolition Supplementary Site Investigation; • Implementation of all works in strict accordance with UK Environmental Permitting and Local Planning Authority Requirements; • Delineation and removal of asbestos impacted soil and naphthalene hotspots; • Controlled removal of all trees and vegetation; • Removal and treatment of all invasive plants species (if required); • Removal of all relict foundations and buried features in their entirety; • Excavation and processing of Made Ground in a controlled manner with the sorting, processing and segregation of identified deleterious materials; • Cut/ fill of the site to suit development construction levels and creation of working platforms if required; • Validation sampling and testing to confirm material retained on-site pose no unacceptable risk to the residential end users, controlled waters or wider environ; • Importation of suitable material (if required) to achieve the required development levels; and, • Replacement of material in accordance with the ERGO enabling specification & engineering requirements.

EXECUTIVE SUMMARY

Summary of Build Phase Mitigation Requirements

The developer's works will also include the completion of the following additional elements:

-  Provision of a 600mm cover system using certified material with appropriate validation within proposed garden areas where Made Ground remains at formation level, comprising 450mm subsoil (potentially site won natural drift deposits) overlain by 150mm topsoil; and,
-  Provision of a 300mm cover system using certified material with appropriate validation within proposed areas of Public Open Space and soft landscaping.

Table of Contents

1. INTRODUCTION	7
1.1 Background	7
1.2 Report Objectives	7
1.3 Scope of Works	7
1.4 Previous Works	7
1.5 Redevelopment Plan	7
1.6 Summary of Parties Involved	8
1.7 Regulatory Correspondence	8
1.8 Site Details	9
1.9 Site Summary	9
1.10 Summary of Reported Ground Conditions	9
2. ERGO CONTAMINATION RISK ASSESSMENT	11
2.1 Background	11
2.2 Human Health Risk Summary	11
2.3 Controlled Waters Contamination Risk Summary	14
2.4 Ground Gas	14
3. SITE REMEDIATION & ENABLING WORKS	15
3.1 Remediation Technology	15
3.2 Overview of Works	16
3.3 Second Phase Mitigation & Management – Build Phase	21
3.4 Materials Management & Legislative Compliance	21
3.5 Validation Sampling Protocol	22
3.6 Remediation Contractors Site Management & Responsibility	23
4. ENVIRONMENTAL MONITORING AND VALIDATION	24
4.1 Site Management	24
4.2 Completion	24
4.3 Mitigation of Risk from Soils with Asbestos Fibres	24
5. GEOTECHNICAL ENGINEERING SPECIFICATION	27
5.1 ERGO Geotechnical Engineering Specification	27
5.2 Locally Won Fill Material	27
5.3 Classification of Fill Material	27
5.3.1 General Classification	27
5.4 Use of Fill Materials	28
5.5 General Requirements	30
5.5.1 Construction of Fills – Highways	31
5.5.2 Construction of Fills – Adopted Highways, Estate Roads & Car Park	32
5.6 Earthworks Material Tests	32
5.7 Specification for Ground Improvement by Vibro Stone Column	33
6. RECORD KEEPING & VERIFICATION	35
6.1 Record Keeping	35
6.2 Verification	35
7. CONTINGENCY PLAN	36
7.1 Previously Unidentified Contaminants	36

APPENDICES

Appendix I Limitations

Appendix II Glossary

Appendix III Drawings

Drawing No 23-1757-001 – Site Location Plan

Drawing No 23-1757-002 – Proposed Development Plan

Drawing No 23-1757-003 – Exploratory Hole Location Plan

Drawing No 23-1757-004 – Depth of Made Ground Plan

Drawing No 23-1757-006 – Historical Features Plan

Drawing No 23-1757-007 – Identified Contaminant Exceedance Plan

Appendix IV ERGO Remediation / Validation Criteria

Appendix V ERGO Material Import Criteria

1. INTRODUCTION

1.1 Background

ERGO has been instructed by Lovell to develop a Remediation Strategy and Enabling Works Performance Specification for the proposed residential development for a parcel of land at Whitburn Lodge in Whitburn.

1.2 Report Objectives

The objectives of this report are to:

-  Prepare an overview of Contaminated Land Remediation requirements;
-  Evaluate feasible remedial technologies;
-  Assess the most appropriate earthworks solution to ensure the delivery of the optimum development platform;
-  Define validation criteria to demonstrate the successful implementation of a site Remediation & Enabling works plan;
-  Specify Geotechnical Engineering Performance Requirements; and,
-  Ensure the safe, cost effective and regulatory compliant redevelopment of the site.

1.3 Scope of Works

The development of the risk management strategy for the subject site includes the following tasks:

-  Identification the relevant pollutant linkages;
-  Review of site characteristics;
-  Identification of geotechnical constraints;
-  Development of remedial objectives;
-  Selection of appropriate remedial technology; and,
-  Development of remedial strategy.

1.4 Previous Works

The following phases of Geo-Environmental investigations have previously been carried out at the site:

-  **ERGO:** *Phase II Geo-Environmental Site Assessment (ref: 22-1169-r02, dated May 2022) for Thirteen Group.*
-  **ERGO:** *Remediation & Enabling Works Strategy (ref: 22-1169-r03, dated May 2022) for Thirteen Group.*
-  **ERGO:** *Phase II Geo-Environmental Site Assessment (ref: 23-1757-r01, dated December 2023) for Lovell.*

To inform the assessment of the potential risk to contaminated land within the context of the proposed residential development and to inform the preparation of the Remediation Strategy the pertinent points from the above reports are summarised within Section 1.9, 1.10 and Section 2.

For the avoidance of any doubt, the ERGO Geo-Environmental Assessments should be read both as a precursor and in conjunction with this document.

1.5 Redevelopment Plan

ERGO understands that Lovell will develop the subject site for a low rise residential end use. The proposed development is understood to comprise detached, semi-detached and terraced properties with associated estate roads, private garden and utility infrastructure.

Drawing 23-1757-002 (Appendix III) identifies the proposed development layout. A snapshot of the proposed development is shown within Figure 1.1 below.

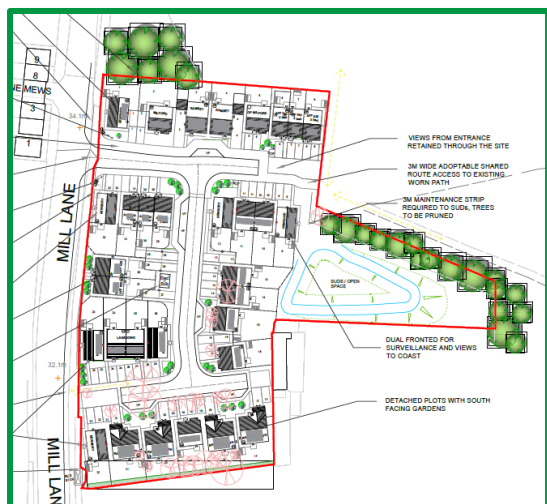


Figure 1.1 Snapshot of Proposed Development

1.6 Summary of Parties Involved

FUNCTION / INTEREST	NAME OF PARTY
Local Planning Authority	South Tyneside Council.
Developer	Lovell.
Geo-Environmental Consultant	ERGO.
Main Contractor	Lovell.
Remediation / Enabling Works Contractor	TBC.
Human Health Regulator	South Tyneside Council.
Controlled Waters & Waste Regulator	Environment Agency.

1.7 Regulatory Correspondence

Lovell are in the process of submitting a detailed Planning Application to South Tyneside Council for the proposed redevelopment of the site for low rise residential housing set to comprise detached, semi-detached and terraced properties with associated estate roads, private garden and utility infrastructure.

It is presumed that as part of the planning approval process, the Planning Authority will undertake consultation with the pertinent statutory consultees which will include:

- Environmental Health / Contaminated Land Officer at the Local Authority (or external advisor);
- Environment Agency Planning Liaison; and,
- The Coal Authority.

1.8 Site Details

Site Address	Land at Whitburn Lodge, Mill Lane, Whitburn.
National Grid Reference	E440717 N563522.
Site Area	1.04 Hectares.

All acronyms used within this report are defined in the Glossary presented in Appendix II.

A site location map is presented in Appendix III as Drawing 23-1757-001.

1.9 Site Summary

SITE DESCRIPTION & SETTING		
Occupancy/use	The subject site forms an irregular shaped parcel of vacant land located to the East of Mill Lane in northern Whitburn. The site comprises a derelict public house, Whitburn Lodge and electricity substation, with associated parking to the north and landscaping to the south. The eastern site area comprises fields in use for grazing, with allotments adjacent in the south-eastern site area.	
Environmental Setting	<i>Drift Geology</i>	Pelaw Clay (Clay) is recorded in the eastern site area with Glaciofluvial deposits (Sand & Gravel) and Glacial Till recorded in the west.
	<i>Bedrock Geology</i>	Roker Formation – Limestone. BGS records in the vicinity identified (suspected) Limestone bedrock at depths of between 1.80-3.25mbgl.
	<i>Hydrogeology</i>	Unproductive (east) and Secondary A (west) aquifer strata overlying a Principal Aquifer (Bedrock Geology). The site is located within a Groundwater Source Protection Zone 3 – Total Catchment Zone. Principal Aquifer with 1no. groundwater abstraction is recorded 172m NE of the site for Pollution Remediation. There are no recorded potable groundwater abstraction points within 1km of the site.
	<i>Surface Water</i>	No surface water receptors are recorded within 250m of the site.
Site History	A review of available historical mapping records indicated the site was occupied by Hope House and fields until 1895, when Whitburn Colliery was developed. A number of buildings and railway sidings were noted to be present within the site associated with the colliery, until closure in 1968 and subsequent demolition. The site was renamed Whitburn Lodge by 1988 and underwent a change of use to a Public House with various extensions recorded to date. It is understood the premises closed in recent years and is presently in a poor state of repair.	
Landfill Sites & Ground Gases	There are no landfills recorded within the site boundary. The nearest recorded landfill is 301m NW operated by O'Brien Aggregate at Marsden Quarry which is noted to be active and accepting inert waste.	

1.10 Summary of Reported Ground Conditions

ERGO has prepared 2no. Site investigation reports (Ref: 22-1169-r02, dated March 2022) for Thirteen Group and (Ref: 23-1757-r01, dated December 2023) for Lovell, the summary of reported ground conditions is summarised overleaf.

SUMMARY OF GROUND CONDITIONS

Made Ground	Reworked topsoil was encountered within the southern and eastern site areas, which was predominantly underlain by blackish or reddish-brown sands and gravels or reworked greyish brown firm to stiff clays at depths to between 0.30-0.80mbgl. In areas of hardstanding, within the central site and car park area, Made Ground generally comprised surficial tarmac and concrete hardstanding overlying black sandy gravels with timber, metal and clinker inclusions with localised reddish brown/black occasionally clayey gravelly sands and light yellowish brown very gravelly sands noted to variable depths between 0.45mbgl (TP105) to 3.30mbgl (TP103). Made Ground is recorded deepest in the north of the site, with shallower deposits encountered in the south and east. Buried brick and concrete features were noted within several of the advanced exploratory trial pits considered to represent relict foundations/floor slabs of formerly present onsite structures.
Topsoil	Topsoil deposits in the southern area of the site where minimal historic development has been recorded may be suitable for reuse, however further chemical validation testing would be required and removal of any anthropogenic inclusions. The topsoil across the remainder of the site is not considered suitable for reuse within the proposed development due to textural unsuitability and frequent anthropogenic inclusions.
Drift	Natural drift deposits predominantly comprise firm to stiff sandy gravelly CLAYs, interbedded with medium dense to very dense slightly silty slightly gravelly fine to coarse SANDs to general depths of between 2.10-7.50mbgl. Occasional thin bands of soft sandy gravelly CLAYs were noted within the central area of site at depths of between 0.70-1.60mbgl.
Bedrock	Solid limestone rockhead was proven within the rotary open boreholes undertaken within the northern and central site areas at depths between 2.80-7.50+mbgl. to maximum proven depths of at least 12.00mbgl.
Groundwater	Limited groundwater has been encountered at the site within intrusive ground investigations and subsequent groundwater monitoring works.

2. ERGO CONTAMINATION RISK ASSESSMENT

2.1 Background

ERGO has completed a Tier 1 Qualitative Contaminated Land Risk Assessment to determine their potential risk to human health, controlled waters and the wider environment. This assessment is documented in full within the ERGO Geo-Environmental Site Investigation Report and for clarity is summarised below.

2.2 Human Health Risk Summary

The ERGO Tier 1 Qualitative Human Health Risk Assessment identified concentrations of the following determinants at or above the screening criteria for the assessment of no unacceptable degree of risk to human health.

-  Asbestos Fibres (Chrysotile and Amosite)
-  Lead
-  Benzo(a)Anthracene
-  Benzo(b)Fluoranthene
-  Benzo(a)Pyrene
-  Dibenzo(a,h)Anthracene
-  Naphthalene

The elevated concentrations of non-volatile PAHs have primary exposure pathways related to dermal contact and ingestion of soils. The chronic risk to human health associated with elevated concentrations of non-volatile PAH compounds can be mitigated through the installation of a suitable cover system in proposed gardens, landscaping and Public Open Space where impacted soils have been identified to remove the potential for direct exposure.

With regards to the elevated naphthalene concentration, this presents a potential volatilisation to indoor air risk. The elevated concentrations have only been identified within 1no. localised area (TP204) of the site and is therefore considered to represent a hotspot. Although TP204 is located within a proposed garden area, it is considered that adequate delineation of the impacted material should be undertaken during a phase of remediation and enabling works to confirm impacted soils do not extend into areas of proposed elevated sensitivity.

Asbestos in the form of chrysotile and amosite fibres and fibrous debris has been identified within shallow Made Ground deposits within localised areas of the site. A process of delineation is recommended to be undertaken to confirm the extent of the identified asbestos material. Subsequent excavation, management and placement of impacted soils at depth beneath proposed plots may be undertaken to ensure they pose no unacceptable risk to the future site users, as shown within the ERGO Developed Asbestos Conceptual Site Model as shown within Figure 2.1 (overleaf). Furthermore, visual ACM in the form of loose asbestos tiles were previously during the intrusive investigation in the area of existing buildings. It is recommended that the existing structures are subject to a pre-demolition asbestos survey with appropriate management undertaken, as required, to ensure no unacceptable risk is posed subsequently.

Figure 2.1 Asbestos Conceptual Site Model

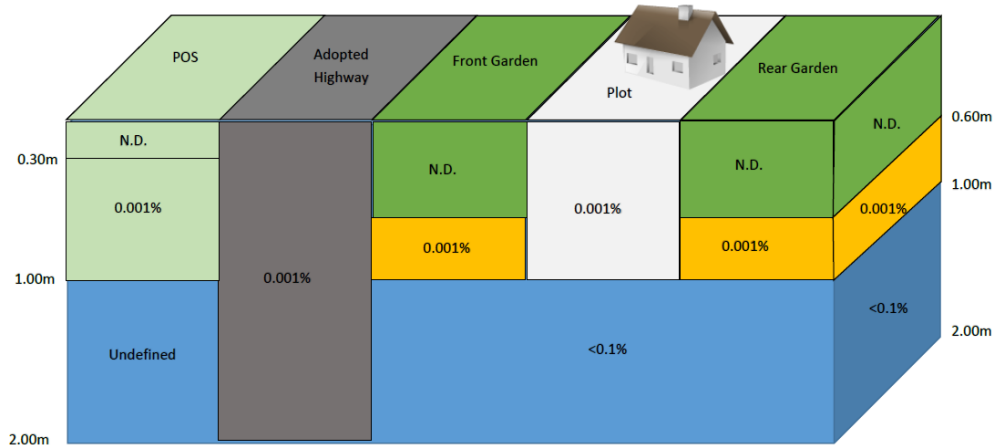
Notes:

N.D. – None Detected

0.001% - Soils may contain 50.001% asbestos using composite testing to ensure there is no potential risk to human health. This value is present within areas where there may be short term low level exposure of soils containing trace asbestos fibres by construction workers where an appropriate level of asbestos management is employed (dust suppression).

0.1% - Soils at a depth of >1.00m bgl may contain <0.1% asbestos using composite testing where they will be not likely to be disturbed in the future and will therefore be in an area of low sensitivity. Risk assessment completed in accordance with the Asbestos IIWG risk assessment tools.

Undefined – This will be dependent upon soils encountered during the earthworks, which may be placed at these depths to ensure no potential risk to human health.



It is recommended that Made Ground deposits, proposed for reuse within the scheme, where asbestos has been identified previously are subject to a process of handpicking by a trained CAT B operative to ensure the removal of all residual visible ACM as far as reasonably practicable.

All Asbestos Containing Material (ACM) identified during the site enabling works must be dealt with in strict accordance with the Control of Asbestos Regulations (CAR) 2012, UK Waste Management Legislation and the Environmental Protection Act 1994.

It should be noted that an additional phase of post-demolition investigation is proposed within the footprints of existing onsite structures which may identify additional sources of potential contamination which may result in revisions to this assessment.

Following site enabling works, it is recommended that proposed landscaped areas where unsuitable Made Ground remains at formation level will require the placement of a 600mm chemically suitable cover system (comprising 450mm subsoil and minimum 150mm topsoil) to remove the exposure pathway and ensure no unacceptable risk to the human health receptors is posed and to provide a suitable growing medium. Where the natural ground is encountered below final garden levels, only a suitable growing medium comprising a minimum of 150mm of suitable topsoil will be required. The specific design and installation process for the appropriate cover systems is defined within this strategy, however industry best practice (as outlined within BRE 465) will require the following minimum depths of certified clean cover:

-  Private Gardens where home-grown vegetables can be cultivated – **600mm**
-  Landscaped areas within private dwellings – **300mm**
-  Public Open Space – **300mm**

Topsoil deposits in the southern area of the site where minimal historic development has been recorded may be suitable for reuse, however further chemical validation testing would be required and removal/screening of anthropogenic inclusions. Topsoil across the remainder of the site is considered texturally unsuitable for reuse within the proposed development due to frequent anthropogenic inclusions. It is considered that suitable clean topsoil will need to be imported.

It is concluded that the site will be suitable for the proposed residential end use subject to the completion of the afore mentioned supplementary assessments and the following build phase mitigation items:

-  Completion of a Supplementary Phase of Investigation within the areas of the site not yet investigated due to the presence of buildings, active utility services or walls restricting access;
-  Confirmation of the Hazardous Ground Gas Regime with the associated installation and validation of suitable ground gas protection measures (if required);
-  Management of soils to ensure all materials impacted by asbestos fibres are placed in areas of low sensitivity during the site enabling works;
-  Use of potable water supply infrastructure that will be compliant with UKWIR assessment criteria;
-  Construction of a clean cover system to all areas of proposed landscaping/ gardens where unsuitable Made Ground remains at formation level in accordance with the detailed methodologies herein.

2.3 Controlled Waters Contamination Risk Summary

The site sensitivity with respect to controlled waters is summarised within Table 2.1

Table 2.1 Summary of Controlled Water Sensitivity

RISK PROFILE	DISCUSSION	SENSITIVITY RATING & RATIONALE
Source Protection Zone (SPZ)	Groundwater SPZ 3 – Total Catchment Zone	Low/ Moderate
Distance to the closest groundwater abstraction point.	1no. groundwater abstraction is recorded 172m NE of the site.	Low – used for Pollution Remediation by the Coal Authority
Aquifer classification in Superficial Drift Deposits	Unproductive in East, Secondary A in West	Moderate
Aquifer classification in Bedrock.	Principal	High
Surface water or Groundwater Vulnerability Area.	No	Low
Viability for Anthropogenic soil in direct contact with aquifer (drift or bedrock).	Yes	Moderate – Variable Made Ground with low level (predominantly low solubility) hydrocarbon impact/ odours is present in the near surface.
Is the site located within 50m of a surface water course	No	Low
Summary The ICSM developed within the context of the site setting has only identified a single viable pollutant risk which would be the downward migration of potentially mobile phase soluble contaminants towards the underlying Principal Aquifer. Furthermore, the site is located within a Zone 3 (Total Catchment) Source Protection Zone further increasing the sensitivity of the receptor. However, minimal groundwater has been recorded on site during the site works and following monitoring period, and limited contamination has been identified within shallow Made Ground deposits which both reduce the likelihood of downward migration of contamination. Risks to surface water receptors are considered negligible in the absence of identified receptors.		

In due consideration of the identified pollutant linkage, a Tier 1 controlled water risk assessment was completed by ERGO as part of the ERGO Geo-Environmental Site Investigations, which both considered risks to controlled waters low.

Based on the assessments completed, the risks to Controlled Water receptors is considered to be low. Should significant groundwater be encountered during subsequent visits, groundwater sampling and analysis will be undertaken with an addendum report produced to confirm apparent risks and liabilities in respect to controlled waters.

Should evidence of gross/significant mobile contamination be encountered during subsequent investigation works, this assessment will need to be revised.

2.4 Ground Gas

Based on the completed gas monitoring period, the site has been classified as CS1/Green when comparing results obtained to guidance outlined within CIRIA C665, and therefore gas protection measures are not required within proposed buildings. The findings of this assessment should be confirmed with the relevant regulatory authorities.

3. SITE REMEDIATION & ENABLING WORKS

3.1 Remediation Technology

Taking into account the site-specific conditions including the nature of the identified impacts, the geology and the objectives of the remediation, the most appropriate soil remedial technologies are considered to be:

-  A Supplementary Phase of Post Demolition Ground Investigation including sampling, testing and assessment within the area of the existing buildings and areas where access was restricted to confirm ground conditions and potential contamination;
-  Appropriate management of topsoil stripping works to ensure that potentially suitable topsoil deposits (within the southern site area, subject to validation testing) are kept separate from unsuitable Made Ground and is stockpiled, stored and reassessed appropriately prior to consideration for reuse;
-  Appropriate validation of placed soils to show all residual soil concentrations are below the SSRT's for the protection of human health, controlled waters and the wider environ;
-  Confirmation of ground gas protection classification and installation/validation of appropriate mitigation measures (if required) with relevant regulatory authorities; and,
-  Construction of a suitable cover system where impacted deposits and unsuitable Made Ground materials are present to mitigate potential risks.

It is considered that these technologies and methodologies will address the identified active pollutant linkages in the following manner:

Contaminants of Concern (CoC)

Metals and PAH Compounds

The human health risk drivers for the carcinogenic PAHs and metal CoC are:

-  Direct contact with the soil source by future on site residents; and,
-  Ingestion of impacted soils by future on site residents.

Therefore, a cover system is considered to be an appropriate remediation technique to address these impacts, as the installation of a cover system to unsurfaced areas of the site where Made Ground is present at formation level will sever the pathway of contact for human health receptors. A cover system is not considered to be required in future hard-standing areas or beneath buildings, as it can reasonably be assumed that the presence of a hard-standing will prevent direct contact.

Naphthalene

The human health risk drivers for Naphthalene are:

-  Vapour inhalation

Elevated concentrations of Naphthalene were identified within 1no. sample within the previously identified area of contamination onsite. This material is to be delineated, excavated and removed from site or alternatively placed within an area of low sensitivity. Following validation sampling to confirm absence of naphthalene within remaining soils within the footprint of the proposed plots, it is considered the risk from naphthalene will be negligible.

Asbestos

Asbestos trace fibres have been identified within shallow Made Ground at 3no. locations on site. A process of delineation is recommended to be undertaken to confirm the extent of the identified asbestos material. Further ACM impacted materials may be encountered within the footprints of proposed onsite structures during subsequent works. All ACM impacted soils must be managed so as to ensure no airborne fibre release during construction or placement of impacted material in such a manner to ensure no future exposure risk.

Soils will be placed in areas of no unacceptable future risk in accordance with the ERGO validation method.

If any visible pieces of Asbestos Containing Material (ACM) are identified during the site Remediation and Enabling Work, this material must be dealt with in strict accordance with the Control of Asbestos Regulations (CAR) 2012, UK Waste Management Legislation and the Environmental Protection Act 1994.

Should off-site disposal be required, then additional asbestos quantification and waste classification testing should be undertaken to ensure that it is classified correctly and disposed at a suitably licensed facility.

3.2 Overview of Works

Prior to the commencement of works on-site, the contractor must establish all necessary plant, equipment and site welfare facilities as is necessary to complete the contract within the agreed timescales to the rationale as outlined in Table 3.1 (below).

Table 3.1 Enabling Works Schedule

	Delineation, Excavation and Treatment of Identified Asbestos and Naphthalene Impact
RE-1	Detectable asbestos fibres have been identified in 3no. locations along with 1no. recorded exceedance of naphthalene, therefore a delineation exercise should be undertaken surrounding these exploratory hole locations to confirm the extent of the naphthalene and asbestos material. During the of the main earthworks all known contamination hotspots should be clearly identified and demarcated to facilitate the safe, legislatively compliant and sustainable removal and treatment of the areas of concern. Upon completion of the delineation and excavation, the sides and base of the resulting void(s) will be chemically validated to confirm no impacted materials remain in situ. Validation samples will be collected at 10 linear meter centres from the side and base of the excavation. The ERGO Developed Conceptual Site Model demonstrates a suitable method for management of soils to negate any future risk. In relation to the naphthalene delineation, materials will be excavated and stockpiled on an impermeable membrane. The membrane will be placed upon a clay containment bund and covered to negate the risk of soils leaching and dispersal of any odours and/or vapours. An ERGO engineer will regularly monitor the stockpiled material with a PID to determine the need for boundary monitoring (albeit not anticipated). This material will then be subject to detailed laboratory analysis to determine the suitability for re-use or the requirements for off-site disposal. In relation to the asbestos delineation, the contractor must ensure than all personnel working on-site are trained in the identification of ACM and the risk associated with impacted soils. Where any visual evidence of ACM is identified, these materials should be carefully segregated and removed from the soil matrices (if / where possible). Validation sampling of the processed Made Ground should be completed to demonstrate compliance with the Developed Conceptual Site Model. This process should be completed under strict controls to be devised and employed by the nominated contractor to ensure no potential for fibre release into ambient air. If necessary, reassurance air testing in accordance with the requirements of HSG 248 should be completed during the operation to move the soils to demonstrate the deployment of the required control procedures and safe working methods.

RE-2	Post Demolition Supplementary Site Investigation Following demolition and clearance of existing buildings, vegetation and hardstanding, a supplementary phase of intrusive investigation should be undertaken which should include contamination testing to confirm conditions within parts of the site not yet investigated. Dependent upon the findings of the supplementary works, a revision to the assessment and required mitigation may be necessary. The ERGO Tier 1 Contamination Risk Assessment identified asbestos fibres and naphthalene within isolated areas of the site. Further sampling and delineation are to be undertaken to determine the extent of impacted soils, as detailed within RE2.
RE-3	Pre-Commencement Regulatory Compliance Prior to commencement of any works onsite, all reports relating to the assessment of risk to contaminated land should be submitted to the regulatory authorities to gain written approval. All relevant Standard Rules Permits should be registered with the EA. The LAPC Part B Notification for deployment of mobile crushing plant should be implemented prior to the establishment of equipment on-site. If the proposed volume of soils to be re-used (excluding crushed materials) exceeds the parameters of the Standard Rules Permit, a CL:AIRE MMP Qualified Declaration should be made by the contractor having obtained full written approval for the Remediation Strategy from the LPA and Environment Agency. It is not anticipated that there will be any requirement to treat any materials on-site (such as hydrocarbon impact soil or groundwater), however should any previously unidentified contaminants be identified, the contractor must either notify the EA of their intention to complete a minor works operation or arrange for the deployment of the appropriate Environmental Permit for the specified operation.
RE-4	Environment & Nuisance Control Management of all works so as to ensure that no environmental nuisance is created through dust emissions, noise or vibration levels. Ensure that all works are completed in a manner so as not to create any structural risk to the adjacent highways. Implement all temporary works as necessary to support excavations throughout the duration of the works. In the event that a complaint is made in respect of dust emissions, noise or vibration levels, remedial measures and a program of ongoing monitoring should be agreed with the local authority and implemented on site.
RE-5	Risk to Infrastructure Site works should be completed in a manner that ensures no risk of disturbance to the adjacent infrastructure including the substation, the bus shelter and the western boundary wall.
RE-6	Identification, Isolation and Treatment of Invasive Plants At this time no invasive plant species have been identified, however the contractor must satisfy themselves with respect to the absence of any species deemed invasive prior to the commencement of works on-site. The contractor shall employ a suitably qualified expert to investigate the presence of invasive plant species on or adjacent to the site. If invasive plant species are identified, these will be treated in strict accordance with an approved method statement. If invasive plant species are identified at the site boundary, a suitable barrier shall be installed to prevent any future re-infestation of the subject site. If any invasive species are treated, a validation report should be prepared documenting all identified invasive plant species, their location and the treatment methodology. Where materials are removed from site all Waste Transfer Notes / Duty of Care certificates should be included within the validation statement.

RE-7	Site Clearance Operations General site clearance & provision of welfare, offices and site security as per the contract requirements. The site is currently overgrown with self-seeded vegetation; this material should be removed in a controlled manner with full compliance with any ecological mitigation measures that are required for the works. Any such measures are outside the scope of this report. All vegetation should either be stockpiled at a pre-agreed location or alternatively removed from site in accordance with Waste Permitting Regulations.
RE-8	Delineation, Excavation, Treatment & Disposal of Unforeseen Impacted Material Should unforeseen contamination be identified at any stage of the enabling works, ERGO should be immediately contacted. Material deemed to be impacted through either visual or olfactory observations or as a result of notable PID readings (>50ppm) will be excavated and stockpiled on an impermeable membrane. The membrane will be placed upon a clay containment bund and covered to negate the risk of soils leaching and dispersal of any odours and/or vapours. An ERGO engineer will regularly monitor the stockpiled material with a PID to determine the need for boundary monitoring (albeit not anticipated). This material will then be subject to detailed laboratory analysis to determine the suitability for re-use or the requirements for off-site disposal. Upon completion of the delineation and excavation, the sides and base of the resulting void(s) will be chemically validated to confirm no impacted materials remain in situ. Validation samples will be collected at 10 linear meter centres from the side and base of the excavation. The results of this validation testing will be directly compared to the Site Specific Remediation Targets (as defined within Appendix IV of this report) to demonstrate that no unacceptable level of risk to human health, controlled waters or the wider environment remains.
RE-9	Excavation, Breaking and Processing of All Above & Below Ground Structures Obstructions, relict foundations and infrastructure (apart from live services) are to be removed from the areas of proposed residential development to include plot footprints, rear gardens, private driveways, adopted highway and utilities infrastructure (road box) in their entirety. Artificially hard materials should be broken out and crushed. Stockpiles will be made, validation testing undertaken, and site won material reused on site where required. Materials will be processed as per the ERGO chemical and geotechnical specification using licensed plant. The ERGO drawings denote the extent of known historic features with obstructions, however it will be the contractor's responsibility to remove all obstructions. Obstructions encountered within the near surface soils will be chased to their full depth and removed; if not possible, the obstruction must be surveyed with the location communicated to ERGO, the client and the developer. Where natural soils are present at a relatively shallow depth (southern area), extreme care should be taken to ensure that the natural cohesive deposits remain undisturbed with a full reduced level survey to be completed to map the depth of filled / processed material.
RE-10	Removal of Deleterious Material All potentially deleterious materials will be delineated, stockpiled and removed from site by the contractor to a licensed waste facility. Prior to the commencement of the main works, the contractor under the supervision of ERGO will undertake trial pits to complete further confirmatory ground investigations to satisfy themselves with regard to the extent of any buried anthropogenic deleterious materials that are unsuitable for retention within a low-rise residential development.

RE-11	Cut & Filling of Made Ground to Development Levels The Made Ground is noted to be locally present to substantial depth in some areas of the site (>3.0m in the northern site area), and further SI is currently required to fully determine the depth of Made Ground and to confirm foundation solutions in the areas of existing buildings and areas previously inaccessible. Where the proposed enabling works levels require the current landform to be cut, extreme care should be taken so as not to disturb the underlying stratum prior to the placement of the appropriate platform in compliance with the ERGO Geotechnical Specification. Where the development levels require material to be filled, site derived Made Ground must be sorted in a controlled manner prior to replacement in accordance with the requirements of this specification for the intended land use. The maximum dry density must be determined in laboratory conditions utilising UKAS accredited testing prior to the commencement of filling and compaction works. In-situ density testing us required to demonstrate compliance with the ERGO Geotechnical Performance Specification.																			
RE-12	Construction of Temporary Working Platform Pending the supplementary site investigation and the finalised foundation schedule, plots may require engineered foundation solutions. Where plots are to be prepared in a manner that will facilitate potential piling or Ground Improvement by Vibro Stone Column, a Temporary Working Platform will be constructed. The specific design for such a platform should be obtained from ERGO, however as a minimum this will comprise: Proof rolling of the sub-grade to ensure a CBR >5%; and, Placement of 300mm of certified 6F2 to be rolled and compacted to ensure a CBR >15%.																			
RE-13	Replacement of Materials Geotechnical Engineering Requirements Material is to be backfilled in strict compliance with the ERGO Geotechnical Engineering Specification as presented in detail within Section 5 of this report which generally requires the following reinstatement and compaction criteria: Unless specific instruction is issued from the client, plots should be prepared for a strip foundation where the target founding stratum is identified to be present at a depth of 1.50m below FFL. Consideration is to be given to the need to construct a strip foundation ~200-400mm into the natural stratum and the contractor remediation elevations: <table><tr><th>LAND USE</th><th>CONSTRUCTION REQUIREMENT</th><th>REQUIREMENT</th></tr><tr><td rowspan="3">Footprint of proposed structure (2.0m on all elevations).</td><td>Pile Foundation</td><td>Backfill using general Method Compaction to CBR of 5%</td></tr><tr><td>Vibro Stone Colum</td><td>Granular backfill with suitably graded granular aggregate with <10% fines. CBR >5% with suitable pile mat.</td></tr><tr><td>Traditional Spread Foundation</td><td>Ensure no disturbance of natural soil at shallow depth.</td></tr><tr><td>Highways</td><td>Adopted Estate Road / Drainage</td><td>Method Compaction using DOT ensure CBR >5% in sub-grade (engineered fill)</td></tr><tr><td>Driveways</td><td>Private Drives & Car Parking</td><td>Method Compaction to CBR >5%</td></tr><tr><td>Gardens & POS</td><td>N/A</td><td>Method Compaction to ensure no settlement.</td></tr></table>	LAND USE	CONSTRUCTION REQUIREMENT	REQUIREMENT	Footprint of proposed structure (2.0m on all elevations).	Pile Foundation	Backfill using general Method Compaction to CBR of 5%	Vibro Stone Colum	Granular backfill with suitably graded granular aggregate with <10% fines. CBR >5% with suitable pile mat.	Traditional Spread Foundation	Ensure no disturbance of natural soil at shallow depth.	Highways	Adopted Estate Road / Drainage	Method Compaction using DOT ensure CBR >5% in sub-grade (engineered fill)	Driveways	Private Drives & Car Parking	Method Compaction to CBR >5%	Gardens & POS	N/A	Method Compaction to ensure no settlement.
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RE-14	Preparation of Ground for Vibro Stone Columns within Tree Influence Pending the finalised foundation schedule, VSC may be used for plots on site. Where trees are present or within their total zone of influence the contractor must ensure that all cohesive soils are removed to the required depth with the subsequent replacement with granular a granular blanket to fully mitigate the potential for volumetric instability in the clay soils. The zone of tree influence will be indicated within the Foundation Zoning Plan and all resultant excavations and subsequent backfilling must be inspected and approved by ERGO.																			

RE-14 (cont'd)	The depth of the granular blanket required will be determined prior to the commencement of the works and in full agreement of the client but will nominally be equal to or in excess of 2.5 x foundation width.
RE-15	Importation of Bulk Fill Where there is a net shortfall of material required to achieve the proposed ground levels, it will be necessary to import natural inert soils and aggregate as per the engineering requirements (Section 6). Imported material must be certified as suitable for use in strict accordance with the ERGO chemical and geotechnical performance criteria in conjunction with the required duty of care notes and waste transfer exemption. If recycled aggregates are imported laboratory testing should be completed to demonstrate compliance with the WRAP Protocol. Where inert soils are imported laboratory testing should be completed in accordance with the requirements of the pertinent Environmental Permit (i.e. U1 Standard Rules) or CL:AIRE MMP for the re-use of clean naturally occurring soils.
RE-16	Preparation of Garden for Cover System As part of the land remediation works, garden areas will be prepared in a manner that will facilitate the placement of the clean cover system during the development phase of the works. The preparation of the areas requiring clean cover is critical in ensuring delivery of the site in a manner that will ensure no risk to the proposed end users. Where Made Ground is deemed unsuitable for retention in a garden, the area will be subject to a reduced level dig to remove unsuitable material to a minimum depth of 600mm below finished garden level or verified natural stratum (whichever is the shallower). Excavated soil will be stockpiled pending the results of the appropriate validation testing (to be completed in accordance with this specification) prior to re-use in an area of no sensitivity or where necessary, this material will be removed from site in accordance with UK Waste Management Legislation. The placement of certified sub-soil and topsoil will be completed as part of the developer works / build phase mitigation plan. All garden areas where a cover system is required will be subject to a 1 in 3 plot specific independent validation.
RE-17	Provision of Subsoil The shallow natural drift deposits (predominantly cohesive soils) are deemed suitable for use within the upper 600mm of clean cover to residential gardens and areas of soft landscaping. It is therefore deemed viable to re-use natural materials that are cut as part of the wider earthworks (regulated by an MMP) to generate the required volumes of material. The garden and landscaped areas will require a 1 in 3 plots depth validation to satisfy the requirement of the Council Mortgage Lenders (CML) in order to demonstrate that the appropriate thickness has been provided as clean cover.
RE-18	Provision of Topsoil Topsoil deposits analysed from the southern field have been assessed as suitable for reuse in residential gardens pending validation testing and removal of minimal anthropogenic inclusions. Topsoil will require testing in line with the schedule present within Section 3.5 and Table 3.2. The garden and landscaped areas will require a 1 in 3 plots depth validation to satisfy the requirement of CML in order to demonstrate that the appropriate thickness has been provided.

RE-19	Independent Validation – Watching Brief Given the site history and potential contamination sources identified within the ICSM, a degree of uncertainty remains with regard to the potential for as yet unidentified contamination impact within the near surface soils and groundwater. It will therefore be necessary to instigate elements of the site wide Remediation & Enabling works under the supervision of a suitably qualified and independent specialist. The specialist is required to attend site as and when appropriate to monitor works, record ground conditions and fully investigate all potential sources of as yet unidentified contamination.
RE-20	Remedial Verification Report Collation of information relating to site clearance, chemical testing, remedial works, remedial verification, material movements and waste transfer documentation where appropriate. Complete remedial validation reported in line with regulatory guidance. This will include a detailed risk assessment. The report will be submitted to the Local Authority for approval following completion.

For the avoidance of any doubt, the proposed operations as set out herein document the required performance objectives and validation sampling protocols, however the specific methods of work deployed to ensure the remediation objectives are achieved in a compliant manner onsite will be the responsibility of the appointed contractor.

3.3 Second Phase Mitigation & Management – Build Phase

A second post Remediation & Enabling phase of works will be required to ensure the proposed development is constructed in a manner that incorporates the required mitigation measures to ensure the development is compliant with UK Building Regulations and the Local Authority Planning requirements.

Once the ground has been rendered suitable for development, the builder will be required to undertake a second phase of remediation works to mitigate the identified theoretical risk to human health.

-  Provision of a 600mm cover system over made ground encountered across the site, using certified material with appropriate validation within proposed garden areas. Natural drift deposits encountered within the upper 600mm of finished ground levels can be directly overlain with a suitable cover (minimum 150mm topsoil).
-  Provision of 300mm certified cover system to all areas of soft landscaping and POS.
-  Provision of appropriately assessed water supply pipes.

3.4 Materials Management & Legislative Compliance

The processing of recycled aggregates will be completed using LAPC Part B Licensed Plant with the appropriate deployment notification to the Local Authority prior to commencement of works. All materials that are recovered as recycled aggregate will be compliant with the requirements of the WRAP protocol and the ERGO validation testing requirements and as such would not be deemed to be a waste material.

A U1 Standard Rules Permit will be registered for the site which allows the re-use of up to 5000T of prescribed material within construction with up to 25,000T of material permissible to be re-used in the construction of roads. It should be noted that only 1000T of material described as sand, stones or clay soil classified as waste can be re-used with a U1.

A T5 Standard Rules permit allows the screening and recovery of up to 3000m3 of permissible material for sub-sequent re-use in construction will also be registered.

All materials that are recovered under the WRAP Protocol, U1 or T5 exemptions must be analysed to demonstrate that they are both chemically and structurally suitable for use within the context of the development.

The relevant LAPC, U1, T5 and WRAP Licenses, Exemption and Protocols provides the legislative framework for material compliance during the site remediation and enabling works to be completed by the specialist contractor under the supervision of ERGO.

Where necessary operations as outlined in detailed within the Remediation Enabling Works Rationale summarised above may be subject to regulation using the appropriate Environmental Permit, Standard Rules Exemption and 'Materials Management Plan' (MMP) to be created in accordance with Version 2 of the CL:AIRE Definition of Waste - Industry Code of Practice.

It is noted that if material is to be imported utilising the CL:AIRE Code of Practice from an alternative development site, only chemically certified, clean, naturally occurring material can be transferred.

If required, the MMP will be created with due consideration of all proposed remediation and enabling works operations prescribed within this document and will be undertaken by a Qualified Person and a signed declaration submitted to the EA prior to re-use of materials on the site.

The importation of material for use within the proposed construction of a development platform will be subject to the compliance with the ERGO Protocol for the importation of materials as set out within the specification for material import included within the Appendix of this report.

3.5 Validation Sampling Protocol

In accordance with the current requirements of the regulatory authorities, validation samples will be collected from all materials that are to be subject to movement under the protocols outlined within this Remediation Strategy, or for materials to be imported onto site to facilitate the proposed residential development.

Upon removal of the hotspots of unsuitable made ground in the northern and eastern areas, validation samples will be collected from the base (2 No.) and sidewalls (4 No.) of the excavation to reasonably demonstrate no residual impact to the underlying strata.

Soil samples destined for chemical analysis will be collected at regular intervals in appropriate sampling containers. All samples will subsequently be stored in cooled boxes prior to submission to a UKAS / MCERTS accredited laboratory.

All samples will be collected using appropriate PPE and sampling equipment that will be cleaned at each sampling location.

A detailed copy of ERGO sampling methodology, QA procedures and laboratory chain of custody forms will be documented within the site records and presented within the final validation report for the site.

Where material is found to contain concentrations of potential contaminants at levels in excess of the site-specific screening criteria (as detailed within Appendix IV), ERGO will undertake further assessment and recommendations on the appropriate use for the material in question, which may involve the disposal of such materials off-site to a suitable waste management facility.

The sampling frequency for materials to be managed under the Remediation Strategy is presented within Table 3.2 overleaf and is in accordance with the recommendations outlined within YALPAG guidance.

Table 3.2 Specification of Chemical Validation Laboratory Analysis

MATERIAL USE	TESTING FREQUENCY	SUITE OF ANALYSIS
Site Generated		
Site Generated 6F2	1 Sample Per 1000m ³	A / B / C / D
Site Won Made Ground General Backfill	1 Sample Per 250m ³	F
	1 Sample Per 1000m ³	A / B / C / D
	1 Sample Per 2000m ³	G
Site Won Natural Backfill	1 Sample Per 2000m ³	A / B / C / D
Site generated Subsoil	1 Sample Per 250m ³	A / B / C / D
Site Generated Topsoil Cover	1 Sample per 50m ³	A / B / C / D
Hotspot Validation Samples	1 Sample per 10m of linear excavation to base and sidewall.	E
Imported		
6F2	Min 1 Sample Per 1000m ³	A / B / C / D
Subsoil Greenfield Source	Min. 3no. then 1no. sample per 200m ³	A / B / C / D
Subsoil Brownfield Source	Min. 6no. then 1no. sample per 50m ³	A / B / C / D
Topsoil Greenfield Source	Min. 3no. then 1no. sample per 200m ³	A / B / C / D
Topsoil Brownfield Source	Min. 6no. then 1no. sample per 50m ³	A / B / C / D
General Engineering Fill (Class 1 & 2 Soil)	1 Sample Per 1000m ³	A / B / C / D

Notes

Suites of Analysis

A) Speciated PAH

B) Speciated TPH (C5-C35)

C) Asbestos (ID)

D) CLEA Inorganic Heavy Metals

E) Contaminant Specific Suite

F) On-site screening for VOC using calibrated PID

G) Leachate analysis of Inorganic heavy metals, TPH, sulphate and PAH.

All analysis prescribed above to be completed by UKAS accredited laboratory.

3.6 Remediation Contractors Site Management & Responsibility

The appointed Remediation Contractor will take full and overarching responsibility for all methods of work required to complete the site remediation and enabling operations to ensure the delivery of the site and the completion of the objectives a safe, legislative compliant manner that ensures no pollution to the subject site or the wider environs.

For individual remediation operations as set out within this performance specification, the contractor will provide site specific methods of work for individual operations pertaining to the removal and treatment of contaminated liquids and soils. For each and every operation as set out herein the contractor will provide a written methodology of works to be supplied to the supervising geo-environmental engineering prior to the instigation of operations on-site.

The site manager will be responsible for documentation of each day's activities with a full recorded schedule of works completed and corresponding site-specific method statements that have been utilised to ensure the completion of the task to the required standard.

4. ENVIRONMENTAL MONITORING AND VALIDATION

4.1 Site Management

The tracking of materials will be based on the following hierarchy:

-  The Principal Contractor will have the responsibility for setting out areas of the site on the basis of the contract specification;
-  Operatives will have instructions only to excavate and to emplace materials in specified areas as assigned by the Site Manager / Foreman;
-  The Site Manager (employed by the Principal Contractor) will issue daily instructions to drivers regarding the placement of materials sourced from specific stockpiles or areas, ensuring that appropriate documentary evidence is collected that details which materials are going where and why;
-  The strategy for each day's work will be agreed with the ERGO Consultant, who will be in attendance as required, prior to the commencement of the works. ERGO will:
 - Inspect the excavation areas and certify that the correct materials are being excavated;
 - Conduct spot checks on loaded vehicles to ensure compliance with this Remediation Strategy;
 - Ensure that any loads which fail visual, olfactory or spot checks either remain on the vehicle or if unloaded are excavated and set aside. This material will be treated according to the recommendations of the ERGO site engineer.
-  All material imported and removed from site will have Duty of Care / Consignment Notes, copies of which will be retained on-site by the Site Manager; and,
-  Materials directly reusable will be incorporated into the earthworks, subject to operational conditions and phasing of excavations, in which case they will be stockpiled prior to final placement.

4.2 Completion

Following the completion of the remediation works a report will be compiled by the Environmental Consultant detailing all site enabling works undertaken, waste consignment notes, and all site investigations, laboratory test certificates, and validation testing undertaken.

A certificate of completion of earthworks should be included within the report which should then be issued to The Local Authority for their approval.

ERGO considers that with the adoption of the above best practices the site can be safely redeveloped. The site enabling works process and presence of any residual contamination (if this is the case) should be recorded for future reference by landowners /occupiers. Future development at the site where this may result in penetration of new areas of hardstanding should be subject to no less stringent measures with respect to assessment, and, where appropriate, monitoring than those set out above.

4.3 Mitigation of Risk from Soils with Asbestos Fibres

Pre-Commencement Works

Prior to the commencement of works the following activities will be undertaken:

-  Induction of all people that will be involved with the proposed site works; and,
-  All methodologies must be agreed upon by all parties involved.

Control, Monitoring and Reporting of General Aerial Emissions; Dusts and Particulates

Damping Down of Soils – Mitigate Particulate (Dust) Emission

During excavation as outlined within the detailed working methodologies, soils will be regularly damped down using water to control the generation of dust (this may also comprise

precipitation). The contractor will determine the best form of dust suppression to be used when a detailed programme has been issued.

If any previously unidentified Asbestos Containing Materials are identified, these should be dealt with in strict accordance with the Control of Asbestos Regulations (2012) and industry best practise as detailed in CIRIA733.

General Control of Dust

The following control measures should be utilised to ensure that dust levels are kept to a minimum at all times:

- Where necessary, haul road, work areas and stockpiles will be damped down with water spray;
- The application of water to haul roads, work areas and stockpiles should be closely monitored by the resident engineer to ensure that soils are not saturated and therefore the potential for water run-off is appropriately mitigated;
- Once completed, any stockpiles will be sealed by compacting at the surface; and,
- Vehicle speeds and movements on site will be kept to a minimum (<5mph) during civil excavation works to reduce the potential to generate dust.

Personal Protective Equipment (PPE)

In accordance with the HSE Guidance Note EM6 (non-licensed asbestos works), ERGO recommend that all site operatives present within the work area where potential asbestos impacted soils are being excavated are supplied with the following Personal Protective Equipment:

Overalls:

- Disposable overalls. Type 5 (BS EN ISO 13982-1) are suitable. Cotton overalls hold dust and need specialist laundering;
- Waterproof overalls for outdoor work;
- Use oversized overalls - this will help to prevent ripping at the seams;
- If the cuffs are loose, seal them with tape;
- Avoid wearing a long-sleeved shirt - these are difficult to cover properly;
- Wear the overall legs over footwear. Tucking them in lets dust into footwear; and
- Wear the hood over the RPE straps.

Failure to utilise and correctly employ PPE will result in immediate cessation of works. Works will not be permitted to recommence until the individual has undergone further training in the use of PPE or the individual removed from works area.

At this current time, with the levels of ACM identified within the soils, the above listed PPE is not considered to be required for all site personnel during the entire management of these soils.

When handling asbestos impacted soils during the enabling works, asbestos monitoring works should be conducted in accordance with but not limited to the following HSE legislation and guidance:

- Health & Safety at Work Act 1974;
- The Control of Asbestos Regulations 2012;
- CL:AIRE, 2016. Control of Asbestos Regulations 2012 - Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials: Industry guidance;
- Approved Code of Practice L143 "Work with materials containing asbestos";
- Management of Health and Safety at Work Regulations 1999;

-  HSE Guidance Note HSG248 'Asbestos, the analysts guide to sampling and analysis';
-  HSE Guidance Note HSG247 'Asbestos: The licensed contractors' guide'; and,
-  CIRIA 733 Asbestos in soil and made ground: a guide to understanding and managing risks.

If required, air monitoring in accordance with HSG248 will be undertaken intermittently throughout the duration of the works at a frequency to be determined by the contractor, entirely dependent on whether asbestos impacted soils are being handled at any one time. In general terms, during any individual monitoring period, ten standard monitoring pumps will be run throughout the day, for the appropriate time period to achieve the required Limit of Detection (LOD). These slides will be analysed immediately by the on-site UKAS accredited laboratory.

Once any monitoring has been analysed by the on-site UKAS accredited laboratory, the results will be delivered to the Resident Engineer who will then follow the correct site procedure. The results will then be included within the Verification Report.

5. GEOTECHNICAL ENGINEERING SPECIFICATION

5.1 ERGO Geotechnical Engineering Specification

The overarching philosophy of the site enabling works will be the delivery of the following:

- It is understood that the client proposes to construct all plots on VSC;
- Engineer all areas of proposed adopted road and private drive to be compliant with the ERGO Geotechnical Specification with CBR and elevation defined by the client.

In the event that it is not possible to prepare the site in a manner that will achieve the required foundation solution, the Supervising Engineer and Client should be contacted at the first available opportunity.

The contractor should employ a suitably experienced engineer to be present onsite during these earthwork operations to ensure soil suitability, placement, compaction and testing is undertaken in accordance with this specification and to ensure that any unforeseen circumstances, such as adverse weather, do not compromise the earthworks process.

Works should be halted during periods of intermittent or prolonged rainfall to ensure the materials are not placed in a manner that would result in softening of either the formation or the newly placed material. It will be the contractor's responsibility to determine appropriate weather conditions and determine the suitability of works.

Particular attention must be given to variable weather conditions when re-engineering clay soils as a moisture content fluctuation (2%+/-) of the tolerable limit will result in unacceptable degree of compaction loss.

It should also be noted that post-demolition investigation is required to enable the assessment of subsurface deposits within areas of the site which were inaccessible during the previous phase of works. It is considered possible that localized deep Made Ground and/or geotechnically poor deposits may be present within these areas which may necessitate the use of alternative foundation solutions.

5.2 Locally Won Fill Material

It is proposed to up-fill and level the site with material won from the development area. From the site-specific investigations undertaken to date, it is expected that the majority of the soils won from the processing of demolition material will be granular and cohesive soil matrixes.

Where site won materials are to be used as fill to achieve the required development platform, they must be compacted to ensure in-situ densities that are in excess of 95% of the Maximum Dry Density as determined using a 4.5KG laboratory Procter Test.

Materials should only be compacted when the actual moisture content is within 2% (+/-) of the optimum for the soil matrixes as determined by laboratory bench testing.

5.3 Classification of Fill Material

This Specification should be read in conjunction with the following:

- The Manual of Contract Documents for Highway Works, Volume 1, Specification for Highway Works, Series 600, Earthworks as amended in November 2005; and,
- Soils for Civil Engineering Purposes, BS1377, 1999.

5.3.1 General Classification

The contractor should ensure that all earthworks materials comply with Clause 601 of the Specification for Highway Works and shall fall into one of the other of the following general classifications as defined in Table 6/1 of the Specification for Highway Works.

- General granular fill (Class 1),
- General cohesive fill (Class 2), excluding class 2A and 2E,

-  Selected granular fill (Class 6).

Table 5.1 (overleaf) displays the Specification for Backfill Compaction.

5.4 Use of Fill Materials

In addition to any grading requirement the maximum particle size of any fill material shall be no more than two-thirds of the compacted layer thickness except that cobbles having an equivalent diameter of more than 150mm shall not be deposited within the restored surface level unless directed otherwise by the Engineer. Un-burnt colliery spoil, pulverised fuel ash or furnace bottom ash shall not be used as a fill material.

Table 5.1 Specification for Backfill Compaction

ERGO EARTHWORKS GEOTECHNICAL COMPACTION SPECIFICATION					
SOIL / MATERIAL TYPE	CLASS	DESCRIPTION	COMPACTION EQUIPMENT	LAYER THICKNESS	ROLLER PASSES
Granular Fill (Sand & gravel Matrices)	1 A	Sandy Gravel with some cobbles	>5000kg Vibrating Roller	225mm	4
	1 B	Sand or Gravel of same grading size	>5000kg Vibrating Roller	250mm	10
	1 C	Coarse gravels with many cobbles	>5000kg Vibrating Roller	400mm	5
Cohesive Fill (Clay with minor sand and gravel component)	2 A	Wet Clays	>100kg Metric Ton Vibrating Tamping Roller (Sheep Foot ONLY)	100-225mm	3
	2 B	Dry Clay	>5000kg Vibrating Roller or 1400kg Tamping (Trench Roller)	225mm or 125mm	4 or 12
	2 C	Gravelly Clay	>5000kg Vibrating Roller or 1400kg Tamping (Trench Roller)	225mm or 125mm	4 or 12
	2 D	Silty / sandy Clay	>5000kg Vibrating Roller or 1400kg Tamping (Trench Roller)	225mm or 125mm	4 or 12
Recycled Aggregate Crush. (<125mm Well Graded)	6F2	Any combination of inert hard materials other colliery spoil or rock with substantial amounts of clay like component.	>5000kg Vibrating Roller	250mm	6

5.5 General Requirements

The contractor shall employ only plant and working methods which are suited to the materials to be handled and traversed. He shall be responsible for maintaining the nature of the acceptable material so that when it is placed and compacted it remains acceptable in accordance with the Contract.

For the purposes of this contract, the proposed earthworks requirements have been split into distinct end use categories with the corresponding requirements for the earthworks specification assigned to individual areas.

Table 5.2 Compaction / Backfill Requirements

LAND USE	COMPACTION METHODOLOGY & GENRAL PERFORMANCE CRITERIA
Re-engineering of soils using Vibro Replacement Stone Column (VRSC) to limit differential settlement and increase net Allowable Bearing pressure (ABP). (if applicable following finalised foundation design) Building Structure Footprint +2.0m on all elevations	Materials to be placed in a controlled manner to facilitate the construction of Vibro Replacement Stone Columns (VRSC). Material must be 90% granular in composition with less than 10% fines which are classified as materials <0.60micron's in size. No material greater than 125mm in size is permitted with 90% of the soils placed conforming to grading <90mm. Material to be placed when actual moisture content is within tolerable limits of the optimum with specific attention to and soils which are notably wet of the optimum. Material to be placed in a manner so as to ensure a minimum CBR of 5% at formation to facilitate machine movement and piling mat construction. Where site won materials are used to up-fill levels must be compacted to an 'end product' performance specification where the in-situ density exceeds 95% of the maximum (determined by laboratory conditions). Where rock is present at a shallow depth, the remediation contractor will ensure the sub-stratum is prepared to ensure a minimum of 1000mm of appropriately graded granular material is present to the underside of the proposed doubly reinforced concrete strip foundation. The sub-stratum must be prepared to ensure a vibro stone column treatment depth is not less than 80% of the immediate adjacent profile.
Piled Foundation (if applicable following finalised foundation design)	All plot footprint (+2.0m) must be free of any deleterious elements, tree roots and obstructions >150mm. Where upfill is proposed, material to be placed using method Compaction Specification to achieve CBR as required by developer for piling mat construction. Piling mat to be placed and constructed in accordance with approved geotechnical engineer's temporary works design.
Adopted Highways (+2.0m from back of footpath).	Method Compaction – Highways Design Manual Series 600 with in-situ Validation Testing to meet requirement of adoptions authority. CBR >5% at sub-grade formation (prior to placement of Capping).
Estate Roads	Method Compaction – Highways Design Manual Series 600 with CBR >5%.
Gardens, POS & Other External Areas	Material is to be placed in layers not exceeding 300mm and must be rolled using dedicated plant (no earth moving equipment) and in general compliance with the requirements of Highways Design Manual Series 600.

Acceptability shall be determined in accordance with Table 6/1 of the Highway Specification.

Laboratory testing for the purposes of determining acceptability and compaction requirements will be conducted by the Engineer.

Haulage of material to embankments or other areas of fill shall proceed only when sufficient spreading and compaction. Plant is operating at the place of deposition to ensure compliance with Clause 612 of the Highways specification.

No excavated acceptable material or unacceptable material required to be processed, other than surplus to the requirements of the Contract, shall be removed from the site.

Where the excavation reveals a combination of acceptable and unacceptable materials the Contractor shall carry out the excavation in such a manner that the acceptable materials are excavated separately for use in the Permanent Works without contamination by the unacceptable materials. Unless otherwise described in the Contract classes of fill material required to be deposited separately shall be excavated separately without contamination by other classes of material.

The Contractor shall make his own arrangements for stockpiling of acceptable material, and unacceptable material to be processed, and for the provision of site for purpose. The Contractor shall ensure that he does not adversely affect the stability of excavations or fills by his methods of stockpiling materials, use of plant or siting of temporary buildings or structures.

Topsoil shall wherever practicable be used immediately after its stripping and if not shall be stored in stockpiles of heights not exceeding 2.0m; topsoil shall not be stockpiled for more than two years. Topsoil shall not be unnecessarily trafficked either before stripping or when in a stockpile. Stockpiles shall not be surcharged, or otherwise loaded and multiple handling shall be kept to a minimum.

Excavations requiring backfilling shall remain open only for the minimum period necessary.

The Contractor shall keep earthworks free of water including:

- (i) Arranging the rapid removal of water:
 - (a) shed on to the earthworks
 - (b) entering the earthworks from any source
- (ii) Provide where necessary temporary watercourses, drains, pumping and the like:
- (iii) Discharge accumulated water and groundwater into the permanent outfalls of the drainage system where practicable
- (iv) Provide adequate means for trapping silt on temporary systems discharging into permanent drainage systems.

The Contractor shall carry out and maintain groundwater lowering or other treatment required.

Where materials are designated either Class U1B or Class U2 (according to the Highways Specification), the Contractor shall carry out any special requirements for their handling. Where such materials are encountered during the progress of the Works, the Contractor shall make all necessary arrangements for their safe handling and disposal after consultation with the appropriate environmental authority.

5.5.1 Construction of Fills – Highways

All fills shall be constructed:

- (i) In the locations as shown in the contract drawings to the lines and levels stated therein;
- (ii) Of classes of material complying with this specification;
- (iii) By deposition, as soon as practicable after excavation, in layers to meet the compaction requirements as required for each Class of material as specified.
- (iv) To the requirements of this clause and any other requirements for fill in this Specification.

Before commencing work on any area of fill the Contractor shall ensure that:

- (i) The base is sound and stable by excavating and removing any topsoil as soft subsoil.

- (ii) Base layers are not exposed until the fill layer is ready for placement.
- (iii) Un-compacted material on the side slopes of previously backfilled zones shall be removed and benches of between 1.0m and 1.5m height cut in compacted fill immediately prior to deposition of the new fill to ensure that the new backfill placed against the slope is properly integrated.

Whenever fill is to be placed on surfaces inclined at 1 vertical to 7 horizontal or steeper, the surface shall be benched immediately prior to deposition of the fill in order to achieve horizontal basal surfaces. The benches shall be between 1.0m and 1.5m in height.

Areas of fill shall, unless otherwise permitted by the Engineer, be constructed evenly over their fullest possible extent and the Contractor shall carefully control and direct construction plant and other vehicular traffic uniformly over the area of compacted fill. The minimum plan dimensions of any one panel of backfilling shall be properly integrated with areas of previous backfilling. Damage by construction plant and other vehicular traffic shall be made good by the Contractor with material having the same characteristics and strength as the material had before it was damaged.

Temporary slopes within compacted and un-compacted backfill shall be formed at gradients which ensure stability.

5.5.2 Construction of Fills – Adopted Highways, Estate Roads & Car Park

The Contractor shall carry out compaction upon the materials which require to be compacted, as soon as practicable after deposition.

Compaction shall be either method as required for the classes of fill in Table 6/1 which requires to be compacted.

The Contractor shall obtain permission from the Overseeing Organisation before carrying out compaction requirements as listed in Table 6/1 for the Class of material being compacted. Method compaction shall be undertaken using the plant and methods appropriate to the compaction requirements as listed in Table 6/1 for the Class of material being compacted.

Earthmoving plant shall not be accepted as compaction equipment nor shall the use of a lighter category of plant to provide any preliminary compaction to assist the use of heavier plant to be taken into account when assessing the amount of compaction required for any layer.

If more than one class of material is being used in such a way that it is not practicable to define the areas in which each class occurs, the Contractor shall compact with plant operating as if only the material which required the greater compaction effort is being compacted.

If the results of field tests show densities which indicate the state of the compaction to be inadequate, if this is due to failure on the Contractor to comply with requirements of the Contract, the Contractor shall carry out such further work as is required to comply with the contract.

Refer to Clause 612/10 of the Highway specification for definition of plant to be used in accordance with this specified works.

The Contractor will be responsible for assessing the Class of Fill in accordance with Table 6/1 of the Highways Specification. Table 6/4 of the Highways Specification should then be employed to assess the method of compaction to be employed. The test results and method statements shall be submitted to the Consulting Engineers for approval.

5.6 Earthworks Material Tests

Prior testing of the potential sources of fill shall be undertaken by the Contractor and submitted to the Consulting Engineers for approval. This testing shall include, but not necessarily be limited to the compaction and backfill requirements detailed in Table 5.3.

Table 5.3 Compaction / Backfill Requirements

LAND USE	COMPACTION METHODOLOGY & GENERAL PERFORMANCE CRITERIA				
Liquid and plastic limits	BS1377: Part 2				
Grading	BS1377: Part 2				
Uniformity Co-efficient	Calculated from grading curve				
Moisture content	BS1377: Part 2				
Organic Matter (maximum 2.5% total organic content)	BS1377: Part 3				
Water soluble sulphate	TRL Report 447 test No 1				
Total sulphate content	TRL Report 447 Test No 4				
Earthwork In-situ Tests	Clause 632 (BS1377: Part 4)				
Subsequent to the filling and compaction of the material a series of in-situ tests shall be undertaken to confirm the success of the compaction process. This testing shall include but necessarily be limited to, the following:					
<table><tr><th>TEST</th><th>TEST METHOD</th></tr><tr><td>Plate load tests (equivalent CBR of 5%)</td><td>BS1377: Part 9</td></tr></table>			TEST	TEST METHOD	Plate load tests (equivalent CBR of 5%)
TEST	TEST METHOD				
Plate load tests (equivalent CBR of 5%)	BS1377: Part 9				
Disposal of Materials					
The contractor shall be responsible for the safe disposal of any excess of unsuitable material found on the Site.					
Multi Point Moisture Condition Value (MCV) (to assess optimum moisture content)					
Proctor compaction testing	BS1377: Part 4				

5.7 Specification for Ground Improvement by Vibro Stone Column

Should VSC be used as a foundation solution for proposed structures, subject to the completion of post-demolition supplementary site investigation, identified plots may be separated into the following categories:

-  **V1** Structures located within the conjectured zone of potential tree influence where cohesive soils present at the near surface. For these plots, the Remediation & Enabling Works Contractor will be required to remove the cohesive soils to the depths as specified within the pertinent revision to the Foundation Zoning Plan. The resulting excavation will be upfilled with material that has been selected by the Contractor in the correct manner with placement and engineering to the required standard with validation testing as required; and,
-  **V2** Structures to be constructed within areas of the site where suitable founding stratum is not present within the near surface to facilitate a shallow spread foundation, therefore the Made Ground will be subject to Ground Improvement by VSC. Within areas of former development, all subterranean structures will be removed in compliance with the ERGO Remediation & Enabling Works Performance Specification prior to the backfill of the resulting excavation with selected material to ensure compliance with the requirements for VSC.

The specification for the placement and compaction of non-compliant material where the fine constituent (<0.63micron) exceeds that standard requirements for Ground Improvement by VSC is shown below.

Compaction & Validation of Non-Standard Material Backfill to VSC

Required parameters	The compaction must achieve the following material parameters:	
	Bulk Density (ρ_b)	95% of the maximum dry density and must be within 3% of the optimum moisture content
	All materials used for upfilling must be durable and inert.	
	In order to verify that the aforementioned material parameters have been attained, representative sampling and testing must be undertaken. All testing will be in accordance with BS EN ISO 17892-1:2014 and BS EN ISO 17892-2:2014. Furthermore all testing is to be undertaken by a laboratory with the relevant UKAS accreditation. The following tests are required:	
	Bulk Density (ρ_b).	Approved methods of in situ testing (i.e. calibrated nuclear density probe (NDP), sand replacement test).
	Moisture Content	Moisture content test
Verification Testing & Report	Bulk density testing on every 500m³ and in each layer of upfill well spread over site within and around the proposed structures' footprint. Testing must be from a range of depths throughout the treated fill. A minimum of six samples must be taken and tested. A drawing depicting the location of each sample and test point must be provided along with a list of each point and the relevant test/sample depth. A list of all geotechnical testing results for each sample and test must be provided along with the relevant test certificates. If the soils are not suitable due to the moisture content being higher than the optimum moisture content then Lime Modification may also be required. The above is given strictly on the basis that it does not conflict with other elements of the project specific requirements.	

6. RECORD KEEPING & VERIFICATION

6.1 Record Keeping

During the course of the remediation and site enabling works, the independent Consultant and site manager will undertake the following record keeping protocols:

-  Detailed daily site diary including material movements;
-  Sampling register, testing results, photographs, details of locations of identified impacted soils (drawings), details of any hotspot removal, details of consignment notes of any impacted material that is required to be disposed of off-site; and,
-  Detailed surveys (volumes).

Record keeping on site, in particular movements and analysis of specific material types, will be in the form of site diaries and a remediation excavation record. This record will remain on site and will be completed by the ERGO onsite engineer during the course of the remediation and site enabling works.

6.2 Verification

The records listed above will then be compiled into a Validation Report produced by ERGO on completion of the remediation and site enabling works, clearly referencing the origin of the materials used and testing carried out to confirm its suitability for use, where required. ERGO will also prepare an as built development drawing clearly detailing the materials present on-site to be cross referenced with the supporting validation documentation. The Validation Report will include the following:

-  Remediation Strategy (including copies of confirmation from regulatory authorities agreeing criteria);
-  Detailed surveys of all excavations and production of 'as built' drawings for the earthworks;
-  Copy of Consignment Notes relating to the movement of wastes to a licensed waste management facility;
-  Detailed drawings showing all sampling locations for both chemical and geotechnical testing;
-  Chemical test results;
-  Geotechnical test results;
-  Details of Qualified Persons signed declaration; and,
-  Monitoring results (if undertaken - i.e. asbestos in air, gas water etc.)

7. CONTINGENCY PLAN

7.1 Previously Unidentified Contaminants

Should significantly impacted material be encountered during the development, then it will be excavated and stockpiled on an impermeable material and sampled and tested for an appropriate range of determinants.

Once the laboratory analysis of the material is available an assessment will be undertaken to determine whether it can be retained on-site as part of the Material Management Plan or whether it should be disposed off-site.

Depending on the nature of any such impact it may be necessary to undertake validation testing of the excavation faces in order to demonstrate that no such materials are left in-situ.

END OF REPORT

APPENDIX I LIMITATIONS



1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between ERGO and the Client as indicated in Section 1.2.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
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10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.



APPENDIX II GLOSSARY



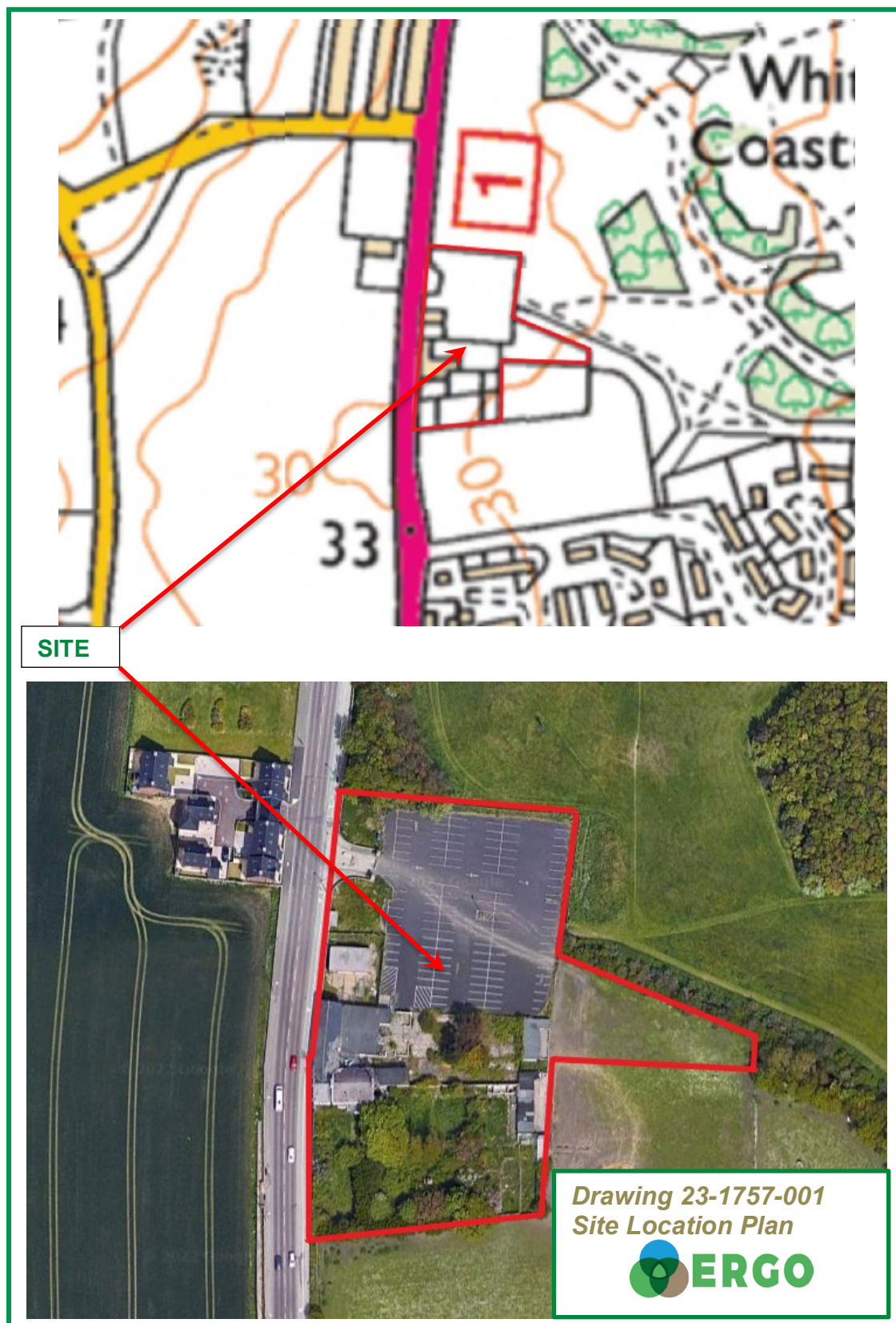
TERMS

AST	Above Ground Storage Tank	SGV	Soil Guideline Value
BGS	British Geological Survey	SPH	Separate Phase Hydrocarbon
BSI	British Standards Institute	TPH CWG	Total Petroleum Hydrocarbon (Criteria Working Group)
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes	SPT	Standard Penetration Test
CIEH	Chartered Institute of Environmental Health	SVOC	Semi Volatile Organic Compound
CIRIA	Construction Industry Research Association	UST	Underground Storage Tank
CLEA	Contaminated Land Exposure Assessment	VCCs	Vibro Concrete Columns
CSM	Conceptual Site Model	VOC	Volatile Organic Compound
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)	WTE	Water Table Elevation
DWS	Drinking Water Standard	m	Metres
EA	Environment Agency	km	Kilometres
EQS	Environmental Quality Standard	%	Percent
GAC	General Assessment Criteria	%v/v	Percent volume in air
GL	Ground Level	mb	Milli Bars (atmospheric pressure)
GSV	Gas Screening Value	l/hr	Litres per hour
HCV	Health Criteria Value	µg/l	Micrograms per Litre (parts per billion)
ICSM	Initial Conceptual Site Model	ppb	Parts Per Billion
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene)	mg/kg	Milligrams per kilogram (parts per million)
ND	Not Detected	ppm	Parts Per Million
LMRL	Lower Method Reporting Limit	mg/m³	Milligram per metre cubed
NR	Not Recorded	m bgl	Metres Below Ground Level
PAH	Polycyclic Aromatic Hydrocarbon	m bcl	Metre Below Cover Level
PCB	Poly-Chlorinated Biphenyl	mAOD	Metres Above Ordnance Datum (sea level)
PID	Photo Ionisation Detector	kN/m²	Kilo Newtons per metre squared
QA	Quality Assurance	µm	Micro metre
SGV	Soil Guideline Value		



APPENDIX III DRAWINGS





EXISTING TREES TO BE PRUNED
OR REMOVED WHERE REQUIRED

FACING EXISTING PROPERTIES

2.4 X 52M VISION SPLAYS

PROPOSED SIGN BOARD
LOCATIONS. REFER TO SIGN BOARD
DESIGNS FOR FURTHER DETAILS

3M SHARED ROUTE PROPOSED
TO LINK FROM MILL LANE TO THE
EAST FOOTPATH NETWORK

NEW VEHICULAR AND PEDESTRIAN
ACCESS - SEE SEPARATE DWG
FOR DETAILS

EXISTING ENTRANCE PILLARS TO
BE RETAINED AND RELOCATED AS
SHOWN

EXISTING BUS SHELTER TO BE
DEMOLISHED AND RE-LOCATED

DOUBLE FRONTED HOUSE TYPES
ALONG MILL LANE

PLOTS FRONTING ONTO MILL LANE
TO MAINTAIN BUILT FORM AND
FRONTAGE

EXISTING SUB STATION TO BE
DEMOLISHED AND NEW ONE
CONSTRUCTED - SIZE, ACCESS AND
MAINTENANCE TO BE CONFIRMED

FOOTPATH LINK THROUGH SOUTH

PLOTS SIDING ON TO MILL LANE TO
ALLOW VIEWS THROUGH THE SITE

BUS SHELTER RELOCATION.
CANTILEVER SHELTER WITH NO
SIDES TO AVOID THE FOOT/CYCLE
PATH. EXACT DETAILS/DESIGN TO
BE CONFIRMED

DOUBLE FRONTED SITE ENTRANCE

THILL
STONE MEWS

MILL LANE

MILL LANE

VIEWS FROM ENTRANCE
RETAINED THROUGH THE SITE

3M WIDE ADOPTABLE SHARED
ROUTE ACCESS TO EXISTING
WORN PATH

3M MAINTENANCE STRIP
REQUIRED TO SUDs, TREES
TO BE PRUNED

DUAL FRONTED FOR
SURVEILLANCE AND VIEWS
TO COAST

DETACHED PLOTS WITH SOUTH
FACING GARDENS

SUDs / OPEN
SPACE

NORTH

Key:

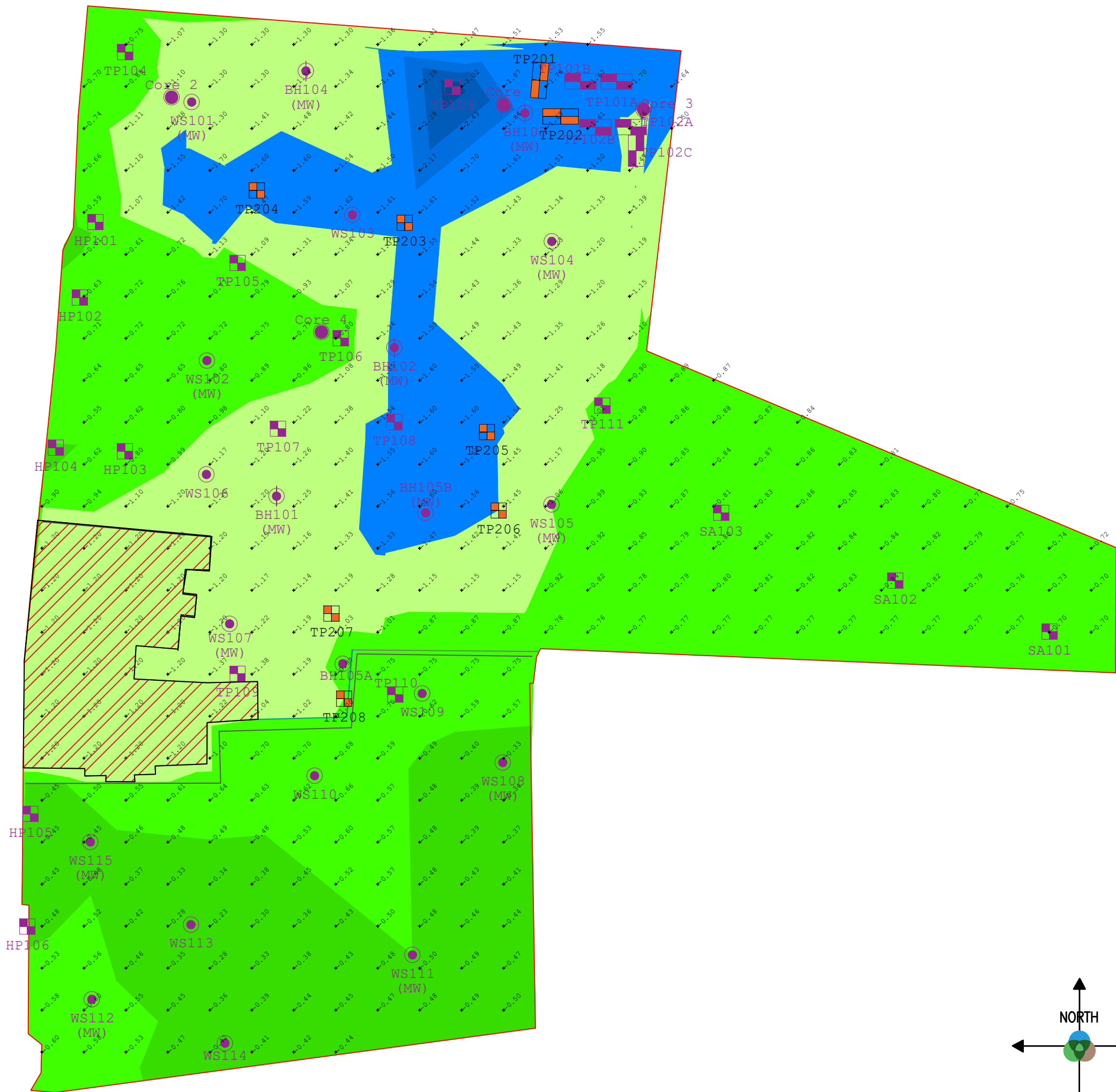
Notes:

Layout Updated	Rev B	21.12.2023	DRAFT	RB	JN
P1	Rev A	16.11.2023	DRAFT	RB	JN
Phase	Revision	Date	Issue	Drawn	Authorised
Client:			Job No:	Date:	
Lovell			23-1757	21.12.2023	
			Drawing No:	Scale:	
			002	NTS	
Job Title:			Drawing Title:		
Land at Whitburn Lodge			Proposed Development Plan		



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Key:

Location Symbols - Current Phase of Investigation

- TP201 Approximate Supplementary Trial Pit Location

Location Symbols - Previous Phases of Investigation

- WS101 Approximate Window Sample Probehole Location
- WS101 (MW) Approximate Window Sample Probehole Location with Install
- TP101 Approximate Trial Pit Location
- HP101 Approximate Hand Dug Pit Location
- BH101 Approximate Rotary Borehole Location
- BH101 (MW) Approximate Rotary Borehole Location with Install
- SA101 Approximate Soakaway Location
- Core 1 Approximate Hardstanding Core Location

Conjectured Made Ground Depth (m)

- Depth of Made Ground Between 0.00 - 0.49m
- Depth of Made Ground Between 0.50 - 0.99m
- Depth of Made Ground Between 1.00 - 1.49m
- Depth of Made Ground Between 1.50 - 1.99m
- Depth of Made Ground Between 2.00 - 2.49m
- Depth of Made Ground Between 2.50 - 2.99m
- Depth of Made Ground in Excess of 3.00m
- Existing Buildings - Depth of Made Ground to be Confirmed Following Demolition

Notes:

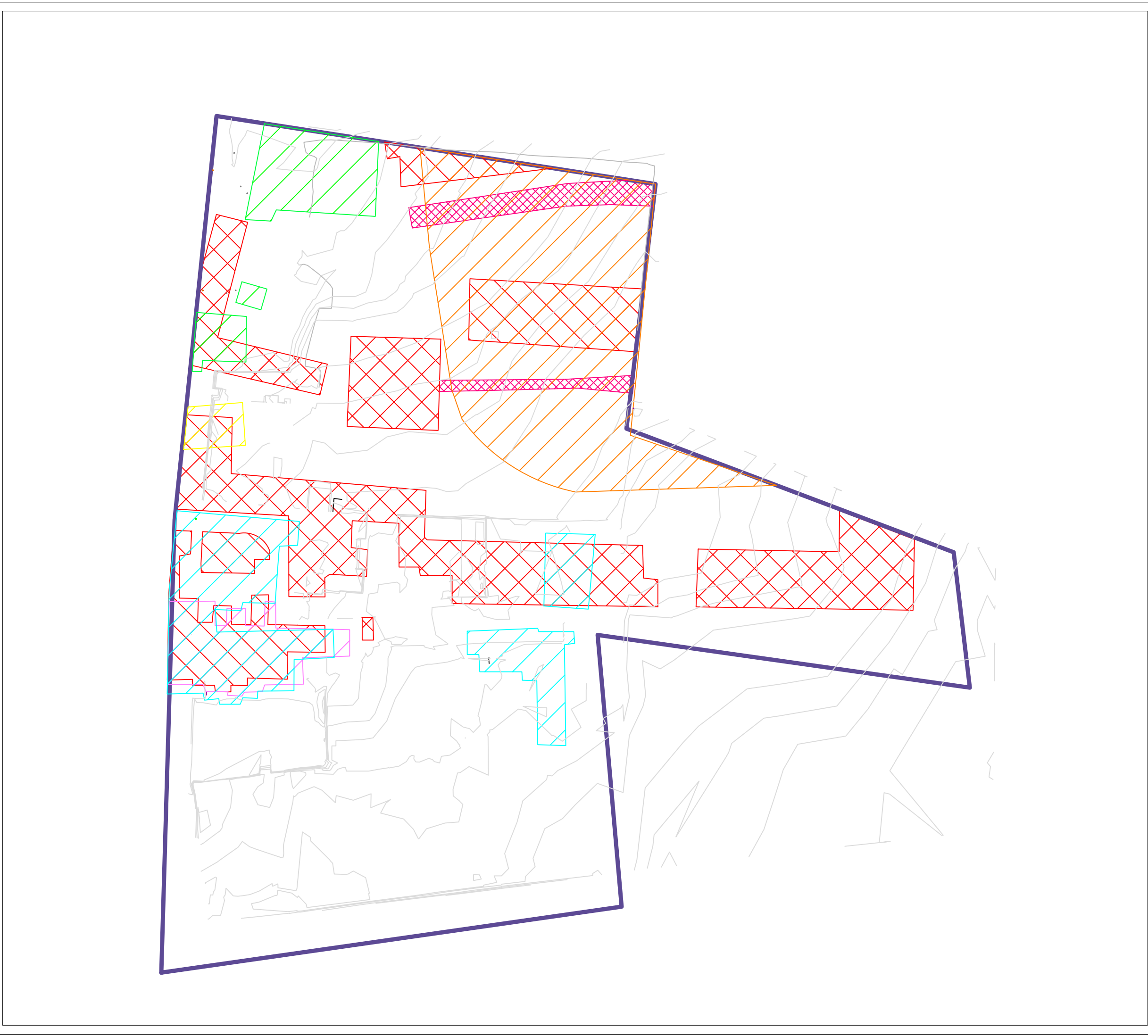
The conjectured depth mapping has been completed using 3D modelling software to produce indicative assessments that at this time are the most accurate interpretation of the Ground Investigation data. However, the conjectured nature of the model, limitations and areas of uncertainty between two proven points and the intermediary area result in uncertainties that should be considered by the reader of a drawing and incorporated in any subsequent assessment.

It should be noted that part of the site is covered by buildings and other areas were not accessible, the possibility of basements cannot be ruled out at this stage. Therefore deeper Made Ground is anticipated than the depth shown on the model in these areas and it is recommended that these drawings are revised following completion of post demolition investigation works.

P1	-	07.11.2023	DRAFT	AB	JN
Phase	Revision	Date	Issue	Drawn	Authorised
Client: Lovell			Job No: 23-1757	Date: 07.11.2023	
			Drawing No: 004	Scale: NTS	
Job Title: Land at Whitburn Lodge			Drawing Title: Conjectured Depth To Made Ground Plan		

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Key:

Historical Features

- Former Buildings (Pre 1896 - Pre 1983)
- Former Buildings (Pre 1942 - Pre 1983)
- Railway track (Pre 1896 - Pre 1959)
- Rail sidings (Pre 1942 - Pre 1983)
- Electrical Sub Station (Pre 1983 - Present)
- Former Buildings (Pre 1983 - Pre 1994)
- Current Buildings (Pre 1994 - Present)
- Site Boundary

Notes:

P1	-	20.11.2023	DRAFT	RB	JN
Phase	Revision	Date	Issue	Drawn	Authorised
Client:			Job No:	Date:	
Lovell			23-1757	20.11.2023	
			Drawing No:	Scale:	
			006	NTS	
Job Title:			Drawing Title:		
Whitburn Lodge			Historical Features Plan		



Key:

Location Symbols - Current Phase of Investigation

- TP201 Approximate Supplementary Trial Pit Location

Location Symbols - Previous Phases of Investigation

- WS101 Approximate Window Sample Probehole Location
- WS101 (MW) Approximate Window Sample Probehole Location with Install
- TP101 Approximate Trial Pit Location
- HP101 Approximate Hand Dug Pit Location
- BH101 Approximate Rotary Borehole Location
- BH101 (MW) Approximate Rotary Borehole Location with Install
- SA101 Approximate Soakaway Location
- Core 1 Approximate Hardstanding Core Location

Location of Identified Exceedances

- Location of Identified Heavy Metal Exceedance
- Location of Identified PAH (non-volatile) Exceedance
- Location of Identified Asbestos
- Location of Identified Naphthalene Exceedance

Notes:

P1	-	11.01.2024	DRAFT	AB	JN
Phase	Revision	Date	Issue	Drawn	Authorised
Client: Lovell			Job No: 23-1757	Date: 11.01.2024	
			Drawing No: 007	Scale: NTS	
Job Title: Whitburn Lodge			Drawing Title: Identified Exceedances Location Plan		

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**APPENDIX IV
ERGO REMEDIATION
&
VALIDATION CRITERIA**



Human Health Remediation Targets – Low Rise Residential End Use

Determinand	Units	Garden >600mm	Public Open Space >300mm	Pathway
Asbestos	%v/v	NFD	NFD	4
Arsenic	mg/kg	37	79	1
Cadmium	mg/kg	11	120	1
Chromium (III)	mg/kg	910	1500	1
Chromium (VI)	mg/kg	6	7.7	1
Lead	mg/kg	200	630	1
Inorganic Mercury	mg/kg	40	120	2
Nickel	mg/kg	130	230	1
Selenium	mg/kg	250	1100	1
Copper	mg/kg	2400	12000	1
Zinc	mg/kg	3700	81000	1
Naphthalene	mg/kg	2.3	4900	2
Acenaphthylene	mg/kg	170	15000	3
Acenaphthene	mg/kg	210	15000	1
Fluorene	mg/kg	170	9900	1
Phenanthrene	mg/kg	95	3100	3
Anthracene	mg/kg	2400	7400	3
Fluoranthene	mg/kg	280	3100	3
Pyrene	mg/kg	620	7400	3
Benzo(a)Anthracene	mg/kg	7.2	29	3
Chrysene	mg/kg	15	57	3
Benzo(b)Fluoranthene	mg/kg	2.6	7.1	3
Benzo(k)Fluoranthene	mg/kg	77	190	3
Benzo(a)Pyrene	mg/kg	2.2	5.7	3
Indeno(123-cd)Pyrene	mg/kg	27	82	3
Dibenzo(a,h)Anthracene	mg/kg	0.24	0.57	3
Benzo(ghi)Perylene	mg/kg	320	640	3
TPH C ₅ -C ₆ (aliphatic)	mg/kg	42	570000	2
TPH C ₆ -C ₈ (aliphatic)	mg/kg	100	600000	2
TPH C ₈ -C ₁₀ (aliphatic)	mg/kg	27	13000	2
TPH C ₁₀ -C ₁₂ (aliphatic)	mg/kg	130	13000	2
TPH C ₁₂ -C ₁₆ (aliphatic)	mg/kg	1100	13000	1
TPH C ₁₆ -C ₂₁ (aliphatic)	mg/kg	65000	250000	1
TPH C ₂₁ -C ₃₅ (aliphatic)	mg/kg			1
TPH C ₅ -C ₇ (aromatic)	mg/kg	70	56000	2
TPH C ₇ -C ₈ (aromatic)	mg/kg	130	56000	2
TPH C ₈ -C ₁₀ (aromatic)	mg/kg	34	5000	2
TPH C ₁₀ -C ₁₂ (aromatic)	mg/kg	74	5000	2
TPH C ₁₂ -C ₁₆ (aromatic)	mg/kg	140	5100	1
TPH C ₁₆ -C ₂₁ (aromatic)	mg/kg	260	3800	1
TPH C ₂₁ -C ₃₅ (aromatic)	mg/kg	1100	3800	1

Main Exposure Pathways: 1 = Soil Ingestion, 2 = Vapour Inhalation (indoor), 3 = Dermal Contact & Ingestion, 4 = Dust Inhalation.

Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; NA – Not Applicable (no exceedance of assessment criteria); Loc of MC = Location of Exceedances

Asbestos will be screened visually onsite by a qualified environmental consultant and where potential ACM is identified representative samples will be subject to quantitative analysis of %volume by weight. Should any ACM be identified within the soil matrices, further detailed quantitative assessment would be required when the reported laboratory result exceeds the limit of detection for the analytical method at 0.01% by volume (weight).



Remediation Targets – Comparison of Leachate Analysis with Tier 1 Screening Levels

DETERMINAND	UNITS	SCREENING VALUE
Arsenic	µg/l	50 ¹
Cadmium	µg/l	5 ²
Chromium	µg/l	2 ¹
Copper	µg/l	5 ^{1,3}
Total Cyanide	µg/l	1 ¹
Lead	µg/l	4 ¹
Mercury	µg/l	1 ²
Nickel	µg/l	50 ¹
Selenium	µg/l	100 ⁴
Zinc	µg/l	10 ⁵
pH	-	6-9
Naphthalene	µg/l	10 ¹
Benzo(a)pyrene	µg/l	0.05 ⁷
benzo[b/k]fluoranthene benzo[g,h,i]perylene & indeno(1,2,3-cd)pyrene	µg/l	0.10 ⁶
TPH C5-C6 (benzene)	µg/l	30 ¹
TPH C6-C8 (toluene)	µg/l	50 ¹
TPH C8-C10 (ethyl Benzene)	µg/l	20 ¹
TPH C10-C12 (xylene)	µg/l	30 ¹
TPH C12-C16 (naphthalene)	µg/l	10 ^{#1}
TPH C16-C35	µg/l	50 [#]
Notes		
#	Solubility <0.01µg/l	
1.	Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Dangerous Substances Directive) - List II substances	
2.	Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Dangerous Substances Directive) - List I substances	
3.	Surface Waters (River Ecosystem) (Classification) Regulations 1994	
4.	WHO Guidelines for Drinking Water Quality. Third edition (2004)	
5.	Council Directive on the quality of fresh waters needing protection or improvement in order to support fish life (Freshwater Fish Directive)	
6.	Council Directive on the quality of water intended for human consumption (Drinking Water Directive)	
7.	Directive establishing a framework for Community action in the field of water policy (Water Framework Directive)	



**APPENDIX V
ERGO REMEDIATION
MATERIAL IMPORT
CONTROL**



Material Import Quality Control Procedure

SITE OF IMPORTATION ADDRESS		ERGO UNIT 38B, NORTH TYNE INDUSTRIAL ESTATE, BENTON, NEWCASTLE UPON TYNE NE12 9SZ  ERGO 0191 389 6200
Client		
Main Contractor		
Earthworks Contractor		
Haulier		
Date of Planned Import		
Overview of Planned Material Import		
Material Source (site of origin) & Postcode		
Site Investigation report	<i>Report Title & Reference:</i> <i>Date:</i> <i>Information supplied by:</i>	
Reason for generation of excess material at site of origin		
Chemical Test Results for Stockpile at site of origin	<i>Date:</i> <i>Laboratory Certificate ref:</i> <i>Organisation responsible for stockpile sampling:</i>	
Geotechnical Material Classification & Testing	<i>Delete as appropriate:</i> Class 1 / Class 2 / Class 6 / Topsoil	
Pictures of Material Stockpile Pending Transportation	<i>Delete as appropriate:</i> Yes / No	
Person or organisation responsible for ensuring Quality Control at site of origin.		
Quantity of material to be imported (m3).		
Proposed area of deposition (site of re-use)		
Waste Exemption / Permit or CL:AIRE MMP	<i>Delete as appropriate:</i> U1 Standard Rules / CL:AIRE MMP (Direct Transfer) / Bespoke	

**APPENDIX VI
CONTRACTORS
COMPLETION
DOCUMENT**



0191 389 6200

info@ERGOenvironmental.com

Geotechnical Enabling Works Completion Form

Upon completion of all site remediation and enabling works, this form will be completed by ERGO in the presence of the appointed contractor to ensure that all pertinent geotechnical enabling works activities are complete or where a deviation from the specification has occurred, all future limitations and issues are documented for the clients record.

Activity	Complete			Signature (initial)
	Yes	No	N/A	
Eradication of all invasive plant species;				
Removal of all vegetation				
Removal of all root bulbs and root networks				
Stockpiling of topsoil and certification of suitability for re-use				
Stockpiling of subsoil and certification of suitability for re-use				
Stockpile all recycled aggregate with geotechnical and chemical validation testing.				
Removal of all relict foundations and infrastructure in their entirety				
Decommission of all redundant drainage infrastructure.				
Decommission of all former interceptors				
Decommission of all former above and below ground tanks				
Removal of all waste materials to a licensed facility				
Removal of all asbestos to a licensed facility				
Engineering of all plots for Shallow Spread Foundation in accordance with ERGO Geotechnical Specification.				
Engineering of all plots for VSC in accordance with ERGO Geotechnical Specification.				
Engineering of all plots for Pile Foundation in accordance with ERGO Geotechnical Specification.				
Engineering of all plots for Raft Foundation in accordance with ERGO Geotechnical Specification.				
Engineering of highways bulk upfill in accordance with ERGO Specification with compliant validation testing				
Engineering of highways sub-grade in accordance with ERGO Specification with compliant validation testing				
Engineering of highways capping in accordance with ERGO Specification with compliant validation testing				
Cut and fill the development site to clients required elevation with 'as built' survey.				





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Post Remediation & Enabling Limitations

All and every deviation from the approved specification for works should be documented by the Remediation & Enabling Works Contractor below:

